Company: San Diego Gas and Electric Company (U 904 G)
Proceeding: 2028 General Rate Case
Application: A.26-06-XXX
Exhibit: SDGE-06-WP-S

REDACTED

SUPPLEMENTAL WORKPAPERS TO

PREPARED DIRECT TESTIMONY

OF DEVIN K. ZORNIZER

(GAS MAJOR PROJECTS)

ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

VOLUME 4 OF 6

JUNE 2026

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SDG&E PSEP Line 1600 Reasonableness Review Project Workpapers

I. LINE 1600 SECTION 1 RAINBOW REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 1 Rainbow Replacement Project that consists of replacement of 3.453 miles of previously existing pipeline with 3.755 miles of new pipeline along [redacted] in the County of San Diego. The Project also installed four new [redacted] valves, one rectifier station, and the installation of 3.755 miles of fiber optic cable and associated equipment. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $49,612,079.

The Line 1600 Section 1 Rainbow Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

[1] See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

[2] D.14-06-007 at 16-17.

[3] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

Final Report for Line 1600 Section 1 Rainbow Replacement Project

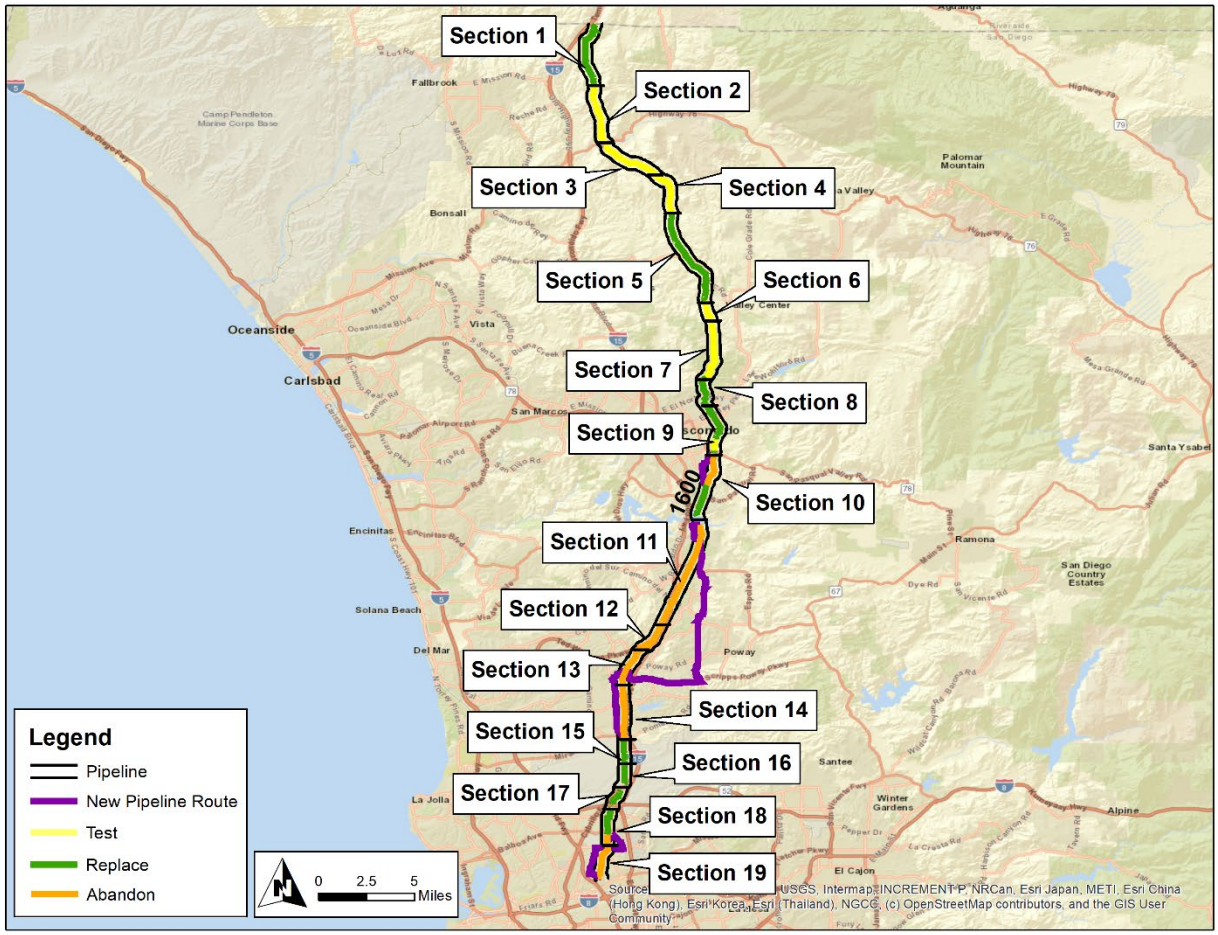
Table 1: General Project Information

Project Name	Section 1 Rainbow		
Project Type	Replacement		
Length	3.755 miles		
Location	San Diego County		
Class	1, 2, and 3		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[4]	[redacted]		
Construction Start	04/18/2022		
Construction Finish	01/23/2023		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[5]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	49,612,079	0	49,612,079

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



Final Report for Line 1600 Section 1 Rainbow Replacement Project

Figure 2: Satellite Image of Line 1600 Section 1 Rainbow Replacement Project

Final Report for Line 1600 Section 1 Rainbow Replacement Project

Figure 3: Overview Map of Line 1600 Section 1 Rainbow Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	3.020 mi.	0.441 mi.	0.014 mi.	0.280 mi.	3.755 mi.
	15,946 ft.	2,328 ft.	74 ft.	1,478 ft.	19,826 ft.

SDG&E provided the Line 1600 Test or Replacement Plan[9] to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 1 Rainbow segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 1 Rainbow segment of Line

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[8] Values may not add to total due to rounding.
[9] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

1600 as the most prudent option. During the Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced 3.453 miles of previously existing pipeline by installing approximately 3.755 miles of new pipeline along [redacted].
   b. The Project Team installed 3.755 miles of fiber optic cable and associated equipment, including an Optical Pipeline Monitoring (OPM) station, which oversees and communicates to Gas Control leak detection, early threat warning and continuously monitors for right-of-way intrusion, such as unanticipated third party digging.
   c. The Project Team installed four new [redacted] valves and one rectifier station.
   d. Incidental and accelerated mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consists of the replacement of 3.453 miles of previously existing pipeline with 3.755 miles of new pipeline as well as the installation of four [redacted] valves, one rectifier station, and 3.755 miles of fiber optic cable and associated equipment. The Accelerated and Incidental mileages consist of 0.441 miles and 0.014 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that

influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability was not compromised and the reliability of service that customers received from the previous pipeline is maintained. The new pipeline alignment was designed to avoid private property and stay within existing franchise right of way (ROW).
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the existing line could be shut-in during installation of the new pipeline.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project required backfeed operations with the use of CNG to reduce outages during the installation and tie-over of the new pipeline. In support of electric grid reliability, shut-ins and tie-ins had to be carefully coordinated so as to minimize curtailments to important local electric generating plants supplied by Line 1600.
4. Community Impact: Traffic impacts and occasional noise.
5. Substructures: The Project Team identified multiple utilities prior to construction and included them in the Project design.
6. Permit Conditions:
   a. The Project Team obtained an encroachment permit and traffic control approval from the County of San Diego.
   b. The Project Team obtained an encroachment permit from the County of Riverside to place traffic control signage.
7. Land Use: No identified issues.
8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
   b. The Project Team identified the need for cultural resource and paleontological monitoring.

c. The Project Team required a Storm Water Pollution Prevention Plan (SWPPP).

9. Valves: The Project Team installed four new [redacted] valves with the new pipeline to provide functionality and to facilitate operability of future Line 1600 Projects.
   a. Three of the valves were installed to bridle Rainbow Compressor Station piping and instrumentation.
   b. One valve was installed to allow the customers fed off the Rainbow section to stay in service while the Rice Canyon Hydrotest (adjacent section) was being conducted.
10. Constructability: The Project Team utilized trenchless installation methods to cross a water feature for a segment of the pipeline replacement.

C. Scope Changes

Through engineering, design, and planning activities, 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 originally planned to install a back-tie to maintain service capability, but it was determined to be unnecessary due to existing feed connections to another nearby pipeline.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $20,977,341.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	04/18/2022
Construction Completion Date	01/23/2023
NOP Date	11/17/2022

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $1,541,000 in change orders.

1. Site Conditions: The Construction Contractor encountered more rock than expected during excavation on [redacted], leading to additional costs from equipment, labor, and schedule delay.
2. Design Changes: The Project Team made updates to accommodate existing line seasoning sampling and injection system. This required ordering new materials and additional construction costs.

Figure 4: Horizontal Directional Drill Pipe Installation on [redacted]

Figure 5: Exit Pit for Horizontal Directional Drill Installation

Figure 6: Excavation of Rock on [redacted]

Figure 7: Excavation of Rock on [redacted]

Figure 8: Excavation of Rock on [redacted]

D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, Optical Pipeline Monitoring (OPM)/ automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include completion of secondary odorant drip system into new Line 1600 and final demolition of existing valves and above ground pipe manifold at the former Rainbow Compressor Station as well as final pave/restoration for tie-overs to existing Regulator Stations at [redacted], completion of deep well anode and rectifier scope near the Fire Station on [redacted], final pavement grind and cap paving of [redacted]. Additional work includes completion of all punch list items in coordination with county inspectors for county permit closeout. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, access bridge, and restoration at the laydown yards.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: The Project Team ordered [redacted] pipe in bulk, providing volume pricing.
2. Schedule Coordination: The Project Team coordinated with the County of San Diego Water Quality Improvement Project to prevent prolonged traffic disturbance on [redacted] and reduce the amount of pavement restoration in the area.
3. Future Maintenance: The Project Team installed a manual MLV to be used for isolation, cross compression, and blowdown activities on future Line 1600 Projects, allowing for minimized customer outages.
4. Construction Execution: The Project Team coordinated with various stakeholders to maintain flow within Line 1600 by utilizing CNG to support customers within the Rainbow section of pipeline. Timing of the overall project was coordinated to avoid full curtailments of important electrical generators during the Project, benefiting customers. Prudent project management and intentional timing of construction avoided potential substantial costs through sourcing gas via the Otay Mesa receipt point.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $35,595,795. 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.

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 $49,612,079.

Table 4: Estimated and Actual Direct Costs and Variances[10]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,050,111	1,395,294	(654,817)
Materials	3,441,665	2,170,144	(1,271,521)
Mechanical Construction Contractor	22,446,144	27,822,894	5,376,750
Electrical Contractor	0	3,781	3,781
Construction Management & Support	2,648,747	3,063,200	414,453
Environmental	1,600,286	1,385,687	(214,599)
Engineering & Design	2,978,591	3,294,806	316,215
Project Management & Services	2,702,261	3,491,778	789,517
ROW & Permits	755,376	773,555	18,179
Total Direct Costs	38,623,180	43,031,629	4,777,958

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[11]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	2,939,267	2,987,147	47,880
AFUDC	3,032,170	2,745,917	(286,253)
Property Taxes	486,247	477,876	(8,370)
Total Indirect Costs	6,457,684	6,210,941	(246,743)
Total Direct Costs	38,623,180	43,401,138	3,375,222
Total Loaded Costs	45,080,864	49,612,079	4,531,215

The Actual Full-Time Equivalents[12] (FTEs) for this Project are 1.58.

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

D. Cost Impacts

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

At the completion of the Line 1600 Section 1 Rainbow Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs exceeded the preliminary estimate by $4,777,958. This variance can be attributed to several factors including: there was a design change in construction methodology that required an HDD under a drainage channel in order to resolve a conflict with a County construction drainage project and environmental concerns; the Project Team encountered significantly more rock than expected along [redacted] adding about $1,042,000 in costs and extending the Project's construction duration; and additional contractor support costs totaling approximately $1,189,000 were due to material hauling, extensive yard set up and restoration, fabrication of six new test heads for use on this project and future Line 1600 projects. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for Line 1600 Section 1 Rainbow Replacement Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 1 Rainbow Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[13]. Through this Replacement Project, SDG&E successfully replaced 3.453 miles of previously existing pipeline with 3.755 miles of new pipeline and installed fiber optic cabling, four [redacted] valves, and one rectifier station in the County of San Diego. The total loaded cost of the Project is $49,612,079.

SDG&E executed this project prudently by rerouting the new pipeline to allow for more efficient construction while avoiding major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered materials, working to reduce traffic and paving impacts in the County of San Diego, and coordinating with other SDG&E projects for future isolation requirements.

End of Line 1600 Section 1 Rainbow Replacement Project Final Report

[13] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

I. LINE 1600 SECTION 2 RICE CANYON HYDROTEST PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 2 Rice Canyon Hydrotest Project that consists of the hydrotest of 3.166 miles of pipeline along [redacted] from just north of [redacted] to just [redacted]. The Project also included 20 pipeline retrofit locations totaling 0.194 miles of new pipeline within this segment, as well as the tie-over of regulator stations and the installation of approximately 696 feet of associated gas transmission pipeline. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $15,739,507.

The Line 1600 Section 2 Rice Canyon Hydrotest Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing [1]. However, pursuant to Commission direction [2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan [3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

Final Report for Line 1600 Section 2 Rice Canyon Hydrotest Project

Table 1: General Project Information

Project Name	Section 2 Rice Canyon		
Project Type	Hydrotest		
Length	3.360 miles		
Location	San Diego County		
Class	1 and 2		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage [4]	[redacted]		
Construction Start	01/08/2024		
Construction Finish	07/31/2024		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS	[redacted]		
New SMYS [5]	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	10,726,140	4,832,408	15,739,507

[4] Predominate pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

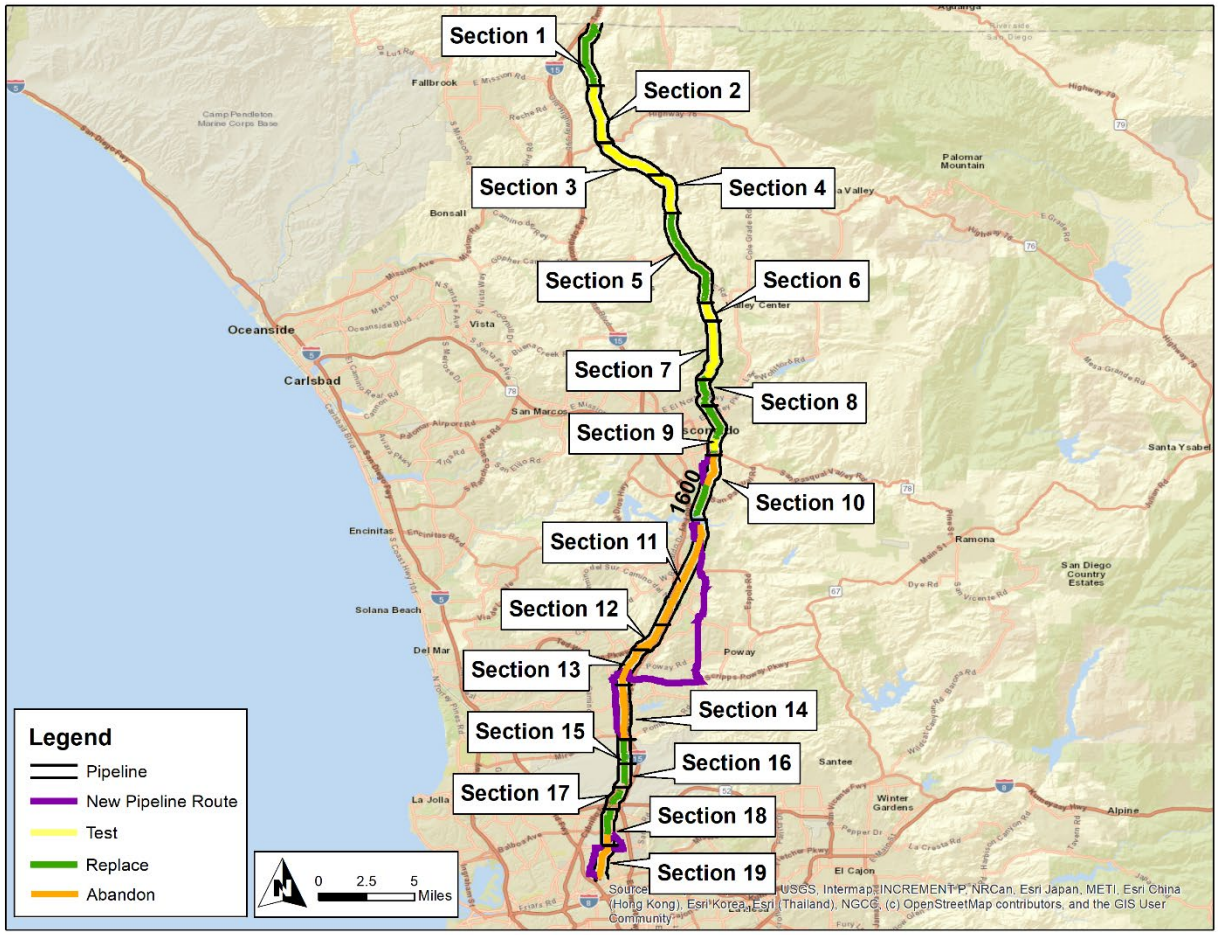


Figure 2: Satellite Image of Line 1600 Section 2 Rice Canyon Project

Figure 3: Overview Map of Line 1600 Section 2 Rice Canyon Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information [6]

	Accelerated [7]	Incidental	New	Total [8]
Final Mileage	3.188 mi.	0.048 mi.	0.123 mi.	3.360 mi.
	16,833 ft.	253 ft.	649 ft.	17,741 ft.

SDG&E provided the Line 1600 Test or Replacement Plan [9] to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E hydrotested the Section 2 Rice Canyon segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined hydrotesting the Section 2 Rice Canyon segment of Line 1600 as the most prudent option. During the Engineering, Design, and

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[8] Values may not add to total due to rounding.

[9] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team hydrotested 3.166 miles of pipeline along [redacted] from just north of [redacted] to just [redacted].
   b. The Project Team included 20 pipeline retrofit locations in order to improve the piggability of the line, mitigate integrity threats, and/or to improve pipeline accessibility. Some of these locations required minimal pipeline replacements resulting in approximately 0.194 miles of new pipeline installed. Retrofit and replacement locations installed [redacted] pipeline and fittings.
   c. The Project Team installed and tested 696 feet of associated gas transmission pipeline via open trench and jack and bore activities to ensure that system reliability was not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained.
   d. The Project Team included the tie-over of four regulation stations within this segment to maintain supply to existing downstream customers.
2. Final Project Scope: The final project scope consists of the hydrotest of 3.166 miles of pipeline, 20 pipeline retrofit locations totaling approximately 0.194 miles of new pipeline within this segment, as well as the tie-over of regulator stations and the installation of 696 feet of associated gas transmission pipeline. The Accelerated and Incidental mileage consists of 3.188 miles and 0.048 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that

influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in for retrofit and hydrotest activities provided an alternative source of feed was established for downstream customers. Due to capacity and reliability constraints, the Project Team determined isolation of this segment was limited to a four-week period between May and June of 2024 when energy demands are lower.
2. Customer Impact: Per the gas transmission and distribution system analyses, the Project required the following:
   a. Partial curtailment of four electric generators during isolation of the pipeline that required significant upfront coordination to mitigate potential impacts.
   b. CNG support for regulator stations and downstream customers during retrofit and hydrotest activities.
   c. Installation of 696 feet of associated gas transmission pipeline and mainline valve bridle assembly. These installations were required to ensure system reliability was not compromised and the existing reliability of service that customers received from the pipeline was maintained.
3. Community Impact: The Project had local community impact adjacent to the construction locations because the test end sites and retrofit locations were predominantly in a rural area that required minimal traffic control. The Project Team mitigated community impacts by managing traffic effectively during construction, and by proactively notifying nearby residents of the Project scope and schedules.
4. Schedule Coordination: The Project Team executed this Project in conjunction with Line 1600 Section 3 Couser Canyon North Hydrotest Project and Line 1600 Section 4 Couser Canyon South Hydrotest Project to allow for efficiencies. The Project Team also coordinated with other SDG&E projects to increase construction efficiencies and to ensure project activities did not materially impact the system or result in customer outages.

5. Substructures: The Project Team researched existing records and performed survey that identified there were no notable substructures within the Project scope.
6. Permit Conditions:
   a. The Project Team obtained excavation permits and a traffic control permit from the County of San Diego.
   b. The Project Team obtained encroachment and traffic control permits (TCP) from Caltrans. This included an Excavation Encroachment Policy Exception (EPE) that allowed the installation of un-encased pipeline within Caltrans ROW via jack and bore as well as open trench. The Project Team coordinated and negotiated extensively with Caltrans throughout a 12-month process.
7. Land Use:
   a. The Project Team obtained temporary right of entry (TRE) agreements from multiple private landowners to access land for workspaces and a laydown area.
   b. The Project Team obtained a new Easement Acquisition Agreement including temporary rights of entry (TRE) with a private property owner for pipeline installed [redacted].
8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations
   b. The Project required biological monitoring during construction.
   c. The Project Team obtained a California Department of Fish and Wildlife (CDFW) Streambed Alteration agreement.
   d. The Project Team obtained water quality permits from the State Water Resources Control Board.
   e. The Project Team obtained a permit from the United States Army Corps of Engineers (USACE).
9. Constructability:
   a. The Project Team identified two span supports requiring temporary support structures during hydrotest activities.

b. Due to the limited isolation window identified during analysis of the pipeline system, the Project Team efficiently coordinated with various stakeholders to execute all construction activities in an efficient and exceptionally expedited manner.

10. Retrofits: The Project Team planned and prepared for 20 pipeline retrofits within this segment to improve the piggability of the pipeline, mitigate integrity threats, and/or improve pipeline accessibility. Some of these locations required minimal pipeline replacements resulting in approximately 0.194 miles new pipeline installed. Retrofit and replacement locations installed [redacted] pipeline and fittings. Through these retrofits, SDG&E adhered to industry standards while also improving accessibility of the pipeline required for ongoing maintenance and/or emergency response.

C. Scope Changes

Through engineering, design, and planning activities, SDG&E determined that changes in scope were appropriate for safety and constructability of the Project and to address engineering and field 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. Scope Decrease: The original Line 1600 Section 2 Rice Canyon Hydrotest Project scope included two retrofit locations that were ultimately removed from the scope.
2. Scope Increase: One month prior to construction mobilization, the Project Team identified an existing segment of Line 1600 that was located within a drainage ditch. It was determined that pipeline at this location required replacement and relocation to increase pipeline accessibility, to obtain an appropriate depth of cover, and to remove risk associated with mechanical damage during drainage ditch maintenance. This was incorporated into the scope of the project as a required retrofit.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $6,653,184.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

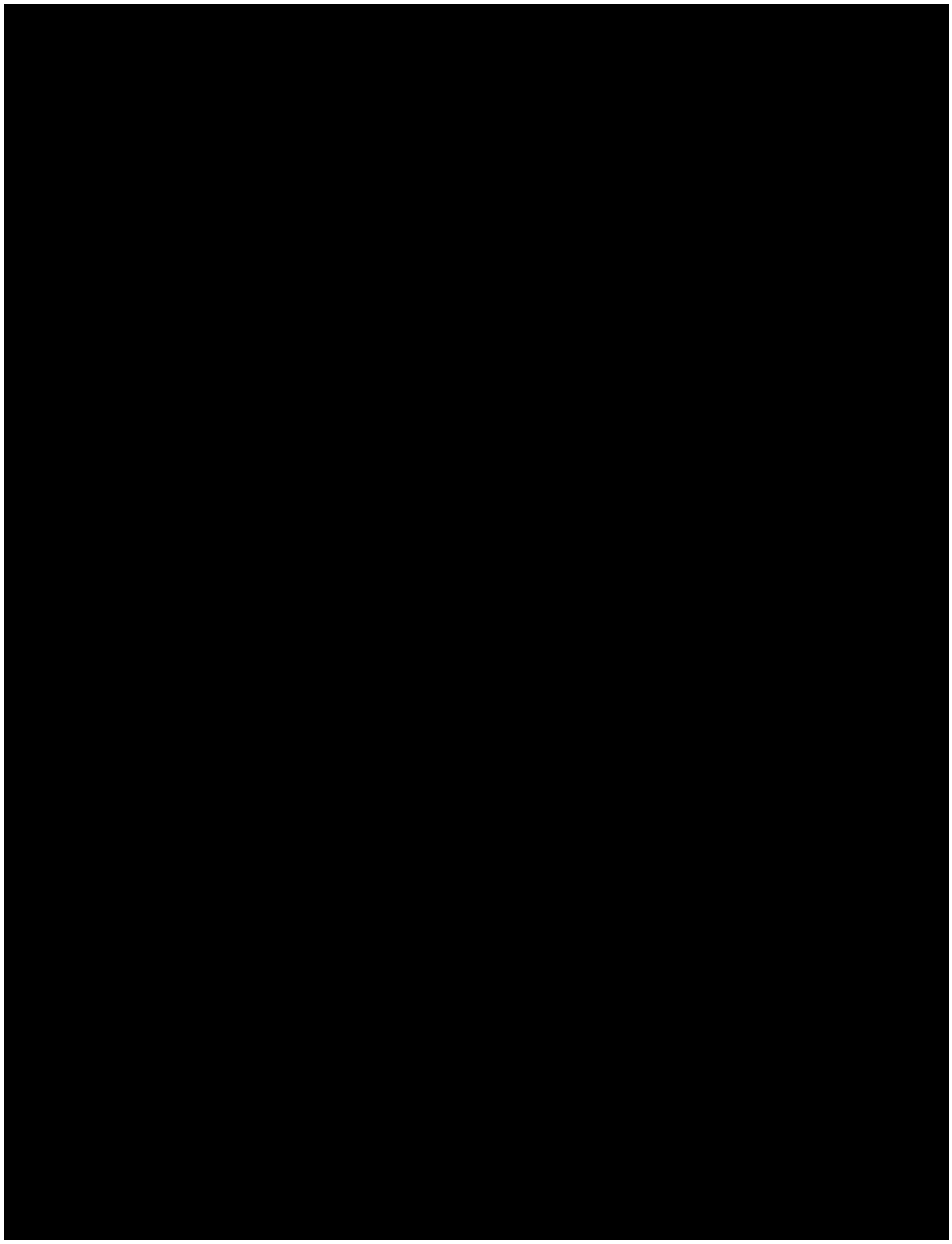
Construction Start Date	01/08/2024
Construction Completion Date	07/31/2024
NOP Date	06/11/2024

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $1,800,000 in change orders.

1. Construction Method: The Project required a relocation of a 689 foot previously existing segment of Line 1600 that was located within a drainage ditch. The previously existing pipeline was abandoned in place per Company standards and new pipeline was rerouted within the paved portion of [redacted].
2. Field Design Changes: The Project required extended excavations in order to locate pipe suitable for welding, free of laminations and porosity defects that are common with the 1949-vintage electric flash welded pipe.

Figure 4: Shallow Pipe Relocation onto Paved Portion of [redacted]



Final Report for Line 1600 Section 2 Rice Canyon Hydrotest Project

Figure 5: Retrofit Location and USACE Stream Diversion

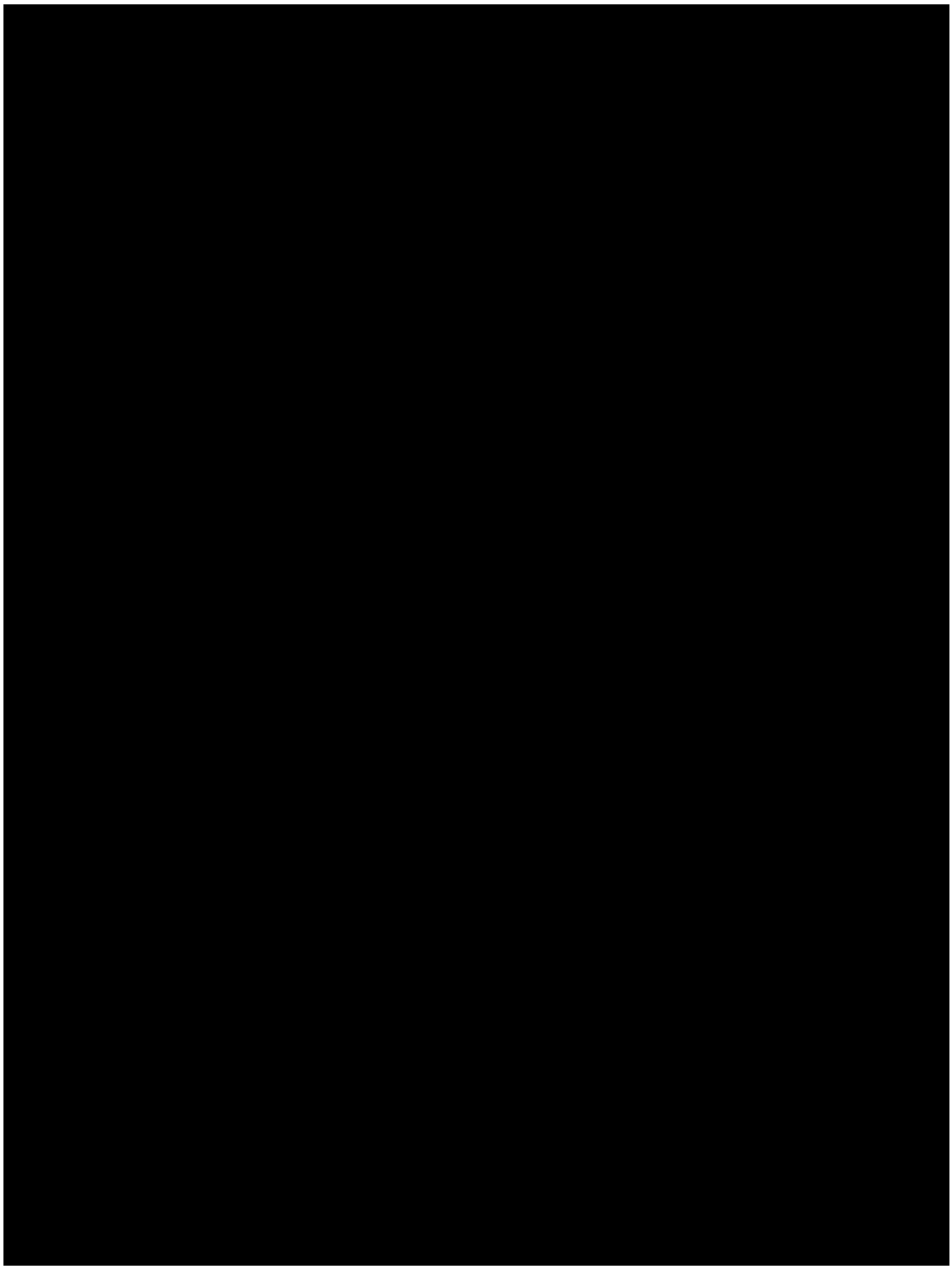
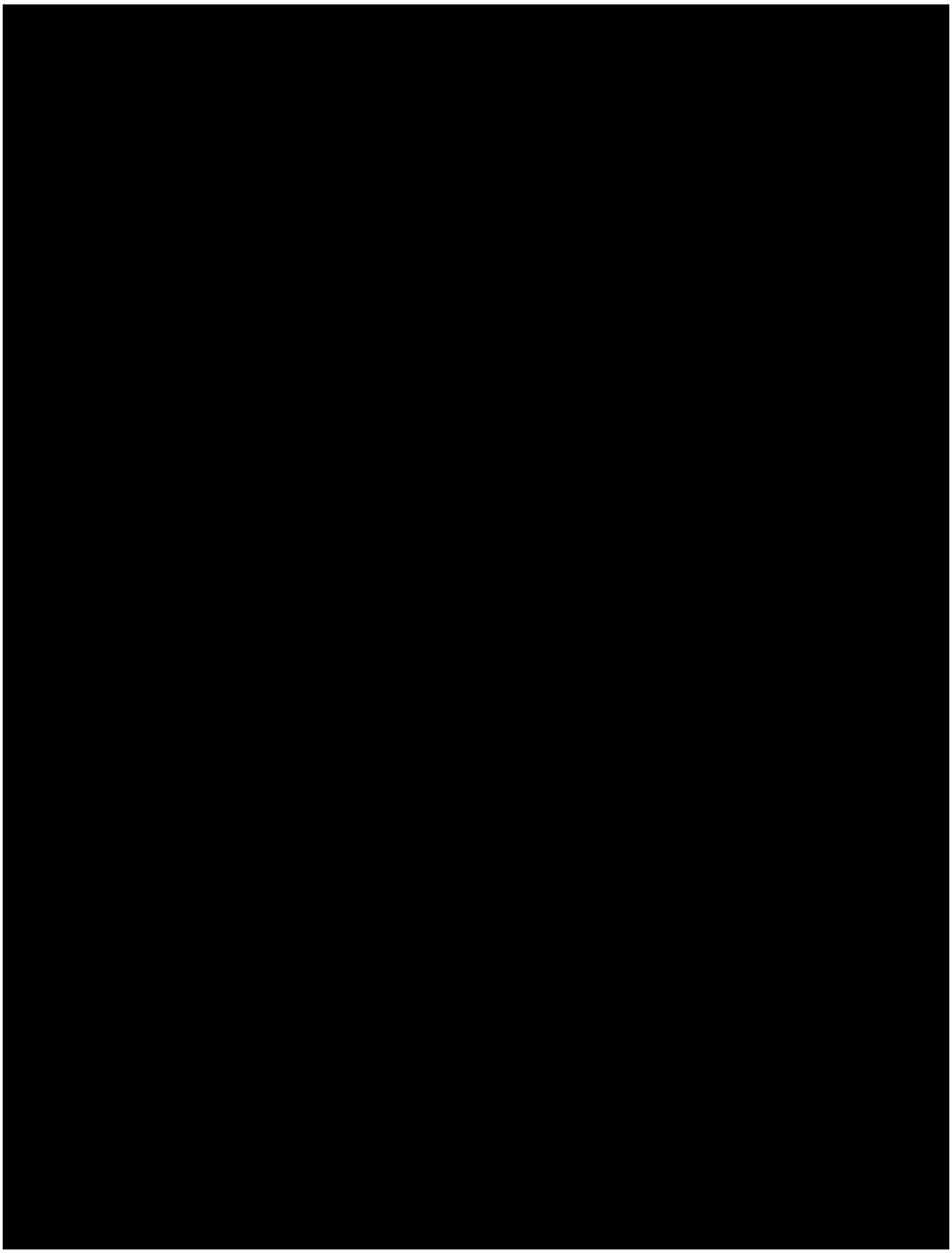


