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VOLUME IV

WP-1483 – 1676

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. RAINBOW VALVE ENHANCEMENT PROJECT – MLV 5

A. Background and Summary

The Rainbow Valve Enhancement Project – MLV 5 consists of valve enhancements made to three existing mainline valves (MLVs) located in the City of Temecula. 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 1027, Line 1028, and Line 6900 in the event of a pipeline rupture. SoCalGas installed a new blowdown assembly and the necessary automation equipment at the site. The total loaded project cost is $1,998,077.

The Rainbow Valve Enhancement Project – MLV 5 construction site is within an existing SoCalGas facility located in an urban area next to a shopping plaza and a heavily trafficked intersection in the City of Temecula. There is an existing block wall enclosing the site. 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 three existing mainline valves and the Operating District funding the costs of the installation of the new blowdown assembly.

Table 1: General Project Information

Rainbow Valve Enhancement Project – MLV 5			
Location	City of Temecula		
Days on Site	84 days		
Construction Start	10/22/2018		
Construction Finish	03/07/2019		
Commissioning Date	09/12/2019		
Valve Upgrades			
Valve Number	1027-28.97-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	1028-28.97-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	6900-28.97-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	Existing – Utility		
Communication	Existing – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Wall	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,998,077		1,998,077
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Rainbow Valve Enhancement Project – MLV 5

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope for the Rainbow Valve Enhancement Project – MLV 5 in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified three MLVs 1027-28.97-0, 1028-28.97-0, and 6900-28.97-0 for automation to enable remote isolation to portions of Line 1027, Line 1028 and Line 6900. 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 MLVs 1027-28.97-0, 1028-28.97-0, and 6900-28.97-0 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 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 three MLVs, the installation of a new blowdown assembly[2], 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).

[2] The Operating District funded the installation of the new blowdown assembly.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1027	28.97	0	[redacted]	C/P	ASV/RCV
1028	28.97	0	[redacted]	C/P	ASV/RCV
6900	28.97	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Rainbow Valve Enhancement Project – MLV 5 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 located next to a shopping plaza near a large intersection. There is an existing block wall 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 had existing utility power.
5. Communication Technology: The site had existing communications equipment.

C. Engineering, Design, and Planning Factors

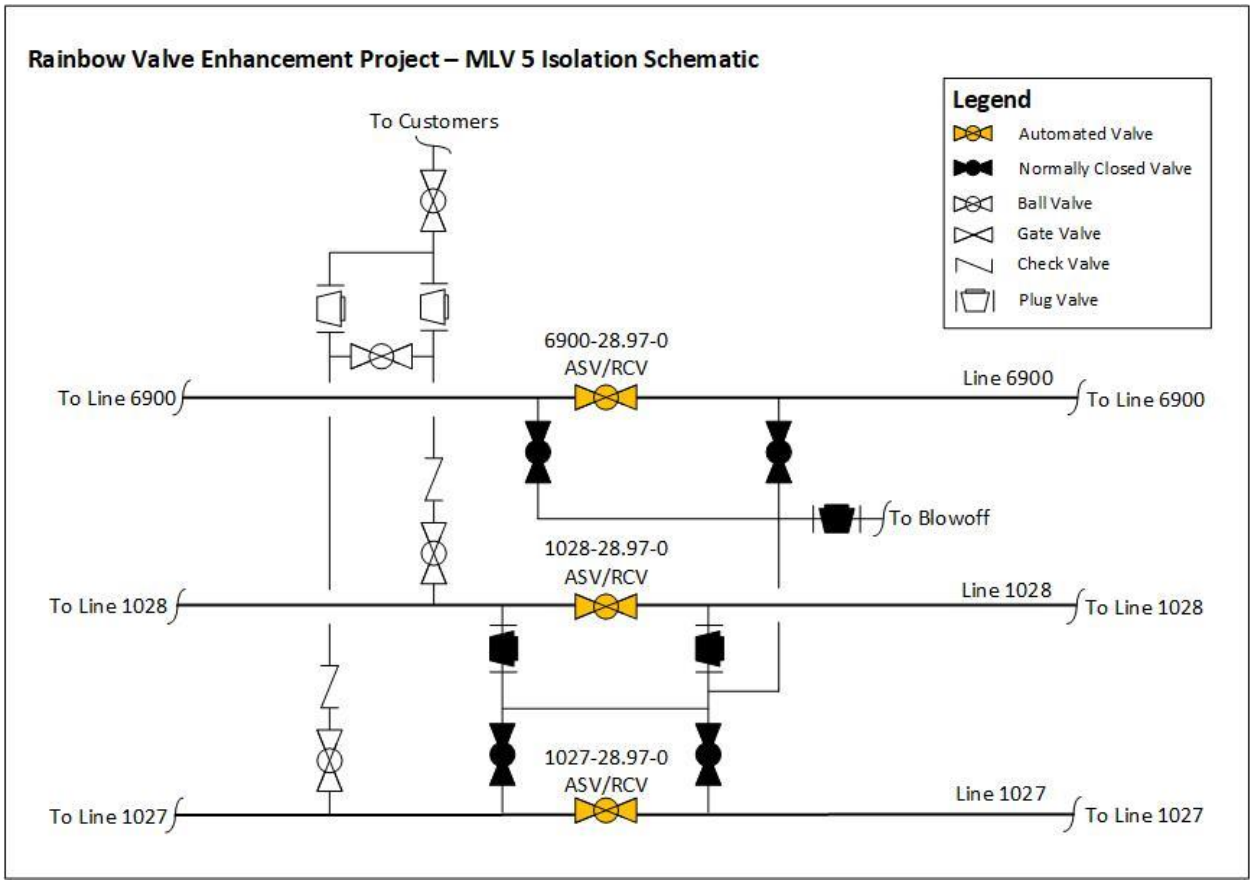
SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

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. 1027-28.97-0: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
   b. 1028-28.97-0: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
   c. 6900-28.97-0: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 1027-28.97-0: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.
   b. 1028-28.97-0: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.
   c. 6900-28.97-0: 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. The Project Team utilized the land outside of the existing facility for a laydown yard during construction.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering of these sites.
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.
9. Land Use: The Project Team obtained a temporary easement outside of the facility for a laydown yard during construction. The Project Team also utilized the same laydown and fabrication yard that was acquired for the Rainbow Check Valve Enhancement Project Bundle.

10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 2: Rainbow Valve Enhancement Project MLV 5 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 initially planned to install a new shelter at the site. After the finalization of the preliminary estimate, the Project Team determined that the existing facility did not have sufficient space for a shelter and the scope was updated to exclude the installation of the shelter.

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 represent PSEP activities 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	10/22/2018
Construction Completion Date	03/07/2019
Days on Site	84 days
Commissioning Date	09/12/2019

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 $136,000 in change orders.

Construction Schedule: The Project Team planned for a 41 day construction schedule. Due to a delay associated with the described Construction Change Order and a work restriction by SoCalGas on Lines 1027, 1028, and 6900, construction lasted a total of 84 days.

Field Design Change: The Project Team requested that the Mechanical Construction Contractor install six additional instrumentation lines that were not included in the construction Scope of Work.

Figure 3: New Blowdown Piping Prior to Installation

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 September 12, 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 utilized the same laydown and fabrication yard that was acquired for the Rainbow Check Valve Enhancement 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 $1,384,058. 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 $1,998,077.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	274,735	243,532	(31,203)
Materials	128,535	113,576	(14,959)
Mechanical Construction Contractor	468,821	519,991	51,170
Electrical Contractor	140,815	132,877	(7,938)
Construction Management & Support	39,603	186,610	147,007
Environmental	32,681	4,423	(28,258)
Engineering & Design	63,006	243,620	180,614
Project Management & Services	36,756	13,239	(23,517)
ROW & Permits	40,592	16,850	(23,742)
GMA	158,514	166,845	8,331
Total Direct Costs	**1,384,058**	**1,641,562**	**257,504**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	401,071	325,138	(75,933)
AFUDC	73,339	26,492	(46,847)
Property Taxes	18,817	4,884	(13,933)
Total Indirect Costs	**493,227**	**356,514**	**(136,713)**
Total Direct Costs	**1,384,058**	**1,641,562**	**257,504**
Total Loaded Costs	**1,877,285**	**1,998,077**	**120,792**

The Actual Full-Time Equivalent[5] (FTE) for this Project is 0.27.

[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 Rainbow Valve Enhancement Project – MLV 5, 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 $257,504. This variance can be attributed to several factors including: the construction duration was initially planned for 41 days, however due to project delays associated with changes during construction detailed in Section III. Part C the construction was extended to a total of 84 days; the project estimate assumed only one inspector would be required, however due to the utilization of separate fabrication yards and primary work areas, it was deemed that two to three inspectors were required on the project; 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 & Design.

V. CONCLUSION

SoCalGas enhanced the safety of their integrated natural gas system by prudently executing the Rainbow Valve Enhancement Project – MLV 5. Through this Valve Enhancement Project, SoCalGas successfully automated three MLVs to achieve the objective of enabling rapid system isolation to portions of Line 1027, Line 1028, and Line 6900 in the City of Temecula. The total loaded cost of the Project is $1,998,077.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives by installing the necessary automation equipment at the site. to enable rapid system isolation of a portion of Line 1027, Line 1028, and Line 6900 located in the City of Temecula.

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

End of Rainbow Valve Enhancement Project MLV 5 Final Report

I. SANTA BARBARA COUNTY VALVE ENHANCEMENT PROJECT – LIONS

A. Background and Summary

The Santa Barbara County Valve Enhancement Project – Lions consists of valve enhancements made to one existing mainline valve (MLV) located in the City of Carpinteria in Santa Barbara County. 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 1005 in the event of a pipeline rupture. SoCalGas installed new power equipment, new communication equipment, and the necessary automation equipment at the site. The total loaded project cost is $2,982,516.

The Santa Barbara Valve Enhancement Project – Lions construction site is located in a rural area on the west side of a residential driveway in the city of Carpinteria. The valve is located in an existing vault. SoCalGas bundled this valve project with two additional valve projects, Santa Barbara County Valve Enhancement Projects – Park Lane and Parsons, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Santa Barbara County Valve Enhancement Project – Lions.

Table 1: General Project Information

Santa Barbara County Valve Enhancement Project – Lions			
Location	Carpinteria		
Days on Site	67 days		
Construction Start	6/19/2018		
Construction Finish	9/27/2018		
Commissioning Date	05/07/2021		
Valve Upgrades			
Valve Number	1005-24.67-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Lions 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	2,982,516	0	2,982,516
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Santa Barbara County Valve Enhancement Project Bundle

Figure 2: Satellite Image of Santa Barbara County Valve Enhancement Project – Lions

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope Santa Barbara County Valve Enhancement Project – Lions in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[1] This conceptual scope identified 1005-24.67-0 for automation to enable remote isolation to a portion of Line 1005. 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 1005-24.67-0 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 enable rapid isolation, thereby achieving the Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team determined that additional communications equipment was necessary due to the location of the project site. The Project Team installed an additional radio antenna at a nearby location to facilitate communications with SoCalGas Gas Control.
4. Final Project Scope: The final project scope consists of the automation of one valve, that included the installation of new power equipment, new communication 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
1005	24.67	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Santa Barbara County Valve Enhancement Project – Lions 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:

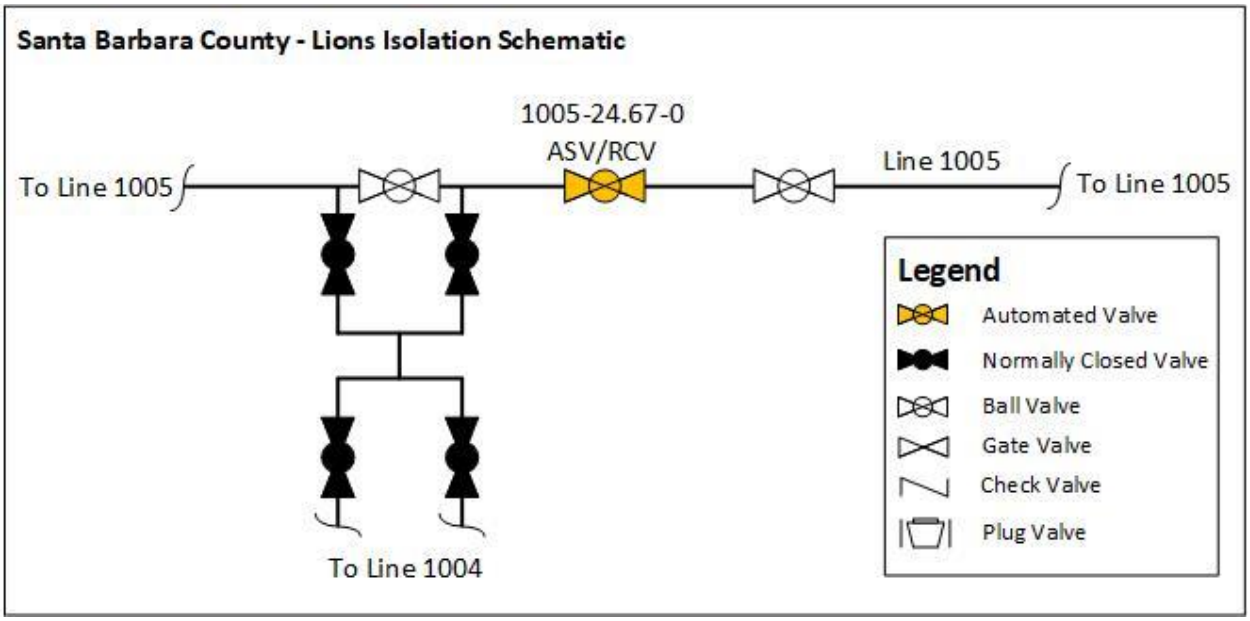
1. Site Description: The site located is in a rural area on the west side of a residential driveway in the city of Carpinteria. The valve is located in an existing vault.
2. Land Issues: During the site evaluation, the Project Team noted a temporary right of entry (TRE) would be necessary during construction and an additional permanent easement would be necessary for the new power and automation equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this valve for automation to satisfy PSEP Spacing Requirements.
4. Power Source: There was no preexisting power source at the site. 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 conducted survey activity 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.
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 closed a private driveway part-time during construction. The Project Team coordinated the closures with the driveway owners. The Project Team also reviewed the scope with the landowner prior to 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 obtained a Coastal Development Permit (CDP) from Santa Barbara County that required dust control, protection for local trees, and the presence of an onsite biologist during construction. The permits also required the Project Team to replace any protected trees where the excavations impacted 20% or more of the protected tree's critical root zone.
8. Permit Restrictions: In addition to the permit conditions described above, the CDP permit restricted the use of noise generating machinery to between 8:00 a.m. and 5:00 p.m. The permit also restricted the workdays to Monday through Thursday.
9. Land Use: The Project Team obtained a TRE to perform construction activities. The Project Team also obtained a new easement for the conduit and meter pedestal for the new utility power. The Project Team utilized a vacant lot nearby for a laydown yard.
10. Traffic Control: The Project Team closed a private driveway part-time during construction. The Project Team coordinated the closures with the driveway owners.

Figure 3: Santa Barbara County Valve Enhancement Project – Lions 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, 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	06/19/2018
Construction Completion Date	09/27/2018
Days on Site	67 days
Commissioning Date	05/07/2021

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 $200,000 in change orders.

