PIPELINE SAFETY AND ENHANCEMENT PLAN (PSEP)
2018 REASONABLENESS REVIEW – A.18-11-010
WORKPAPERS
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I. LINE 3600 VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Line 3600 Valve Enhancement Project Bundle that consists of valve enhancements made to six existing mainline valves (MLVs) and six existing bridle valves in the cities and unincorporated areas of Santee, La Mesa, Spring Valley, Bonita, Chula Vista, and Otay Mesa in San Diego County. Through this project, SoCalGas and SDG&E enhanced the capabilities of six MLVs and six bridle valves to enable rapid transmission system isolation to a portion of Line 3600, Line 2010, and Line 3012. SoCalGas and SDG&E installed eight new actuators, new communications equipment, and necessary automation equipment. The total loaded project cost is $5,294,781.

The 12 valves comprising the Line 3600 Valve Enhancement Project Bundle are separated into six different sites. The Santee Station is an existing SDG&E facility located at the end of a residential street, the Fletch Parkway Station is located in the parkway of a road in a commercial and residential area, the Sweetwater Springs Boulevard site is located on the side of the street in an industrial, commercial and residential area, the Sweetwater Road site is located in an open area at the end of a residential development, the Eastlake Station site in an existing SDG&E facility that is located next to a commercial complex, and the Harvest Station site is an existing SDG&E facility located next to California Route 11. SoCalGas and SDG&E grouped the six project sites together into a single valve bundle and executed the six sites as a comprehensive package because the sites are geographically proximate and are locations where work could be performed simultaneously, such that the Project Team could manage the work load between project sites and capture efficiencies by limiting the number of mobilizations and demobilizations.

Table 1: General Project Information

Line 3600 Valve Enhancement Project Bundle			
Site	Santee Station	Fletcher Parkway Station	Sweetwater Springs Boulevard
Location	Santee	La Mesa	Spring Valley
Days on Site	12 days	12 days	35 Days
Construction Start	05/05/2015	12/14/2015	11/4/2015
Construction Finish	06/17/2015	11/04/2016	12/10/2015
Commissioning Date	03/16/2016	12/27/2017	3/16/2016
Valve Upgrades			
Valve Number	2010-2003.5-0	3600-3602-0	3600-3603-0
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball
Actuator	Existing	New	New
Actuator Above-/Below-Grade	Above-Grade	Below-Grade	Below-Grade
ASV	Yes	Yes	Yes
RCV	Yes	Yes	Yes
Valve Number		3600-3602-1	3600-3603-1
Valve Type		Existing – Ball	Existing – Ball
Actuator		New	New
Actuator Above-/Below-Grade		Below-Grade	Below-Grade
ASV		No	No
RCV		Yes	Yes
Valve Number		3600-3602-2	3600-3603-2
Valve Type		Existing – Ball	Existing – Ball
Actuator		New	New
Actuator Above-/Below-Grade		Below-Grade	Below-Grade
ASV		No	No
RCV		Yes	Yes
Site Upgrades			
Vault	None	Existing	Existing
Power	Existing – Utility	Existing – Utility	Existing – Utility
Communication	Existing – Radio	New – Radio	New – Radio
SCADA Panel	Existing	New	New
Equipment Shelter	None	None	None
Fencing/Wall	Existing – Wall	None	None

Table 1: General Project Information (Continued)

Line 3600 Valve Enhancement Project Bundle			
Site	Sweetwater Road	Eastlake Station	Harvest Station
Location	Bonita	Chula Vista	Otay Mesa
Days on Site	30 days	23 days	11 days
Construction Start	10/05/2015	04/06/2015	03/30/2015
Construction Finish	11/25/2015	06/19/2015	06/19/2015
Commissioning Date	03/16/2016	07/22/2015	07/23/2015
Valve Upgrades			
Valve Number	3600-3604-0	3600-3605-0	3012-3013-0
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball
Actuator	New	Existing	New
Actuator Above-/Below-Grade	Below-Grade	Above-Grade	Above-Grade
ASV	Yes	Yes	Yes
RCV	Yes	Yes	Yes
Valve Number		3600-3605-1	
Valve Type		Existing – Ball	
Actuator		Existing	
Actuator Above-/Below-Grade		Above-Grade	
ASV		No	
RCV		Yes	
Valve Number		3600-3605-2	
Valve Type		Existing – Ball	
Actuator		Existing	
Actuator Above-/Below-Grade		Above-Grade	
ASV		No	
RCV		Yes	
Site Upgrades			
Vault	Existing	None	None
Power	Existing – Utility	Existing – Utility	Existing – Utility
Communication	New – Radio	Existing – Radio	New – Radio
SCADA Panel	New	New	New
Equipment Shelter	New	New	New
Fencing/Wall	None	Existing – Fence	Existing – Fence

Table 1: General Project Information (Continued)

Project Costs ($)	Capital	O&M	Total
Loaded Project Costs	5,294,781	-	5,294,781
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 3600 Valve Enhancement Project Overview

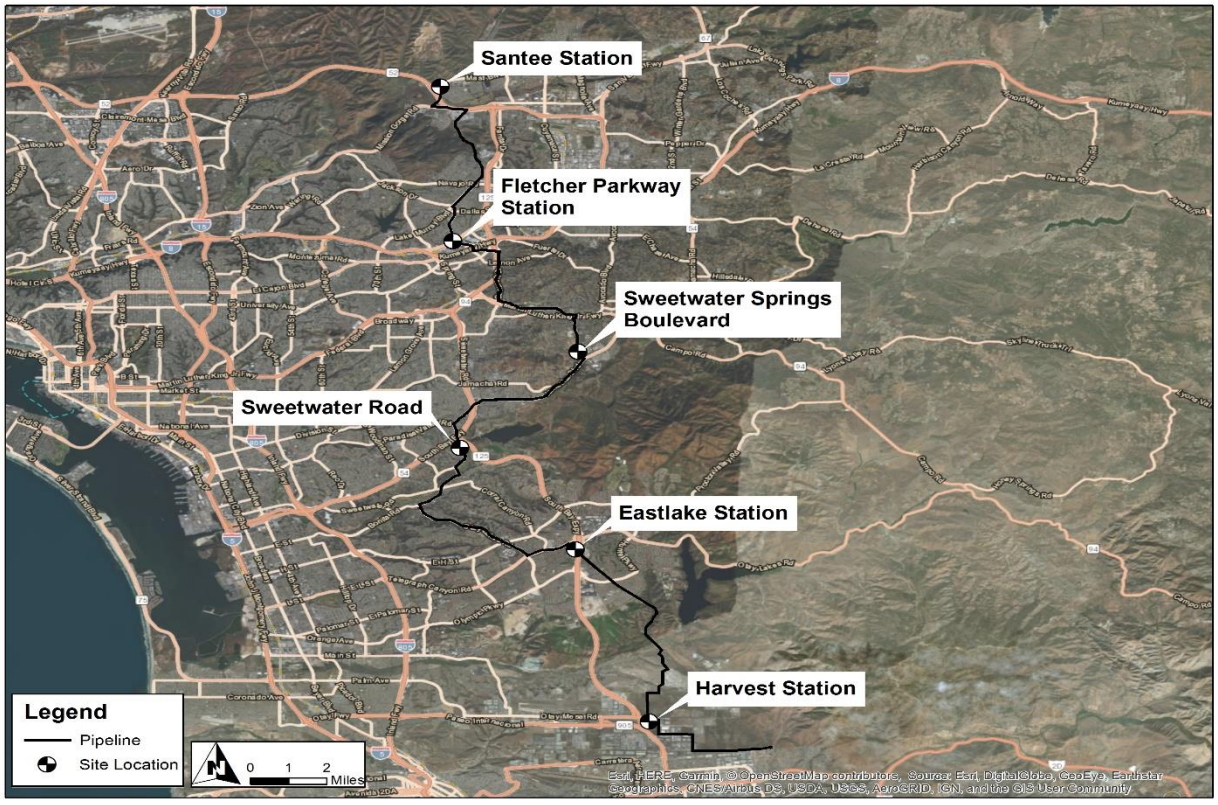


Figure 2: Satellite Image of Santee Station

Figure 3: Satellite Image of Fletcher Parkway Station

Figure 4: Satellite Image of Sweetwater Spring Boulevard

Figure 5: Satellite Image of Sweetwater Road

Figure 6: Satellite Image of Eastlake Station

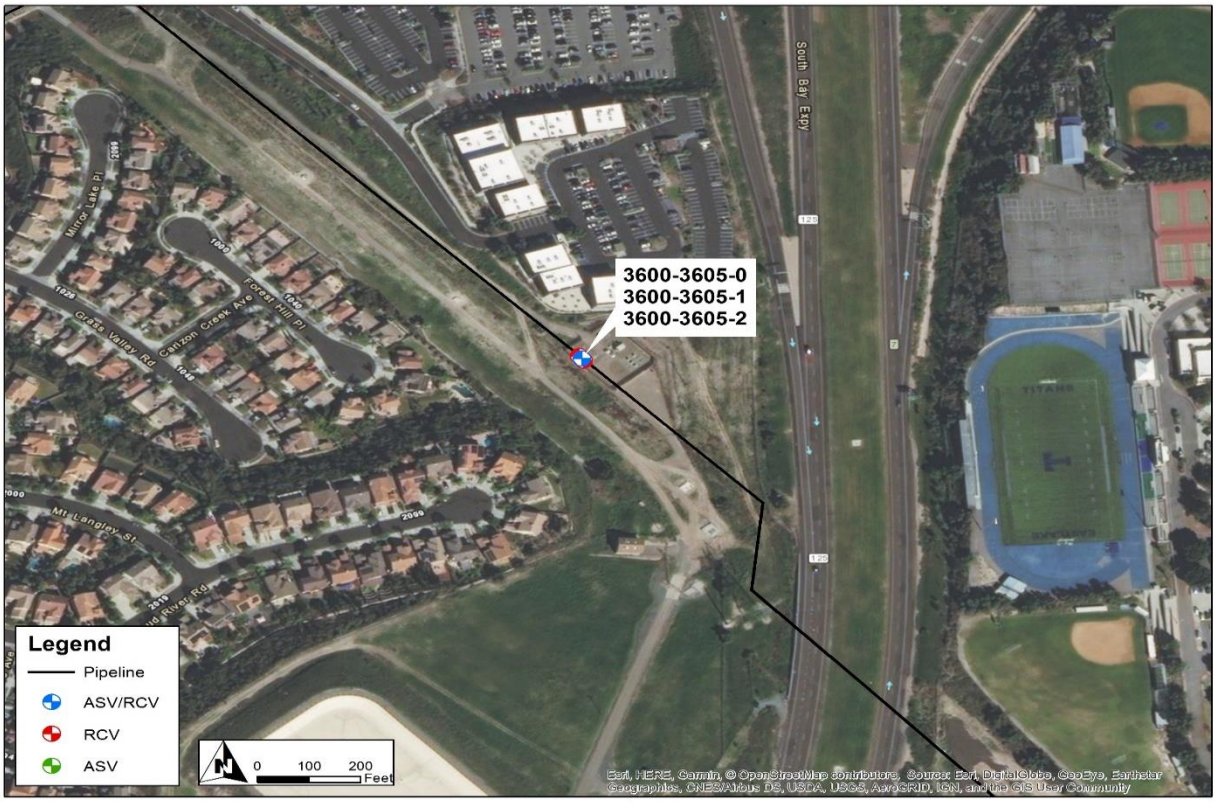


Figure 7: Satellite Image of Harvest Station

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified six MLVs for automation to provide remote isolation to portions of Line 3600 and Line 2010. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in the identification of seven additional valves for enhancement to provide the planned isolation. Additionally, MLV 3600-3606-0 was descoped from the bundle. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E identified MLVs 2010-2003.5-0, 3600-3602-0, 3600-3603-0, 3600-3604-0, 3600-3605-0, and 3600-3606-0 for automation to achieve the objective of rapid system isolation.

[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. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that automation of these six valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. The Project Team determined that MLV 3600-3606-0 would not provide the necessary isolation on Line 3600, therefore this valve was descoped and replaced with Valve 3012-3013-0 on Line 3012. The Project Team also determined that to achieve the transmission isolation objectives set forth in the Valve Enhancement Plan, it was necessary to automate bridle valves 3600-3602-1, 3600-3602-2, 3600-3603-1, 3600-3603-2, 3600-3605-1, and 3600-3600-2. Together, the automation of these 12 valves enables rapid isolation, achieving Valve Enhancement Plan objectives.

3. Engineering, Design, and Constructability: SoCalGas and SDG&E initially planned to install a new valve at the Santee Station site. The Project Team determined that the replacement of this valve does not fall under the scope of PSEP. The Operating District installed a new valve prior to the planned PSEP construction activities.

4. Final Project Scope: The final project scope consists of the automation of twelve valves, that included the installation of eight new actuators, the installation of power equipment, the installation of communications equipment, and the installation of necessary automation equipment at the sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile[2]	Valve #	Valve Size (*confidential*)	Installation Type	Function
2010	NA	2010-2003.5-0	[redacted]	C/P	ASV/RCV
3600	NA	3600-3602-0	[redacted]	A/VT	ASV/RCV
3600	NA	3600-3602-1	[redacted]	A/VT	RCV
3600	NA	3600-3602-2	[redacted]	A/VT	RCV
3600	NA	3600-3603-0	[redacted]	A/VT	ASV/RCV
3600	NA	3600-3603-1	[redacted]	A/VT	RCV
3600	NA	3600-3603-2	[redacted]	A/VT	RCV
3600	NA	3600-3604-0	[redacted]	A/VT	ASV/RCV
3600	NA	3600-3605-0	[redacted]	C/P	ASV/RCV
3600	NA	3600-3605-1	[redacted]	C/P	RCV
3600	NA	3600-3605-2	[redacted]	C/P	RCV
3012	NA	3012-3013-0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 3600 Valve Enhancement Project Bundle by performing a pre-design site walk to determine the existing conditions and assess any potential impacts on the design. Key factors that influenced the engineering and design of this project are as follows:

Santee Station

1. Site Description: This site is an existing SDG&E facility located in an urban environment. 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.

[2] Valve naming convention at SDG&E does not include mile point.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: The site had existing utility power. The Project Team expanded the utility power equipment to accommodate the increased loads from the new automation equipment.

5. Communication Technology: The site has existing radio communications.

Fletcher Parkway Station

1. Site Description: This site is located in a high density area that is a mix of commercial and residential buildings. The existing actuator is located in a vault.

2. Land Issues: During the pre-design site walk, the Project Team determined that the work can be performed within the existing easements.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: The site had existing utility power. The Project Team expanded the utility power equipment to accommodate the increased loads from the new automation equipment.

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

Sweetwater Springs Boulevard

1. Site Description: This site is in a vault located in a city street in an urban environment.

2. Land Issues: During the pre-design site walk, the Project Team determined that all work can be performed within the existing easements.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: The site had existing utility power. The Project Team expanded the utility power equipment to accommodate the increased loads from the new automation equipment.

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

Sweetwater Road

1. Site Description: This site is in a vault located adjacent to a road in an urban environment.

2. Land Issues: During the pre-design site walk, the Project Team determined that all work can be performed within the existing easements.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: The site had existing utility power. The Project Team expanded the utility power equipment to accommodate the increased loads from the new automation equipment.

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

Eastlake Station

1. Site Description: This site is an existing SoCalGas facility located in an urban environment. There is an existing fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team all work can be performed within the existing easements.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: There was existing utility power.

5. Communication Technology: The site has existing radio communications.

Harvest Station

1. Site Description: This site is an existing SoCalGas facility located in an industrial environment. There is an existing fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team determined that all work can be performed within the existing easements.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: There was 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 and SDG&E reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a pre-design site walk. Key factors that influenced the engineering and design of the Project are as follows:

Santee Station

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would accommodate the new equipment.
2. Valve Details: The existing valve is a manually actuated Class 600 ball valve that the Project Team reused.
3. Actuator Details: The existing actuator was compatible with PSEP technology 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 spot checks during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas facility.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Fletcher Parkway Station

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and verified that the existing vault could house the new actuator.

2. Valve Details:

   a. 3600-3602-0: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

   b. 3600-3602-1: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

   c. 3600-3602-2: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

   a. 3600-3602-0: There was no preexisting actuator, the Project Team installed a new actuator.

   b. 3600-3602-1: There was no preexisting actuator, the Project Team installed a new actuator.

   c. 3600-3602-2: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any notable 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Sweetwater Spring Boulevard

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and verified that the existing vault would house the new actuator.

2. Valve Details:

   a. 3600-3603-0: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

   b. 3600-3603-1: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

c. 3600-3603-2: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

   a. 3600-3603-0: There was no preexisting actuator, the Project Team installed a new actuator.

   b. 3600-3603-1: There was no preexisting actuator, the Project Team installed a new actuator.

   c. 3600-3603-2: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any notable 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Sweetwater Road

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and verified that the existing vault could house the new actuator.

2. Valve Details: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Eastlake Station

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would accommodate the new equipment.

2. Valve Details:

   a. 3600-3605-0: The existing valve is a manually actuated Class 600 ball valve that was reused.

   b. 3600-3605-1: The existing valve is a manually actuated Class 600 ball valve that was reused.

   c. 3600-3605-2: The existing valve is a manually actuated Class 600 ball valve that was reused.

3. Actuator Details:

   a. 3600-3605-0: The existing actuator was compatible with PSEP technology that the Project Team reused.

   b. 3600-3605-1: The existing actuator was compatible with PSEP technology that the Project Team reused.

c. 3600-3605-2: The existing actuator was compatible with PSEP technology 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Harvest Station

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would accommodate the new equipment.

2. Valve Details: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

3. Actuator Details: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any 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.

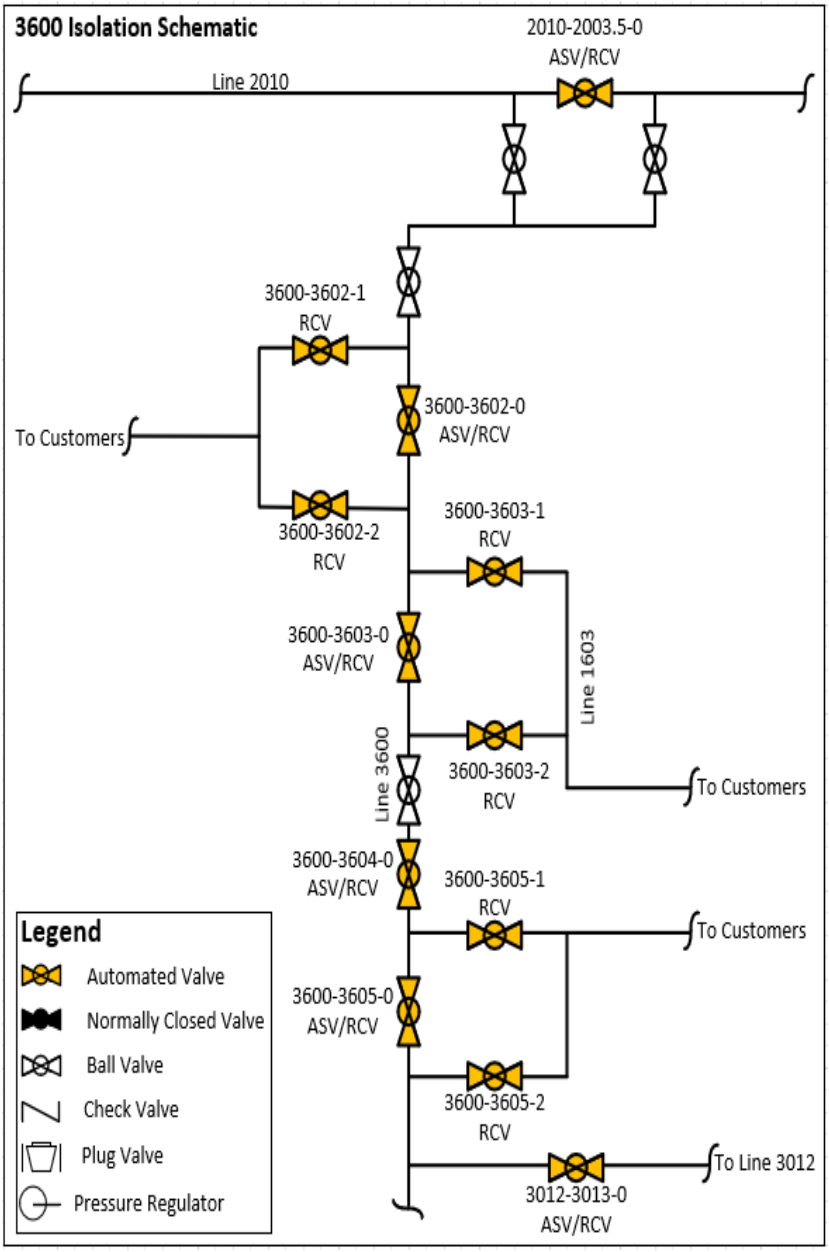
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Figure 8: Line 3600 Valve Enhancement Project Bundle Schematic



D. Scope Changes

SoCalGas and SDG&E 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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Santee Station	
Construction Start Date	05/05/2015
Construction Completion Date	06/17/2015
Days on Site	12 days
Commissioning Date	03/16/2016
Fletcher Parkway Station	
Construction Start Date	12/14/2015
Construction Completion Date	11/04/2016
Days on Site	12 days
Commissioning Date	12/27/2017
Sweetwater Springs Boulevard	
Construction Start Date	11/4/2015
Construction Completion Date	12/10/2015
Days on Site	35 Days
Commissioning Date	03/16/2016
Sweetwater Road	
Construction Start Date	10/05/2015
Construction Completion Date	11/25/2015
Days on Site	30 Days
Commissioning Date	03/16/2016
Eastlake Station	
Construction Start Date	04/06/2015
Construction Completion Date	06/19/2015
Days on Site	23 Days
Commissioning Date	07/22/2015
Harvest Station	
Construction Start Date	03/30/2015
Construction Completion Date	06/19/2015
Days on Site	11 Days
Commissioning Date	07/23/2015

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $676,000 in change orders.

Santee Station

The site conditions at the Santee Station site had no notable impact during construction.

Fletcher Parkway Station

1. Constructability Issues: The Project Team determined the service connections for sense lines planned for installation inside an underground vault could not be installed due to space limitations. Therefore, the design was modified to accommodate site conditions. This required additional excavation and backfill, traffic control, and modifications to the existing vault.

Sweetwater Springs

1. Constructability Issues: The Project Team determined that service connections for sense lines planned for installation inside an underground vault could not be installed due to space limitations. Therefore, the design was modified to accommodate site conditions. This required additional excavation and backfill, traffic control, and modifications to existing vault.

2. Soil Conditions: The Project Team encountered rock during their excavation for the radio communications antenna. This required additional equipment and labor.

3. Site Restoration: Due to a request from the City of San Diego, the Project Team directed the Mechanical Construction Contractor to pave the work area adjacent to the sidewalk.

Sweetwater Road

The site conditions at the Sweetwater Road site had no notable impacts during construction.

Eastlake Station

The site conditions at the Eastlake Station site had no notable impacts during construction.

Harvest Station

The site conditions at the Harvest Station site had no notable impacts during construction.

Figure 9: Typical Sense Line Piping

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves back into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on July 22, 2015, July 23, 2015, March 16, 2016, and December 27, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. The Project Team bundled projects to coordinate engineering activities between the six Line 3600 Valve Enhancement Project Bundle 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 and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $2,404,718. This estimate was prepared in May of 2014, using the “Stage 3 San Diego Valve Estimate Template Rev 0” estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $5,294,781.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	99,440	317,038	217,598
Materials	1,074,354	644,134	(430,220)
Mechanical Construction Contractor	460,460	1,605,599	1,145,139
Electrical Contractor	350,955	486,483	135,528
Construction Management & Support	121,440	308,625	187,185
Environmental	11,220	79,073	67,853
Engineering & Design	11,220	511,970	500,750
Project Management & Services	4,972	89,908	84,936
ROW & Permits	16,500	5,578	(10,922)
GMA	254,157	323,644	69,487
Total Direct Costs	**2,404,718**	**4,372,052**	**1,967,334**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	348,631	725,868	377,237
AFUDC	127,124	164,415	37,291
Property Taxes	-	32,446	32,446
Total Indirect Costs	**475,755**	**922,729**	**446,974**
Total Direct Costs	**2,404,718**	**4,372,052**	**1,967,334**
Total Loaded Costs	**2,880,473**	**5,294,781**	**2,414,308**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 3600 Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated six mainline valves, and six bridle valves to achieve the objective of enabling rapid system isolation in the cities and unincorporated areas of Santee, La Mesa, Spring Valley, Bonita, Chula Vista, and Otay Mesa . The total loaded cost of the Project is $5,294,781.

SoCalGas and SDG&E executed this project prudently through designing and executing the Project to achieve the PSEP Valve Enhancement Plan isolation objectives, coordinating and bundling six valve projects into a comprehensive construction package to capture efficiencies through coordinated scheduling of construction crews, and installing equipment necessary to enable rapid system isolation to portions of Line 3600, Line 2010, and Line 3012 in the cities and unincorporated communities of Santee, La Mesa, Spring Valley, Bonita, Chula Vista, and Otay Mesa.

SoCalGas and SDG&E 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 across six different project sites to maximize efficiencies and reduce customer and community impacts.

End of Line 3600 Valve Enhancement Project Bundle Final Report

I. LINE 4000 BENSON AND 7TH VALVE PROJECT

A. Background and Summary

This report describes the activities associated with the Line 4000 Benson and 7th Valve Enhancement Project that consists of valve enhancements made to an existing mainline valve (MLV) in the City of Upland in San Bernardino County. Through this project, SoCalGas and SDG&E enhanced the capabilities of MLV 4000-92.74-0 to enable rapid transmission system isolation to a portion of Line 4000. SoCalGas and SDG&E installed a new actuator, power equipment, communications equipment, and necessary automation equipment at the site. The total loaded project cost is $1,612,051.

The Line 4000 Benson and 7th Valve Enhancement Project site is located in an open space in a commercial area on Benson Avenue in the City of Upland.

Table 1: General Project Information

Line 4000 Benson and 7th Valve Enhancement Project			
Location	City of Upland		
Days on Site	32 days		
Construction Start	10/10/2016		
Construction Finish	11/29/2016		
Commissioning Date	01/17/2018		
Valve Upgrades			
Valve Number	4000-92.74-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	Existing		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	Yes0		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,612,051	-	1,612,051
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 4000 Benson and 7th Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified MLV 4000-92.74-0, for automation to provide remote isolation to a portion of Line 4000. Prior to initiating execution of the Project, SoCalGas and SDG&E 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 and SDG&E identified MLV 4000-92.74-0 for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.

3. Engineering, Design, and Constructability: No notable engineering adjustments were required to the standard design.

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

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

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
4000	92.74	0	[redacted]	A/VT	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 4000 Benson and 7th Valve Project by performing a pre-design site walk to determine the existing conditions and assess any potential impacts on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is in a high-density, primarily commercial area. The existing valve was positioned on its side with its valve stem extended into a vault.
2. Land Issues: During the pre-design site walk, the Project Team noted that construction activities 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 the site.

C. Engineering, Design, and Planning Factors

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

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and measurements of the preexisting vault. Based on the specifications of the new actuator to be installed, the Project Team determined that the existing vault provided sufficient space to house and operate the new actuator.

2. Valve Details: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team 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.

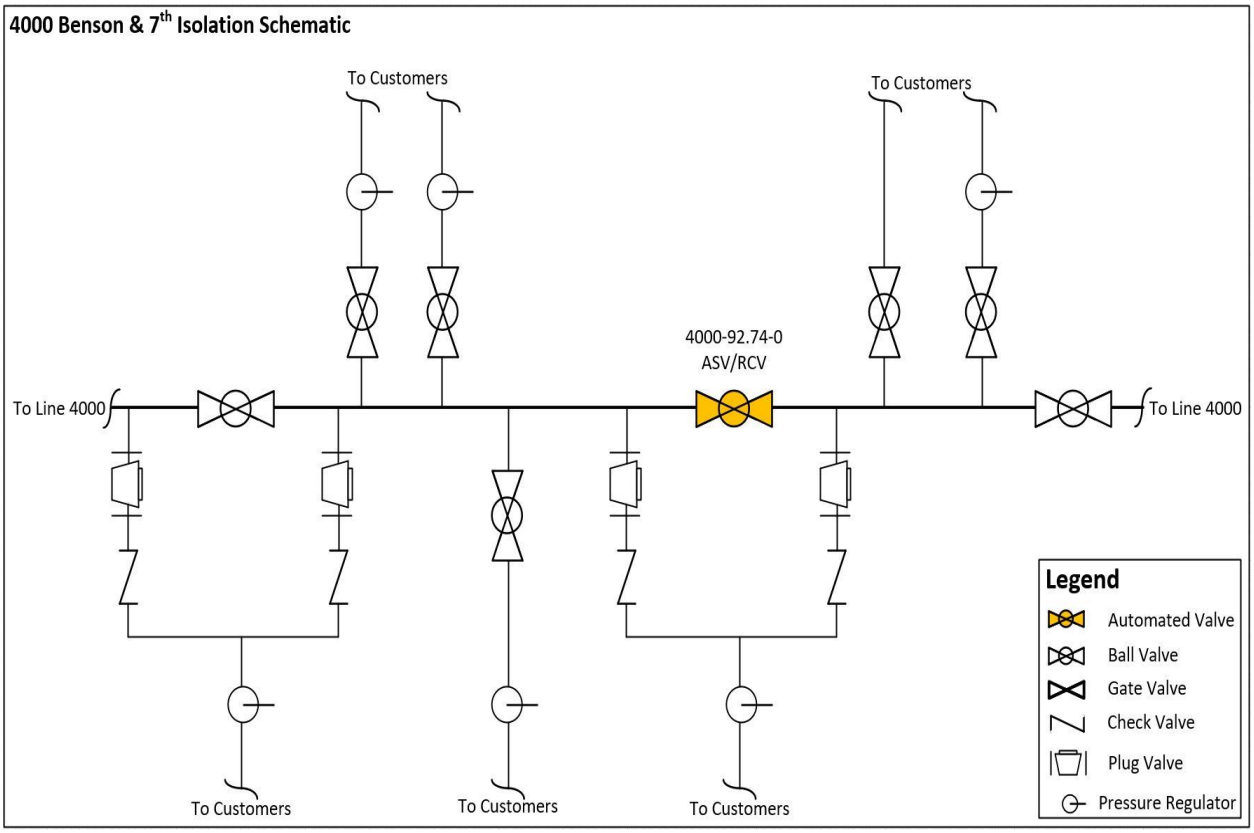
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The Project Team obtained permits from the City of Upland, City of Montclair, and Caltrans.

9. Land Use: The Project Team performed all work within the existing SoCalGas easements.

10. Traffic Control: The Project Team closed one traffic lane during construction for excavation. The Project Team plated the excavation during non-working hours to allow traffic to pass through unimpeded during non-construction hours.

Figure 2: Schematic of Line 4000 Benson and 7th Site



D. Scope Changes

SoCalGas and SDG&E 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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's preliminary cost estimate for construction [redacted].

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

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	10/10/2016
Construction Completion Date	11/29/2016
Days on Site	32 days
Commissioning Date	01/17/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $150,000 in change orders.

1. Field Design Change:

   a. The Project design did not include trenching from the power source to the new electrical meter pedestal in the cost estimate. Therefore, the Project Team directed the Construction Contractor to trench, lay electrical conduit, and pave approximately 300 feet of road from the City of Montclair side of the street at the power source to the electrical meter pedestal on the City of Upland side of the street. This activity required extensive traffic control for daytime excavation across the roadway.

   b. In order to remove the existing actuator from the existing vault, the Construction Contractor removed the manhole cover and identified that the concrete collar had deteriorated and needed to be replaced.

Figure 3: Underground Power Crossing Benson Avenue

Figure 4: Cabinets for Automation

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the actuator into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on January 17, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 utilized an electric actuator in order to avoid the installation of a new vault.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $1,097,594. This estimate was prepared in September of 2016, using the "Stage 3 SCG Estimating Template Rev 3" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $1,612,051.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	172,700	134,064	(38,636)
Materials	145,463	125,008	(20,455)
Mechanical Construction Contractor	300,425	435,228	134,803
Electrical Contractor	149,160	104,441	(44,719)
Construction Management & Support	53,350	91,287	37,937
Environmental	38,830	18,501	(20,329)
Engineering & Design	18,224	171,469	153,245
Project Management & Services	94,911	34,405	(60,506)
ROW & Permits	24,750	53,446	28,696
GMA	99,781	165,994	66,213
Total Direct Costs	**1,097,594**	**1,333,843**	**236,249**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	493,710	173,723	(319,987)
AFUDC	57,700	80,548	22,848
Property Taxes	12,504	23,937	11,433
Total Indirect Costs	**563,914**	**278,208**	**(285,706)**
Total Direct Costs	**1,097,594**	**1,333,843**	**236,249**
Total Loaded Costs	**1,661,508**	**1,612,051**	**(49,457)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 4000 Benson and 7th Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully automated one mainline valve to achieve the objective of enabling rapid system isolation in City of Upland. The total loaded cost of the Project is $1,612,051.

SoCalGas and SDG&E executed this project prudently by designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, installing a new electric actuator in the existing vault, and by installing the equipment necessary to bring power and communication capabilities to this valve to enable rapid system isolation to a portion of Line 4000 in the City of Upland.

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

End of Line 4000 Benson and 7th Valve Project Final Report

I. LINE 4000 MP 45.36 VALVE ENHANCEMENT PROJECT

A. Background and Summary

This report describes the activities associated with the Line 4000 MP 45.36 Valve Enhancement Project that consists of valve enhancements made to a new mainline valve (MLV) in the City of Apple Valley in San Bernardino County. Through this project, SoCalGas and SDG&E enhanced the capabilities of new MLV 4000-45.36-0 to provide rapid transmission system isolation to a portion of Line 4000. SoCalGas and SDG&E expanded an existing facility, which included the installation of a new mainline valve, a new blowdown assembly, a new actuator, a new vault to house the actuator, a new bridle tap that serves another gas utility, new communications equipment, and the necessary automation equipment at the site. This valve is now known as MLV 4000-45.37-0. The total loaded project cost of the PSEP scope of this project is $1,257,024.

The Line 4000 MP 45.36 Valve Enhancement Project site is located in an existing fenced in SoCalGas facility in Apple Valley. The facility is in a desert environment with a few residences nearby. This project was designed and executed as one cohesive project, however the project costs were shared by PSEP and the Operating District with PSEP funding the activities that provided system isolation through automation of the new mainline valve.

Table 1: General Project Information

Line 4000 MP 45.36 Valve Enhancement Project			
Location	Apple Valley		
Days on Site	46 days		
Construction Start	09/26/2016		
Construction Finish	12/28/2016		
Commissioning Date	03/07/2017		
Valve Upgrades			
Valve Number	4000-45.36-0		
Valve Type	New – Ball		
Actuator	New		
Actuator Above/Below-Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	New		
Power	Existing – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing	Existing – Expanded		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,257,024	-	1,257,024
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 4000 MP 45.36 Valve Enhancement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope did not include this project. SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis that identified this location for a new MLV 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 and SDG&E reviewed the conceptual project scope and determined that the installation and automation of a new MLV on Line 4000 enables rapid isolation, achieving Valve Enhancement Plan objectives.

3. Engineering, Design, and Constructability:
   a. The SoCalGas and SDG&E selected this location for a new MLV and bridle assembly to provide improved operational flexibility and reliability.

   b. SoCalGas and SDG&E determined that automation of this MLV would provide rapid transmission system isolation to a portion of Line 4000.

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

4. Final Project Scope: The final project scope consists of the installation of a new mainline valve, the installation of a new actuator, the installation of a new vault to house the actuator, the installation of a new blowdown assembly, the installation of a new bridle tap assembly to a separate gas utility, the installation of communications equipment, and the necessary automation equipment at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
4000	45.36	0	[redacted]	NV/VT	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 4000 MP 45.36 Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impacts 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 with an existing tap to a separate gas utility. The facility is in a low-density, desert environment with a few residences nearby.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: The site has existing utility power.

5. Communication Technology: The site had existing 4-wire communications which was no longer serviced by the communication utility. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

SoCalGas and SDG&E 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: SoCalGas and SDG&E identified this section of Line 4000 as requiring a new MLV and bridle assembly to provide improved operational flexibility and reliability. This site was selected because it is an existing SoCalGas facility. During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.

2. Valve Details: There was no 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 performed all work during summer conditions to avoid any customer impacts. The Project Team accelerated the construction schedule to take advantage of a blowdown for another project on Line 4000 to limit the number of shut-ins to the line. The Project Team coordinated work with the local gas utility serviced by this section of the line to avoid service disruptions.

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.

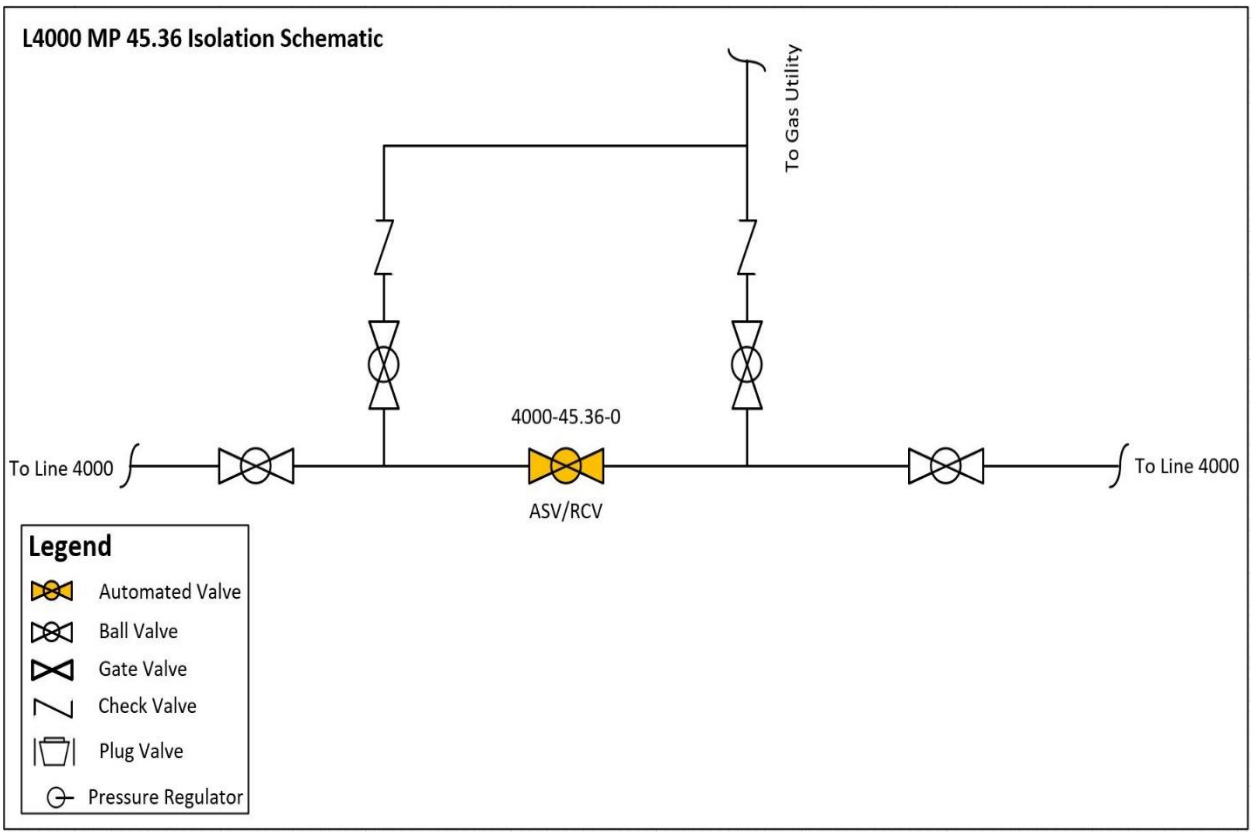
7. Environmental: The Project Team completed a biological survey one week prior to construction activities. A biological monitor was on-site full time during construction.

8. Permit Restrictions: The Project Team obtained two permits from the County of San Bernardino for the installation of the electrical shelter and the relocation of the existing utility power meterbox.

9. Land Use: The Project Team obtained a Temporary Right of Entry (TRE) for construction activities.

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

Figure 2: Line 4000 MP 45.36 Valve Enhancement Project Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E 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. SoCalGas and SDG&E determined that the installation cost of the new mainline valve should be a shared cost between PSEP and the Operating District. This valve location was critical for accomplishing the PSEP objective of system isolation by installing a new MLV and bridle assembly to provide improved operational flexibility and reliability. Therefore, PSEP and the Operating District shared contract, materials, and direct costs related to the installation and automation of the new mainline valve at a predetermined allocation. The remaining costs directly related to the automation of the new valve and the installation of two check valves for backflow prevention were allocated solely to PSEP, as these activities and costs are associated with the PSEP objectives of system isolation and prevention of backflow.

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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	09/26/2016
Construction Completion Date	12/28/2016
Days on Site	46 days
Commissioning Date	03/07/2017

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

C. Changes During Construction

SoCalGas and SDG&E 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 3: New Vault in the Foreground, Existing Piping 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 and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. 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 7, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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. Planning and Coordination: The Project Team accelerated the schedule for the Line 4000 MP 45.36 Valve Enhancement Project to align with a planned blowdown for work being performed by the Operating District. This allowed for a single blowdown of this portion of Line 4000 that accommodated the work related to both projects. Additionally, the Project Team scheduled construction to occur during summer conditions to avoid the need to utilize CNG/LNG during the tie-in.
2. Land Use: SoCalGas and SDG&E stayed within existing easements, avoiding the cost of new land and easements.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $1,220,431. This estimate was prepared in June of 2015, using the "Stage 3 SCG Valve Estimate Template Rev 1" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $1,257,024.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	150,621	103,408	(47,213)
Materials	125,032	164,137	39,105
Mechanical Construction Contractor	358,761	244,908	(113,853)
Electrical Contractor	150,471	152,564	2,093
Construction Management & Support	53,411	82,036	28,625
Environmental	26,798	9,369	(17,429)
Engineering & Design	143,530	162,226	18,696
Project Management & Services	72,772	54,267	(18,505)
ROW & Permits	-	9,063	9,063
GMA	139,035	129,577	(9,458)
Total Direct Costs	**1,220,431**	**1,111,555**	**(108,876)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	323,725	125,722	(198,003)
AFUDC	151,278	14,377	(136,901)
Property Taxes	31,697	5,370	(26,327)
Total Indirect Costs	**506,700**	**145,469**	**(361,231)**
Total Direct Costs	**1,220,431**	**1,111,555**	**(108,876)**
Total Loaded Costs	**1,727,131**	**1,257,024**	**(470,107)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 4000 MP 45.36 Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully automated a new mainline valve to achieve the objective of enabling rapid system isolation in the City of Apple Valley. The total loaded cost of the Project is $1,257,024.

SoCalGas and SDG&E executed this project prudently through: designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives; coordinating work with the Operating District, and scheduling construction to take advantage of a planned blowdown to the pipeline, avoiding any additional blowdown; and installing the equipment necessary to bring communication capabilities to this valve to enable rapid system isolation to a portion of Line 4000 in Apple Valley.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by careful planning and coordination of construction activity with a separate project, while avoiding any customer impacts during a planned blowdown; 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 given the conditions and work scope changes experienced during construction, so as to complete the safety enhancement work as soon as practicable.