Figure 6: Bridle Valve Automation



Final Report for Line 1600 Section 2 Rice Canyon Hydrotest Project

Figure 7: Crane Usage for Pipe Lowering at Jack and Bore Location

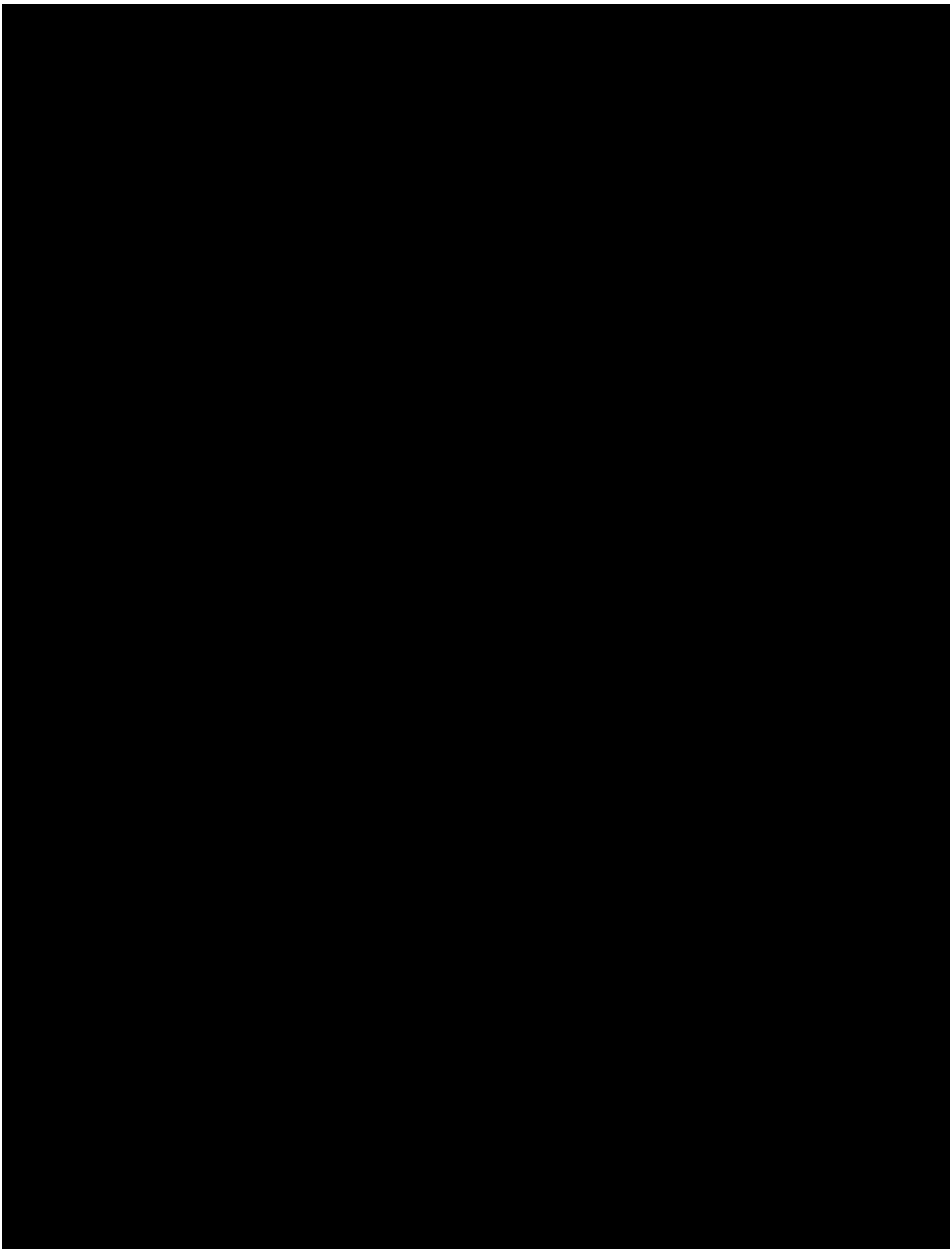


Figure 8: Jack and Bore Launching Pit

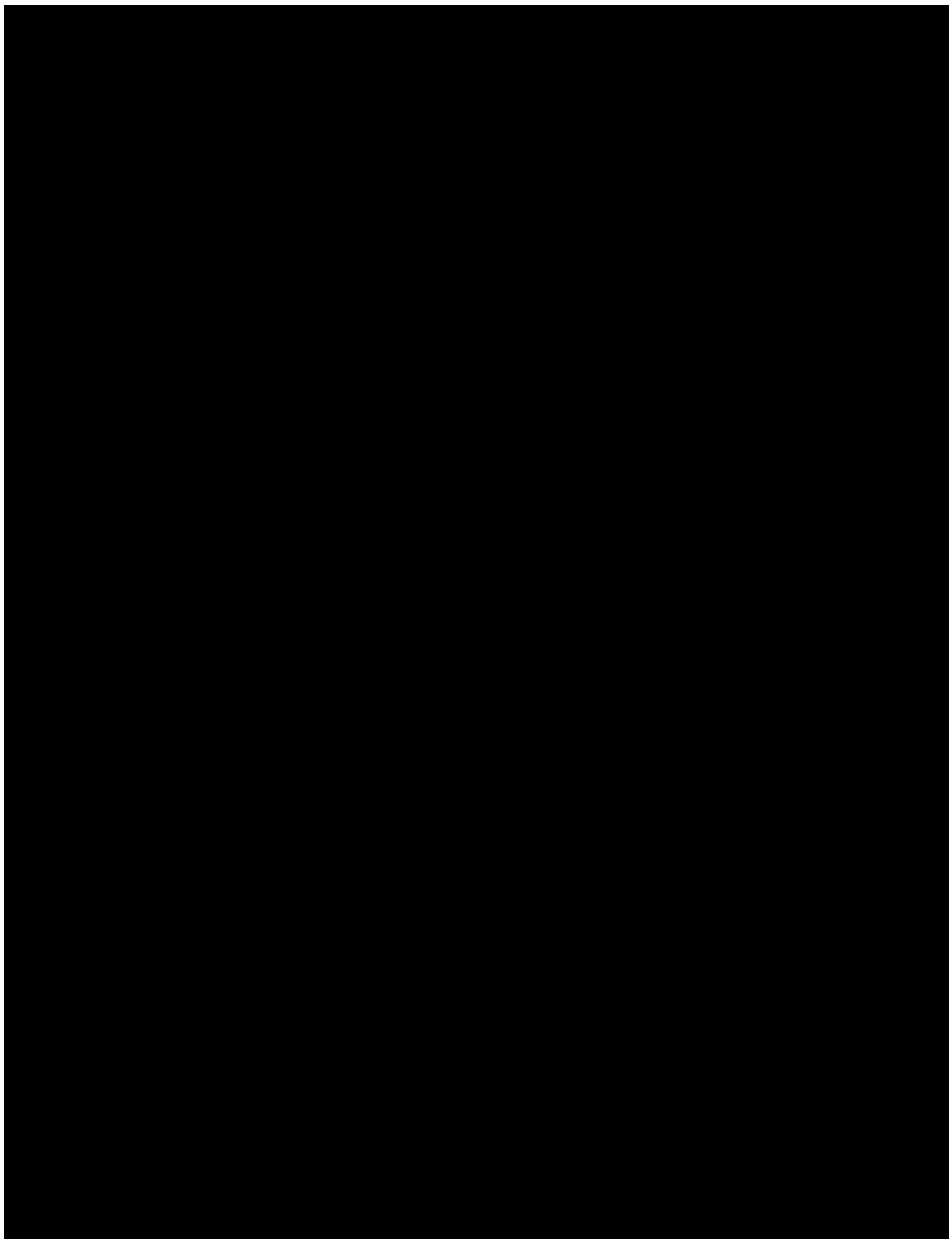
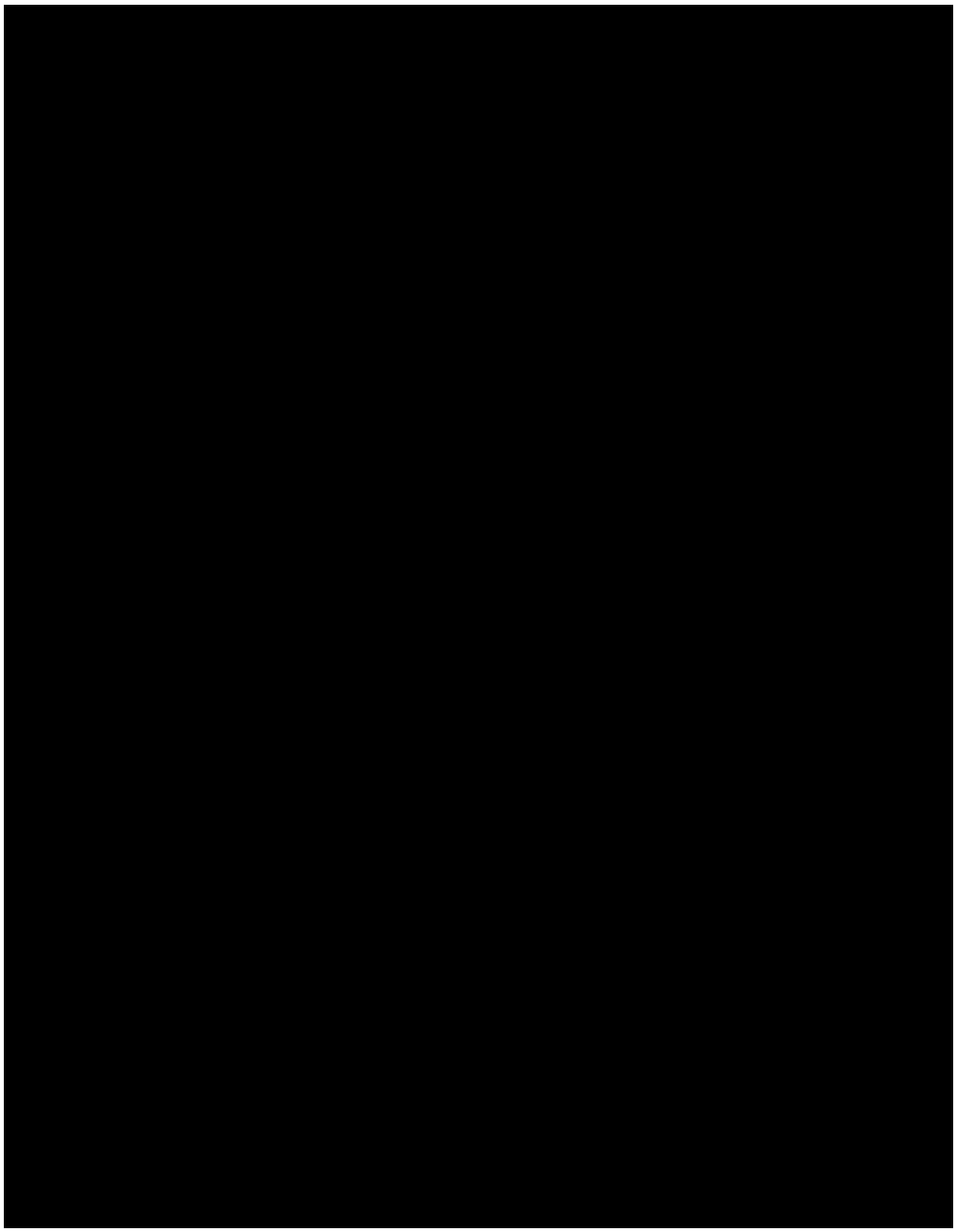


Figure 9: PCF Plugging Equipment



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include asphalt and road restoration for the replacement and bypass installation near the intersection of [redacted] and [redacted], restoration at the north tie in, and final paving and surface restoration associated with the tie over to existing regulator stations and pipeline cutouts within county roadways including [redacted]. Additional work includes completion of all punch list items in coordination with Caltrans inspectors for permit closeout, as well as follow up items required by county inspectors for county permit closeout. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines and restoration including gravel removal and hydroseeding at two laydown yards, one of which was near the [redacted] and one of which was a Caltrans property on [redacted], which were shared with Couser Canyon North and Couser Canyon South projects.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Construction Execution:
   a. The Project Team diligently released for bid and executed this Project in conjunction with other Line 1600 Hydrotest Projects. This resulted in various efficiencies including utilizing the same Construction Contractor, optimizing the bidding process as well as reducing overall mobilization and construction costs. Since various pricing scenarios for the three projects was requested together, the Project Team was able to optimize pricing options for each project.
   b. The Project Team identified and incorporated various construction efficiencies by completing this Project in conjunction with adjacent Line 1600 Hydrotest Projects. Efficiencies included utilizing the same construction management team, survey crews, and environmental monitoring personnel.
   c. The Project Team coordinated with various stakeholders to maintain flow within Line 1600 by incorporating partial curtailments and utilizing CNG instead of purchasing gas externally.
2. Land Use: The Project shared the same laydown yard with two neighboring Line 1600 Projects, reducing overall cost for the Project.
3. Water Management:
   a. The Project Team coordinated this hydrotest with the neighboring combined hydrotests for Line 1600 Section 3 Couser Canyon North and Section 4 Couser Canyon South Projects to optimize a shared water tank location and share costs for rental of water tanks and equipment.

b. This Project Team reused water from the previous combined hydrotest for Line 1600 Section 3 Couser Canyon North Hydrotest and Line 1600 Section 4 Couser Canyon South Hydrotest Projects.

4. Materials: The Project Team ordered [redacted] pipe in bulk, providing volume pricing.
5. Schedule Coordination: In coordination with two adjacent projects, the Project Team switched the initial isolation window for this Project to avoid additional costs and potential system impacts.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $16,137,078. 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.

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 $15,739,507.

Table 4: Estimated and Actual Direct Costs and Variances [10]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	1,480,108	959,009	(521,099)
Materials	432,214	772,234	340,021
Construction Contractor	6,653,184	5,328,320	(1,324,864)
Construction Management & Support	759,900	1,638,668	878,768
Environmental	1,675,563	940,455	(735,108)
Engineering & Design	528,819	131,066	(397,753)
Project Management & Services	3,859,905	3,768,400	(91,505)
ROW & Permits	747,387	327,479	(419,907)
Total Direct Costs	16,137,078	13,865,631	(2,271,447)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances [11]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	2,357,015	1,638,059	(718,956)
AFUDC	229,044	201,626	(27,418)
Property Taxes	36,532	34,191	(2,341)
Total Indirect Costs	2,622,591	1,873,876	(748,715)
Total Direct Costs	16,137,078	13,865,631	(2,271,447)
Total Loaded Costs	18,759,669	15,739,507	(3,020,162)

The Actual Full-Time Equivalents [12] (FTEs) for this Project are 1.58.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 2 Rice Canyon Hydrotest, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $2,271,447. This variance can be attributed to several factors including: coordination with the Line 1600 Section 3 Couser Canyon North and Section 4 Couser Canyon South Projects allowed for shared efforts and reduced costs for construction contractor, project management, environmental monitoring, and laydown yard acquisition. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for Line 1600 Section 2 Rice Canyon Hydrotest Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 2 Rice Canyon Hydrotest Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan [13]. Through this Hydrotest Project, SDG&E successfully hydrotested 3.166 miles of pipeline, completed 20 pipeline retrofits totaling 0.194 miles of new pipeline within this segment, tied-over existing regulator stations and installed 696 feet of associated gas transmission pipeline. The total loaded cost of the Project is $15,739,507.

SDG&E executed this project prudently through the use of CNG and the installation of associated gas transmission pipeline that avoided major customer and community impacts during the Project.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, bidding out and executing various activities for this Project simultaneously or in conjunction with adjacent projects to reduce construction costs, optimizing construction activities to increase efficiencies and reduce project costs, where applicable.

End of Line 1600 Section 2 Rice Canyon Hydrotest Project Final Report

[13] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

I. LINE 1600 SECTION 3 COUSER CANYON NORTH HYDROTEST PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 3 Couser Canyon North Hydrotest Project that consists of the hydrotest of 2.290 miles of previously existing pipeline primarily along [redacted] from just [redacted] to the intersection of [redacted] and [redacted]. The Project also included 16 pipeline retrofit locations totaling 0.398 miles of new pipeline within this segment, as well as the tie-over of regulator stations within the segment. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $12,525,175.

The Line 1600 Section 3 Couser Canyon North Hydrotest Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	Section 3 Couser Canyon North		
Project Type	Hydrotest		
Length	2.688 miles		
Location	San Diego County		
Class	1 and 2		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[4]	[redacted]		
Construction Start	01/23/2024		
Construction Finish	07/26/2024		
Nominal Pipe Diameter	[redacted]		
Original Pipe Diameter	[redacted]		
Original SMYS	[redacted]		
New SMYS[5]	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	8,013,238	4,511,937	12,525,175

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

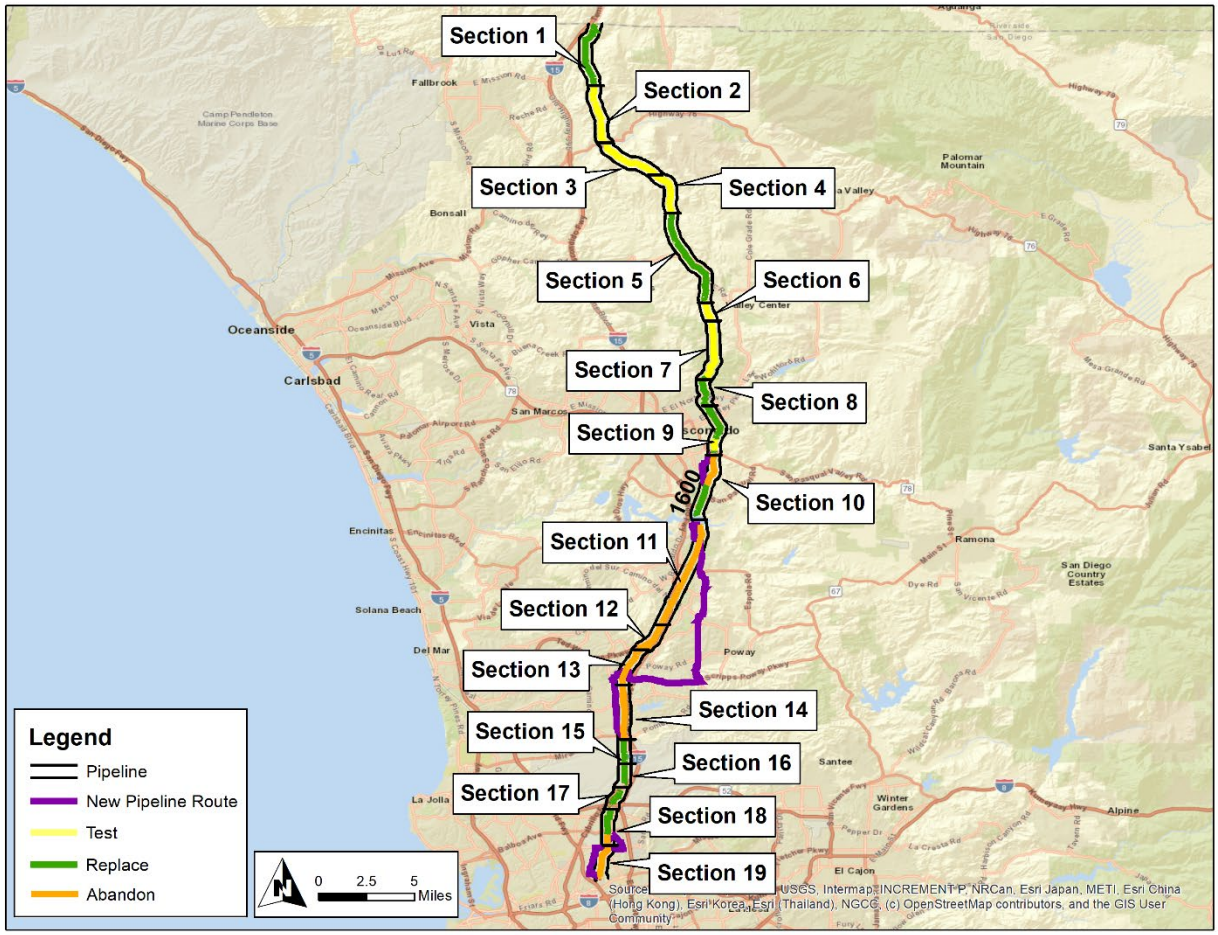


Figure 2: Satellite Image of Line 1600 Section 3 Couser Canyon North Hydrotest Project

Final Report for Line 1600 Section 3 Couser Canyon North Hydrotest Project

Figure 3: Overview Map of Line 1600 Section 3 Couser Canyon North Hydrotest Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	2.535 mi.	0.122 mi.	0.032 mi.	2.688 mi.
	13,385 ft.	644 ft.	169 ft.	14,193 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E hydrotested the Section 3 Couser Canyon North segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined hydrotesting the Section 3 Couser Canyon North segment of Line 1600 as the most prudent option. During the

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[8] Values may not add to total due to rounding.

Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team hydrotested 2.290 miles of previously existing pipeline primarily along [redacted] from just [redacted] to the intersection of [redacted] and [redacted].
   b. The Project Team included 16 pipeline retrofit locations in order to increase the piggability of the line, mitigate integrity threats, and/or to improve pipeline accessibility. Some of these locations required minimal pipeline replacements resulting in approximately 0.398 miles of new pipeline installed. Retrofit and replacement locations installed [redacted] pipeline and fittings.
   c. The Project Team included the tie-over of four regulator stations within this segment. These were completed in a way that ensured system reliability was not compromised and the existing reliability of service that customers received from the previously existing pipeline was maintained.
   d. The Project Team hydrotested the newly retrofitted [redacted] pipeline in conjunction with the Line 1600 Section 4 Couser Canyon South Hydrotest Project.
2. Final Project Scope: The final project scope consists of the hydrotest of 2.290 miles of previously existing pipeline, 16 pipeline retrofit locations totaling 0.398 miles of new pipeline, as well as the tie-over of regulator stations within this segment. The Accelerated and Incidental mileages consist of 2.535 miles and 0.122 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that

influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in for retrofit and hydrotest activities however, alternative source of feed would be required for downstream customers. Due to capacity and reliability constraints, the Project Team determined isolation of this segment was limited to a four-week period between April and May of 2024 when energy demands are lower.
2. Customer Impact: Per the gas transmission and distribution system analyses, the Project required CNG support for regulator stations and downstream customers during the retrofit and hydrotest activities. The Project also required a partial curtailment of four electric generators during isolation of the pipeline that required significant upfront coordination to mitigate potential impacts.
3. Community Impact: The Project had local community impact adjacent to the construction locations because the test end sites and retrofit locations were predominantly in a rural area that required minimal traffic control. The Project Team mitigated community impacts by managing traffic effectively during construction, and by proactively notifying nearby residents of the Project scope and schedules.
4. Schedule Coordination: The Project Team executed this Project in conjunction with Line 1600 Section 4 Couser Canyon South Hydrotest Project and Line 1600 Section 2 Rice Canyon Hydrotest Project to allow for efficiencies. The Project Team also coordinated with other SDG&E projects to increase construction efficiencies, and to ensure project activities did not materially impact the system or result in customer outages.
5. Substructures: The Project Team researched existing records and performed survey that identified there were no notable substructures within the Project scope.
6. Permit Conditions:
   a. The Project Team obtained excavation permits and a traffic control permit from the County of San Diego.

b. The Project Team obtained encroachment and traffic control permits (TCP) from Caltrans. This included an Excavation Encroachment Policy Exception (EPE) that allowed the installation of un-encased pipeline within Caltrans ROW via open trench. The Project Team coordinated and negotiated extensively with Caltrans throughout a 12-month process.

7. Land Use:
   a. The Project Team obtained temporary right of entry (TRE) agreements from multiple private landowners to access land for workspaces and a laydown area.
   b. The Project Team obtained two new Easement Acquisition Agreements including temporary rights of entry (TRE) with a private property owner for pipeline installed via open trench along [redacted].
8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
   b. The Project Team obtained a California Department of Fish and Wildlife (CDFW) Streambed Alteration agreement.
   c. The Project Team obtained water quality permits from the State Water Resources Control Board.
9. Constructability:
   a. The Project Team identified six span supports requiring temporary support structures during hydrotest activities, one of which required a crane for support. The crane support was required to avoid impacts to environmentally sensitive areas.
   b. Due to the limited isolation window identified during analysis of the pipeline system, the Project Team efficiently coordinated with various stakeholders to execute all construction activities in an efficient and exceptionally expedited manner.
10. Retrofits: The Project Team planned and prepared for 16 pipeline retrofits within this segment to increase the piggability of the pipeline, mitigate integrity threats, and/or improve pipeline accessibility. Some of these locations required minimal pipeline replacements, resulting in approximately 0.398 miles of new pipeline installed. Retrofit

and replacement locations installed [redacted] pipeline and fittings. Through these retrofits, SDG&E adhered to industry standards while also improving accessibility of the pipeline required for ongoing maintenance and/or emergency response.

C. Scope Changes

Through Engineering, Design, and Planning activities, SDG&E determined that changes in scope were appropriate for safety and constructability of the Project and to address engineering and field 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. Scope Refinement: During detailed design, the Project Team considered various execution options to complete retrofits on a pipeline segment that traversed beneath a pond on private land. Through detailed evaluation of each option and a cost-benefit analysis, it was determined that a reroute of the pipeline at this location would optimize constructability and mitigate impacts while also improving the safety and future accessibility of the pipeline. The Project Team actively communicated with the CPUC's Safety and Enforcement Division regarding the updated and refined scope.

2. Regulatory Changes: A change in the Pipeline and Hazardous Materials Safety Administration (PHMSA) Code of Federal Regulations (CFR) Part 192 that went into effect prior to construction mobilization. The change required coating testing for replacements greater than 1,000 feet of backfilled length, that applied to the newly identified retrofit location where pipeline traversed beneath a pond. This required the use of alternating current voltage gradient (ACVG) surveys to assess the integrity of new coating along this segment of Line 1600.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $5,132,969.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], which was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	01/23/2024
Construction Completion Date	07/26/2024
NOP Date	05/08/2024

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $1,300,467 change orders.

1. Field Design Changes: The Project required extended excavations in order to locate pipe suitable for welding, free of laminations and porosity defects which are common with the 1949-vintage electric flash welded pipe.

2. Regulatory Changes: The Project complied with a change in the PHMSA CFR Part 192 that went into effect prior to construction mobilization. The Project required coating testing for one retrofit location where pipeline traversed beneath a pond within. ACVG surveys assessed the integrity of new coating at this location and confirmed standard requirements were met.