1. Expanded Scope: The local electric utility requested that concrete stairs and a handrail be installed to allow for safe access to the new electric meter pedestal. The Project Team requested that the Mechanical Construction Contractor install the new stairs and handrail.

    a. The Project Team requested that the Mechanical Construction Contractor perform all concrete work, restoration work, and install a fence and fire suppression at the additional radio antenna site. This work was initially part of the Electrical Construction Contractor's scope. Due to the location of the site, the foundations were fabricated at a secondary yard in Ventura and transported to the construction site.

2. Schedule Delay: The new concrete stairs and handrail required a new building permit from Santa Barbara County and a revised CDP. The Project demobilized until the new permits were obtained.

3. Site Restoration: The CDP permit required that new trees be planted whenever excavation impacted 20% or more of the critical root zone of any protected tree. The Mechanical Construction Contractor planted 15 new Coastal Live Oaks per this requirement.

Figure 4: New Instrument Piping Exiting the Vault

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 7, 2021, 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 valve projects, Santa Barbara County Valve Enhancement Projects – Park Lane and Parsons, 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 $1,228,792. 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 $2,982,516.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	164,875	163,686	(1,189)
Materials	70,896	78,363	7,467
Mechanical Construction Contractor	348,095	545,409	197,314
Electrical Contractor	129,606	122,724	(6,882)
Construction Management & Support	87,234	168,137	80,903
Environmental	51,060	193,339	142,279
Engineering & Design	114,741	523,727	408,986
Project Management & Services	122,954	161,764	38,810
ROW & Permits	14,455	229,636	215,181
GMA	124,876	209,826	84,950
Total Direct Costs	**1,228,792**	**2,396,609**	**1,167,817**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	579,904	331,473	(248,431)
AFUDC	230,526	220,660	(9,866)
Property Taxes	53,877	33,774	(20,103)
Total Indirect Costs	**864,307**	**585,907**	**(278,400)**
Total Direct Costs	**1,228,792**	**2,396,609**	**1,167,817**
Total Loaded Costs	**2,093,099**	**2,982,516**	**889,417**

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

The Actual Full-Time Equivalents[4] (FTEs) for this Project are 0.54.

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 Santa Barbara County Valve Enhancement Project – Lions, Actual Direct Costs exceeded the preliminary estimate by $1,167,817. This variance is attributable to a variety of factors including:

1. Mechanical Construction Contractor: Activities to address or mitigate conditions encountered during construction are detailed in Section III. Part C resulted in approximately $200,000 in change orders.
2. Construction Management & Support: The local electric utility requested that concrete stairs and a handrail be installed to allow for safe access to the new electric meter pedestal. Permitting delays for these additions caused construction to be delayed by

[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.

approximately 20 days. Support was required for the additional duration of construction, resulting in an approximate price increase of $90,000.

3. Environmental:
   a. Additional Santa Barbara County permitting requirements included the planting of 15 trees during site restoration. SoCalGas was also required to provide two years of environmental oversight and ongoing tree maintenance which resulted in additional permitting and environmental contractor costs of approximately $94,000.
   b. Extra activities were necessary when working with Santa Barbara County, such as additional environmental reviews, meetings, and site visits, resulting in increased total environmental costs.
4. Engineering & Design:
   a. The Project Team required additional project and engineering support to obtain permits from Santa Barbara County, including the creation of additional drawings for concrete stair installation, grading and erosion plans, and tree replacement plans. These updates resulted in an increase of total costs by approximately $40,000.
   b. The Engineering and Design firms completed activities originally identified as Project Management & Services in the initial estimate while actual costs of approximately $42,000 were recognized under Engineering and Design.
5. Project Management & Services: The engineering firm provided Project Management & Services activities which were originally estimated under Project Management & Services, but approximately $42,000 of these costs were recognized in Engineering & Design.
6. Land & ROW:
   a. At the request of a landowner, the alignment of the electrical conduit was changed to the opposite side of a private road. To complete installation, the Project Team acquired additional easements for the electrical equipment installation at a cost of approximately $134,000.

b. The Project Team determined during detailed design that additional permits and permit acquisition costs were required for working in Santa Barbara County, which resulted in an approximate increased cost of $109,000.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Santa Barbara Valve Enhancement Project – Lions. 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 1005 in Santa Barbara County. The total loaded cost of the Project is $2,982,516.

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 to capture efficiencies, and installing the equipment necessary to bring power and communications capabilities to the site to enable rapid system isolation of a portion of Line 1005 located in Carpinteria.

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 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 Santa Barbara County Valve Enhancement Project – Lions Final Report

I. SPENCE STATION VALVE ENHANCEMENT PROJECT

A. Background and Summary

The Spence Station Valve Enhancement Project Spence Station consists of valve enhancements made to one existing mainline valve (MLV) located in the City of Los Angeles. 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 765 in the event of a pipeline rupture. SoCalGas installed a new actuator, a new flowmeter, a new vault to house the flowmeter, and the necessary automation equipment. The total loaded project cost is $1,703,834.

The Spence Station Valve Enhancement Project construction site is within an existing SoCalGas facility in an industrial area in the City of Los Angeles. All work was done within the station where there was sufficient space for a laydown yard.

Table 1: General Project Information

Spence Station Valve Enhancement Project			
Location	Los Angeles		
Days on Site	36 days		
Construction Start	12/14/2017		
Construction Finish	03/15/2018		
Commissioning Date	09/04/2019		
Valve Upgrades			
Valve Number	765-12.36-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	2000-222.71-FM		
Valve Type	Flow Meter		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Spence Station Site Upgrades			
Vault	New		
Power	Existing – Utility		
Communication	Existing – Radio		
SCADA Panel	New		
Equipment Shelter	Existing		
Fencing/Wall	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,703,834	-	1,703,834
Disallowed Costs	-	-	-

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope for the Spence Station Valve Enhancement Project in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[1] This conceptual scope identified valves 765-12.36-0, 765-12.36-1 and 765-12.36-2 for automation to enable remote isolation to a portion of Line 765. 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 identified an additional valve for enhancement to provide the planned isolation. SoCalGas also identified this location as one of the candidates for flowmeter installation. Prior to TIC, the Project Team descoped valves 765-12.36-1 and 765-12.36-2 from the project scope. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E identified valves 765-12.36-0, 765-12.36-1, and 765-12.36-2 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 alone not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas reevaluated the isolation points at valves 765-12.36-0, 765-12.36-1, and 765-12.36-2 and determined that the automation of valve 765-12.36-4 would better achieve the objectives set forth in the Valve Enhancement Plan. SoCalGas also determined that this is an ideal location for the installation of a flow meter, thereby achieving Valve Enhancement Plan objectives.

[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).

3. Engineering, Design, and Constructability:
   a. The Project Team determined that valve 765-12.36-1 is normally closed and did not require automation to achieve Valve Enhancement Plan objectives.
   b. The Project Team determined that valve 765-12.36-2 had existing automation capabilities and did not require automation to achieve Valve Enhancement Plan objectives.
   c. The Project Team determined that the automation of valve 765-12.36-4 was not necessary to achieve Valve Enhancement Plan objectives.
4. Final Project Scope: The final project scope consists of the automation of one MLV, that included the installation of one new actuator, the installation of one flowmeter, the installation of one new vault to house the flowmeter, and the installation of the necessary automation equipment.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
765	12.36	0	[redacted]	A/AG	ASV/RCV
2000	222.71	FM	[redacted]	FM	FLOWMETER

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Spence 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 industrial area north in the City of Los Angeles.
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 3 location.
4. Power Source: The project site had existing utility power.
5. Communication Technology: The project site had radio communications.

C. Engineering, Design, and Planning Factors

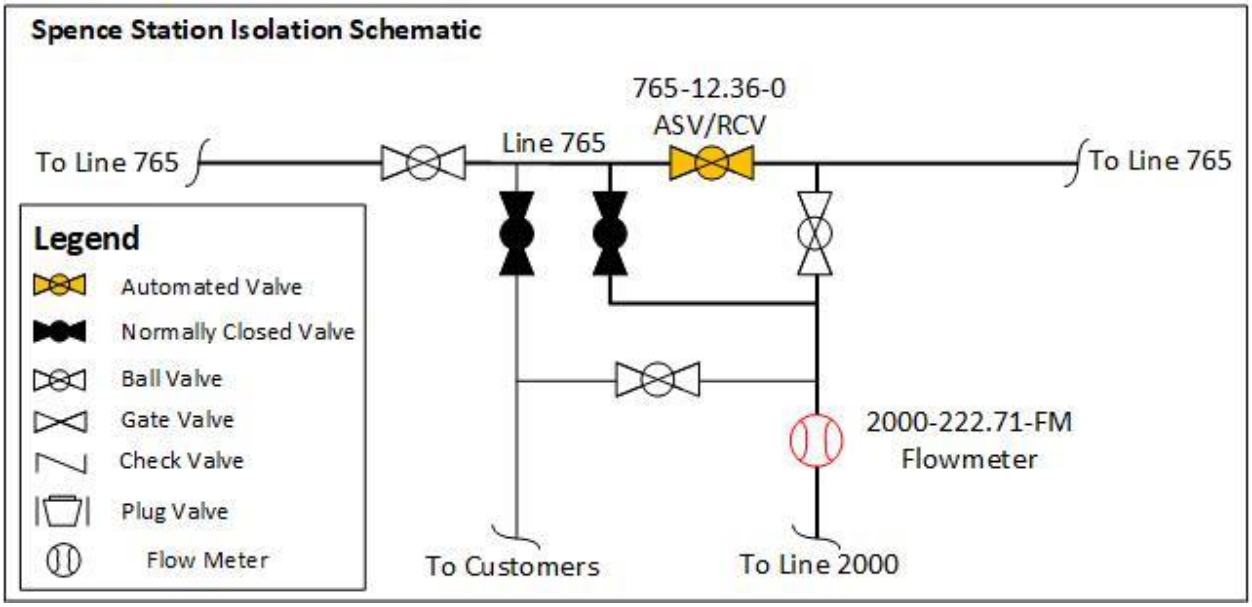
SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the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

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station could accommodate the new equipment.
2. Valve Details: The existing valve was a manually operated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details: 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.
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 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.

9. Land Use: The Project Team performed all work withing the existing SoCalGas facility.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Final Report for Spence Station Valve Enhancement Project

Figure 1: Spence Station Valve Enhancement Project Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that a change 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. A notable change in scope was made after the preliminary cost estimate was developed and approved. The Project Team determined that valve 765-12.36-4 did not require automation to achieve Valve Enhancement Plan objectives.

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	12/14/2017
Construction Completion Date	03/15/2018
Days on Site	36 days
Commissioning Date	09/04/2019

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 2: New Main Line Valve Actuator

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 4, 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 performed the work within a company 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 $1,525,219. 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 $1,703,834.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	317,827	180,404	(137,423)
Materials	173,400	169,015	(4,385)
Mechanical Construction Contractor	502,197	369,002	(133,195)
Electrical Contractor	113,043	127,332	14,289
Construction Management & Support	65,486	112,426	46,940
Environmental	67,163	19,413	(47,750)
Engineering & Design	72,078	132,868	60,790
Project Management & Services	55,634	19,608	(36,026)
ROW & Permits	0	436	436
GMA	158,391	178,750	20,359
Total Direct Costs	**1,525,219**	**1,309,252**	**(215,967)**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	357,274	249,487	(107,787)
AFUDC	84,073	126,370	42,297
Property Taxes	19,695	18,725	(970)
Total Indirect Costs	**461,042**	**394,582**	**(66,460)**
Total Direct Costs	**1,525,219**	**1,309,252**	**(215,967)**
Total Loaded Costs	**1,986,261**	**1,703,834**	**(282,427)**

The Actual Full-Time Equivalents[4] (FTEs) for this Project are 0.46.

[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 Spence 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 $215,967. This variance can be attributed to several factors including: During project initiation, SoCalGas reevaluated the isolation points at valves 765-12.36-0, 765-12.36-1, and 765-12.36-2 and determined that the automation of valve 765-12.36-4 would better achieve the objectives set forth in the Valve Enhancement Plan which reduced the costs for various construction activities; the project estimate took a conservative approach to address potential environmental activities required due to the age of the station, which was not as extensive as anticipated resulting in reduced environmental costs; 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.

V. CONCLUSION

SoCalGas enhanced the safety of their integrated natural gas system by prudently executing the Spence Station Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve on Line 765 and installed a flowmeter on Line 2000 to achieve the objective of enabling rapid system isolation to a portion of Line 765 in the City of Los Angeles. The total loaded cost of the Project is $1,703,834.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, installing the necessary automation equipment, and installing equipment necessary to bring communication capabilities to the site to enable rapid system isolation of a portion of Line 765 located in the urban area north of the Los Angeles River 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 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 Spence Station Valve Enhancement Project Final Report

I. TAFT VALVE ENHANCEMENT PROJECT – 7TH STANDARD

A. Background and Summary

The Taft Valve Enhancement Project – 7th Standard site consists of valve enhancements made to an existing mainline valve (MLV) located in Kern 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 7039 in the event of a pipeline rupture. SoCalGas installed a new actuator, new fencing, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,356,740.

The Taft Valve Enhancement Project – 7th Standard construction site is within an existing SoCalGas facility in an open area next to an irrigation canal. There are multiple industrial facilities nearby. SoCalGas bundled this valve project with three additional valve projects, Taft Valve Enhancement Projects – Buttonwillow; Hageman and Renfro; and Sycamore Road, into a single valve bundle to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Line 225 Valve Enhancement Project – 7th Standard site.