End of Line 4000 MP 45.36 Valve Enhancement Project Final Report

I. LINE 4000 MP 53.00 VALVE ENHANCEMENT PROJECT

A. Background and Summary

This report describes the activities associated with the Line 4000 MP 53.00 Valve Enhancement Project that consists of valve enhancements made to a new mainline valve (MLV) in San Bernardino County. Through this project, SoCalGas and SDG&E enhanced the new MLV 4000-53.00-0 to enable rapid transmission system isolation to a portion of Line 4000. SoCalGas and SDG&E constructed a new valve station, that included the installation of a new mainline valve, a new actuator, a new block wall, a new blowdown assembly, a new tap to the Los Flores Regulating Station, new power equipment, new communications equipment and the necessary automation equipment at the site. This valve is now known as MLV 4000-53.84-0. The total loaded project cost of the PSEP scope of this project is $1,369,749.

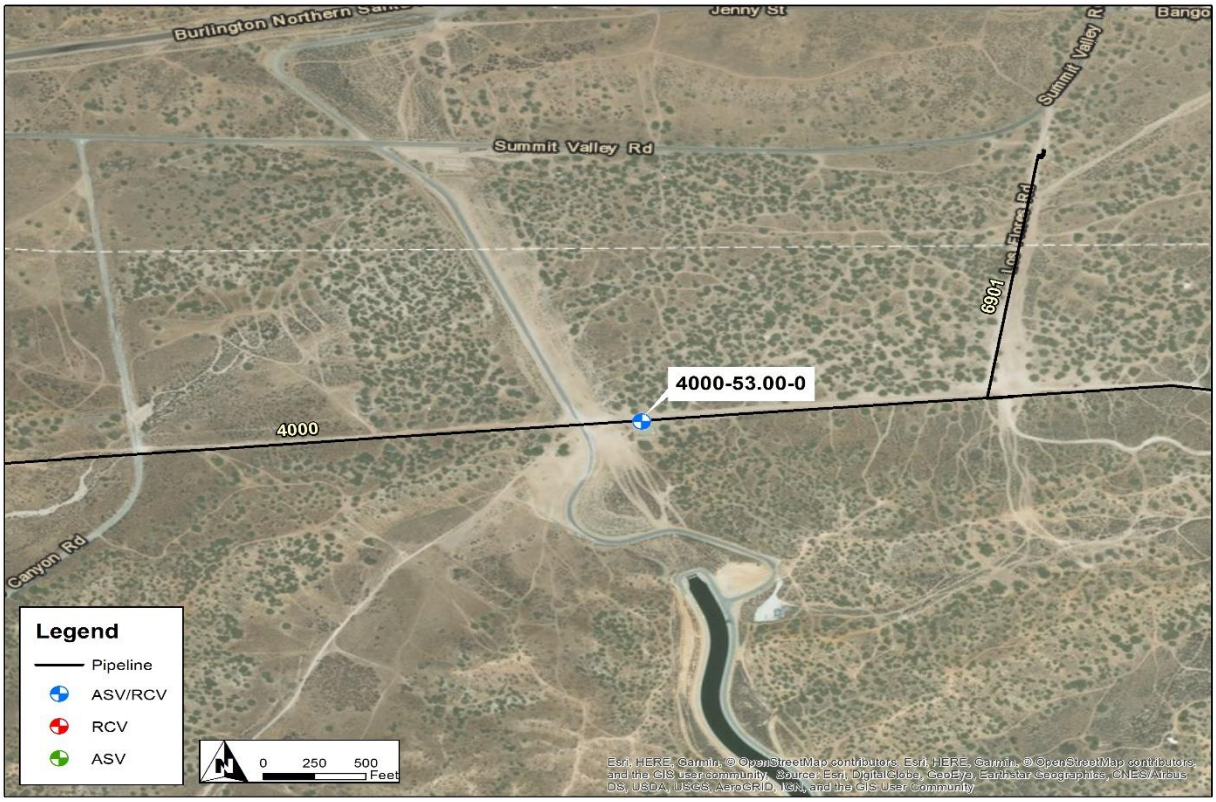
The Line 4000 MP 53.00 Valve Enhancement Project site is in a desert environment within the environmentally sensitive California Desert Conservation Area (CDCA). The project site is near the existing Los Flores Regulating station. This project was designed and executed as one cohesive project, however the project costs were shared by PSEP and the Operating District with PSEP funding the activities that provided system isolation through automation of the new mainline valve.

Table 1: General Project Information

Line 4000 MP 53.00 Valve Enhancement Project			
Location	San Bernardino County		
Days on Site	104 days		
Construction Start	05/26/2015		
Construction Finish	11/19/2015		
Commissioning Date	04/04/2016		
Valve Upgrades			
Valve Number	4000-53.00-0		
Valve Type	New – 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		
Wall	New		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,369,749	-	1,369,749
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 4000 MP 53.00 Valve Enhancement Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. The conceptual scope did not include this project. SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope that identified this location for a new MLV to provide the planned isolation. Additionally, SoCalGas and SDG&E had identified this section of Line 4000 for the installation of a new mainline valve due to a class location update. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E did not previously identify this valve for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon Project initiation, SoCalGas and SDG&E reviewed the available information and determined that a MLV was necessary on Line 4000 due to a change in class location. The automation of this new MLV would achieve the isolation objectives set forth in the Valve Enhancement Plan.

3. Engineering, Design, and Constructability: The Project site is located near the existing Los Flores Regulating Station, that feeds another natural gas utility. The tap to the station was abandoned and a new bridle tap was installed within the new station. The Project Team installed two check valves on the new bridle tap for backflow prevention.

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

4. Final Project Scope: The final project scope consists of the installation of a new mainline valve, the installation of a new actuator, the installation of a block wall, the abandonment of the existing tap to the Los Flores Regulating Station, the installation of a new bridle tap to the Los Flores Regulating Station, the installation of a new blowdown assembly, the installation of power equipment, the installation of communications equipment, the necessary automation equipment, and the installation of two check valves at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
4000	53.00	0	[redacted]	NV/VT	ASV/RCV
4000	53.00	Chk	[redacted]	NV	BFP2
4000	53.00	Chk	[redacted]	NV	BFP2

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 4000 MP 53.00 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 in a desert environment on private property. This location is easily accessible for both construction and for future maintenance and operation. There are existing overhead powerlines near the project site. The existing 2-inch tap for the Los Flores Regulating Station that feeds a separate gas utility is approximately 1,000 feet to the east of this location.

2. Land Issues: The site for the new valve station is on private property. The Project Team obtained above-ground exclusive easement rights.

3. DOT Class: This Project Site is a Class 1 Location. SoCalGas and SDG&E selected this MLV for automation in order to isolate an HCA location upstream of this valve and to satisfy the PSEP valve spacing requirements.

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 and SDG&E 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 pre-design site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: SoCalGas and SDG&E identified this section of Line 4000 as requiring a new mainline valve due to a change in class location. This specific site was selected due to its proximity to the existing Los Flores Regulating Station and due to increased operational flexibility that would result from the installation of a new bridle configuration servicing the regulating station at the new mainline valve.

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 Project Team performed all work during summer conditions to avoid customer impacts. The Project Team accelerated the construction schedule to take advantage of a blowdown for another project on Line 4000, limiting the impact of the shut-ins.

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.

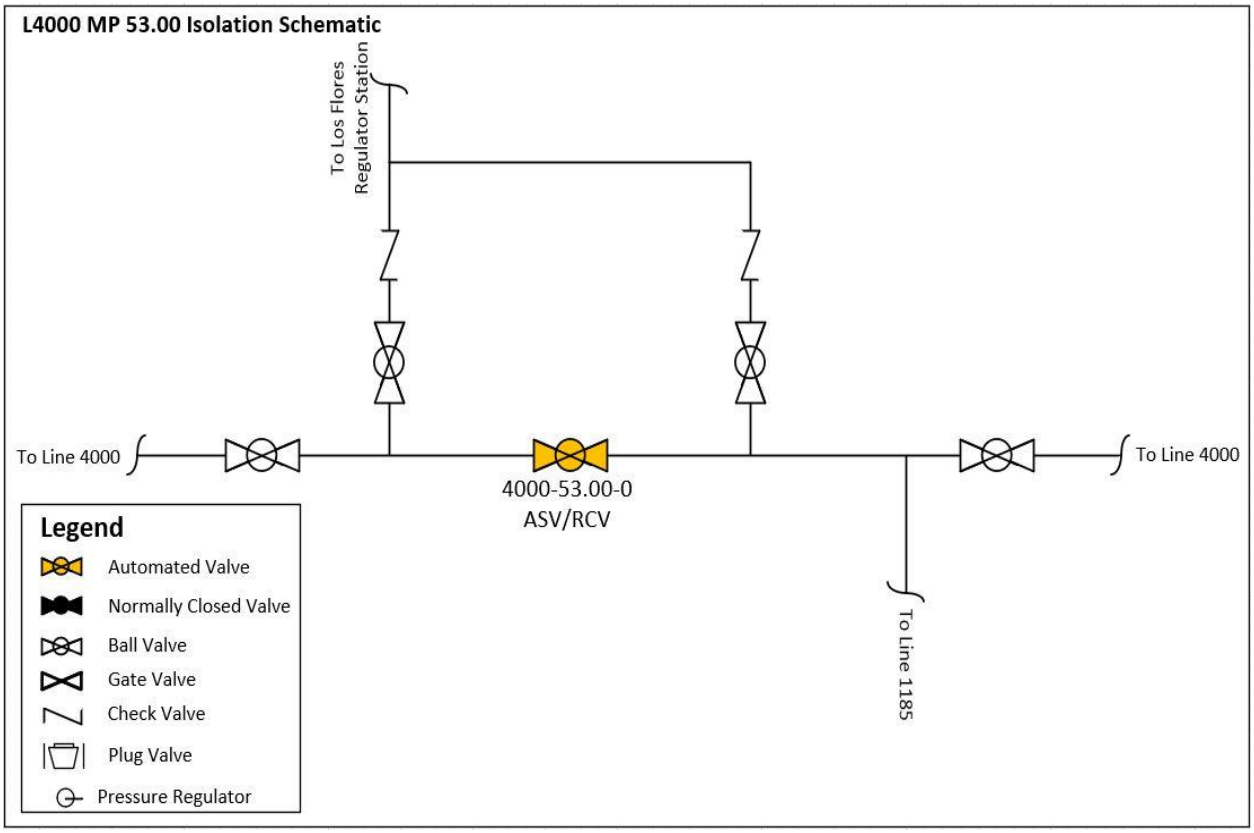
7. Environmental: The Project Team completed a biological survey one week prior to construction activities. A biological monitor was on-site full time during construction.

8. Permit Restrictions: The Project Team received a permit for the installation of the electrical pedestal from The County of San Bernardino Building and Safety Department.

9. Land Use: The Project Team obtained a new, above-grade, easement for the new station.

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

Figure 2: Line 4000 MP 53.00 Valve Enhancement Project Schematic



D. Scope Changes

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

1. SoCalGas and SDG&E determined that the installation cost of the new mainline valve should be a shared cost between PSEP and the Operating District because, although this valve location was critical for accomplishing the PSEP objective of system isolation, it was also required due to a class location update. Therefore, PSEP and the Operating District shared contract, materials, and direct costs related to the installation and automation of the new mainline valve at a predetermined allocation. The remaining costs directly related to the automation of the new valve and the installation of two check valves for backflow prevention were allocated solely to PSEP, as these activities and costs are associated with the PSEP objectives of system isolation and prevention of backflow.

2. The Project Team planned to install solar power at the new station. SoCalGas and SDG&E revised the design to utilize utility power at the new station. This increased engineering costs.

3. SoCalGas and SDG&E updated the company electrical standards, requiring a redesign prior to construction. This resulted in increased engineering costs.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package, that included the updated design described in the discussion of notable changes in scope above. The estimated values below include PSEP and non-PSEP work, whereas Table 4 and 5 include estimated and actual values for PSEP work only.

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

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

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

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

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/26/2015
Construction Completion Date	11/19/2015
Days on Site	104 days
Commissioning Date	04/04/2016

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $235,000 in change orders.

1. Safety: Before restoring service, SoCalGas and SDG&E excavated the line and performed x-ray tests after a foreign sound was heard in the pipe, causing concern that there was potentially an object inside the pipe that could damage the valve. These tests revealed that it was safe to complete the job and restore service. SoCalGas and SDG&E backfilled the trench, and work proceeded.

2. Field Design Change: The Project Team relocated the sliding gate on the block wall to the north side of the wall to improve safety. This resulted in a schedule delay while waiting for approval from the County of San Bernardino.

Figure 3: Placement of the New Mainline Valve Assembly

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. 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 4, 2016, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E exercised due diligence in the design, planning, and execution of 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. Planning and Coordination:

    a. The Project Team accelerated the schedule for the Line 4000 MP 53.00 Valve Enhancement Project to align with a planned blowdown for work being performed by the Operating District. This allowed for a single blowdown of this portion of Line 4000 that accommodated the work related to the two projects. Additionally, the Project Team scheduled construction to occur during summer conditions to avoid the need to utilize CNG/LNG during the tie-in.

    b. The Project Team scheduled and coordinated construction with the Line 4000 MP 80.08 Valve Enhancement Project. Both projects were awarded to the same Performance and Alliance Partners so that resources could be shared. This minimized the downtime for construction contractors and allowed the projects to share inspectors.

2. Engineering and Design: The Project Team selected a location that would minimize the length of the new bridle associated with the existing Los Flores Regulator Station.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $800,149. This estimate was prepared in April of 2015, using the "Stage 3 SCG Valve Estimate Template Rev 2" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $1,369,749.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	39,804	109,036	69,232
Materials	128,456	75,082	(53,374)
Mechanical Construction Contractor	157,795	327,339	169,544
Electrical Contractor	31,035	107,785	76,750
Construction Management & Support	26,831	163,843	137,012
Environmental	14,703	56,737	42,034
Engineering & Design	79,895	129,883	49,988
Project Management & Services	48,798	35,972	(12,826)
ROW & Permits	8,823	41,376	32,553
GMA	264,009	137,168	(126,841)
Total Direct Costs	**800,149**	**1,184,221**	**384,072**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	453,412	145,441	(307,971)
AFUDC	42,971	35,897	(7,074)
Property Taxes	39,132	4,190	(34,942)
Total Indirect Costs	**535,515**	**185,528**	**(349,987)**
Total Direct Costs	**800,149**	**1,184,221**	**384,072**
Total Loaded Costs	**1,335,664**	**1,369,749**	**34,085**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 4000 MP 53.00 Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully installed and automated a mainline valve to achieve the objective of enabling rapid system isolation in San Bernardino County. The total loaded cost of the Project is $1,369,749.

SoCalGas and SDG&E executed this project prudently through coordinating and bundling construction with the MP 80.08 Valve Enhancement Project to capture efficiencies through coordinated scheduling of construction crews, coordinating work with required transmission work at the same location, and scheduling construction to take advantage of a planned blowdown to the pipeline, avoiding an additional blowdown.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by careful planning and coordination of construction activities with a separate project, while avoiding customer impacts during a planned blowdown, engaged in reasonable efforts to promote competitive and market-based rates for contractor services and materials, and used a reasonable amount of company and contractor resources given the conditions and work scope changes experienced during construction, so as to complete the safety enhancement work as soon as practicable.

End of Project Line 4000 MP53.00 Valve Enhancement Project

I. LINE 4000 MP 80.08 VALVE ENHANCEMENT PROJECT

A. Background and Summary

This report describes the activities associated with the Line 4000 MP 80.08 Valve Enhancement Project that consists of valve enhancements made to a new mainline valve (MLV) in the City of Fontana. Through this project, SoCalGas and SDG&E enhanced the capabilities of new MLV 4000-80.08-0 to provide rapid transmission system isolation to a portion of Line 4000. SoCalGas and SDG&E installed a new mainline valve, a new actuator, a new vault to house the actuator, two new check valves, a new tap to an existing regulating station, a new blowdown assembly, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost of the PSEP scope of this project is $1,244,774.

The Line 4000 MP 80.08 Valve Enhancement Project site is in an agricultural field within the City of Fontana. The site is next to the existing regulating station. There is an existing tap from Line 4000 to the regulating station at the project site. This project was designed and executed as one cohesive project, but the project costs were shared by PSEP and the Operating District with PSEP funding the activities that provided system isolation through automated communication with the new mainline valve.

Table 1: General Project Information

Line 4000 MP 80.08 Valve Enhancement Project			
Location	Fontana		
Days on Site	52 days		
Construction Start	05/12/2015		
Construction Finish	08/26/2015		
Commissioning Date	03/03/2016		
Valve Upgrades			
Valve Number	4000-80.08-0		
Valve Type	New – Ball		
Actuator	New		
Actuator Above/Below Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	New		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,244,715	59	1,244,774
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 4000 MP 80.08 Valve Enhancement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope did not include this project. SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope that identified this location for a new MLV to provide the planned isolation. Additionally, SoCalGas and SDG&E had identified this section of Line 4000 for the installation of a new mainline valve due to a class location update. 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: Upon project initiation, SoCalGas and SDG&E reviewed the available information and determined that a MLV was necessary on Line 4000 due to a change in class location. The automation of this new MLV would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.

3. Engineering, Design, and Constructability:

    a. The Project Team reviewed the option of installing a new above-grade station. Due to existing easement restrictions, the Project Team determined that a below-grade design would suffice and proceeded with the project design.

[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. The project site is located near the existing regulating station ID-1293IE. The tap to the station was abandoned and a new bridle tap was installed at the Project Site. The Project Team installed two check valves on the new bridle taps for backflow prevention.

4. Final Project Scope: The final project scope consists of the installation of a new mainline valve, the installation of a new actuator, the installation of a new vault to house the actuator, the installation of two new taps to ID-1293IE, the installation of two check valves for backflow prevention, the installation of a blowdown assembly, and the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
4000	80.08	0	[redacted]	NV/VT	ASV/RCV
4000	80.08	Chk	[redacted]	NV	BFP2
4000	80.08	Chk	[redacted]	NV	BFP2

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 4000 MP 80.08 Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impacts on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is in an agricultural field on private property. There is a dirt road that runs parallel to Line 4000. There are transmission power lines that run parallel to Line 4000 that are approximately 200 feet northwest of the mainline. There is a tap to ID-1293IE at this location.

2. Land Issues: The Project Team preformed all work within the existing easement.

3. DOT Class: This project site is a Class 1 Location. SoCalGas and SDG&E selected this MLV for automation in order to isolate HCA locations upstream and downstream of this valve and to satisfy the PSEP valve spacing requirements.

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

1. Engineering Assessment: SoCalGas and SDG&E identified this section of Line 4000 as requiring a new mainline valve due to a change in class location. The Project Team determined that a new above-ground station was not feasible at this location due to existing easement restrictions. Instead, the valve was installed below-grade and the actuator was installed in the new vault next to the mainline valve. The Project Team installed a blowdown at this site within a vault and reconfigured the existing tap to the neighboring regulator station.

2. Valve Details: There was no existing valve. The Project Team installed a new Class 600 ball valve.

3. Actuator Details: There was no preexisting actuator. The Project Team installed a new actuator.

4. Customer Impact: The Project Team performed all work during summer conditions to avoid customer impacts. The Project Team accelerated the construction schedule to take advantage of a blowdown for another project on Line 4000 to limit the amount of shut-ins.

5. Community Impact: The Project Team did not anticipate any 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.

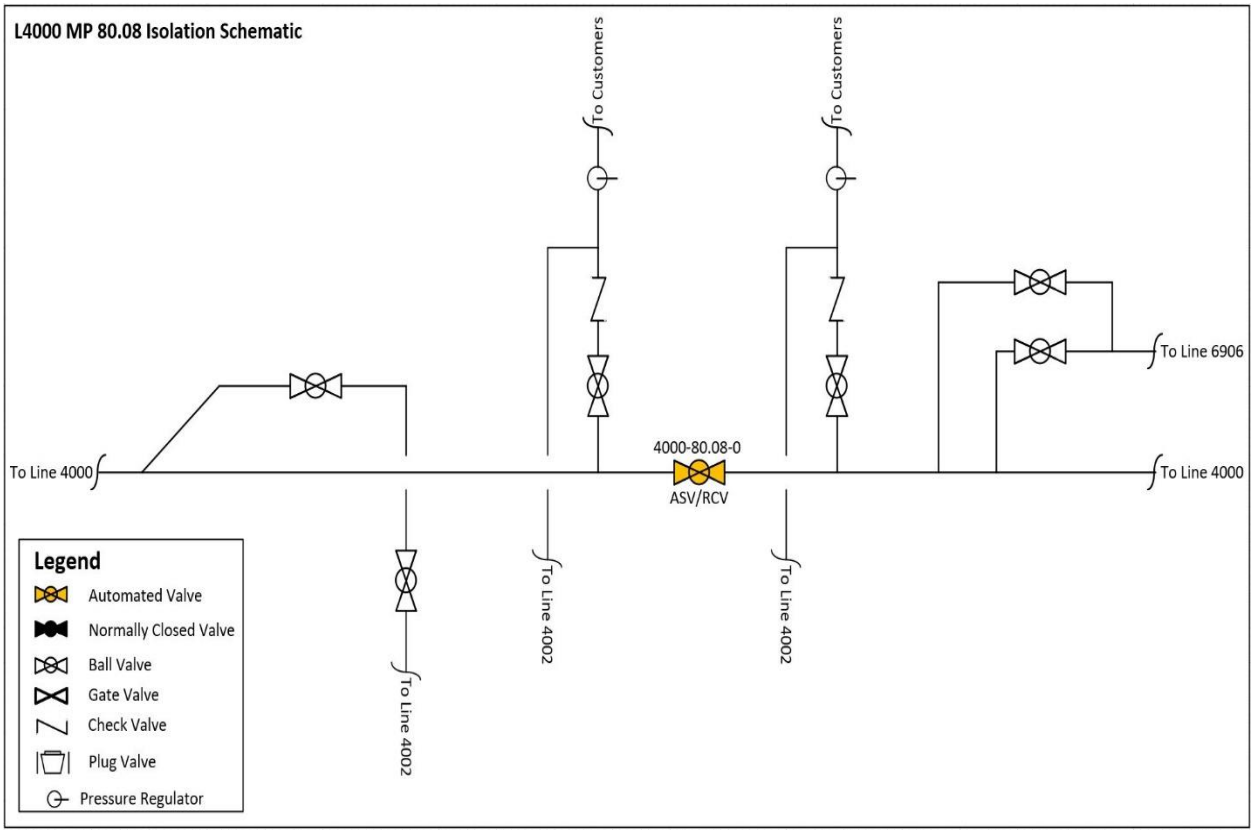
7. Environmental: The Project Team completed a biological survey one week prior to construction activities. A biological monitor was on-site full time during construction.

8. Permit Restrictions: The Project Team obtained a Utility Excavation Permit from the City of Fontana for this project.

9. Land Use: The Project Team performed all work within the existing easement.

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

Figure 2: Line 4000 MP 80.08 Valve Enhancement Project Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E 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. SoCalGas and SDG&E determined that the installation cost of the new mainline valve should be a shared cost between PSEP and the Operating District because, although this valve location was critical for accomplishing the PSEP objective of system isolation, it was also required due to a class location update. Therefore, PSEP and the Operating District shared contract, materials, and direct costs related to the installation and automation of the new mainline valve at a predetermined allocation. The remaining costs directly related to the automation of the new valve and the installation of two check valves for backflow prevention were allocated solely to PSEP, as these activities and costs are associated with the PSEP objectives of system isolation and prevention of backflow.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package, that included the updated design described in the discussion of notable changes in scope above. The estimated values below include PSEP and non-PSEP work, whereas Table 4 and 5 include estimated and actual values for PSEP work only.

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

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

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

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

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/12/2015
Construction Completion Date	08/26/2015
Days on Site	52 Days
Commissioning Date	03/03/2016

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $120,000 in change orders.

1. Field Design Change: The Mechanical Construction Contractor fabricated three [redacted] wedding bands and installed fire control fittings to assist during the tie-in that were not included in the initial scope. The Mechanical Construction Contractor also assisted in the fabrication, testing and installation of the [redacted] piping that was associated with the backflow prevention work.

2. Schedule: The Mechanical Construction Contractor was on standby while the actuator subcontractor completed the installation of the new actuator. The Mechanical Construction Contractor was also on stand-by for longer than the anticipated 24 hours due to additional weld x-rays.

3. Construction Method: Line 4000 was scheduled to be tied in during the planned blowdown for the Operating District work. To meet this deadline, the crews worked extended hours to meet the Operating District blowdown schedule.

4. Scope Change: The Mechanical Construction Contractor assisted in the excavation and backfill for the electrical trenches. This was not in the scope of work for the Mechanical Construction Contractor.

Figure 3: New Mainline Valve and Bottom Section of the New Vault

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. 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 3, 2016, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E exercised due diligence in the design, planning, and execution of 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. Planning and Coordination:

    a. The Project Team accelerated the schedule for the Line 4000 MP 80.08 Valve Enhancement Project to align with a planned blowdown for work being performed by the Operating District. This allowed for a single blowdown of this portion of Line 4000 that accommodated the work related to the two projects. Additionally, the Project Team scheduled construction to occur during summer conditions to avoid the need to utilize CNG/LNG during the tie-in.

    b. The Project Team scheduled and coordinated construction with the Line 4000 MP 53.00 Valve Enhancement Project. Both projects were awarded to the same Performance and Alliance Partners so that resources could be shared. This minimized the downtime for construction contractors and allowed the projects to share inspectors.

2. Engineering and Design: The location was carefully selected to minimize the length of the new bridle associated with existing regulator station.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $828,629. This estimate was prepared in February of 2015, using the "Stage 3 SCG Valve Estimate Template Rev 2" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $1,244,774.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	58,954	33,220	(25,734)
Materials	150,569	94,967	(55,602)
Mechanical Construction Contractor	232,159	475,281	243,122
Electrical Contractor	52,307	82,780	30,473
Construction Management & Support	30,401	137,544	107,143
Environmental	12,134	10,152	(1,982)
Engineering & Design	73,642	117,416	43,774
Project Management & Services	24,417	42,793	18,376
ROW & Permits	5,060	9,679	4,619
GMA	188,986	131,672	(57,314)
Total Direct Costs	**828,629**	**1,135,504**	**306,875**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	209,170	81,270	(127,900)
AFUDC	153,598	23,328	(130,270)
Property Taxes	32,647	4,672	(27,975)
Total Indirect Costs	**395,415**	**109,270**	**(286,145)**
Total Direct Costs	**828,629**	**1,135,504**	**306,875**
Total Loaded Costs	**1,224,044**	**1,244,774**	**20,730**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 4000 MP 80.08 Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully automated a mainline valve to achieve the objective of enabling rapid system isolation in the City of Fontana. The total loaded cost of the Project is $1,244,774.

SoCalGas and SDG&E executed this project prudently through coordinating and bundling construction with the Line 4000 MP 53.00 Valve Enhancement Project to capture efficiencies through coordinated scheduling of construction crews, coordinating work with required transmission work at the same location, and scheduling construction to take advantage of a planned blowdown to the pipeline, avoiding an additional blowdown.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by careful planning and coordination of construction activity with a separate project, while avoiding any customer impacts during a planned blowdown; engaged in reasonable efforts to promote competitive and market-based rates for contractor services and materials; and used a reasonable amount of company and contractor resources given the conditions and work scope changes experienced during construction, so as to complete the safety enhancement work as soon as practicable.

End of Line 4000 MP 80.08 Valve Enhancement Project Final Report

I. LINE 4002 FONTANA VALVE ENHANCEMENT PROJECT

A. Background and Summary

This report describes the activities associated with the Line 4002 Fontana Valve Enhancement Project, that consists of valve enhancements made to an existing mainline valve (MLV) located in the City of Ontario in San Bernardino County. Through this project, SoCalGas and SDG&E enhanced the capabilities of one MLV to enable rapid transmission system isolation of a portion of Line 4002. SoCalGas and SDG&E installed a new actuator, a new vault to house the actuator, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,259,228.

The Line 4002 Fontana Valve Enhancement Project site is on South Archibald Avenue, a heavily trafficked roadway in the City of Ontario. The Project site is in a rural area near several housing developments within the City of Ontario. The Project Team coordinated construction activity on this project to coincide with the City of Ontario's planned lane expansion construction to minimize the duration of community impacts and reduce site restoration costs for customers.

Table 1: General Project Information

Line 4002 Fontana Valve Enhancement Project			
Location	City of Ontario		
Days on Site	31 days		
Construction Start	07/29/2015		
Construction Finish	09/30/2015		
Commissioning Date	04/18/2016		
Valve Upgrades			
Valve Number	4002-92.52-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-Grade/Below-Grade	Below		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	New		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,259,228	-	1,259,228
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Fontana Line 4002 Valve Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified MLV 4002-92.52-0 for automation to provide remote isolation to a portion of Line 4002. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project, that 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 and SDG&E identified MLV 4002-92.52-0 for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E 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: During the pre-design site walk discussed below, the Project Team determined the existing vault was not large enough to house and service the new actuator however some of the existing instrument piping could be reused. The Project Team took measurements during the pre-design site walk to facilitate continued use of the existing instrument piping.

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

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

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
4002	92.52	0	[redacted]	A/VT	ASV/RCV

B. Site Evaluation and Planning

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

1. Site Description: The site is in a low density, primarily agricultural area. The valve is in South Archibald Avenue and is positioned on its side. The valve stem extends into a vault.

2. Land Issues: During the pre-design site walk, the Project Team noted that excavations will impact the street, as well as the adjacent curb and gutter.

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

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and the measurements of the preexisting vault. Based on the specifications of the new actuator to be installed, the Project Team determined that the preexisting vault did not provide sufficient space to house, maintain and operate the new actuator.

2. Valve Details: The existing valve was a manually actuated Class 400 ball valve that the Project Team reused.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The City of Ontario scheduled construction to expand South Archibald Avenue to four lanes and add a new sidewalk. The Project Team coordinated the final design and construction of the Fontana Line 4002 Valve Project with the City of Ontario and its contractors.

6. Substructures: The Project Team analyzed the preexisting vault and designed the new vault to utilize existing taps. The Project Team identified two existing bridle taps on the pipeline leading to blowdown piping at the site and determined these would not interfere with the planned design.

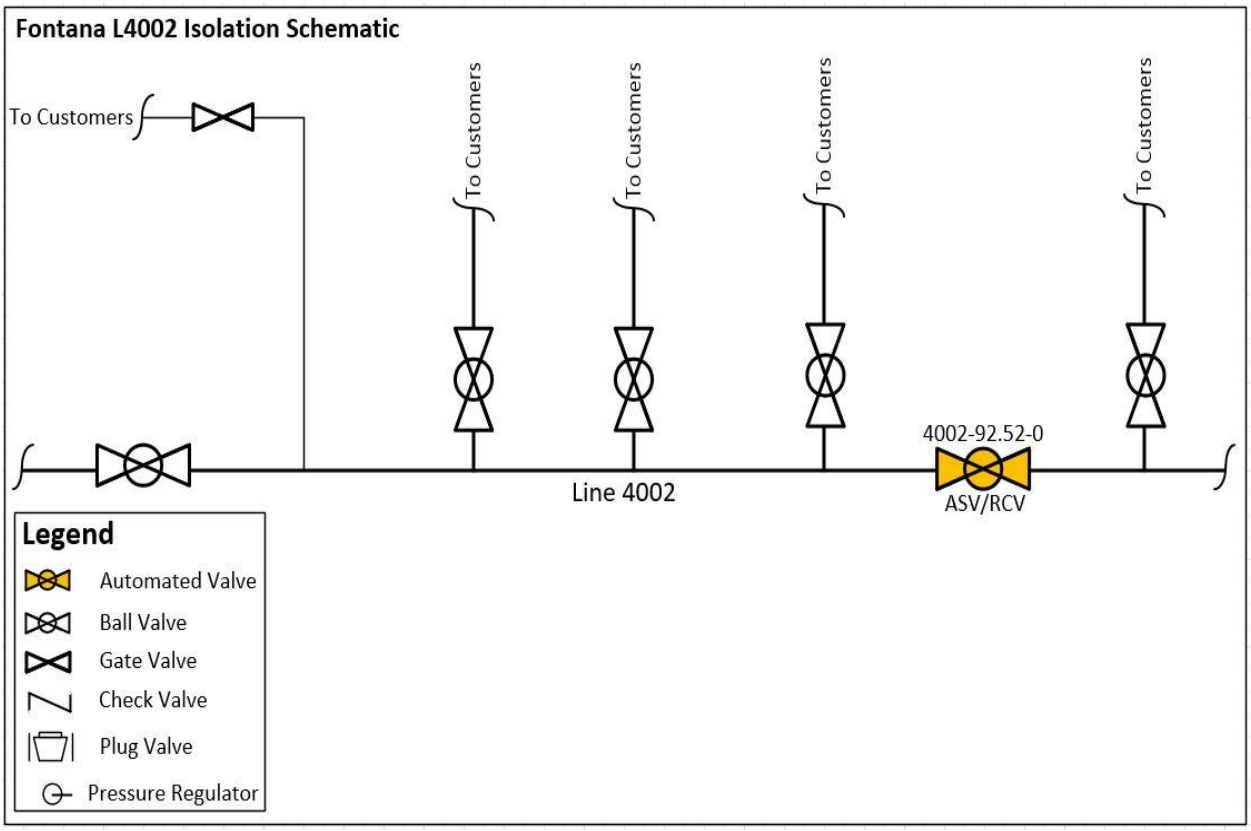
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The Project Team obtained an encroachment permit from the City of Ontario that included the installation of the new vault, actuator, and two new electrical cabinets. Per the permit, the working hours were from 7 am to 4 pm. There were no other special permit conditions.

9. Land Use: The Project Team utilized the space around the Project site as a laydown yard.

10. Traffic Control: The Project Team scheduled construction activities to take place before the City of Ontario paved the new roadway. This avoided the need for any traffic control and the related costs during construction.

Figure 2: Fontana Line 4002 Valve Enhancement Project Schematic



D. Scope Changes

SoCalGas and SDG&E 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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	07/29/2015
Construction Completion Date	09/30/2015
Days on Site	31 days
Commissioning Date	04/18/2016

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

C. Changes During Construction

SoCalGas and SDG&E 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 2: Instrument Cabinet in Foreground: Vault Lid and Vault Vent in Background – Post Construction

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve back into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. 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 18, 2016, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

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

1. Planning and Coordination:

    a. The Project Team initiated the permitting process with the City of Ontario early in the Project lifecycle. Upon learning of the city's plan to undertake street improvement construction in the area, the Project Team accelerated the Project schedule to align the Project's construction activities with the city's construction activities. This decreased the costs for traffic control and permitting and lowered the cost of construction because site restoration activities, such as paving, curb, gutter and sidewalk restoration, were performed by the city's contractors.

    b. The Project Team delayed the installation of utility power so that power could be obtained from the new transformer installed as a component of the city's construction project on the same side of the street as the Fontana Valve Project. The existing transformer was located on the other side of the street and utilizing that transformer as a power source would have required the Project Team to use directional boring across the roadway at an additional expense, customer inconvenience, and the added cost of traffic control.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $790,897. This estimate was prepared in October of 2014, using the "Stage 3 SCG Valve Estimate Template Rev 1" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project based on initial design plans.

SoCalGas and SDG&E 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 $1,259,228.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	61,545	72,324	10,779
Materials	212,096	194,048	(18,048)
Mechanical Construction Contractor	277,166	277,814	648
Electrical Contractor	96,982	55,974	(41,008)
Construction Management & Support	48,077	138,747	90,670
Environmental	11,220	59,180	47,960
Engineering & Design	-	104,917	104,917
Project Management & Services	-	78,199	78,199
ROW & Permits	220	1,104	884
GMA	83,591	127,525	43,934
Total Direct Costs	**790,897**	**1,109,832**	**318,935**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta over/(under)
Overheads	105,854	123,610	17,756
AFUDC	39,744	22,798	(16,946)
Property Taxes	8,372	2,988	(5,384)
Total Indirect Costs	**153,970**	**149,396**	**(4,574)**
Total Direct Costs	**790,897**	**1,109,832**	**318,935**
Total Loaded Costs	**944,867**	**1,259,228**	**314,361**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line Fontana 4002 Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully automated one mainline valve to achieve the objective of enabling rapid system isolation in the City of Ontario. The total loaded cost of the Project is $1,259,228.

SoCalGas and SDG&E executed this project prudently through: designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, installing a new and larger vault to accommodate a new actuator and facilitate future operation and maintenance activity, by responding to field changes by relocating electrical equipment to accommodate field modifications by the local electrical utility, and installing the equipment necessary to bring power and communication capabilities to this valve to enable rapid automated isolation to a portion of Line 4002 in the City of Ontario.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by expediting the Project schedule to align with the city's construction activities to minimize restoration costs and reduce community impacts, delaying the installation of utility power to avoid additional costs for traffic control and directional boring, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Line 4002 Fontana Valve Enhancement Project Final Report

I. LINE 404 VENTURA VALVE PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Line 404 Ventura Valve Enhancement Project Bundle, that consists of valve enhancements made to four existing mainline valves (MLVs) located in the Cities of Camarillo, Moorpark, and Calabasas in Ventura County and Los Angeles County. Through this project, SoCalGas and SDG&E enhanced the capabilities of four MLVs to enable rapid transmission system isolation to portions of Lines 404 and 406. SoCalGas and SDG&E installed new fencing, new power equipment, new communications equipment and the necessary automation equipment at the sites. The total loaded project cost is $4,646,352.

The four valves comprising the Line 404 Ventura Valve Enhancement Project Bundle are located in undeveloped and developed areas and are separated into three sites. The Santa Rosa Road site is located on Santa Rosa Road in the unincorporated community of Santa Rosa. The Moorkpark Station site is an existing SoCalGas facility located in a residential area in Moorpark. The Simi Tap site is located in an undeveloped area in Calabasas. SoCalGas and SDG&E grouped the three project sites together into a single valve bundle and executed the three sites as a comprehensive package because the sites are geographically proximate.

Table 1: General Project Information

Line 404 Ventura Valve Enhancement Project Bundle			
Site	Santa Rosa Road	Moorpark Station	Simi Tap
Location	City of Camarillo	City of Moorpark	City of Calabasas
Days on Site	41 days	36 days	45 days
Construction Start	03/14/2016	02/08/2016	06/21/2016
Construction Finish	05/26/2016	03/31/2016	09/07/2016
Commissioning Date	08/15/2017	12/01/2016	10/25/2016
Valve Upgrades			
Valve Number	404-27.82-0	404-30.48-0	404-40.76-0
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball
Actuator	Existing	Existing	Existing
Actuator Above/Below-Grade	Below-Grade	Below-Grade	Above-Grade
ASV	Yes	Yes	Yes
RCV	Yes	Yes	Yes
Valve Number			406-39.14-0
Valve Type			Existing – Ball
Actuator			Existing
Actuator Above/Below-Grade			Above-Grade
ASV			Yes
RCV			Yes
Site Upgrades			
Vault	Existing	Existing	None
Power	New – Utility	New – Utility	New – Solar
Communication	New – Satellite	New – Radio	New – Satellite
SCADA Panel	New	New	New
Equipment Shelter	No	No	No
Fencing	None	Existing	New
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	4,646,352	-	4,646,352
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 404 Ventura Bundle – Overview

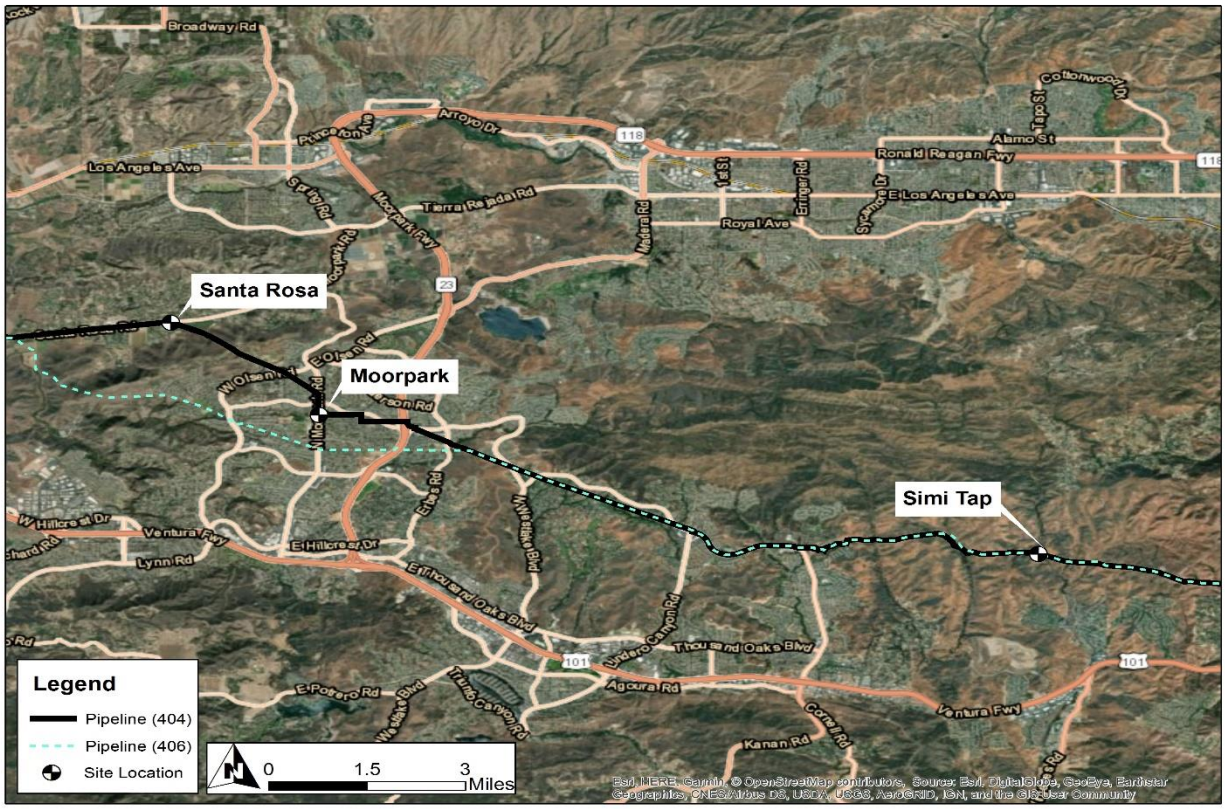


Figure 2: Satellite Image of Santa Rosa Road Site

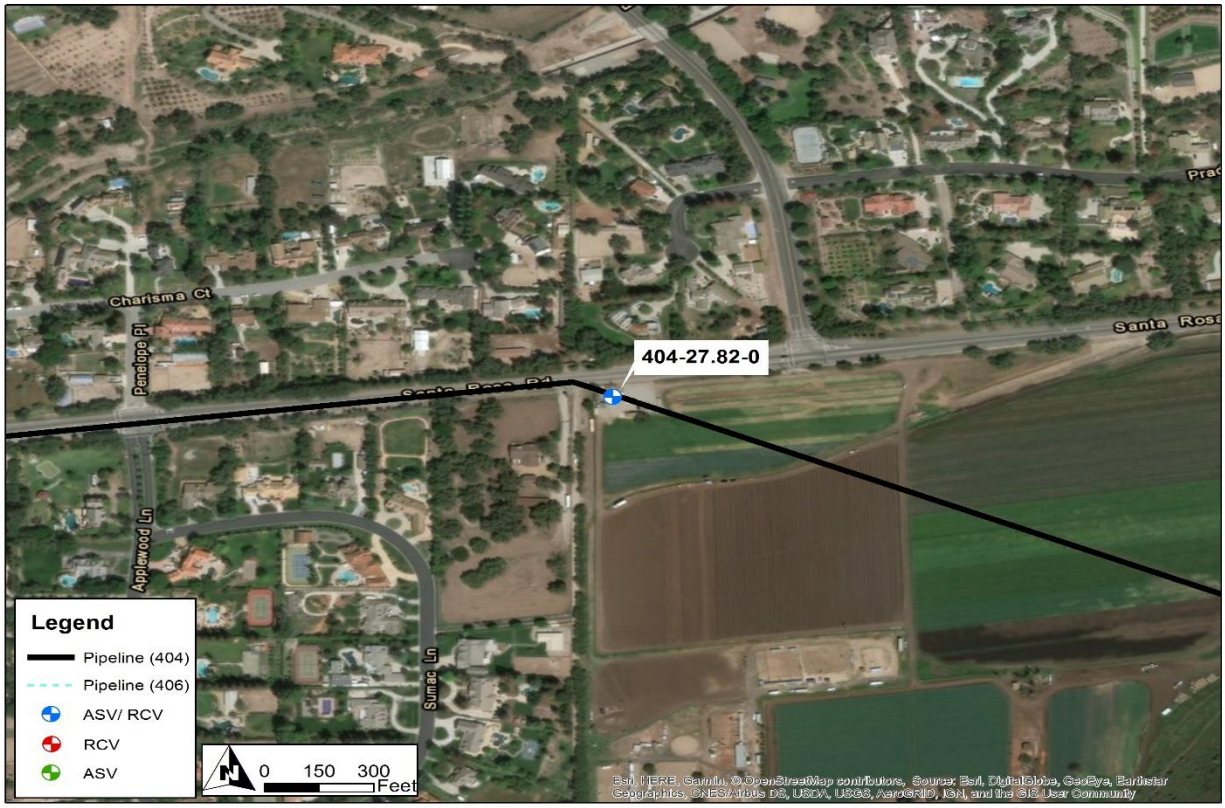


Figure 3: Satellite Image of Moorpark Station

Figure 4: Satellite Image of Simi Tap Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified two valves: 404-30.48-0 and 406-39.14-0 for automation to provide remote isolation to portions of Lines 404 and 406. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in identification of two additional valves for enhancement and four new check valves for installation to provide the planned isolation. The final project scopes are summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E identified two valves for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that the automation of these valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. The Project Team determined it was also necessary to automate valves 404-27.82-0, and 406-39.14-0. The Project Team determined it was also necessary to install four check valves downstream of each valve selected for automation to prevent backflow to Lines 404 and 406. Together, the automation of these four valves and the installation of four check valves enables rapid isolation, thereby achieving the 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: The Project Team determined that existing check valves provided the necessary backflow prevention to Lines 404 and 406. The installation of the new check valves were descoped from the Project..