Figure 4: Northern Tie-In Spool Piece

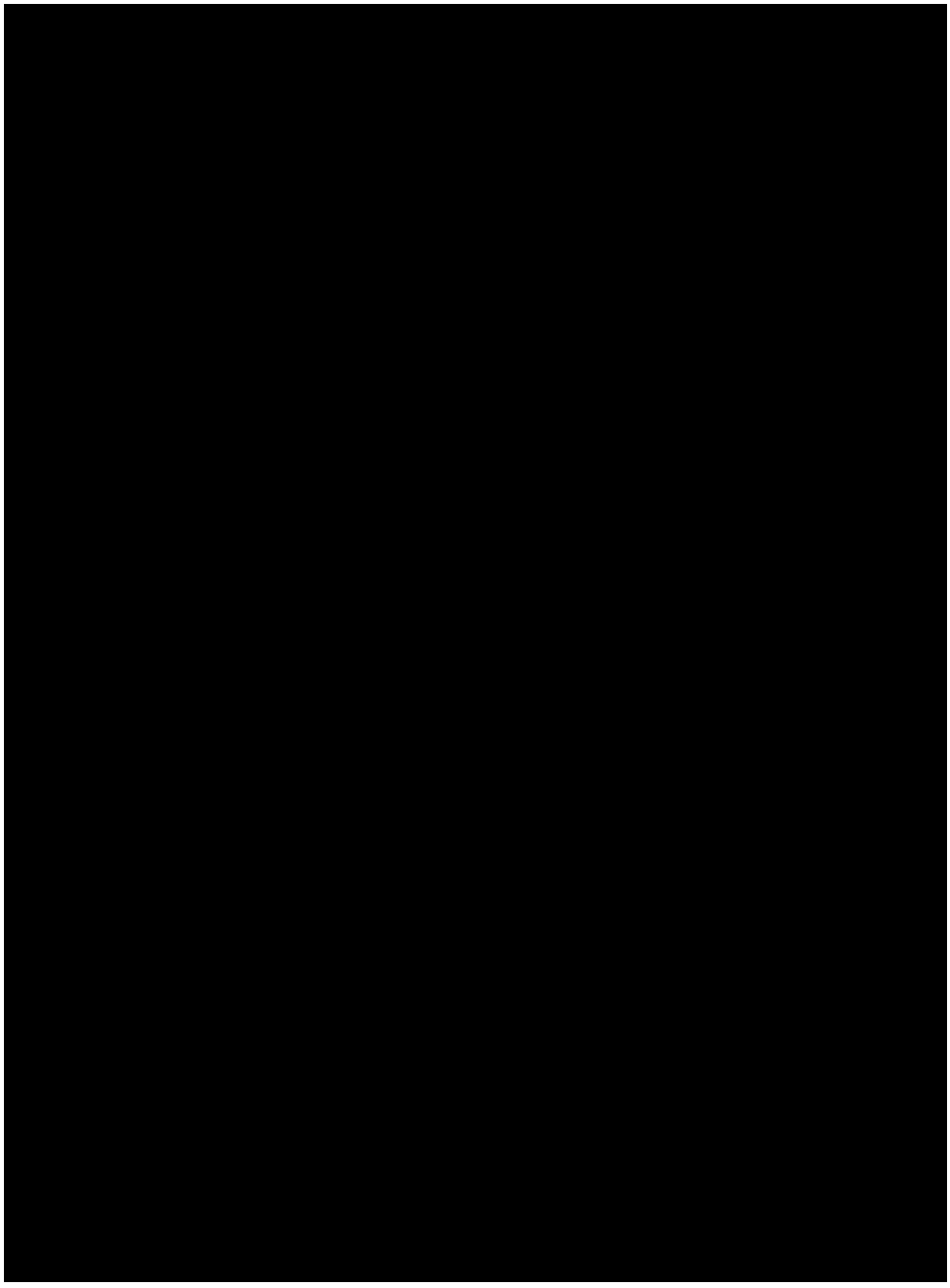


Figure 5: Pipe Span Replacement

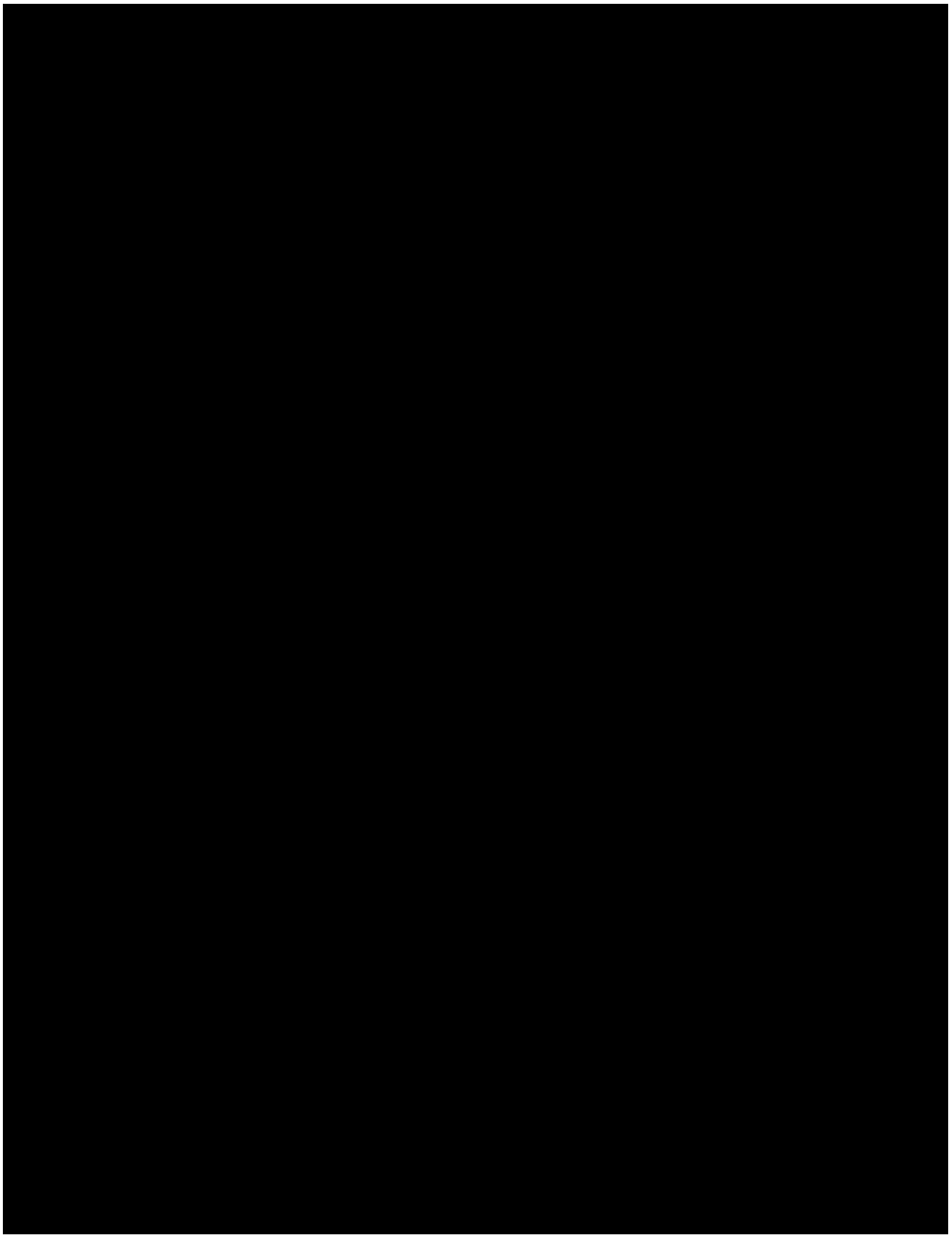


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Figure 6: Pipe Span Support During Hydrotest Activities

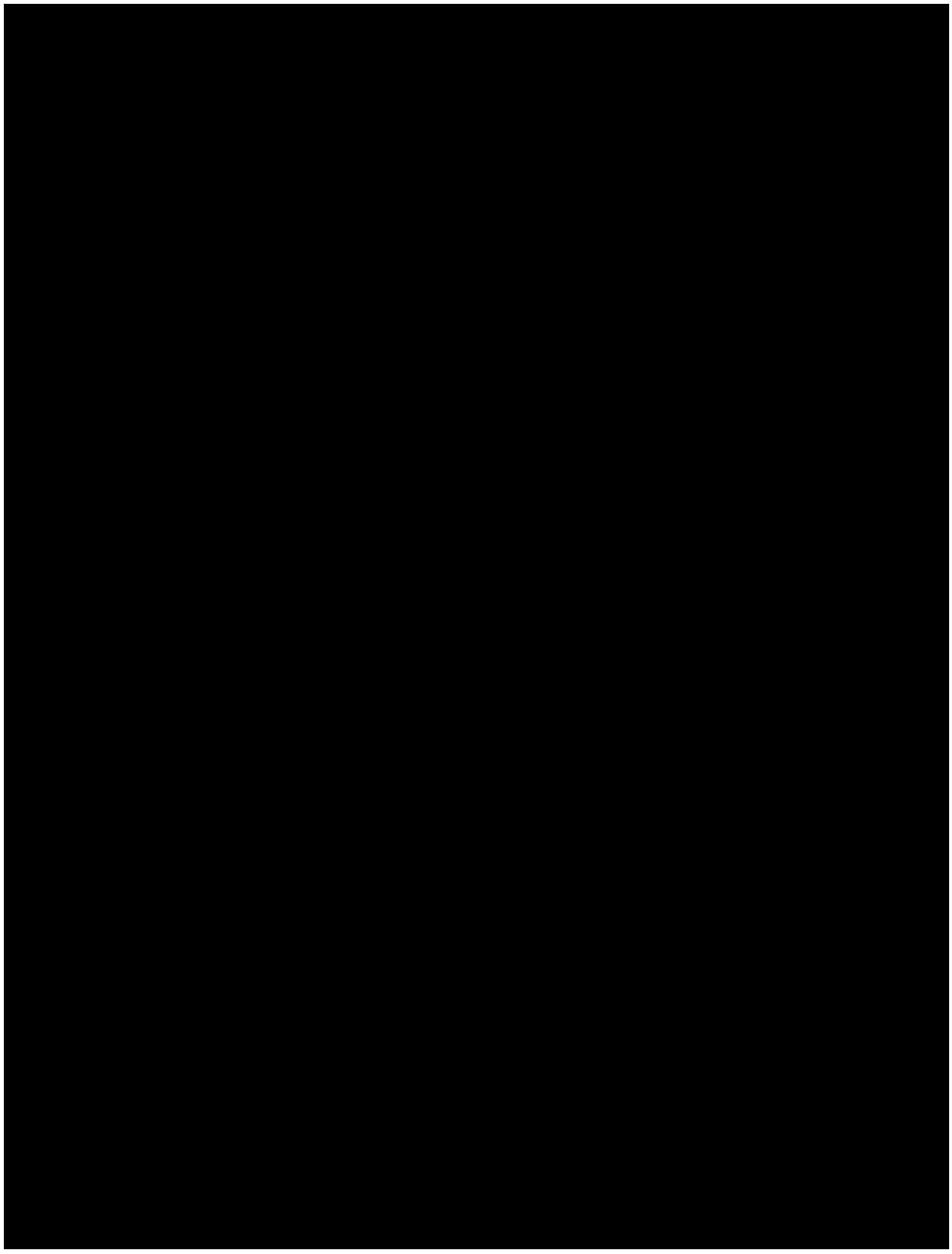


Figure 7: Retrofit Location Excavation

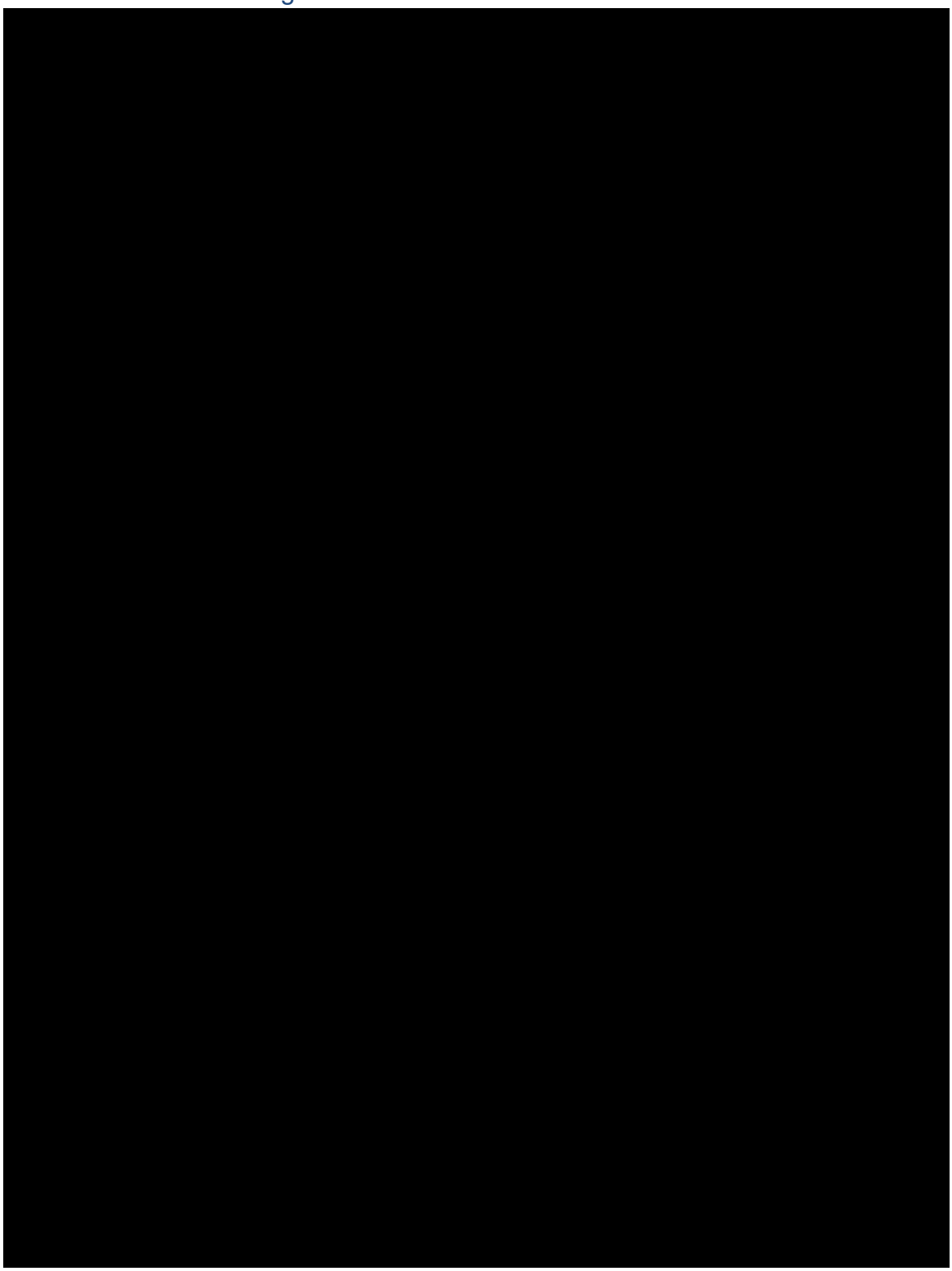
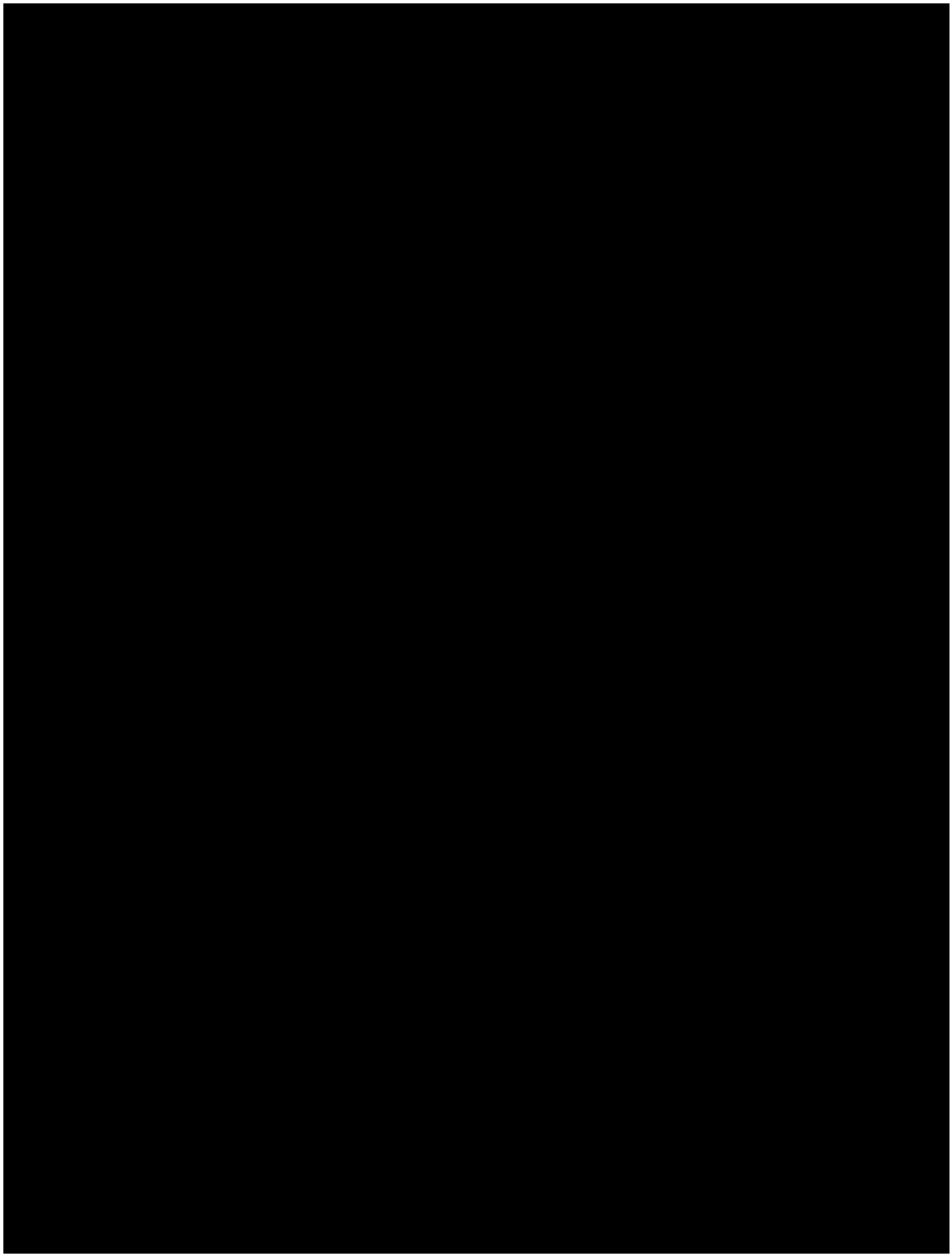


Figure 8: Retrofit Excavation Requiring Dewatering Activities



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include restoration of top soil at the pond anomaly reroute and final paving and surface restoration associated with the tie over to existing regulator stations and pipeline cutouts within county roadways, including [redacted]. Additional work includes completion of all punch list items in coordination with Caltrans inspectors for permit closeout, as well as follow up items required by county inspectors for county permit closeout. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines and restoration including gravel removal and hydroseeding at two laydown yards, one of which was near the [redacted] and one of which was a Caltrans property on [redacted], which were shared with Rice Canyon and Couser Canyon South projects.

IV. PROJECT COSTS

A. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and Engineering, Design, and Planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $13,754,682. 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.

SDG&E estimated Indirect Costs of the Project based on the estimated Direct Costs and other project related variables.

B. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the Engineering, Design, and Planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Construction Execution:
    a. The Project Team diligently released for bid and executed this Project in conjunction with other Line 1600 Hydrotest Projects. This resulted in various efficiencies including utilizing the same Construction Contractor, optimizing the bidding process as well as reducing overall mobilization and construction costs. Since various pricing scenarios for the three projects was requested together, the Project Team was able to optimize pricing options for each project.

b. The Project Team identified and incorporated various construction efficiencies by completing this Project in conjunction with neighboring Line 1600 Hydrotest Projects. Efficiencies included utilizing the same construction management team, survey crews, and environmental monitoring personnel.
c. The Project Team planned and executed a combined hydrotest for this Project with the adjacent Line 1600 Section 4 Couser Canyon South Hydrotest Project, providing efficiencies and savings for both projects, as well as minimizing operational impacts to critical customers.
d. The Project Team coordinated with various stakeholders to maintain flow within Line 1600 by incorporating partial curtailments and utilizing CNG instead of purchasing gas externally.

2. Land Use: The Project shared the same laydown yard with two neighboring Line 1600 Projects, reducing overall cost for the Project.
3. Water Management: The Project Team coordinated this combined hydrotest with the neighboring Line 1600 Section 2 Rice Canyon Hydrotest Project to optimize a shared water tank location and share costs for rental of water tanks and equipment.
4. Materials: The Project ordered [redacted] pipe in bulk, providing volume pricing.
5. Scope Refinement: During detailed design, the Project Team conducted a scope refinement that addressed retrofits to a pipeline segment that traversed beneath a pond on private land. Through detailed evaluation of various execution options and a cost-benefit analysis, a reroute of the pipeline at this location was determined to be the most cost-effective option with the least environmental impacts, while also improving the safety and future accessibility of the pipeline.

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 $12,525,175.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	1,606,191	684,898	(921,293)
Materials	160,232	547,878	387,646
Construction Contractor	5,132,969	4,711,535	(421,434)
Construction Management & Support	482,591	1,428,442	945,851
Environmental	1,420,667	725,066	(695,601)
Engineering & Design	642,888	1,515,751	872,863
Project Management & Services	4,024,421	1,038,801	(2,985,621)
ROW & Permits	284,722	531,288	246,566
Total Direct Costs	13,754,682	11,183,659	(2,571,023)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[10]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	1,110,960	1,053,960	(57,000)
AFUDC	245,017	245,017	0
Property Taxes	42,539	42,539	0
Total Indirect Costs	1,398,516	1,341,516	(57,000)
Total Direct Costs	13,754,682	11,183,659	(2,571,023)
Total Loaded Costs	15,153,198	12,525,175	(2,628,023)

The Actual Full-Time Equivalents[11] (FTEs) for this Project are 1.36.

[9] Values may not add to total due to rounding.
[10] Ibid.
[11] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 3 Couser Canyon North, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $2,571,023. This variance can be attributed to several factors including: the Project Team created a combined isolation and hydrotest with the Line 1600 Section 4 Couser Canyon South and Line 1600 Section 2 Rice Canyon Projects leveraging shared contractors, construction management, survey and environmental monitoring, optimized pricing and bidding strategies, and combined mainline hydrotests. These actions reduced mobilization and construction costs. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

E. Disallowance

There was no disallowance for Line 1600 Section 3 Couser Canyon North Hydrotest Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 3 Couser Canyon North Hydrotest Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[12]. Through this Hydrotest Project, SDG&E successfully hydrotested 2.290 miles of previously existing pipeline, completed 16 pipeline retrofits totaling 0.398 miles of new pipeline within this segment, and tied-over existing regulator stations within the segment. The total loaded cost of the Project is $12,525,175.

SDG&E executed this project prudently through detailed review of the pipeline attributes and elevation changes within this segment, with substantial consideration of combined hydrotests for neighboring segments, and through continuous refinement of the design to execute the Projects efficiently.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, bidding out and executing various activities for this Project simultaneously or in conjunction with adjacent projects to reduce construction costs, optimizing hydrotest activities to increase construction efficiencies and reduce project costs, where applicable.

End of Line 1600 Section 3 Couser Canyon North Hydrotest Project Final Report

[12] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

I. LINE 1600 SECTION 4 COUSER CANYON SOUTH HYDROTEST PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 4 Couser Canyon South Hydrotest Project that consists of the hydrotest of 2.398 miles of previously existing pipeline near [redacted] from the intersection of [redacted] and [redacted] to the intersection of [redacted] and [redacted]. The Project also included 25 pipeline retrofit locations totaling 0.172 miles of new pipeline within this segment, as well as the tie-over and/or abandonment of existing regulator stations within the segment. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $13,542,672.

The Line 1600 Section 4 Couser Canyon South Hydrotest Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	Section 4 Couser Canyon South		
Project Type	Hydrotest		
Length	2.569 miles		
Location	San Diego County		
Class	1 and 2		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage	[redacted]		
Construction Start	01/23/2024		
Construction Finish	07/26/2024		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS	[redacted]		
SMYS[4]	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	7,852,984	5,689,688	13,542,672

[4] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

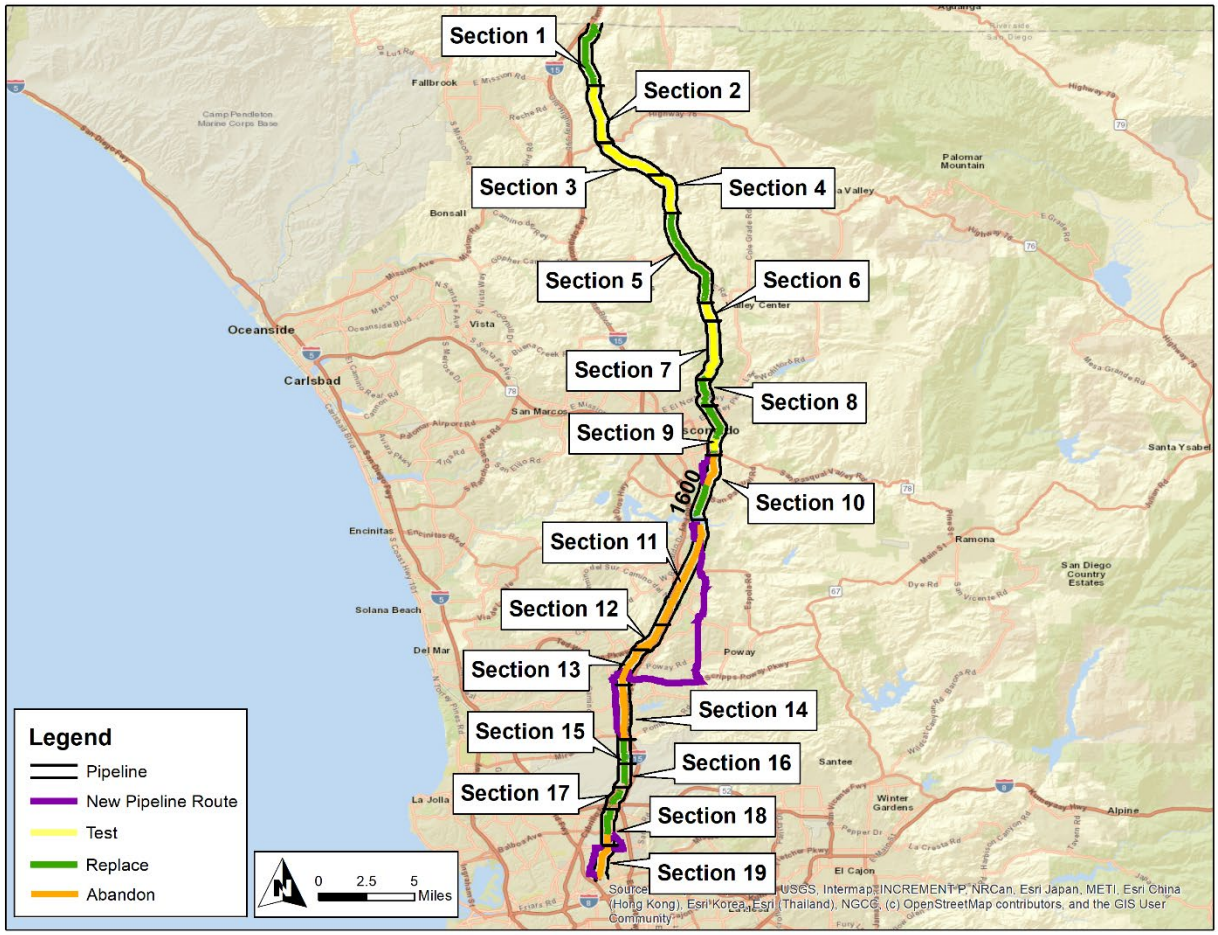


Figure 2: Satellite Image of Line 1600 Section 4 Couser Canyon South Hydrotest Project

Final Report for Line 1600 Section 4 Couser Canyon South Hydrotest Project

Figure 3: Overview Map of Line 1600 Section 4 Couser Canyon South Hydrotest Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information

	Accelerated[5]	Incidental	New	Total
Final Mileage	2.554 mi.	0.009 mi.	0.006 mi.	2.569 mi.
	13,485 ft.	48 ft.	32 ft.	13,564 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E hydrotested the Section 4 Couser Canyon South segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined hydrotesting the Section 4 Couser Canyon South segment of Line 1600 as the most prudent option. During the

[5] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team hydrotested 2.398 miles of previously existing pipeline near [redacted] from the intersection of [redacted] and [redacted] to the intersection of [redacted] and [redacted].
   b. The Project Team included 25 pipeline retrofit locations in order to increase the piggability of the line, mitigate integrity threats, and/or to improve pipeline accessibility. Some of these locations required minimal pipeline replacements resulting in approximately 0.172 miles of new pipeline installed. Retrofit and replacement locations installed [redacted] pipeline and fittings.
   c. The Project Team included the tie-over of two regulator stations and the abandonment of one regulator station within this segment. These were completed in a way that ensured system reliability was not compromised and the existing reliability of service that customers received from the previously existing pipeline was maintained.
   d. The Project Team hydrotested the newly retrofitted [redacted] pipeline in conjunction with the Line 1600 Section 3 Couser Canyon North Hydrotest Project.
2. Final Project Scope: The final project scope consists of the hydrotest of 2.398 miles of previously existing pipeline, 25 pipeline retrofit locations totaling 0.172 miles of new pipeline, as well as tie-over and/or abandonment of regulator stations within the segment. The Accelerated and Incidental mileages consist of 2.554 miles and 0.009 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including

reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in for retrofit and hydrotest activities however alternative source of feed would be required for downstream customers. Due to capacity and reliability constraints, the Project Team determined isolation of this segment was limited to a four-week period between April and May of 2024 when energy demands are lower.
2. Customer Impact: Per the gas transmission and distribution system analyses, the Project required CNG support for regulator stations and downstream customers during the retrofit and hydrotest activities. The Project also required a partial curtailment of four electric generators during isolation of the pipeline that required significant upfront coordination to mitigate potential impacts.
3. Community Impact: The Project had local community impact adjacent to the construction locations because the test end sites and retrofit locations were predominantly in a rural area that required minimal traffic control. The Project Team mitigated community impacts by managing traffic effectively during construction, and by proactively notifying nearby residents of the Project scope and schedules.
4. Schedule Coordination: The Project Team executed this Project in conjunction with Line 1600 Section 3 Couser Canyon North Hydrotest Project and Line 1600 Section 2 Rice Canyon Hydrotest Project to allow for efficiencies. The Project Team also coordinated with other SDG&E projects to increase construction efficiencies and to ensure project activities did not materially impact the system or result in customer outages.
5. Substructures: The Project Team researched existing records and performed survey to identify multiple substructures within the construction alignment and included them in the Project design.

6. Permit Conditions:
   a. The Project Team obtained excavation permits and a traffic control permit from the County of San Diego.
   b. The Project Team obtained encroachment and traffic control permits (TCP) from Caltrans. This included an Excavation Encroachment Policy Exception (EPE) that allowed the installation of un-encased pipeline within Caltrans ROW via open trench. The Project Team coordinated and negotiated extensively with Caltrans throughout an 8-month process.
7. Land Use: The Project Team obtained temporary right of entry (TRE) agreements from multiple private landowners to access land for temporary workspace and laydown area.
8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
   b. The Project Team obtained a California Department of Fish and Wildlife (CDFW) Streambed Alteration agreement.
   c. The Project Team obtained water quality permits from the State Water Resources Control Board.
9. Constructability:
   a. The Project Team identified five spans within this segment that required temporary support structures during hydrotest activities.
   b. Due to the limited isolation window identified during analysis of the pipeline system, the Project Team efficiently coordinated with various stakeholders to execute all construction activities in an efficient and exceptionally expedited manner.
   c. After careful consideration of the necessary pipeline isolation schedules, the Project Team completed the abandonment of one regulator station within this segment prior to the construction mobilization for this hydrotest Project.
10. Retrofits: The Project Team planned and prepared for 24 pipeline retrofits within this segment to increase the piggability of the pipeline, mitigate integrity threats, and/or

improve pipeline accessibility. This included the installation of various [redacted] pipeline fittings and approximately 200 feet of new [redacted] pipeline. Through these retrofits, SDG&E adhered to industry standards while also improving accessibility of the pipeline required for ongoing maintenance and/or emergency response.

C. Scope Changes

Through engineering, design, and planning activities, SDG&E determined that changes in scope were appropriate for safety and constructability of the Project and to address engineering and field 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 considered horizontal directional drilling or jack and bore installations for pipe bends within this segment due to environmental impacts, but during detailed engineering and design the need for these installation methods was removed from the scope.

2. The original Line 16 Section 4 Couser Canyon South Hydrotest Project scope included one retrofit location and regulator station abandonment that were transferred from this Project to the neighboring Line 1600 Section 5 [redacted] Replacement Project to optimize constructability.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $5,679,811.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], which was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	01/23/2024
Construction Completion Date	07/26/2024
NOP Date	05/08/2024

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $980,000 in change orders.

1. Field Design Changes:
   a. During construction, the Project Team learned of an additional required retrofit location underneath a graded roadway. Upon physical inspection of the location, the pipeline was found to be shallow and required the installation of 200 feet of pipeline at this location to obtain the proper depth of cover, adhering to industry standards and increasing the safety of the pipeline.
   b. The Project required extended excavations in order to locate pipe suitable for welding, free of laminations and porosity defects that are common with the 1949-vintage electric flash welded pipe.