Table 1: General Project Information

Taft Valve Enhancement Project – 7th Standard			
Location	Kern County		
Days on Site	37 days		
Construction Start	09/11/2017		
Construction Finish	11/29/2017		
Commissioning Date	08/22/2018		
Valve Upgrades			
Valve Number	7039-11.49-0		
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	New		
Fencing	New		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,356,740	0	1,356,740
Disallowed Costs	0	0	0

B. Maps and Images

Figure 1: Taft Bundle Overview

Figure 2: Satellite Image of Taft Valve Enhancement Project – 7th Standard

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Taft Valve Enhancement Project – 7th Standard in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 7039-11.49-0 for automation to enable remote isolation to a portion of Line 7039. 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 MLV 7039-11.49-0 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 achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: The Project Team initially planned to install a new actuator in a new vault. During the site evaluation, the Project Team determined that the new actuator could be installed above grade and the new vault was not necessary.
4. Final Project Scope: The final project scope consists of the automation of one MLV that included the installation of a new actuator, 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 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
7039	11.49	0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Taft Valve Enhancement Project – 7th Standard 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:

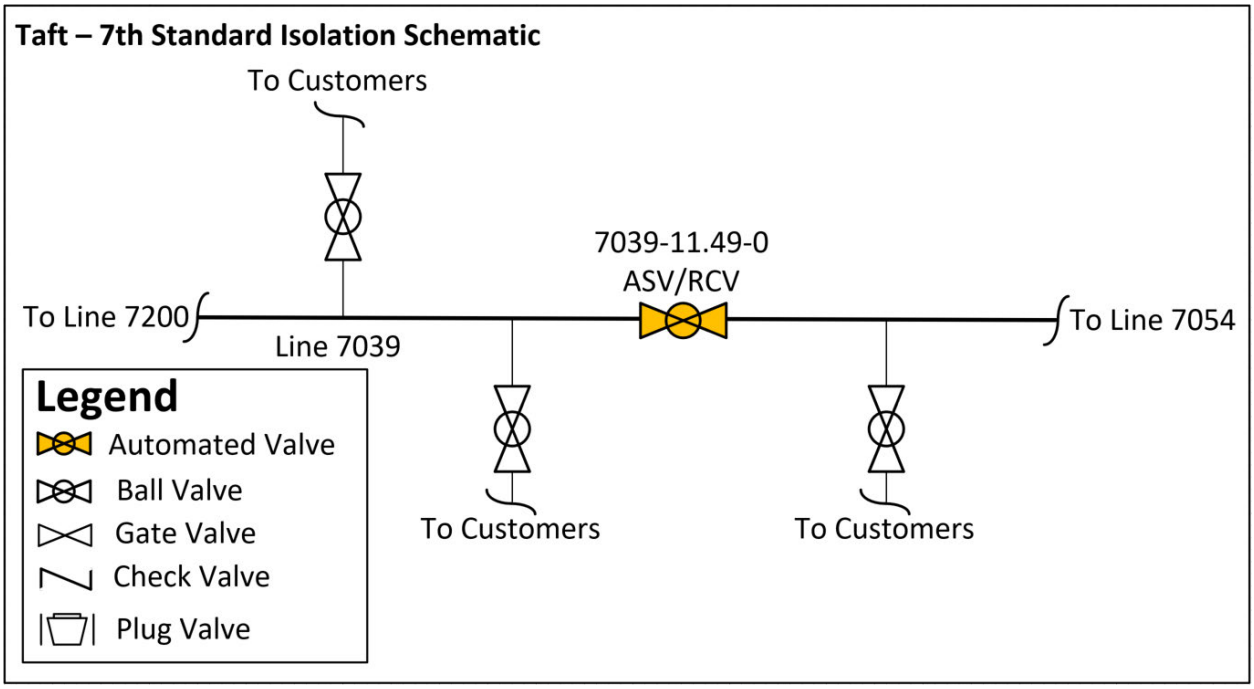
1. Site Description: The site is an existing SoCalGas facility in an open area next to an irrigation canal. There are multiple industrial facilities nearby.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing stations would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power 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 operated Class 600 ball, which was reused by the Project Team.
3. Actuator Details: There was no preexisting actuator 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 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.
9. Land Use: The Project Team entered into a license agreement with the North Kern Water Storage District for the land necessary to expand the existing facility. The Project Team also obtained a Temporary Right of Entry for the duration of construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Taft Valve Enhancement Project – 7th Standard 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. A notable change in scope was made after the preliminary cost estimate was developed and approved. The Project Team initially planned to install a ground grid at the new station. After the creation of the Stage 3 Estimate, the Project Team determined that the ground grid was not necessary.

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	09/11/2017
Construction Completion Date	11/29/2017
Days on Site	37 days
Commissioning Date	08/22/2018

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: Setup for Instrument Piping Pressure Test

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 22, 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. The Project Team bundled this project with the Taft Valve Enhancement Projects – Buttonwillow, Hageman and Renfro, and Sycamore Road, 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 $1,483,999. 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 $1,356,740.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	189,750	69,844	(119,906)
Materials	138,133	83,115	(55,018)
Mechanical Construction Contractor	394,123	271,273	(122,850)
Electrical Contractor	172,628	109,336	(63,292)
Construction Management & Support	71,170	111,115	39,945
Environmental	63,635	66,820	3,185
Engineering & Design	178,648	232,529	53,881
Project Management & Services	132,753	45,582	(87,171)
ROW & Permits	8,250	23,193	14,943
GMA	134,909	142,090	7,181
Total Direct Costs	**1,483,999**	**1,154,898**	**(329,101)**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	221,978	139,299	(82,679)
AFUDC	102,974	54,192	(48,782)
Property Taxes	24,566	8,350	(16,216)
Total Indirect Costs	**349,518**	**201,842**	**(147,676)**
Total Direct Costs	**1,483,999**	**1,154,898**	**(329,101)**
Total Loaded Costs	**1,833,519**	**1,356,740**	**(476,779)**

The Actual Full-Time Equivalent[4] (FTE) for this Project are 0.52.

[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 Taft Valve Enhancement Project - 7th Standard, Actual Direct Costs were less than the preliminary estimate by $329,103. This variance is attributable to a variety of factors including: SoCalGas bundled this valve project with three additional valve projects to gain efficiencies in engineering, planning, and construction activities; The Project Team initially planned to install a ground grid at the new station. During detailed design it was that the ground grid was not required; construction was estimated to be completed in approximately 60 days, but the actual construction length was 37 days, resulting in lowered construction costs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Taft Valve Enhancement Project - 7th Standard. 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 7039 located within Kern County. The total loaded cost of the Project is $1,356,740.

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 construction planning, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation to a portion of Line 7039 located within Kern 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 Taft Valve Enhancement Project – 7th Standard Final Report

I. TAFT VALVE ENHANCEMENT PROJECT – BUTTONWILLOW

A. Background and Summary

The Taft Valve Enhancement Project – Buttonwillow consists of valve enhancements made to one existing mainline valve (MLV) located in the unincorporated community of Buttonwillow within Kern 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 293 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 $1,419,326.

The Taft Valve Enhancement Project – Buttonwillow construction site is within an existing SoCalGas facility on Highway 58 in a farmland area. SoCalGas bundled this valve project with three additional valve projects, the Taft Valve Enhancement Projects – 7th Standard, Hageman and Renfro, and Sycamore Road, into a single valve bundle to gain efficiencies in engineering, planning, and construction activities. The Project Team tracked the projects separately to more effectively track cost and streamline project closeout for individual sites. This workpaper describes the construction activities and costs of the Taft Valve Enhancement Project – Buttonwillow.

Final Report for Taft Valve Enhancement Project - Buttonwillow

Table 1: General Project Information

Taft Valve Enhancement Project - Buttonwillow			
Location	Buttonwillow		
Days on Site	46 days		
Construction Start	04/03/2017		
Construction Finish	07/06/2017		
Commissioning Date	03/28/2018		
Valve Upgrades			
Valve Number	293-8.23-0		
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	Yes		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,419,326	0	1,419,326
Disallowed Costs	0	0	0

B. Maps and Images

Figure 1: Taft Bundle Overview

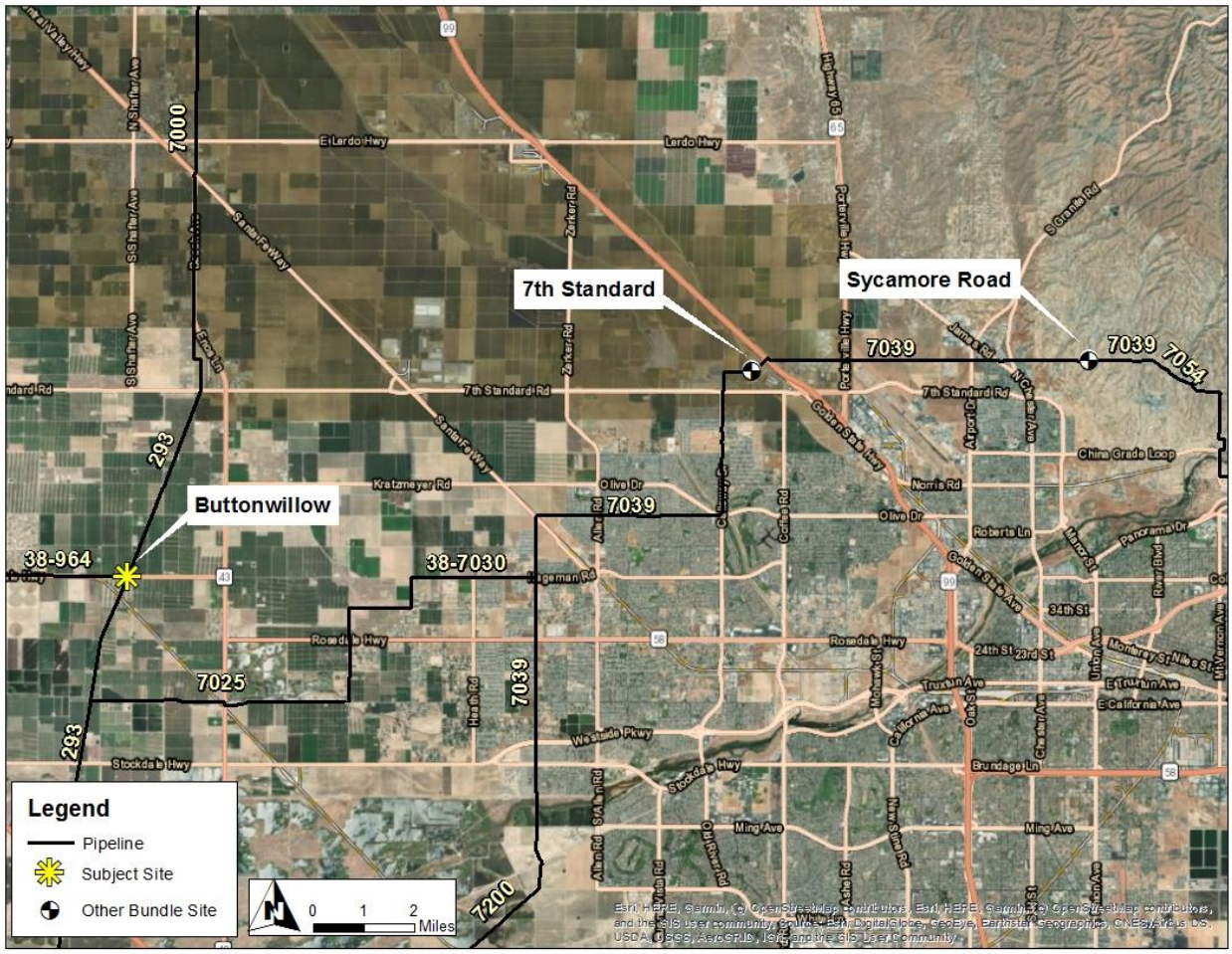


Figure 2: Satellite Image of Taft Valve Enhancement Project - Buttonwillow

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Taft Valve Enhancement Project – Buttonwillow in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 293-8.23-0, for automation to enable remote isolation to a portion of Line 293. 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 MLVs 293-8.23-0 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 MLV, that includes the installation of one new actuator, the installation of new fencing, the installation of power equipment, the installation of 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
293	8.23	0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Taft Valve Enhancement Project – Buttonwillow 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:

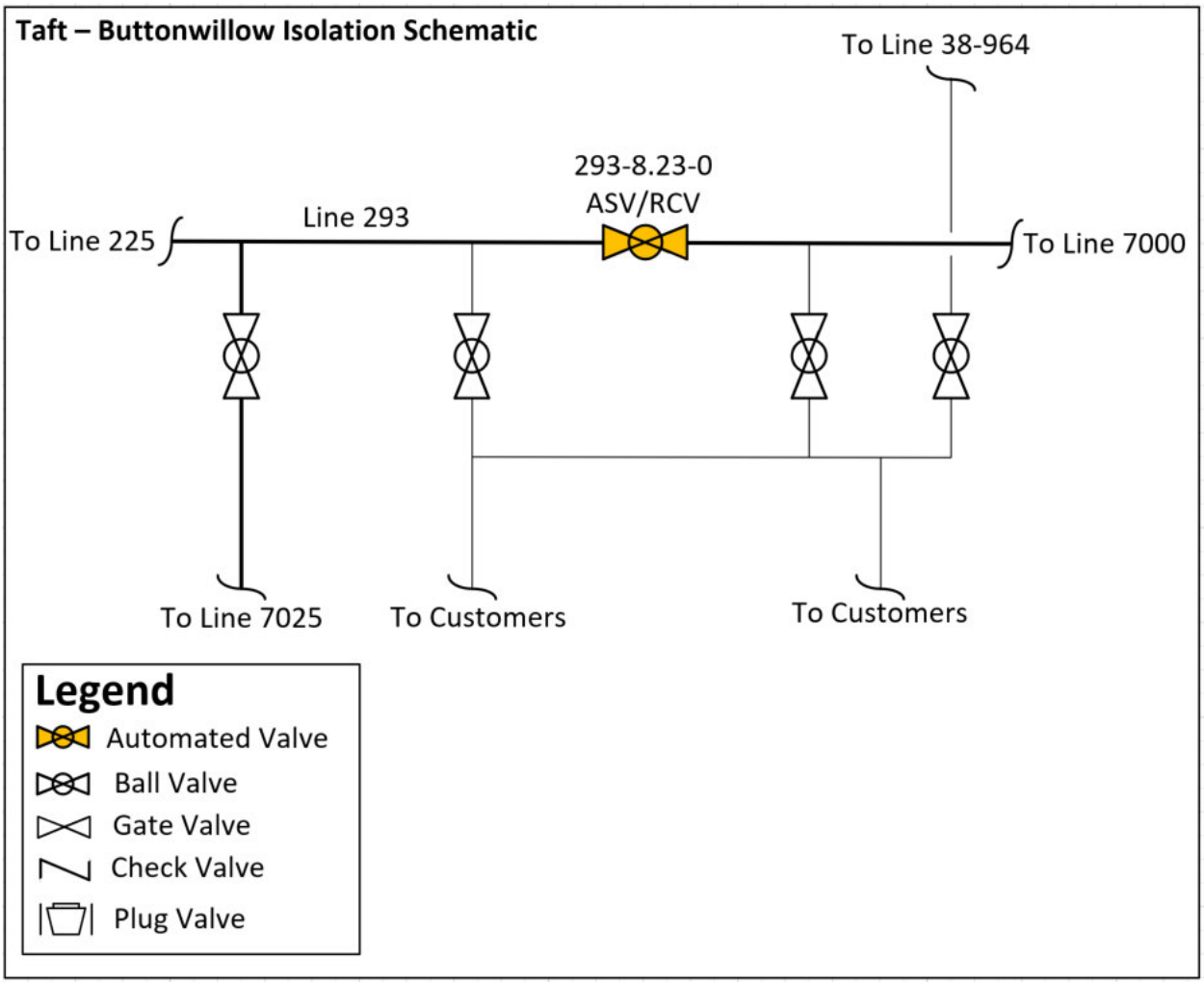
1. Site Description: The site is located in a fenced in station north of Highway 58 in a farmland area.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation to satisfy the objectives of the PSEP Valve Enhancement Plan.
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 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 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 new easement for the expansion of the existing SoCalGas facility. The Project Team also obtained a Temporary Right of Entry for construction. The Project Team utilized the area around the facility as a laydown yard.
10. Traffic Control: The Project Team placed cones along Highway 58 during construction.

Figure 3: Taft Valve Enhancement Project – Buttonwillow 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	04/03/2017
Construction Completion Date	07/06/2017
Days on Site	46 days
Commissioning Date	03/28/2018

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

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $36,000 in change orders.

1. Extended Scope: The Project Team expanded a portion of the station to accommodate the necessary communications equipment. The new portion of fencing was higher than the remaining portions. The Project Team replaced the existing fencing so that the station fencing was uniform and improved the station's security.
2. Field Design Change: The Project Team installed solar power rather than connecting to the local utility after the utility informed the Project Team that the existing pole could not accommodate the new power equipment and required siting the new pole on the opposite side of the highway. To avoid the costs of permitting, trenching, and boring under the highway, the Project Team chose the more cost efficient option of solar power.

Figure 4: Excavation Around Valve Assembly and New Actuator

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 March 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 known site conditions in the project plan and design.