4. Final Project Scope: The final scope for this project consists of the automation of four MLVs, that included the installation of new fencing around one of the sites, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
404	30.48	0	[redacted]	C/P	ASV/RCV
404	27.82	0	[redacted]	C/P	ASV/RCV
404	40.76	0	[redacted]	C/P	ASV/RCV
406	39.14	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 404 Ventura Valve Bundle 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:

Santa Rosa Road

1. Site Description: This project site is located in an agricultural field next to a residential area. The valve is positioned on its side. The valve stem extends into the vault where there is an existing actuator.

2. Land Issues: During the pre-design site walk, The Project Team noted the planned work would not impact the street. The Project Team acquired a new easement for power run from the existing SoCalGas and SDG&E easement to the new power pole installed by the local electric utility.

3. DOT Class: This 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.

Moorpark Station

1. Site Description: This site is an existing SoCalGas facility in a residential area. 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 solar power. The Project Team expanded the 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.

Simi Tap

1. Site Description: This site is an existing SoCalGas facility in an undeveloped area. There is an existing chain link fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.

3. DOT Class: The site is in a Class 1 location.

    a. MLV 404-40.76-0: SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 HCA locations and known geological threats both upstream and downstream of the valve.

    b. MLV 406-39.14-0: SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 HCA locations and known geological threats both upstream and downstream of the valve.

4. Power Source: There was no preexisting power source, the Project Team installed new power equipment at the site.

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

C. Engineering, Design, and Planning Factors

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

Santa Rosa Road

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and measurements of the existing vault. The Project Team determined that the existing vault could be reused.
2. Valve Details: The existing valve was a manually actuated Class 600 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 impact to the community from this project.
6. Substructures: Aside from the existing vault, 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 spot checks during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team obtained new easements for the new above ground equipment and to install the new utility power.
10. Traffic Control: Traffic control was not required for this project.

Moorpark Station

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology, measurements of the preexisting vault, and verified that the station would accommodate the new equipment. The Project Team determined that the existing vault could be reused.

2. Valve Details: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

3. Actuator Details: The existing actuator was a rotary piston double acting 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 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

10. Traffic Control: Traffic control was not required for this project.

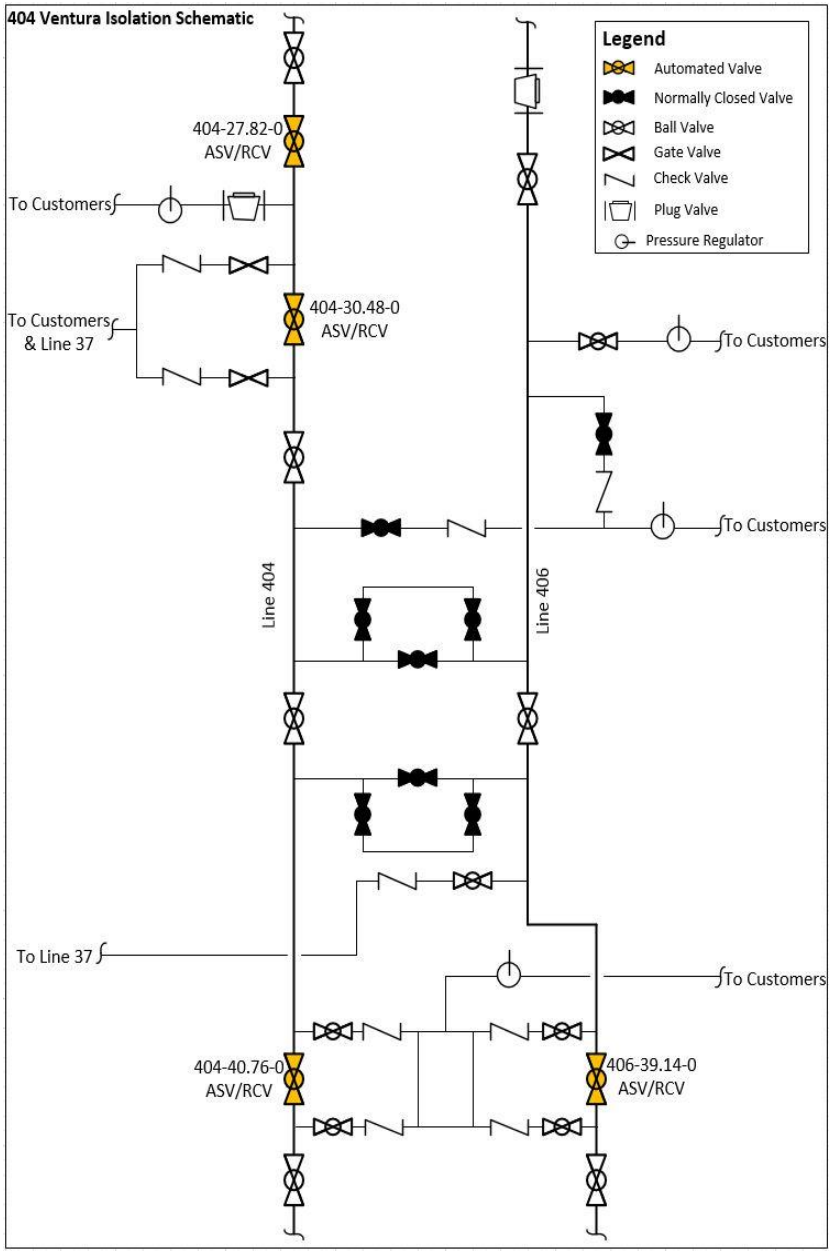
Simi Tap

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.
3. Actuator Details: The existing actuator was a rotary piston double acting 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 impact to the community from this Project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project site and access roads are sensitive to rainfall. The Project Team did not perform any construction activities for five days following rain to prevent any damage to the access roads. A biological monitor was on-site 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 performed all work within the existing SoCalGas facility.

10. Traffic Control: Traffic control was not required for this project.

Figure 5: Line 404 Ventura Valve Project Bundle Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E 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. After the creation of the preliminary estimate, the Project Team determined that existing check valves provided the necessary backflow prevention to Lines 404 and 406. The installation of the new check valves were descoped from the Project.

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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Santa Rosa Road	
Construction Start Date	03/14/2016
Construction Completion Date	05/26/2016
Days on Site	41 days
Commissioning Date	08/15/2017
Moorpark Station	
Construction Start Date	02/08/2016
Construction Completion Date	03/31/2016
Days on Site	36 days
Commissioning Date	12/01/2016
Simi Tap	
Construction Start Date	06/21/2016
Construction Completion Date	09/07/2016
Days on Site	45 days
Commissioning Date	10/25/2016

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

C. Changes During Construction

SoCalGas and SDG&E 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 8: Trenching at Santa Rosa Road

Figure 9: Equipment at Simi Tap

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the actuators into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on October 25, 2016, December 1, 2016 and August 15, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design site walk to incorporate known site conditions in the Project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Planning and Coordination:

    a. SoCalGas and SDG&E bundled projects to coordinate construction activities between the Line 404 Ventura Valve Bundle Project sites and with the Line 406 Valve Bundle Enhancement Project sites to reduce overall costs for customers.

    b. The Project Team adjusted the construction schedule to allow the construction contractors to sequence construction tasks between the Line 404 Ventura Valve Bundle Project sites and the Line 406 Ventura Valve Enhancement Project site to minimize crew overlap. The contractor was able to move from site to site as the schedule required, minimizing the number of mobilizations and demobilizations.

2. Land Use: The Project Team used existing SoCalGas land for laydown at Moorpark Station and Simi Tap.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $3,823,233. This estimate was prepared in June of 2015, using the "Stage 3 SCG Estimating Template Rev 3" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $4,646,352.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	414,243	321,269	(92,974)
Materials	282,139	331,907	49,768
Mechanical Construction Contractor	940,686	396,603	(544,083)
Electrical Contractor	308,000	378,719	70,719
Construction Management & Support	283,686	257,430	(26,256)
Environmental	135,695	129,705	(5,990)
Engineering & Design	1,023,510	1,154,416	130,906
Project Management & Services	155,917	188,469	32,552
ROW & Permits	11,550	250,192	238,642
GMA	267,807	443,407	175,600
Total Direct Costs	**3,823,233**	**3,852,117**	**28,884**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	529,767	456,713	(73,054)
AFUDC	180,300	298,635	118,335
Property Taxes	37,440	38,887	1,447
Total Indirect Costs	**747,507**	**794,235**	**46,728**
Total Direct Costs	**3,823,233**	**3,852,117**	**28,884**
Total Loaded Costs	**4,570,740**	**4,646,352**	**75,612**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 404 Ventura Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated four mainline valves to achieve the objective of enabling rapid system isolation in the Cities of Camarillo, Moorpark and Calabasas. The total loaded cost of the Project is $4,646,352.

SoCalGas and SDG&E executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives; coordinating and bundling three valve projects into a comprehensive package to capture efficiencies through coordinated scheduling of construction crews; and installing equipment necessary to bring power and communication capabilities to these valves to enable rapid system isolation to portions of Lines 404 and 406.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at reasonable cost by carefully planning and coordinating construction activity with the Line 406 Ventura Valve Enhancement Bundle, and by limiting the number of mobilizations and laydown yards across three different project sites to maximize efficiencies and reduce customer and community impacts.

End of Line 404 Ventura Valve Project Bundle Final Report

I. LINE 404-406 VENTURA VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Line 404-406 Ventura Valve Enhancement Project Bundle that consists of valve enhancements made to three existing mainline valves (MLVs) in the City of Ventura and unincorporated Ventura County in Ventura County. Through this project, SoCalGas and SDG&E enhanced the capabilities of three MLVs to enable rapid transmission system isolation to a portion of Line 404 and Line 406. SoCalGas and SDG&E installed a new actuator, new power equipment, new communications equipment and the necessary automation equipment at the sites. The total loaded project cost is $973,638.

The valves comprising the Line 404-406 Ventura Valve Enhancement Project Bundle are located in undeveloped agricultural and rural areas and are separated into two project sites. The Hall Canyon site is located on a hillside west of Hall Canyon near Hall Canyon Road in the City of Ventura, the Santa Clara West site is located west of the Santa Clara River and east of Darling Road in unincorporated Ventura County. SoCalGas and SDG&E grouped the two project sites together into a single valve bundle and executed the two sites as a comprehensive package because the sites are geographically proximate.

Table 1: General Project Information

Line 404-406 Ventura Valve Enhancement Project Bundle				
Site	Hall Canyon		Santa Clara West	
Location	City of Ventura		Unincorporated Ventura County	
Days on Site	18 days		47 days	
Construction Start	10/10/2016		11/07/2016	
Construction Finish	11/10/2016		02/24/2017	
Commissioning Date	10/30/2018		08/14/2018	
Valve Upgrades				
Valve Number	404-3.71-0		404-12.50-0	
Valve Type	Existing – Ball		Existing – Ball	
Actuator	Existing		Existing	
Actuator Above-/Below-Grade	Above-Grade		Above-Grade	
ASV	Yes		Yes	
RCV	No		Yes	
Valve Number			406-11.49-0	
Valve Type			Existing – Ball	
Actuator			New	
Actuator Above-/Below-Grade			Above-Grade	
ASV			Yes	
RCV			Yes	
Site Upgrades				
Vault	None		None	
Power	New – Solar		New – Solar	
Communication	New – Radio		New – Radio	
SCADA Panel	None		New	
Equipment Shelter	No		No	
Fencing	Existing – Fencing		Existing – Fencing	
Project Costs ($)	**Capital**	**O&M**		**Total**
Loaded Project Costs	973,638	-		973,638
Disallowed Costs	-	-		-

B. Maps and Images

Figure 1: Satellite Image of 404-406 Ventura Bundle: Overview

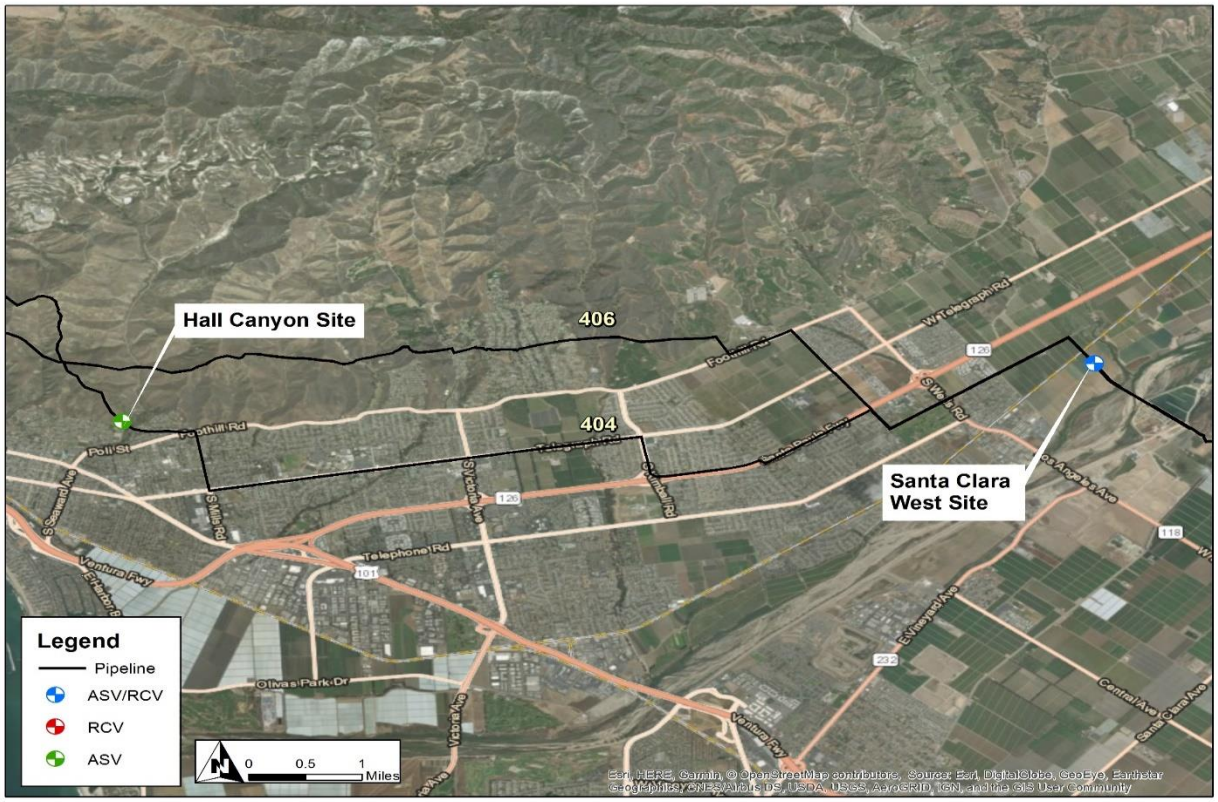


Figure 2: Satellite Image of Hall Canyon

Figure 3: Satellite Image of Santa Clara West

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified two valves for automation to provide remote isolation to a portion of Lines 404 and 406. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in identification of a third valve 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 identified MLV 404-12.50-0 and MLV 406-11.49-0 for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that automation of MLVs alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. The Project Team determined it was also necessary to automate existing MLV 404-3.71-0. Together, the automation of these three valves enable rapid isolation, 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: Mainline Valve 404-12.71-0 was a preexisting valve that was non-piggable. SoCalGas and SDG&E had scheduled a PSEP Replacement Project[2] at the Santa Clara West Site. SoCalGas and SDG&E included the replacement of this valve in that Project scope.

4. Final Project Scope: The final scope for this project consists of the automation of three MLVs, that included the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
404	3.71	0	[redacted]	C/P	ASV
404	12.50	0	[redacted]	C/P	ASV/RCV
406	11.49	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 404-406 Ventura Valve Bundle Project by performing pre-design site walks 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:

[2] See Final Report for Line 404 Section3A Hydrotest and Replacement Projects.

Hall Canyon

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

Santa Clara West

1. Site Description: This site is an existing SoCalGas facility in an agricultural area. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate a Class 3 HCA location upstream of this valve.
4. Power Source: There was no preexisting power source, the Project Team installed new power equipment at the site.

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

C. Engineering, Design, and Planning Factors

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

Hall Canyon

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 is a manually actuated Class 600 ball valve that the Project Team reused.
3. Actuator Details: The existing actuator is 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 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Santa Clara West

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology. Based on the specifications of the existing site, the Project Team determined that the existing valve and actuator would not need to be replaced on MLV 404-12.50-0, however the existing actuator on MLV 406-11.49-0 would be replaced.

2. Valve Details:

   a. 404-12.50-0: The valve is a manually actuated Class 600 ball valve that the Project Team reused.

   b. 406-11.49-0: The valve is a manually actuated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

   a. 404-12.50-0: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.

   b. 406-11.49-0: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any notable impact to the community from this project.

6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.

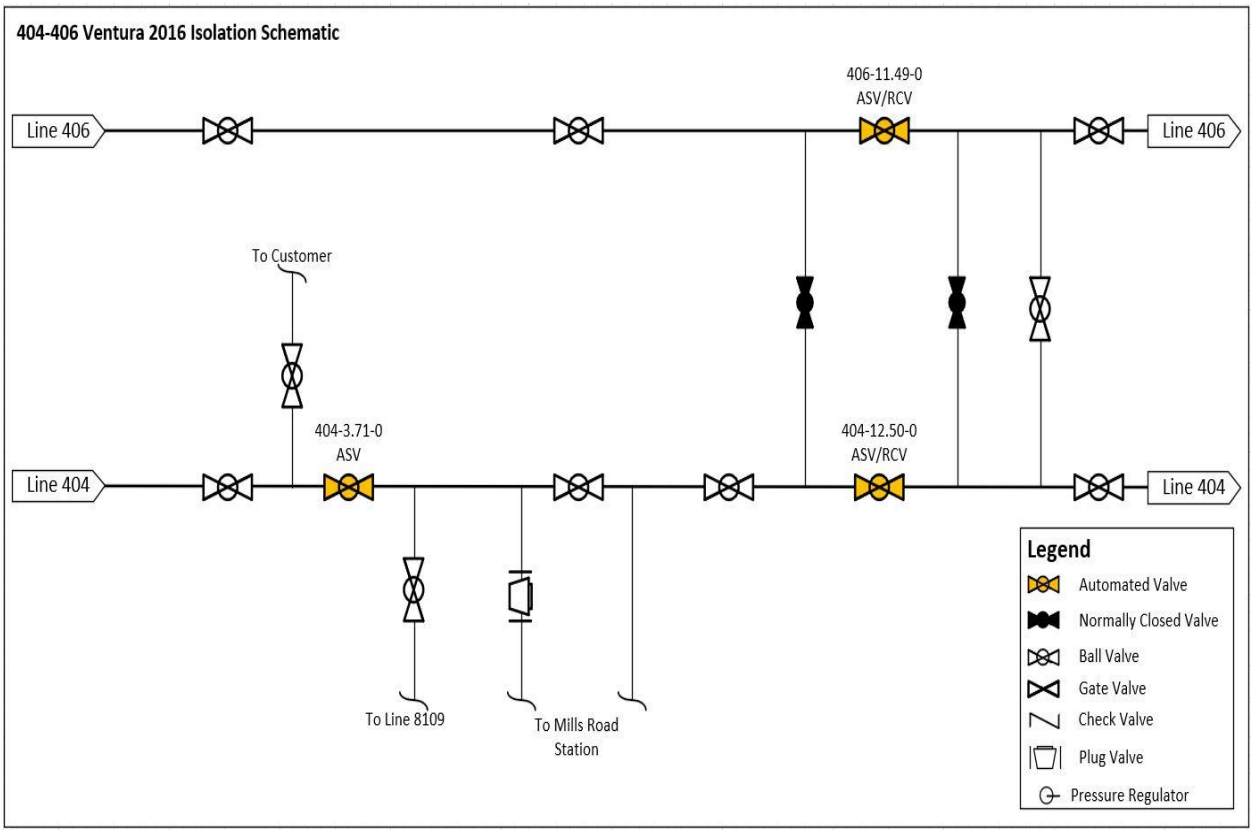
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team expanded the existing easement and facility to accommodate the new automation equipment.

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

Figure 4: Schematic of 404-406 Ventura Valve Bundle



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E 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 included the automation of MLV 404-22.36-0. Mainline Valve 404-22.36-0 was descoped from this bundle after the finalization of the preliminary estimate due to on-going negotiations with the land owner at the project location that delayed the start of construction.

III. CONSTRUCTION

A. Construction Contractor Selection

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

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

2. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], that was [redacted] than SoCalGas and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Hall Canyon	
Construction Start Date	10/10/2016
Construction Completion Date	11/10/2016
Days on Site	18 days
Commissioning Date	10/30/2018
Santa Clara West	
Construction Start Date	11/07/2016
Construction Completion Date	02/24/2017
Days on Site	47 days
Commissioning Date	08/14/2018

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

C. Changes During Construction

SoCalGas and SDG&E 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 5: New Position Indicator at Hall Canyon

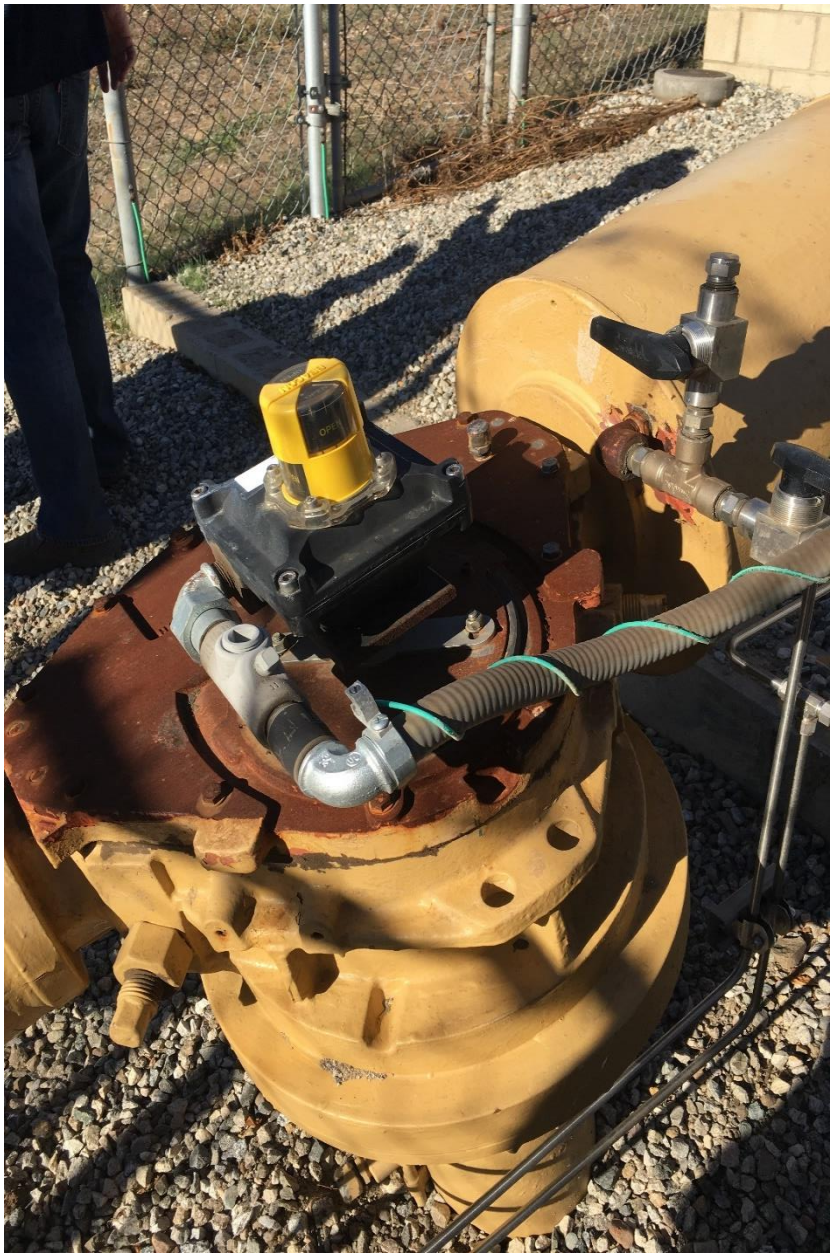


Figure 6: New Cabinets and Solar Panel at Santa Clara West

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the actuators into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on October 30, 2018 and August 14, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E exercised due diligence in the design, planning, and execution of 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. Planning and Coordination:
    a. The Project Team bundled projects to coordinate engineering and construction activity between the two project sites to reduce overall costs for customers.
    b. The Project Team adjusted the construction schedule to allow the construction contractor to sequence construction tasks in a way that minimized crew overlap.
2. Land Use: The Project Team used existing SoCalGas and SDG&E land for laydown at both 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 and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $1,060,197. This estimate was prepared in September of 2016, using the "Stage 3 SCG Estimating Template Rev 3" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $973,638.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	219,670	69,747	(149,923)
Materials	173,782	218,908	45,126
Mechanical Construction Contractor	-	-	-
Electrical Contractor	285,890	152,851	(133,039)
Construction Management & Support	56,278	123,187	66,909
Environmental	19,635	6,902	(12,733)
Engineering & Design	87,552	142,440	54,888
Project Management & Services	121,008	25,571	(95,437)
ROW & Permits	-	9,422	9,422
GMA	96,382	99,283	2,901
Total Direct Costs	**1,060,197**	**848,311**	**(211,886)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	355,964	109,631	(246,333)
AFUDC	46,541	9,390	(37,151)
Property Taxes	10,345	6,306	(4,039)
Total Indirect Costs	**412,850**	**125,327**	**(287,523)**
Total Direct Costs	**1,060,197**	**848,311**	**(211,886)**
Total Loaded Costs	**1,473,047**	**973,638**	**(499,409)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 404-406 Ventura Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated three mainline valves to achieve the objective of enabling rapid system isolation in the City of Ventura and unincorporated Ventura County. The total loaded cost of the Project is $973,638.

SoCalGas and SDG&E executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives; coordinating and bundling two valve projects into a comprehensive package to capture efficiencies through coordinated scheduling of construction crews installing the necessary automation equipment, installing the equipment necessary to bring power and communication capabilities to these valves to enable rapid automated isolation of portions of Lines 404 and 406 in the City of Ventura and unincorporated Ventura County.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at reasonable cost. Through careful planning and coordination of construction activity, SoCalGas and SDG&E limited the number of mobilizations across two different project sites to maximize efficiencies and reduce customer and community impacts.

End of Line 404-406 Ventura Valve Project Bundle Final Report

I. LINE 406 VENTURA VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Line 406 Ventura Valve Enhancement Project Bundle, that consists of valve enhancements made to a new mainline valve (MLV), three existing MLVs, and a crossover valve at four separate sites located in the Cities of Westlake Village, Ventura and Los Angeles and the unincorporated community of Santa Rosa Valley in Ventura County and Los Angeles County. Through this project, SoCalGas and SDG&E enhanced the capabilities of four MLVs and a crossover valve to enable rapid transmission system isolation to a portion of Lines 404 and 406. SoCalGas and SDG&E installed a new mainline valve, two new actuators, a new blowdown assembly, new power equipment at three of the sites, new communications equipment at three of the sites and the necessary automation equipment at the sites. The total loaded project cost is $3,902,061.

The five valves comprising the Line 406 Ventura Valve Enhancement Project Bundle are located in developed commercial, rural, and/or residential neighborhoods. The Alberson Crossover site is located on a golf course in Westlake Village, the Sexton Canyon site is located next to North Victoria Avenue in the City of Ventura, the Hill Canyon Site is located in a rural area near the city of Agoura Hillsa, and the Westside Station site is located in a residential area near El Canon Avenue in the City of Los Angeles. SoCalGas and SDG&E grouped the four projects sites together into a valve project bundle and executed the four sites as a comprehensive package because the sites are geographically proximate. The SoCalGas and SDG&E selected main valve 406-33.04-0 for replacement. The installation of automation of this valve was designed and executed as one cohesive project, however the project costs were shared by PSEP and the Operating District with PSEP funding the activities that provided system isolation through automation of the new mainline valve.

Table 1: General Project Information

Line 406 Ventura Valve Enhancement Project Bundle				
Site	Alberson Crossover	Sexton Canyon	Hill Canyon	Westside Station
Location	Westlake Village	Ventura	Santa Rosa Valley	Los Angeles
Days on Site	53 days	10 days	42 days	19 days
Construction Start	02/29/2016	11/30/2015	04/18/2016	05/09/2016
Construction Finish	06/03/2016	01/20/2016	08/03/2016	06/06/2016
Commissioning Date	04/25/2017	08/24/2016	08/09/2017	10/05/2016
Valve Upgrades				
Valve Number	404-34.70-0	406-5.53-0	406-25.06-0	406-44.59-15
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball	Existing – Ball
Actuator	Existing	Existing	Existing	New
Actuator Above/Below-Grade	Above-Grade	Above-Grade	Above-Grade	Above-Grade
ASV	Yes	Yes	Yes	No
RCV	Yes	Yes	Yes	Yes
Valve Number	406-33.04-0			
Valve Type	New – Ball			
Actuator	New			
Actuator Above/Below-Ground	Above-Grade			
ASV	Yes			
RCV	Yes			
Site Upgrades				
Vault	None	None	None	None
Power	New – Solar	New – Utility	New – Solar	Existing – Utility
Communication	New – Satellite	New – Satellite	New – Antenna	Existing – Antenna
SCADA Panel	New	New	New	Existing
Equipment Shelter	No	No	No	No
Fencing/Wall	New – Fencing	None	New – Fencing	Existing – Wall

Table 1: General Project Information (Continued)

Project Costs ($)	Capital	O&M	Total
Loaded Project Costs	3,902,061	-	3,902,061
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of 406 Ventura Valve Enhancement Project Bundle

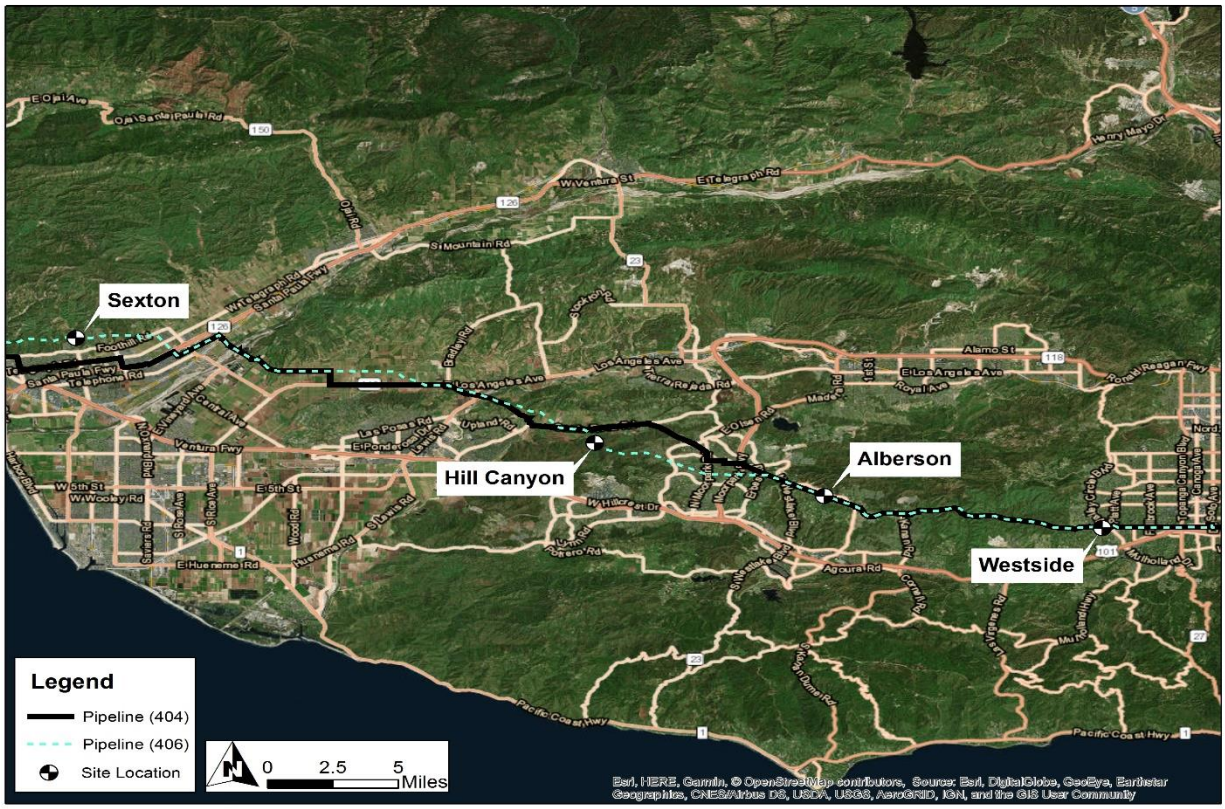


Figure 2: Satellite Image of Alberson Crossover Site

Figure 3: Satellite Image of Sexton Canyon Site

Figure 4: Satellite Image of Hill Canyon Site

Figure 5: Satellite Image of Westside Station Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 PSEP filing. This conceptual scope identified four valves: 404-34.70, 406-5.53-0, 406-25.06-0, and 406-33.04-0 for automation to provide remote isolation of portions of Lines 404 and 406. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in identification of a fifth valve 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 identified four valves for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that the automation of these valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. The Project Team determined it was also necessary to automate valve 406-44.59-15 so that Lines 404 and 406 can be isolated from each other. Together, the automation of these five valves enabled rapid isolation, thereby achieving the Valve Enhancement Plan objectives.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhnacement 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: No notable engineering adjustments were required.

4. Final Project Scope: The final scope for this project consists of the automation of five valves that included the installation of a new mainline valve, the installation of two new actuators, the installation of new fencing at two of the sites, the installation of a new blowdown assembly, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
406	5.53	0	[redacted]	C/P	ASV/RCV
406	25.06	0	[redacted]	C/P	ASV/RCV
404	34.70	0	[redacted]	C/P	ASV/RCV
406	33.04	0	[redacted]	NV/AG	ASV/RCV
406	44.59	15	[redacted]	A/AG	RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 406 Ventura Valve Enhancement Project Bundle by performing a pre-design site walk to determine the existing conditions and assess any potential impacts on the design. Key factors that influenced the engineering and design of this project are as follows:

Alberson Crossover

1. Site Description: This project site is an existing SoCalGas facility on a golf course.
2. Land Issues: During the pre-design site walk, the Project Team noted the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: The 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.

Sexton Canyon

1. Site Description: This project site is an existing SoCalGas facility in an avocado orchard near Victoria 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 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.

Hill Canyon

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

Westside Station

1. Site Description: This site is an existing SoCalGas facility located in a residential area.
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: The site is in a Class 3 location.
4. Power Source: The site has existing utility power.
5. Communication Technology: The site has existing radio communications.

C. Engineering, Design, and Planning Factors

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

Alberson Crossover

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station, to accommodate the new equipment. The Project Team determined that the preexisting blowdown assembly required relocation to accommodate the new automation equipment.

2. Valve Details:

    a. 404-34.70-0: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

    b. 406-33.04-0: The existing valve was a manually actuated Class 600 that SoCalGas and SDG&E replaced.

3. Actuator Details:

    a. 404-34.70-0: The existing actuator was a double-acting actuator that the Project Team reused.

    b. 406-33.04-0: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team scheduled construction to take advantage of a planned shut-in for another project on Line 406.

5. Community Impact: The Project Team coordinated with the golf course management so that no construction activities took place during planned golf tournaments. The new valve was installed overnight to limit the impact to the North Ranch Country Club.

6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.

7. Environmental: The Project Team identified an oak tree next to the planned excavation. The City of Westlake Village required that an arborist be on site during all excavations near the oak tree.

8. Permit Restrictions: A temporary right of entry (TRE) was in place during construction.

9. Land Use: The Project Team expanded the existing easement and facility to accommodate the new automation equipment.

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

Sexton Canyon

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 600 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas easement.

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

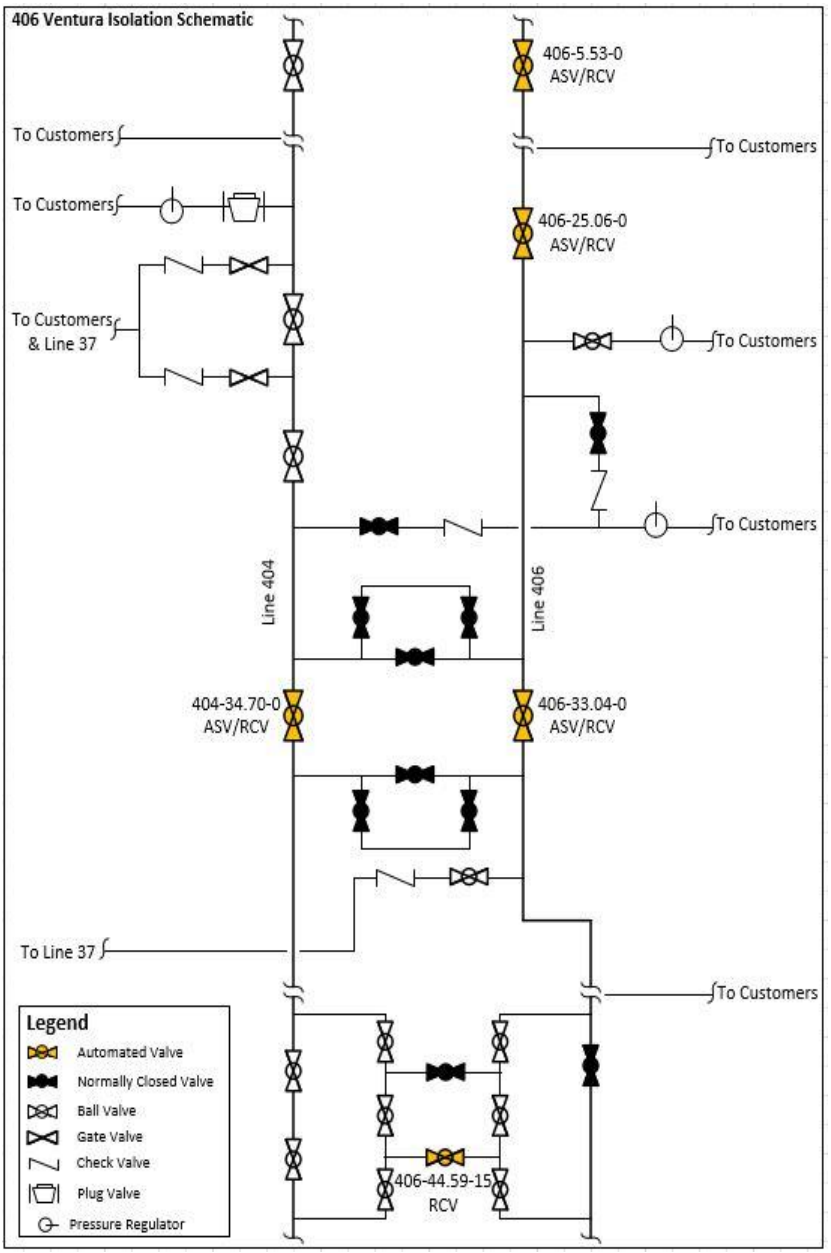
Hill Canyon Road

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station, to accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 600 ball valve 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 identified no substructures during this phase that would affect the design.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team expanded the existing easement and facility to accommodate the new automation equipment.
10. Traffic Control: Traffic control was not required for this project.

Westside Station

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 is a manually actuated Class 600 ball valve that the Project Team reused.
3. Actuator Details: There was no existing actuator, so the Project Team installed a new actuator.
4. Customer Impact: The Project Team did not anticipate service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team identified the presence of a nesting bird near the project site. A biological monitor was on-site part time during construction to monitor the noise level and impact to the nesting site.
8. Permit Restrictions: The Project Team did not identify any restrictions.
9. Land Use: The Project Team performed all work within the existing SoCalGas facility.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 6: Line 406 Ventura Valve Enhancement Project Bundle



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. The Project Team determined that a retaining wall was required to protect the new automation equipment from potential erosion on the adjacent hillside. The cost of this retaining wall was not included in the preliminary estimate.

III. CONSTRUCTION

A. Construction Contractor Selection

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

1. SoCalGas and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Alberson Crossover	
Construction Start Date	02/29/2016
Construction Completion Date	06/03/2016
Days on Site	53 days
Commissioning Date	04/25/2017
Sexton Canyon	
Construction Start Date	11/30/2015
Construction Completion Date	01/20/2016
Days on Site	10 days
Commissioning Date	08/24/2016
Hill Canyon	
Construction Start Date	04/18/2016
Construction Completion Date	08/03/2016
Days on Site	42 days
Commissioning Date	08/09/2016
Westside Station	
Construction Start Date	05/09/2016
Construction Completion Date	06/06/2016
Days on Site	19 days
Commissioning Date	10/05/2016

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

C. Changes During Construction

SoCalGas and SDG&E 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 7: Conduit Trenching at Sexton Canyon

Figure 8: Equipment at Hill Canyon

Figure 9: RCV at Westside Station

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on August 9, 2016, August 24, 2016, October 5, 2016 and April 25, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design site walk to incorporate known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Planning and Coordination:

    a. The Project Team bundled projects to coordinate engineering and construction activity between the four project sites to reduce overall costs for customers.

    b. The Project Team adjusted the construction schedule to allow the construction contractors to sequence construction tasks between the Line 406 Ventura Valve Enhancement Bundle Project sites and the Line 404 Ventura Valve Enhancement Project Bundle in a way that minimized crew overlap.

    c. The Project Team scheduled construction to align with a planned blowdown for work being performed by the Operating District. This allowed for a single blowdown of Line 406 that accommodated the work related to this project and the installation of the new MLV on Line 406.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $3,523,954. This estimate was prepared in June of 2015 using the "Stage 3 SCG Estimating Template Rev 3" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 cost of the Project is $3,902,061.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	352,498	308,613	(43,885)
Materials	430,872	365,248	(65,624)
Mechanical Construction Contractor	690,072	161,086	(528,986)
Electrical Contractor	319,605	432,922	113,317
Construction Management & Support	297,995	227,339	(70,656)
Environmental	61,094	89,948	28,854
Engineering & Design	932,358	1,019,611	87,253
Project Management & Services	132,633	104,055	(28,578)
ROW & Permits	11,000	158,161	147,161
GMA	295,827	372,176	76,349
Total Direct Costs	**3,523,954**	**3,239,159**	**(284,795)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta over/(under)
Overheads	442,602	431,427	(11,175)
AFUDC	168,670	204,789	36,119
Property Taxes	35,025	26,686	(8,339)
Total Indirect Costs	**646,297**	**662,902**	**16,605**
Total Direct Costs	**3,523,954**	**3,239,159**	**(284,795)**
Total Loaded Costs	**4,170,251**	**3,902,061**	**(268,190)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their natural gas transmission system by prudently executing the Line 406 Ventura Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated four mainline valves and one crossover valve to achieve the objective of enabling rapid system isolation in the Cities of Westlake Village, Ventura, and Los Angeles and in the unincorporated community of Santa Rosa Valley. The total loaded cost of the Project is $3,902,061.