Figure 4: Excavation with Shoring

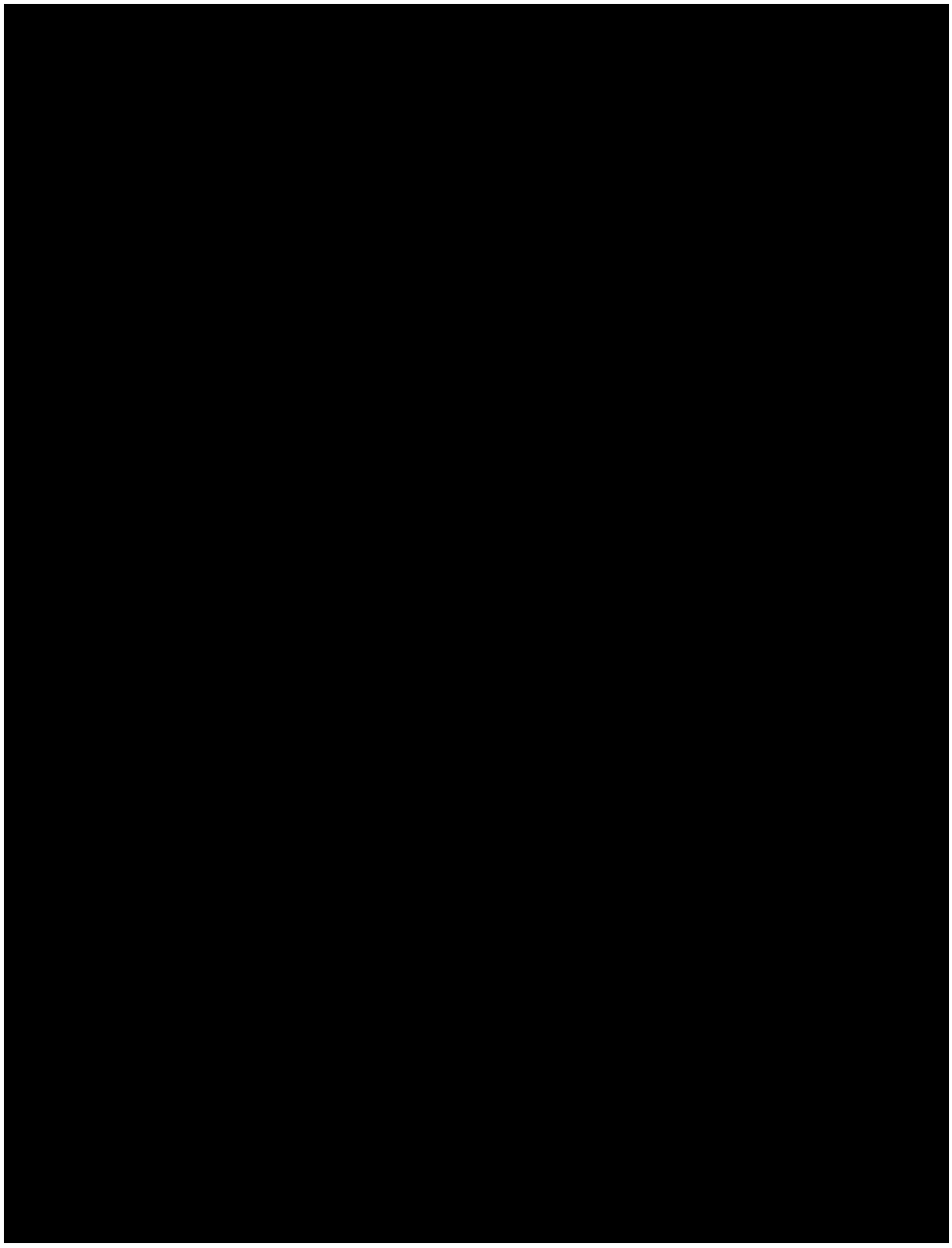


Figure 5: Excavation with Shoring

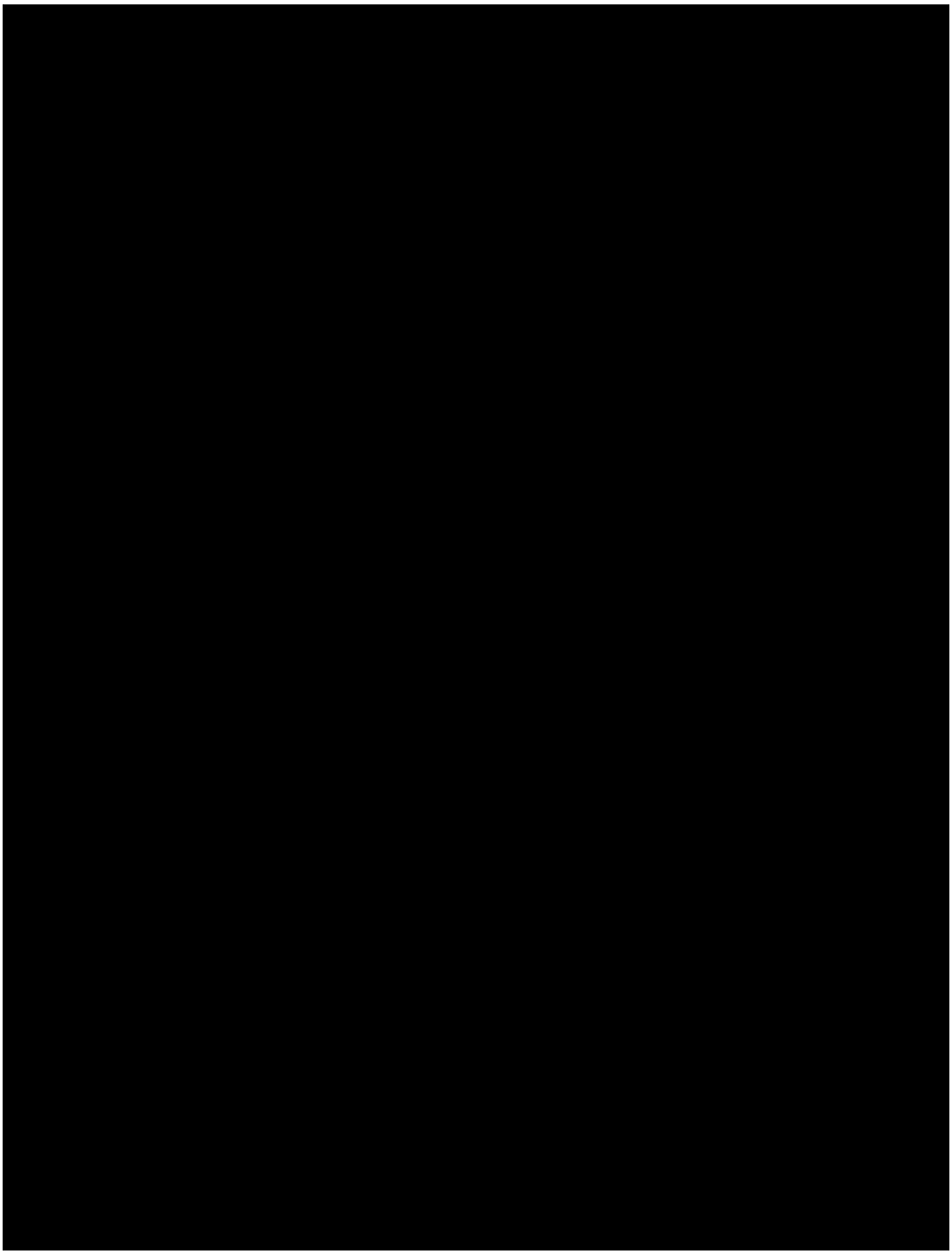


Figure 6: Lowering of Pipeline into Excavation

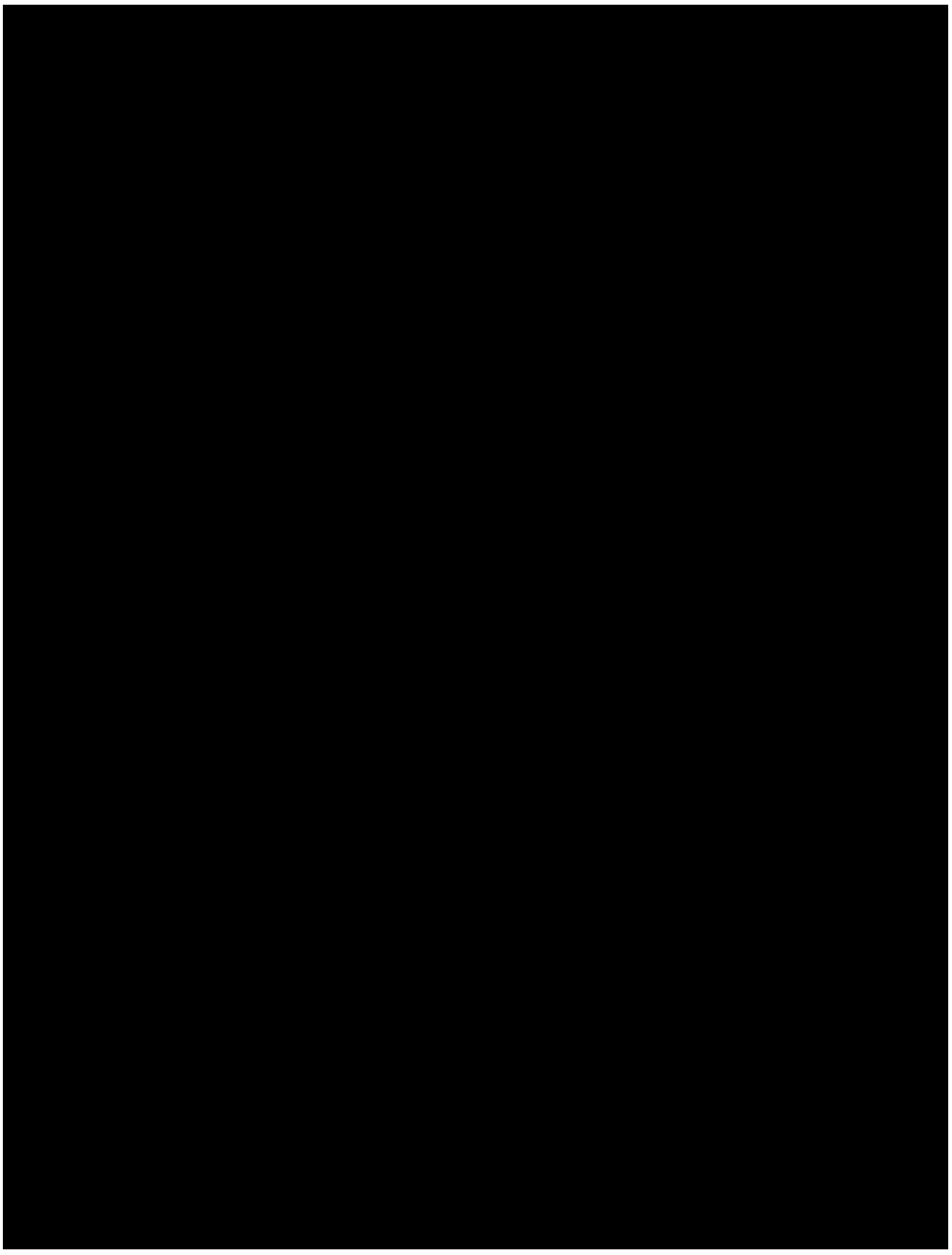


Figure 7: Pipeline Replacement Location

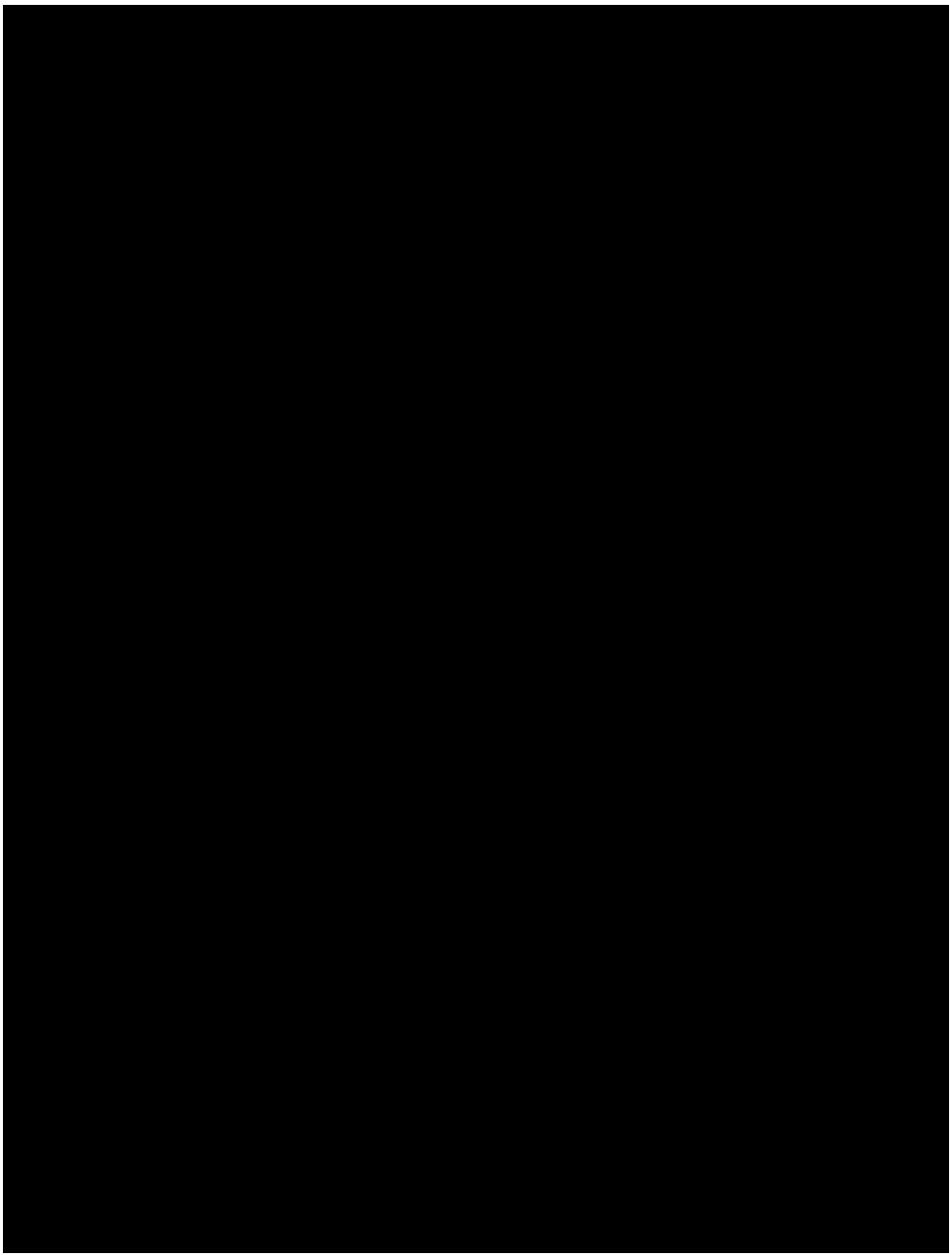


Figure 8: Lowering of Pipeline into Excavation

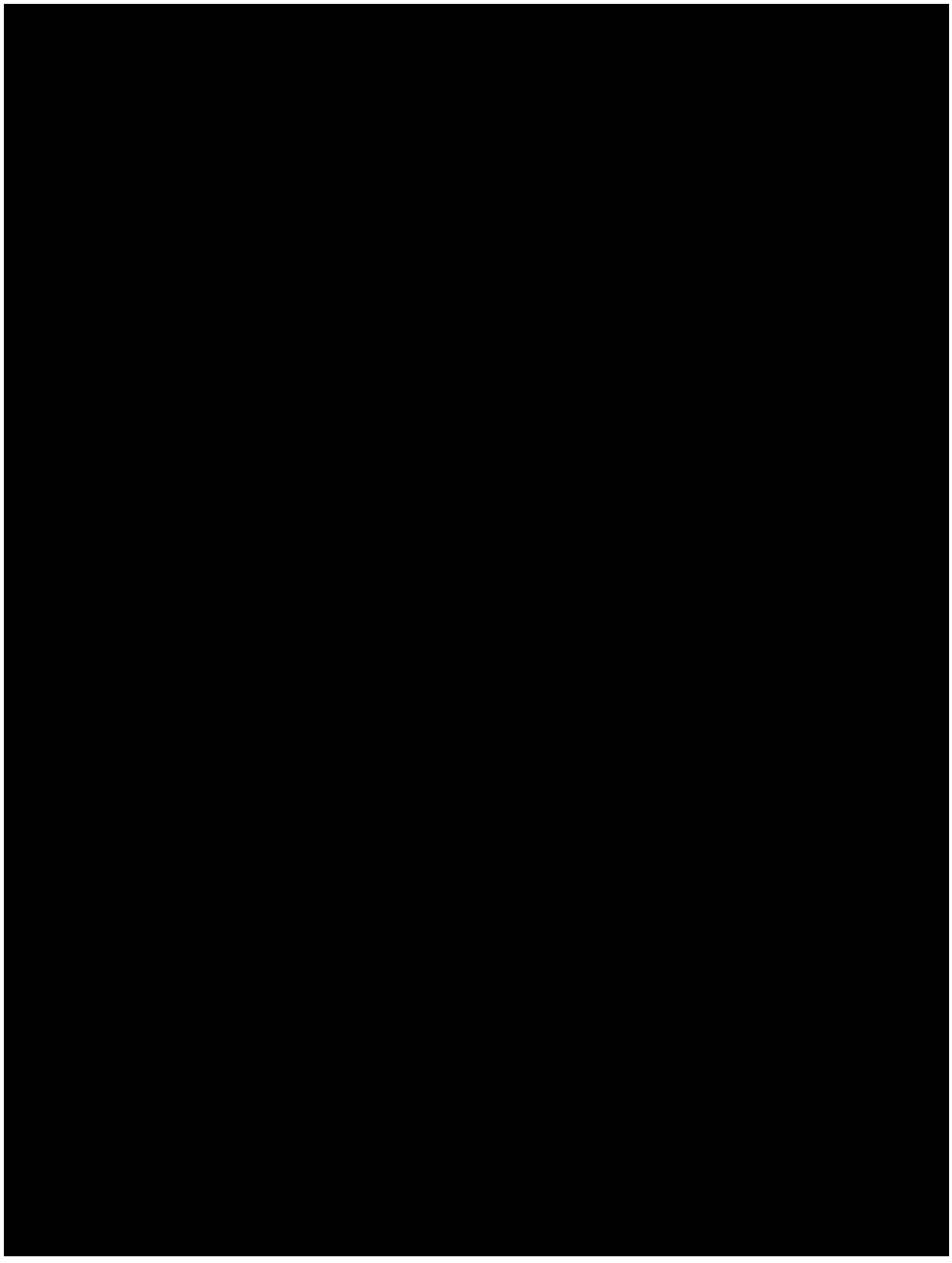
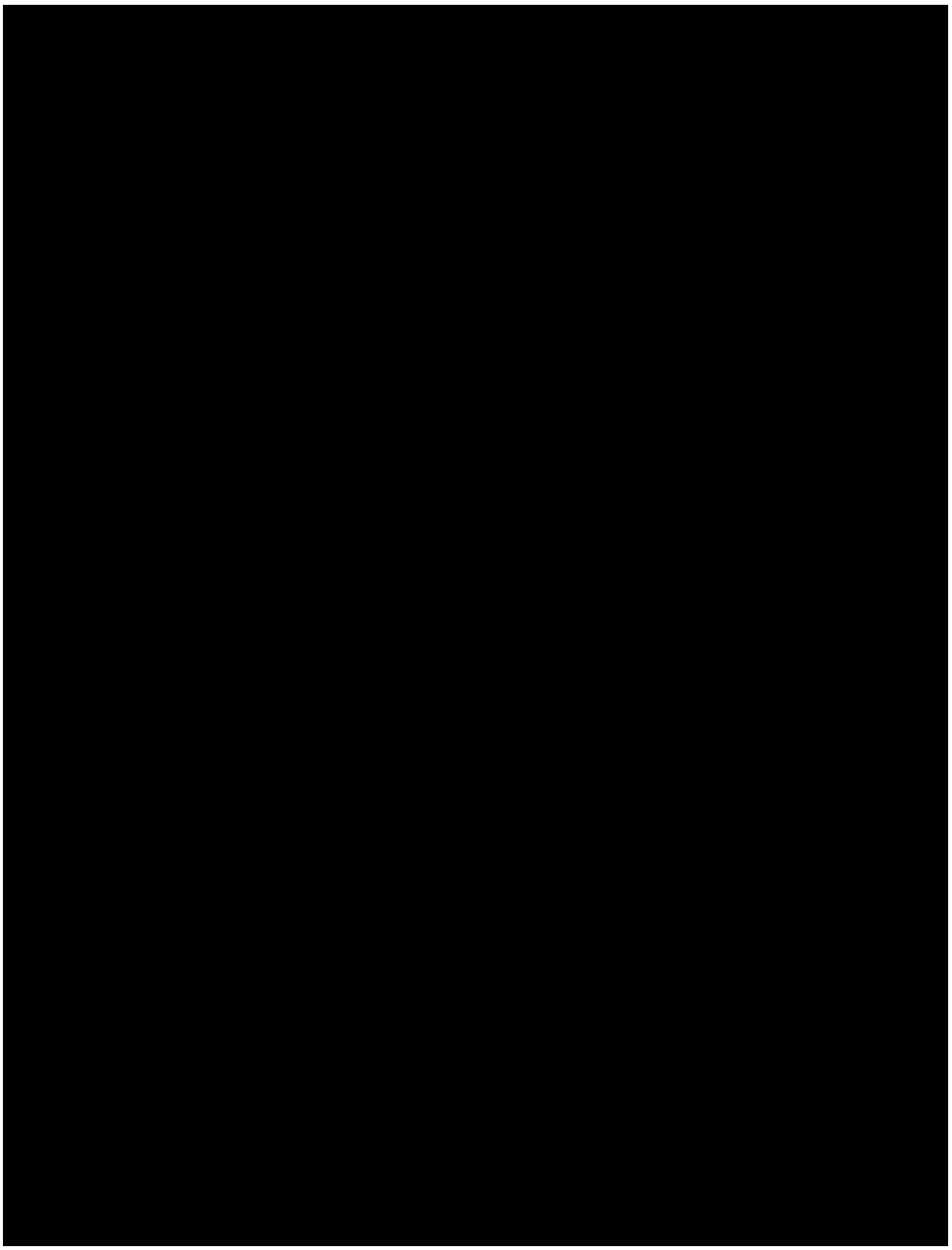


Figure 9: Southern Isolation



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include restoration of south tie-in location at [redacted], final paving and surface restoration associated with the tie over to existing regulator stations and pipeline cutouts within county roadways including [redacted]. Additional work includes completion of all punch list items in coordination with Caltrans inspectors for permit closeout, as well as follow up items required by county inspectors for county permit closeout. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines and restoration including gravel removal and hydroseeding at two laydown yards, one of which was near the [redacted] and one of which was a Caltrans property on [redacted], which were shared with Rice Canyon and Couser Canyon North projects.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Construction Execution:
   a. The Project Team diligently released for bid and executed this Project in conjunction with other Line 1600 Hydrotest Projects. This resulted in various efficiencies including utilizing the same Construction Contractor, optimizing the bidding process as well as reducing overall mobilization and construction costs. Since various pricing scenarios for the three projects was requested together, the Project Team was able to optimize pricing options for each project.
   b. The Project Team identified and incorporated various construction efficiencies by completing this Project in conjunction with neighboring Line 1600 Hydrotest Projects. Efficiencies included utilizing the same construction management team, survey crews, and environmental monitoring personnel.
   c. The Project Team carefully planned and executed combined mainline hydrotests for this segment and the adjacent Line 1600 Section 3 Couser Canyon North Hydrotest Project, providing efficiencies and savings for both projects.
   d. The Project Team initially considered horizontal directional drilling or jack and bore installations for pipe bends within this segment due to environmental impacts however through detailed engineering and design, these installations were removed from the scope, minimizing project costs.

e. The Project Team coordinated with various stakeholders to maintain flow within Line 1600 by incorporating partial curtailments and utilizing CNG instead of purchasing gas externally.

2. Land Use: The Project shared the same laydown yard with two neighboring Line 1600 Projects, reducing overall cost for the Project.
3. Water Management: The Project Team coordinated this combined hydrotest with the neighboring Line 1600 Section 2 Hydrotest Project to optimize a shared water tank location and share costs for rental of water tanks and equipment.
4. Permit Conditions: The Project Team coordinated with the neighboring Line 1600 Section 5 [redacted] Replacement Project to utilize the same Caltrans workspace footprint, minimizing mobilization activities on the Caltrans mitigation land.
5. Materials: The Project ordered [redacted] pipe in bulk, providing volume pricing.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $14,430,390. 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.

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 $13,542,672.

Table 4: Estimated and Actual Direct Costs and Variances[6]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	1,691,838	729,300	(962,538)
Materials	360,681	1,717,224	1,356,542
Construction Contractor	5,679,811	4,267,161	(1,412,650)
Construction Management & Support	483,368	723,543	240,175
Environmental	1,135,923	583,698	(552,225)
Engineering & Design	638,177	1,750,313	1,112,136
Project Management & Services	3,767,588	1,757,576	(2,010,012)
ROW & Permits	673,005	192,253	(480,752)
Total Direct Costs	14,430,390	11,721,066	(2,709,324)

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	1,252,180	1,575,903	323,723
AFUDC	177,338	209,420	32,114
Property Taxes	29,064	36,252	7,188
Total Indirect Costs	1,458,581	1,821,606	363,025
Total Direct Costs	14,430,390	11,721,066	(2,709,324)
Total Loaded Costs	15,888,972	13,542,672	(2,346,299)

The Actual Full-Time Equivalents[8] (FTEs) for this Project are 1.26.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 4 Couser Canyon South, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $2,709,324. This variance can be attributed to several factors including: the Project Team created a combined isolation and hydrotest with the Line 1600 Section 3 Couser Canyon North and Line 1600 Section 2 Rice Canyon Projects leveraging shared contractors, construction management, survey and environmental monitoring, optimized pricing and bidding strategies, and combined mainline hydrotests. These actions reduced mobilization and construction costs. Further, the Project Team minimized overall project costs through detailed engineering analysis that resulted in the Project Team being able to utilize an open trench installation versus more costly and time consuming environmentally driven trenchless installations. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for Line 1600 Section 4 Couser Canyon South Hydrotest Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 4 Couser Canyon South Hydrotest Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[9]. Through this Hydrotest Project, SDG&E successfully hydrotested 2.398 miles of previously existing pipeline, completed 25 pipeline retrofits totaling 0.172 miles of new pipeline within this segment, and tied-over/abandoned existing regulator stations within the segment. The total loaded cost of the Project is $13,542,672.

SDG&E executed this project prudently through detailed review of the pipeline attributes and elevation changes within this segment, with substantial consideration of combined hydrotests for neighboring segments, and through continuous refinement of the design to execute the Projects efficiently.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, bidding out and executing various activities for this Project simultaneously or in conjunction with adjacent projects to reduce construction costs, optimizing hydrotest activities to increase construction efficiencies and reduce project costs, where applicable.

End of Line 1600 Section 4 Couser Canyon South Hydrotest Project Final Report

[9] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to “submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.”

I. LINE 1600 SECTION 5 LILAC ROAD REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 5 [redacted] Replacement Project that consists of the replacement of 5.11 miles of previously existing pipeline with approximately 6.002 miles of new pipeline primarily along [redacted] from [redacted] to [redacted]. The Project also includes the tie-over and/or replacement of regulator stations within the segment, installation of 0.034 miles of associated distribution piping, and the installation of 6.002 miles of fiber optic cable and associated equipment. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $87,655,851.

The Line 1600 Section 5 [redacted] Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

Final Report for Line 1600 Section 5 [redacted] Replacement Project

Table 1: General Project Information

Project Name	Section 5 Lilac Road		
Project Type	Replacement		
Length	6.002 miles		
Location	San Diego County		
Class	1, 2, and 3		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[4]	[redacted]		
Construction Start	11/15/2022		
Construction Finish	01/11/2024		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[5]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	87,655,851	0	87,655,851

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

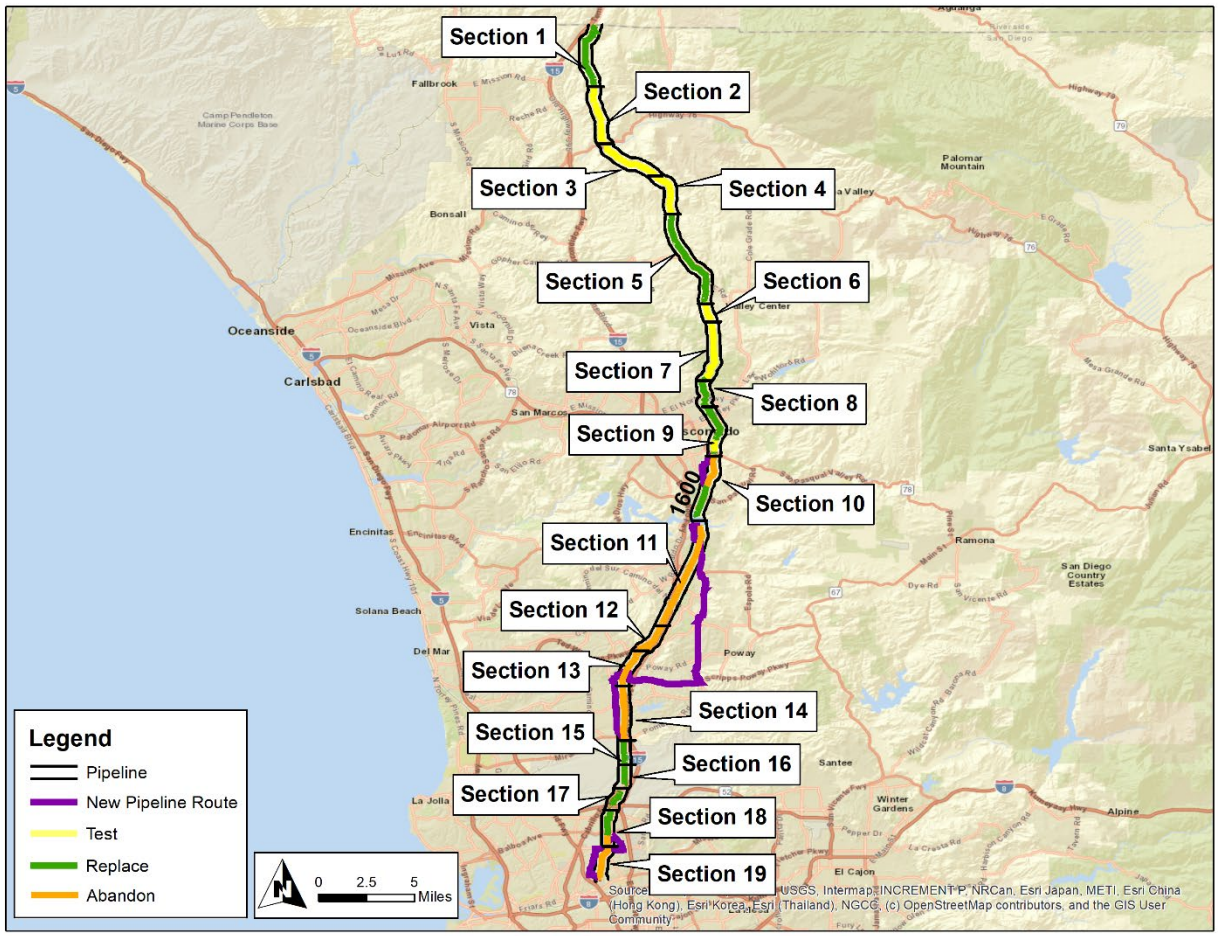


Figure 2: Satellite Image of Line 1600 Section 5 Lilac Road Replacement Project

Figure 3: Overview Map of Line 1600 Section 5 Lilac Road Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	4.630 mi.	0.492 mi.	0.008 mi.	0.872 mi.	6.002 mi.
	24,446 ft.	2,598 ft.	42 ft.	4,604 ft.	31,691 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 5 [redacted] segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 5 [redacted] segment of Line 1600 as the most prudent option. During the Engineering, Design, and Planning phase,

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[8] Values may not add to total due to rounding.

SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced 5.11 miles of previously existing pipeline by installing 6.002 miles of new pipeline primarily along [redacted] from [redacted] to [redacted]. This included three trenchless installations of [redacted] pipeline to cross [redacted], [redacted], and [redacted] within this segment. These installations were completed via horizontal directional drilling (HDD).
   b. The Project required the tie-over of two existing regulator stations, as well as the installation of two new regulator stations and abandonment of four previously existing regulator stations. The Project also included installation of 0.034 miles of associated distribution pipeline for these efforts. This was done to ensure that system reliability was not compromised and the existing reliability of service that customers received from the previously existing pipeline was maintained.
   c. The Project required four double-stopple bypasses and complex gas handling arrangements to maintain uninterrupted service during construction.
   d. The Project required hydrotests for new installations including [redacted] pipeline, valves, lateral piping within this segment, as well as temporary bypass piping. The Project also included nitrogen tests for two newly installed regulator stations and valves to be installed.
   e. The Project Team installed 6.002 miles of fiber optic cable and associated equipment, including an Optical Pipeline Monitoring (OPM) station, which oversees and communicates to Gas Control leak detection, early threat warning and continuously monitors for right-of-way intrusion, such as unanticipated third party digging.
   f. Incidental and accelerated mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consists of the replacement of 5.11 miles of previously existing pipeline with 6.002 miles of new pipeline, the tie-over and/or replacement of regulator stations within this segment, the installation of 0.034 miles

of associated distribution piping, as well as the installation of 6.002 miles of fiber optic cable and associated equipment. The Accelerated and Incidental mileages consist of 0.492 miles and 0.008 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability was not compromised and the reliability of service that customers received from the previous pipeline is maintained. The new pipeline alignment was designed to minimize impacts to private property and environmentally sensitive areas, remove existing spans within the segment, and stay within existing franchise right of way (ROW).
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded temporary bypasses, back-feed operations, and alternative feed using CNG were required during tie-in and line seasoning activities. These were required to maintain feed to customers and to maintain system reliability, while also avoiding curtailment of critical electrical generation generators during the Project.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project required four temporary double stopple bypasses, back-feed operations for three regulator station tie-overs, and temporary CNG support for one regulator station tie-over.

4. Community Impact: The Project Team communicated with the unincorporated community of Valley Center regarding project scope and timelines, by holding in-person meetings and routing various notifications. The Project Team incorporated adjustments to the design and execution plan to mitigate the concerns provided by the community and important stakeholders.
5. Schedule Coordination:
   a. The Project Team coordinated with the Line 1600 Section 6 Moosa Creek Hydrotest Project Team in rebuilding the inlet feed to an existing regulator station. Although the rebuild at this location was initially within the Section 5 [redacted] Replacement Project scope, it was mostly completed by the Section 6 Moosa Creek Hydrotest Project as part of the required backfeed operations during isolation. This coordination eliminated duplication of efforts between both Projects.
   b. The Project Team collaborated with the County of San Diego to ensure project schedules and construction activities for this Project did not conflict with a County paving project near the north of the segment.
6. Substructures: The Project Team researched existing records and performed survey to identify multiple substructures within the construction alignment and included them in the Project design.
7. Permit Conditions:
   a. The Project Team obtained excavation, noise variance, and traffic control permits (TCP) from the County of San Diego.
   b. The Project Team obtained encroachment permits from Caltrans for temporary use of workspace and laydown area. This included an Excavation Encroachment Policy Exception (EPE) that allowed the installations of un-encased pipeline within Caltrans right of way (ROW). In efforts to comply with Caltrans requests to change workspace near Keys Creek, the permitting process induced additional reviews including Caltrans Headquarters (HQ) and State Historic Preservations Office (SHPO), delaying approval of the permit. The Project Team coordinated and negotiated extensively with Caltrans throughout a 15-month process.