1. Project Design: The Project Team altered the project design to utilize solar power instead of utility power. Installing utility power would have resulted in increased permitting costs as well as project delays.
2. Bundling of Projects: The Project Team bundled this project with the Taft Valve Enhancement Projects – 7th Standard, Hageman and Renfro, and Sycamore Road, 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 $1,441,658. 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 $1,419,326.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	189,750	73,138	(116,612)
Materials	115,423	94,046	(21,377)
Mechanical Construction Contractor	455,509	321,778	(133,731)
Electrical Contractor	119,800	107,153	(12,647)
Construction Management & Support	71,170	104,110	32,940
Environmental	41,635	79,121	37,486
Engineering & Design	178,507	255,612	77,105
Project Management & Services	132,753	39,327	(93,426)
ROW & Permits	6,050	17,265	11,215
GMA	131,060	141,984	10,924
Total Direct Costs	**1,441,658**	**1,233,534**	**(208,124)**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	220,956	115,623	(105,333)
AFUDC	67,513	61,793	(5,720)
Property Taxes	15,961	8,375	(7,586)
Total Indirect Costs	**304,430**	**185,792**	**(118,638)**
Total Direct Costs	**1,441,658**	**1,233,534**	**(208,123)**
Total Loaded Costs	**1,746,088**	**1,419,326**	**(326,762)**

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

The Actual Full-Time Equivalents[4] (FTEs) for this Project are 0.43.

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 Taft Valve Enhancement Project – Buttonwillow, 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 $208,124. This variance can be attributed to several 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 [redacted] the construction estimate to [redacted]. The initial project estimate included costs associated with adding utility power for the valve station which was later evaluated and redesigned with a solar panel electrical system to mitigate project costs during

[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.

construction; 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.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Taft Valve Enhancement Project – Buttonwillow site. Through this Valve Enhancement Project, SoCalGas successfully automated one existing mainline valve to achieve the objective of enabling rapid system isolation of a portion of Line 293 located in the unincorporated community of Buttonwillow within Kern County. The total loaded cost of the Project is $1,419,326.

SoCalGas executed this project prudently through: designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling four geography 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 to a portion of Line 293 located in the unincorporated community of Buttonwillow within Kern County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by installing solar power at the project site instead of utility power reducing overall project costs, by limiting the number of mobilizations by carefully planning and coordinating construction activity, and by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts.

End of Taft Valve Enhancement Project – Buttonwillow Final Report

I. TAFT VALVE ENHANCEMENT PROJECT - HAGEMAN AND RENFRO

A. Background and Summary

The Taft Valve Enhancement Project - Hageman and Renfro consists of valve enhancements made to two new mainline valves (MLVs) located in the City of Bakersfield within Kern 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 7039 and Supply Line 38-7030 in the event of a pipeline rupture. SoCalGas removed one MLV, installed two new valves, two new actuators, two new vaults to house the actuators, new power equipment, new communications equipment, and the necessary automation equipment at the sites. The total loaded project cost is $8,150,072.

The Taft Valve Enhancement Project - Hageman and Renfro Project consists of two construction sites. The first construction site, MLV 38-7030-1 is located on Hageman Road in the City of Bakersfield. The second construction site, MLV 7039-5.14-0 is located on Renfro Road in the City of Bakersfield approximately half a mile north of the first site. Both sites are located in residential areas with the MLV 7039-5.14-0 site adjacent to an agricultural field. SoCalGas bundled these two sites into one into a single valve bundle to gain efficiencies in engineering, planning and construction activities.

Table 1: General Project Information

Taft Valve Enhancement Project - Hageman and Renfro			
Location	City of Bakersfield		
Days on Site	88 days		
Construction Start	11/09/2018		
Construction Finish	04/25/2019		
Commissioning Date	10/17/2019		
Valve Upgrades			
Valve Number	38-7030-1		
Valve Type	New – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Below-Grade		
ASV	No		
RCV	Yes		
Valve Number	7039-5.14-0		
Valve Type	New – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	New – Two		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	8,150,072	-	8,150,072
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Taft Valve Enhancement Project - Hageman and Renfro

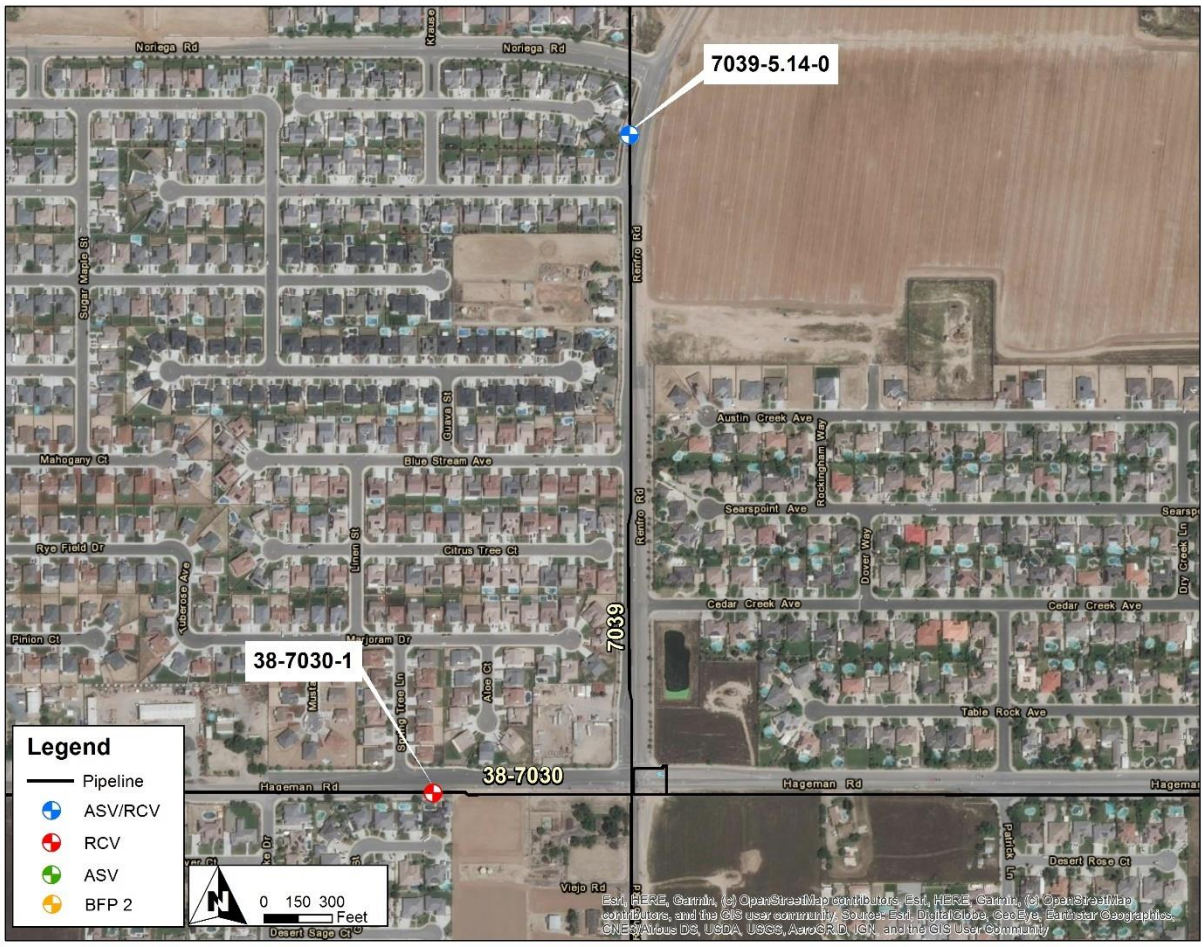


Figure 2: Satellite Image of Taft Valve Enhancement Project - Hageman Road

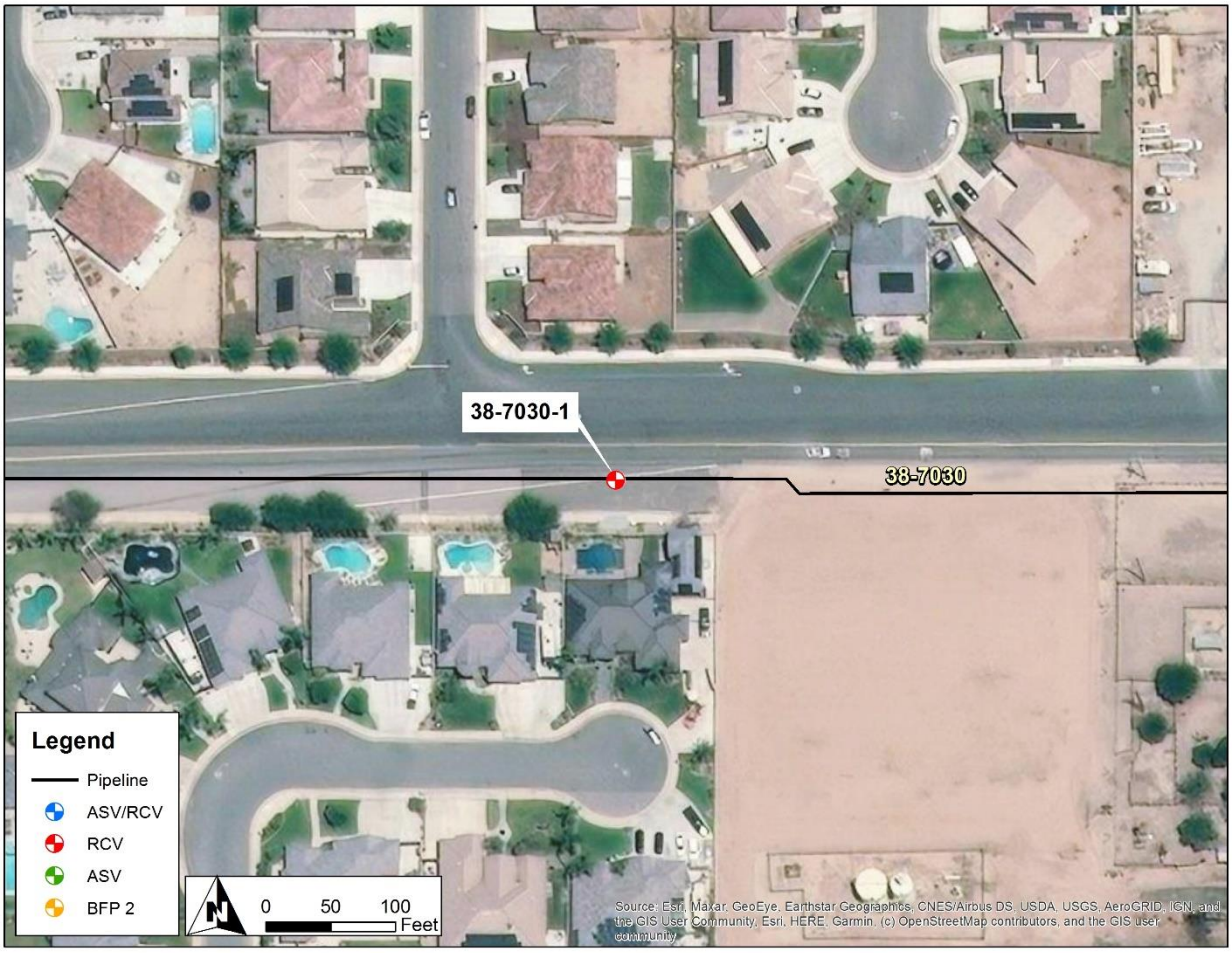


Figure 3: Satellite Image of Taft Valve Enhancement Project - Renfro Road

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope for the Taft Valve Enhancement Project – Hageman and Renfro in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing[1]. This conceptual scope identified MLV 7039-4.69-0 for automation to enable remote isolation to a portion of Line 7039. 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 7039-4.69-0 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: SoCalGas initially planned to automate MLV 7039-4.69-0 however Kern County did not approve the construction permits due to planned road widening at the project site. The Project Team reevaluated the planned isolation point and identified two alternate isolation points. The Project Team determined that the installation of two new valves, one north of MLV 7039-4.69-0, and one west of MLV 7039-4.69-0 would enable rapid isolation, thereby achieving 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).

Enhancement Plan objectives. The Project Team revised the scope to the installation and automation of two new valves at these locations.

4. Final Project Scope: The final project scope consists of the automation of two new MLVs that included the removal of one MLV, the installation of two MLVs, the installation of two new actuators, the installation of two new vaults to house the actuators, the installation of new power equipment, the installation of new communications equipment, the installation of the necessary automation equipment at the sites, and the removal of MLV 7039-4.69-0.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
38-7030	-	1	[redacted]	NV/VT	RCV
7039	5.14	0	[redacted]	NV/VT	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Taft Valve Enhancement Project - Hageman and Renfro 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 38-7030-1

1. Site Description: The site is located in a residential area west of the intersection of Hageman Road and Renfro Road in Bakersfield.
2. Land Issues: During the pre-design of this project, the Project Team noted that excavations will impact the street as well as the adjacent sidewalk.
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 this site.

MLV 7039-5.14-0

1. Site Description: The project is next to a residential development and an agricultural field on the heavily traveled Renfro Road. This site location is approximately half a mile north of the initial site location.
2. Land Issues: During the pre-design of this project, the Project Team noted that excavations will impact the street as well as 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:

MLV 38-7030-1

1. Engineering Assessment: During the site evaluation, the Project Team verified that the automation of the new valves would achieve the objectives Valve Enhancement Plan objectives.
2. Valve Details: There was no existing valve. The Project Team installed a new Class 600 ball valve.
3. Actuator Details: There was no existing actuator. The Project Team installed a new actuator.