SoCalGas and SDG&E executed this project prudently by: designing and executing the Project to support achievement of the Valve Enhancement Plan isolation objectives, coordinating and bundling four valve projects into a comprehensive package to capture efficiencies through coordinated scheduling of construction crews, and installing equipment necessary to bring power and communication capabilities to these valves to enable rapid automated isolation of portions of Lines 404 and 406.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating construction activity with the Line 404 Ventura Valve Enhancement Bundle, and by limiting the number of mobilizations and across four different project sites to maximize efficiencies and reduce customer and community impacts.

End of Line 406 Ventura Valve Project Bundle Final Report

I. LINE 49-28 RCV UPGRADE VALVE ENHANCEMENT PROJECT

A. Background and Summary

This report describes the activities associated with the Line 49-28 Valve Enhancement Project, that consists of valve enhancements made to an existing mainline valve (MLV) located in the City of San Diego in San Diego County. Through this project, SoCalGas and SDG&E enhanced the capabilities of one MLV to enable rapid transmission system isolation to a portion of Line 49-28. SoCalGas and SDG&E installed a new actuator, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,658,289.

The Line 49-28 Valve Enhancement Project is located along heavily trafficked Morena Boulevard in a commercial area in the City of San Diego.

Table 1: General Project Information

Line 49-28 RCV Upgrade Valve Enhancement Project			
Location	San Diego		
Days on Site	31 days		
Construction Start	10/03/2016		
Construction Finish	10/20/2017		
Commissioning Date	08/30/2018		
Valve Upgrades			
Valve Number	20375		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	Existing – Retrofitted		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,658,289	-	1,658,289
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 49-28 Valve Enhancement Project Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope did not include this project. SoCalGas and SDG&E 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 these valves for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that this isolation point would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.

3. Engineering, Design, and Constructability: No notable engineering adjustments were required.

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

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

Table 2: Final Project Scope

Final Project Scope					
Line	Mile[2]	Valve #	Valve Size (*confidential*)	Installation Type	Function
49-28	N/A	20375	[redacted]	A/VT	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 49-28 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 a high-density, primarily commercial area. The existing valve is located in a vault on Morena Boulevard.
2. Land Issues: During the pre-design site walk, 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 the site.

[2] Valve naming convention at SDG&E does not include milepoint.

C. Engineering, Design, and Planning Factors

SoCalGas and SDG&E reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity and completed a pre-design 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. There were items of note that affected the design.
2. Valve Details: The existing valve was a manually operated Class 600 ball valve, and the Project Team reused it.
3. Actuator Details: There was no preexisting actuator, the Project Team installed a new actuator.
4. Customer Impact: The Project Team did not anticipate service disruptions to customers.
5. Community Impact: The Project Team restricted public access to the sidewalk during construction
6. Substructures: The Project Team identified existing storm drains, a water main, telecommunitions, electrical conduit, and gas pipelines below grade.
7. Environmental: The Project team identified two trees that interfered with the installation of the new automation equipment. The Project Team obtained a permit for the removal of the two trees. An environmental monitor performed spot checks during construction.

8. Permit Restrictions:

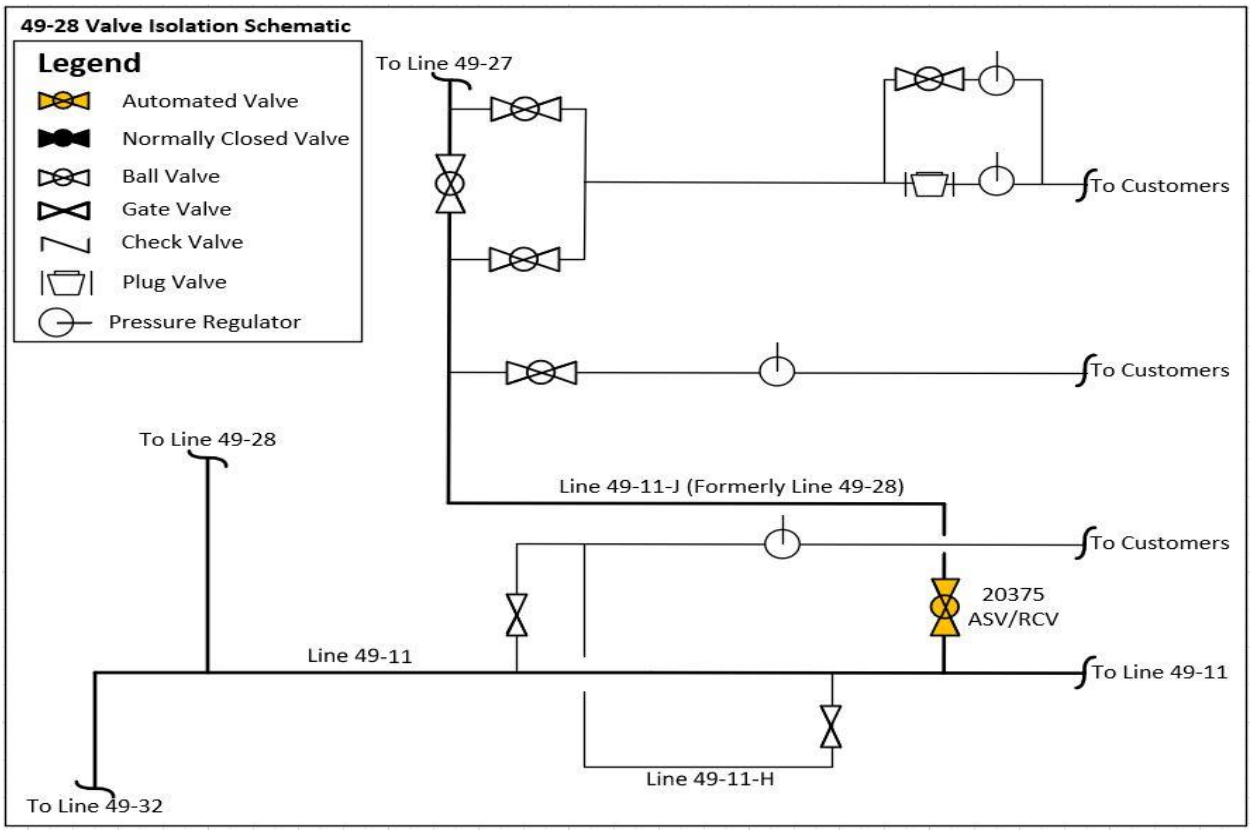
   a. The Project Team obtained a Traffic Control Permit (TCP) which limited construction to night time due to the amount of traffic during the day on Morena Boulevard.

   b. There was a moratorium in place for Morena Boulevard. The Project Team was required to repave the street from the curb to the median.

9. Land Use: The Project Team initially planned to install the linebreak cabinet, SCADA cabinet, and radio antenna inside the property line of a large retail chain store. Due to complications with negotiations, the Project Team redesigned the Project to install the new automation equipment in the city franchise within an existing SDG&E easement.

10. Traffic Control: The Project Team closed two traffic lanes during construction for excavation. The Project Team plated the excavation during non-working hours to allow traffic to pass through unimpeded during non-construction hours.

Figure 2: Schematic of 49-28 RCV Upgrade Site



D. Scope Changes

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

1. The Project Team initially planned to locate the new automation equipment in front of a large retail chain store. The design was then changed, and the automation equipment was installed within the city franchise in an existing SDG&E electric easement.

2. The location of the radio antenna was updated to install the antenna onto an existing utility pole.

III. CONSTRUCTION

A. Construction Contractor Selection

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

1. SoCalGas and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	10/03/2016
Construction Completion Date	10/20/2017
Days on Site	31 days
Commissioning Date	08/30/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $120,800 in change orders.

1. Field Design Change: During installation of the new actuator in the existing vault, the vault lid was removed, and it was identified that the concrete collar had deteriorated, and the Project Team would need to replace it.

2. Site Restoration: Following the planned removal of a tree by the Construction Contractor, the City of San Diego requested additional curb and gutter restoration.

3. Weather: Excessive rain caused the trench to collapse and damaged one of the recently installed sensing lines. The Construction Contractor replaced the damaged sensing lines.

Figure 3: Valve Extension

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the actuators into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. 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 30, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design site walk to incorporate the site conditions in the Project plan and design. An example of cost avoidance action taken on this project was the design placed the antenna on an existing utility pole to reduce costs associated with new pole installation.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $1,109,612. This estimate was prepared in August of 2016, using the “Stage 3 San Diego Pipeline Estimate Template Rev 2” estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $1,658,289.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	26,180	11,351	(14,829)
Materials	120,465	186,316	65,851
Mechanical Construction Contractor	498,502	698,808	200,306
Electrical Contractor	103,714	110,615	6,901
Construction Management & Support	36,575	151,009	114,434
Environmental	84,040	532	(83,508)
Engineering & Design	116,833	200,597	83,764
Project Management & Services	22,429	349	(22,080)
ROW & Permits	-	1,071	1,071
GMA	100,874	85,873	(15,001)
Total Direct Costs	**1,109,612**	**1,446,521**	**336,909**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	81,244	204,159	122,915
AFUDC	73,996	7,167	(66,829)
Property Taxes	-	442	442
Total Indirect Costs	**155,240**	**211,768**	**56,528**
Total Direct Costs	**1,109,612**	**1,446,521**	**336,909**
Total Loaded Costs	**1,264,852**	**1,658,289**	**393,437**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 49-28 Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully automated one mainline valve to achieve the objective of enabling backflow prevention in City of San Diego. The total loaded cost of the Project is $1,658,289.

SoCalGas and SDG&E executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, installing a new actuator in the existing vault, and by installing the necessary equipment to bring power and communication capabilities to this valve to enable backflow prevention from a portion of Line 49-28 in the City of San Diego.

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

End of Line 49-28 RCV Upgrade Valve Project Final Report

I. LINE 6916 VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Line 6916 Valve Enhancement Project Bundle, that consists of valve enhancements made to three existing mainline valves (MLVs) located in Twentynine Palms and in the unincorporated communities of Whitewater and Morongo Valley, in San Bernardino County. Through this project, SoCalGas and SDG&E enhanced the capabilities of three MLVs to enable rapid transmission system isolation to portions of Line 6916. SoCalGas and SDG&E expanded existing solar power, installed new communications equipment, and the necessary automation equipment at the sites. The total loaded project cost is $2,787,819.

The three valves comprising the Line 6916 Valve Enhancement Project Bundle are located in desert environments in the Morongo Valley and are separated into three sites. All three sites are existing SoCalGas facilities. SoCalGas and SDG&E grouped the three project sites together into a single valve bundle and executed the three sites as a comprehensive package because the sites are geographically proximate and are locations where work could be performed simultaneously, such that the Project Team could manage the work load between project sites and capture efficiencies by limiting the number of mobilizations and demobilizations.

Table 1: General Project Information

Line 6916 Valve Enhancement Project Bundle			
Site	Indian Trail	Malibu Trail	Morongo
Location	Twentynine Palms	Morongo Valley	Whitewater
Days on Site	30 days	24 days	24 days
Construction Start	02/13/2017	12/06/2016	11/08/2016
Construction Finish	04/10/2017	01/17/2017	12/15/2016
Commissioning Date	09/07/2017	08/08/2017	06/26/2017
Valve Upgrades			
Valve Number	6916-70.31-0	6916-99.61-0	6916-114.24-0
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball
Actuator	Existing	Existing	Existing
Actuator Above-/Below-Grade	Above-Grade	Above-Grade	Above-Grade
ASV	Yes	Yes	Yes
RCV	Yes	Yes	Yes
Site Upgrades			
Vault	None	None	None
Power	Existing – Utility	Existing – Utility	New -- Utility
Communication	New – Satellite	New – Satellite	New – Radio
SCADA Panel	New	New	New
Equipment Shelter	New	New	New
Fencing	Existing	Existing	Existing
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	2,787,819	-	2,787,819
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 6916 Valve Enhancement Project Bundle: Overview

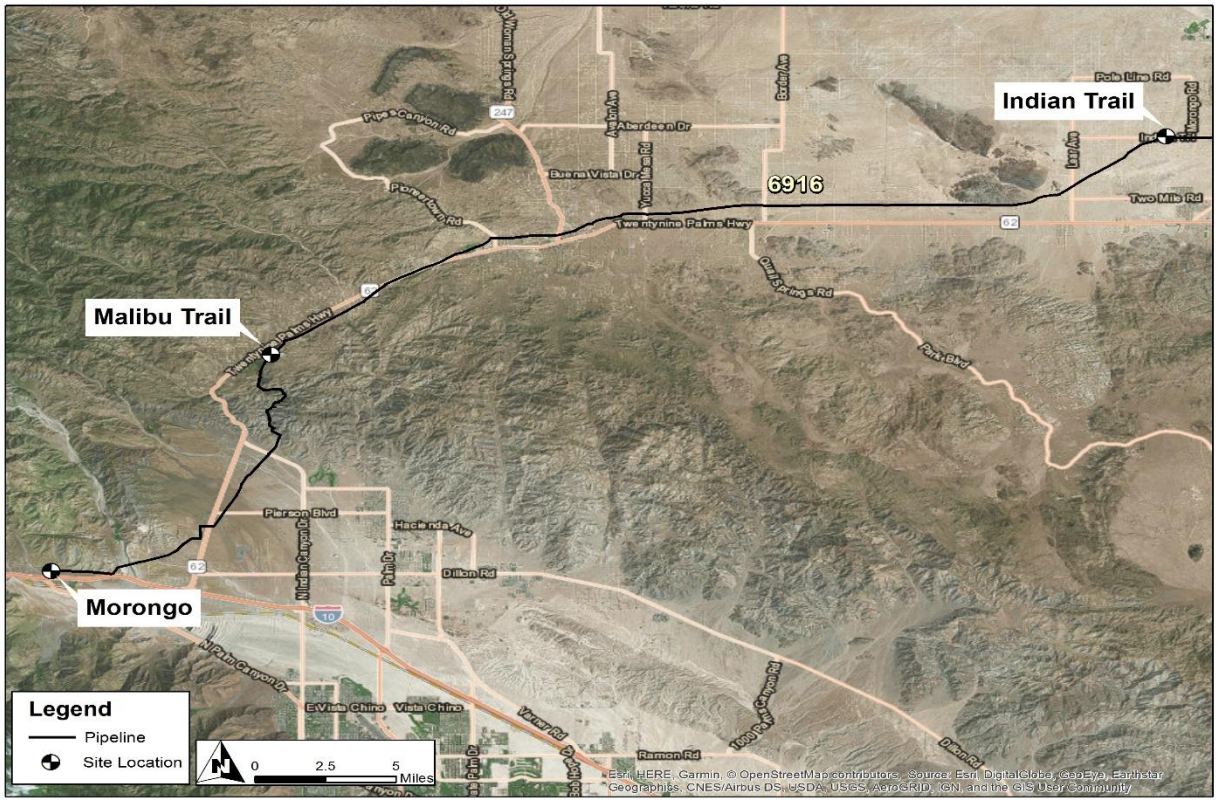


Figure 2: Satellite Image of Indian Trail

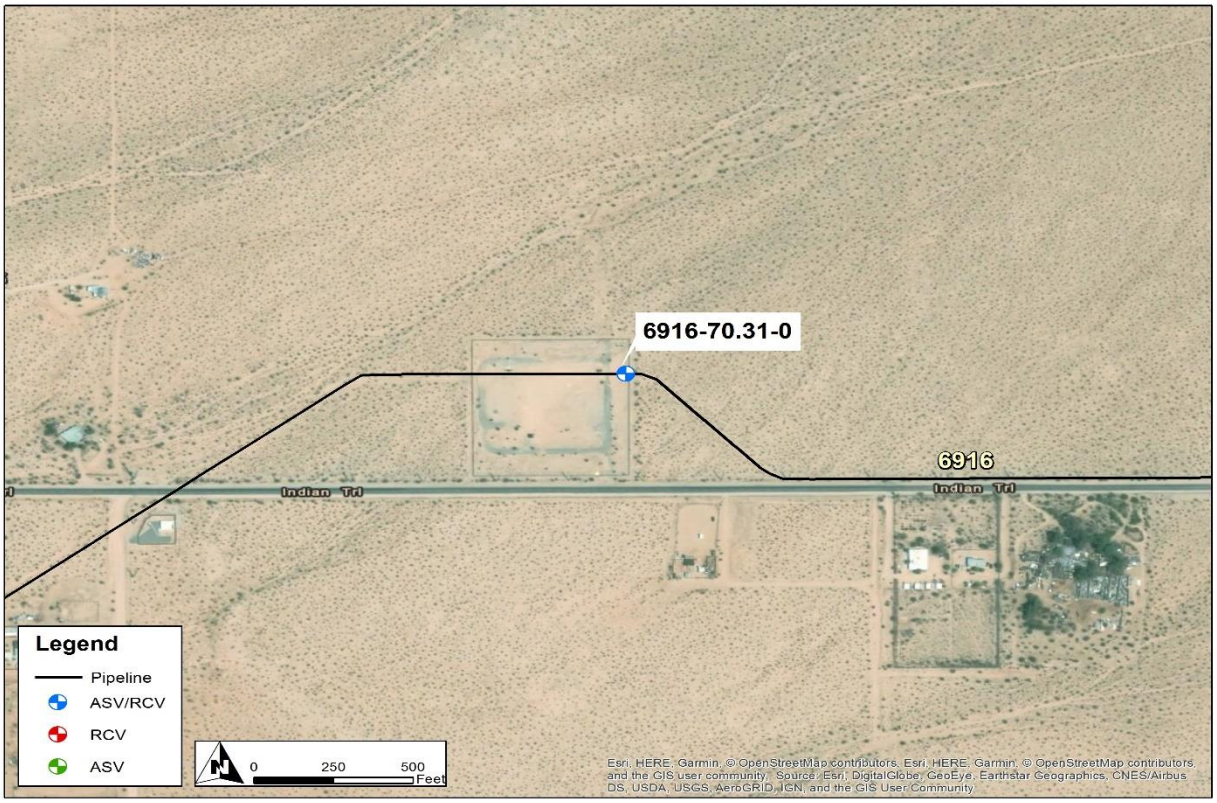


Figure 3: Satellite Image of Malibu Trail

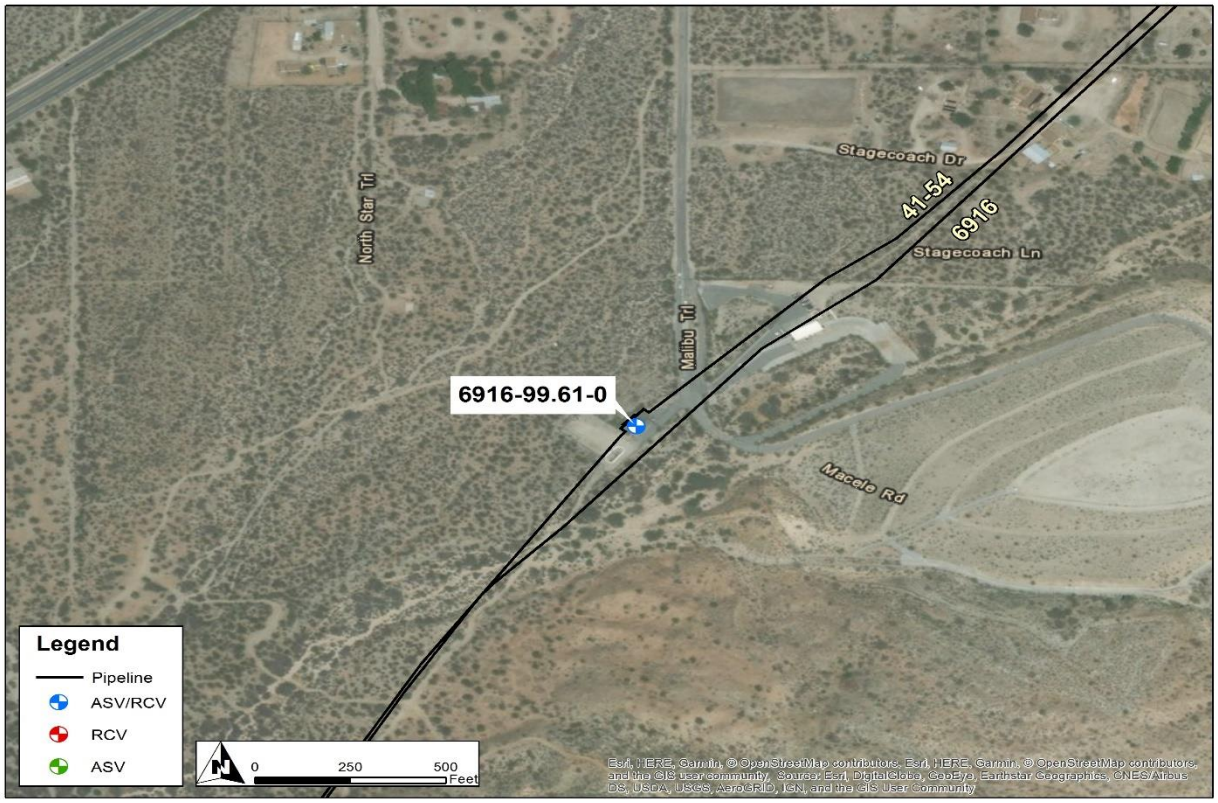
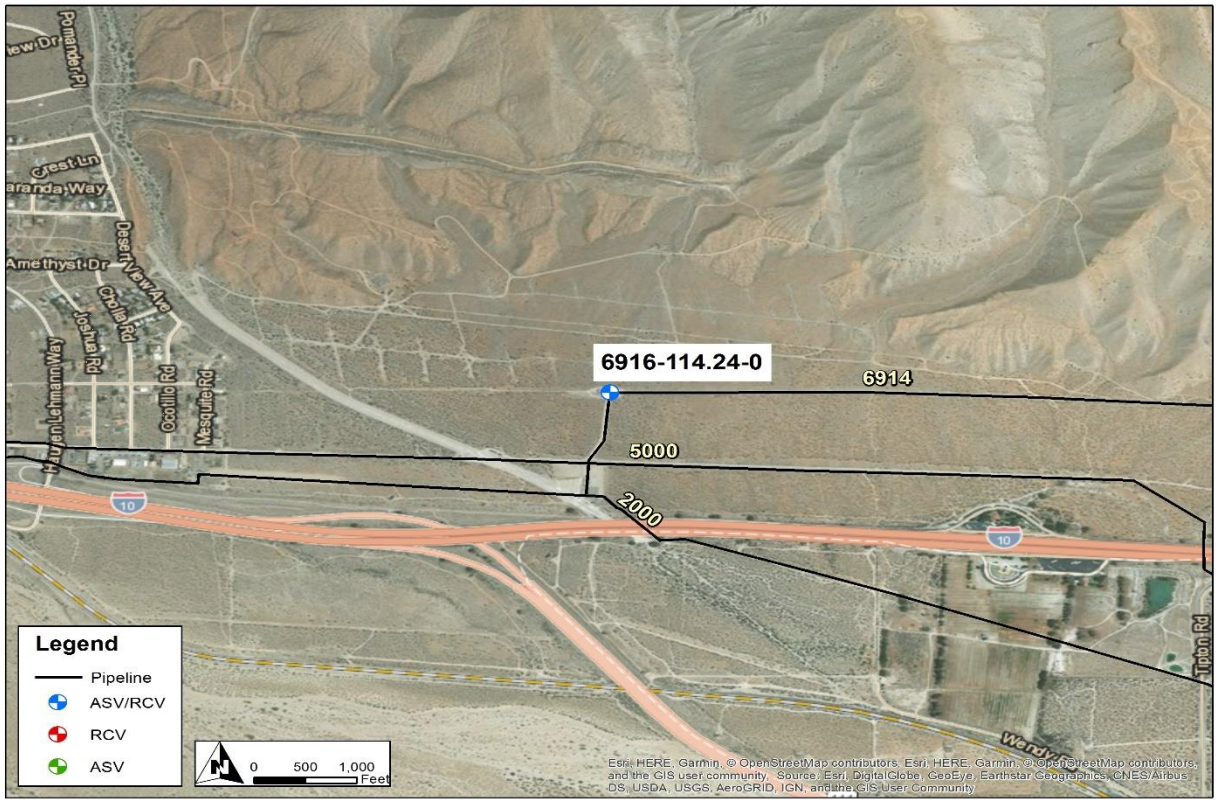


Figure 4: Satellite Image of Morongo



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

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

1. 2011 PSEP Filing: SoCalGas and SDG&E did not identify these valves for automation to achieve the objective of rapid system isolation.

2. Updated Scope: SoCalGas and SDG&E determined that the automation of these three MLVs would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.

3. Engineering, Design, and Constructability: No notable engineering adjustments were required to the standard design.

4. Final Project Scope: The final project scope consists of the automation of three valves that included upgrades to the existing power equipment, the installation of communications equipment and the installation of the necessary automation equipment at the project sites.

[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
6916	70.31	0	[redacted]	C/P	ASV/RCV
6916	99.61	0	[redacted]	C/P	ASV/RCV
6916	114.24	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Line 6916 Valve Enhancement Project Bundle by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

Indian Trail

1. Site Description: This site is an existing SoCalGas facility in a desert environment. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate known geological threats upstream and downstream of this valve.
4. Power Source: The site has existing utility power.

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

Malibu Trail

1. Site Description: This site is an existing SoCalGas facility in a desert environment. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate known geological threats upstream and downstream of this valve.
4. Power Source: The site has existing utility power.
5. Communication Technology: There was no preexisting communications equipment, the Project Team installed new communications equipment at the site.

Morongo

1. Site Description: This site is an existing SoCalGas facility in a desert environment. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate known geological threats upstream and downstream of this valve.

4. Power Source: There was no preexisting power source. There is an existing SoCalGas facility approximately 800 feet south of this project site. SoCalGas has an existing easement between the two sites and connected the equipment at the Morongo site to this existing utility power.

5. Communication Technology: There was no preexisting communications equipment, so SoCalGas and SDG&E installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

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

Indian Trail

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 600 ball valve that the Project Team reused.

3. Actuator Details: The existing actuator was a rotary piston double acting 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 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 spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Malibu Trail

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would accommodate the new equipment.

2. Valve Details: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

3. Actuator Details: The existing actuator is a rotary piston double acting 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 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 spot checks during construction.

8. Permit Restrictions: The Project Team obtained a building permit from San Bernardino County for the new electrical shelter.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility.

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

Morongo

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 600 ball valve that the Project Team reused.

3. Actuator Details: The existing actuator was a double acting pneumatic actuator that The Project 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 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.

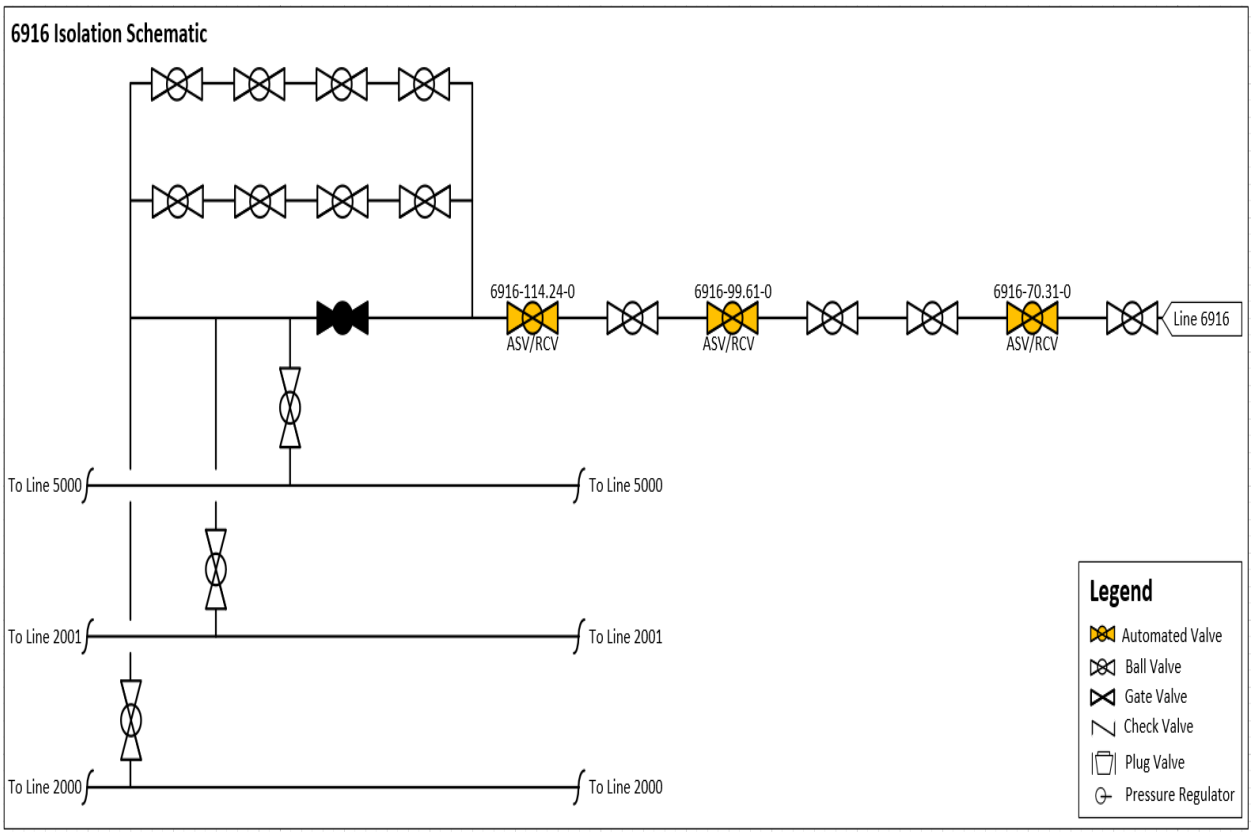
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas easements.

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

Figure 5: Line 6916 Valve Enhancement Project Bundle Schematic



D. Scope Changes

SoCalGas and SDG&E 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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Indian Trail	
Construction Start Date	02/13/2017
Construction Completion Date	04/10/2017
Days on Site	30 days
Commissioning Date	09/07/2017
Malibu Trail	
Construction Start Date	12/06/2016
Construction Completion Date	01/17/2017
Days on Site	24 days
Commissioning Date	08/08/2017
Morongo	
Construction Start Date	11/08/2016
Construction Completion Date	12/15/2016
Days on Site	24 days
Commissioning Date	06/26/2017

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

C. Changes During Construction

SoCalGas and SDG&E 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 6: Indian Trail – Satellite Communications Equipment and Electrical Shelter in Foreground, Linebreak Cabinet and Actuator in Background

Figure 7: Malibu Trail – Linebreak Cabinet and Canopy

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves back into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on June 26, 2017, August 8, 2017 and September 7, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design 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. Planning and Coordination: The Project Team bundled projects to coordinate engineering activities between the three project sites.
2. Land Use: The Project Team utilized existing SoCalGas facilities as laydown yards.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $2,892,520. This estimate was prepared in October of 2016, using the “Stage 3 SCG Valve Estimate Template Rev 3” estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $2,787,819.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	411,620	194,891	(216,729)
Materials	300,583	188,968	(111,615)
Mechanical Construction Contractor	559,780	584,666	24,886
Electrical Contractor	632,190	402,579	(229,611)
Construction Management & Support	155,760	153,793	(1,967)
Environmental	136,290	28,882	(107,408)
Engineering & Design	213,864	519,970	306,106
Project Management & Services	208,477	44,916	(163,561)
ROW & Permits	11,000	28,741	17,741
GMA	262,956	274,422	11,466
Total Direct Costs	**2,892,520**	**2,421,828**	**(470,692)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	470,072	292,727	(177,345)
AFUDC	235,278	62,564	(172,714)
Property Taxes	55,856	10,700	(45,156)
Total Indirect Costs	**761,206**	**365,991**	**(395,215)**
Total Direct Costs	**2,892,520**	**2,421,828**	**(470,692)**
Total Loaded Costs	**3,653,726**	**2,787,819**	**(865,907)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 6916 Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated three mainline valves to achieve the objective of enabling rapid system isolation in Twentynine Palms, and the unincorporated communities of Whitewater and Morongo Valley. The total loaded cost of the Project is $2,787,819.

SoCalGas and SDG&E executed this project prudently through: designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, coordinating and bundling three valve projects into a comprehensive construction package to capture efficiencies through coordinated scheduling of construction crews, installing the necessary automation equipment, expanding the existing utility power at two of the sites; utilizing existing utility power at a nearby facility at the third site, and installing the equipment necessary to bring communication capabilities to these valves to enable rapid system isolation to a portion of Line 6916 in San Bernardino and Riverside Counties.

SoCalGas and SDG&E 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 across three different project sites to maximize efficiencies and reduce customer and community impacts.

End of Line 6916 Valve Enhancement Project Bundle Final Report

I. LINE 7000 VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Line 7000 Valve Enhancement Project Bundle that consists of valve enhancements made to two existing mainline valves (MLVs) in the City of Delano and the unincorporated community of Tipton Kern and Tulare County. Through this project, SoCalGas and SDG&E enhanced the capabilities of two MLVs to enable rapid transmission system isolation to portions of Line 7000. SoCalGas and SDG&E installed two new actuators, new power equipment, new communications equipment, and the necessary automation equipment at the sites. The total loaded project cost is $1,843,070.

The two valves comprising the Line 7000 Valve Enhancement Project Bundle are located in existing SoCalGas facilities adjacent to farmland and are separated into two project sites. The Delano site is on the southwest corner of Avenue 24 and Road 112 in Kern County; and the Tipton site is on the southeast corner of Olive Street and Wesling Road in the City of Tipton. SoCalGas and SDG&E grouped the two project sites together into a single valve bundle and executed the two sites as a comprehensive package because the sites are geographically proximate and are locations where work could be performed simultaneously, such that the Project Team could manage the workload between project sites and capture efficiencies by limiting the number of mobilizations and demobilizations.

Table 1: General Project Information

Line 7000 Valve Enhancement Project Bundle			
Site	Delano	Tipton	
Location	City of Delano	Unincorporated Tipton	
Days on Site	26 days	32 days	
Construction Start	09/12/2016	09/19/2016	
Construction Finish	10/24/2016	10/10/2016	
Commissioning Date	40/20/2017	12/05/2017	
Valve Upgrades			
Valve Number	7000-29.43-0	7000-45.45-0	
Valve Type	Existing – Ball	Existing – Ball	
Actuator	New	New	
Actuator Above-/Below-Grade	Above-Grade	Above-Grade	
ASV	Yes	Yes	
RCV	Yes	Yes	
Site Upgrades			
Vault	None	None	
Power	Existing – Utility	New – Utility	
Communication	New – Radio	New – Radio	
SCADA Panel	New	New	
Equipment Shelter	New	New	
Fencing	Existing	Existing	
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,843,070	-	1,843,070
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Line 7000 Valve Enhancement Project Bundle: Overview

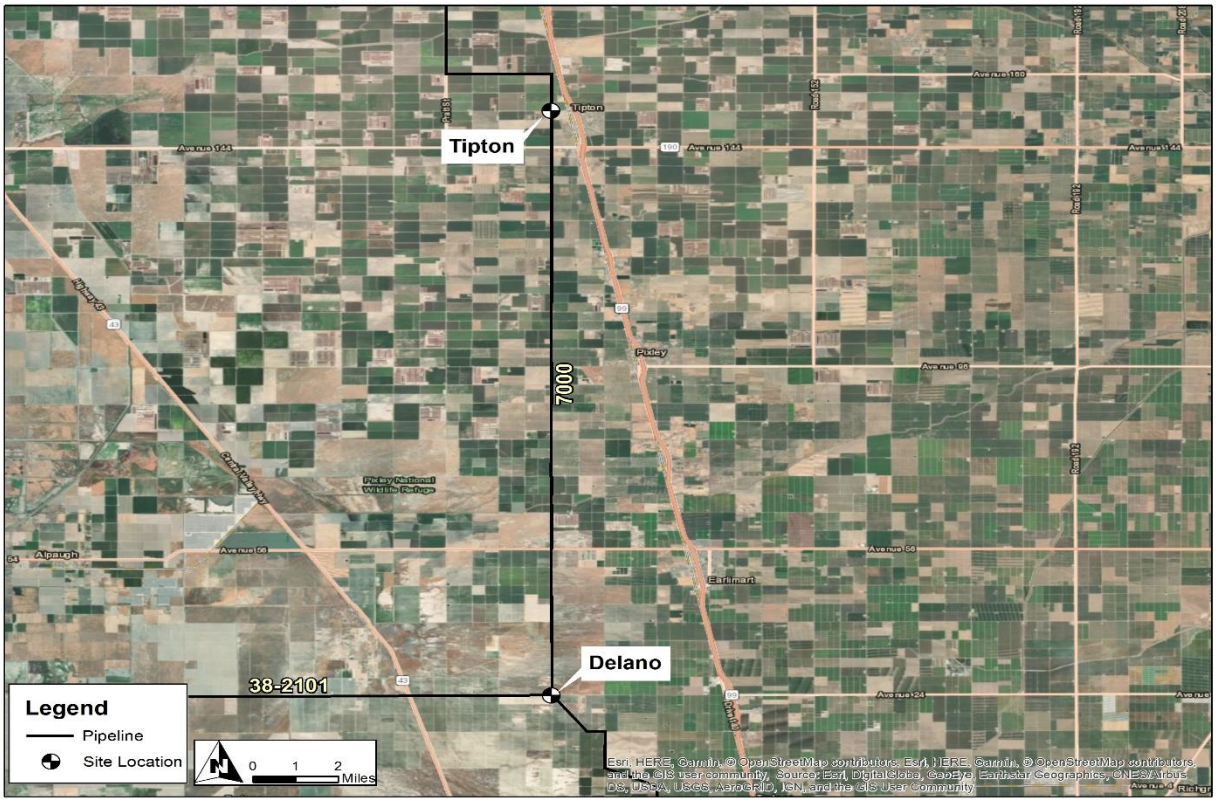


Figure 2: Satellite Image of Delano

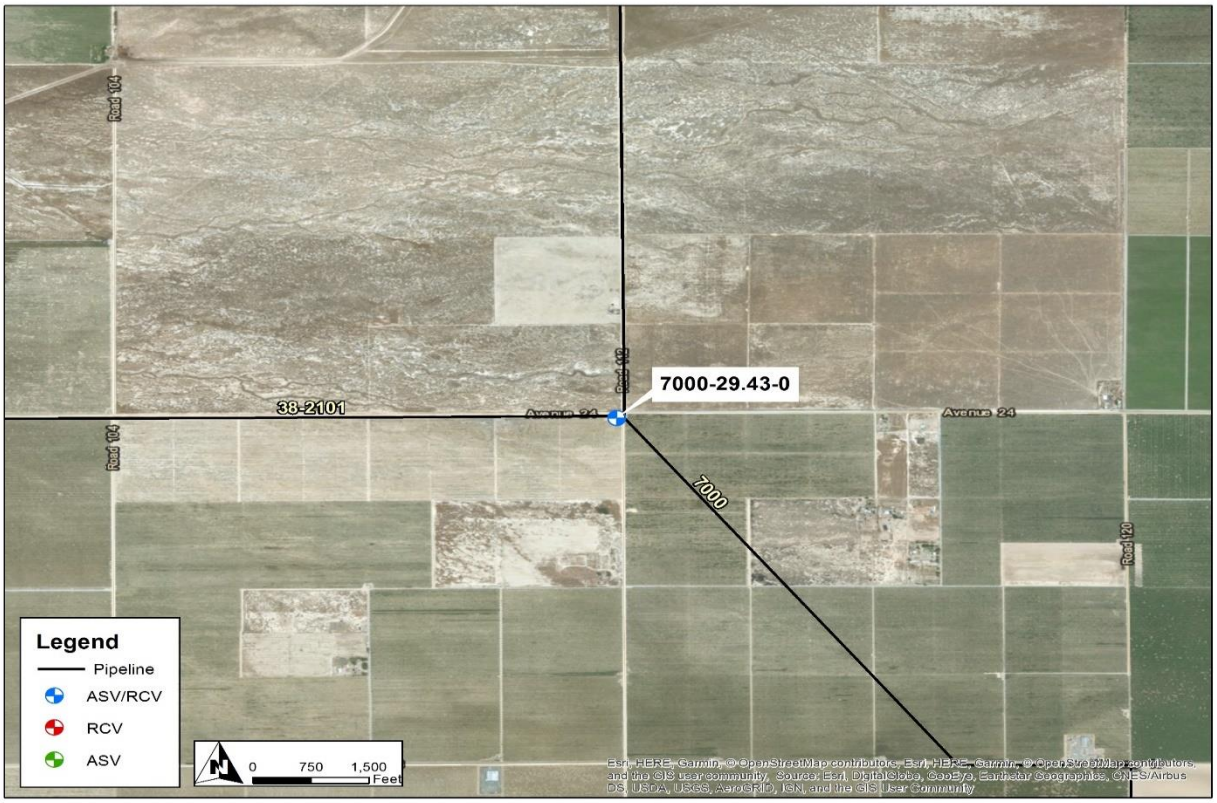


Figure 3: Satellite Image of Tipton

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified two MLVs for automation to provide remote isolation to portions of Line 7000. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project that confirmed that these valve enhancements will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E identified MLVs 7000-29.43-0 and 7000-45.44-0 for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that the automation of these two MLVs enable rapid isolation, achieving Valve Enhancement Plan objectives.

3. Engineering, Design, and Constructability:

    a. The Valve Enhancement Plan called for MLV 7000-29.43-0 to be replaced and for the actuator to be installed in the vault. The Project Team determined that the valve could be reused and that the actuator could be installed above-grade in the existing facility.

[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. The Valve Enhancement Plan also called for MLV 7000-45.44-0 to be automated. The Project Team determined that this valve no longer was in service and was replaced by MLV 7000-45.45-0. The Project Team proceeded with the automation of MLV 7000-45.45-0.

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

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
7000	29.43	0	[redacted]	A/AG	ASV/RCV
7000	45.45	0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

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

Delano

1. Site Description: This site is an existing SoCalGas facility in a rural area. There is an existing chain link fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.

3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 HCA locations upstream of this valve.

4. Power Source: This site has existing utility power.

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

Tipton

1. Site Description: This site is an existing SoCalGas facility in a rural area. There is an existing chain link fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.

3. DOT Class: This project site is in a Class 2 location. SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 HCA locations downstream of this valve.