8. Land Use:
   a. The Project Team required four new Easement Acquisition Agreements including temporary rights of entry (TRE) with private property owners for pipeline installed via open trench and HDD along [redacted], [redacted], [redacted] [redacted] crossing, and [redacted].
   b. The Project Team obtained temporary right of entry (TRE) agreements from multiple private property landowners to access land for temporary workspace and laydown area.
9. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline tie-in locations, test head locations, span locations, as well as grout fill locations.
   b. The Project required specific environmental personnel and monitoring including an arborist present during oak tree trimming, biological monitoring, cultural resource monitoring, and paleontological monitoring.
   c. The Project Team obtained a California Department of Fish and Wildlife Emergency Lake or Streambed Alteration Agreement for HDD crossing activities.
   d. The Project required a Storm Water Pollution Prevention Plan (SWPPP), a Hydrotest Water Discharge Permit, and Ground Water Discharge Permit.
   e. The Project disposed of hydrotest water to land, as outlined under State Water Resources Control Board Order.
10. Valves: The Project Team included the installation of a [redacted] mainline valve at the north tie-in to facilitate future isolations, including the Line 1600 Couser North and South Projects.
11. Constructability:
   a. The Project Team conducted extensive research on the project locations to prepare an execution plan that was efficient and adequate for the Section 5 [redacted] Replacement Project. Challenges identified included multiple creek crossings within environmentally sensitive lands and limited workspace, considerations of open trench and bore installations through granite rock, traffic concerns due to the narrow roadway and limited workspace, and wildfire mitigation

activities during construction. This resulted in a complex and detailed design and execution plan that addressed these challenges with the information at hand prior to construction. Even with all such factors taken into consideration, the Project Team was required to navigate different and more challenging field conditions during construction, including more stringent requirements by local authorities. This led to various changes in execution during construction.

b. The Project Team proactively planned for three installations underneath environmentally sensitive streambeds via HDD to minimize local environmental impacts and to avoid impacts to well water levels and local streambed caused by construction dewatering.
c. Most of the previously existing pipeline within the segment was abandoned in place, according to company standards, however 11 previously existing pipeline spans were removed for future safety concerns and to minimally impact environmentally sensitive areas.
d. The Project required 10 excavations to access the abandoned pipeline for grout fill activities.

C. Scope Changes

Through engineering, design, and planning activities, SDG&E determined that changes in scope were appropriate for safety and constructability of the Project and to address engineering and field 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 considered various options for pipe installations at creek crossings including HDD, jack and bore, and span installations. Throughout the design process, it was determined that all three installations would be completed using HDD through granite rock primarily due to environmental constraints, limited workspace, and potential local impacts.

2. The original Project scope and estimates incorporated the purchase of external gas to maintain customer feed and system reliability during the construction phase of the Project. During the detailed planning for Project, it was determined that the actual costs for this option were much higher than the original estimate and gas purchase was deemed an unreasonable option. Through extensive coordination, the Project Team was able to update the scope to include a combination of double stopple bypasses, CNG, and backfeed operations.
3. To mitigate geohazard risks and assure weld integrity under potential high external stress and loading conditions, a modified welding procedure needed to be developed for locations with geotechnical hazards. This resulted in significantly longer welding times at these locations and ultimately increased 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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $33,601,025.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	11/15/2022
Construction Completion Date	01/11/2024
NOP Date	10/23/2023

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $9,400,000 in change orders.

1. Regulatory Changes: The Project complied with a change in the Pipeline and Hazardous Materials Safety Administration Code of Federal Regulations Part 192 that went into effect during the construction timeline for this Project. The change required coating testing for replacements greater than 1,000 feet of backfilled length. This resulted in the use of alternating current voltage gradient (ACVG) surveys to assess the integrity of new coating along this segment of Line 1600. ACVG surveys confirmed the new coating along the newly installed pipeline met standard requirements, however existing coating at the tie-in locations required extensive abatement and recoating.
2. Wildfire Prevention: As an additional requirement from the Valley Center Fire Department during construction, the Project Team incorporated additional fire prevention measures by including Type 6 wildland engines and personnel at each primary construction work zone within the Project.
3. Substructures: The Project Team coordinated extensively with the Valley Center Municipal Water District during construction, due to water lines being close in proximity to the Line 1600 pipeline construction. To protect the safety and integrity of these critical water facilities, the Project Team avoided pipeline installation via open trench and instead installed the pipeline via HDD, increasing the amount of HDD installations from three to four. In addition, the Project Team encountered two unidentified and unmarked [redacted] storm drains requiring added excavation efforts and additional offset welding.
4. Site Conditions: During construction, the Project Team encountered increasingly unfavorable geotechnical conditions at all four HDD locations. The rock encountered at these sites were of higher hardness levels than what was initially reflected in geotechnical reports, ultimately causing additional pilot bores, longer drill times

resulting in longer equipment rental times, damage to and need for new drilling equipment, changeout to larger drilling equipment and machinery, damage to test pieces of pipe, additional abrasive-resistant pipe coating, as well as increased standby time.

5. Traffic: Construction for the Project initially consisted of two construction crews, with separate traffic control plans along [redacted], that is the only major thoroughfare for the Valley Center community. In addition, Valley Center Municipal Water District had another traffic control hold near SDG&E's Project associated with their significant construction scope, heavily impacting traffic and wait times on the narrow two-lane road. Due to community and governmental agency concerns regarding these impacts, the County of San Diego temporarily shutdown SDG&E's Project, resulting in approximately four weeks of delay. During this time, SDG&E, the County, and the Construction Contractor collaborated to develop a new workplan that required additional traffic message boards along [redacted] due to field conditions and to improve public safety. The workplan also addressed work zones, work hours, traffic, and noise requirements, however this resulted in significant constraints compared to the initially approved permit.
6. Work Hours: Following the temporary shutdown of the Project, and as a condition to resume the Project, work hours for one of the two pipeline crews was switched from daytime to nighttime, improving traffic holds and impacts to the community.
7. Weather: Hurricane Hilary caused extreme weather conditions including heavy rainfall during the construction timeframe, leading to a rise in the flow of water in Moosa Creek. This led to several weeks of extensive dewatering activities using pumps to achieve dry excavations for necessary construction activities including shoring, coating, welding, and backfill activities at this location.

Final Report for Line 1600 Section 5 [redacted] Replacement Project

Figure 4: Open Trench and Traffic Impact Along [redacted]

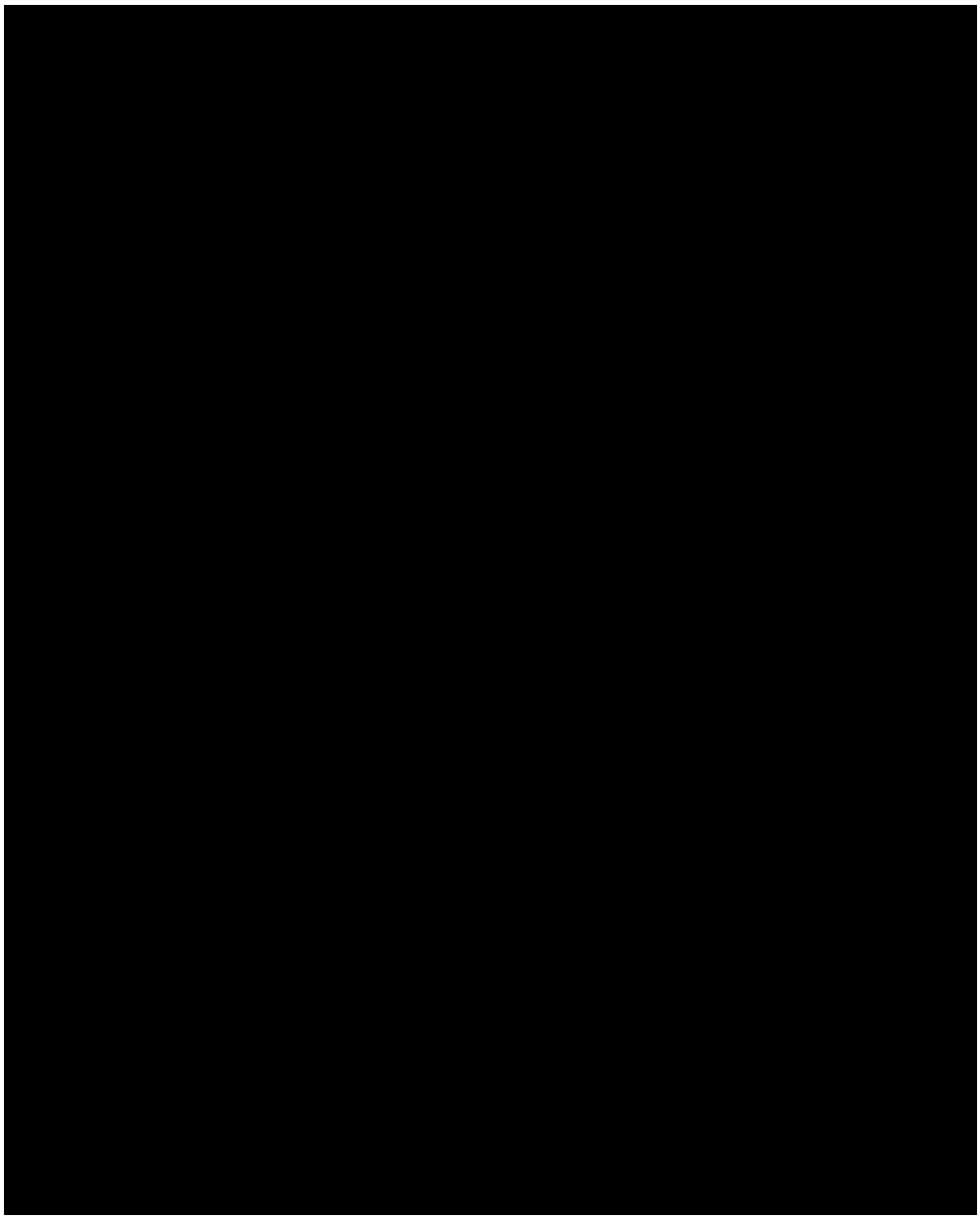


Figure 5: Open Trench Requiring Dewatering

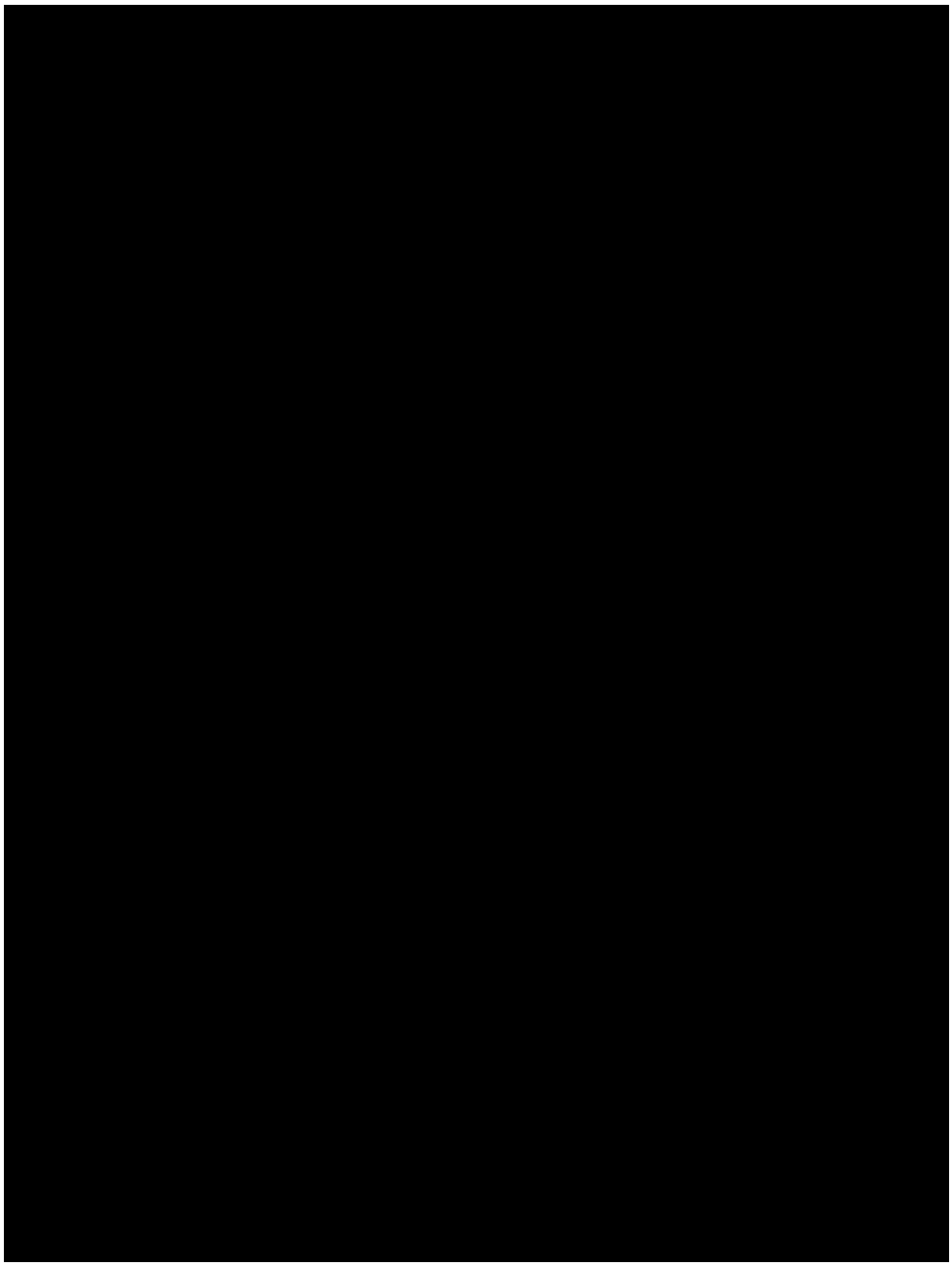


Figure 6: Open Trench Requiring Dewatering

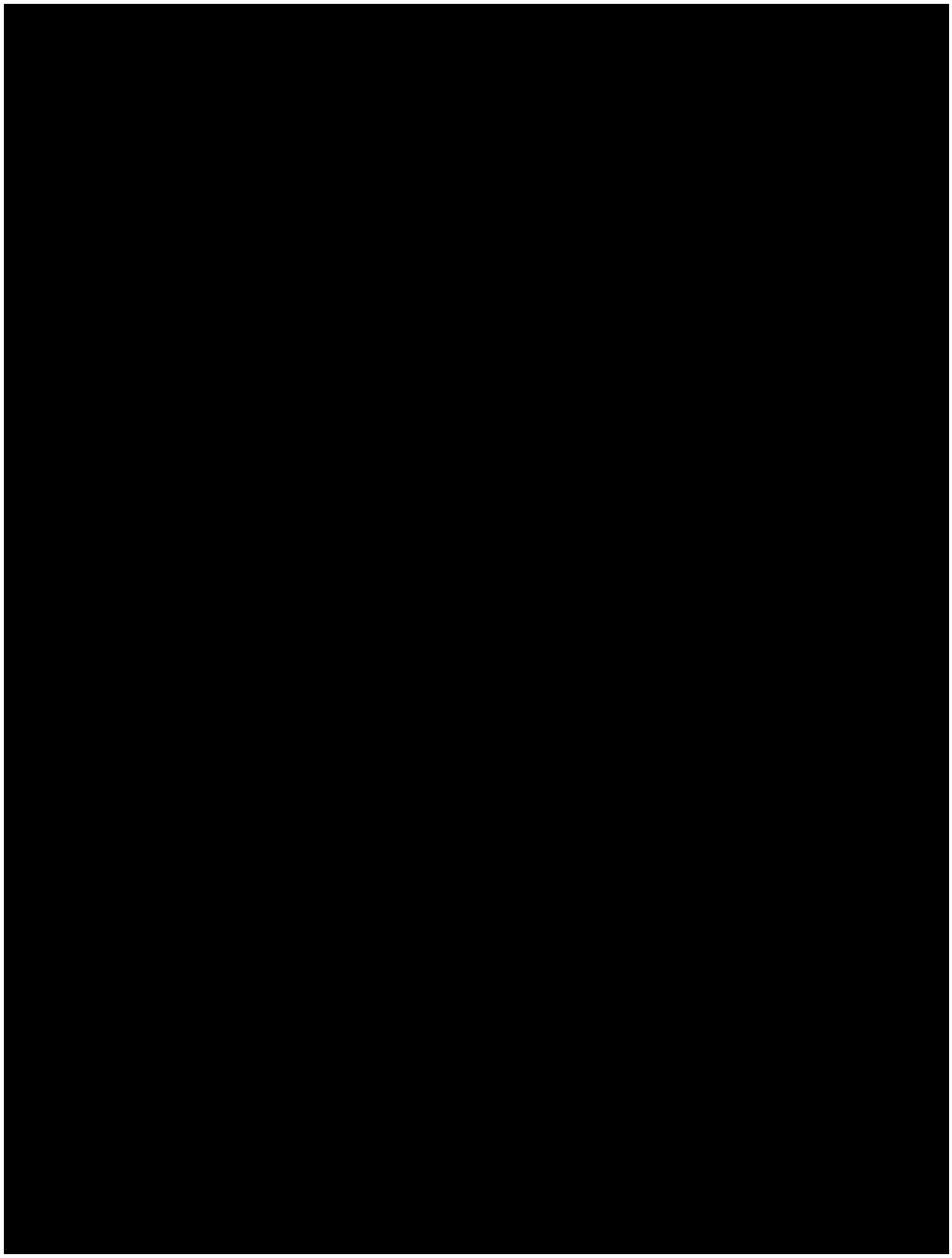


Figure 7: Boulder Encountered within Open Trench

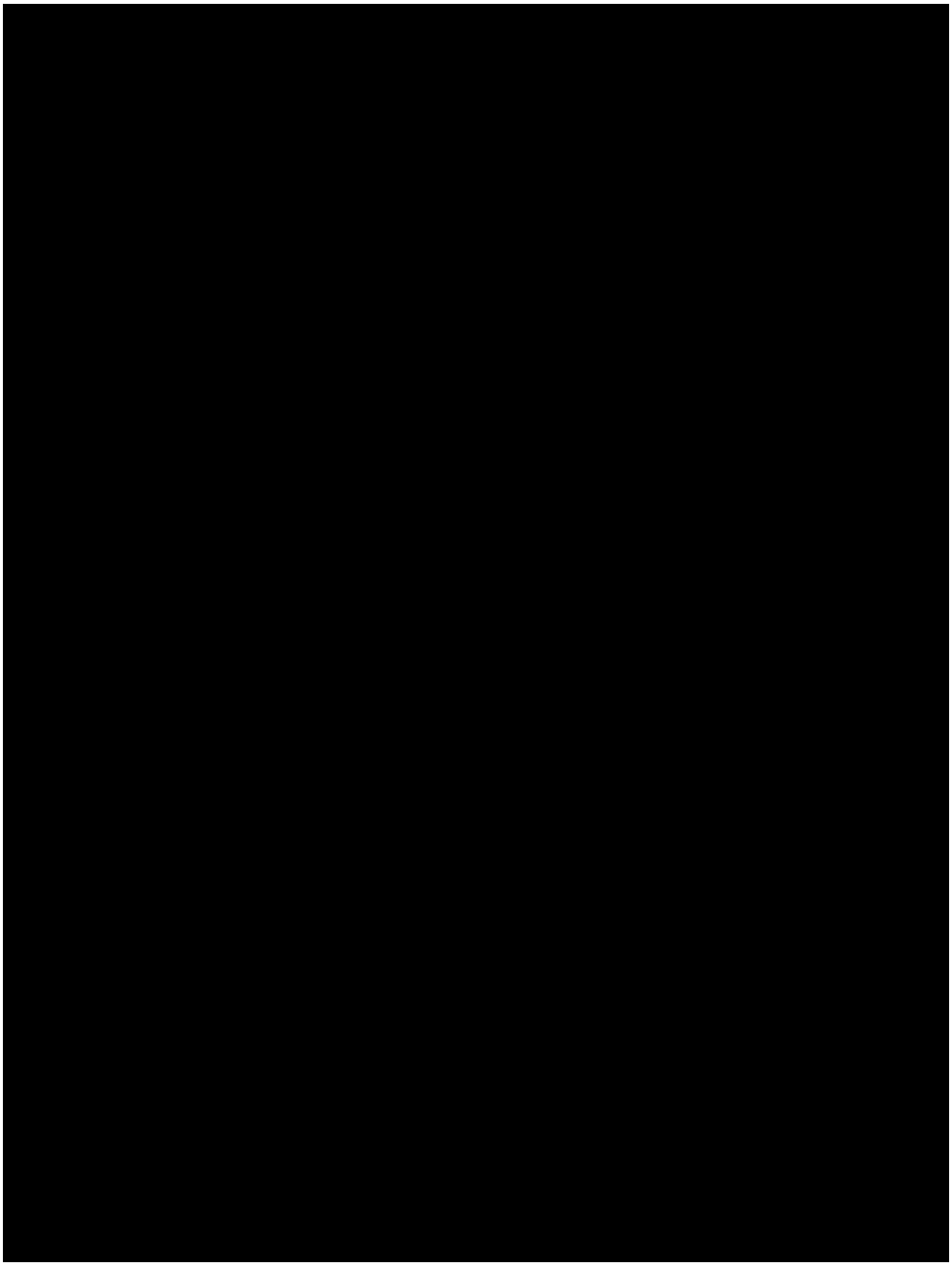


Figure 8: Additional Fire Prevention

Figure 9: Challenging HDD Activities through Granite Rock

Figure 10: HDD Cutting Head

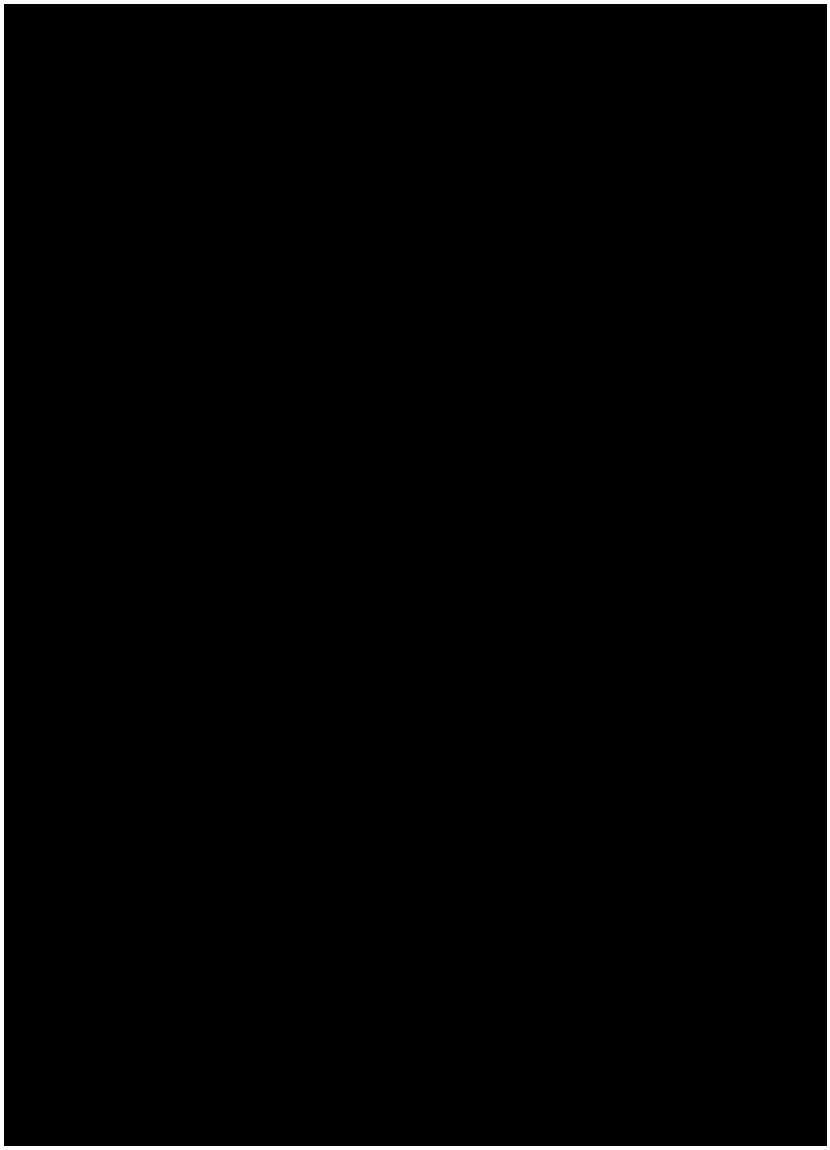


Figure 11: Damaged HDD Cutting Head – Cones Impacted During Drilling

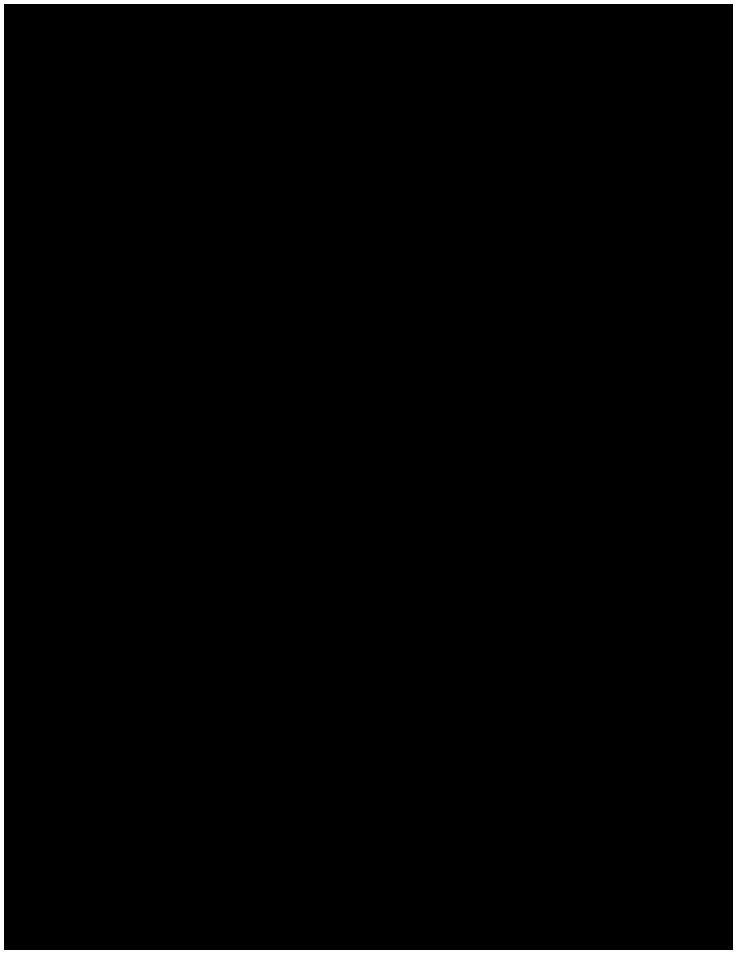
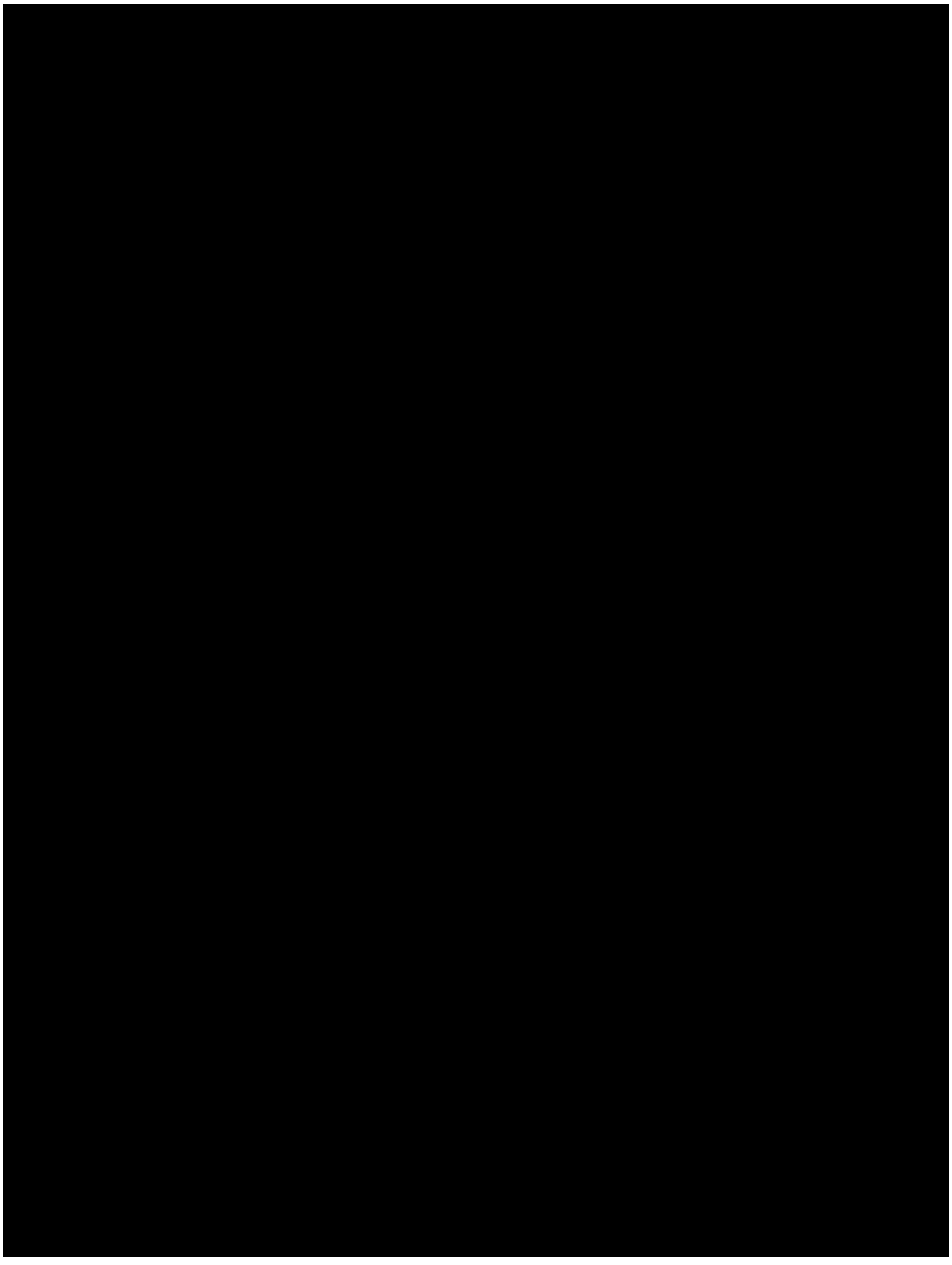


Figure 12: Reaming to Smooth Out HDD Granite Rock Opening for Pipe Installation



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, Optical Pipeline Monitoring (OPM)/ automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include restoration of north tie-in location at [redacted], final paving and surface restoration associated with the OPM station install and commissioning, tie over to existing regulator stations and pipeline cutouts within county roadways, final grind and cap paving of [redacted] and [redacted]. Additional work includes completion of all punch list items in coordination with county inspectors for county permit closeout. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines and restoration at one laydown yard off of [redacted]. The Caltrans yard at the north end remained to be used by and eventually restored by the Rice Canyon, Couser Canyon North, and Couser Canyon South projects.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Scope Changes: The Project Team actively negotiated with the Construction Contractor to minimize the total dollar amount of change orders for the Project, from an initial change order dollar amount of approximately $17,000,000.
2. Construction Execution: The Project Team coordinated with various stakeholders to maintain flow within Line 1600 by utilizing four double stopple bypasses instead of purchasing gas externally. Additionally, this ultimately eliminated curtailment of critical electrical generation generators during the Project, benefiting customers.
3. Permit Conditions:
   a. The Project Team coordinated with the Line 1600 Section 4 Couser Canyon South Hydrotest Project to utilize the same Caltrans workspace footprint, minimizing demobilization activities and delaying full restoration efforts for the Caltrans mitigation land. Complete restoration was finalized once the Line 1600 Section 4 Couser Canyon South Hydrotest Project was completed in July of 2024.
   b. The Project Team proactively requested an EPE from Caltrans to install un-encased pipeline within Caltrans Right of Way via open trench and HDD. This installation method is preferred due to increased safety throughout the life of the pipeline as well as minimized costs for the Project and long-term recurring maintenance.
4. Materials: The Project Team ordered [redacted] pipe in bulk, providing volume pricing.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $54,314,352. 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.