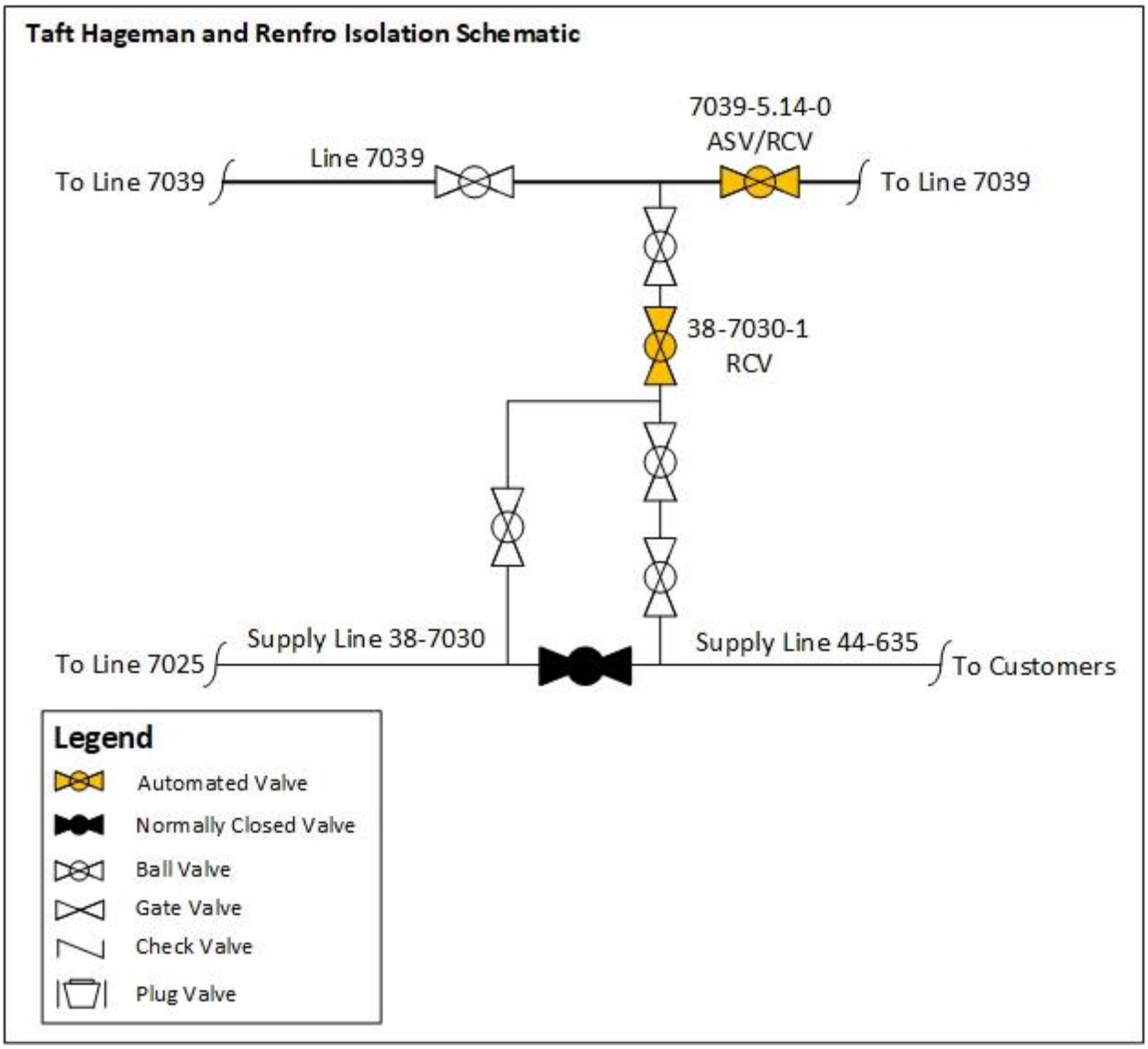
4. Customer Impact: The installation of the new MLV required a shut in of Supply Line 38-7030. The Project Team utilized stopple fittings to avoid any service disruptions to customers.
5. Community Impact: The Project Team restricted public access to the sidewalk during construction.
6. Substructures: 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 obtained excavation and traffic control permits from Kern County.
9. Land Use: The Project Team obtained a non-exclusive easement for the installation of vaults and panels in public roadways. The Project Team obtained a Temporary Right of Entry (TRE) for the laydown yard that was shared between the two project sites.
10. Traffic Control: The Project Team closed one lane of Hageman Road during construction for excavation. Flagmen, k-rails, and signage were utilized for traffic control.

MLV 7039-5.14-0

1. Engineering Assessment: During the site evaluation, the Project Team verified that the automation of the new valves would achieve the objectives Valve Enhancement Plan objectives..
2. Valve Details:
   a. MLV 7039-4.69-0: The preexisting valve was removed.
   b. MLV 7039-5.14-0: There was no existing valve. The Project Team installed a new Class 600 ball valve.
3. Actuator Details: There was no existing actuator. The Project Team installed a new actuator.

4. Customer Impact: The Project Team determined that the existing line could be shut in without an impact 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 obtained excavation and traffic control permits from Kern County.
9. Land Use: The Project Team obtained a TRE for the laydown yard that was shared between both project sites.
10. Traffic Control: The Project Team closed one lane of Renfro Road during construction for excavation. Flagmen, k-rails, and signage were utilized for traffic control.

Figure 4: Taft Valve Enhancement Project Hageman and Renfro - 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, 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	11/09/2018
Construction Completion Date	04/25/2019
Days on Site	88 days
Commissioning Date	10/17/2019

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 $452,000 in change orders.

MLV 38-7030-1

1. Constructability Issues: During potholing, the construction contractor discovered that the proposed location for a new stopple installation did not satisfy the depth requirements of the stopple fitting. The Project Team relocated the stopple location approximately 1,000 feet west of the original location.
2. Utility Coordination: The original planned location for the electrical installation from was relocated to the opposite side of Hageman Road. The Project Team utilized a horizontal directional drill to cross Hageman Road while installing the new conduit.
3. Tie-In: SoCalGas requested additional personnel to support with equipment installation, and fire watch during the tie-in due to complicated gas handling procedures.

4. Traffic: The placement of the K-rails, as part of the traffic control plans, did not allow for a 14 foot wide lane. The City of Bakersfield requested that the Project Team repaint the double yellow centerline on Hageman Road to achieve the required width.
5. Constructability Issues: Construction crews determined that two trees and some communication lines would interfere with the installation of the new vault. The Construction Contractor removed the two trees and rerouted the communication lines to facilitate the installation of the new vault.

MLV 7039-5.14-0

1. Tie-in: The tie-in was delayed due to a work restriction by SoCalGas on Line 7039 resulting in standby charges. The tie-in also extended beyond the 24 hours included in the TPE.
2. Schedule: The construction duration extended 28 days beyond what was planned. This resulted in additional charges for shoring, equipment, security, and other overheads during construction.
3. Weather: Heavy rain and poor soil conditions resulted in a cave-in of the excavation during construction. The Construction Contractor removed the existing soil and backfilled with 1-sack slurry to prevent any future cave-ins. Construction was also delayed multiple times due to fog and rain.

Figure 5: MLV and Framework Prior to Fabrication of the Cast-in-Place Vault

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 October 17, 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 utilized a single laydown yard for both project sites in the installation of the two MLVs.

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 $5,936,207. 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 $8,150,072.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	525,343	351,586	(173,757)
Materials	565,414	499,634	(65,779)
Mechanical Construction Contractor	2,589,877	3,582,744	992,867
Electrical Contractor	184,698	205,974	21,276
Construction Management & Support	426,755	394,050	(32,704)
Environmental	131,401	146,667	15,266
Engineering & Design	429,024	975,973	546,949
Project Management & Services	208,681	62,308	(146,373)
ROW & Permits	250,118	82,475	(167,643)
GMA	624,897	771,547	146,650
Total Direct Costs	**5,936,207**	**7,072,959**	**1,136,752**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	890,422	775,933	(114,489)
AFUDC	1,304,102	259,763	(1,044,339)
Property Taxes	327,446	41,417	(286,029)
Total Indirect Costs	**2,521,970**	**1,077,113**	**(1,444,857)**
Total Direct Costs	**5,936,207**	**7,072,959**	**1,136,752**
Total Loaded Costs	**8,458,177**	**8,150,072**	**(308,105)**

The Actual Full-Time Equivalents[4] (FTEs) for this Project are 1.34.

[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 Taft Valve Enhancement Project - Hageman and Renfro, 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 $1,136,752. This variance can be attributed to several factors including: the construction contractor discovered that the proposed location for a new stopple installation did not satisfy the depth requirements of the stopple fitting and had to be moved approximately 1,000 feet west of the original location which resulted in reshoring and was not included in the estimate; the project had construction schedule delays due to unanticipated weather conditions and encountered geotechnical challenges that required specialized tools to complete the beam installation along with communication line reroutes that were in conflict with the new vault location, which was not originally anticipated in the initial project estimate; during detailed design PG&E required the new electrical power run to be located within pavement across the street which required a directional drill to be performed; 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 & Design.

V. CONCLUSION

SoCalGas enhanced the safety of their integrated natural gas system by prudently executing the Taft Valve Enhancement Project – Hageman and Renfro. Through this Valve Enhancement Project, SoCalGas successfully installed and automated two new mainline valves to achieve the objective of enabling rapid system isolation to portions of Line 7039 and Supply Line 38-7030 in the City of Bakersfield. The total loaded cost of the Project is $8,150,072.

SoCalGas executed this project prudently through designing and executing the Project to support the Valve Enhancement Plan isolation objectives; coordinating and bundling two valves sites into one comprehensive package to capture efficiencies through coordinated scheduling of construction crews; installing two new mainline valves, two new actuators, and installing equipment necessary to bring power and communication capabilities to these valves to enable rapid system isolation of portions of Line 7039 and Supply Line 38-7030 located in the City of Bakersfield.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a 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 Taft Valve Enhancement Project - Hageman and Renfro Final Report

I. TAFT VALVE ENHANCEMENT PROJECT – SYCAMORE ROAD

A. Background and Summary

The Taft Valve Enhancement Project – Sycamore Road consists of valve enhancements made to an existing mainline valve (MLV) located in the Kern River Oil Field within Kern County. Through this project, SoCalGas enhanced the safety of their integrated gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of Line 7039 in the event of a pipeline rupture. SoCalGas installed a new actuator, new fencing, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,340,306.

The Taft Valve Enhancement Project – Sycamore Road construction site is within an existing SoCalGas facility in the Kern River Oil Field near Bakersfield. There are no buildings or vegetation in the area. SoCalGas bundled this valve project with three additional valve projects, the Taft Valve Enhancement Projects – 7th Standard, Buttonwillow, and Hageman and Renfro, into a single valve bundle to gain efficiencies in engineering, planning, and construction activities. The Project Team tracked the projects separately to more effectively track cost and streamline project closeout for individual sites. This workpaper describes the construction activities and costs of the Taft Valve Enhancement Project – Sycamore Road.

Table 1: General Project Information

Taft Valve Enhancement Project – Sycamore Road			
Location	City of Bakersfield		
Days on Site	31 days		
Construction Start	08/21/2017		
Construction Finish	11/29/2017		
Commissioning Date	08/22/2018		
Valve Upgrades			
Valve Number	7039-16.99-0		
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	1,340,306	0	1,340,306
Disallowed Costs			

B. Maps and Images

Figure 1: Taft Valve Enhancement Sycamore Road

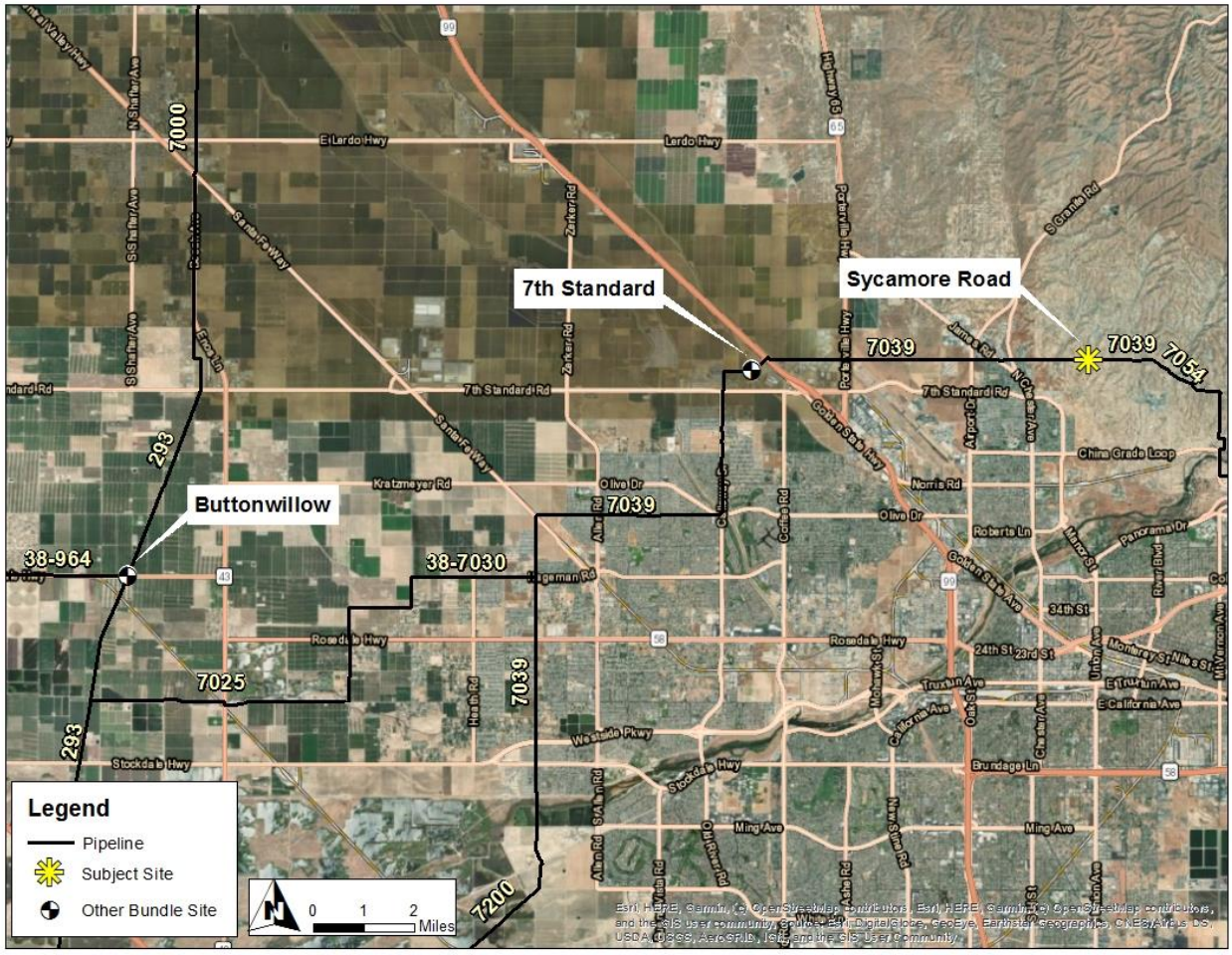
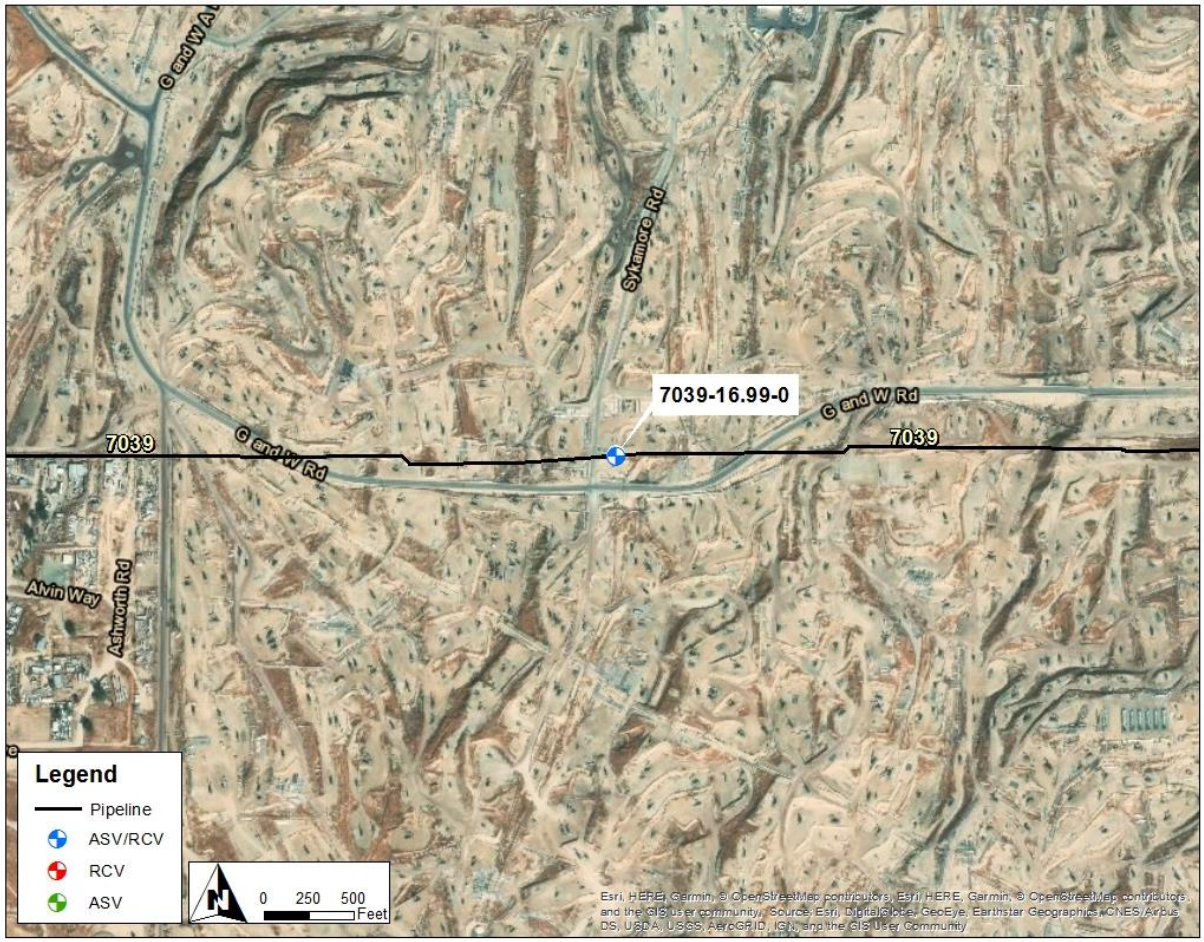


Figure 2: Satellite Image of Taft Valve Enhancement Project – Sycamore Road



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 include this 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 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 7039-16.99-0 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 one MLV, the installation of a new actuator, 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.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
7039	16.99	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 and initiated the planning process for the Taft Valve Enhancement Project – Sycamore Road 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 an existing SoCalGas facility in the Kern River Oil Field outside of Bakersfield. There are no buildings or vegetation in the area.
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 Class 3 location upstream of this valve, and to satisfy the objectives of the PSEP Valve Enhancement Plan.
4. Power Source: There was no preexisting power equipment at this site. The Project Team installed new power equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment.