4. Power Source: There was no preexisting power source, the Project Team installed new power equipment at the site.

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

C. Engineering, Design, and Planning Factors

SoCalGas and SDG&E 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:

Delano

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 is a manually operated Class 600 ball valve that the Project Team reused.
3. Actuator Details: There was no preexisting actuator, the Project Team installed a new actuator.
4. Customer Impact: The Project Team did not anticipate service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any 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 performed a biological survey for San Joaquin Valley special status species prior to construction. The Project Team received approval to proceed with construction once it was determined that the construction activities would avoid impacting potential habitat for the Blunt Nose Leopard Lizard and the San Joaquin Kit Fox. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: SoCalGas and SDG&E performed all work within the existing SoCalGas facility.

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

Tipton

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would accommodate the new equipment.

2. Valve Details: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

3. Actuator Details: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any 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.

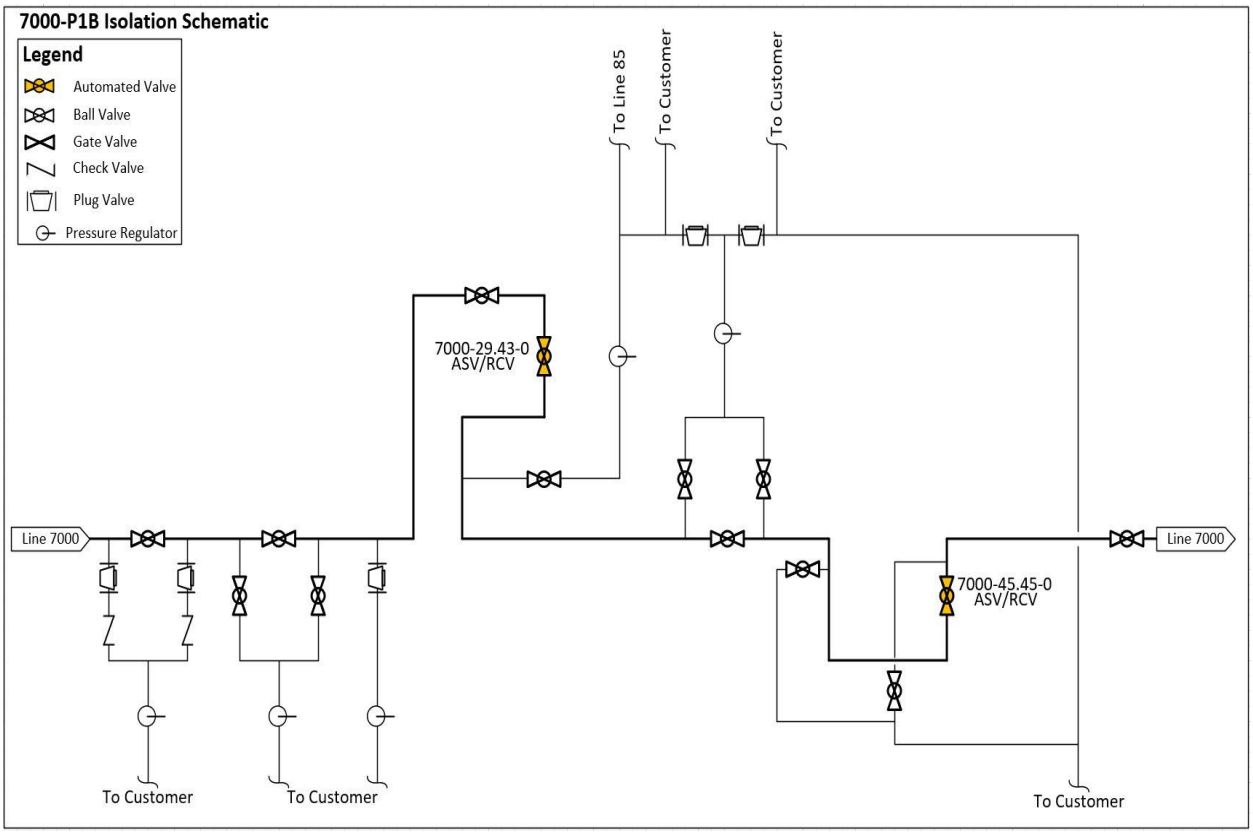
7. Environmental: The Project Team performed a biological survey for San Joaquin Valley special status species prior to construction. The Project Team received approval to proceed with construction once the potential for San Joaquin Kit Fox burrows adjacent to the site were deemed inactive. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The Project Team obtained an electrical permit from Tulare County for the installation utility power.

9. Land Use: The Project Team utilized space east of the existing facility as a laydown yard during construction.

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

Figure 4: Line 7000 Valve Enhancement Project Bundle Schematic



D. Scope Changes

SoCalGas and SDG&E 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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's preliminary cost estimate for construction was [redacted].

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

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

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

B. Construction Schedule

Table 3: Construction Timeline

Delano	
Construction Start Date	09/12/2016
Construction Completion Date	10/24/2016
Days on Site	26 days
Commissioning Date	04/20/2017
Tipton	
Construction Start Date	09/19/2016
Construction Completion Date	10/10/2016
Days on Site	32 days
Commissioning Date	12/05/2017

SoCalGas and SDG&E completed all construction activities as soon as practicable prior to commissioning. Commissioning was delayed at the Delano site due to SoCalGas Gas Control delaying all commissioning activities during the first quarter of 2017 in response to system demand. Commissioning was delayed at the Tipton site while the local electrical utility completed the activities necessary to provide service.

C. Changes During Construction

SoCalGas and SDG&E 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 5: Delano Site Excavation for New Linebreak Cabinet in Foreground, Existing Piping Configuration in Background

Figure 6: Tipton Site New Actuator and Linebreak Cabinet in Foreground, Blowdown in Background

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves back into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on April 20, 2017 and December 5, 2017 as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E exercised due diligence in the design, planning, and execution of construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. The Project Team scheduled construction to start within one week of each other. This allowed for the sharing of construction resources between the two sites to reduce overall costs for customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $1,627,237. This estimate was prepared in July of 2016, using the “Stage 3 SCG Valve Estimate Template Rev 3” estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $1,843,070.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	84,163	119,690	35,527
Materials	231,605	86,431	(145,174)
Mechanical Construction Contractor	465,474	280,016	(185,458)
Electrical Contractor	123,814	197,215	73,401
Construction Management & Support	78,608	144,957	66,349
Environmental	101,310	10,239	(91,071)
Engineering & Design	280,801	407,062	126,261
Project Management & Services	88,232	72,367	(15,865)
ROW & Permits	25,300	27,847	2,547
GMA	147,930	163,342	15,412
Total Direct Costs	**1,627,237**	**1,509,166**	**(118,071)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	848,864	168,797	(680,067)
AFUDC	605,099	142,726	(462,373)
Property Taxes	143,775	22,381	(121,394)
Total Indirect Costs	**1,597,738**	**333,904**	**(1,263,834)**
Total Direct Costs	**1,627,237**	**1,509,166**	**(118,071)**
Total Loaded Costs	**3,224,975**	**1,843,070**	**(1,381,905)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Line 7000 Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated two mainline valves to achieve the objective of enabling rapid system isolation in the City of Delano and the unincorporated community of Tipton. The total loaded cost of the Project is $1,843,070.

SoCalGas and SDG&E executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives; coordinating and bundling two valve projects into a comprehensive construction package to capture efficiencies through coordinated scheduling of construction crews, adding utility power to one of the sites; and installing the equipment necessary to bring communication capabilities to these valves to enable rapid system isolation to a portion of Line 7000 in the County of Tulare

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating construction activity, limiting the number of mobilizations and reducing costs for customers.

End of Line 7000 Valve Enhancement Project Bundle Final Report

I. NEW DESERT VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the New Desert Valve Enhancement Project Bundle that consists of valve enhancements made to three new mainline valves (MLVs), two new crossover valves, and two existing crossover valves in the Cities of Palm Springs and Indio in Riverside County. Through this project, SoCalGas and SDG&E enhanced the capabilities of three MLVs and four crossover valves to enable rapid transmission system isolation to a portion of Lines 2000, 2001, 2051, and 6904. SoCalGas and SDG&E installed six new valves, four new blowdown assemblies, seven new actuators, a new crossover between Lines 2000, 2001 and 6904, expanded the existing SoCalGas facility at the Garnet Site, created a new SoCalGas facility at the Fargo Canyon Site, and installed power equipment, new communications equipment, and the necessary automation equipment at the sites. The total loaded project cost is $10,528,773.

The valves comprising the New Desert Valve Enhancement Project Bundle are in desert environments. The Garnet Station is in an existing SoCalGas property in a remote area in Palm Springs. Fargo Canyon is in a remote desert location. and will be a new SoCalGas facility. SoCalGas and SDG&E grouped the two project sites together into a single valve bundle and executed the two sites as a comprehensive package due to their geographical proximity.

Table 1: General Project Information

New Desert Valve Enhancement Project Bundle		
Site	Garnet Station	Fargo Canyon
Location	City of Palm Springs	City of Indio
Days on Site	83 days	44 days
Construction Start	10/13/2014	06/08/2015
Construction Finish	02/09/2017	09/08/2015
Commissioning Date	07/31/2017	02/09/2016
Valve Upgrades		
Valve Number	2000-121.83-1	2051-97.54-0
Valve Type	New – Ball	New – Ball
Actuator	New	New
Actuator Above-/Below-Grade	Above-Grade	Above-Grade
ASV	Yes	Yes
RCV	Yes	Yes
Valve Number	2000-121.83-2	
Valve Type	New – Ball	
Actuator	New	
Actuator Above-/Below-Grade	Above-Grade	
ASV	No	
RCV	Yes	
Valve Number	2000-121.84-0	
Valve Type	Existing – Ball	
Actuator	New	
Actuator Above-/Below-Grade	Above-Grade	
ASV	No	
RCV	Yes	

Table 1: General Project Information (Continued)

New Desert Valve Enhancement Project Bundle			
Site	Garnet Station	Fargo Canyon	
Valve Number	2001-121.82-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Valve Number	2001-121.83-1		
Valve Type	New – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	2001-121.83-2		
Valve Type	New – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Site Upgrades			
Vault	None	None	
Power	New – Utility	New – Solar	
Communication	New – Radio	New – Radio	
SCADA Panel	New	New	
Equipment Shelter	New	None	
Fencing	Expanded	New	
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	10,523,296	5,477	10,528,773
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of New Desert Valve Enhancement Project Bundle: Overview

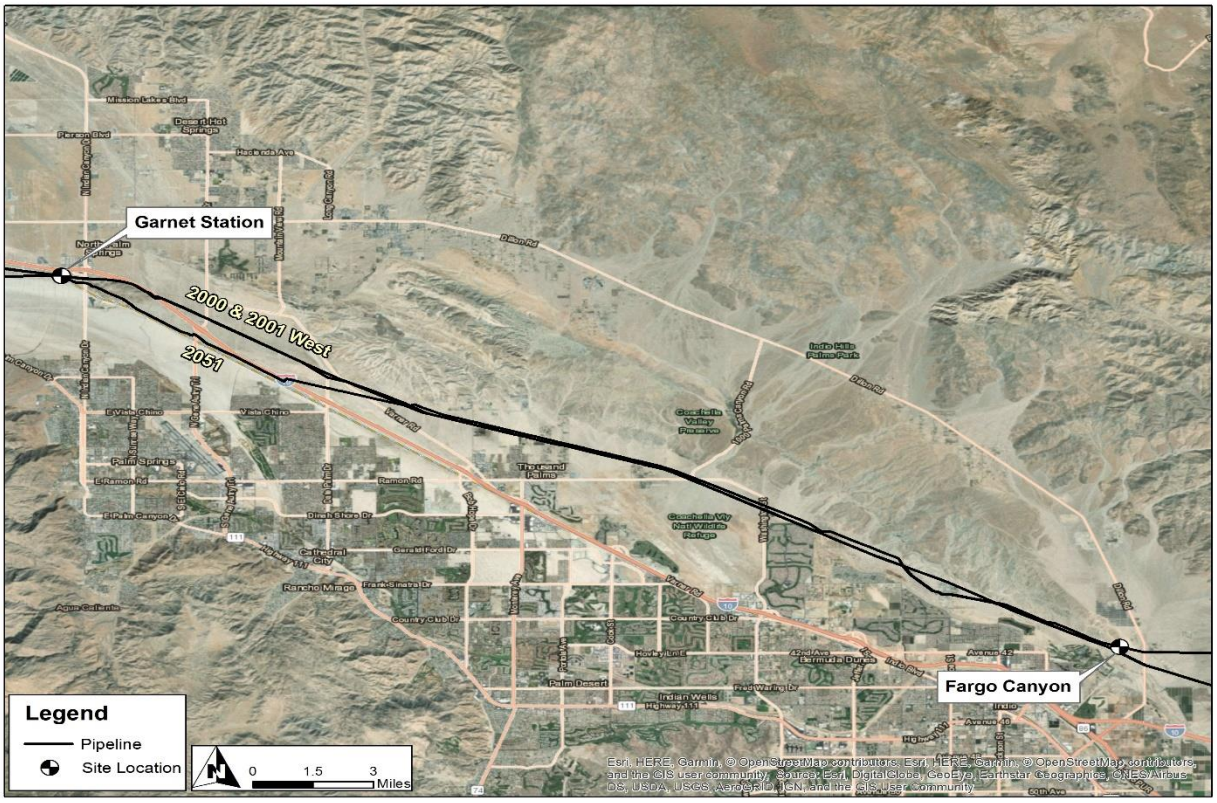


Figure 2: Garnet Station

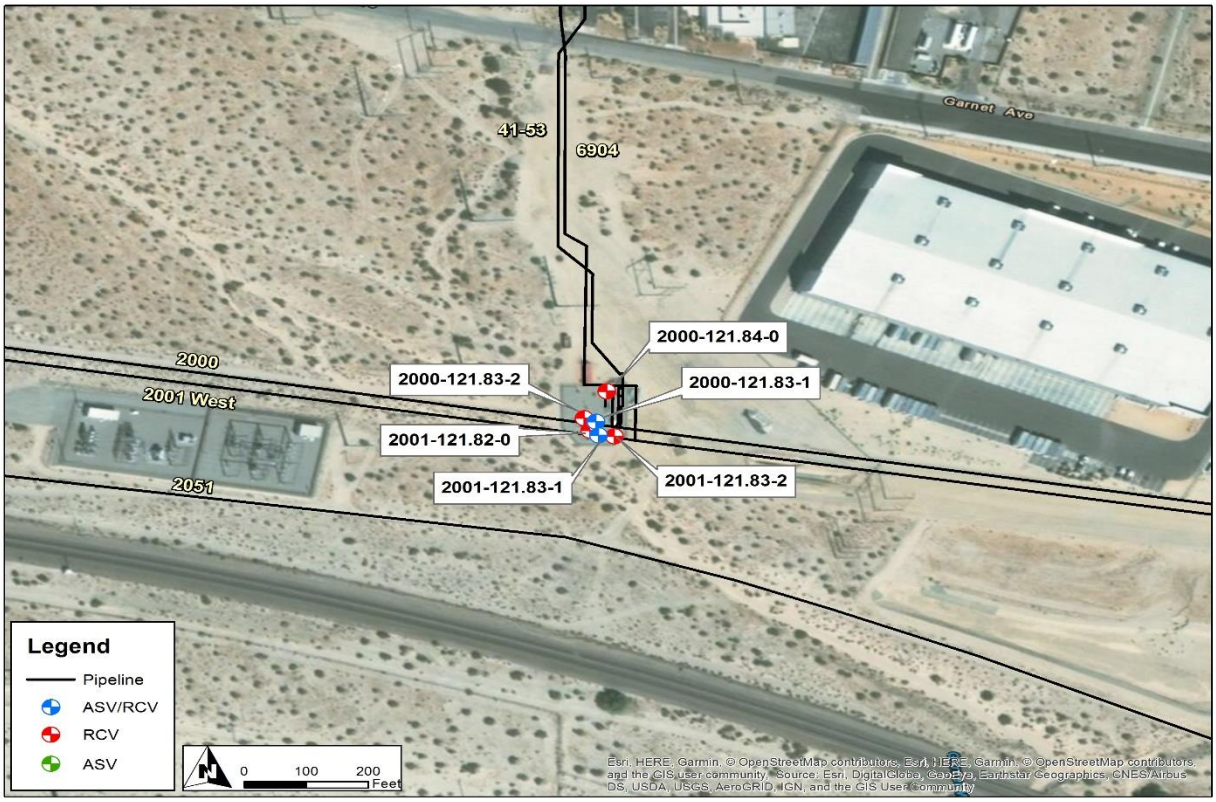
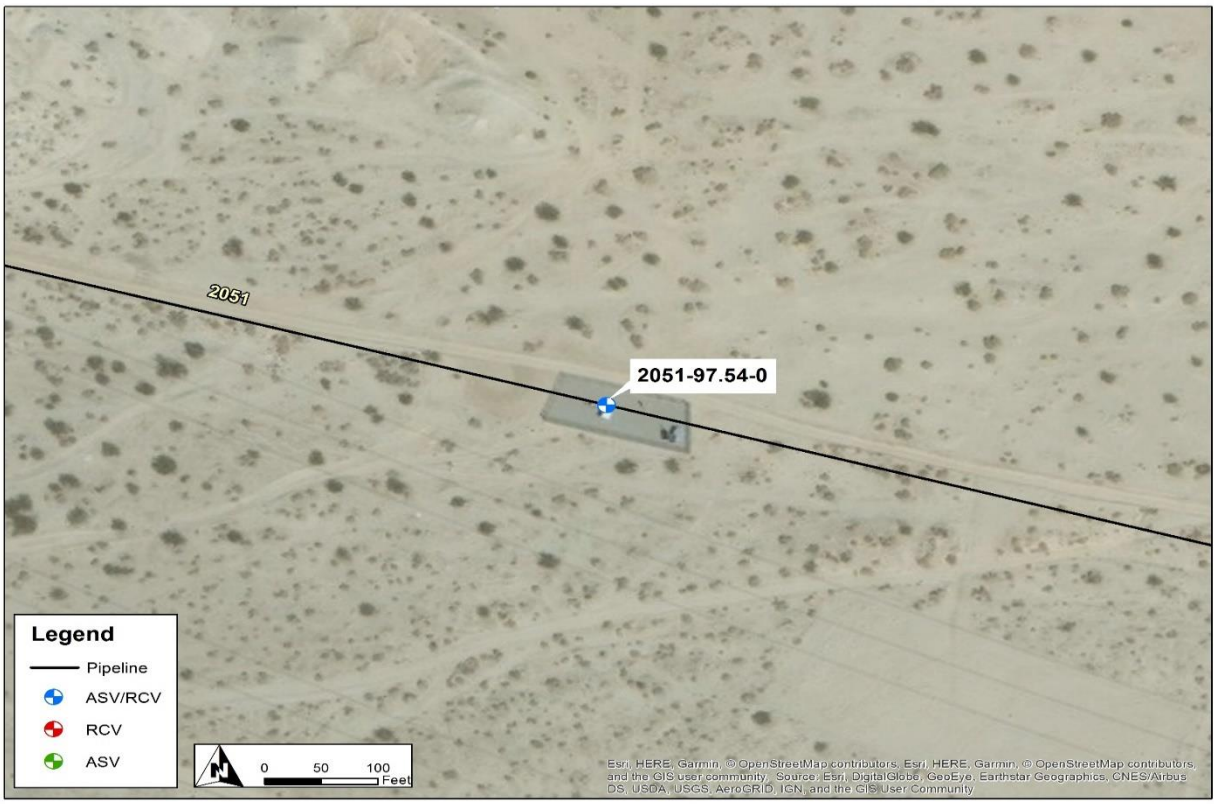


Figure 3: Fargo Canyon



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope did not include the valves automated by the New Desert Valve Enhancement Project Bundle. SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis that identified these seven valves as candidates for automation to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E did not identify these valves for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Lines 2000, 2001, and 6904 cross multiple known geological threats in this area that required isolation. SoCalGas and SDG&E determined that the automation of these valves, as listed in Table 2, will achieve the transmission isolation objectives for vault isolation set forth in the Valve Enhancement Plan.

3. Engineering, Design, and Constructability:

    a. The Project Team separated construction at the Garnet Station into two phases, expediting a planned shut-in to coincide with scheduled maintenance with a large, non-core customer.

[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. Line 2051 serves a large core customer. The Project Team scheduled the shut-in of Line 2051 at the Fargo Canyon site to coincide with non-working days of the core customer avoiding the need for CNG/LNG support.

4. Final Project Scope: The final project scope consists of the installation of five new valves, the installation of seven new actuators, the installation of thre new blowdown assemblies, the installation of a new crossover, the creation of a new SoCalGas Facility at the Fargo Canyon Site, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2000	121.83	1	[redacted]	NV/AG	ASV/RCV
2000	121.83	2	[redacted]	NV/AG	RCV
2000	121.84	0	[redacted]	C/P	RCV
2001	121.82	0	[redacted]	C/P	RCV
2001	121.83	1	[redacted]	NV/AG	ASV/RCV
2001	121.83	2	[redacted]	NV/AG	RCV
2051	97.54	0	[redacted]	NV/AG	ASV/RCV

B. Site Evaluation and Planning

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

Garnet Station

1. Site Description: The site is an existing SoCalGas facility in a desert environment and is situated next to a grouping of wind turbines. There are transmission power lines next to the site and there is a commercial distribution center northwest of the facility.

2. Land Issues: During the pre-design site walk, the Project Team noted the existing station would need to be expanded to accommodate the additional equipment.

3. DOT Class: The project site is in a Class 3 location.

    a. 2000-121.83-1: SoCalGas and SDG&E selected this MLV for automation to isolate HCA locations upstream and downstream of this valve and to meet the PSEP spacing criteria.

    b. 2000-121.83-2: SoCalGas and SDG&E selected this valve for automation to achieve backflow prevention between Lines 2000 and 2001.

    c. 2000-121.84-0: SoCalGas and SDG&E selected this valve for automation to achieve backflow prevention on Line 6904 and to maintain operational flexibility to an existing customer on Line 6904.

    d. 2001-121.82-0: SoCalGas and SDG&E selected this valve for automation to achieve backflow prevention on Line 6904 and to maintain operational flexibility to an existing customer on Line 6904.

    e. 2001-121.83-1: SoCalGas and SDG&E selected this MLV for automation to isolate HCA locations upstream and downstream of this valve and to meet the PSEP spacing criteria.

f. 2001-121.83-2: SoCalGas and SDG&E selected this valve for automation to achieve backflow prevention between Lines 2000 and 2001.

4. Power Source: There was existing solar power equipment, the Project Team installed new utility power equipment at the site to accommodate the increased loads required by the new equipment.

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

Fargo Canyon

1. Site Description: The site is located in a desert environment next to a road.

2. Land Issues: The Project Team obtained an above-ground, exclusive easement for the new facility.

3. DOT Class: This site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate a geological threat in the area and to isolate HCA locations upstream and downstream of the valve.

4. Power Source: There was no preexisting power source, the Project Team installed new power equipment at the site.

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

C. Engineering, Design, and Planning Factors

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

Garnet Station

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment. The Project Team determined that a crossover line should be installed between Line 2000, Line 2001, and Line 6904 to maintain operational flexibility in case of a linebreak.
2. Valve Details:
    a. 2000-121.83-1: There was no existing valve. The Project Team installed a new Class 600 ball valve.
    b. 2000-121.83-2: There was no existing valve. The Project Team installed a new Class 600 ball valve.
    c. 2000-121.84-0: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.
    d. 2001-121.82-0: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

e. 2001-121.83-1: There was no existing valve. The Project Team installed a new Class 600 ball valve.

f. 2001-121.83-2: There was no existing valve. The Project Team installed a new Class 600 ball valve.

3. Actuator Details:

a. 2000-121.83-1: There was no preexisting actuator, the Project Team installed a new actuator.

b. 2000-121.83-2: There was no preexisting actuator, the Project Team installed a new actuator.

c. 2000-121.84-0: There was no preexisting actuator, the Project Team installed a new actuator.

d. 2001-121.82-0: There was no preexisting actuator, the Project Team installed a new actuator.

e. 2001-121.83-1: There was no preexisting actuator, the Project Team installed a new actuator.

f. 2001-121.83-2: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: Line 6904 serves an energy generation customer. The Project Team coordinated the shut-in of Line 6904 with the maintenance schedule for this customer, avoiding the need for CNG/LNG support.

5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this Project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team identified an environmentally sensitive drainage basin that required a redesign to the piping configuration. A biological monitor was on-site full time during construction.
8. Permit Restrictions: The Project Team obtained a Dust Control Permit from the City of Palm Springs.
9. Land Use: The Project Team acquired a new below ground easement for the installation of utility power. There was sufficient space at the construction site for a laydown yard.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Fargo Canyon

1. Engineering Assessment: There were no items of note that affected the design.
2. Valve Details: There was no existing valve, the Project Team installed a new Class 600 ball valve.
3. Actuator Details: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: There is one large core customer that would be impacted by a shut-in on this portion of Line 2051. The Project Team coordinated the shut-in of Line 2051 with the customer's non-working days schedule, avoiding the need for CNG/LNG support.

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.

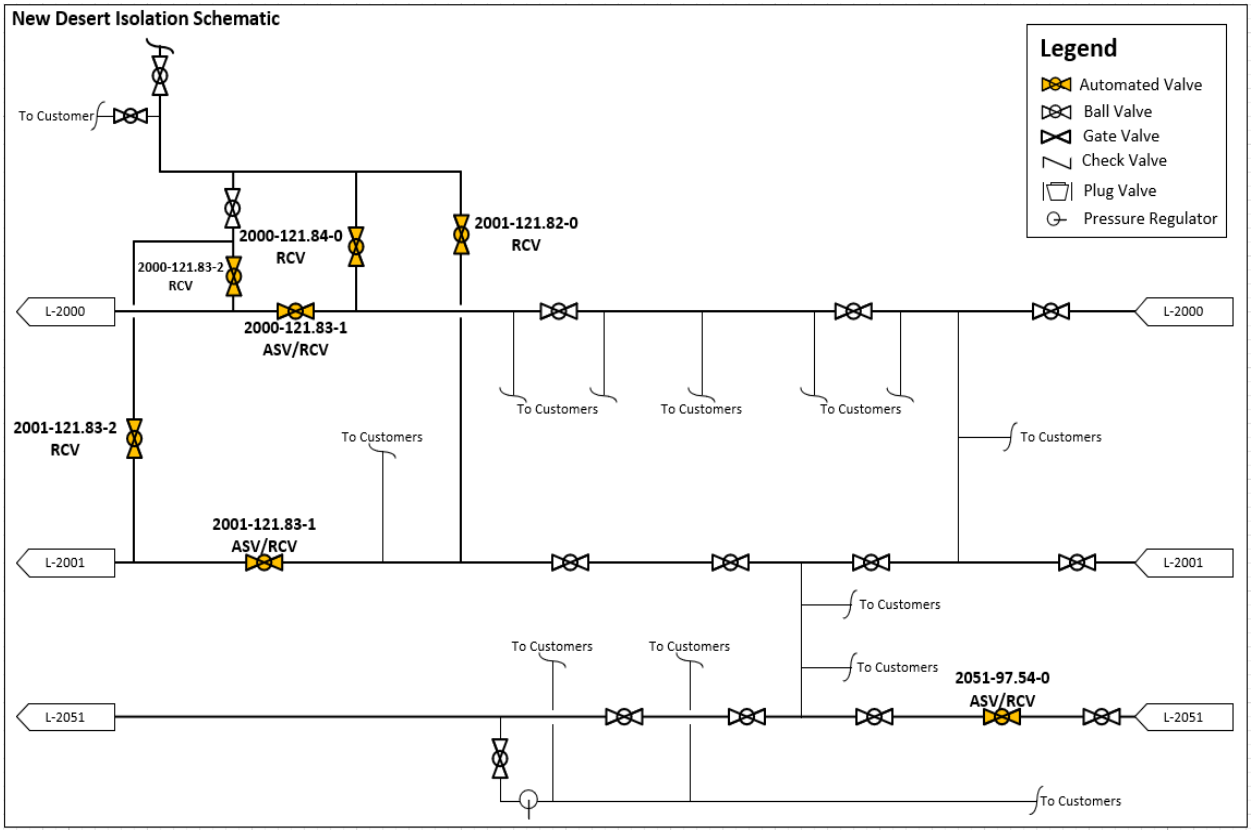
7. Environmental: The Project Team completed a biological survey one week prior to construction activities. A biological monitor was on-site full time during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team obtained a new, above-grade, easement for the new station.

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

Figure 4: New Desert Valve Enhancement Project Bundle Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. The Project Team accelerated a portion of the design and construction of the Garnet Station to align with planned maintenance for a major energy generation customer who is serviced by Line 6904, avoiding the need for CNG/LNG support. The first phase of construction consisted solely of activities that would impact this customer. Upon completion of this first phase, the Mechanical Construction Contractor demobilized and returned at a later date to complete construction activities. This additional mobilization and demobilization, as well as the associated efforts to accelerate construction and to create a separate drawing package, were not incorporated into the preliminary estimate. After the creation of the preliminary estimate, the Project Team determined that a naturally occurring drainage culvert interfered with construction activities at the Garnet Station. The Project Team redesigned the station to avoid impacting that culvert. The Fargo Canyon site was initially located next to Fargo Canyon Road. Due to difficulties obtaining land, the Project Team utilized a different location that was nearby.

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 entered into a competitive bidding process to select a Mechanical Construction Contractor, and directed the Alliance Partner (Electrical Contractor) to prepare cost an estimate based on a more detailed engineering design package, that included the updated design described in the discussion of notable changes in scope above.

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

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

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Garnet Station	
Construction Start Date	10/13/2014
Construction Completion Date	02/09/2017
Days on Site	83 days
Commissioning Date	07/31/2017
Fargo Canyon	
Construction Start Date	06/08/2015
Construction Completion Date	09/08/2015
Days on Site	44 days
Commissioning Date	02/09/2016

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $806,000 in change orders.

1. Hydrotest:

   a. Prior to the tie-in, the Project Team identified cracking on the coating of the three [redacted] by [redacted] tees. The Mechanical Construction Contractor was directed by SoCalGas and SDG&E to sandblast the tees for further inspection.

b. SoCalGas and SDG&E confirmed that the three tees were defective and directed the Mechanical Construction Contractor to remove and replace the tees. This resulted in a demobilization until replacement tees arrived.

2. Construction Schedule: The Mechanical Construction Contractor initially estimated the Project assuming that construction for Phase 2 of the Garnet Station and the Fargo Canyon Station would occur concurrently. There was a delay in obtaining the Dust Control Permit for the Garnet Station. This extended the construction duration of Garnet Station by one month.

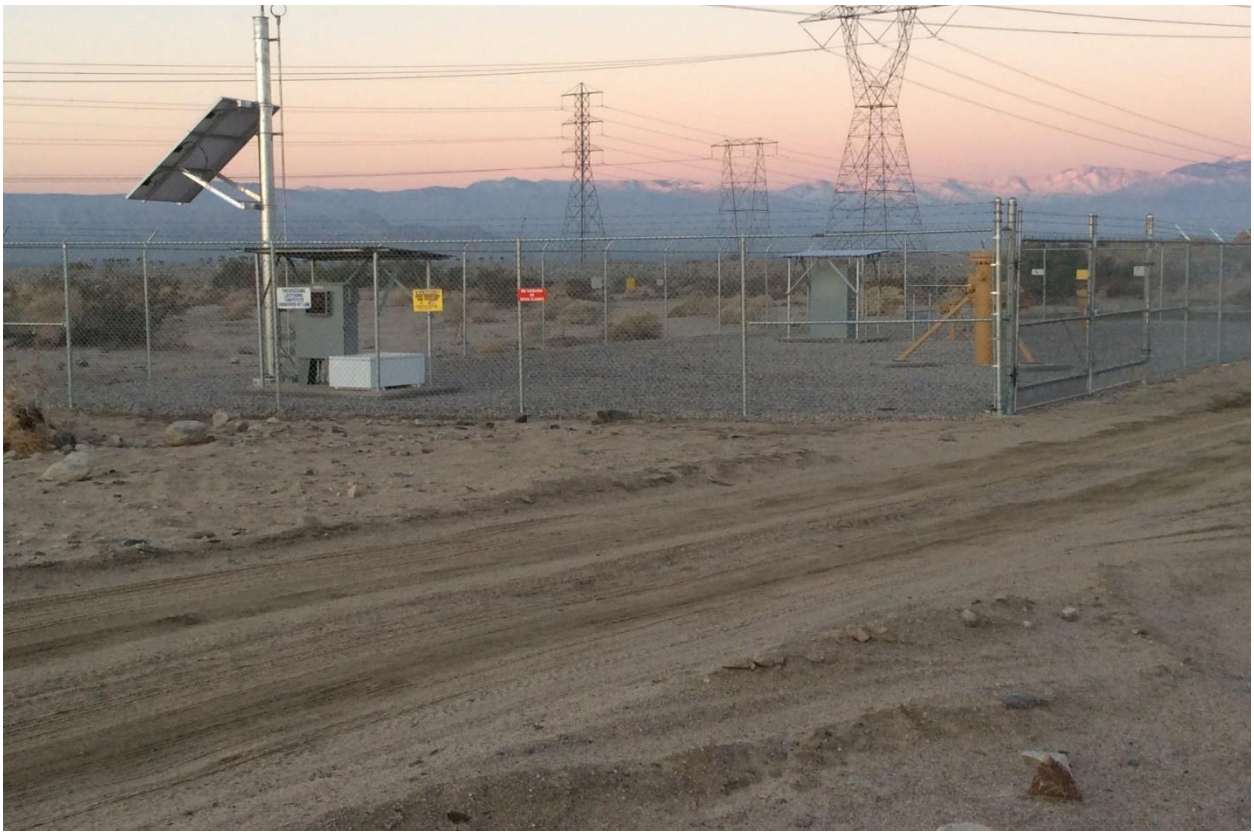
3. Tie-In: The Project Team initially planned for a two and a half day tie-in. Due to complex gas handling and isolation activities, the tie-in was extended.

4. Safety: Due to windy conditions, the Project Team requested that a 500-ton crane be utilized rather the 250-ton crane that was initially planned.

5. Field Design Change: The Project Team requested that the lengths of the previously fabricated test heads be extended an additional 5-feet 10-inches.

Figure 5: Garnet Station – New Piping Assembly After Installation

Figure 6: Fargo Canyon – Project Site Post Construction



D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on February 9, 2016 and July 31, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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. Planning and Coordination:

    a. The Project Team bundled projects to coordinate engineering and construction activity between the three project sites, reducing overall costs for customers.

    b. The Project Team scheduled construction so that the shut-ins aligned with the customers' maintenance and work schedules, thus avoiding the need for CNG or LNG.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $6,302,771. This estimate was prepared in July of 2014, using the "Stage 3 SCG Valve Estimate Template Rev 1" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $10,528,773.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	464,025	487,003	22,978
Materials	1,200,382	743,504	(456,878)
Mechanical Construction Contractor	2,202,461	3,086,643	884,182
Electrical Contractor	294,250	519,747	225,497
Construction Management & Support	456,938	1,261,728	804,790
Environmental	118,888	349,681	230,793
Engineering & Design	463,210	1,154,410	691,200
Project Management & Services	158,721	489,765	331,044
ROW & Permits	277,750	178,829	(98,921)
GMA	666,146	1,075,837	409,691
Total Direct Costs	**6,302,771**	**9,347,147**	**3,044,376**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	880,298	823,511	(56,787)
AFUDC	226,466	316,991	90,525
Property Taxes	44,051	41,124	(2,927)
Total Indirect Costs	**1,150,815**	**1,181,626**	**30,811**
Total Direct Costs	**6,302,771**	**9,347,147**	**3,044,376**
Total Loaded Costs	**7,453,586**	**10,528,773**	**3,075,187**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the New Desert Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully installed six new valves and automated seven total valves to achieve the objective of enabling rapid system isolation in the Cities of Palm Springs and Indio. The total loaded cost of the Project is $10,528,773.

SoCalGas and SDG&E executed this Project prudently through: designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, coordinating and bundling two valve projects into a comprehensive construction package to capture efficiencies through coordinated engineering and design; expanding one existing sites to accommodate the new equipment, creating a new SoCalGas facility at a second site, installing six new valves, installing a new crossover between Lines 2000, 2001 and 6904, and installing equipment necessary to bring power and communication capabilities to these valves to enable rapid system isolation to portions of Lines 2000, 2001, 2501, and 6904 in Riverside County.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts by adjusting the project schedule to align with a planned shutdown of a major non-core customer, engaged in reasonable efforts to promote competitive and market-based rates for contractor services and materials, and used a reasonable amount of company and contractor resources to complete the safety enhancement work as soon as practicable.

End of New Desert Valve Enhancement Project Bundle Final Report

I. NEWHALL VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Newhall Valve Enhancement Project Bundle that consists of valve enhancements made to two new mainline valves (MLVs), four new valves, and one existing valve located in the City of Santa Clarita in Los Angeles County. Through this project, SoCalGas and SDG&E enhanced the capabilities of two MLVs and five additional valves to enable rapid transmission system isolation to a portion of Lines 85 and 408. SoCalGas and SDG&E installed six new valves, seven new actuators, four new vaults, new power equipment, new communications equipment, and the necessary automation equipment. The total loaded project cost is $15,885,984.

The valves comprising the Newhall Valve Enhancement Project Bundle are located in urban environments. The Castaic Junction Site is located in a residential area off of Magic Mountain Parkway. The Newhall Station site is located in an existing SoCalGas facility off of Newhall Avenue that is in an area comprised of both commercial and residential. The Newhall Avenue site is in an undeveloped area next to Newhall Avenue, a low density commercial area.

Table 1: General Project Information

Newhall Valve Enhancement Project Bundle			
Site	Castaic Junction	Newhall Station	Newhall Avenue
Location	Santa Clarita	Santa Clarita	Santa Clarita
Days on Site	130 days	54 days	162 days
Construction Start	09/21/2015	05/26/2015	01/12/2015
Construction Finish	03/16/2016	07/17/2015	08/03/2015
Commissioning Date	08/25/2016	11/07/2017	03/15/2016
Valve Upgrades			
Valve Number	85-151.63-0	163-2.43-4	408-0.00-0
Valve Type	New – Ball	New – Ball	New – Ball
Actuator	New	New	New
Actuator Above-/Below-Grade	Below-Grade	Above-Grade	Below-Grade
ASV	Yes	No	Yes
RCV	Yes	Yes	Yes
Valve Number	85-151.63-1		408-0.00-1
Valve Type	New – Ball		New – Ball
Actuator	New		New
Actuator Above-/Below-Grade	Below-Grade		Below-Grade
ASV	No		No
RCV	Yes		Yes
Valve Number	85-151.63-4		408-0.00-2
Valve Type	New – Ball		Existing – Ball
Actuator	New		New
Actuator Above-/Below-Grade	Below-Grade		Below-Grade
ASV	No		No
RCV	Yes		Yes
Site Upgrades			
Vault	New (1)	None	New (3)
Power	New – Utility	Existing – Utility	New – Utility
Communication	New – Radio	Existing – Radio and Utility	New – Radio
SCADA Panel	New	New	New
Equipment Shelter	None	Existing	None
Fencing/Wall	New – Fencing	Existing – Wall	None
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	15,885,984	-	15,885,984
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Newhall Valve Enhancement Project Bundle: Overview

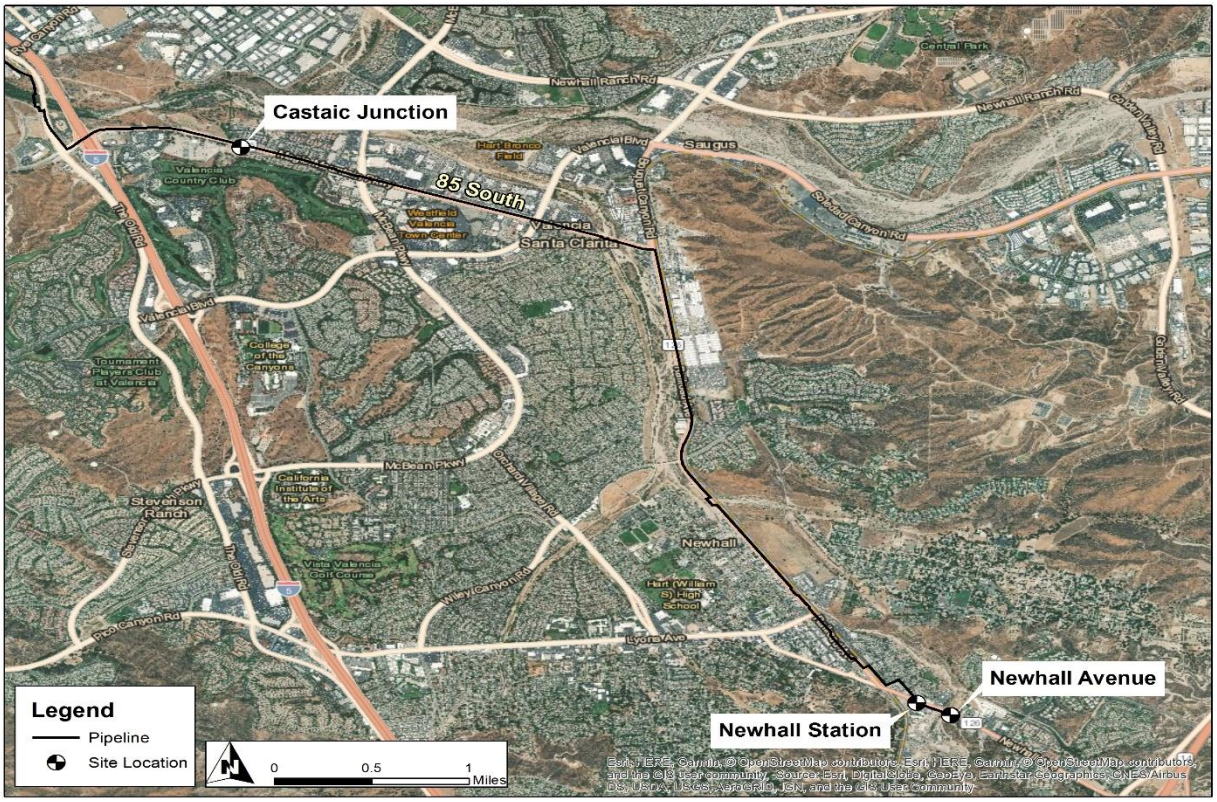


Figure 2: Satellite Image of Castaic Junction

Figure 3: Satellite Image of Newhall Station

Figure 4: Satellite Image of Newhall Avenue

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified four valves for automation to provide remote isolation to a portion of Lines 85 and 408. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in identification of three additional valves 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 identified valves 85-151.63-0, 408-0.00-0, 408-0.00-1, and 408-0.00-2 for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that the automation of these valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. The Project Team determined it was also necessary to automate valve 163-2.43-4 to provide isolation of Supply Line 45-163 from Line 85. The Project Team also determined that it was necessary to automation valve 85-151.63-1 and 85-151.63-4 to prevent backflow on Line 85. Together, the automation of these seven valves enables rapid isolation, 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. At the Castaic Junction site, the preexisting mainline valve was positioned on its side with the gearbox facing the middle of the street. The two preexisting bridle valves were positioned so that the two gearboxes were facing the center of the existing bridle assembly. The preexisting orientation did not allow enough space for the new automation equipment. The Project Team reconfigured the piping to allow for the new automation equipment.

   b. At the Newhall Station Site, SoCalGas and SDG&E had a PSEP Replacement Project[2] and an Operating District Project scheduled to begin construction during the same time that the Valve Enhancement Project was planning to begin construction. The Project Team coordinated the installation of the new valve with these projects to avoid an additional shut-in.

   c. At the Newhall Avenue Project Site, the City of Santa Clarita had planned street improvements to Newhall Avenue. The Project Team scheduled construction to conclude prior to these improvements, reducing restoration costs.