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 $87,655,851.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	3,626,033	2,424,144	(1,201,889)
Materials	4,628,644	6,900,876	2,272,232
Mechanical Construction Contractor	35,047,054	43,631,908	8,584,854
Electrical Contractor	0	1,761	1,761
Construction Management & Support	2,429,303	7,174,949	4,745,646
Environmental	2,437,578	3,191,412	753,834
Engineering & Design	4,071,369	6,514,543	2,443,174
Project Management & Services	4,032,115	3,679,210	(352,905)
ROW & Permits	1,126,011	1,080,090	(45,921)
Total Direct Costs	57,398,107	74,598,894	17,200,787

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[10]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	4,397,780	5,493,515	1,095,736
AFUDC	5,446,655	6,330,003	883,348
Property Taxes	1,333,593	1,233,439	(100,154)
Total Indirect Costs	11,178,027	13,056,957	1,878,930
Total Direct Costs	57,398,107	74,598,894	17,200,787
Total Loaded Costs	68,576,134	87,655,851	19,079,717

The Actual Full-Time Equivalents11 (FTEs) for this Project are 3.53.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

Due to land and easement acquisition constraints associated with finding a location for the replacement pipeline that was acceptable to both SDG&E and the land owners, the project team was required to shift approximately 5,000 feet of the final southern alignment. This design-driven change resulted more difficult construction, environmental conditions, and restoration effects, directly increasing construction scope and associated bid costs. The revised alignment required shifts in construction sequencing, additional restoration efforts, and environmental support and contributed to higher overall construction pricing reflected in the contractor's final bid.

Further project development, including detailed geotechnical investigations, soil borings, and updated survey work, supported the Horizontal Directional Drill (HDD) to cross Moosa Creek, but also revealed a significant presence of rock anticipated during construction. These unforeseen subsurface conditions increased anticipated construction complexity and costs. As a result, the total project cost was updated based on final contractor bid

pricing and a revised Total Installed Cost (TIC) estimate that reflects the refined design, procurement, and construction requirements identified through these efforts.

At the completion of the Line 1600 Section 5 [redacted] Replacement Project, Actual Direct Costs exceeded the preliminary estimate by $17,200,787. This variance is attributable to a variety of factors including:

1. Mechanical Construction Contractor:

    a. Activities to address or mitigate conditions encountered during construction are detailed in Section III, Part C and resulted in approximately $9,428,101 in change orders. Detailed change order information is provided below:

        i. During construction, the Project Team encountered increasingly challenging geotechnical conditions across all four HDD locations. The rock formations proved significantly harder than indicated in the original geotechnical reports, leading to an increase in HDD length, additional pilot bores, extended drilling durations—and therefore longer equipment rentals—extensive wear and damage to drilling tools, extended working hours, upgrades to larger drilling machinery, damage to test pipe segments, the application of secondary abrasive-resistant pipe coating, tertiary fiber-reinforced Composite pipe coating, and increased standby time. These conditions amounted to an additional cost of approximately $4,933,000. No other reasonable alternatives were available due to environmentally sensitive areas, community concerns and limitations of land rights.

ii. The Project adhered to a revised requirement in PHMSA's Code of Federal Regulations Part 192, which took effect during construction. The updated regulation mandated coating inspections for pipeline replacements exceeding 1,000 feet of backfilled length. To comply, ACVG surveys were performed to evaluate the post-construction condition of the new coating along this portion of Line 1600. These surveys verified that the coating on the newly installed pipe met applicable standards, although the existing coating at the tie-in points required significant abatement and recoating which added an increased cost of approximately $323,000.

iii. The Project Team coordinated closely with the Valley Center Municipal Water District and shifted for safety reasons from a proposed open-trench installation to an additional HDD crossing to protect nearby water lines. Also, during construction, two unmarked [redacted] storm drains were discovered, requiring extra excavation and welding to route the gas pipeline under the storm drains. These unknown features added $514,000 in costs.

iv. At the direction of the Valley Center Fire Department, the Project Team implemented enhanced fire-prevention measures during construction[12] by deploying Type 6 wildland engines and dedicated fire patrol personnel at each primary construction zone resulting in an increased cost of $1,140,000.

[12] This activity refers to construction of SDG&E Line 1600 and any costs are separate and distinct from SDG&E's Wildfire Prevention Plan. Wildfire Prevention and Mitigation costs associated with Line 1600 are recorded in the SDG&E SECCBA. Line 1600 costs are not part of any other SDG&E wildfire cost tracking and recovery.

v. The Project faced significant delays because two unaffiliated construction projects: SDG&E and the local Water District were both constructing pipelines and operating separate traffic control plans along the narrow two-lane [redacted], resulting in impacts to the community including emergency response times. As a result, the County of San Diego temporarily halted SDG&E's work for about four weeks while a revised plan was developed to improve overall traffic management for the community and public safety. The stricter updated requirements— including added message boards, modified work zones and hours, and enhanced procedures—resulted in an additional cost of $975,000.

vi. After the Project's temporary shutdown, and as a condition from the County for restarting work, one of the two pipeline crews was reassigned from daytime to nighttime shifts to reduce traffic disruptions and lessen impacts on the surrounding community, increasing construction costs by approximately $932,000.

vii. During the construction period, Hurricane Hilary brought severe weather and heavy rainfall, causing elevated water levels in Moosa Creek. As a result, several weeks of extensive dewatering with pumps were required for critical construction activities such as shoring, coating, welding, and backfilling, which added an increased cost of approximately $148,000.

2. Construction Management & Support:

a. Construction duration was originally estimated as 169 days, while actual duration was 290 working days with increased number of working hours per day, primarily due to groundwater, traffic control restrictions, and rocky subsurface conditions. This resulted in an approximate additional costs of $2,678,000 for inspectors, field engineers, and other construction management support.

3. Engineering & Design:
   a. Due to unanticipated field condition changes, construction sequencing adjustments, and increased construction work hours as identified in the Construction cost impacts section above (Section D.2.), engineering as-built survey support for Lilac construction increased from the originally planned one full time field crew to three full time field crews. These changes were driven by unexpected construction delays and logistical challenges associated with field design changes as well as supporting multiple concurrent construction crews working both day and night shifts. This elevated level of survey support exceeded the original budget basis and increased engineering costs by approximately $1,179,000.
   b. Additional engineering, geotechnical services, and survey work were required to support the evaluation of alternatives and execution of the HDDs. These efforts resulted in an increase to engineering and design costs of approximately $230,000.
   c. The Project Team coordinated with a private landowner to secure a suitable easement for Line 1600 pipeline and associated pressure regulation station. This required updates to the design, including a revised road-widening and grading plan for Hideaway Lake, and relocating the pressure regulation station to the slope side. This included surveying and southern route development. The costs associated with additional engineering, design, and surveying was approximately $180,000.

E. Disallowance

There was no disallowance for Line 1600 Section 5 [redacted] Replacement Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 5 [redacted] Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[13]. Through this Replacement Project, SDG&E successfully replaced 5.11 miles of previously existing pipeline with 6.002 miles of pipeline, in the San Diego County, including the installation of an OPM station and 6.002 miles of fiber optic cable, 0.034 miles of associated distribution piping, and the tie-over and/or replacement of multiple regulator stations within the segment. The total loaded cost of the Project is $87,655,851.

SDG&E executed this project prudently by rerouting the new pipeline to allow easier construction while avoiding environmentally sensitive lands and instead placing the new pipeline mostly within public ROW, allowing for easier construction during the Project.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, changing the gas handling for the Project to ultimately lower project costs, and coordinating with a neighboring Line 1600 Project to utilize the same jurisdictional footprint.

The Line 1600 Section 5 [redacted] Replacement Project was one of the largest and most challenging of all the Line 1600 Projects. Throughout the duration of the Project, the Project Team overcame various challenges and obstacles including multiple creek crossings within environmentally sensitive lands and limited workspace along the segment, open trench and bore installations through granite rock, heavy rainfall requiring extensive dewatering activities, traffic concerns due to the narrow roadway and limited workspace, as well as in-flight changes of permit conditions restricting work activities. The Project Team overcame each of these challenges by completing all necessary

[13] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

adjustments to the design and execution of the Project, ultimately delivering a successful Project.

End of Line 1600 Section 5 [redacted] Replacement Project Final Report

I. LINE 1600 SECTION 6 MOOSA CREEK HYDROTEST PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 6 Moosa Creek Hydrotest Project that consists of the hydrotest of 0.896 miles of previously existing pipeline, replacement of 829 feet of previously existing pipeline, and installation of one temporary bypass. The Project also included nine pipeline retrofit locations within this section. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $8,755,887.

The Line 1600 Section 6 Moosa Creek Hydrotest Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

Final Report for Line 1600 Section 6 Moosa Creek Hydrotest Project

Table 1: General Project Information

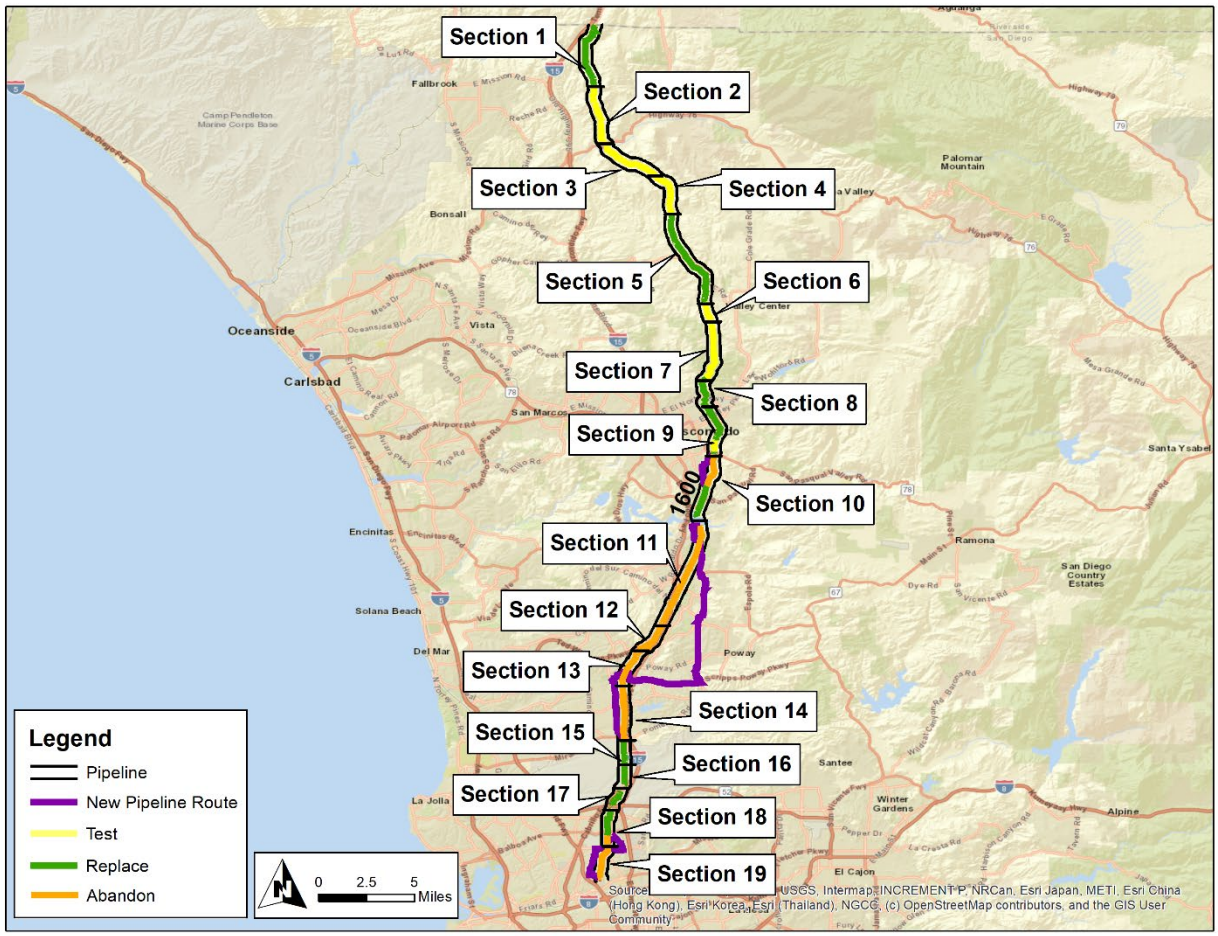
Project Name	Section 6 Moosa Creek		
Project Type	Hydrotest		
Length	1.022 miles		
Location	San Diego County		
Class	1 and 2		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage	[redacted]		
Construction Start	01/09/2023		
Construction Finish	04/28/2023		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS	[redacted]		
New SMYS[4]	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	6,344,110	2,411,777	8,755,887

[4] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

Final Report for Line 1600 Section 6 Moosa Creek Hydrotest Project

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



Final Report for Line 1600 Section 6 Moosa Creek Hydrotest Project

Figure 2: Satellite Image of Line 1600 Section 6 Moosa Creek Hydrotest Project

Final Report for Line 1600 Section 6 Moosa Creek Hydrotest Project

Figure 3: Overview Map of Line 1600 Section 6 Moosa Creek Hydrotest Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information

	Criteria	Accelerated[5]	Incidental	Total[6]
Final Mileage	0.001 mi.	1.017 mi.	0.004 mi.	1.022 mi.
	7 ft.	5,367 ft.	21 ft.	5,396 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E hydrotested the Section 6 Moosa Creek segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined hydrotesting the Section 6 Moosa Creek segment of Line 1600 as the most prudent option. During the Engineering, Design, and

[5] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[6] Values may not add to total due to rounding.

Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team hydrotested 0.896 miles of previously existing pipeline north of Mirar De Valle and Frace Lane.
   b. The Project Team included nine pipeline retrofit locations in order to improve the piggability of the line, mitigate integrity threats, and to increase pipeline accessibility prior to the hydrotest.
   c. The Project Team determined approximately 829 feet of existing [redacted] shallow pipe in a high-risk zone during pre-construction potholing. The Project replaced this segment of pipeline to align with current safety standards.
   d. The Project Team installed a temporary bypass to an existing regulator station to ensure that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained.
   e. Incidental mileage was included for the constructability of the hydrotest.
2. Final Project Scope: The final project scope consists of the hydrotest of 0.896 miles of previously existing pipeline, replacement of 829 feet of previously existing pipeline, nine retrofit locations, and installation of one temporary bypass. The Accelerated and Incidental mileages consists of 1.017 miles and 0.004 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that

influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded that the existing line could be shut-in during hydrotest of the pipeline by using a temporary bypass and supplemental CNG service to existing regulator stations.
2. Customer Impact: Per the gas transmission and distribution system analyses, the Project required maintenance of customer service by backfeeding with the use of CNG during the tie-in. In support of electric grid reliability, shutdowns and tie-ins had to be carefully coordinated to minimize curtailments to important local electric generating plants supplied by Line 1600.
3. Community Impact: The Project required traffic control for installation of the temporary bypass.
4. Schedule Coordination: The Project Team coordinated with the Line 1600 Section 7 Daley Ranch Hydrotest Project to combine both hydrotests into one single hydrotest. This reduced costs and minimized customer impact.
5. Permit Conditions: The Project Team obtained permits from San Diego County for encroachment and traffic control.
6. Substructures: No issues identified.
7. Land Use: The Project Team obtained temporary right of entry (TRE) agreements from private property landowners to access land for use as a laydown area.
8. Environmental:
    a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
    b. The Project Team identified the need for environmental screening for nesting birds prior to construction.
    c. The Project Team obtained environmental permits from the California Department of Fish and Wildlife, the Resource Water Quality Control Board, and the US Army Corps of Engineers.

9. Constructability: The Project Team was not able to utilize one originally selected location for temporary CNG. A backfeed test was performed on the pipeline system to determine that the system could be shut-in without use of CNG at that location.

C. Scope Changes

Through engineering, design, and planning activities, 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 coordinated with the Line 1600 Section 7 Daley Ranch Hydrotest Project, allowing for one continuous hydrotest between both Projects.
2. The Project Team increased the scope to replace 829 feet of previously existing pipeline due to its shallow installation depth in a high risk area.
3. The original Project scope and estimates incorporated the purchase of external gas to maintain customer feed and system reliability during the construction phase of the Project. During the detailed planning for Project, it was determined that the actual costs for this option were much higher than the original estimate and gas purchase was deemed an unreasonable option. Through extensive coordination, the Project Team was able to update the scope to include a combination of double stopple bypasses, CNG, and backfeed operations.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $3,358,320.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	01/09/2023
Construction Completion Date	04/28/2023
NOP Date	04/17/2023

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $503,000 in change orders.

1. Site Conditions:
   a. Extensive amounts of rain during construction resulted in reduced Construction Contractor productivity. Mitigation efforts resulted in additional water handling and storage, disposal costs, and mud removal.
   b. The Construction Contractor encountered areas of hard rock during excavation of the previously existing pipeline. A subcontractor was utilized to remove the rock without impacting the schedule, but labor costs were increased.

Figure 4: Open Trench Draining

Figure 5: Flooding of Open Trench

D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include restoration of pipeline right-of-way, final restoration of conditions at the 450 foot replacement at the greenhouses, newly installed bypass to Regulator Station 915, tie over to existing regulator stations and pipeline cutout within county roadways. Additional work includes completion of all punch list items in coordination with county inspectors for county permit closeout. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines and restoration at one laydown yard off [redacted].

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Scope Change:
   a. The Project Team replaced 829 feet of existing shallow pipe, avoiding additional future costs.
   b. The Project Team coordinated with the Line 1600 Section 7 Daley Ranch Hydrotest Project, allowing for one continuous hydrotest and reducing costs for both Projects.
2. Construction Execution:
   a. The Project Team coordinated with various stakeholders and the Line 1600 Section 5 [redacted] Replacement Project to maintain flow within Line 1600 by utilizing temporary bypass instead of purchasing gas externally.
   b. Additionally, this ultimately eliminated curtailment of critical electrical generation generators during the Project, benefiting customers.
3. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
4. Land Use: The Project shared a laydown yard with Line 1600 Section 5 [redacted] and Section 7 Daley Ranch Projects.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $10,626,105. 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.

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 $8,755,887.

Table 4: Estimated and Actual Direct Costs and Variances[7]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	1,569,211	698,903	(870,308)
Materials	181,967	215,943	33,976
Construction Contractor	3,358,320	3,379,089	20,769
Construction Management & Support	402,093	787,887	385,794
Environmental	1,018,893	615,764	(403,129)
Engineering & Design	367,027	901,925	534,898
Project Management & Services	3,509,231	685,121	(2,824,110)
ROW & Permits	219,364	69,940	(149,424)
Total Direct Costs	10,626,105	7,354,572	(3,271,534)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[8]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	1,711,855	844,413	(867,442)
AFUDC	53,278	533,259	479,981
Property Taxes	8,062	23,643	15,581
Total Indirect Costs	1,773,195	1,401,315	(371,880)
Total Direct Costs	10,626,105	7,354,572	(3,271,534)
Total Loaded Costs	12,399,300	8,755,887	(3,643,414)

The Actual Full-Time Equivalents[9] (FTEs) for this Project are 1.09.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 6 Moosa Creek Hydrotest Project, Actual Direct Costs were less than the preliminary estimate by $3,271,534. This variance can be attributed to a variety of factors including: the project was executed in coordination with Line 1600 Section 7 Daley Ranch, which allowed for shared design and planning resources, and reduced overall costs for construction, project management and environmental services; the original estimate accounted for purchasing gas through the Otay Mesa receipt point during the hydrotest outage duration, however the Project Team was able to readjust schedule to execute the project during off-peak season and would allow the San Diego Gas Fueled Electric Generators to be curtailed during the outage, significantly saving project costs.

E. Disallowance

There was no disallowance for Line 1600 Section 6 Moosa Creek Hydrotest Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 6 Moosa Creek Hydrotest Project consistent with the approved 2018 Line 1600 Test or Replacement Plan[10]. Through this Hydrotest Project, SDG&E successfully hydrotested 0.896 miles of previously existing pipeline, replaced 829 feet of previously existing pipeline, and performed nine retrofits at various pipeline locations. The total loaded cost of the Project is $8,755,887.

SDG&E executed this project prudently through installation of a bypass and use of temporary CNG to avoid major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered materials, coordinating with another Line 1600 Hydrotest Project to perform a combined hydrotest, sharing a laydown yard, and sharing a temporary bypass.

End of Line 1600 Section 6 Moosa Creek Hydrotest Project Final Report

[10] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor

I. LINE 1600 SECTION 7 DALEY RANCH HYDROTEST PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 7 Daley Ranch Hydrotest Project that consists of the hydrotest of 2.876 miles of previously existing pipeline and the replacement of 0.257 miles of previously existing pipeline with 0.262 miles of new pipeline. The Project also included 14 pipeline retrofit locations within this section. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $11,217,316.

The Line 1600 Section 7 Daley Ranch Hydrotest Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

Final Report for Line 1600 Section 7 Daley Ranch Hydrotest Project

Table 1: General Project Information

Project Name	Section 7 Daley Ranch		
Project Type	Hydrotest		
Length	3.138 miles		
Location	Escondido, San Diego		
Class	1 and 2		
MAOP	[redacted]		
Pipe Grade			
Wall Thickness			
Pipe Vintage[4]			
Construction Start	01/09/2023		
Construction Finish	05/04/2023		
Original Pipe Diameter			
Nominal Pipe Diameter			
Original SMYS			
New SMYS[5]			
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	8,685,664	2,531,653	11,217,316

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

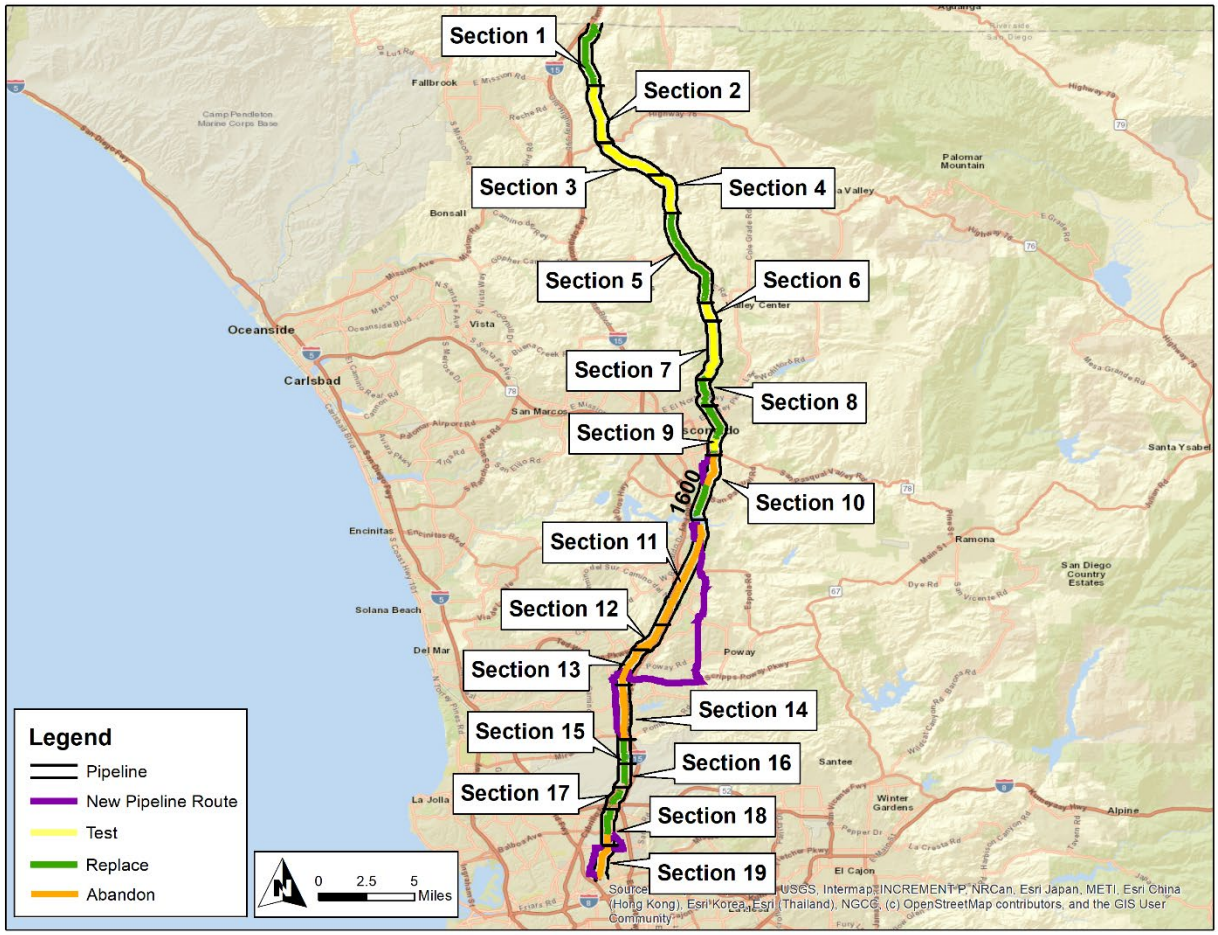


Figure 2: Satellite Image of Line 1600 Section 7 Daley Ranch Hydrotest Project

Final Report for Line 1600 Section 7 Daley Ranch Hydrotest Project

Figure 3: Overview Map of Line 1600 Section 7 Daley Ranch Hydrotest Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information

	Criteria	Accelerated[6]	New	Total[7]
Final Mileage	0.191 mi.	2.942 mi.	0.005 mi.	3.138 mi.
	1,013 ft.	16,161 ft.	0 ft.	17,174 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E hydrotested the Section 7 Daley Ranch segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined hydrotesting the Section 7 Daley Ranch segment of Line 1600 as the most prudent option. During the Engineering, Design, and

[6] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[7] Values may not add to total due to rounding.

Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team hydrotested 2.876 miles of previously existing pipeline in [redacted].
   b. The Project Team included 14 pipeline retrofit locations in order to increase the piggability of the line, mitigate integrity threats, and/or to improve pipeline accessibility prior to the hydrotest.
   c. The Project Team replaced 1,000 feet of existing [redacted] pipe located in an area that was reclassified as High Consequence Area (HCA) location during project execution, that caused that pipe to be reclassified as Category 4 Criteria pipe.
   d. The Project Team determined approximately 300 feet of existing [redacted] shallow pipe in a high-risk zone during pre-construction potholing. The Project Team replaced this segment of pipeline to align with current safety standards.
2. Final Project Scope: The final project scope consists of the hydrotest of 2.876 miles of previously existing pipeline, replacement of 0.257 miles of previously existing pipeline with 0.262 miles of new pipeline, and fourteen pipeline retrofit locations. The Accelerated mileage consists of 2.942 miles.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that

influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the existing line could be shut-in during hydrotest and replacement of the pipeline.
2. Customer Impact: Per the gas transmission and distribution system analyses, the Project Team identified no customers on this segment of the pipeline who would be impacted by the Project.
3. Community Impact: The Project Team worked to minimize impact and notified members of the public who use Daley Ranch as a hiking trail location that access would temporarily be limited.
4. Schedule Coordination: The Project Team coordinated with the Line 1600 Section 6 [redacted] Hydrotest Project to combine both hydrotests into one single hydrotest. This reduced costs and minimized customer impact.
5. Permit Conditions: The Project Team obtained an encroachment permit from the City of Escondido.
6. Substructures: No issues identified.
7. Land Use: The Project Team obtained temporary right of entry (TRE) agreements from private property landowners to access land for use as a laydown area
8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
   b. The Project Team identified the need for environmental screening for nesting birds prior to construction.
   c. The Project Team obtained environmental permits from the California Department of Fish and Wildlife, the Resource Water Quality Control Board, and the US Army Corps of Engineers.

C. Scope Changes

Through engineering, design, and planning activities, 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 coordinated with the Line 1600 Section 6 [redacted] Hydrotest Project, allowing for one continuous hydrotest between both Projects.

2. The Project Team increased the scope to replace 1,000 feet of previously existing pipeline due to reclassification of HCA areas, and replacement of approximately 300 feet of previously existing pipeline due to shallow installation depths in high-risk areas.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $4,226,191.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], which was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	01/09/2023
Construction Completion Date	05/04/2023
NOP Date	04/14/2023

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $1,798,000 in change orders.

1. Weather: Hurricane Hilary caused extreme weather conditions including heavy rainfall during the construction timeframe, leading to a rise in the flow of water in the area. This led to several weeks of extensive dewatering activities using pumps to achieve dry excavations for necessary construction activities including shoring, coating, welding, and backfill activities at this location. The rains also caused erosion of an access road to the construction site that required restoration to continue construction.
2. Field Design Changes: The Project Team determined that inspection of the pipeline was necessary, requiring expansion of four retrofit excavations to validate identified integrity threats.

Figure 4: Southern Tie-in

Final Report for Line 1600 Section 7 Daley Ranch Hydrotest Project

Figure 5: Southern Tie-in

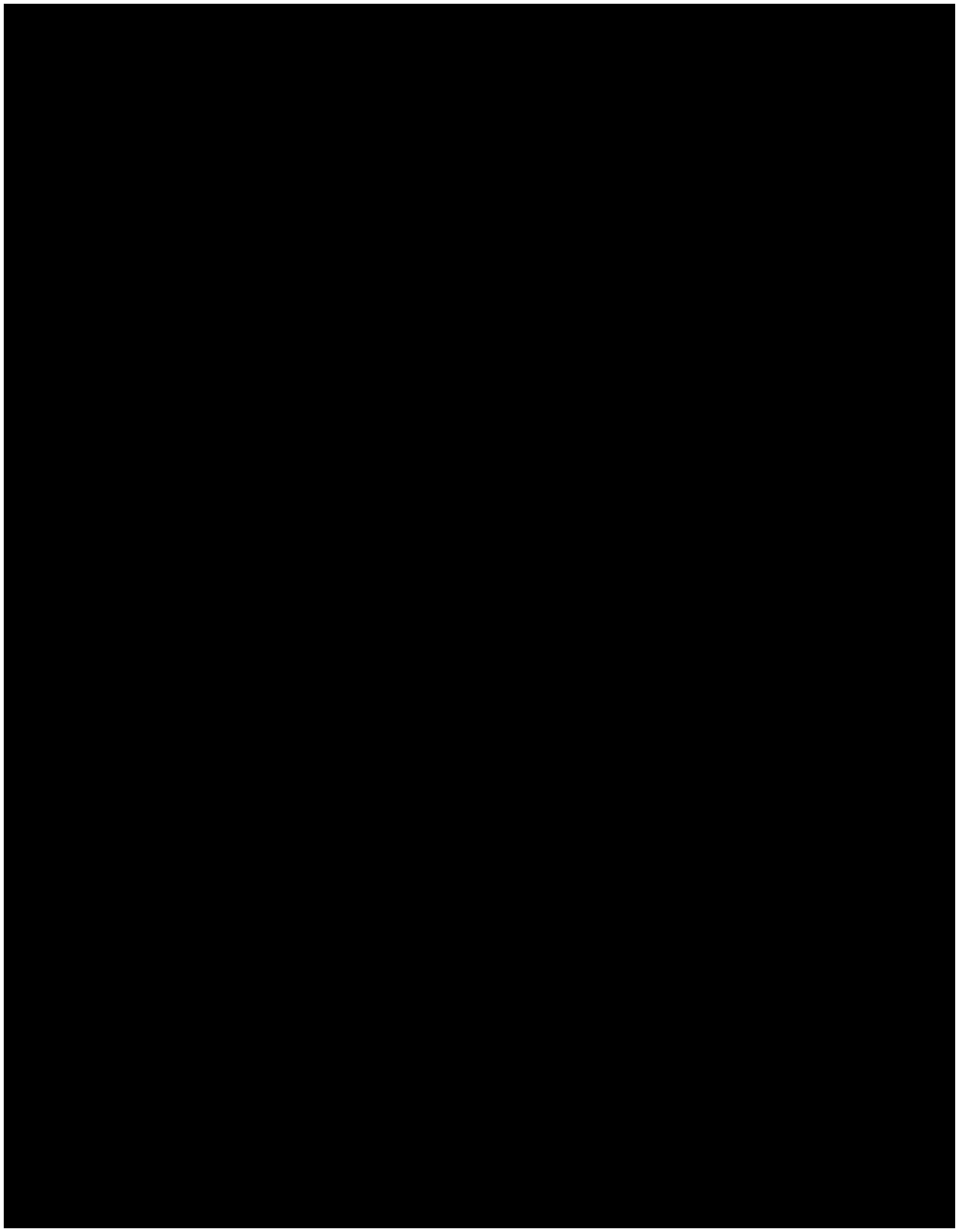


Figure 6: Road Repairs at [redacted]

Final Report for Line 1600 Section 7 Daley Ranch Hydrotest Project

Figure 7: Installation of Concrete Revetment Mats for Erosion Control

D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include restoration of conditions of the construction area near the Daley Ranch House, final paving and surface restoration of the Daley Ranch Dixon Lake parking lot, and pipeline cutouts along the Daley Ranch hiking trails and pipeline access road were impacted by construction. Additional work includes completion of all punch list items in coordination with county inspectors for county permit closeout. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines and restoration at one laydown yard off [redacted].