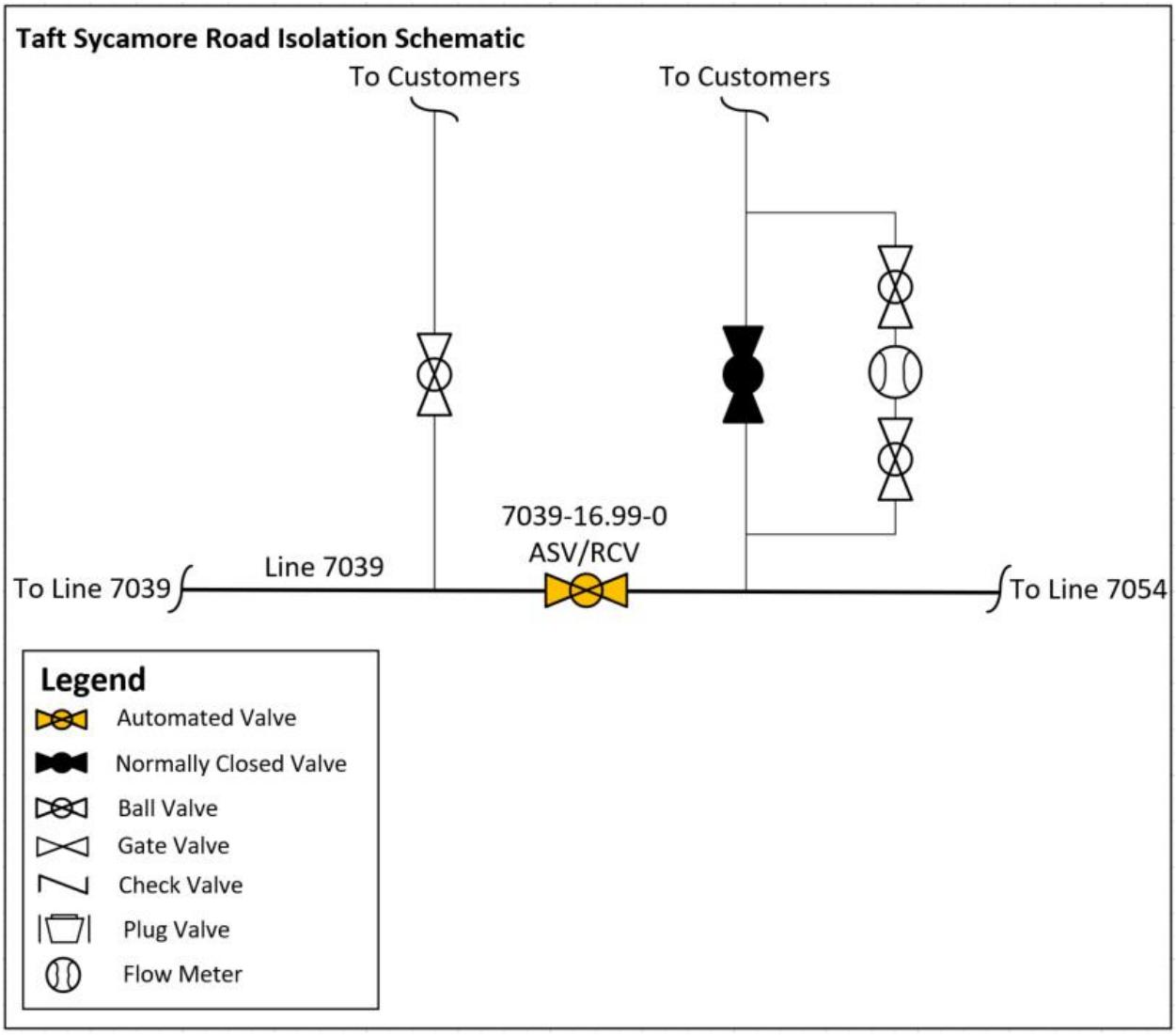
C. Engineering, Design, and Planning Factors

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:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would need to be expanded 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 existing actuator, 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 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.
9. Land Use: The Project Team obtained a new easement for the expansion of the existing SoCalGas facility. The Project Team also obtained a Temporary Right of Entry for construction. The Project Team utilized the area around the facility as a laydown yard.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Taft Valve Enhancement Project Schematic – Sycamore Road



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. A notable change in scope was made after the preliminary cost estimate was developed and approved. The Project Team initially planned to install a ground grid at the new station. The Project Team determined that the ground grid was not necessary.

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	08/21/2017
Construction Completion Date	11/29/2017
Days on Site	31 days
Commissioning Date	08/22/2018

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 new Actuator Installation in Foreground, Existing Pig Launcher 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. During the development of the reconciliation package, SoCalGas determined that this valve will be known as MLV 7039-17.00-0. The site was commissioned on August 22, 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. The Project Team bundled this project with the Taft Valve Enhancement Projects – 7th Standard, Buttonwillow, and Hageman and Renfro, 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 $1,661,767. 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 $ 1,340,306 .

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	189,750	74,529	(115,221)
Materials	146,803	86,195	(60,608)
Mechanical Construction Contractor	471,905	283,802	(188,103)
Electrical Contractor	187,905	98,231	(89,674)
Construction Management & Support	72,270	80,012	7,742
Environmental	118,085	78,305	(39,780)
Engineering & Design	179,676	274,310	94,634
Project Management & Services	132,753	27,479	(105,274)
ROW & Permits	11,550	19,739	8,189
GMA	151,070	126,874	(24,196)
Total Direct Costs	**1,661,767**	**1,149,476**	**(512,291)**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	226,350	118,454	(107,896)
AFUDC	118,884	62,809	(56,075)
Property Taxes	28,360	9,567	(18,793)
Total Indirect Costs	**373,594**	**190,830**	**(182,764)**
Total Direct Costs	**1,661,767**	**1,149,476**	**(512,291)**
Total Loaded Costs	**2,035,362**	**1,340,306**	**(695,055)**

The Actual Full-Time Equivalent[4] (FTE) for this Project are 0.40.

[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 Taft Valve Enhancement Project, Actual Direct Costs were less than the preliminary estimate by $512,291. This variance can be attributed to a variety of factors including: SoCalGas bundled this valve project with three additional valve projects to gain efficiencies in engineering, planning, and construction activities; the project design initially included costs associated with an electrical ground grid for the valve station which was later evaluated and redesigned with a solar panel electrical system to mitigate construction costs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Taft Valve Enhancement Project – Sycamore Road. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system of a portion of Line 7039 located within Kern County. The total loaded cost of the Project is $1,340,306.

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 construction planning, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation to a portion of Line 7039 located in Kern 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 Taft Valve Enhancement Project – Sycamore Road Final Report

I. VICTORVILLE COMMS VALVE ENHANCEMENT PROJECT – MLV 11

A. Background and Summary

The Victorville COMMS Valve Enhancement Project – MLV 11 consists of valve enhancements made to an existing mainline valve (MLV) located in an unincorporated area within 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 3000 in the event of a pipeline rupture. SoCalGas installed new communications equipment and the necessary automation equipment at the site. The total loaded project cost is $308,849.

The Victorville COMMS Valve Enhancement Project – MLV 11 construction site is within an existing SoCalGas facility in the desert environment near the unincorporated community of Ludlow. SoCalGas bundled this valve project with an additional valve project, Victorville COMMS Valve Enhancement Project – MLV 12 to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Victorville COMMS Valve Enhancement Project – MLV 11. This Project's costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through automation of the mainline valve, and the Operating District funding separately the activities to install the new linebreak cabinet and canopy.

Table 1: General Project Information

Victorville COMMS Valve Enhancement Project – MLV 11 Valve Enhancement Project			
Location	San Bernardino County		
Days on Site	14 days		
Construction Start	10/22/2018		
Construction Finish	01/10/2019		
Commissioning Date	06/11/2019		
Valve Upgrades			
Valve Number	3000-99.43-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above Ground		
ASV	Yes		
RCV	No		
Valve 11 Site Upgrades			
Vault	None		
Power	Existing – Utility		
Communication	New – Radio		
SCADA Panel	None		
Equipment Shelter	None		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	308,849	-	308,849
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Victorville COMMS Bundle Overview

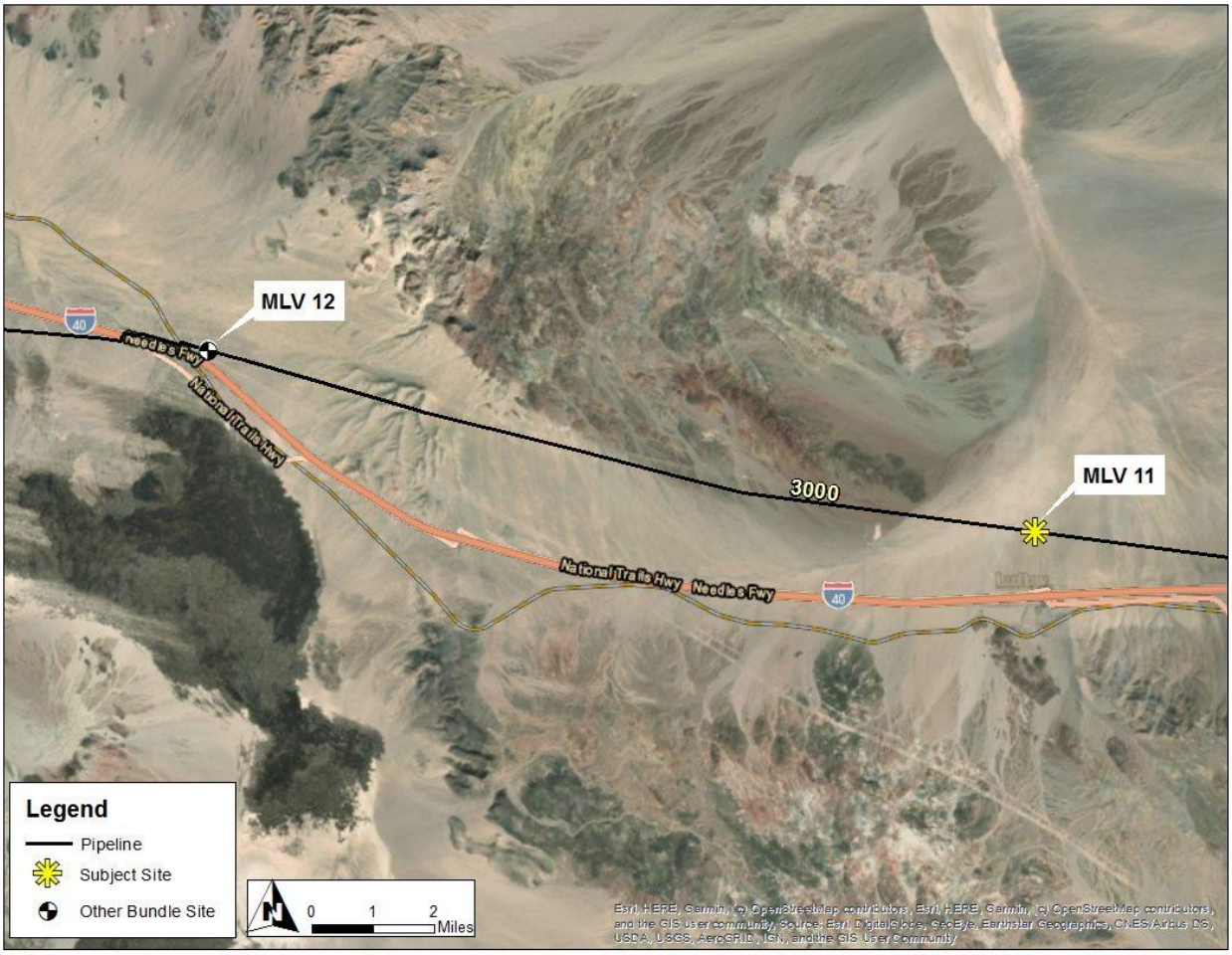


Figure 2: Satellite Image of Victorville COMMS Valve Enhancement Project – MLV 11

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 PSEP filing.[1] This conceptual scope did not include this project. SoCalGas reviewed available information and performed a detailed system flow analysis that 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 3000-99.93-0 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 one MLV, that included upgrades to the existing 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
3000	99.43	0	[redacted]	COMM	ASV

[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 Victorville COMMS Valve Enhancement Project – MLV 11 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 an existing SoCalGas facility in a desert environment near the unincorporated community of Ludlow approximately one mile North of Interstate 40. 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. The Project Team noted that this project is located on lands owned by the Bureau of Land Management (BLM) within the Desert Renewable Energy Conservation Plan (DRECP) area.
3. DOT Class: This project site is in a class 1 location. SoCalGas selected this MLV for automation in accordance with the Valve Enhancement Plan as there was existing power and Lineguard technology, and to isolate known geological threats upstream and downstream of this valve.
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.