4. Final Project Scope: The final project scope consists of the automation of seven valves, that included the installation of six new valves, the installation of seven new actuators, the installation of four new vaults to house the actuators, and the installation of power and communications equipment at two of the sites.

[2] The final report for Line 85 South Newhall Avenue Replacement Project was submitted in workpapers and includes a description of the activities and costs associated with the installation of Valve 163-2.43-0.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
85	151.63	0	[redacted]	NV/VT	ASV/RCV
85	151.63	1	[redacted]	NV/VT	RCV
85	151.63	4	[redacted]	NV/VT	RCV
163	2.43	4	[redacted]	NV/AG	RCV
408	0.00	0	[redacted]	NV/VT	ASV/RCV
408	0.00	1	[redacted]	NV/VT	RCV
408	0.00	2	[redacted]	A/VT	RCV

B. Site Evaluation and Planning

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

Castaic Junction

1. Site Description: This site is located in a residential area. The pipeline runs underneath Magic Mountain Parkway. There is an existing SoCalGas facility next to the project site.

2. Land Issues: During the pre-design site walk, 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 the site.

Newhall Station

1. Site Description: This site is an existing SoCalGas facility in an area that is a commercial and residential mix. There is an existing block wall enclosing the site.

2. Land Issues: SoCalGas and SDG&E determined that the existing facility can accommodate the new equipment and therefore, there was no need to expand the existing facility.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: This site had existing utility power.

5. Communication Technology: The site has existing radio and utility communications.

Newhall Avenue

1. Site Description: This Project Site is in a low density, residential area. The pipeline is next to Newhall Avenue.

2. Land Issues: The Project Team noted that the construction will require the removal of several trees in the area.

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 and SDG&E 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:

Castaic Junction

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and the positioning of the existing valves. The preexisting mainline valve was positioned on its side with the gearbox facing the middle of the street. The two preexisting valves were positioned so that the two gearboxes were facing the center of the existing bridle assembly. The valve assembly required reconfiguration to accommodate the new automation equipment.

2. Valve Details:

    a. 85-15163-0: There was no existing valve, the Project Team installed a new Class 600 ball valve.

    b. 85-151.63-1: There was no existing valve, the Project Team installed a new Class 600 ball valve.

    c. 85-151.63-4: The existing valve is a manually operated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

   a. 85-151.63-0: There was no existing actuator, the Project Team installed a new actuator.

   b. 85-151.63-1: There was no existing actuator, the Project Team installed a new actuator.

   c. 85-151.63-4: There was no existing actuator, the Project Team installed a new actuator.

4. Customer Impact: The Project Team requested a Request for Engineering Review (RER) for the installation of the new valves. The Project Team performed the shut-in during summer conditions to avoid customer impacts.

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 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 spot checks during construction.

8. Permit Restrictions: The Project Team obtained an encroachment permit from the City of Santa Clarita.

9. Land Use: The Project Team utilized a nearby parking log for a laydown area.

10. Traffic Control: The Project Team closed one lane of traffic during construction.

Newhall Station

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and verified that the station would accommodate the new equipment. SoCalGas and SDG&E had two projects scheduled to occur at the Newhall Station, the Project Team coordinated the installation of the new valve with these projects, avoiding an additional second shut-in.

2. Valve Details: The preexisting valve was a manually actuated Class 300 ball valve that the Project Team replaced.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers. The Project Team installed a temporary bypass to maintain service during the shut-in.

5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.

6. Substructures: The Project Team did not identify any 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 spot checks during construction.

8. Permit Restrictions: The Project Team obtained a permit from the City of Santa Clarita for the laydown yard.

9. Land Use: The Project Team utilized a laydown yard on Pine Street during construction.

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

Newhall Avenue

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology. The Project Team determined that the existing valve 408-0.00-2 could be reused.

2. Valve Details:

   a. 408-0.00-0: The preexisting valve was a manually operated Class 600 ball valve that the Project Team replaced.

   b. 408-0.00-1: The preexisting valve was a manually operated Class 600 ball valve that the Project Team replaced.

   c. 408-0.00-2: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

   a. 408-0.00-0: There was no preexisting actuator, the Project Team installed a new actuator.

   b. 408-0.00-1: There was no preexisting actuator, the Project Team installed a new actuator.

c. 408-0.00-2: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any notable impact to the community from this project.

6. Substructures: The Project Team did not identify any substructures that affected the design and engineering at this site.

7. Environmental: The Project Team identified several oak trees in the easement that interfered with the planned design and construction.

8. Permit Restrictions: The Project Team obtained a new above ground easement for the new automation equipment. The Project Team obtained an Encroachment Permit from the City of Santa Clarita for construction. The Project Team also obtained a Temporary Right of Entry for the laydown yard at Newhall Avenue and Pine Street. The Project Team obtained a second Temporary Right of Entry (TRE) for construction, this permit included an amendment for the removal and replanting of the oak trees.

9. Land Use: The Project Team utilized a laydown yard at the corner of Newhall Avenue and Pine Street.

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

Figure 5: Newhall Bundle Valve Enhancement Project Bundle Schematic – Newhall Station and Castaic Junction:

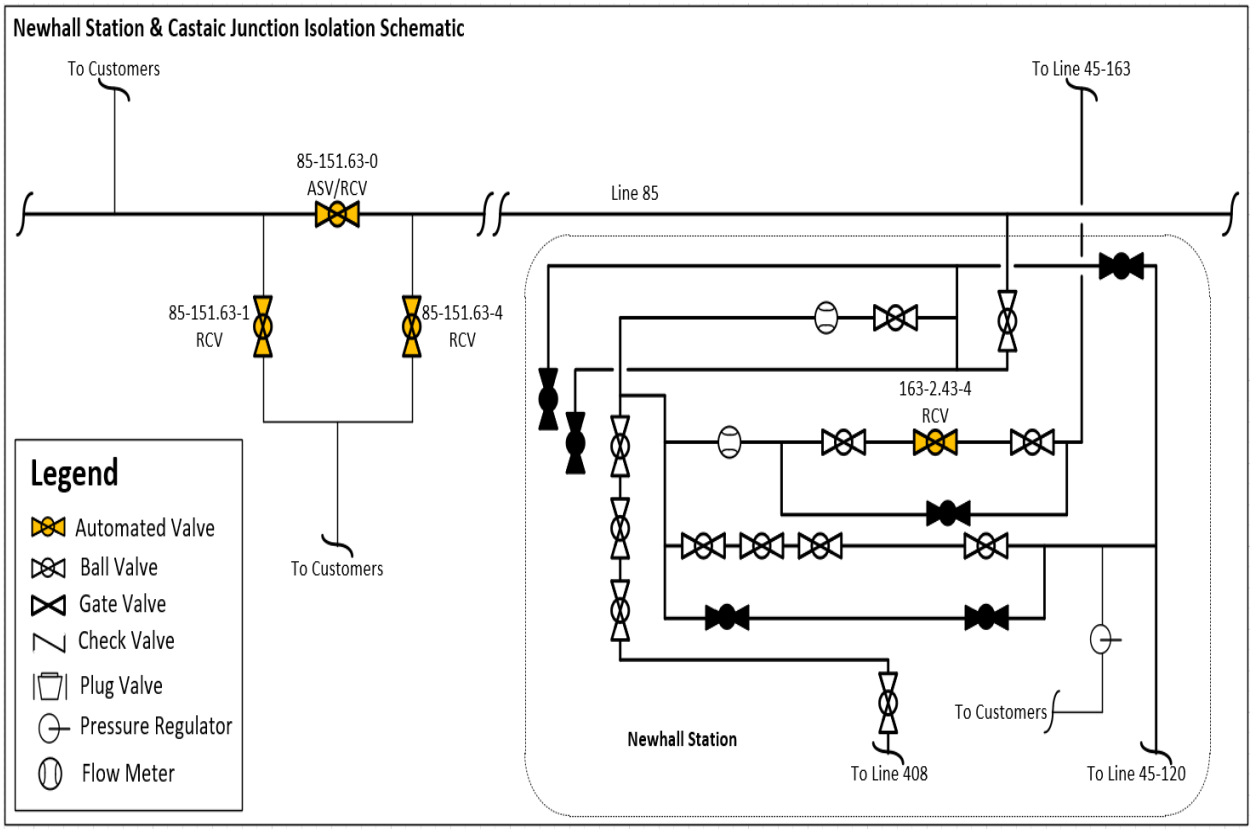
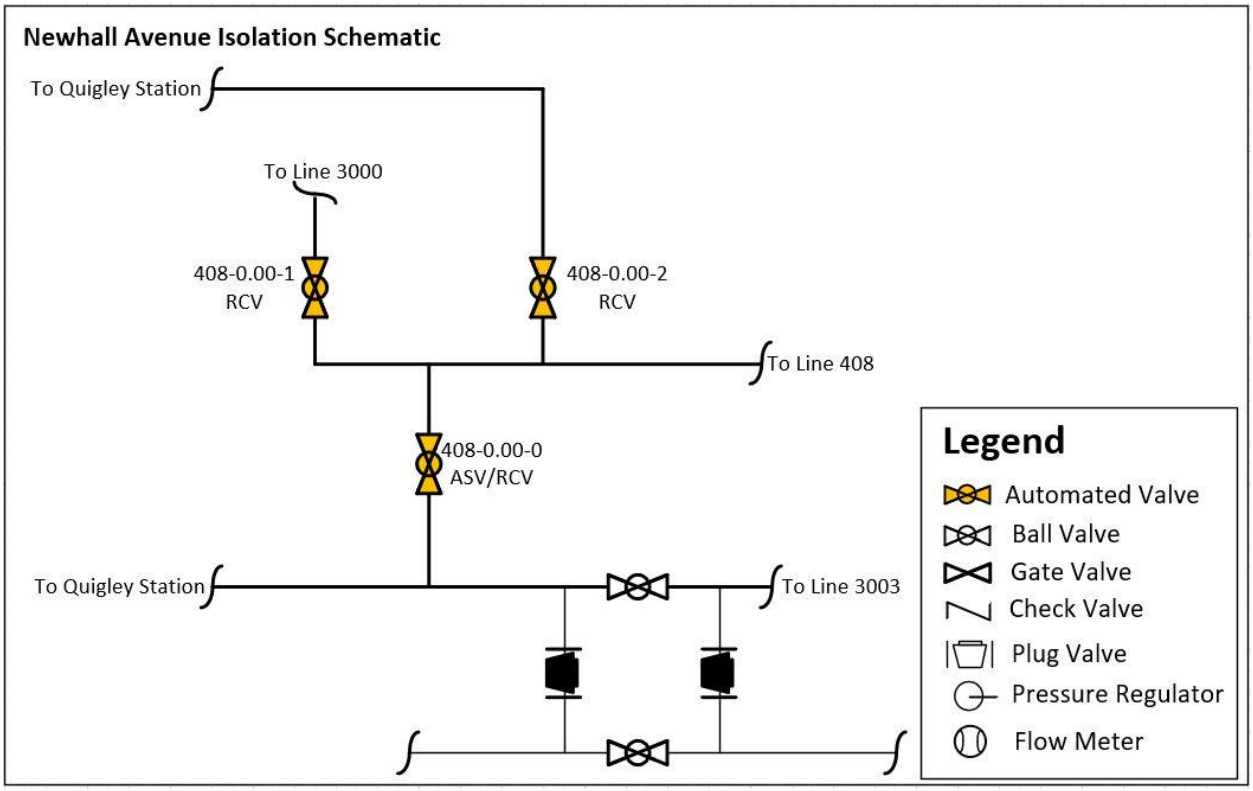


Figure 6: Newhall Bundle Valve Enhancement Project Bundle Schematic – Newhall Avenue



D. Scope Changes

SoCalGas and SDG&E 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, that included the updated design described in the discussion of notable changes in scope above.

As stated above, the Project Team coordinated the installation of the new valve at the Newhall Station site with construction for a separate PSEP Replacement Project and a separate Operating District Project. The estimate provided by the Performance Partner for this site included the costs related to the scope of work for those projects. The Mechanical Construction Contractor's estimate below includes work at all three sites and the Construction Contractor costs for the PSEP Replacement Project and the Operating District Project in Newhall Station.

1. SoCalGas and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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][3], which was [redacted] than SoCalGas and SDG&E's preliminary cost estimate for construction.

[3] The Mechanical Construction Contractor's Target Price Estimate includes the Line 85 South work at Newhall Station in addition to the work related to the Newhall Valve Enhancement Project Bundle.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Castaic Junction	
Construction Start Date	09/21/2015
Construction Completion Date	03/16/2016
Days on Site	130 days
Commissioning Date	08/25/2016
Newhall Station	
Construction Start Date	05/26/2015
Construction Completion Date	07/17/2015
Days on Site	54 days
Commissioning Date	11/07/2017
Newhall Avenue	
Construction Start Date	01/12/2015
Construction Completion Date	08/03/2015
Days on Site	162 days
Commissioning Date	03/15/2016

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $977,000 in change orders.

Castaic Junction

1. Customer Impact Mitigation:
    a. SoCalGas and SDG&E identified additional system requirements during construction that required LNG support during the shut-in.
    b. The Project was delayed during construction while services for contracted LNG support were completed.
2. Schedule Delay:
    a. The Project Schedule was pushed out an additional four and a half months resulting in additional incurred costs. The delay was related to the LNG requirement and the related efforts obtaining staging areas for the LNG.
    b. The nitrogen testing was performed one day later than scheduled resulting in additional equipment rental costs.
3. Site Conditions: During preconstruction potholing, the Mechanical Construction Contractor encountered two sack slurry, increasing equipment and labor costs to excavate.
4. Substructures: During excavation the Project Team encountered an abandoned vault that required removal, as it interfered with the planned excavation.

5. Safety: The Project Team found it necessary to secure a light pole adjacent to the excavation for safety purposes.

Newhall Avenue

1. Site Restoration: As part of the restoration efforts, the Project Team determined the vault would need to be elevated to prevent future flooding and mitigate safety concerns.

2. Existing Utilities: The Project Team relocated an existing communications line that interfered with the installation of the new vault.

3. Field Design Change: Because a [redacted] wedding band was added during the tie-in, the Project Team requested that the Mechanical Construction Contractor perform additional welding activities prior to the final x-ray.

4. Schedule Delay: The Project Team identified a leak on the lube line to valve 408-0.00-2 during construction. Access was denied to all construction personnel until the necessary repairs were complete, resulting in three day delay.

5. Environmental Mitigation: While excavating Line 408 the Mechanical Construction Contractor encountered coal tar wrap containing suspected asbestos. Construction was on standby during the asbestos abatement efforts.

Figure 6: Castaic Junction – New Piping Assembly Prior to Tie-in

Figure 7 – Newhall Station – Newhall Station Post Construction

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. Valve 163-2.43-4 was replaced and automated as part of this project bundle and during closeout, this valve was renamed to valve 85-156.72-10. The sites were commissioned on March 15, 2016, August 25, 2016, and November 7, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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. Planning and Coordination:

    a. The Project Team bundled projects to coordinate engineering activities between the three project sites.

    b. The Project Team adjusted the construction schedule to take advantage of the planned work at the Newhall Station, avoiding the need for multiple mobilizations and multiple shut-ins.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $6,092,917. This estimate was prepared in June of 2014, using the “Stage 3 SCG Valve Estimate Template Rev 0” estimating tool, the most current version of the PSEP Estimate Template at the time.

The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $15,885,984.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	539,945	640,572	100,627
Materials	643,877	805,743	161,866
Mechanical Construction Contractor	2,890,492	4,800,008	1,909,516
Electrical Contractor	310,712	350,554	39,842
Construction Management & Support	329,926	2,127,823	1,797,897
Environmental	39,380	210,339	170,959
Engineering & Design	553,538	2,413,220	1,859,682
Project Management & Services	117,981	301,802	183,821
ROW & Permits	23,100	196,317	173,217
GMA	643,966	1,527,224	883,258
Total Direct Costs	**6,092,917**	**13,373,602**	**7,280,685**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	916,540	1,229,991	313,451
AFUDC	216,488	1,133,474	916,986
Property Tax	42,110	148,917	106,807
Total Indirect Costs	**1,175,138**	**2,512,382**	**1,337,244**
Total Direct Costs	**6,092,917**	**13,373,602**	**7,280,685**
Total Loaded Costs	**7,268,055**	**15,885,984**	**8,617,929**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Newhall Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated seven valves to achieve the objective of enabling rapid system isolation in the City of Santa Clarita. The total loaded cost of the Project is $15,885,984.

SoCalGas and SDG&E executed this project prudently through coordinating and bundling the design of three valve projects into one bundle and scheduling construction to take advantage of planned work at the Newhall Station Site, avoiding multiple mobilizations and shut-ins. Also the Project Team responded to unanticipated field changes by providing LNG support, avoiding interruption of service to customers, installed the equipment necessary to bring power to two of the sites, and installed the equipment necessary to bring communication capabilities to all three sites to enable rapid automated isolation to portions of Lines 85, and 408 in the City of Santa Clarita.

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

End of Newhall Valve Enhancement Project Bundle Final Report

I. ORANGE VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Orange Valve Enhancement Project Bundle, that consists of enhancements made to three existing mainline valves (MLVs) in the City of Orange in Orange County. Through this project, SoCalGas and SDG&E enhanced the capabilities of three MLVs to enable rapid transmission system isolation to portions of Lines 1016 and 1019. SoCalGas and SDG&E installed three new actuators, three 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 $5,326,195.

The valves comprising the Orange Valve Enhancement Project Bundle are in high density commercial and residential neighborhoods and are separated into three different project sites. MLV 1016-9.75-0 is located on the southwest corner of West Walnut Avenue and North Cypress Street; MLV 1016-10.25-0 is located on the southeast corner of West Maple Avenue and North Pixley Street; and MLV 1019-0.17-0 is located east of the intersection of West Almond Avenue and South Citrus Street. SoCalGas and SDG&E grouped the three project sites together into a single valve bundle and executed the three sites as a comprehensive package because the sites are geographically proximate.

Table 1: General Project Information

Orange Valve Enhancement Project Bundle			
Site	Walnut & Cypress	Maple & Pixley	Almond & Citrus
Location	City of Orange	City of Orange	City of Orange
Days on Site	52 days	49 days	44 days
Construction Start	04/29/2015	04/06/2015	06/24/2015
Construction Finish	12/16/2015	08/13/2015	11/16/2015
Commissioning Date	05/03/2016	10/28/2015	05/10/2016
Valve Upgrades			
Valve Number	1016-9.75-0	1016-10.25-0	1019-0.17-0
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball
Actuator	New	New	New
Actuator Above-/Below-Grade	Below	Below	Below
ASV	Yes	No	Yes
RCV	Yes	Yes	Yes
Site Upgrades			
Vault	New	New	New
Power	New – Utility	New – Utility	New – Utility
Communication	New – 4 Wire	New – 4 Wire	New – 4 Wire
SCADA Panel	New	New	New
Equipment Shelter	None	None	None
Fencing/Wall	None	None	None
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	5,324,332	1,863	5,326,195
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Orange Valve Enhancement Project Bundle: Overview

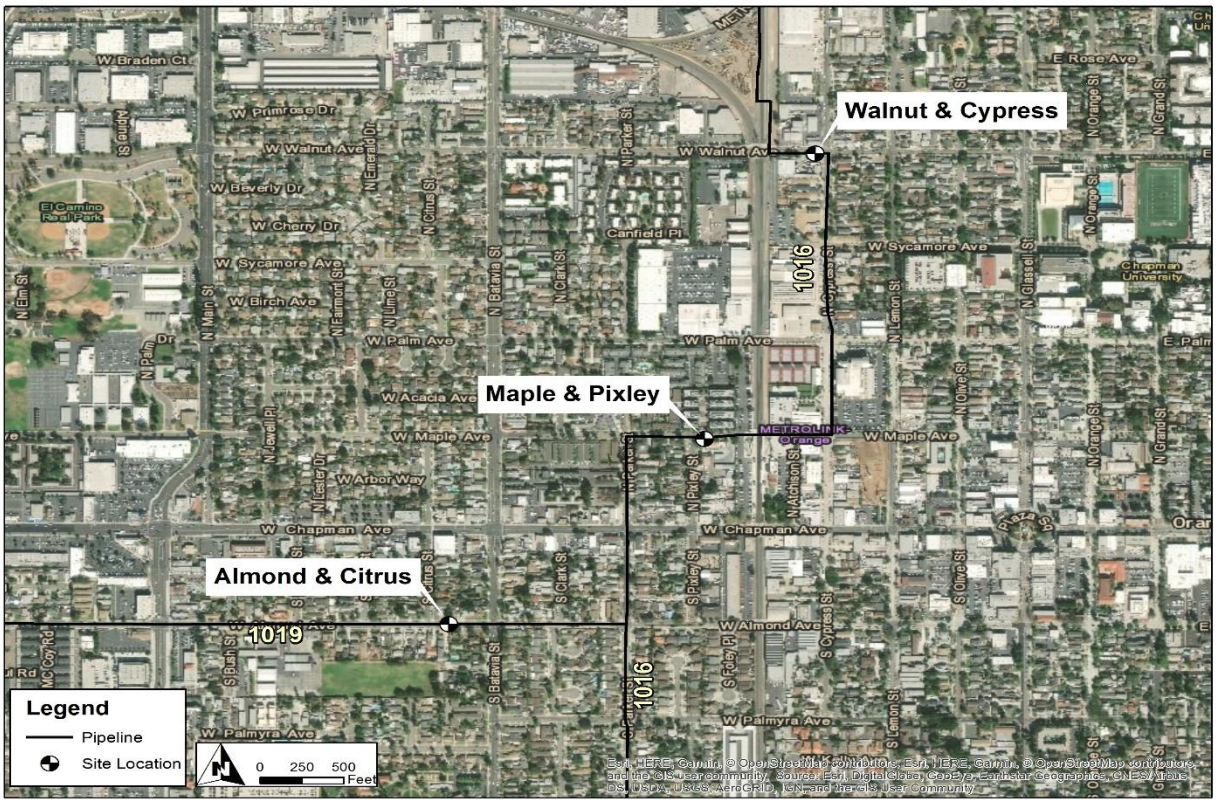


Figure 2: Walnut and Cypress Site

Figure 3: Maple and Pixley Site

Figure 4: Almond and Citrus Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified two valves for automation to provide remote isolation to a portion of Lines 1016 and 1019. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in identification of a third valve 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 identified two MLVs for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon Project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that automation of these valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas and SDG&E determined it was also necessary to automate MLV 1016-10.25-0. Together, the automation of these valves enables rapid isolation, 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. During the pre-design site walk discussed below, The Project Team determined the existing vaults were not large enough to house and service the new actuators, however some of the existing instrument piping could be reused. The Project Team took measurements during the pre-design site walk to facilitate continued use of the existing instrument piping.

   b. The Project Team initially identified MLV 1019-0.002-0 for automation. This valve is located in the middle of an intersection, and construction would have resulted in major impacts to the community and customers, as well as increased construction costs. Therefore, SoCalGas and SDG&E revised the scope to select MLV 1019-0.17-0 for automation. The Project Team anticipated construction at the MLV 1019-0.17-0 site to be less costly and disruptive to the neighborhood, while providing the same isolation capabilities on Line 1019.

4. Final Project Scope: The final project scope consists of the automation of three valves, that included the installation of three new actuators, the installation of three new vaults to house the actuators, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1016	9.75	0	[redacted]	A/VT	ASV/RCV
1016	10.25	0	[redacted]	A/VT	RCV
1019	0.17	0	[redacted]	A/VT	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Orange Valve Enhancement Project Bundle by performing pre-design site walks to determine the existing conditions and assess any potential impacts on the design. Key factors that influenced the engineering and design of this project are as follows:

Walnut and Cypress

1. Site Description: This site is in a high-density area that is a mix of commercial and residential buildings. The valve is in the street and is positioned on its side. The valve stem extends into a vault.

2. Land Issues: During the pre-design site walk, the Project Team noted that excavations will impact the street as well as the adjacent sidewalk. The Project Team determined that the nearby Pixley Station could be used as a laydown yard.

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.

Maple and Pixley

1. Site Description: This site is located in a high-density, primarily residential area. The valve is located in the street and is positioned on its side. The valve stem extends into a vault.

2. Land Issues: During the pre-design site walk, the Project Team noted that excavations will impact the street as well as the adjacent sidewalk. The Project Team determined that the nearby Pixley Station could be used as a laydown yard.

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.

Almond and Citrus

1. Site Description: This site is located in a high-density, primarily residential area. The valve is located in the street and is positioned on its side. The valve stem extends into a vault.

2. Land Issues: During the pre-design site walk, the Project Team noted that excavations will impact the street as well as the adjacent sidewalk. The Project Team determined that the nearby Pixley Station could be used as a laydown yard.

3. DOT Class: The 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 and SDG&E reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, and completed a pre-design site walk. Key factors that influenced the engineering and design of the Project are as follows:

Walnut and Cypress

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and measurements of the preexisting vault. Based on the specifications of the new actuator to be installed, the Project Team determined that the preexisting vault did not provide sufficient space to house and operate the new actuator.

2. Valve Details: The existing valve was a manually operated Class 300 ball valve that the Project Team reused.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team restricted public access to the sidewalk during construction.

6. Substructures: The Project Team analyzed the preexisting vault to design the new vault to utilize existing taps. Aside from the preexisting vault, the Project Team identified no substructures during this phase that would affect the design.

7. Environmental: The Project Team identified a tree that interfered with the planned construction. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The City of Orange granted an encroachment permit that included the installation of the new vault, new actuator, and two new electrical cabinets. The encroachment permit allowed for excavation to the center of the street. Per the permit, the working hours were from 7:30 am to 5:30 pm, Monday through Friday. At this site, the Project Team needed to remove one tree, as its location would interfere with the removal of the existing vault, as well as the installation of the new vault. The tree removal was included within the scope of the encroachment permit from the City of Orange.

9. Land Use: The Project Team utilized the existing Pixley Station as a laydown yard for this project site.

10. Traffic Control: The Project Team closed one traffic lane during construction for excavation. The Project Team plated the excavation during non-working hours to allow traffic to pass through unimpeded during non-construction hours.

Maple and Pixley

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and measurements of the preexisting vault. Based on the specifications of the new actuator to be installed, the Project Team determined that the preexisting vault did not provide sufficient space to house and operate the new actuator.

2. Valve Details: The existing valve was a manually operated Class 300 ball valve that the Project Team reused.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team initially identified MLV 1019-0.002-0 for automation. This valve is located in the middle of an intersection, and construction would have resulted in major impacts to the community and customers and increased construction costs. Therefore, SoCalGas and SDG&E revised the scope to select MLV 1019-0.17-0 for automation. The Project Team anticipated construction at the MLV 1019-0.17-0 site to be less costly and less disruptive to the neighborhood, while providing the same isolation capabilities on Line 1019. The Project Team restricted the public access to the sidewalk during construction.

6. Substructures: The Project Team analyzed the preexisting vault to design the new vault to utilize existing taps. Aside from the preexisting vault, the Project Team identified no substructures during this phase that would affect the design.

7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The City of Orange granted an encroachment permit that included the installation of the new vault, new actuator, and two new electrical cabinets. The encroachment permit allowed for excavation to the center of the street. Per the permit, the working hours were from 7:30 am to 5:30 pm, Monday through Friday.

9. Land Use: The Project Team utilized the existing Pixley Station as a laydown yard for this project site.

10. Traffic Control: The Project Team closed one traffic lane during construction for excavation. The Project Team plated the excavation during non-working hours to allow traffic to pass through unimpeded during non-construction hours.

Almond and Citrus

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and measurements of the preexisting vault. Based on the specifications of the new actuator to be installed, the Project Team determined that the preexisting vault did not provide sufficient space to house and operate the new actuator.

2. Valve Details: The existing valve is a manually operated Class 300 ball valve that the Project Team reused.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology. The Project Team installed a new actuator..

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team restricted the public access to the sidewalk during construction.

6. Substructures: The Project Team analyzed the preexisting vault to design the new vault to utilize existing taps. Aside from the preexisting vault, the Project Team identified no substructures during this phase that would affect the design.

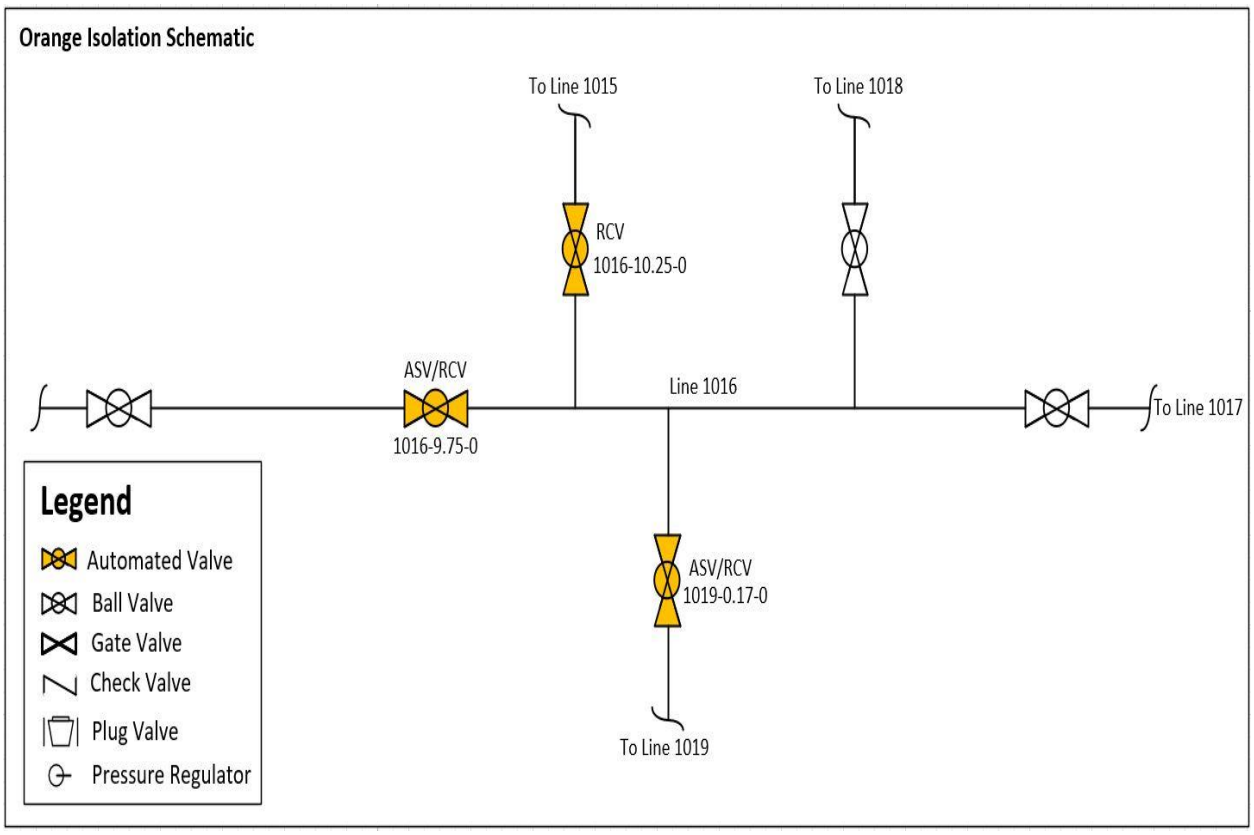
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The City of Orange granted an encroachment permit that included the installation of the new vault, new actuator, and two new electrical cabinets. The encroachment permit allowed for excavation to the center of the street. Per the permit, the working hours were from 7:30 am to 5:30 pm, Monday through Friday.

9. Land Use: The Project Team utilized the existing Pixley Station as a laydown yard for this project site.

10. Traffic Control: The Project Team closed one traffic lane during construction for excavation. The Project Team plated the excavation during non-working hours to allow traffic to pass through unimpeded during non-construction hours.

Figure 5: Orange Valve Enhancement Project Bundle Schematic



Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E 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. After SoCalGas and SDG&E completed their preliminary estimate, the City of Orange requested a redesign that required SoCalGas and SDG&E to relocate linebreak cabinet at the Almond and Citrus site.

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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Walnut and Cypress	
Construction Start Date	04/29/2015
Construction Completion Date	12/16/2015
Days on Site	52 days
Commissioning Date	05/03/2016
Maple & Pixley	
Construction Start Date	04/06/2015
Construction Completion Date	08/13/2015
Days on Site	49 days
Commissioning Date	10/28/2015
Almond & Citrus	
Construction Start Date	06/24/2015
Construction Completion Date	11/16/2015
Days on Site	44 days
Commissioning Date	05/10/2016

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $620,000 in change orders.

Walnut and Cypress / Maple and Pixley / Almond and Citrus

The Mechanical Construction Contractor's preliminary estimate was based on construction at all three sites ending on 05/28/2015. Due to project delays related to the items discussed below, the overall construction schedule was extended resulting in increased costs for fencing, shoring, traffic control, portable restrooms, equipment and supervision labor costs.

Walnut and Cypress

1. Field Design Change:

    a. At the time the cost estimates were prepared, the Project Team did not know the location of the electrical feed. During construction, the local electrical utility determined that the power source was across the street from the Project site. This required the Project Team to excavate and restore an electrical trench.

    b. The Project Team determined that the removal and replacement of body bleed valves under the MLVs was needed.

2. Constructability Issues: During excavation, construction crews determined that an existing [redacted] gas distribution line would interfere with the installation of the new vault. The Project Team performed a blowdown to reroute the distribution line.

3. Environmental Abatement: During excavation, construction crews exposed a layer of material between the upper and lower portions of the preexisting vault that potentially contained asbestos. This required the Project Team to undertake unplanned abatement activities.

Maple and Pixley

1. Field Design Change:

   a. At the time when the cost estimates were prepared, the Project Team did not know the location of the electrical feed. During construction, the local electric utility determined that the power source was across the street from the Project site. This required the Project Team to excavate and restore an electrical trench.

   b. Due to the leak condition listed below, SoCalGas and SDG&E installed two new taps to provide instrument gas to the new control panel. The planned route of the piping did not change.

2. Constructability: The Project Team determined that two existing supports were blocking the new vault and needed to be demolished and replaced.

3. Environmental Abatement: During excavation, construction crews exposed a layer of material between the upper and lower portions of the preexisting vault that potentially contained asbestos. This required the Project Team to undertake unplanned abatement activities.

4. Additional Support: The Project Team requested that the Mechanical Construction Contractor assist with the removal of the existing actuator, which included installing two bolts in the upper section of the vault to assist in its removal and resulted in an extension of the crane rental.

5. Leak Condition: When attempting to shut off the existing instrument gas, the Project Team found that two of the three existing pin-off tees would not seal. The Project Team removed the pin-off tees, sealed the taps, and installed new pin-off tees. This required a blowdown of a portion of Line 1016.

Almond and Citrus

1. Field Design Change:

   a. Due to the leak condition listed below, the Project Team installed two new taps to provide instrument gas to the new control panel. The planned route of the piping did not change.

   b. The Project Team requested that the Mechanical Construction Contractor assist in the removal and replacement of the body bleed valves under the mainline valve.

2. Environmental Abatement: During excavation, construction crews exposed a layer of material between the upper and lower portions of the preexisting vault that potentially contained asbestos. This required the Project Team to undertake unplanned abatement activities.

3. Mobilization and Demobilization: The Project Team postponed the blowdown of Line 1019 due to availability of district personnel. The Mechanical Construction Contractor demobilized, then remobilized at a time when the blowdown could occur.

4. Additional Support: The Project Team requested that the Mechanical Construction Contractor assist in the removal of the actuator.

5. Leak Condition: When attempting to shut off the existing instrument gas, the Project Team found that two of the three existing pin-off tees would not seal. Because of this, the SoCalGas and SDG&E removed the pin-off tees, sealed the taps, and installed new pin-off tees. This required a blowdown of a portion of Line 1019.

6. Customer Impact Mitigation: During the blowdown of Line 1019, construction coordinated with Gas Control to prevent any customer impact as well as prevent the need for any CNG/LNG support.

Figure 5: Orange Valve Enhancement Project Bundle, Walnut and Cypress Site – Placement of the Vault

Figure 6: Orange Valve Enhancement Project Bundle, Maple Pixley Site –Preparing for Vault Installation

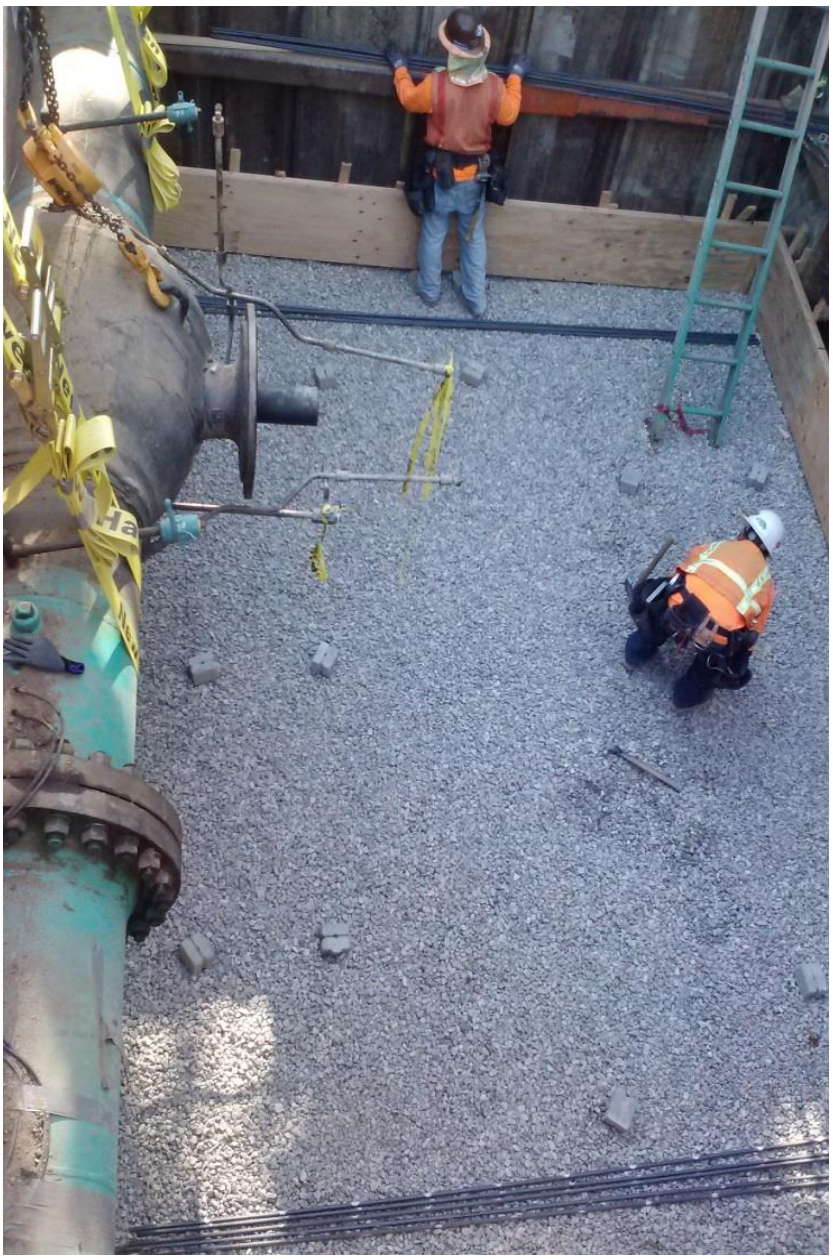


Figure 7: Orange Valve Enhancement Project Bundle, Almond and Citrus Site –Bottom Section of the New Vault and Actuator

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves back into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on October 28, 2015, May 3, 2016, and May 10, 2016, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design 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. Planning and Coordination: The Project Team bundled projects to coordinate engineering activities between the three Orange Valve Enhancement Project Bundle sites.

2. Land Use: The Project Team utilized the Pixley station as a laydown yard for all three project sites within this bundle, avoiding the cost of obtaining temporary easements for a laydown yard.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $3,651,973. This estimate was prepared in June of 2014, using the “Stage 3 SCG Valve Estimate Template Rev 0” estimating tool, the most current version of the PSEP Estimate Template at the time.

The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $5,326,195.

Table 4: Estimated and Actual Direct Costs and Variances

DIRECT COSTS ($)	Estimate	Actuals	Delta over/(under)
Company Labor	280,187	236,064	(44,123)
Materials	460,708	492,072	31,364
Mechanical Construction Contractor	1,272,300	1,460,676	188,376
Electrical Contractor	294,525	242,448	(52,077)
Construction Management & Support	269,447	493,786	224,339
Environmental	121,220	275,489	154,269
Engineering & Design	551,814	857,380	305,566
Project Management & Services	10,842	109,986	99,144
ROW & Permits	4,950	3,102	(1,848)
GMA	385,980	543,804	157,824
Total Direct Costs	**3,651,973**	**4,714,807**	**1,062,834**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta over/(under)
Overheads	563,638	433,354	(130,284)
AFUDC	119,450	157,922	38,472
Property Tax	22,942	20,112	(2,830)
Total Indirect Costs	**706,030**	**611,388**	**(94,642)**
Total Direct Costs	**3,651,973**	**4,714,807**	**1,062,834**
Total Loaded Costs	**4,358,003**	**5,326,195**	**968,192**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Orange Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated two mainline valves and one crossover valve to achieve the objective of enabling rapid system isolation in the City of Orange. The total loaded cost of the Project is $5,326,195.

SoCalGas and SDG&E executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, coordinating and bundling three valve projects into a comprehensive bid package to capture efficiencies through coordinated scheduling of construction crews, installing new and larger vaults to accommodate new actuators and facilitate future operation and maintenance activity, and installing equipment necessary to bring power and communication capabilities to these valves to enable rapid system isolation to portions of Lines 1016 and 1019 in the City of Orange.

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

End of Orange Valve Enhancement Project Bundle Final Report

I. QUESTAR TAPS VALVE ENHANCEMENT PROJECT

A. Background and Summary

This report describes the activities associated with the Questar Taps Valve Enhancement Project, that consists of valve enhancements made to three new mainline valves (MLVs) and three existing crossover valves in the unincorporated community of Whitewater in Riverside County. Through this project, SoCalGas and SDG&E enhanced the capabilities of these MLVs to provide rapid transmission system isolation to portions of Lines 2000, 2001 and 5000. SoCalGas and SDG&E installed three new valves, five new actuators, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,767,811.

The valves comprising the Questar Taps Project are located in two fenced SoCalGas facilities approximately 300-feet apart in a desert environment near Interstate 10. 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 valves and with the Operating District paying for the installation of the new MLVs.