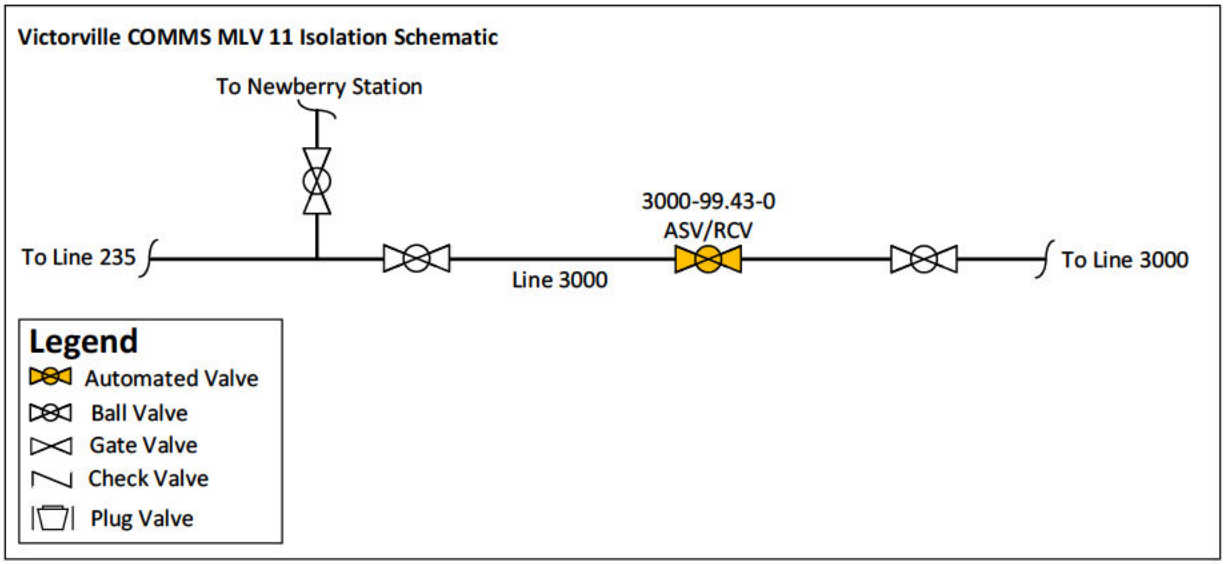
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, 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 did not make any notable changes in scope to the engineering and design of this project.

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 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 noted that this project is located on lands owned by the Bureau of Land Management (BLM) within the Desert Renewable Energy Conservation Plan (DRECP) area. A desert tortoise biological 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 acquired a Temporary Right of Way (ROW) from the County of San Bernardino. The Project Team performed all work within the ROW.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Victorville COMMS Valve Enhancement Project – MLV 11 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 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 Alliance Partner prepared and submitted their estimates. The estimated values below include PSEP and non-PSEP work, whereas Tables 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	10/22/2018
Construction Completion Date	01/10/2019
Days on Site	14 days
Commissioning Date	06/11/2019

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: Partial Backfill of Conduit Trench

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 June 11, 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 bundled this valve project with an additional valve project, Victorville COMMS Valve Enhancement Project – Valve 12, 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 $291,150. 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 $308,849.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	96,106	21,636	(74,470)
Materials	5,157	1,368	(3,789)
Mechanical Construction Contractor	76,859	62,051	(14,808)
Electrical Contractor	20,581	19,044	(1,537)
Construction Management & Support	0	5,345	5,345
Environmental	15,216	12,500	(2,716)
Engineering & Design	7,360	37,502	30,142
Project Management & Services	25,431	4,045	(21,386)
ROW & Permits	4,035	7,204	3,169
GMA	40,405	17,840	(22,565)
Total Direct Costs	**291,150**	**188,535**	**(102,615)**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	159,050	102,831	(56,219)
AFUDC	50,409	10,523	(39,886)
Property Taxes	11,818	6,960	(4,858)
Total Indirect Costs	**221,277**	**120,313**	**(100,964)**
Total Direct Costs	**291,150**	**188,535**	**(102,615)**
Total Loaded Costs	**512,427**	**308,849**	**(203,578)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.04.

[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 Victorville COMMS Valve Enhancement Project MLV 11, Actual Direct Costs were less than the preliminary estimate by $102,615. This variance is attributable to a variety of factors, including the Project Team's ability to execute the project concurrently with a SoCalGas Operating District project, thereby realizing synergies and reducing the overall cost.

V. CONCLUSION

SoCalGas enhanced the safety of its gas system by prudently executing the Victorville COMMS MLV 11 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 3000 located in an unincorporated area within San Bernardino County. The total loaded cost of the Project is $308,849.

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 together to capture efficiencies through coordinated engineering, and installing equipment necessary to bring communication capabilities to the site to enable rapid system isolation of a portion of Line 3000 located in San Bernardino 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 Victorville COMMS Valve Enhancement Project – MLV 11 Final Report

I. VICTORVILLE COMMS VALVE ENHANCEMENT PROJECT – MLV 12

A. Background and Summary

The Victorville COMMS Valve Enhancement Project – MLV 12 site consists of valve enhancements made to an existing mainline valve (MLV) 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 3000 in the event of a pipeline rupture. SoCalGas expanded an existing SoCalGas facility, installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $528,982.

The Victorville COMMS Valve Enhancement Project – MLV 12 construction site is within an existing SoCalGas facility located in a desert area outside of Victorville next to Interstate 40. SoCalGas bundled this valve project with an additional valve project, Victorville COMMS Valve Enhancement Project – MLV 11 to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Victorville COMMS Valve Enhancement Project – MLV 12. This Project's costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through automation of the mainline valve, and the Operating District funding separately the activities to install the new linebreak cabinet and canopy.

Final Report for Victorville COMMS Valve Enhancement Project – MLV 12

Table 1: General Project Information

Victorville COMMS Valve Enhancement Project – MLV 12			
Location	San Bernardino County		
Days on Site	18 days		
Construction Start	11/06/2017		
Construction Finish	12/19/2017		
Commissioning Date	05/22/2018		
Valve Upgrades			
Valve Number	3000-110.93-0		
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	New		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	528,982	-	528,982
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Victorville COMMS Bundle Overview

Final Report for Victorville COMMS Valve Enhancement Project – MLV 12

Figure 2: Satellite Image of Victorville COMMS Valve Enhancement Project – MLV 12

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 include this project. SoCalGas reviewed available information and performed a detailed system flow analysis that 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 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 3000-110.93-0 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 one MLV, the expansion of an existing facility, 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
3000	110.93	0	[redacted]	COMM	ASV

[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 Victorville COMMS Valve Enhancement Project – MLV 12 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:

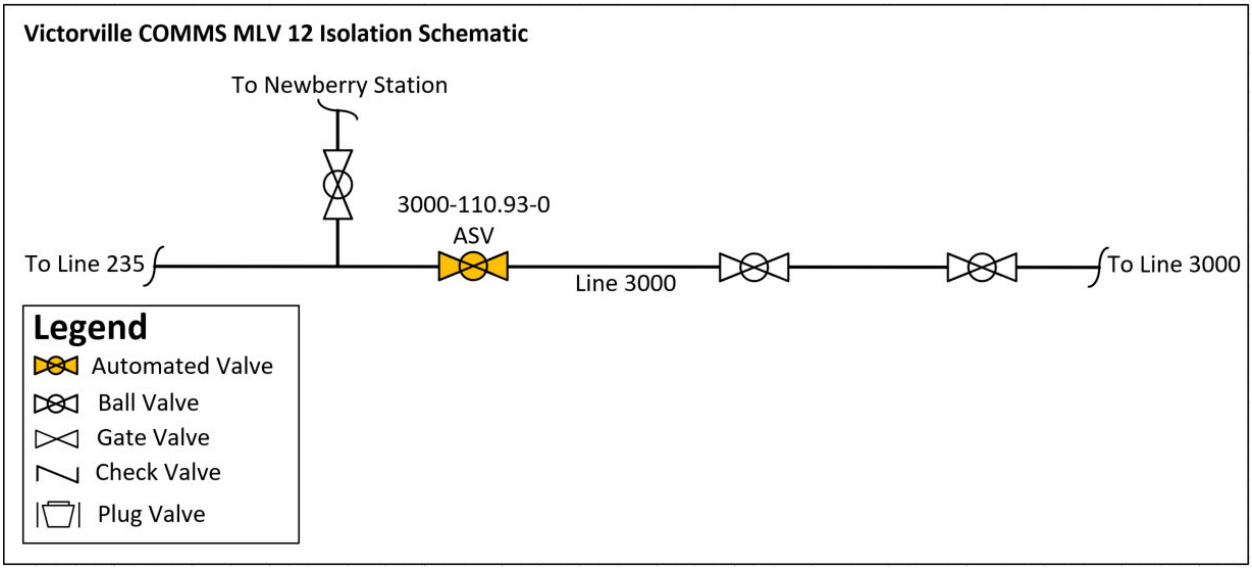
1. Site Description: This site is an existing SoCalGas facility in a desert area in San Bernardino County, next to Interstate 40.
2. Land Issues: During the site evaluation, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment. The Project Team noted that this project is located on lands owned by the Bureau of Land Management (BLM) within the Desert Renewable Energy Conservation Plan (DRECP) area.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation in accordance with the Valve Enhancement Plan as there was existing power and Lineguard technology, and 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, 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 did not make any notable changes in scope to the engineering and design of this project.
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 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 noted that this project is located on lands owned by the Bureau of Land Management (BLM) within the Desert Renewable Energy Conservation Plan (DRECP) area. A desert tortoise biological monitor was onsite full time during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project.
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: Victorville COMMS Valve Enhancement Project – MLV 12 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 Tables 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	11/06/2017
Construction Completion Date	12/19/2017
Days on Site	18 days
Commissioning Date	05/22/2018

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: Nitrogen Test for New Instrument Piping

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 May 22, 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 bundled this valve project with an additional valve project, Victorville COMMS Valve Enhancement Project – MLV 11 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 $323,473. 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 $528,982.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	105,151	66,470	(38,681)
Materials	5,157	6,411	1,254
Mechanical Construction Contractor	89,209	89,533	324
Electrical Contractor	20,581	54,218	33,637
Construction Management & Support	-	18,376	18,376
Environmental	20,488	49,093	28,605
Engineering & Design	7,360	72,481	65,121
Project Management & Services	25,565	9,981	(15,584)
ROW & Permits	4,035	5,281	1,246
GMA	45,927	57,448	11,521
Total Direct Costs	**323,473**	**429,291**	**105,818**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	176,562	86,374	(90,188)
AFUDC	59,845	10,570	(49,275)
Property Taxes	14,030	2,747	(11,283)
Total Indirect Costs	**250,437**	**99,691**	**(150,746)**
Total Direct Costs	**323,473**	**429,291**	**105,818**
Total Loaded Costs	**573,910**	**528,982**	**(44,928)**

The Actual Full-Time Equivalent[5] (FTE) for this Project is 0.54.

[2] Values may not add to total due to rounding.
[3] Valves 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 Victorville COMMS Valve Enhancement Project – MLV 12, Actual Direct Costs exceeded the preliminary estimate by $105,818. This variance is attributable to a variety of factors including:

1. Environmental: The Project Team determined during construction that additional Environmental support was required to monitor desert tortoise. The Project Team engaged an onsite biological monitor to be present during the full duration of construction.
2. Engineering & Design:
    a. The estimate included activities provided by external engineering firms under Project Management & Services, these costs were recognized under Engineering and Design.
    b. Survey costs for construction were more extensive than originally anticipated.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Victorville COMMS Valve Enhancement Project – MLV 12. Through this Valve Enhancement Project, SoCalGas successfully automated one MLV to achieve the objective of enabling rapid system isolation of a portion of Line 3000 in San Bernardino County. The total loaded cost of the Project is $528,982.

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 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 located in San Bernardino 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 Victorville COMMS Valve Enhancement Project – MLV 12 Final Report

I. WESTERN DEL REY VALVE ENHANCEMENT PROJECT – MISSISSIPPI AND ARMACOST

A. Background and Summary

This report describes the activities associated with the Western Del Rey Valve Enhancement Project – Mississippi and Armacost site, that consists of valve enhancements made to one existing mainline valve (MLV) located in the City of Los Angeles, in Los Angeles County. Through this project, SoCalGas enhanced the safety of their integrated gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of Lines 2003 and 407 in the event of a pipeline rupture. SoCalGas installed, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $494,984.

The Western Del Rey Valve Enhancement Project – Mississippi and Armacost site is an existing SoCalGas facility in an urban area on Mississippi Avenue in West Los Angeles. SoCalGas grouped this site with two additional sites, McLaughlin and Palms and Del Rey Junction, into a single valve bundle to gain efficiencies in engineering, and planning, activities. This workpaper speaks to the Mississippi and Armacost site.

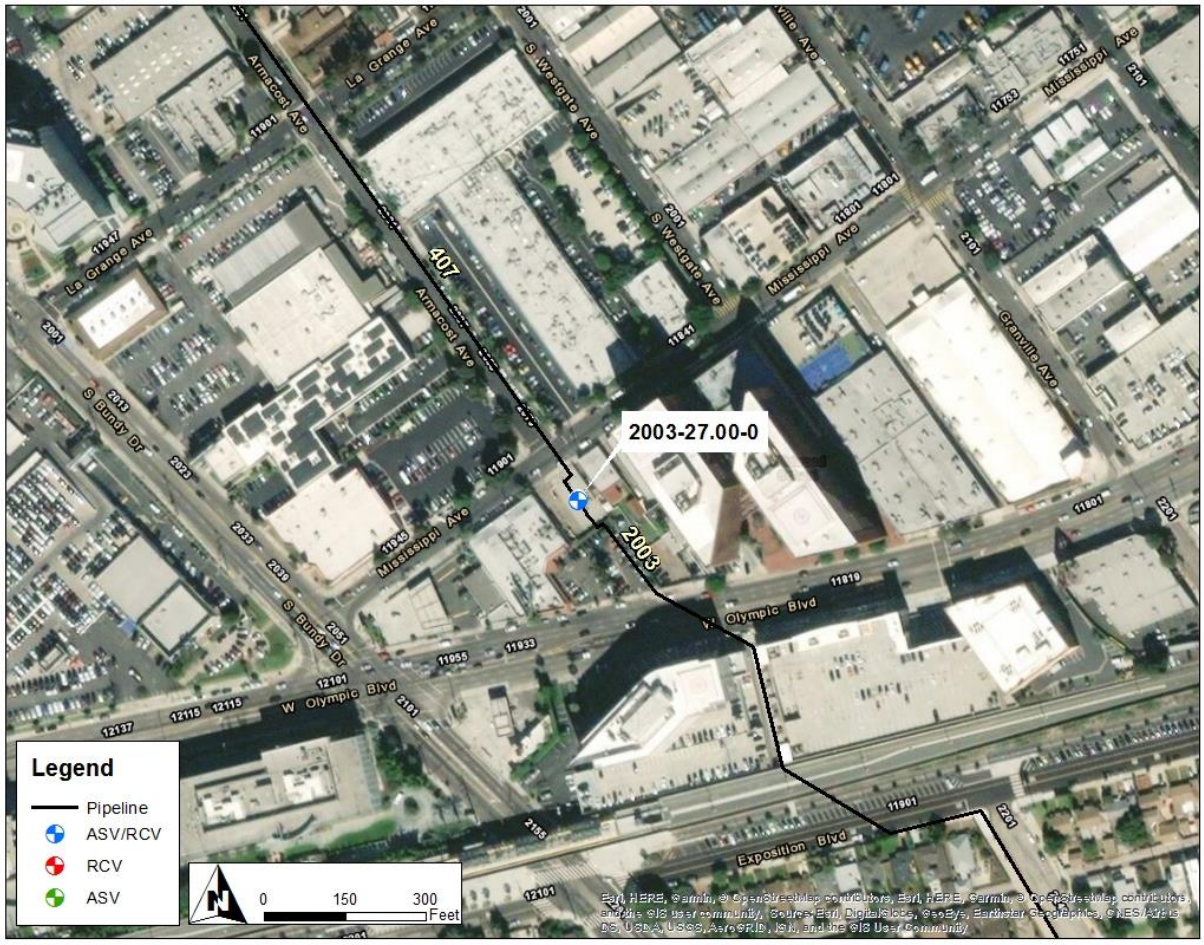
Table 1: General Project Information

Western Del Rey Mississippi and Armacost Valve Enhancement Project			
Location	City of Los Angeles		
Days on Site	24 days		
Construction Start	12/06/2017		
Construction Finish	04/15/2019		
Commissioning Date	09/24/2018		
Valve Upgrades			
Valve Number	2003-27.00-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	Existing – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	Existing		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	494,984	-	494,984
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Western Del Rey Bundle Overview