Table 1: General Project Information

Questar Taps Valve Enhancement Project	
Location	Unincorporated Whitewater
Days on Site	120 days
Construction Start	09/24/2015
Construction Finish	02/01/2016
Commissioning Date	03/02/2017
Valve Upgrades	
Valve Number	2000-129.11-0
Valve Type	Existing – Ball
Actuator	New
Actuator Above-/Below-Grade	Above
ASV	No
RCV	Yes
Valve Number	2000-129.11-1
Valve Type	New – Ball
Actuator	New
Actuator Above-/Below-Grade	Above
ASV	Yes
RCV	Yes
Valve Number	2001-129.13-0
Valve Type	Existing – Ball
Actuator	New
Actuator Above-/Below-Grade	Above
ASV	No
RCV	Yes
Valve Number	2001-129.13-1
Valve Type	New – Ball
Actuator	New
Actuator Above-/Below-Grade	Above
ASV	Yes
RCV	Yes

Table 1: General Project Information (Continued)

Valve Upgrades			
Valve Number	5000-130.58-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above		
ASV	No		
RCV	Yes		
Valve Number	5000-130.58-1		
Valve Type	New – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing	Expanded		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,762,534	5,277	1,767,811
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Questar Taps Valve Enhancement Project

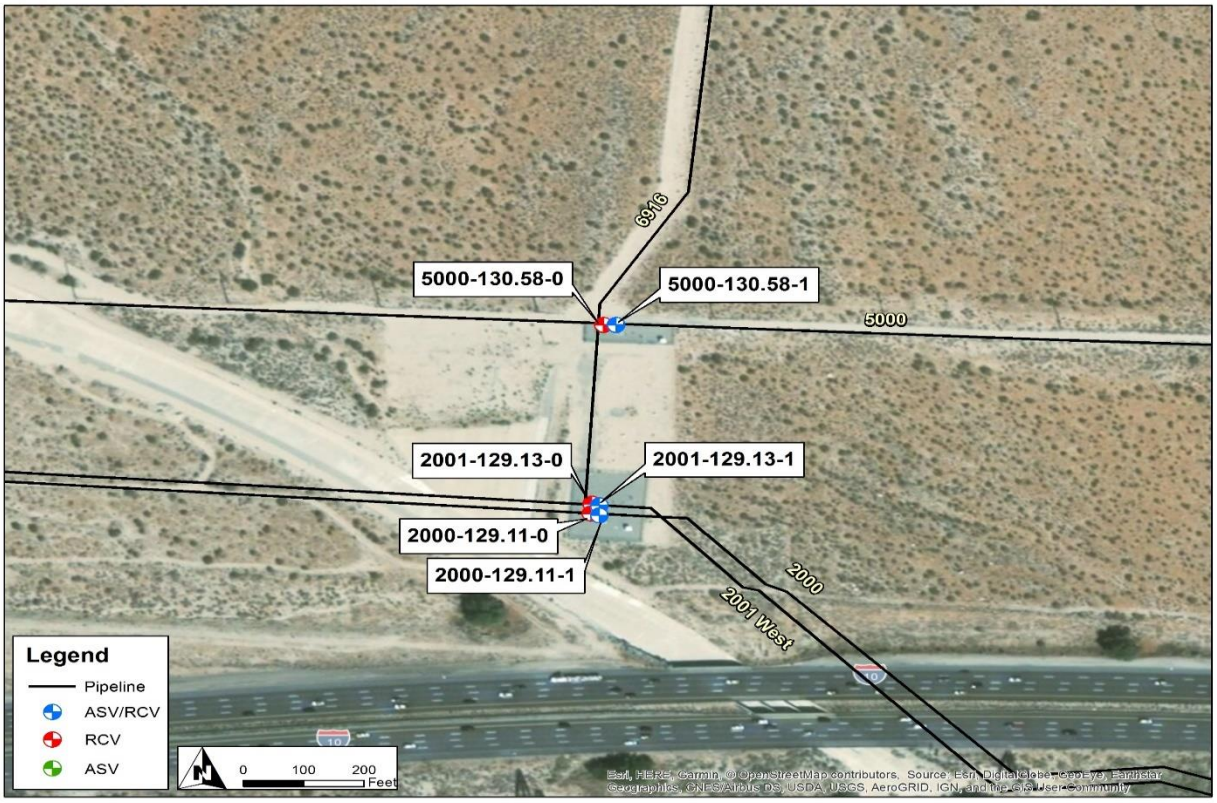
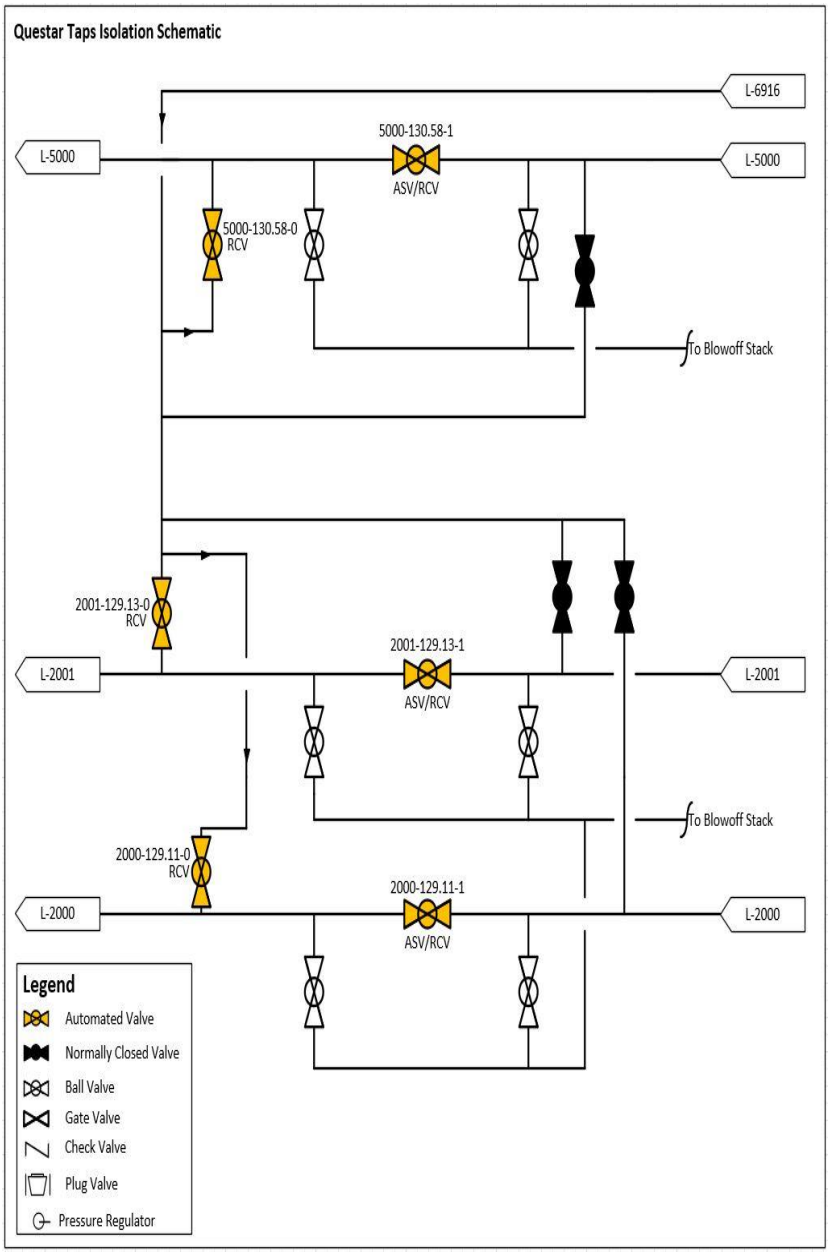


Figure 2: Questar Taps Valve Enhancement Project Schematic



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

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

1. 2011 PSEP Filing: SoCalGas and SDG&E did not previously identify these valves for automation.

2. Updated Scope: SoCalGas and SDG&E identified six valves for automation to achieve the transmission isolation objectives set forth in the approved Valve Enhancement Plan.

3. Engineering, Design, and Constructability: SoCalGas and SDG&E determined that the Operating District will fund the installation of the new mainline valves.

4. Final Project Scope: The final project scope consists of the automation of six valves that included the installation of three new valves, the installation of five new actuators, 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 project sites.

[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
2000	129.11	0	[redacted]	A/AG	RCV
2000	129.11	1	[redacted]	NV/AG	ASV/RCV
2001	129.13	0	[redacted]	A/AG	RCV
2001	129.13	1	[redacted]	NV/AG	ASV/RCV
5000	130.58	0	[redacted]	C/P	RCV
5000	130.58	1	[redacted]	NV/AG	ASV/RCV

B. Site Evaluation and Planning

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

1. Site Description: The site is located in an open area on private property near Interstate 10. The valves are located in two separate existing SoCalGas facilities that are approximately 300 feet apart.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing stations would need to be expanded to accommodate the additional equipment.

3. DOT Class: This project site is in a Class 1 location.

    a. 2000-129.11-0: SoCalGas and SDG&E selected this valve for automation to to prevent backflow between Lines 2000, 2001 and 5000.

b. 2000-129.11-1: SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 HCA locations upstream and downstream of this valve.

c. 2001-129.13-0: SoCalGas and SDG&E selected this valve for automation to to prevent backflow between Lines 2000, 2001 and 5000.

d. 2001-129.13-1: SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 HCA locations upstream and downstream of this valve.

e. 5000-130.58-0: SoCalGas and SDG&E selected this valve for automation to to prevent backflow between Lines 2000, 2001 and 5000.

f. 5000-130.58-1: SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 HCA locations upstream and downstream of this valve.

4. Power Source: There was no preexisting power source, the Project Team installed new power equipment at the site.

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

C. Engineering, Design, and Planning Factors

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

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station, to accommodate the new equipment.

2. Valve Details:

   a. 2000-129.11-0: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

   b. 2000-129.11-1: There was no preexisting valve, the Project Team installed a new valve.

   c. 2001-129.13-0: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

   d. 2001-129.13-1: There was no preexisting valve, the Project Team installed a new valve.

   e. 5000-130.58-0: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

   f. 5000-130.58-1: There was no preexisting valve, the Project Team installed a new valve.

3. Actuator Details:

   a. 2000-129.11-0: There was no preexisting actuator, the Project Team installed a new actuator.

   b. 2000-129.11-1: There was no preexisting actuator, the Project Team installed a new actuator.

c. 2001-129.13-0: There was no preexisting actuator, the Project Team installed a new actuator.

d. 2001-129.13-1: There was no preexisting actuator, the Project Team installed a new actuator.

e. 5000-130.58-0: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.

f. 5000-130.58-1: There was no preexisting actuator, the Project Team installed a new actuator.

4. Customer Impact: The Project Team requested a Request for Engineering Review (RER) for the installation of the MLVs that concluded that the required shut-in should be performed during summer conditions to minimize the risk of impacting service to any customers. The lines were shut-in independently of each other.

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 created a dust control plan that was approved by the South Coast Air Quality Management District (AQMD). An environmental monitor performed spot checks during construction.

8. Permit Restrictions: Aside from the dust control plan, there were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team identified the need to extend the existing site easements for this location to accommodate the new automation equipment.

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

D. Scope Changes

Through engineering, design, and planning activities, SoCalGas and SDG&E 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. After the creation of the preliminary estimate, the Project Team determined that the South Coast AQMD required a dust control plan, the costs related to the dust control plan are not included in the preliminary estimate.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package that included the updated requirements described in the discussion of notable changes in scope above. The Operating District funded the new mainline valve installation cost, the related Performance Partner (Mechanical Construction Contractor) costs will not be discussed in this report.

1. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	09/24/2015
Construction Completion Date	02/01/2016
Days on Site	120 days
Commissioning Date	03/2/2017

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

C. Changes During Construction

SoCalGas and SDG&E 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 related to the activities funded by PSEP. There were conditions encountered during construction that were funded by the Operating District. Those conditions will not be discussed in this report.

Figure 3: Questar Taps Valve Enhancement Project After Site Restoration

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. 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 2, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design 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. Construction Execution: The Project Team utilized one mobilization and demobilization to install the new MLV's and the necessary automation equipment.
2. Land Use: The Project Team designed the project to minimize the amount of additional space required to accommodate the necessary automation equipment.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $1,408,330. This estimate was prepared in April of 2015, using the "Stage 3 SCG Valve Estimate Template Rev 2" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the Project.

SoCalGas and SDG&E 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 Service costs incurred to execute the Project Actual Indirect Costs reflect costs for incremental overhead loaders applied in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,767,811

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	101,088	62,702	(38,386)
Materials	417,331	383,242	(34,089)
Mechanical Construction Contractor	-	-	-
Electrical Contractor	409,438	394,506	(14,932)
Construction Management & Support	82,841	271,288	188,447
Environmental	13,860	59,527	45,667
Engineering & Design	120,134	207,875	87,741
Project Management & Services	59,983	67,877	7,894
ROW & Permits	55,462	55,504	42
GMA	148,193	196,102	47,909
Total Direct Costs	**1,408,330**	**1,698,623**	**290,293**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta over/(under)
Overheads	743,825	56,026	(687,799)
AFUDC	307,868	9,199	(298,669)
Property Taxes	64,754	3,963	(60,791)
Total Indirect Costs	**1,116,447**	**69,188**	**(1,047,259)**
Total Direct Costs	**1,408,330**	**1,698,623**	**290,293**
Total Loaded Costs	**2,524,777**	**1,767,811**	**(756,966)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Questar Taps Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully automated six valves to achieve the objective of enabling rapid system isolation in Riverside County. The total loaded cost of the Project is $1,767,811.

SoCalGas and SDG&E executed this project prudently by designing the project to effectively utilize the existing easement minimizing the amount of new land that was required, and installing the equipment necessary to bring power and communication capabilities to the valves to enable rapid system isolation to portions of Lines 2000, 2001 and 5000 in Riverside County.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at reasonable cost by carefully planning and coordinating construction activity, and by limiting the number of mobilizations to maximize efficiencies and reduce customer and community impacts.

End of Questar Taps Valve Enhancement Project Final Report

I. RAINBOW VALVE ENHANCEMENT PROJECT BUNDLE

A. Background and Summary

This report describes the activities associated with the Rainbow Valve Enhancement Project Bundle that consists of valve enhancements made to ten existing mainline valves (MLVs) in the Cities of Menifee, Murrieta, and the unincorporated community of Lakeview in Riverside County. Through this project, SoCalGas and SDG&E enhanced the capabilities of ten MLVs to provide rapid transmission system isolation to a portion of Lines 1027, 1028, and 6900. SoCalGas and SDG&E installed six new actuators, new power equipment, new communications equipment, and the necessary automation equipment at the sites. The total loaded project cost is $5,207,418.

The ten valves comprising the Rainbow Valve Enhancement Project Bundle are located in existing SoCalGas facilities in Riverside County and are separated into four different project sites. The Menifee and Watson site is a fenced in facility on the northwest corner of Menifee Road and Watson Road. The Marino and Briggs site is a fenced in facility north of the intersection of Marino Drive and Briggs Road on the east side of Briggs road. The Los Alamos and Briggs site is a fenced in facility east of the intersection of Los Alamos Road and Briggs Road next to a parking lot. The Davis and Martin site is a fenced in facility south of the intersection of Davis Road and Marvin Road on the east side of Davis Road. SoCalGas and SDG&E grouped the four project sites together into a single valve bundle and executed the four sites as a comprehensive package because the sites are geographically proximate.

Table 1: General Project Information

Rainbow Valve Enhancement Project Bundle				
Site	Menifee and Watson	Marino and Briggs	Los Alamos and Briggs	Davis and Marvin
Location	Menifee	Menifee	Murrieta	Lakeview
Days on Site	24 days	43 days	37 days	27 days
Construction Start	06/27/2016	05/31/2016	05/23/2016	01/17/2017
Construction Finish	08/15/2016	08/10/2016	07/28/2016	03/15/2017
Commissioning Date	10/11/2016	12/08/2016	10/12/2016	09/28/2017
Valve Upgrades				
Valve Number	1027-11.75-0	1027-18.20-0	1027-22.77-0	6900-5.13-0
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball	Existing – Ball
Actuator	New	New	Existing	New
Actuator Above-/Below- Grade	Above-Grade	Above-Grade	Above-Grade	Above-Grade
ASV	Yes	Yes	Yes	Yes
RCV	Yes	Yes	Yes	Yes
Valve Number	1028-11.75-0	1028-18.20-0	1028-22.77-0	
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball	
Actuator	New	New	Existing	
Actuator Above-/Below- Grade	Above-Grade	Above-Grade	Above-Grade	
ASV	Yes	Yes	Yes	
RCV	Yes	Yes	Yes	
Valve Number	6900-12.91-0	6900-18.20-0	6900-22.77-0	
Valve Type	Existing – Ball	Existing – Ball	Existing – Ball	
Actuator	New	Existing	Existing	
Actuator Above-/Below- Grade	Above-Grade	Above-Grade	Above-Grade	
ASV	Yes	Yes	Yes	
RCV	Yes	Yes	Yes	

Site Upgrades				
Vault	None	None	None	None
Power	Existing – Utility	Existing – Utility	Existing – Utility	New – Solar
Communication	New – Radio	New – Radio	New – Radio	New – Radio
SCADA Panel	New	New	New	New
Equipment Shelter	None	None	None	None
Fencing	Existing – Expanded	Existing	Existing	Existing

Project Costs ($)	Capital	O&M	Total
Loaded Project Costs	5,207,418	-	5,207,418
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Rainbow Valve Enhancement Project Bundle: Overview

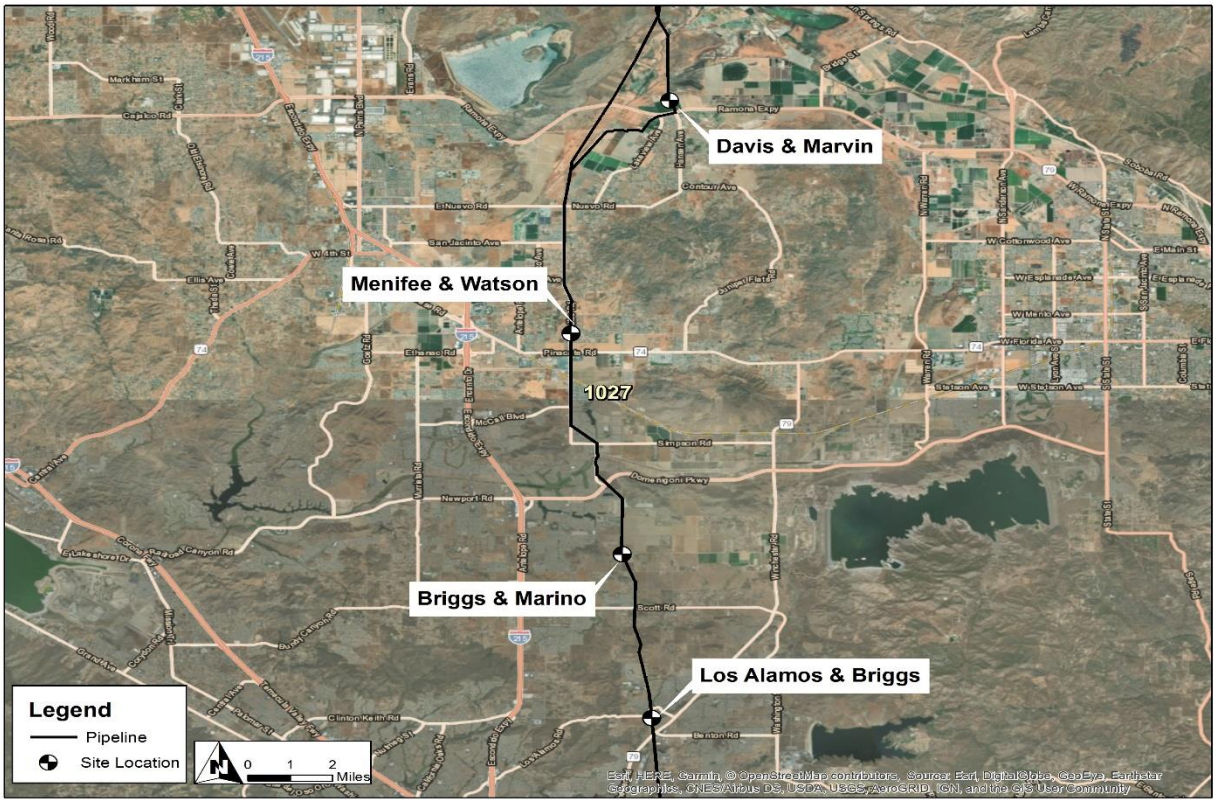


Figure 2: Satellite Image of Menifee and Watson

Figure 3: Satellite Image of Marino and Briggs

Figure 4: Satellite Image of Los Alamos and Briggs

Figure 5: Satellite Image of Davis and Marvin

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified nine MLVs, for automation to provide remote isolation to a portion of Lines 1027, 1028, and 6900. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in the identification of one additional valve 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 identified nine MLVs for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that automation of these nine valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. The Project Team determined it was also necessary to automate existing valve 1027-22.77-0. Together, the automation of these ten valves enable rapid isolation, 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: The Rainbow Valve Enhancement Project Bundle initially included a fifth project site, Martin and Ramona. Since this site required long lead environmental permits, the Project Team removed this site from the Rainbow Valve Enhancement Project Bundle and continued the work on the remaining four project sites. The Martin and Ramona Valve Enhancement Project will be presented for reasonableness review in a future filing.

4. Final Project Scope: The final project scope consists of the automation of ten valves, that included the installation of six new actuators, the installation of power equipment at one of the sites, the installation of communications equipment, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1027	11.75	0	[redacted]	A/AG	ASV/RCV
1027	18.20	0	[redacted]	A/AG	ASV/RCV
1027	22.77	0	[redacted]	C/P	ASV/RCV
1028	11.75	0	[redacted]	A/AG	ASV/RCV
1028	18.20	0	[redacted]	A/AG	ASV/RCV
1028	22.77	0	[redacted]	C/P	ASV/RCV
6900	5.13	0	[redacted]	A/AG	ASV/RCV
6900	12.91	0	[redacted]	A/AG	ASV/RCV
6900	18.20	0	[redacted]	C/P	ASV/RCV
6900	22.77	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Rainbow Valve Enhancement Project Bundle by performing pre-design site walks to determine existing conditions and assess any potential impacts on the design. Key factors that influenced the engineering and design of this project are as follows:

Menifee and Watson

1. Site Description: This site is an existing SoCalGas facility in an urban area next to a small residential community near the intersection of Menifee Road and Watson Road. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 locations upstream and downstream of this valve.
4. Power Source: The site has existing utility power.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

Marino and Briggs

1. Site Description: This site is an existing SoCalGas facility in a rural area near the intersection of Marino Drive and Briggs Road. There is an existing chain link fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.

3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 locations upstream and downstream of this valve.

4. Power Source: The site has existing utility power.

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

Los Alamos and Briggs

1. Site Description: This site is an existing SoCalGas facility in an urban area next to a residential community near the intersection of Los Alamos Road and Briggs Road. There is an existing chain link fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.

3. DOT Class: This project site is in a Class 1 location. SoCalGas and SDG&E selected this MLV for automation to isolate Class 3 locations upstream and downstream of this valve.

4. Power Source: The site has existing utility power.

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

Davis and Marvin

1. Site Description: This site is an existing SoCalGas facility in a desert environment near the intersection of Davis Road and Marvin Road. There is an existing chain link fence enclosing the site.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.

3. DOT Class: This Project is in a Class 1 Location. SoCalGas and SDG&E selected this MLV for automation to isolate a Class 3 HCA location downstream of this valve.

4. Power Source: There was no preexisting power source. The Project Team installed new solar 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 and SDG&E reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a pre-design site walk. Key factors that influenced the engineering and design of the Project are as follows:

Menifee and Watson

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station, to accommodate the new equipment.

2. Valve Details:

   a. 1027-11.75-0: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

   b. 1028-11.75-0: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

   c. 6900-12.91-0: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

   a. 1027-11.75-0: There was no preexisting actuator, the Project Team installed a new actuator.

   b. 1028-11.75-0: There was no preexisting actuator, the Project Team installed a new actuator.

   c. 6900-12.91-0: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team utilized a laydown yard across the street from the station at the Menifee and Watson site. The Project Team utilized a flagman and signage when transporting equipment and materials across the street.

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 spot checks during construction.

8. Permit Restrictions: The Project Team obtained an Encroachment Permit from the City of Menifee to place signage and a flagman at Menifee and Watson to assist in traffic control next to the laydown yard.

9. Land Use: The Project Team expanded the existing easement and facility to accommodate the new automation equipment. The Project Team designed the Project to stay within the existing easement. The Project Team utilized a SoCalGas owned property across the street from the Menifee and Watson site as a laydown yard for the entire Rainbow Valve Enhancement Project Bundle.

10. Traffic Control: The Project Team utilized a flagman and signage during construction at the laydown yard across the street from the Menifee and Watson site. The Project Team did not close any lanes.

Marino and Briggs

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. 1027-18.20-0: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

b. 1028-18.20-0: The existing valve was a manually operated Class 600 ball valve that the Project Team reused.

c. 6900-18.20-0: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

a. 1027-18.20-0: There was no preexisting actuator, the Project Team installed a new actuator.

b. 1028-18.20-0: There was no preexisting actuator, the Project Team installed a new actuator.

c. 6900-18.20-0: 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 utilized a laydown yard across the street from the station at the Menifee and Watson site. The Project Team utilized a flagman and signage when transporting equipment and materials. The Project Team also utilized Briggs Road for parking 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 performed a biological survey for the Stephens Kangaroo Rat prior to construction, the Stephens Kangaroo Rat burrows were deemed inactive. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The Project Team obtained an Encroachment Permit from the City of Menifee to place signage and a flagman at Menifee and Watson to assist in traffic control next to the laydown yard. SoCalGas and SDG&E also obtained an Encroachment Permit to park on the east side of Briggs Road during construction.

9. Land Use: The Project Team utilized a SoCalGas owned property across the street from the Menifee and Watson site as a laydown yard for the entire Rainbow Valve Enhancement Project Bundle.

10. Traffic Control: The Project Team utilized a flagman and signage during construction at the laydown yard across the street from the Menifee and Watson site. The Project Team did not close any lanes. The Project Team utilized signage and cones during construction around the parking area.

Los Alamos and Briggs

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. 1027-22.77-0: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

b. 1028-22.77-0: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

c. 6900-22.77-0: The existing valve was a manually actuated Class 600 ball valve that the Project Team reused.

3. Actuator Details:

a. 1027-22.77-0: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.

b. 1028-22.77-0: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.

c. 6900-22.77-0: 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 utilized a laydown yard across the street from the station at the Menifee and Watson site. The Project Team utilized a flagman and signage when transporting equipment and materials.

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 spot checks during construction.

8. Permit Restrictions: The Project Team obtained an Encroachment Permit from the City of Menifee to place signage and a flagman at Menifee and Watson to assist in traffic control next to the laydown yard.

9. Land Use: The Project Team utilized a SoCalGas owned property across the street from the Menifee and Watson site as a laydown yard for the entire Rainbow Valve Enhancement Project Bundle. The Project Team also obtained a Temporary Right of Entry (TRE), during construction.

10. Traffic Control: The Project Team utilized a flagman and signage during construction at the laydown yard across the street from the Menifee and Watson site. The Project Team did not close any lanes.

Davis and Marvin

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 600 ball valve that the Project Team reused.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, the Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team utilized a laydown yard across the street from the station at the Menifee and Watson site. The Project Team utilized a flagman and signage when transporting equipment and materials. The Project Team also utilized Davis Road for parking during construction.

6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.

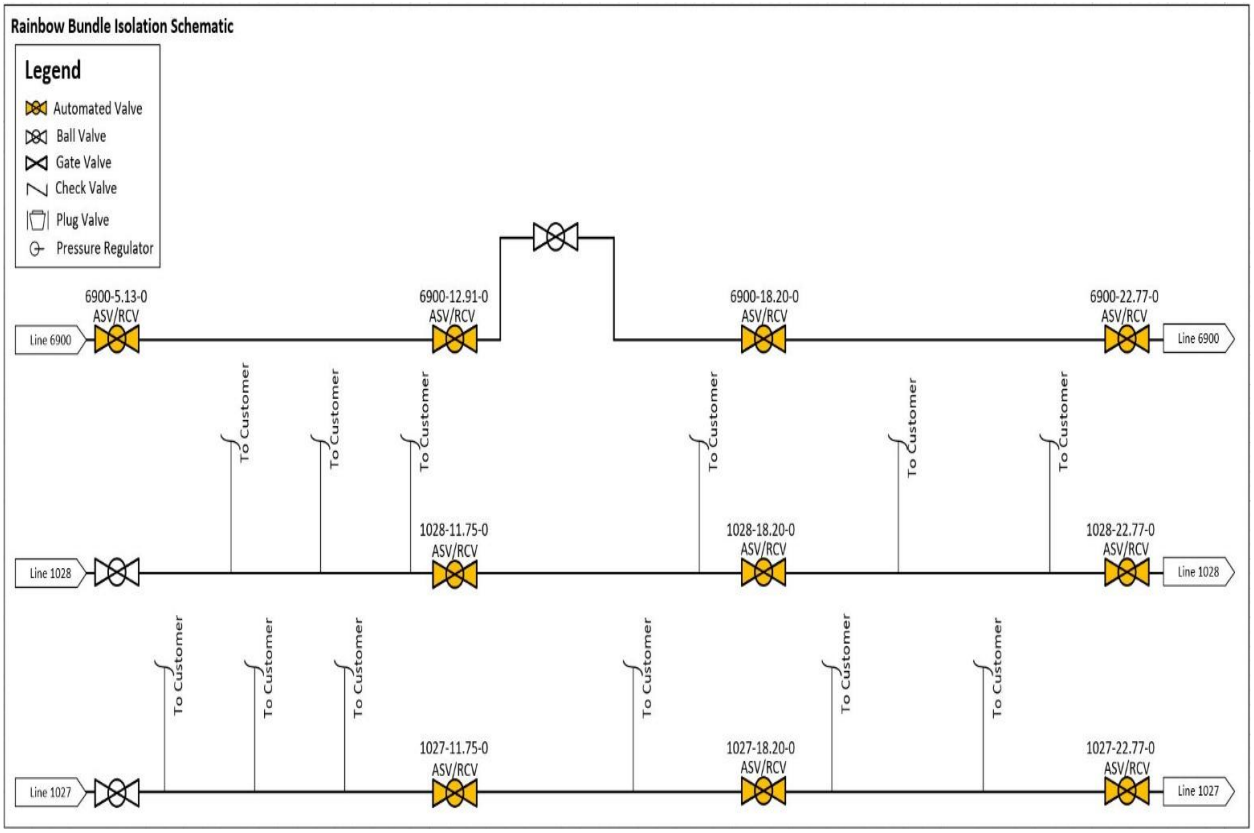
7. Environmental: The Project Team performed a biological survey for the Stephens Kangaroo Rat prior to construction. The Project Team obtained an incidental take permit from Riverside County Habitat Conservation Agency prior to construction. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: The Project Team obtained an Encroachment Permit from the City of Menifee to place signage and a flagman at Menifee and Watson to assist in traffic control next to the laydown yard. SoCalGas and SDG&E also obtained an Encroachment Permit to park on the east side of Davis Road during construction. SoCalGas and SDG&E also received an Incidental Take Permit for the Stephens Kangaroo Rat from the Riverside County Habitat Conservation Agency.

9. Land Use: The Project Team utilized a SoCalGas owned property across the street from the Menifee and Watson site as a laydown yard for the entire Rainbow Valve Enhancement Project Bundle.

10. Traffic Control: The Project Team utilized a flagman and signage during construction at the laydown yard across the street from the Menifee and Watson site. The Project Team did not close any lanes. The Project Team utilized signage and cones during construction around the parking area.

Figure 6: Rainbow Valve Enhancement Project Bundle Schematic



D. Scope Changes

SoCalGas and SDG&E 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) area 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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas and SDG&E's preliminary cost estimate for construction was [redacted].

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

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Menifee and Watson	
Construction Start Date	06/27/2016
Construction Completion Date	08/15/2016
Days on Site	24 days
Commissioning Date	10/11/2016
Marino and Briggs	
Construction Start Date	05/31/2016
Construction Completion Date	08/10/2016
Days on Site	43 days
Commissioning Date	12/08/2016
Los Alamos and Briggs	
Construction Start Date	05/23/2016
Construction Completion Date	07/28/2016
Days on Site	37 days
Commissioning Date	10/12/2016
Davis and Marvin	
Construction Start Date	01/17/2017
Construction Completion Date	03/15/2017
Days on Site	27 days
Commissioning Date	09/28/2017

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $116,000 in change orders.

Conditions at All Four Sites

1. Construction Method: The Mechanical Construction Contractor excavated all electrical trenches for the Electrical Contractor, this was not included in their scope of work.

2. Security: During construction, vandalism took place during non-working hours. The Mechanical Construction Contractor provided security for the office and tool trailers. This was not included in the scope of work.

3. Materials: Permanent fencing was installed at the laydown yard as opposed to temporary fencing.

Figure 7: Rainbow Valve Enhancement Project Bundle, Briggs & Marino Site – Conduit Trench Excavation

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves back into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on October 11, 2016, October, 12, 2016, December 8, 2016 and September 28, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design site walk to incorporate known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Planning and Coordination: The Project Team bundled projects to coordinate engineering activities between the four Rainbow Valve Enhancement Project Bundle sites to reduce overall costs for customers.

2. Land Use: The Project Team utilized the SoCalGas owned property next to the Menifee and Watson site as a laydown yard for all four project sites within this bundle avoiding the cost of obtaining temporary easements for a laydown yard.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $4,090,336. This estimate was prepared in July of 2016, using the “Stage 3 SCG Valve Estimate Template Rev 3” estimating tool, the most current version of the PSEP Estimate Template at the time.

The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas and SDG&E 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 $5,207,418.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	321,308	329,996	8,688
Materials	820,292	509,980	(310,312)
Mechanical Construction Contractor	1,176,187	1,060,708	(115,479)
Electrical Contractor	385,252	655,787	270,535
Construction Management & Support	125,041	258,114	133,073
Environmental	133,172	61,114	(72,058)
Engineering & Design	475,905	868,495	392,590
Project Management & Services	204,779	102,083	(102,696)
ROW & Permits	4,950	55,122	50,172
GMA	443,450	505,811	62,361
Total Direct Costs	**4,090,336**	**4,407,210**	**316,874**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	471,902	516,108	44,206
AFUDC	338,317	241,879	(96,438)
Property Tax	79,000	42,221	(36,779)
Total Indirect Costs	**889,219**	**800,208**	**(89,011)**
Total Direct Costs	**4,090,336**	**4,407,210**	**316,874**
Total Loaded Costs	**4,979,555**	**5,207,418**	**227,863**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Rainbow Valve Enhancement Project Bundle. Through this Valve Enhancement Project Bundle, SoCalGas and SDG&E successfully automated ten mainline valves to achieve the objective of enabling rapid system isolation in the Cities of Menifee, Murrieta, and the unincorporated community of Lakeview. The total loaded cost of the Project is $5,207,418.

SoCalGas and SDG&E executed this project prudently through designing and executing the Project to support the achievement of Valve Enhancement Plan isolation objectives; coordinating and bundling four valve projects into a comprehensive package to capture efficiencies through coordinated scheduling of construction crews, installing the solar power at one of the sites; and installing the equipment necessary to bring communication capabilities to these valves to enable rapid system isolation to a portion of Lines 1027, 1028 and 6900 in the County of Riverside.

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

End of Rainbow Valve Enhancement Project Bundle Final Report

I. SEPULVEDA STATION VALVE ENHANCEMENT PROJECT

A. Background and Summary

This report describes the activities associated with the Sepulveda Station Valve Enhancement Project, that consists of valve enhancements made to an existing mainline valve (MLV), and the installation of a flow meter, located in the City of Carson, in Los Angeles County. Through this project, SoCalGas and SDG&E enhanced the capabilities of one MLV to enable rapid transmission system isolation to a portion of Line 325 and to isolate Line 765 from Line 1176. SoCalGas and SDG&E installed power equipment, communications equipment, a flow meter and the necessary automation equipment at the site. The total loaded project cost is $1,037,941.

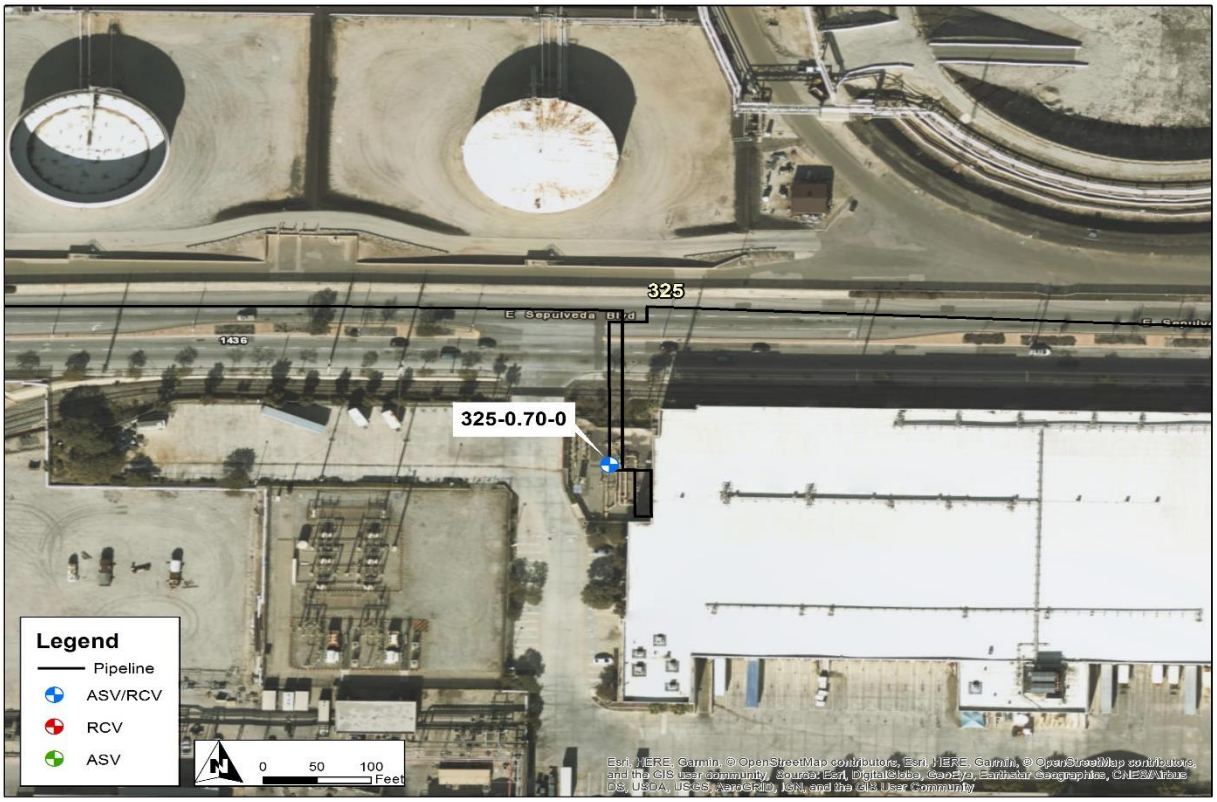
The Sepulveda Station Valve Enhancement Project site is located in an industrial area next to East Sepulveda Boulevard.

Table 1: General Project Information

Sepulveda Station Valve Enhancement Project			
Location	City of Carson		
Days on Site	53		
Construction Start	09/29/2016		
Construction Finish	01/13/2016		
Commissioning Date	08/24/2017		
Valve Upgrades			
Valve Number	325-0.70-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
RCV	Yes		
ASV	Yes		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing	Existing – Fencing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,037,941	-	1,037,941
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Sepulveda Station Valve Enhancement Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan[1] in the 2011 filing. This conceptual scope identified valves 1176-3.11-1 and 1176-3.11-2 for automation to provide remote isolation to portions of Line 1176. Prior to initiating execution of the Project, SoCalGas and SDG&E reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. The final project scope is summarized in Table 2 below:

1. 2011 PSEP Filing: SoCalGas and SDG&E identified valves 1176-3.11-1 and 1176-3.11-2 for automation to achieve the objective of rapid system isolation.

2. Updated Scope: Upon project initiation, SoCalGas and SDG&E reviewed the conceptual project scope and determined that these isolation points would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. During the scope review, the Project Team determined that the automation of existing MLV 325-0.70-0 also achieves Valve Enhancement Plan objectives at a lower cost to customers.

[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. Valves 1176-3.11-1 and 1176-3.11-2 are located in a highly trafficked intersection and required relocation for automation. This would have resulted in an increase to construction costs and impact to the community. The Project Team determined the automation of the previously discussed MLV on Line 325 would enable rapid isolation, achieving Valve Enhancement Plan objectives while avoiding the relocation of any valves.

   b. SoCalGas and SDG&E added a flow meter to the project scope to monitor flow between Lines 765 and 1176.

4. Final Project Scope: The final project scope consists of automation of one MLV, that included the installation of one new actuator, the installation of power equipment, the installation of communications equipment, the installation of a new flow meter, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
325	0.70	0	[redacted]	A/AG	ASV/RCV
325	0.70	FM	[redacted]	FM	FLOWMETER

B. Site Evaluation and Planning

SoCalGas and SDG&E initiated the planning process for the Sepulveda 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: This site is an existing SoCalGas Facility located in a high-density area that is a mix of industrial and commercial businesses.

2. Land Issues: During the pre-design site walk, SoCalGas and SDG&E noted the existing facility can accommodate the new equipment.

3. DOT Class: This project site is in a Class 3 location.

4. Power Source: There was no preexisting power source. SoCalGas and SDG&E installed new power equipment at the site.

5. Communication Technology: There was existing communications at the site. The Project Team added additional communications equipment that was compatible with the new PSEP linebreak technology.

C. Engineering, Design, and Planning Factors

SoCalGas and SDG&E 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 determined that a more cost effective and less impactful design would be to automate MLV 25-0.70-0 as opposed to the previously identified valves on Line 1176. The Project Team selected the new location as it was in an existing SoCalGas facility and did not require the relocation of any piping. 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 600 ball valve that the Project Team reused.

3. Actuator Details: There was no preexisting actuator. The Project Team installed a new actuator.

4. Customer Impact: The Project Team did not anticipate service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any notable impact to the community from this Project.

6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.

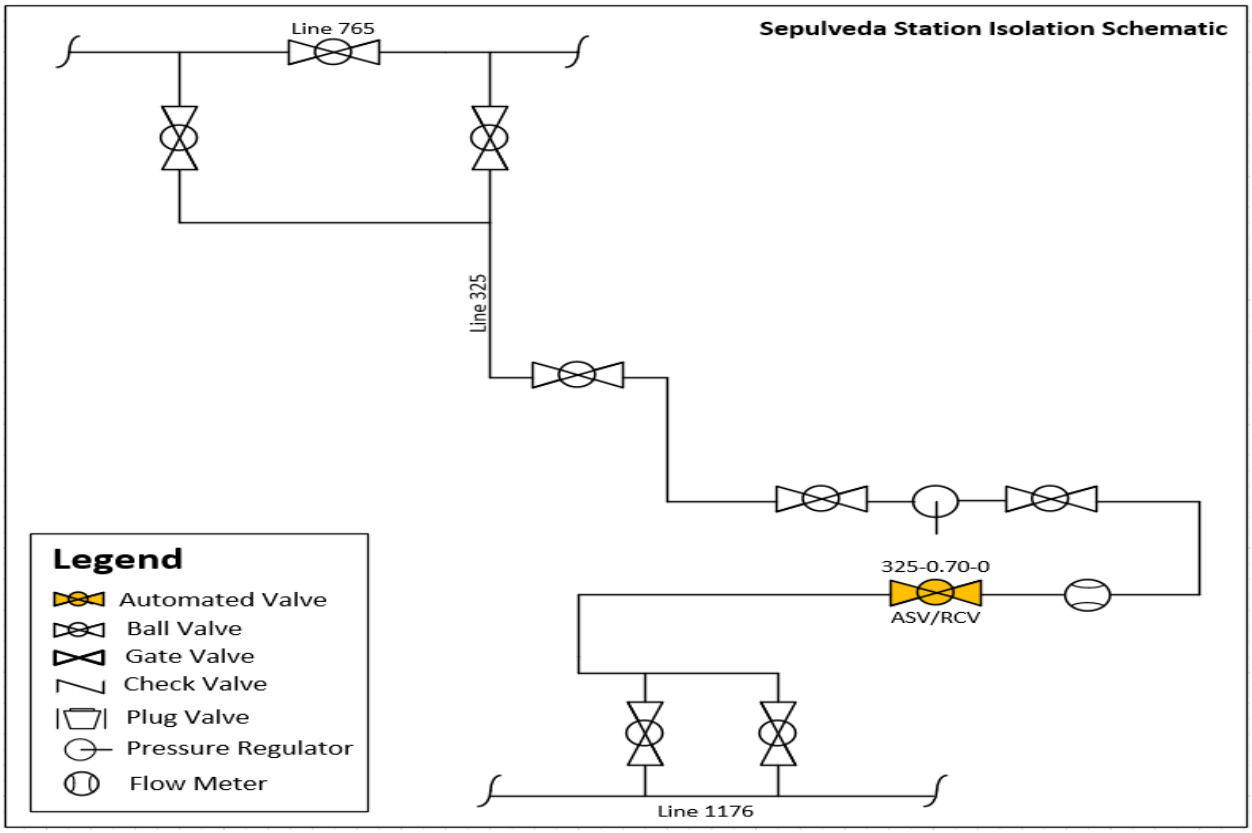
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.