Figure 2: Satellite Image of Western Del Rey Mississippi and Armacost 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 filing.[1] This conceptual scope identified MLV 2003-27.00-0 for automation to enable remote isolation to a portion of Lines 2003 and 407. 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 that 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 2003-27.00-0 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: SoCalGas initially planned to replace the existing valve and actuator. The Project Team determined that the existing valve and actuator was compatible with the new PSEP linebreak technology. The Project Team updated the scope to reuse the existing valve and actuator.
4. Final Project Scope: The final project scope consists of 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
2003	27.00	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Western Del Rey Mississippi and Armacost 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:

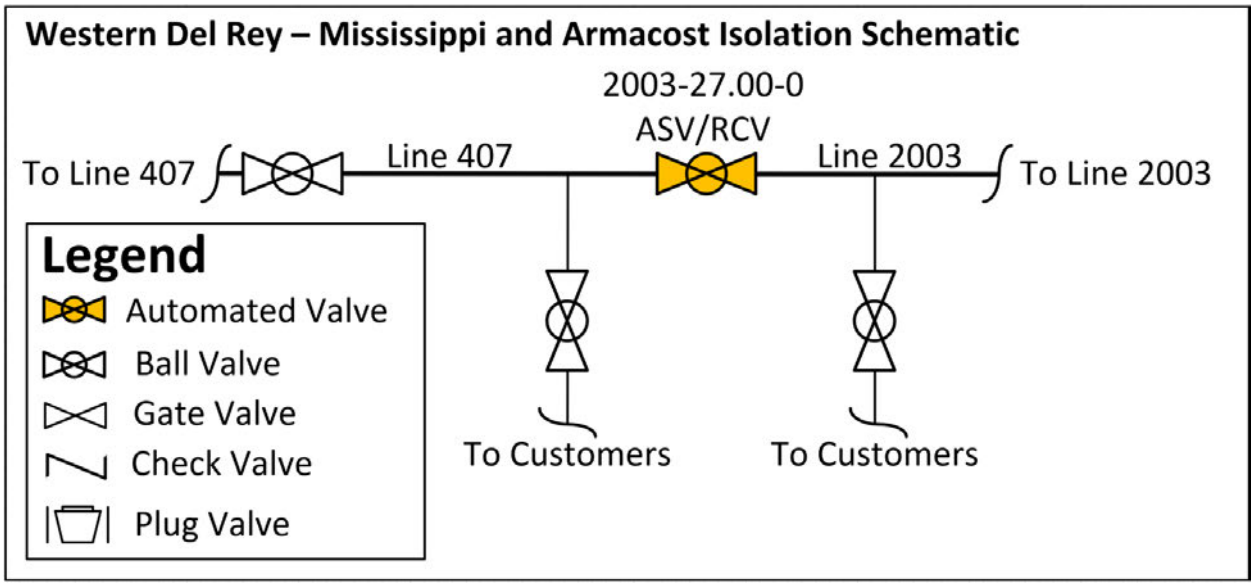
1. Site Description: This site is located in an existing SoCalGas facility in a high-density, commercial area in the City of Los Angeles on Mississippi Avenue.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 4 location.
4. Power Source: The site has existing utility power.
5. Communication Technology: The existing communication equipment was incompatible with the PSEP standard design and was limited to alarm signals only, 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 could accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 300 ball valve that the Project Team reused.
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 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: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team used the existing SoCalGas facility as a laydown yard.
10. Traffic Control: The Project Team did not anticipate the use of traffic control at this site.

Figure 3: Western Del Rey Mississippi and Armacost 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 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 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	12/06/2017
Construction Completion Date	4/15/2019
Days on Site	24 days
Commissioning Date	09/24/2018

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: Trenching to Access Existing Electrical Power

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 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 24, 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 utilized existing SoCalGas facilities and easements for construction avoiding the need to acquire additional land or easements.
2. Bundling of Projects: The Project Team bundled this project with the Western Del Rey Valve Enhancement Projects – McLaughlin and Palms and; Del Rey Junction, coordinating engineering, activities between the project sites.

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 $708,641. 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 $494,984.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	187,365	42,512	(144,853)
Materials	49,674	62,343	12,669
Mechanical Construction Contractor	-	-	-
Electrical Contractor	171,248	104,647	(66,601)
Construction Management & Support	26,336	35,867	9,531
Environmental	22,624	-	(22,624)
Engineering & Design	117,368	114,607	(2,761)
Project Management & Services	53,395	1,211	(52,184)
ROW & Permits	732	615	118
GMA	79,898	53,960	(25,938)
Total Direct Costs	**708,641**	**415,761**	**(292,880)**

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

Indirect Costs/Total Costs ($)[2]	Estimate	Actuals	Delta Over/(Under)
Overheads	229,856	68,876	(160,980)
AFUDC	118,366	9,101	(109,265)
Property Taxes	27,191	1,245	(25,946)
Total Indirect Costs	**375,413**	**79,223**	**(296,190)**
Total Direct Costs	**708,641**	**415,761**	**(292,880)**
Total Loaded Costs	**1,084,054**	**494,984**	**(589,070)**

The Actual Full-Time Equivalents[4] (FTEs) for this Project are 0.30.

[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 Western Del Rey Mississippi and Armacost Valve Enhancement Project, Actual Direct Costs were less than the preliminary estimate by $292,880. This variance is attributable to a variety of factors including: the project team was able to work with increased efficiency and company labor hours required were approximately half of what was anticipated for execution and closeout; the original estimate included the installation of a light pole and meter pedestal which were later determined to not be needed for project completion and were not installed; and the project team anticipated the need for abatement and removal of hazardous materials, but none were encountered during construction.

V. CONCLUSION

SoCalGas enhanced the safety of their integrated natural gas system by prudently executing the Western Del Rey Mississippi and Armacost Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated one MLV to achieve the objective of enabling rapid system isolation in the City of Los Angeles. The total loaded cost of the Project is $494,984.

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 communication capabilities to the site to enable rapid system isolation to a portion of Lines 2003 and 407.

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

End of Western Del Rey Valve Enhancement Project –Mississippi and Armacost Final Report

I. WILMINGTON VALVE ENHANCEMENT PROJECT – EUBANK STATION

A. Background and Summary

This report describes the activities associated with the Wilmington Valve Enhancement Project – Eubank Station site that consists of valve enhancements made to two existing valves located in the City of Wilmington. Through this project, SoCalGas enhanced the safety of its 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 1024 and Supply Line 43-1200 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 $780,030.

The Wilmington Valve Enhancement Project – Eubank Station construction site is within an existing SoCalGas facility in an area that is a mixture of industrial and residential development. SoCalGas bundled this valve project with an additional valve project, Wilmington Valve Enhancement Project – Lecouver and F Street, to gain efficiencies in engineering, planning and construction activities. This workpaper speaks to the Eubank Station site. 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 two valves and the Operating District funding the activities to install a new light pole and two new pressure transmitters.

Table 1: General Project Information

Wilmington Valve Enhancement Project – Eubank Station			
Location	City of Wilmington		
Days on Site	43 days		
Construction Start	03/19/2018		
Construction Finish	06/14/2018		
Commissioning Date	04/10/2019		
Valve Upgrades			
Valve Number	1024-0.31-8		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Valve Number	1024-0.31-12		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	Yes – Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	780,030	-	780,030
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Wilmington Bundle Overview

Figure 2: Satellite Image of Wilmington Valve Enhancement Project – Eubank 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 identified valves 1024-0.31-0 and 1024-1.62-2 for automation to enable remote isolation to portions of Line 1024. SoCalGas reviewed available information, performed a detailed system flow analysis, and determined that valves 1024-0.31-8 and 1024-0.31-12 were better candidates for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified valves 1024-0.31-0 and 1024-1.62-2 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 not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas reevaluated the isolation points and determined that the automation of valves 1024-0.31-8 and 1024-0.31-12 would better achieve the objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: The Operating District requested that two pressure transmitters and a new light pole be installed at this facility. The Project Team incorporated this into the scope of work. The Operating District paid for the material and the installation of the pressure transmitters and the new light pole.
4. Final Project Scope: The final project scope consists of the automation of two valves, that included the installation of power equipment, the installation of 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
1024	0.31	8	[redacted]	C/P	RCV
1024	0.31	12	[redacted]	C/P	RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Wilmington Valve Enhancement Project – Eubank 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:

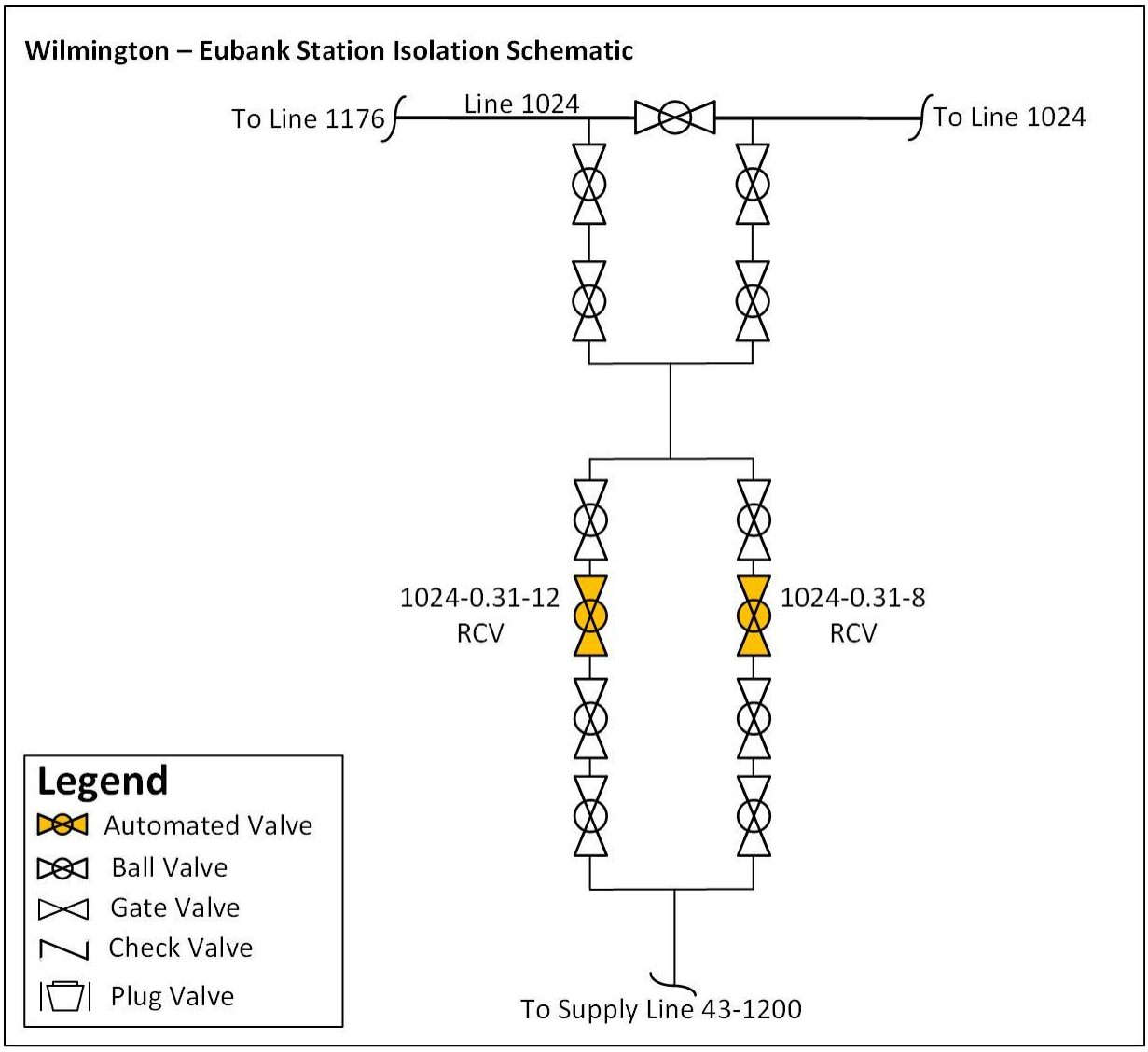
1. Site Description: This site is an existing SoCalGas facility in an area that is a mixture of industrial and residential development.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power 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 that the station could accommodate the new equipment.
2. Valve Details:
   a. 1024-0.31-8: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
   b. 1024-0.31-12: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 1024-0.31-8: The existing actuator was a pneumatic actuator, which was reused by the Project Team.
   b. 1024-0.31-12: The existing actuator was a 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 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 used the existing SoCalGas facility as a laydown yard.
10. Traffic Control: The Project Team did not identify any traffic needs control at this site.

Figure 3: Wilmington Valve Enhancement Project – Eubank 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 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 Alliance Partner prepared and submitted their estimate. The estimated values below represent the PSEP portion of the scope.

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	06/14/2018
Days on Site	43 days
Commissioning Date	04/10/2019

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: New Automation Equipment

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves back 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 10, 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 grouped this site with one additional site, Wilmington Valve Enhancement Project – Lecouver and F Street, 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 $1,002,562. 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 $780,030.

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

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	272,955	94,340	(178,615)
Materials	39,301	9,168	(30,133)
Mechanical Construction Contractor	0	0	0
Electrical Contractor	194,244	164,570	(29,674)
Construction Management & Support	39,192	91,137	51,945
Environmental	16,870	0	(16,870)
Engineering & Design	49,466	159,543	110,077
Project Management & Services	284,533	4,185	(280,348)
ROW & Permits	5,000	13,703	8,703
GMA	101,001	69,777	(31,224)
Total Direct Costs	**1,002,562**	**606,423**	**(396,139)**

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	321,221	129,524	(191,697)
AFUDC	189,612	38,695	(150,917)
Property Taxes	43,543	5,388	(38,155)
Total Indirect Costs	**554,376**	**173,607**	**(380,769)**
Total Direct Costs	**1,002,562**	**606,423**	**(396,139)**
Total Loaded Costs	**1,556,938**	**780,030**	**(776,908)**

The Actual Full-Time Equivalent[6] (FTE) for this Project is 0.50.

[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 Wilmington Valve Enhancement Project, Actual Direct Costs were less than the preliminary estimate by $396,139. This variance can be attributed to a variety of factors including: SoCalGas bundled this valve project with an additional valve project and work performed by the Operating District 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 these costs were recognized in Engineering and Design; and during construction, abatement services on the existing pipeline were initially anticipated but determined to not be required, therefore decreasing Environmental costs.

V. CONCLUSION

SoCalGas enhanced the safety of their integrated natural gas system by prudently executing the Wilmington Valve Enhancement Project – Eubank Station. Through this Valve Enhancement Project, SoCalGas successfully automated two valves to achieve the objective of enabling rapid system isolation in the City of Wilmington. The total loaded cost of the Project is $780,030.

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 together to capture efficiencies through coordinated engineering, and by installing the equipment necessary to enable rapid system isolation to portions of Line 1024 and Supply Line 43-1200 in the City of Wilmington.

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 Wilmington Valve Enhancement Project – Eubank Station Final Report