9. Land Use: The Project Team performed all work within the existing SoCalGas facility. The Project Team obtained temporary parking permits for construction.

10. Traffic Control: The Project Team obtained temporary parking permits during construction.

Figure 2: Sepulveda Station Valve Enhancement Project Schematic



D. Scope Changes

SoCalGas and SDG&E 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 and SDG&E's Preliminary Mechanical Construction Contractor Estimate (*confidential*): SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate for construction.

3. SoCalGas and SDG&E's Preliminary Electrical Contractor Estimate (*confidential*): SoCalGas and SDG&E's 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 and SDG&E's preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Site 1	
Construction Start Date	09/29/2016
Construction Completion Date	01/13/2016
Days on Site	53
Commissioning Date	08/24/2017

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas and SDG&E's 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 $52,000 in change orders.

Field Design Change: The Project Team changed the alignment of the [redacted] sensing lines from the west side of the station to the east side of the station. The resulting design change placed the sensing lines in direct conflict with the three east side vertical platform foundations. The Construction Contractor also determined that the northwest column was in conflict with the existing [redacted] valve. The Construction Contractor supplied the necessary material, erected a steel platform, and made the necessary field modifications to install the platform. Once the steel platform was delivered to the job site, the Project Team had to make other modifications to install the platform.

Figure 3: New Actuator and Platform for Maintenance and Operations

Figure 4: Ultrasonic Flow Meter Installed on Line 325

Figure 5: New Linebreak Panel to Monitor the Pressure of Line 325 for Automatic Closure

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve back into service. During this stage, SoCalGas and SDG&E successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve and new flow meter. SoCalGas and SDG&E trained Field Operations personnel on the proper use and operation of the new equipment. 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 24, 2017 as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas and SDG&E 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 pre-design site walk to incorporate known site conditions in the project plan and design. The Project Team evaluated the site of the valves identified in the Valve Enhancement Plan and determined that the automation of existing MLV 325-0.70-0, in an existing SoCalGas facility, would also achieve the transmission isolation objectives set forth in the Valve Enhancement Plan at a lower cost and at less of an impact to the community.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas and SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $931,724. This estimate was prepared in August of 2016, using the “Stage 3 SCG Valve Estimate Template Rev 3” estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material and Services costs anticipated to be incurred to execute the project based on initial design plans.

SoCalGas and SDG&E 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 Service 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 $1,037,941.

Table 4: Estimated and Actual Direct Costs and Variances

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	104,280	82,708	(21,572)
Materials	120,778	104,538	(16,240)
Mechanical Construction Contractor	161,700	151,552	(10,148)
Electrical Contractor	161,700	126,870	(34,830)
Construction Management & Support	53,260	64,457	11,197
Environmental	48,884	22,217	(26,667)
Engineering & Design	137,500	193,250	55,750
Project Management & Services	59,485	28,075	(31,410)
ROW & Permits	-	6,012	6,012
GMA	84,137	103,536	19,399
Total Direct Costs	**931,724**	**883,215**	**(48,509)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances

Indirect Cost/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	128,783	117,341	(11,442)
AFUDC	53,772	32,601	(21,171)
Property Tax	12,553	4,784	(7,769)
Total Indirect Costs	**195,108**	**154,726**	**(40,382)**
Total Direct Costs	**931,724**	**883,215**	**(48,509)**
Total Loaded Costs	**1,126,832**	**1,037,941**	**(88,891)**

V. CONCLUSION

SoCalGas and SDG&E enhanced the safety of their integrated natural gas system by prudently executing the Sepulveda Station Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas and SDG&E successfully automated a mainline valve and installed a flow meter on Line 325 to achieve the objective of enabling rapid system isolation in the City of Carson. The total loaded cost of the Project is $1,037,941.

SoCalGas and SDG&E executed this project prudently through: designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, performing the Project in an existing SoCalGas facility, and installing equipment necessary to bring power and communication capabilities to this valve to enable rapid automated isolation to a portion of Line 325 in the City of Carson.

SoCalGas and SDG&E engaged in prudent cost avoidance efforts to complete this safety enhancement at reasonable cost by carefully planning and coordinating construction activity and by limiting the number of mobilizations sites to maximize efficiencies and reduce customer and community impacts.

End of Sepulveda Station Valve Enhancement Project Final Report

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Company Overheads

Southern California Gas Company

PSEP Cost Recovery Application

Overhead Costs ($000's)

	Capital	O&M	Total
Payroll Taxes	2,847	424	3,271
Vacation & Sick	4,395	645	5,040
Benefits (non-balanced)	5,500	810	6,310
Workers Compensation	505	69	574
Public Liability/ Property Damage	832	138	970
Incentive Compensation Plan	4,895	694	5,588
Purchasing	2,812	280	3,092
Administrative & General	7,742	(0)	7,742
PSEP Insurance	4,855	2,160	7,015
Total Overhead Costs [1]	34,383	5,218	39,601

1 The overhead costs shown in the SoCalGas table is reflective of overheads applied to direct costs - Labor and Non-Labor. Not included in the figures are overheads applied to GMA and disallowances, totaling $18,163K.

San Diego Gas & Electric Company

PSEP Cost Recovery Application

Overhead Costs ($000's)

	Capital	O&M	Total
Payroll Taxes	217	4	221
Vacation & Sick	1,150	55	1,205
Benefits (non-balanced)	963	59	1,022
Workers Compensation	59	3	63
Public Liability/ Property Damage	53	1	54
Incentive Compensation Plan	1,584	93	1,677
Purchasing	544	24	568
Administrative & General	4,921	26	4,948
PSEP Insurance	1,539	70	1,609
Total Overhead Costs [1]	11,031	335	11,367

[1] Total overhead costs shown in the SDG&E table is reflective of overheads applied to direct costs - Labor and Non-Labor. Not included in the figures are overheads applied to GMA and disallowances, totaling $5,628K.

PSEP Insurance by Project

SoCalGas

($000s)

Project Name	Capital	O&M	Total
Completed Projects:			
1004	48	52	100
2000-C Desert Hydrotest	16	88	104
2000-West Santa Fe Springs Station	54	-	54
2001 West - B 17,18,19	5	29	33
2003 Section 2	3	18	21
30-18 Sec 1 & 3	182	-	182
31-09	-	28	28
32-21 Section 1	6	64	70
32-21 Section 2	7	31	38
32-21 Section 3	6	18	24
33-120 Section 3	47	1	48
36-1002	13	0	13
36-9-09 JJ	13	0	13
36-9-09 North Section 1	368	0	368
36-9-09 North Section 3	200	0	201
36-9-09 North Section 4A & 4B	101	-	101
36-9-09 North Section 5A	101	0	101
36-9-09 North Section 7A & 7B	280	0	280
36-9-09 South	14	0	14
37-07	216	0	216
37-18 Section 1-5	387	-	387
37-18-F	4	47	51
38-200	54	0	55
38-501 Section 1 & 2	146	0	146
38-504	35	0	35
38-512 Section 1, 2 & 3	228	14	242
38-514 Section 1 & 2	100	0	100
38-931	46	-	46
38-KWB-P1B-01	2	0	2
404 Sec 1, 2, 2A, 3, 3A, 4, 4A, 5, 7, 8, 8A & 9	96	85	181
406 Section 3	3	15	18
41-116	0	-	0
41-17	22	0	22
43-121 South	236	-	236
44-137	199	0	199
44-687	41	0	42
44-720	78	0	78
41-6000-2	557	-	557
85 South Newhall Avenue	62	-	62
SL43-121N-P1A-01	110	-	110
Valve - 404 Ventura Bundle	14	-	14
Valve - 404-406 Ventura 2016 Bundle	4	-	4
Valve - 406 Ventura Bundle	11	-	11
Valve - Alhambra Station	19	-	19
Valve - Aviation Bundle	34	-	34
Valve - Banning 5000	9	-	9

PSEP Insurance by Project

SoCalGas

($000s)

Project Name	Capital	O&M	Total
Completed Projects:			
Valve - El Segundo Bundle	31	-	31
Valve - Fontana Bundle - L4002	4	-	4
Valve - Fontana MLVs 4000-4002	10	-	10
Valve - Haynes Station	8	-	8
Valve - Honor Ranch Bundle - L225	7	-	7
Valve - Indio 2014 Bundle	13	0	13
Valve - L1014 Brea Bundle	16	-	16
Valve - L1018 BUNDLE	0	-	0
Valve - L1018 Bundle Alipaz	-	-	-
Valve - L1018 Bundle Avery	0	-	0
Valve - L1018 Bundle Burt	0	-	0
Valve - L1018 Bundle Camino Capistrano	0	-	0
Valve - L1018 Bundle El Toro	-	-	-
Valve - L1018 Bundle Harvard	-	-	-
Valve - L1020 Bundle	4	-	4
Valve - L2000 Beaumont Riverside Bundle	9	-	9
Valve - L2001 W Seg 10-11	5	-	5
Valve - L2003 East Bundle	10	-	10
Valve - L2003 WEST	18	-	18
Valve - L225 Bundle-P1B	2	-	2
Valve - L235-335 East Bundle	19	-	19
Valve - L4000 MP 45.36	5	-	5
Valve - L4000 MP53.00	5	-	5
Valve - L4000 MP80.08 MLV	12	0	12
Valve - L6916 Bundle	7	-	7
Valve - L7000 Bundle-P1B	0	-	0
Valve - Lampson Bundle	38	-	38
Valve - New Desert Bundle	30	0	30
Valve - Newhall Station Bundle	56	-	56
Valve - Orange Bundle	18	(0)	18
Valve - Questar Taps Bundle	3	0	3
Valve - Rainbow Bundle	22	-	22
Valve - Riverside 2001 Bundle	7	-	7
Valve - Santa Barbara Bundle - 1005	4	-	4
Valve - Sepulveda Station	2	-	2
De-scoped Projects:	-	-	-
2001 East	-	-	-
36-1006	-	-	-
44-719	-	0	0
MLV GT-NG 247	-	0	0
Valve 115	-	0	0
Valve Alamitos	-	-	-
Valve Goleta	-	0	0
Valve Lampson	-	0	0
Valve Quigley Station	-	-	-

PSEP Insurance by Project

SoCalGas

($000s)

Project Name	Capital	O&M	Total
Completed Projects:			
Miscellaneous Costs:	-	-	-
PSEP SoCalGas Lease	-	-	-
Post Completion Adjustments:	-	-	-
Total	1	13	14
PSRMA:	-	-	-
2000 A	300	1,653	1,953
Play Del Rey Phase (1-3)	-	2	2
42-66-1 & 42-66-2	4	-	4
2001 East	-	1	1
SL 38-528	-	1	1
Total SoCalGas PSEP Insurance	4,855	2,160	7,015

PSEP Insurance by Project

SDG&E

($000s)

Project Name	Capital	O&M	Total
Completed Projects:			
49-11	46	21	67
49-13	173	48	221
49-15 Transmission Section 1, Distribution Section 1, 2, 3 and 4	397	-	397
49-28	445	-	445
Valve - 1600 Bundle	2	-	2
Valve - 3010 Bundle	1	-	1
Valve - 3600 Bundle	39	-	39
Valve - 49-28	11	-	11
Valve 2010 and 3011	1	-	1
Miscellaneous Costs:	-	-	-
PSEP SDG&E Lease	-	0	0
Post Completion Adjustments:			
Total	(130)	-	(130)
Total SDG&E PSEP Insurance	986	70	1,055

WP-IX-A1 - A8

Revenue Requirements

Southern California Gas Company and San Diego Gas & Electric Company

PSEP 2018 Reasonableness Review (RR) - Revenue Requirements

(1,000$'s excluding FF&U)

	SoCalGas	SDG&E	Total
O&M:			
Costs:			
Completed Projects	67,965	6,576	74,541
Descoped Projects	731	-	731
Post Completion Adjustments	7,359	363	7,721
PSRMA PSEP Insurance	1,656	-	1,656
Subtotal - Costs	77,711	6,939	84,650
Revenue - 50% Interim Recovery [1]	(33,364)	(4,514)	(37,878)
Regulatory Account Interest [2]	995	103	1,098
Subtotal O&M RR	45,342	2,527	47,870
Capital:			
Capital-Related Costs			
Completed Projects	166,635	23,823	190,458
Post Completion Adjustments	(8)	(14)	(22)
PSRMA PSEP Insurance	167	-	167
Subtotal - Capital Related Costs	166,795	23,809	190,604
Revenue - 50% Interim Recovery [1]	(25,602)	(3,656)	(29,258)
Regulatory Account Interest [2]	1,781	251	2,032
Subtotal - Capital Related RR	142,974	20,404	163,378
Total Revenue Requirement	188,317	22,931	211,248

Sums may not equal due to rounding.

[1] Per Decision (D.) 16-08-003.

[2] Regulatory account interest was calculated through April 2018 based on the costs requested in this proceeding as of April 2018.

Southern California Gas Company
PSEP Cost Recovery Application
PSEP O&M Revenue Requirements (excluding FF&U) by Project

Line	Project Name	PSEP Costs (Chapter III, IV, VIII)	Pension/ PBOPs	Other OH Exclusions and Adjustments	Post-1955 Disallowances	Adjusted O&M Revenue Requirement	Cost Recovery Through April 2018[1]	Regulatory Interest Through April 2018	Balance Through April 2018
		a	b	c	d	e = a-b-c-d	f	g	h = e+f+g
1	**Completed Projects:**								
2	1004	7,120,958	(33,991)	16	-	7,154,933	(4,870,333)	89,093	2,373,693
3	2000-C	10,867,012	50,097	-	0	10,816,915	(4,391,419)	141,183	6,566,680
4	2001 West- B	4,430,452	10,807	-	4,690	4,414,955	(2,654,793)	56,968	1,817,130
5	2003 Section 2	2,439,116	6,905	-	311,028	2,121,183	(1,320,029)	30,898	832,052
6	31-09	3,651,114	2,468	-	820,900	2,827,746	(45,734)	9,293	2,791,305
7	32-21 Section 1	9,289,078	168,921	-	-	9,120,158	(6,437,418)	115,890	2,798,630
8	32-21 Section 2	4,739,803	8,260	-	-	4,731,543	(1,328,451)	67,115	3,470,207
9	32-21 Section 3	3,174,878	12,782	-	-	3,162,096	(735,837)	47,775	2,474,035
10	33-120 Section 3	119,678	783	-	-	118,896	-	585	119,481
11	36-1002	118	1	-	-	117	-	0	117
12	36-9-09 JJ Abandonment	2,186	55	-	-	2,131	-	6	2,136
13	36-9-09 North Section 1	2,081	12	-	-	2,069	-	3	2,072
14	36-9-09 North Section 3	3,732	22	-	-	3,710	-	8	3,718
15	36-9-09 North Section 5A	2,498	65	-	-	2,434	-	3	2,436
16	36-9-09 North Section 7A & 7B	15,344	54	-	-	15,290	(834)	100	14,557
17	36-9-09 South	1,731	11	-	-	1,720	-	4	1,725
18	37-07	4,677	28	-	-	4,649	-	10	4,659
19	37-18-F	7,473,075	(23,064)	-	-	7,496,139	(2,857,050)	108,581	4,747,670
20	38-200	22,659	77	-	-	22,582	(3,537)	226	19,271
21	38-501	6,748	90	-	-	6,659	-	11	6,669
22	38-504	6,693	38	-	-	6,655	-	9	6,664
23	38-512	1,244,725	13,451	-	-	1,231,274	-	8,339	1,239,613
24	38-514	23,145	129	-	-	23,016	-	28	23,044
25	404 Sections 1,2,2A,3,3A,4&5,8A and 9	12,484,239	65,454	-	2,561	12,416,224	(5,917,595)	167,142	6,665,771
26	406 Section 3	2,221,613	15,811	-	-	2,205,802	(863,769)	34,635	1,376,668
27	41-17	153	1	-	-	152	-	0	152
28	44-137	16,145	169	-	-	15,976	-	27	16,003
29	44-687	9,635	55	-	-	9,581	-	14	9,595
30	44-720	9,162	53	-	-	9,110	-	15	9,125
31	Kern Wildlife Bundle	3,586	24	-	-	3,562	-	9	3,571
32	Valve - 2003 East	10	0	-	-	10	-	0	10
33	Valve - 4000 MP80.08	59	0	-	-	59	-	0	59
34	Valve - Indio	5,463	29	-	-	5,434	-	4	5,438
35	Valve - New Desert	5,477	81	-	-	5,396	-	8	5,404
36	Valve - Orange Enhancement	1,863	10	-	-	1,853	-	1	1,855
37	Valve - Questar	5,277	31	-	-	5,246	-	10	5,256
38									
39	**Descoped Projects:**								
40	2001 East	13,572	84	-	-	13,488	-	11	13,498
41	36-1006	605	45	-	-	560	-	0	560
42	44-719	1,130	27	-	-	1,103	-	1	1,104
43	MLV GT-NG 247	63,954	4,570	-	-	59,384	-	47	59,431
44	Valve 115	157,164	2,805	(0)	-	154,358	-	122	154,481
45	Valve Los Alamitos	249,515	711	-	-	248,804	-	197	249,001
46	Valve Goleta	134,369	2,165	-	-	132,204	-	105	132,309
47	Valve Lampson	17,808	554	1,566	-	15,689	-	12	15,701
48	Valve Quigley Station	107,768	2,110	-	-	105,657	-	84	105,741
49									
50	**Post Completion Adjustments:**								
51	PSEP SoCalGas Lease	6,112,448	121	-	-	6,112,326	(1,207,008)	68,934	4,974,252
52	Other	1,256,052	9,875	-	-	1,246,177	(451,376)	15,604	810,405
53									
54	**PSRMA PSEP Insurance**	1,656,295	-	-	-	1,656,295	(278,861)	32,103	1,409,538
55									
56	**Total PSEP O&M Costs**	**79,174,866**	**322,787**	**1,581**	**1,139,178**	**77,711,320**	**(33,364,045)**	**995,219**	**45,342,494**

[1] Per Decision (D.) 16-08-003.

Southern California Gas Company
PSEP Cost Recovery Application
PSEP Adjusted Capital Cost Basis

Line	Project Name	(a) Capital Costs Excluding AFUDC[1]	(b) AFUDC[2]	(c)=(a)+(b) Total Capital Costs	(d) Pension/ PBOPs[3]	(e) Other Exclusions[4]	(f) Disallowed Hydro-Testing Costs[5]	(g)=(c)-(d)-(e)-(f) Adjusted Capital Basis
1	**Completed Projects:**							
2	1004	6,815,522	83,298	6,898,820	10,824	244,951	-	6,643,045
3	2000-C	3,019,056	66,551	3,085,607	24,872	776,983	-	2,283,752
4	2000-West Santa Fe Springs Station	9,175,983	240,167	9,416,150	86,629	580,106	-	8,749,415
5	2001 West- B	686,232	-	686,232	2,196	54,723	-	629,312
6	2003 Section 2	487,965	-	487,965	1,656	177,119	-	309,190
7	30-18 Section 1 & 3	26,280,890	2,000,310	28,281,200	112,533	614	59,150	28,108,904
8	32-21 Section 1	766,274	316,543	1,082,817	19,299	5,397	-	1,058,121
9	32-21 Section 2	758,854	1,708	760,561	7,554	119,730	-	633,277
10	32-21 Section 3	679,199	3,496	682,696	4,305	49,789	-	628,602
11	33-120 Section 3	7,005,740	314,421	7,320,161	29,759	31,340	-	7,259,063
12	36-1002	2,019,879	15,494	2,035,373	6,661	37,423	-	1,991,290
13	36-9-09 JJ Abandonment	1,877,560	27,047	1,904,607	15,107	1,263,096	-	626,404
14	36-9-09 North Section 1	51,014,667	2,820,514	53,835,181	38,344	306,376	-	53,490,461
15	36-9-09 North Section 3	27,237,467	6,378	27,243,845	113,345	27,407	480,994	26,622,099
16	36-9-09 North Section 4A & 4B	14,160,245	985,087	15,145,332	76,402	246,829	-	14,822,101
17	36-9-09 North Section 5A	13,559,016	637,742	14,196,758	77,695	297,081	-	13,821,982
18	36-9-09 North Section 7A & 7B	37,316,630	412,625	37,729,254	129,531	1,191,480	-	36,408,243
19	36-9-09 South	2,330,119	8,504	2,338,622	20,745	2,216,668	-	101,209
20	37-07	29,582,382	1,700,658	31,283,040	16,552	26,348	-	31,240,140
21	37-18 Sections 1,2,3,4 & 5	53,631,098	4,422,601	58,053,699	(115,391)	1,082,403	-	57,086,686
22	37-18-F	82,366	487	82,853	641	-	-	82,212
23	38-200	8,204,076	334,889	8,538,965	59,031	205,444	-	8,274,489
24	38-501	22,053,055	285,536	22,338,591	133,575	468,913	-	21,736,103
25	38-504	5,605,234	108,397	5,713,631	32,290	46,040	-	5,635,301
26	38-512	30,142,008	747,260	30,889,268	34,437	110,994	-	30,743,837
27	38-514	14,616,217	134,981	14,751,198	137,705	155,512	-	14,457,981
28	38-931	7,282,073	184,718	7,466,791	48,303	268,292	-	7,150,196
29	404 Sections 1,2,2A,3,3A,4&5,8A and 9	13,714,640	133,022	13,847,661	82,923	885,353	8,052	12,871,334
30	406 Section 3	371,055	18,565	389,620	(1,765)	15,465	-	375,920
31	41-116	226,370	384	226,755	4,076	3,514	-	219,164
32	41-17	2,730,229	13,322	2,743,551	14,772	0	-	2,728,779
33	41-6000-2	82,499,549	2,357,832	84,857,381	46,527	0	-	84,810,854
34	43-121 North Section 1	15,403,825	586,683	15,990,508	97,145	181,753	-	15,711,609
35	43-121 South	32,870,543	2,973,822	35,844,365	107,319	39,490	-	35,697,556
36	44-137	26,490,168	1,114,558	27,604,726	80,055	63,796	-	27,460,875
37	44-687	5,650,675	240,865	5,891,540	23,021	58,550	-	5,809,969
38	44-720	10,798,612	182,381	10,980,992	17,227	114,474	-	10,849,292
39	85 South	9,860,626	19,206	9,879,832	21,625	556,142	-	9,302,065
40	Kern Wildlife Bundle	1,888,221	-	1,888,221	4,423	1,883,798	-	-
41	Valve - 1005 - Santa Barbara	500,351	16,049	516,400	5,353	(0)	-	511,048
42	Valve - 1014 Brea Enhancement	7,083,892	213,142	7,297,034	51,072	77,522	-	7,168,440
43	Valve - 1018 Dana Point	666,357	67,768	734,125	9,649	(195)	-	724,671
44	Valve - 1020	1,574,342	89,842	1,664,184	5,635	2,347	-	1,656,201
45	Valve - 2000 Beaumont Riverside	2,635,186	151,124	2,786,310	6,843	0	-	2,779,467
46	Valve - 2001 Riverside	2,335,202	143,420	2,478,621	14,786	1,749	-	2,462,085
47	Valve - 2001 West	1,461,196	83,786	1,544,982	9,276	(273)	-	1,535,979
48	Valve - 2003 East	4,268,942	167,365	4,436,307	5,111	34,674	-	4,396,522
49	Valve - 2003 West	3,783,646	146,314	3,929,959	32,492	(0)	-	3,897,467
50	Valve - 225	2,489,263	85,290	2,574,554	20,570	9,862	-	2,544,122
51	Valve - 235-335	3,758,195	135,446	3,893,642	16,225	16,791	-	3,860,625
52	Valve - 4000 Benson and 7th	1,531,504	80,548	1,612,051	12,769	(69,879)	-	1,669,161
53	Valve - 4000 MP 45.36	1,242,648	14,377	1,257,024	14,107	27,120	-	1,215,797
54	Valve - 4000 MP 53.00	1,333,851	35,897	1,369,749	2,905	19,360	-	1,347,484
55	Valve - 4000 MP 80.08	1,221,387	23,328	1,244,715	(1,694)	6,598	-	1,239,811
56	Valve - 4002 Fontana	1,236,430	22,798	1,259,228	10,648	112,378	-	1,136,202
57	Valve - 404 Ventura	4,347,717	298,635	4,646,352	32,812	10,360	-	4,603,179
58	Valve - 404-406 Ventura	964,248	9,390	973,638	12,201	1,921	-	959,516
59	Valve - 406 Ventura	3,697,272	204,789	3,902,061	23,341	1,133	-	3,877,587
60	Valve - 5000 Banning	2,350,646	58,898	2,409,544	19,030	0	-	2,390,513
61	Valve - 6916	2,725,255	62,564	2,787,819	25,675	25,589	-	2,736,556
62	Valve - 7000	1,700,344	142,726	1,843,070	12,941	(4,897)	-	1,835,026
63	Valve - Alhambra Station	3,468,702	118,974	3,587,677	7,723	33,781	-	3,546,173
64	Valve - Aviation and Boardwalk	7,282,538	114,761	7,397,299	23,928	102,997	-	7,270,374
65	Valve - El Segundo	7,257,884	230,274	7,488,159	59,199	94,215	-	7,334,744
66	Valve - Haynes Station	1,637,375	112,816	1,750,191	12,260	24,487	-	1,713,443
67	Valve - Honor Ranch	1,412,436	73,166	1,485,602	24,919	(1,251)	-	1,461,934
68	Valve - Indio	2,725,191	127,759	2,852,950	10,593	2,801	-	2,839,556
69	Valve - Lampson Station	8,861,877	770,460	9,632,337	26,508	160,864	-	9,444,964
70	Valve - New Desert	10,206,305	316,991	10,523,296	12,610	147,567	-	10,363,119
71	Valve - Newhall	14,752,510	1,133,474	15,885,984	33,863	2,321,048	-	13,531,074
72	Valve - Orange Enhancement	5,166,409	157,922	5,324,332	21,230	1,538	-	5,301,564
73	Valve - Questar	1,753,335	9,199	1,762,534	(30,177)	470	-	1,792,240
74	Valve - Rainbow	4,965,539	241,879	5,207,418	42,769	23,050	-	5,141,599
75	Valve - Sepulveda Station	1,005,341	32,601	1,037,941	13,497	2,175	-	1,022,270
76								
77	**Post Completion Adjustments**	51,817	96,368	148,184	2,261	444,490	-	(298,567)
78								
79	**PSRMA PSEP Insurance**	304,683	-	304,683	-	263	-	304,421
80								
81	**Total**	**702,654,136**	**29,290,191**	**731,944,326**	**2,224,881**	**17,424,050**	**548,196**	**711,747,199**

NOTES:

[1] Includes capitalized property taxes of approximately $3.4 million pursuant to SoCalGas capitalization policy.

[2] Capitalized Allowance for Funds Used During Construction (AFUDC) pursuant to SoCalGas' capitalization policy and based on Commission-approved formula prescribed in the FERC Code of Federal Regulations (CFR), Subchapter F, Part 201, Section 3.147.

[3] Pension and PBOP overheads are calculated based on direct labor costs and are excluded from the calculation of the revenue requirements as these costs are subject to separate balancing account treatment in SoCalGas' Pension and PBOP balancing accounts.

[4] Other Exclusions include certain non-incremental overheads such as warehousing costs and fleet; and cost of removal.

[5] Disallowed hydro-testing costs (i.e., where pressure test records do not exist) have been excluded from the calculation of the revenue requirements.

Southern California Gas Company

PSEP Cost Recovery Application

PSEP Capital Revenue Requirements (excluding FF&U) by Project

Line	Project Name	(a) Adjusted Capital Basis	(b) Capital-Related Costs Through April 2018	(c) Cost Recovery Through April 2018[1]	(d) Regulatory Interest Through April 2018	(e)=(b)+(c)+(d) Balance Through April 2018	Distribution	Local Transmission	Backbone Transmission
1	**Completed Projects:**								
2	1004	6,643,045	2,077,574	(449,069)	23,850	1,652,355	-	-	1,652,355
3	2000-C	2,283,752	265,379	(11,813)	1,818	255,383	-	24,983	230,401
4	2000-West Santa Fe Springs Station	8,749,415	1,388,462	(108,691)	11,830	1,291,600	396	125,601	1,165,603
5	2001 West- B	629,312	165,945	(23,717)	1,860	144,088	-	4,122	139,966
6	2003 Section 2	309,190	77,811	(9,676)	870	69,005	-	69,005	-
7	30-18 Section 1 & 3	28,108,904	7,329,297	(1,268,157)	81,504	6,142,644	6,142,644	-	-
8	32-21 Section 1	1,058,121	305,599	(61,854)	3,467	247,212	247,212	-	-
9	32-21 Section 2	633,277	123,834	(11,860)	1,232	113,205	113,205	-	-
10	32-21 Section 3	628,602	112,540	(10,001)	1,070	103,609	103,609	-	-
11	33-120 Section 3	7,259,063	753,830	(12,569)	4,468	745,729	745,729	-	-
12	36-1002	1,991,290	650,339	(155,805)	7,529	502,063	502,063	-	-
13	36-9-09 JJ Abandonment	626,404	135,392	(13,662)	1,409	123,139	123,139	-	-
14	36-9-09 North Section 1	53,490,461	12,094,675	(1,270,850)	131,472	10,955,297	10,955,297	-	-
15	36-9-09 North Section 3	26,622,099	8,049,404	(1,743,739)	92,120	6,397,785	6,397,785	-	-
16	36-9-09 North Section 4A & 4B	14,822,101	2,734,079	(469,693)	25,713	2,290,099	2,290,099	-	-
17	36-9-09 North Section 5A	13,821,982	2,065,981	(160,807)	17,903	1,923,077	1,923,077	-	-
18	36-9-09 North Section 7A & 7B	36,408,243	9,373,829	(1,694,822)	102,797	7,781,804	7,781,804	-	-
19	36-9-09 South	101,209	25,076	(3,326)	276	22,026	22,026	-	-
20	37-07	31,240,140	9,911,473	(2,247,982)	114,305	7,777,796	7,777,796	-	-
21	37-18 Sections 1,2,3,4 & 5	57,086,686	9,740,230	(820,996)	90,754	9,009,989	9,009,989	-	-
22	37-18-F	82,212	2,422	-	5	2,427	2,427	-	-
23	38-200	8,274,489	2,030,144	(251,223)	22,456	1,801,378	1,801,378	-	-
24	38-501	21,736,103	5,020,920	(746,908)	52,186	4,326,198	4,326,198	-	-
25	38-504	5,635,301	1,148,735	(111,485)	11,450	1,048,699	1,048,699	-	-
26	38-512	30,743,837	9,926,507	(2,305,870)	114,936	7,735,574	7,735,574	-	-
27	38-514	14,457,981	3,576,240	(443,218)	39,647	3,172,669	3,172,669	-	-
28	38-931	7,150,196	1,070,193	(77,633)	8,715	1,001,274	1,001,274	-	-
29	404 Sections 1,2,2A,3,3A,4&5,8A and 9	12,871,334	3,234,039	(510,143)	35,075	2,758,970	5	535,593	2,223,372
30	406 Section 3	375,920	92,894	(10,088)	1,037	83,843	-	11,453	72,390
31	41-116	219,164	12,707	(457)	71	12,321	12,321	-	-
32	41-17	2,728,779	484,459	(41,843)	4,392	447,009	447,009	-	-
33	41-6000-2	84,810,854	20,022,669	(2,303,573)	219,942	17,939,038	-	17,939,038	-
34	43-121 North Section 1	15,711,609	2,665,551	(217,874)	24,140	2,471,817	2,471,817	-	-
35	43-121 South	35,697,556	7,206,249	(694,411)	71,851	6,583,688	6,583,688	-	-
36	44-137	27,460,875	8,253,774	(1,712,925)	94,412	6,635,261	6,635,261	-	-
37	44-687	5,809,969	1,888,446	(440,936)	21,886	1,469,395	1,469,395	-	-
38	44-720	10,849,292	3,515,992	(829,083)	40,707	2,727,616	2,727,616	-	-
39	85 South	9,302,065	3,069,143	(736,532)	35,544	2,368,156	504,560	31,639	1,831,957
40	Kern Wildlife Bundle	-	-	-	-	-	-	-	-
41	Valve - 1005 - Santa Barbara	511,048	156,305	(32,820)	1,790	125,275	-	-	125,275
42	Valve - 1014 Brea Enhancement	7,168,440	1,528,425	(154,317)	15,891	1,389,999	297,989	947,478	144,533
43	Valve - 1018 Dana Point	724,671	52,260	(2,049)	316	50,527	-	50,390	137
44	Valve - 1020	1,656,201	379,564	(44,173)	4,116	339,506	-	254,792	84,714
45	Valve - 2000 Beaumont Riverside	2,779,467	645,115	(101,278)	6,823	550,660	-	100,744	449,916
46	Valve - 2001 Riverside	2,462,085	447,116	(56,736)	4,362	394,742	-	33,682	361,061
47	Valve - 2001 West	1,535,979	139,932	(2,746)	812	137,998	-	10,189	127,809
48	Valve - 2003 East	4,396,522	873,962	(124,769)	8,765	757,958	-	651,381	106,576
49	Valve - 2003 West	3,897,467	775,373	(84,802)	7,739	698,310	-	545,321	152,989
50	Valve - 225	2,544,122	370,636	(25,796)	3,063	347,903	-	48,344	299,560
51	Valve - 235-335	3,860,625	421,912	(19,812)	2,866	404,966	-	63,452	341,513
52	Valve - 4000 Benson and 7th	1,669,161	172,626	(7,548)	1,145	166,223	-	44,468	121,755
53	Valve - 4000 MP 45.36	1,215,797	255,675	(31,906)	2,473	226,242	-	32,309	193,934
54	Valve - 4000 MP 53.00	1,347,484	566,697	(130,721)	6,853	442,828	-	17,441	425,387
55	Valve - 4000 MP 80.08	1,239,811	425,626	(90,905)	4,949	339,670	-	15,533	324,137
56	Valve - 4002 Fontana	1,136,202	336,578	(69,505)	3,839	270,912	-	41,539	229,373
57	Valve - 404 Ventura	4,603,179	932,806	(90,969)	9,366	851,202	-	186,527	664,675
58	Valve - 404-406 Ventura	959,516	104,525	(4,550)	694	100,670	-	31,724	68,946
59	Valve - 406 Ventura	3,877,587	858,305	(92,580)	8,894	774,618	-	164,407	610,211
60	Valve - 5000 Banning	2,390,513	559,263	(85,091)	5,942	480,113	-	-	480,113
61	Valve - 6916	2,736,556	373,758	(22,644)	2,808	353,922	-	30,196	323,725
62	Valve - 7000	1,835,026	255,659	(18,898)	2,175	238,937	-	199,600	39,337
63	Valve - Alhambra Station	3,546,173	1,081,602	(228,522)	12,391	865,470	-	179,442	686,029
64	Valve - Aviation and Boardwalk	7,270,374	1,047,764	(43,384)	7,220	1,011,600	-	940,748	70,853
65	Valve - El Segundo	7,334,744	1,683,891	(242,478)	18,327	1,459,739	-	1,203,199	256,540
66	Valve - Haynes Station	1,713,443	162,780	(3,212)	961	160,529	-	94,166	66,362
67	Valve - Honor Ranch	1,461,934	183,519	(11,450)	1,451	173,520	-	899	172,621
68	Valve - Indio	2,839,556	834,640	(180,630)	9,559	663,569	-	204,683	458,886
69	Valve - Lampson Station	9,444,964	1,813,083	(168,312)	17,503	1,662,274	-	1,199,333	462,941
70	Valve - New Desert	10,363,119	3,133,000	(650,209)	35,875	2,518,666	-	248,252	2,270,414
71	Valve - Newhall	13,531,074	2,200,428	(190,873)	19,511	2,029,066	211,647	1,361,877	455,542
72	Valve - Orange Enhancement	5,301,564	1,584,922	(316,413)	18,171	1,286,681	-	852,300	434,381
73	Valve - Questar	1,792,240	898,211	(222,548)	11,305	686,968	-	68,068	618,900
74	Valve - Rainbow	5,141,599	646,938	(34,243)	4,676	617,370	-	164,952	452,417
75	Valve - Sepulveda Station	1,022,270	130,523	(7,392)	949	124,080	-	115,438	8,643
76									
77	**Post Completion Adjustments**	(298,567)	(7,609)	78	(90)	(7,621)	12,330	(17,628)	(2,323)
78									
79	**PSRMA PSEP Insurance**	304,421	167,248	(24,098)	2,666	145,816	2,034	14,388	129,394
80									
81	**Total**	**711,747,199**	**166,794,890**	**(25,601,597)**	**1,780,858**	**142,974,151**	**94,599,760**	**28,841,072**	**19,533,319**

NOTES:

Capital-related costs, or revenue requirements, are calculated on an aggregate basis by functional area for assets placed in service. The allocation of the capital-related costs to individual projects is based on the relative Adjusted Capital Basis of that project to the total Adjusted Capital Basis within that functional category.

[1] Per Decision (D.) 16-08-003.

Southern California Gas Company

PSEP Cost Recovery Application

Summary of Revenue Requirements (excluding FF&U)

(1,000$'s excluding FF&U)

O&M:	Total
Costs:	
Completed Projects	67,965
Descoped Projects	731
Post Completion Adjustments	7,359
PSRMA PSEP Insurance	1,656
Subtotal - Costs	77,711
Revenue - 50% Interim Recovery [1/]	(33,364)
Regulatory Account Interest [2/]	995
Subtotal O&M RR	45,342
Capital:	
Capital-Related Costs	
Completed Projects	166,635
Post Completion Adjustments	(8)
PSRMA PSEP Insurance	167
Subtotal - Capital Related Costs	166,795
Revenue - 50% Interim Recovery [1/]	(25,602)
Regulatory Account Interest [2/]	1,781
Subtotal - Capital Related RR	142,974
Total Revenue Requirement	188,317

Sums may not equal due to rounding.

[1] Per Decision (D.) 16-08-003.

[2] Regulatory account interest was calculated through April 2018 based on the costs requested in this proceeding as of April 2018.

San Diego Gas & Electric Company

PSEP Cost Recovery Application

PSEP O&M Revenue Requirements (excluding FF&U) by Project

Line	Project Name	PSEP Costs (Chapter III, IV)	Pension/ PBOPs	Other OH exclusions	Post-1955 Disallowances	Adjusted O&M Costs	Cost Recovery Through April 2018[1]	Regulatory Interest Through April 2018	Balance Through April 2018
		a	b	c	d	e = a-b-c-d	f	g	h = e+f+g
1	**Completed Projects:**								
2	49-11	2,612,727	4,180	1,338	556,341	2,050,868	(1,534,282)	34,591	551,177
3	49-13	4,569,189	3,120	1,070	40,008	4,524,990	(2,885,895)	62,344	1,701,439
4	49-15	27	-	27	-	-	-	-	-
5									
6	**Post Completion Adjustments:**								
7	PSEP SDG&E Lease	362,874	-	-	-	362,874	(94,064)	5,617	274,427
8									
9	**Total PSEP O&M Costs**	**7,544,817**	**7,301**	**2,435**	**596,349**	**6,938,732**	**(4,514,240)**	**102,551**	**2,527,043**

[1] Per Decision (D.) 16-08-003.

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PSEP Adjusted Capital Cost Basis

		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)	(g)=(c)-(d)-(e)-(f)							
Line	**Project Name**	**Capital Costs Excluding AFUDC[1]**	**AFUDC[2]**	**Total Capital Costs**	**Pension/ PBOPs**	**Other Exclusions[3]**	**Disallowed Hydro-Testing Costs[5]**	**Adjusted Capital Basis**	**Capital-Related Costs Through April 2018**	**Cost Recovery Through April 2018[6]**	**Regulatory Interest Through April 2018**	**Balance Through April 2018**	**Distribution**	**Transmission**
1	**Completed Projects:**													
2	49-11	4,464,915	296,634	4,761,549	18,653	2,689	11,956	4,728,252	1,285,979	(257,893)	14,900	1,042,986	1,042,986	-
3	49-13	18,758,478	251,390	19,009,868	16,044	1,539,227	5,612	17,448,985	3,870,827	(631,438)	42,191	3,281,580	3,281,580	-
4	49-15	42,234,754	1,254,013	43,488,767	26,067	166,107	-	43,296,594	7,645,917	(922,547)	78,560	6,801,930	6,801,930	-
5	49-28	43,981,513	3,008,529	46,990,042	68,500	230,979	-	46,690,564	9,716,162	(1,660,976)	102,347	8,157,533	8,157,533	-
6	Valve - 1600	635,837	70,784	706,621	2,102	2,570	-	701,949	74,319	(5,274)	598	69,642	-	69,642
7	Valve - 3010	259,159	16,378	275,538	213	9,132	-	266,194	22,711	(2,373)	170	20,508	-	20,508
8	Valve - 3600	5,130,366	164,415	5,294,781	5,332	17,367	-	5,272,082	1,040,770	(165,868)	11,196	886,098	-	886,098
9	Valve - 49-28	1,651,121	7,167	1,658,289	343	108,606	-	1,549,339	166,298	(13,593)	1,391	154,096	-	154,096
10														
11	**Post Completion Adjustments**	(114,765)	-	(114,765)	95	146	-	(115,006)	(13,896)	3,826	(155)	(10,225)	(10,225)	-
12														
13	Total	**117,001,379**	**5,069,311**	**122,070,690**	**137,349**	**2,076,822**	**17,568**	**119,838,952**	**23,809,087**	**(3,656,138)**	**251,199**	**20,404,149**	**19,273,805**	**1,130,344**

NOTES:

[1] Includes capitalized property taxes of approximately $868 thousand pursuant to SDG&E capitalization policy.

[2] Capitalized Allowance for Funds Used During Construction (AFUDC) pursuant to SDG&E capitalization policy and based on Commission-approved formula prescribed in the FERC Code of Federal Regulations (CFR), Subchapter F, Part 201, Section 3.147.

[3] Pension and PBOP overheads are calculated based on direct labor costs and are excluded from the calculation of the revenue requirements as these costs are subject to separate balancing account treatment in SDG&E's Pension and PBOP balancing accounts.

[4] Other Exclusions include certain non-incremental overheads such as warehousing costs and fleet; and cost of removal.

[5] Disallowed hydro-testing costs (i.e., where pressure test records do not exist) have been excluded from the calculation of the revenue requirements.

[6] Per Decision (D.) 16-08-003.

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PSEP Cost Recovery Application

Summary of Revenue Requirements (excluding FF&U)

(1,000$'s excluding FF&U)

O&M:	Total
Costs:	
Completed Projects	6,576
Post Completion Adjustments	363
Subtotal - Costs	6,939
Revenue - 50% Interim Recovery [1/]	(4,514)
Regulatory Account Interest [2/]	103
Subtotal O&M RR	2,527
Capital:	
Capital-Related Costs	
Completed Projects	23,823
Post Completion Adjustments	(14)
Subtotal - Capital Related Costs	23,809
Revenue - 50% Interim Recovery [1/]	(3,656)
Regulatory Account Interest [2/]	251
Subtotal - Capital Related RR	20,404
Total Revenue Requirement	22,931

Sums may not equal due to rounding.

[1] Per Decision (D.) 16-08-003.

[2] Regulatory account interest was calculated through April 2018 based on the costs requested in this proceeding as of April 2018.