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Scope Change:
   a. The Project Team determined 300 feet of existing pipe installed in a high risk zone at a shallow depth near the south end of the pipeline. The Project Team made the decision to replace this segment of pipeline as the most cost effective means of remediation.
   b. The Project Team coordinated with the Line 1600 Section 6 [redacted] Hydrotest Project, allowing for one continuous hydrotest reducing costs for both Projects.
2. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe and fittings.
3. Land Use: The Project shared a laydown yard with Line 1600 Section 5 [redacted] and Section 6 [redacted] Projects.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $11,615,229. 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.

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 $11,217,316.

Table 4: Estimated and Actual Direct Costs and Variances[8]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	1,706,242	617,154	(1,089,088)
Materials	79,962	66,980	(12,982)
Construction Contractor	4,226,191	5,512,385	1,286,195
Construction Management & Support	414,409	810,927	396,518
Environmental	1,076,591	932,612	(143,979)
Engineering & Design	439,052	961,385	522,333
Project Management & Services	3,487,958	828,855	(2,659,103)
ROW & Permits	184,824	85,276	(99,548)
Total Direct Costs	11,615,229	9,815,574	(1,799,655)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[9]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	1,444,693	783,322	(661,370)
AFUDC	81,173	598,171	517,022
Property Taxes	14,626	20,225	5,599
Total Indirect Costs	1,540,492	1,401,742	(138,750)
Total Direct Costs	11,615,229	9,815,574	(1,799,655)
Total Loaded Costs	13,155,721	11,217,316	(1,938,405)

The Actual Full-Time Equivalents[10] (FTEs) for this Project are 0.94.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 7 Daley Ranch Hydrotest Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $1,799,655. This variance can be attributed to several factors including: the project was executed in coordination with Line 1600 Section 5 [redacted] and Line 1600 Section 6 [redacted], which allowed for shared design and planning resources and reduced overall costs for project management and services. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for Line 1600 Section 7 Daley Ranch Hydrotest Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 7 Daley Ranch Hydrotest Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[11]. Through this Hydrotest Project, SDG&E successfully hydrotested 2.876 miles of previously existing pipeline, replaced 0.257 miles of previously existing pipeline with 0.262 miles of new pipeline, and performed 14 pipeline retrofit locations. The total loaded cost of the Project is $11,217,316.

SDG&E executed this project prudently through coordinating with the Line 1600 Section 5 [redacted] Hydrotest Project to share construction efforts and minimize waste by performing a combined hydrotest.

SDG&E engaged in prudent cost avoidance efforts by replacing shallow pipe, utilizing volume pricing from bulk ordered pipe, and sharing construction efforts and laydown yards with the Line 1600 Section 6 [redacted] Hydrotest Project

End of Line 1600 Section 7 Daley Ranch Hydrotest Project Final Report

[11] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor

I. LINE 1600 SECTION 8 LA HONDA LINCOLN REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning at the San Diego/Riverside County line, and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 8 La Honda Lincoln Replacement Project that consists of the replacement of 1.511 miles of previously existing pipeline with approximately 1.645 miles of new pipeline along [redacted], in the City of Escondido and San Diego County. This Project also includes the replacement of one existing mainline valve (MLV), and the installation of 1.645 miles of fiber optic cable and associated equipment. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $39,502,984.

The Line 1600 Section 8 La Honda Lincoln Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	Section 8 La Honda Lincoln		
Project Type	Replacement		
Length	1.645 miles		
Location	Escondido, San Diego County		
Class	1 and 3		
MAOP	[redacted]		
Pipe Grade			
Wall Thickness			
Pipe Vintage[4]			
Construction Start	12/20/2021		
Construction Finish	01/12/2023		
Original Pipe Diameter			
Nominal Pipe Diameter			
Original SMYS[5]			
New SMYS			
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	39,502,984	0	39,502,984

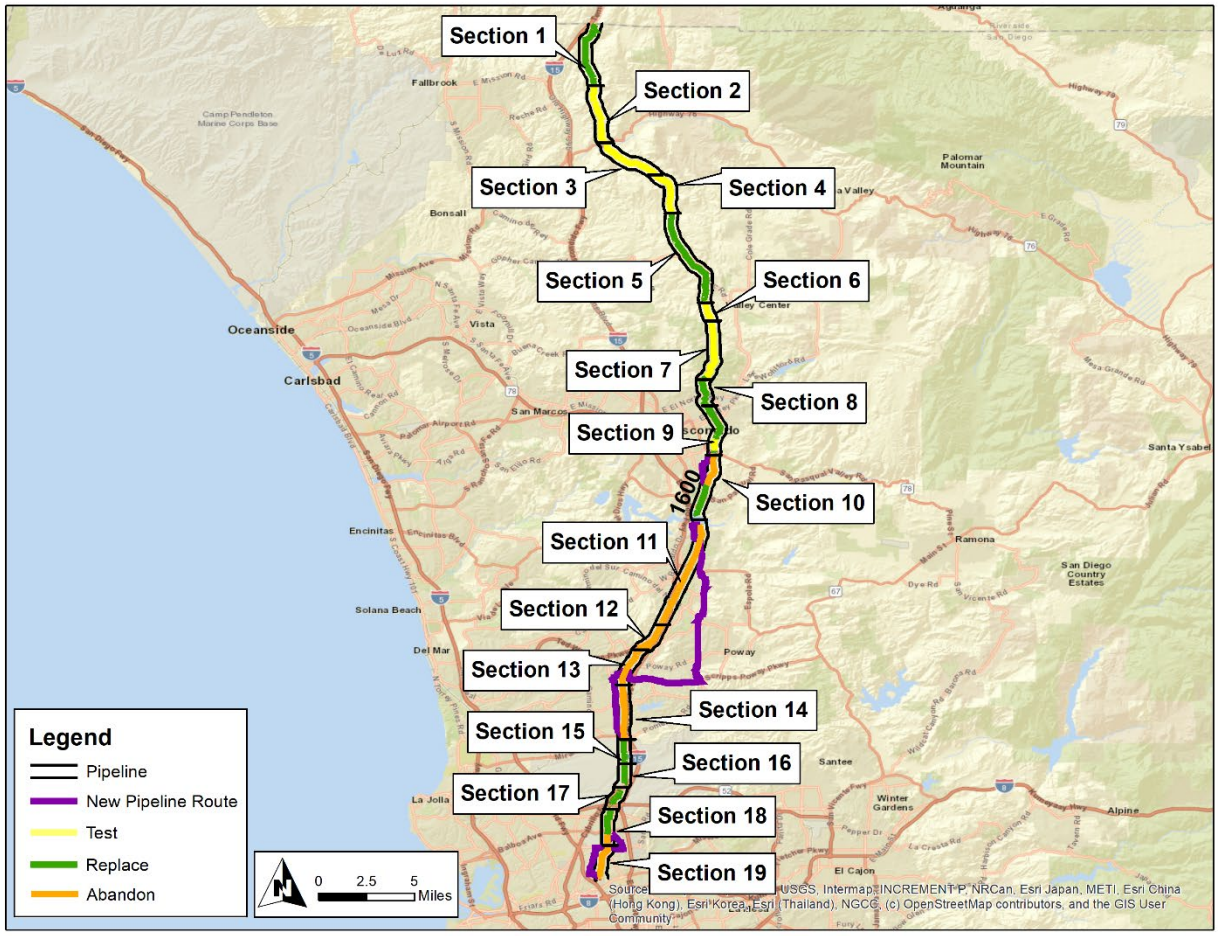
[4] Predominant pipeline vintage

[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 2: Satellite Image of Line 1600 Section 8 La Honda Lincoln Replacement Project

Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 3: Overview Map of Line 1600 Section 8 La Honda Lincoln Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	1.416 mi.	0.082 mi.	0.009 mi.	0.138 mi.	1.645 mi.
	7,446 ft.	432 ft.	48 ft.	729 ft.	8,686 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 8 La Honda Lincoln segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 8 La Honda Lincoln

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[8] Values may not add to total due to rounding.

segment of Line 1600 as the most prudent option. During the Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project replaced approximately 1.511 miles of previously existing pipeline with approximately 1.645 miles of new pipeline along [redacted].
   b. The Project replaced one existing automated MLV.
   c. The Project Team installed 1.645 miles of fiber optic cable and associated equipment, including an Optical Pipeline Monitoring (OPM) station, which oversees and communicates to Gas Control leak detection, early threat warning and continuously monitors for right-of-way intrusion, such as unanticipated third party digging.
   d. Accelerated and Incidental mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consists of a 1.511 mile Replacement with 1.645 miles of new pipeline, replacement of one automated MLV, as well as the installation of 1.645 miles of fiber optic cable and associated equipment. The Accelerated and Incidental mileages consist of 0.082 miles and 0.009 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that

influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained. The new pipeline alignment was designed to avoid private property and stay within existing franchise right of way (ROW).
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the previously existing pipeline could be shut-in, although system capacity would be temporarily reduced until the new pipeline was installed and energized.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project required coordination with customers served by the previously existing pipeline to provide backfed service and scheduled curtailments in order to minimize service downtime while the new pipeline was installed and customers were tied over. In support of electric grid reliability, shutdowns and tie-ins had to be carefully coordinated so as to minimize curtailments to important local electric generating plants supplied by Line 1600.
4. Community Impact: Multiple homes and businesses required advance notice and coordination for construction activities.
5. Valves: The Project Team identified that the location of the replacement MLV would require a new easement and significant land grading activities.
6. Schedule Coordination: The Project Team coordinated with other ongoing SDG&E projects to avoid any overlap that would result in major customer outages.
7. Substructures: No issues identified.
8. Traffic Control: No issues identified.
9. Land Use: The Project Team would realign new pipeline from the planned route due to challenges in obtaining necessary easements for the north tie-in location. This

increased the new pipe installation by 0.057 miles to replace an additional 0.041 miles of previously existing pipeline.

10. Permit Conditions:
    a. The Project Team obtained permits from the City of Escondido for encroachment and traffic control.
    b. The Project Team obtained permits from San Diego County for encroachment at the Hidden Valley access roadway.
11. Environmental:
    a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations
    b. The Project Team identified the need for environmental screening for nesting birds prior to construction.
    c. The Project Team obtained approval to discharge hydrotest and ground water in the City of Escondido. Water required contaminant testing prior to discharge.
    d. The Project Team obtained approval for their Storm Water Pollution Prevention Plan (SWPPP).
    e. The Project Team identified the need to remove multiple avocado trees at the north end of the pipeline alignment.

C. Scope Changes

Through engineering, design, and planning activities, SoCalGas/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 faced constraints with land and easement acquisition, requiring the tie-in location to be moved further north.

2. The new tie-in location and the MLV replacement site required additional grading, geotechnical assessment, and excavation of rock outcrops.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $17,673,581.
2. Construction Contractor's Estimate: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	12/20/2021
Construction Completion Date	01/12/2023
NOP Date	08/01/2022

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $2,800,000 in change orders.

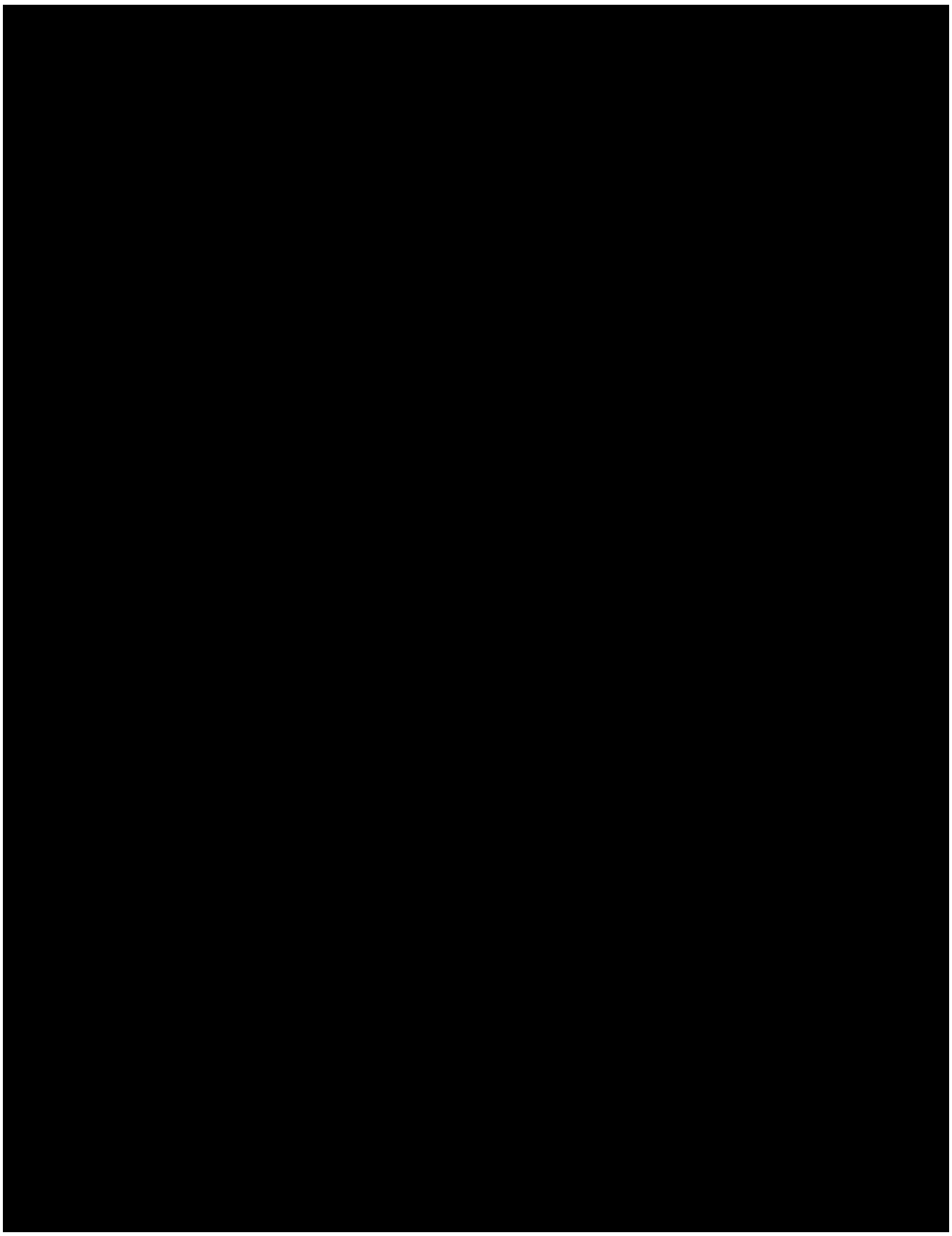
1. Customer Impact Mitigation: The Project Team needed to change construction sequencing for work on Hidden Valley Access Road due to Restricted Maintenance Operations (RMO) and isolation requirements. The new sequence allowed construction to continue but was less efficient.
2. Permits: The City of Escondido permit conditions required curb and pavement improvements and landscaping at the new MLV site on [redacted], requiring additional planning and construction.
3. Site Conditions: Extensive amounts of groundwater were encountered during construction along [redacted], resulting in reduced Construction Contractor productivity. Groundwater mitigation efforts also resulted in additional environmental monitoring, water handling and storage, water filtration equipment, and disposal costs.
4. Substructures: The City of Escondido revealed plans for future installation of new storm drains that conflicted with the location chosen for the new pipeline alignment. The Project Team redesigned the new pipeline installation to avoid the proposed storm drain alignment. In addition, the Construction Contractor performed work out of sequence at the request of the city, to accommodate conflicting city improvement projects in the vicinity. The realignment also resulted in the need to install the pipeline approximately 15 feet deep to maintain minimum separation from other substructures.

Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 4: Pipe Lowered into Trench on [redacted]

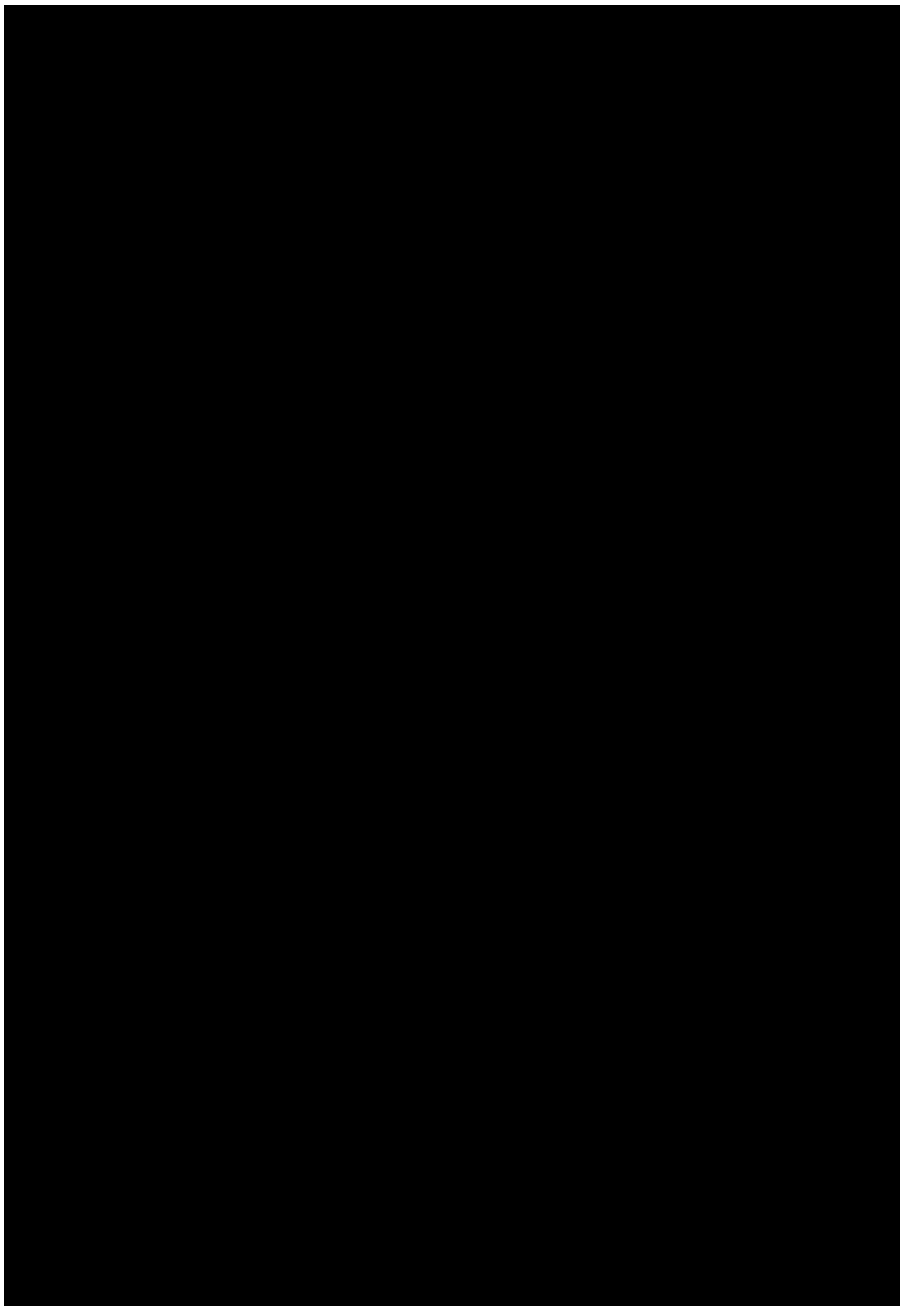
Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 5: [redacted] Narrow Right-of-Way with Rock Outcroppings



Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 6: Excessive Groundwater in Trench on [redacted]



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, Optical Pipeline Monitoring (OPM)/ automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include restoration at Hidden Valley pipeline access road, new mainline valve and OPM locations, final paving and surface restoration, permit closure with City of Escondido, final pavement grind and cap paving of [redacted]. Additional work includes completion of all punch list items such as curb and road repairs and new landscaping in coordination with city and county inspectors for closeout of city and county permits. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines and restoration at Lendee laydown yard previously used by Midway and Bear Valley projects.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Land Use: The Project Team moved the north tie-in location due to easement negotiations with private property owner, removing the possibility of condemnation and/or litigation costs.
3. Relocation Avoidance: The Project Team coordinated with the City of Escondido over future public works storm drain projects to avoid the need for future franchise relocation of Line 1600 at ratepayers' expense.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $27,557,361. 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.

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 $39,502,984.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	1,966,056	1,334,612	(631,445)
Materials	1,637,961	1,181,993	(455,968)
Mechanical Construction Contractor	14,559,021	20,071,321	5,512,300
Electrical Contractor	0	125,690	125,690
Construction Management & Support	2,083,133	3,576,367	1,548,234
Environmental	999,423	1,396,880	397,457
Engineering & Design	1,890,813	3,903,575	2,012,762
Project Management & Services	1,614,111	1,654,225	40,114
ROW & Permits	310,713	579,624	268,911
Total Direct Costs	25,006,232	33,824,287	8,818,055

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[10]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	3,134,974	3,271,117	136,143
AFUDC	1,839,604	2,033,244	193,640
Property Taxes	334,340	374,335	39,996
Total Indirect Costs	5,308,918	5,678,697	369,779
Total Direct Costs	25,006,232	33,824,287	8,818,055
Total Loaded Costs	30,315,150	39,502,984	9,187,834

[9] Values may not add to total due to rounding.
[10] Ibid

The Actual Full-Time Equivalents[11] (FTEs) for this Project are 1.09.

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

Due to land and easement acquisition constraints associated with finding a location for the replacement pipeline that was acceptable to both SDG&E and the land owner, the project team was required to shift the northern tie-in location farther north than originally planned. This field-driven change resulted in an additional 0.057 miles of new pipeline to be installed via open trench, directly increasing construction scope and associated bid costs. The added mileage and revised alignment required reassessment of constructability and contributed to higher overall construction pricing reflected in the contractor's final bid.

Further project development, including detailed geotechnical investigations, soil borings, and updated survey work, allowed for a more comprehensive grading plan but also

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

revealed a significant presence of rock anticipated during construction. These unforeseen subsurface conditions increased anticipated construction complexity and costs. As a result, the total project cost was updated based on final contractor bid pricing and a revised Total Installed Cost (TIC) estimate that reflects the refined design, procurement, and construction requirements identified through these efforts.

At the completion of the Line 1600 Section 8 La Honda Lincoln Replacement Project, Actual Direct Costs exceeded the preliminary estimate by $8,818,055. This variance is attributable to a variety of factors including:

1. Mechanical Construction Contractor:

    a. Activities to address or mitigate conditions encountered during construction are detailed in Section III, Part C and resulted in approximately $2,754,123 in change orders. Detailed change order information is provided below:

        i. Field conditions revealed groundwater volumes significantly greater than anticipated, which adversely affected excavation stability and reduced construction productivity. Elevated groundwater compromised the integrity of the excavation, necessitating the use of pump trucks to perform continuous dewatering in order to maintain safe working conditions. Despite these measures, the groundwater table remained higher than expected, requiring the excavation crew to modify planned excavation and shoring methods. Additional steel plates, shoring systems, and jacks were required to maintain trench stability. These unanticipated subsurface conditions led to an incremental construction cost increase of approximately $769,000.

ii. The Project Team discovered multiple unknown existing utilities with unidentified coatings. These utilities required work stoppages, resequencing, and treatment of coatings as asbestos until they were inspected. In a separate instance, the Project Team was directed to change the pipeline alignment to avoid conflicts with previously unidentified substructures encountered during trenching. Both issues resulted in additional labor, equipment standby, and installation, contributing to added project costs of approximately $59,000.

iii. The Project Team prepared the replacement pipeline right-of-way and constructed an access road to connect the La Honda Replacement Project to the original pipeline alignment associated with the Daley Ranch project within an existing avocado grove. The access road facilitated right-of-way preparation for pipeline installation and provided necessary access for construction activities and emergency response personnel. During detailed design, the access road proved to be more challenging than originally anticipated, due to geographical terrain and the geotechnical subsurface conditions. Safety and drainage enhancements not originally anticipated during initial project design included additional access road grading work, the installation of a safety cable railing system, and additional concrete swales to improve roadway stability and operational safety. These activities resulted in incremental costs of approximately $792,000.

iv. The Project Team was directed by the City of Escondido through their permitting requirements to perform multiple scope additions and revisions associated with the La Honda Mainline Valve (MLV) site and surrounding infrastructure. These requirements included expanded landscaping and irrigation work, additional water service trenching tied into City water systems, increased fencing and gate installations, and mandated street improvements along the MLV property, including main driveway access. The added scope also required coordination with approved permits, updated design documents, and compliance with City and DOT standards, resulting in additional grading, paving, guardrail installation, and utility connections. These changes resulted in a cost increase of approximately $562,000.

v. Additional post construction activities were required by the County of San Diego and included extensive restoration of the laydown yard and adjacent street infrastructure. Work included curb and gutter repair, slurry seal application, and construction of concrete and asphalt driveways in accordance with specified county standards and approved details. These requirements added construction activities and associated costs of approximately $127,000 to complete restoration.

vi. The Project Team was directed by the City of Escondido to modify the Nightingale drop section to avoid a conflict with a new storm drain being installed by the city. This directive required excavating an additional three feet in depth and extending the drop section by 43 feet to accommodate the storm drain alignment. These changes increased excavation effort, scope, and associated costs by approximately $235,000.

2. Construction Management & Support:
   a. Construction duration was originally estimated as 97 days, while actual duration was 152 working days with increased number of working hours per day, primarily due to ground water, rocky subsurface conditions, and scope increases for mainline valve and access road grading. This resulted in increased costs of approximately $1,228,000 for inspectors, field engineers, and other construction management support.
3. Engineering & Design:
   a. The Project utilized enhanced engineering and design, drafting, and 3D modeling during project closeout, using the company's new standard design software to improve accuracy, safety and integration into completion drawings. This resulted in an increase in engineering and design costs of approximately $99,000.
   b. Expanded geotechnical services for the La Honda segment were required due to extensive rock and groundwater conditions, unanticipated construction activities required by the city, and to prepare the pipeline right-of-way. These requests required additional soil borings, extended geotechnical testing and inspection services, and prolonged inspection durations at the MLV site and [redacted] access road due to extended construction timelines. The expanded scope also included added engineering and design support related to roadway grading, wall and erosion, material review, and updated survey staking files, resulting in increased costs of approximately $175,000.

c. The Project Team pursued a reroute of the Hidden Valley pipeline alignment after the property owner objected to the original route due to operational and future development concerns, resulting in selection of an alternative northern alignment. Additional design and engineering support was also required to facilitate easement acquisition efforts. Lastly, detailed as-built surveys and grading as-built drawings for the Hidden Valley access road and MLV site were necessary to satisfy City of Escondido and County permit closeout requirements and project documentation needs. These project changes amounted to increased costs of approximately $233,000.

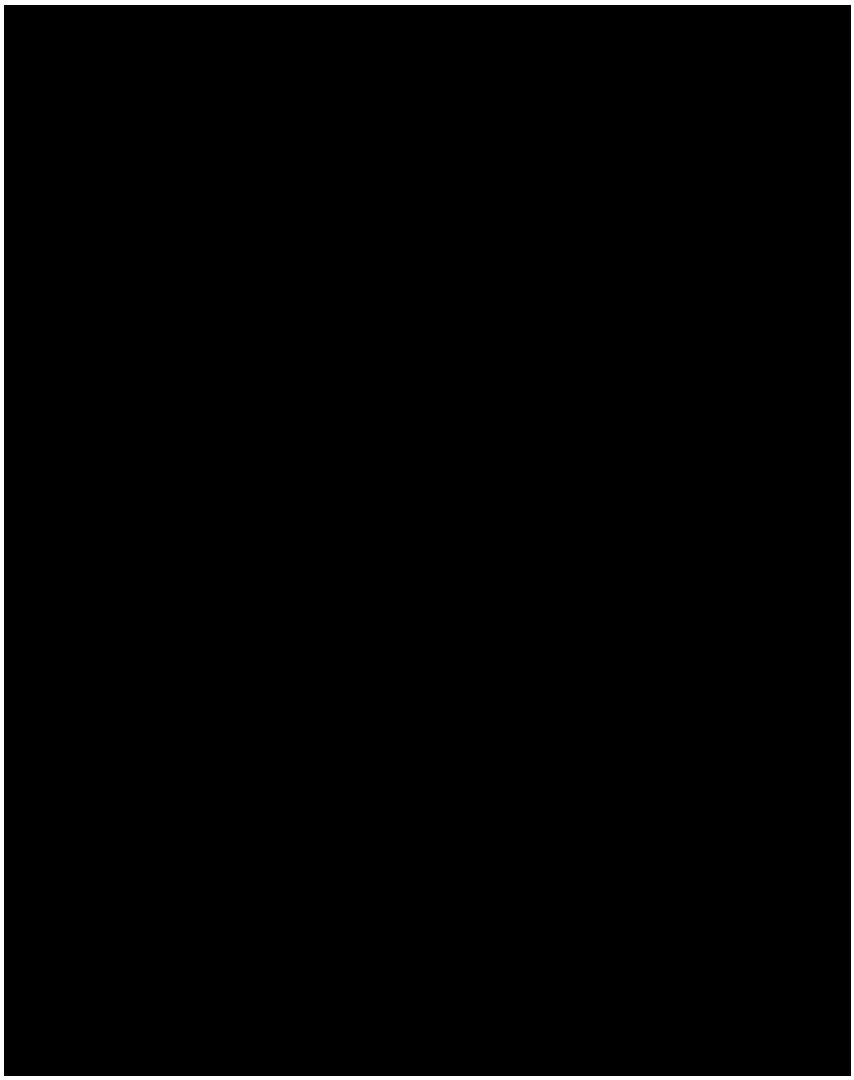
d. Additional design and engineering support was required for easement acquisition to advance plans for the MLV site beyond the original scope. This included progressing grading and retaining wall designs to a more advanced level, addressing multiple rounds of City comments on road widening permit plans, and preparing additional safety-driven guardrail design revisions. These added efforts exceeded initially budgeted support and resulted in increased costs of approximately $311,000 related to permitting, design refinement, and coordination with both the property owner and the City.

e. The Project encountered multiple conflicts with City storm drain plans and safety requirements that required route changes and design revisions. These conflicts led to rerouting the [redacted] pipeline, relocating an existing [redacted] gas line due to inadequate clearances, and resolving design discrepancies related to storm drain elevations. This resulted in expanded scope and added costs of approximately $182,000.

f. Extended construction durations required additional survey support beyond the original scope. As construction was delayed for about two months, continued survey services were needed to support ongoing staking, re-staking, grading, fencing, and close-out activities at both the MLV site and the Hidden Valley access road. These extended requirements resulted in added survey effort and increased project costs by approximately $244,000.

Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 7: Early Progress of the New Access Road at [redacted]



Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 8: New Guard Rail Installation on the Widened Road Near the MLV Site

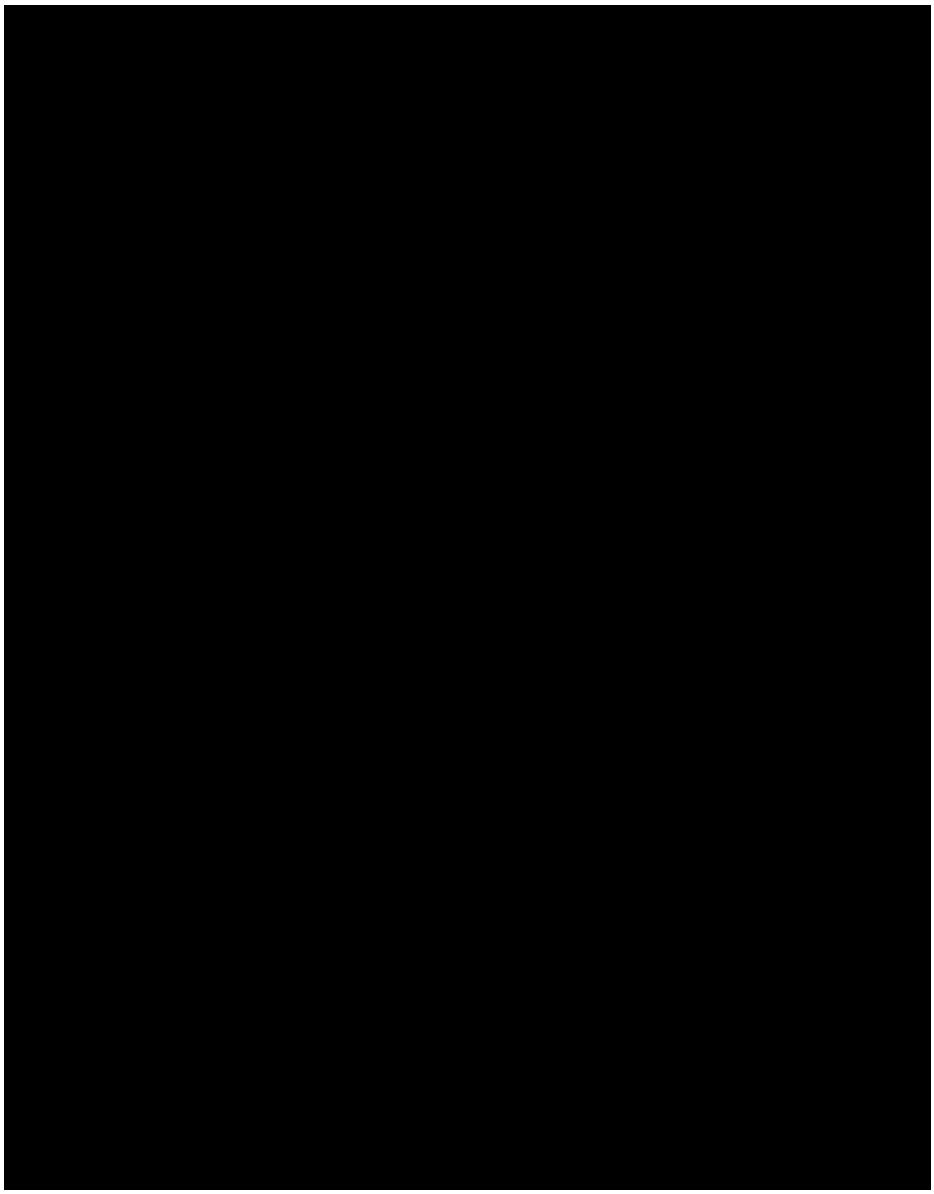


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Figure 9: Excavating Rock with Rock Wheel

Figure 10: Excavating Rock from Trench

Final Report for Line 1600 Section 8 La Honda Lincoln Replacement Project

Figure 11: Grading at the MLV Site

E. Disallowance

There was no disallowance for Line 1600 Section 8 La Honda Lincoln Replacement Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 8 La Honda Lincoln Replacement Project. Through this Replacement Project, SDG&E successfully replaced 1.511 miles of pipeline with 1.645 miles of pipeline in the City of Escondido and San Diego County, replaced one MLV, and installed an OPM station and 1.645 miles of fiber optic cable. The total loaded cost of the Project is $39,502,984.

SDG&E executed this project prudently by rerouting the new pipeline to allow easier construction and all-weather access while avoiding major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe and rerouting the new alignment to avoid private property.

End of Line 1600 Section 8 La Honda Lincoln Replacement Project Final Report

I. LINE 1600 SECTION 9 [redacted] REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 9 [redacted] Replacement Project, which consists of the replacement of 2.415 miles of previously existing pipeline with 2.487 miles of new pipeline, the hydrotest of 0.582 miles of previously existing pipeline, and removal of approximately 935 feet of previously existing pipeline along [redacted] within the City of Escondido and San Diego County. The post-completion pressure test was conducted in one continuous test rather than two, thus capturing approximately 950 feet of Incidental pipe avoiding the cost of two separate post-completion pressure tests. This Project also includes the installation 3.070 miles of fiber optic cable with the new pipeline. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $35,305,681.

The Line 1600 Section 9 [redacted] Replacement Project is a component of Line 1600, which was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	**Section 9 Midway Drive**		
Project Type	Replacement		
Length	3.070 miles		
Location	Escondido, San Diego County		
Class	[redacted]		
MAOP			
Pipe Grade			
Wall Thickness			
Pipe Vintage[4]			
Construction Start	02/11/2020		
Construction Finish	12/02/2020		
Original Pipe Diameter			
Nominal Pipe Diameter			
Original SMYS[5]			
New SMYS			
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	35,305,681	0	35,305,681

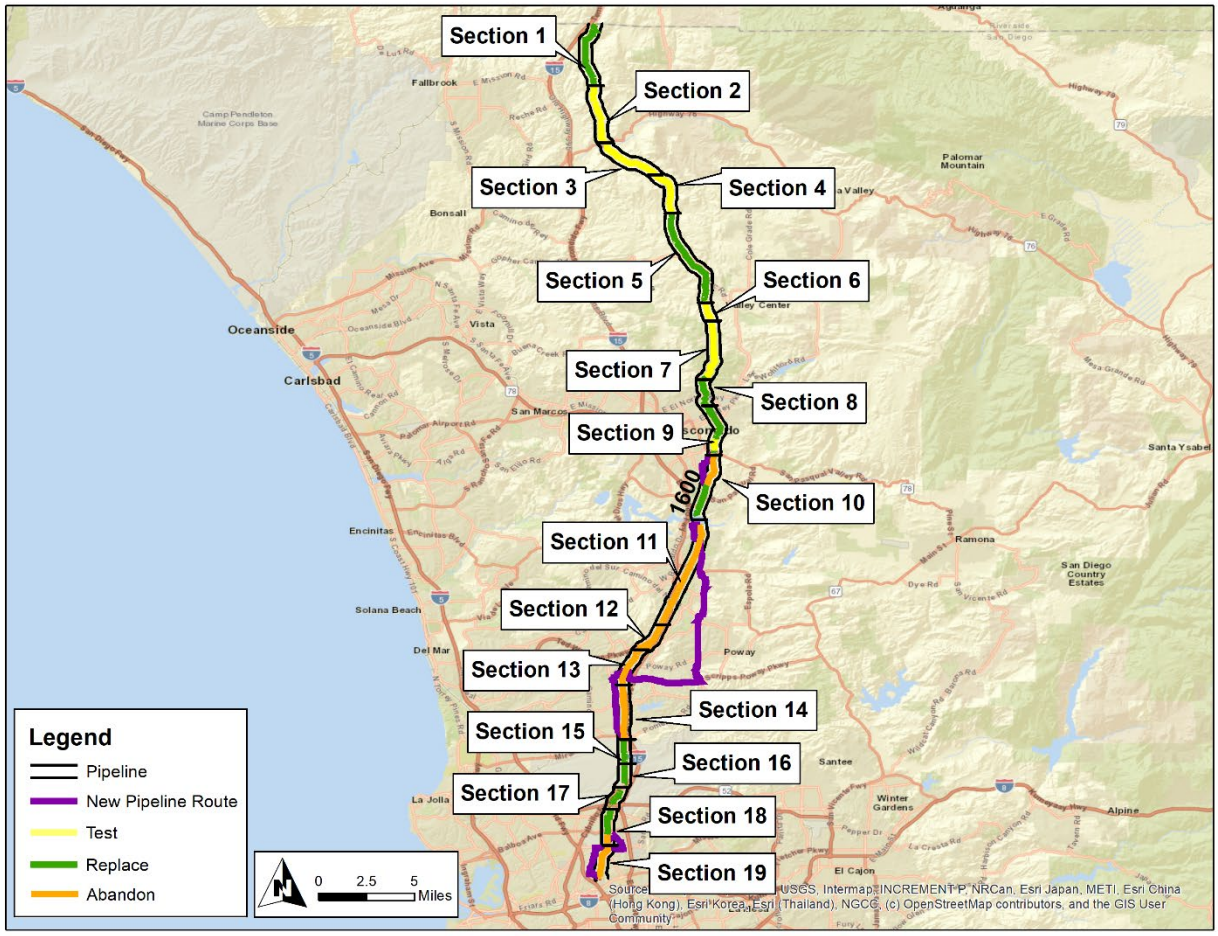
[3] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

[4] Predominant pipeline vintage.

[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



Final Report for Line 1600 Section 9 [redacted] Replacement Project

Figure 2: Satellite Image of Line 1600 Section 9 [redacted] Replacement Project

Final Report for Line 1600 Section 9 [redacted] Replacement Project

Figure 3: Overview Map of Line 1600 Section 9 [redacted] Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	2.314 mi.	0.030 mi.	0.653 mi.	0.072 mi.	3.070 mi.
	12,218 ft.	158 ft.	3,448 ft.	380 ft.	16,210 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 9 [redacted] segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing Section 9 [redacted] segment of Line 1600 as the most prudent option. During the Engineering, Design, and

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[8] Values may not add to total due to rounding.

Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced the previously existing pipeline in two separate segments. The northern segment will replace approximately 2.24 miles of pipe starting at the intersection of [redacted] within the City of Escondido, continuing south along [redacted]. The southern segment will replace 0.16 miles of pipe along [redacted], crossing Highway 78 and ending at an existing mainline valve (MLV).
   b. 0.582 miles of previously existing pipe bridges the gap between the northern and southern replacement segments. The Project hydrotested this segment during the final hydrotest of the newly installed pipeline.
   c. A portion of the northern replacement crossed the [redacted] by installing a new pipe span east of the existing bridge.
   d. The majority of the previously existing pipe was abandoned in place, and approximately 935 feet of the previously existing pipe was physically removed to assist in future maintenance and achieve minimum horizontal separation from existing substructures.
   e. The Project Team installed approximately 3.070 miles of fiber optic cable along the new and hydrotested pipeline segments.
   f. Incidental mileage was included to allow the post-completion pressure test to be executed in one continuous test rather than multiple tests. This avoided additional costs for land acquisition and test head materials.
2. Final Project Scope: The final project scope consists of a 2.415 mile Replacement and 0.582 mile Hydrotest of previously existing pipeline between the two segments of new pipeline. It also includes the removal of 935 feet of existing pipe and the installation of 3.070 miles of fiber optic cable. The Accelerated and Incidental mileages consist of 0.030 and 0.653 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded that an extended shut-in of the pipeline would reduce system capacity, requiring the curtailment of multiple electrical generation facilities served by the pipeline.
2. Customer Impact: Per the gas transmission and distribution system analyses, the Project required service be maintained to customers by advance coordination with the customer and California Independent System Operator (CAISO). Electrical generation facilities were temporarily curtailed during the isolation period to tie-in the new pipeline.
3. Community Impact: Multiple residents and businesses required advance notice and coordination for construction activities.
4. Substructures: The Project Team identified multiple utilities prior to construction and included them within the Project design. Initial design was rerouted to provide sufficient horizontal clearance from other existing utilities.
5. Permit Conditions: The Project Team obtained encroachment and traffic control permits from the City of Escondido, San Diego County, and Caltrans.
6. Land Use: The Project Team changed the pipeline alignment design for the crossing over Escondido Creek to stay within franchise boundaries.
7. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.

b. The Project Team obtained a permit to mitigate ground water. The Project removed approximately 800,000 gallons of water during construction.

8. Constructability: The Project Team determined that it was feasible and would be more efficient to perform the post-completion pressure test in one continuous test rather than two separate tests.

C. Scope Changes

Through engineering, design, and planning activities, SDG&E determined that changes in scope were appropriate for safety and constructability of the Project and to address engineering and field 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. Constructability: During surveying of the job location, it was determined that an existing bridge across the [redacted] could not be used for the new pipeline installation, requiring the installation of a pipeline span to cross the creek instead.
2. Customer Impact: The Project Team determined the need to install a bridled tap to another nearby gas pipeline to increase system reliability, that also required the adjustment of the final tie-in location and an increased pipeline installation of 23 feet.

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 to prepare cost estimates based on a more detailed engineering design package, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E determined that a Performance Partner procurement strategy was the most appropriate delivery method. This structure is intended to incentivize adherence to schedule and budget commitments, promote efficiencies in construction sequencing, and establish a balanced risk-sharing framework between SDG&E and the contractor. SDG&E awarded the construction contract to the Performance Partner.

1. SDG&E's Preliminary Construction Cost Estimate: SoCalGas/SDG&E's preliminary cost estimate for construction was $15,321,986.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	02/11/2020
Construction Completion Date	12/02/2020
NOP Date	10/10/2020

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $1,511,000 in change orders.

1. Permit Conditions: The City of Escondido requested that the street grinding and capping be extended from the original 8 feet width to 12 feet wide for the entire project, that was not included in the original Scope of Work.
2. Equipment Needs: The Construction Contractor required the use of additional steel plates and shoring to safely protect trenches affected by ground water.
3. Traffic: The City of Escondido requested that traffic control between [redacted] be extended due to heavy traffic, requiring the use of additional traffic control personnel.
4. Substructures: The Construction Contractor needed to perform more potholing than was agreed upon in the Scope of Work, causing an increase in labor costs.
5. Schedule Delay: The Construction Contractor required additional field supervision personnel due to delays primarily caused by ground water mitigation requirements, additional potholing, and inclement weather.

Final Report for Line 1600 Section 9 [redacted] Replacement Project

Figure 4: Preparation for Installing Fiber Optic Cable

Final Report for Line 1600 Section 9 [redacted] Replacement Project

Figure 5: Installing New Pipe Span across [redacted]

Final Report for Line 1600 Section 9 [redacted] Replacement Project

Figure 6: Restoration and Final Paving along [redacted]

Final Report for Line 1600 Section 9 [redacted] Replacement Project

Figure 7: Paving and Site Restoration Activities

D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include final paving and surface restoration of span locations as well as final painting of the above ground span, and final cap and grind paving of [redacted]. Site demobilization includes removal of all equipment and environmental BMPs at project work sites. The Lendee yard remained to be used by the Bear Valley and La Honda projects and was eventually restored by the La Honda project.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Construction Execution: Only one hydrotest was performed for the two segments of replaced pipeline, resulting in the hydrotest of 0.59 miles of Incidental pipe and avoiding the need for multiple hydrotest operations.
3. Permit Conditions: The Project Team obtained a policy exemption from Caltrans to allow for the open trench installation of uncased pipe across Highway 78, removing the need for more costly trenchless installation.
4. Schedule Coordination: The schedule was designed to not construct on [redacted] until March 2020, avoiding a street moratorium to expire and removing associated paving and restoration costs.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $29,822,931. 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.

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 $35,305,681.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals[10]	Delta Over/(Under)
Company Labor	2,577,336	1,586,618	(990,717)
Materials	890,894	1,341,173	450,279
Mechanical Construction Contractor	18,347,541	17,980,177	(367,364)
Electrical contractor	0	29,083	29,083
Construction Management & Support	1,410,120	2,875,531	1,465,411
Environmental	1,151,937	1,951,616	499,679
Engineering & Design	2,064,704	2,469,861	(39,728)
Project Management & Services	2,151,485	1,299,209	(852,275)
ROW & Permits	784,031	424,180	(359,850)
Total Direct Costs	29,822,931	29,957,449	134,517

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[11]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	4,880,097	3,444,582	(1,435,515)
AFUDC	1,440,857	1,644,638	203,781
Property Taxes	259,012	259,012	0
Total Indirect Costs	6,579,966	5348,232	(1,231,734)
Total Direct Costs	29,822,931	29,957,449	134,518
Total Loaded Costs	36,402,897	35,305,681	(1,097,217)

[9] Values may not add to total due to rounding.
[10] Actual Material and Construction Contractor costs exclude the cost of upsizing the pipe.
[11] Values may not add to total due to rounding.

The Actual Full-Time Equivalents[12] (FTEs) for this Project are 7.86.

D. Cost Impacts

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

At the completion of the Line 1600 Section 9 [redacted] Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

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

E. Disallowance

There was no disallowance for Line 1600 Section 9 [redacted] as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 9 [redacted] Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[13]. Through this Replacement Project, SDG&E successfully replaced 2.415 miles, hydrotested 0.582 miles within the post-completion hydrotest, and removed 935 feet of previously existing pipeline in the City of Escondido and San Diego County, including the installation of 3.070 miles of fiber optic cable. The total loaded cost of the Project is $35,305,681.

SDG&E executed this project prudently through minimizing community impacts, conducting the post-completion pressure test in one continuous test rather than two, and improving safety by executing this Project as a replacement rather than a hydrotest project.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, testing incidental pipe to avoid multiple hydrotest operations, obtaining Caltrans exemptions to allow open trench installation, and avoiding the need to install pipe during a street paving moratorium.

End of Line 1600 Section 9 [redacted] Replacement Project Final Report

[13] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor

I. LINE 1600 SECTION 10 BEAR VALLEY REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 10 Bear Valley Replacement Project that consists of the replacement of 3.498 miles of previously existing pipeline with approximately 3.591 miles of new pipeline along [redacted] between [redacted] and [redacted]. This Project also includes the tie over of two existing regulator stations, the removal of one regulator station, and installation of 3.591 miles of fiber optic cable. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $41,116,300.

The Line 1600 Section 10 Bear Valley Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

Table 1: General Project Information

Project Name	Section 10		
Project Type	Replacement		
Length	3.591 miles		
Location	Escondido, San Diego		
Class	[redacted]		
MAOP			
Pipe Grade			
Wall Thickness			
Pipe Vintage[4]			
Construction Start	11/16/2020		
Construction Finish	08/06/2021		
Original Pipe Diameter			
Nominal Pipe Diameter			
Original SMYS[5]			
New SMYS			
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	41,037,724	78,576	41,116,300

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

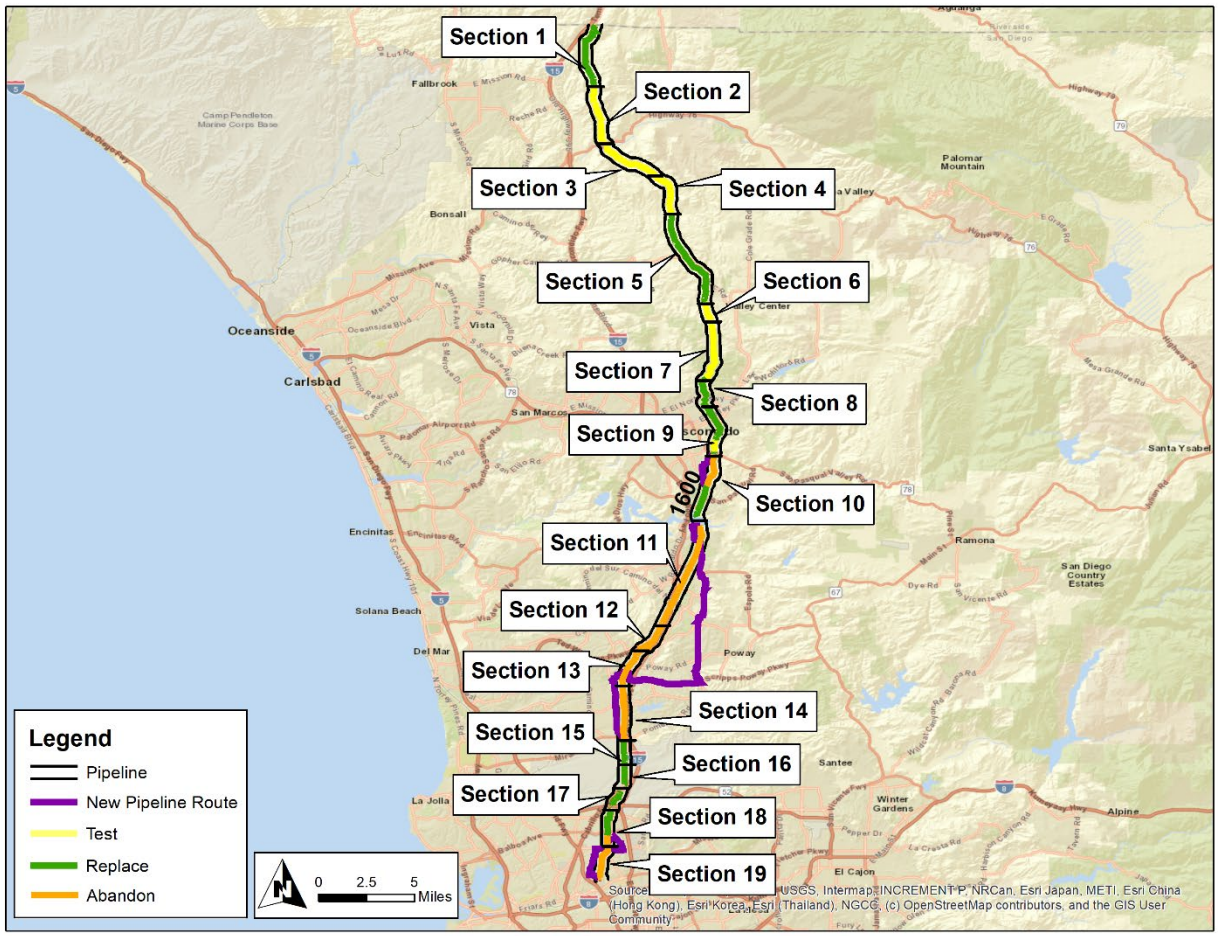


Figure 2: Satellite Image of Line 1600 Section 10 Bear Valley Replacement Project

Final Report for Line 1600 Section 10 Bear Valley Replacement Project

Figure 3: Overview Map of Line 1600 Section 10 Bear Valley Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	3.189 mi.	0.307 mi.	0.001 mi.	0.093 mi.	3.591 mi.
	16,840 ft.	1,620 ft.	5 ft.	491 ft.	18,960 ft.

SDG&E provided the Line 1600 Test or Replacement Plan[9] to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 10 Bear Valley segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 10 Bear Valley segment of Line 1600 as the most prudent option. During the Engineering, Design, and

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[8] Values may not add to total due to rounding.

[9] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project consisted of replacement of 3.498 miles of previously existing pipeline and installing 3.591 miles of new pipeline along [redacted] between [redacted]. The Project Team then hydrotested the newly installed pipeline after installation.
   b. The Project Team tied over two existing regulator stations from the previously existing pipeline to the new pipeline.
   c. The Project Team removed one existing regulator station from service.
   d. The Project Team installed 3.591 miles of fiber optic cable along the length of the new pipeline.
   e. Incidental mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consists of a 3.498 mile replacement with 3.591 miles of new pipeline, tie-over of two existing regulator stations, the removal of one existing regulator station, and the installation of 3.591 miles of fiber optic cable. The Accelerated and Incidental mileages consist of 0.307 miles and 0.001 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained.

2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded that the line could be shut-in during construction.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project Team determined that the Project would cause no customer impacts.
4. Community Impact: Multiple homes and businesses require advance notice and coordination for construction activities.
5. Schedule Coordination: The Project Team coordinated with another SDG&E project in the area to utilize an existing laydown yard.
6. Substructures: The Project Team identified multiple substructures prior to construction, that were incorporated into the design.
7. Permit Conditions:
   a. The Project Team obtained permits from the City of San Diego for Temporary Right of Entry on property owned by the City.
   b. The Project Team obtained permits from the County of San Diego for encroachment and traffic control.
   c. The Project Team obtained permits from the City of Escondido for encroachment and traffic control.
   d. The Project Team obtained a permit from Caltrans for traffic control.
8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline tie-in locations, test head locations, span locations, as well as grout fill locations.
   b. The Project Team anticipated encountering groundwater and utilized vacuum trucks to manage groundwater encountered within the excavations.

C. Scope Changes

Through engineering, design, and planning activities, SDG&E determined that changes in scope were appropriate for safety and constructability of the Project and to address engineering and field 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 identified the need for soil compaction, traffic control, and street repairs that increased permitting requirements for the Project.
2. In certain areas along the pipeline route installation was in close proximity to the existing in-service Line 1600 pipeline in a narrow right of way, that required increased potholing and plating for heavy equipment for safety reasons.
3. The Project Team determined the need to utilize a saw trencher to increase production in certain segments of the pipeline installation.
4. The Project originally planned to install fiber optic line across [redacted], but the job scope was updated to install a fiber optic station within the Line 1600 Section 8 La Honda Lincoln Replacement Project due to land rights and environmental considerations preventing construction of the Lake crossing.

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 to prepare cost estimates based on a more detailed engineering design package, which included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E determined that a Performance Partner procurement strategy was the most appropriate delivery method. This structure is intended to incentivize adherence to schedule and budget commitments, promote efficiencies in construction sequencing, and establish a balanced risk-sharing framework between SDG&E and the contractor. SDG&E awarded the construction contract to the Performance Partner after submittal of its Target Price Estimate (TPE).

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $18,966,348.
2. Construction Contractor's: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	11/16/2020
Construction Completion Date	07/28/2021
NOP Date	07/06/2021

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $1,380,000 in change orders.

1. Traffic Control: Due to permit requirements for traffic control, the Construction Contractor was required to perform work at night, that increased labor costs.
2. Construction Impacts: Additional costs for security, site facility rent, and overhead costs due to schedule delays were included as a change order.
3. Site Conditions: The Project Team encountered blue granite rock in excavation locations, requiring additional time and equipment for rock splitting and soil removal.
4. RMO: Restricted Maintenance Orders caused by severe weather caused delays in construction for a combined total of 20 days, increasing total costs to the Project.

Figure 4: Trench along [redacted] with Shoring

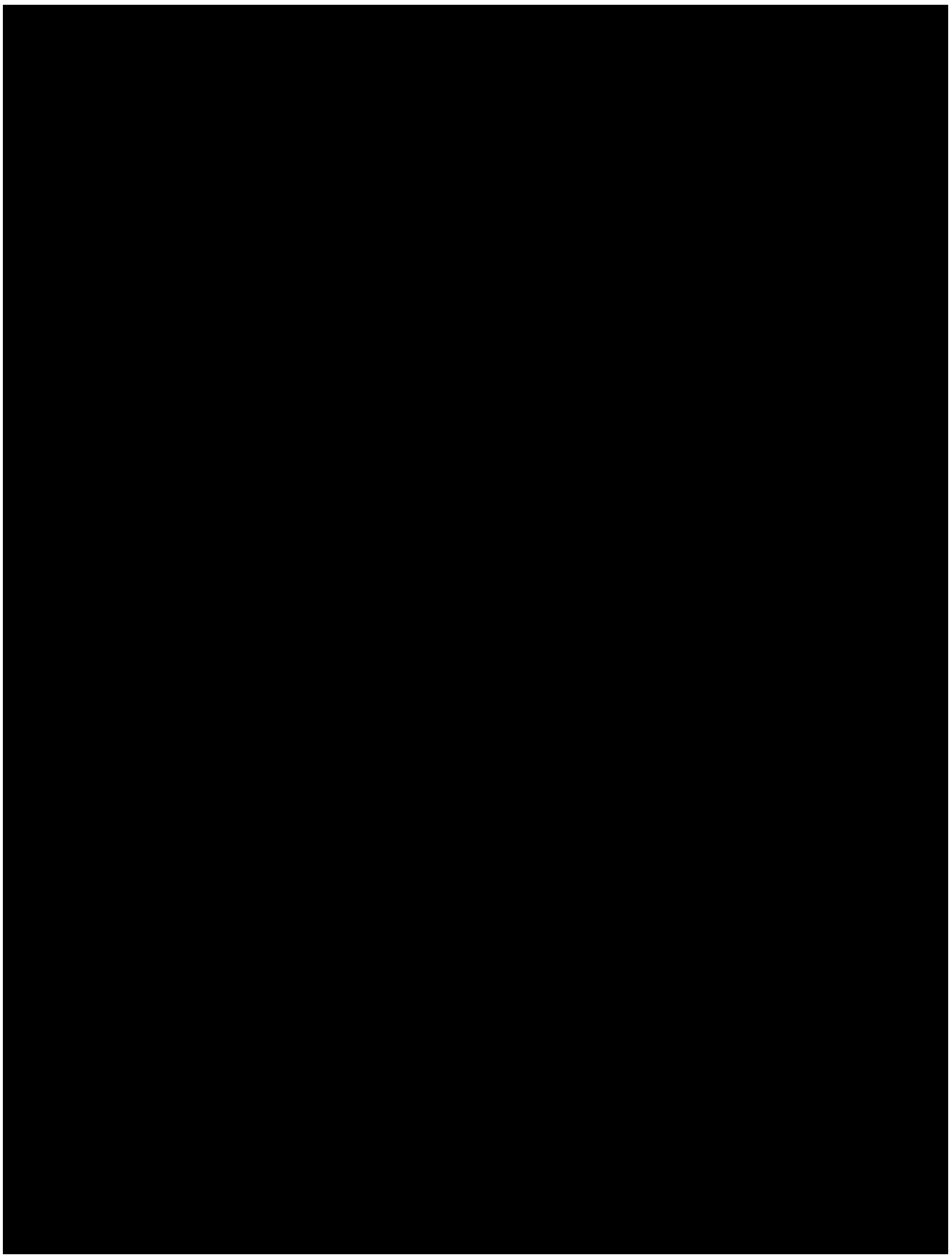


Figure 5: Hard Rock Encountered Requiring Use of Rock Breaker

Figure 6: Fiber Optic Installation in Trench

Figure 7: Trench Backfill and Warning Tape

D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include restoration at north tie-in at existing MLV 1605 station and environmental restoration including hydroseeding of areas along [redacted] that were impacted by construction, as well as final paving and surface restoration associated with the tie over to existing regulator stations, final cap and grind paving of [redacted]. Site demobilization includes removal of all equipment and environmental BMPs at project work sites. The Lendee yard remained to be used by the La Honda project and was eventually restored by the La Honda project.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Permit Conditions: The Project Team negotiated with the City of San Diego to allow temporary patching after potholing activity until the end of construction.
3. Land Use: The Project Team planned the alignment to avoid community impacts and the need to acquire property from the City of San Diego.
4. Work Hours: The Project Team was able to negotiate with Escondido to allow work during school hours, removing the need for potential night work in some areas.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $32,594,730. 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.

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 $41,116,300.

Table 4: Estimated and Actual Direct Costs and Variances[10]

Direct Costs ($)	Estimate	Actuals[11]	Delta Over/(Under)
Company Labor	2,699,556	1,368,858	(1,330,698)
Materials	1,486,909	1,105,766	(381,143)
Construction Contractor	18,966,348	23,268,442	4,302,094
Construction Management & Support	1,393,807	3,388,437	1,994,630
Environmental	1,256,547	1,972,348	715,801
Engineering & Design	2,361,523	2,553,112	191,589
Project Management & Services	3,351,952	1,659,411	(1,692,540)
ROW & Permits	1,078,088	465,587	(612,501)
Total Direct Costs	32,594,730	35,781,962	3,187,232

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[12]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	5,229,149	2,987,594	(2,241,555)
AFUDC	1,848,109	1,998,655	150,546
Property Taxes	0	348,089	348,089
Total Indirect Costs	7,077,258	5,334,338	(1,742,920)
Total Direct Costs	32,594,730	35,781,962	3,187,232
Total Loaded Costs	39,671,988	41,116,300	1,444,312

The Actual Full-Time Equivalents[13] (FTEs) for this Project are 2.75.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 10 Bear Valley Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $3,187,232. This variance can be attributed to several factors including: construction contractor costs increased due to project delays caused by severe weather conditions that triggered a RMO for a combined total of 20 days; hard digging due to blue granite rock, groundwater management, and complications with pigging of Line 1600 on another SDG&E project; and the Project Team initially anticipated a six-month construction duration, but due to the aforementioned factors actual construction duration was nine months, increasing construction management support costs. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for Line 1600 Section 10 Bear Valley Replacement Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 10 Bear Valley Replacement Project. Through this Replacement Project, SDG&E successfully replaced 3.498 miles of pipeline with 3.591 miles of pipeline in the cities of Escondido and San Diego, including the tie over of two regulator stations, removal of one regulator station, and the installation of 3.591 miles of fiber optic cable. The total loaded cost of the Project is $41,116,300.

SDG&E executed this project prudently by rerouting the new pipeline to allow easier construction while avoiding major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from obtaining Caltrans exemptions to delay redundant street repairs and avoiding night work where possible.

End of Line 1600 Section 10 Bear Valley Replacement Project Final Report

I. LINE 1600 SECTION 11 [redacted] REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 11 [redacted] Replacement Project that consists of the replacement of 5.305 miles of previously existing pipeline with approximately 6.100 miles of new pipeline along [redacted] from [redacted] to the intersection of [redacted]. This Project also includes the installation of 0.46 miles of associated distribution piping, three regulator stations, one mainline valve (MLV), and one gas chromatograph shelter. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $74,609,320.

The Line 1600 Section 11 [redacted] Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	Section 11 Pomerado Road North		
Project Type	Replacement		
Length	6.100 miles		
Location	San Diego, Poway		
Class	[redacted]		
MAOP			
Pipe Grade			
Wall Thickness			
Pipe Vintage[4]			
Construction Start	05/17/2021		
Construction Finish	08/25/2022		
Original Pipe Diameter			
Nominal Pipe Diameter			
Original SMYS[5]			
New SMYS			
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	74,609,320	0	74,609,320

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

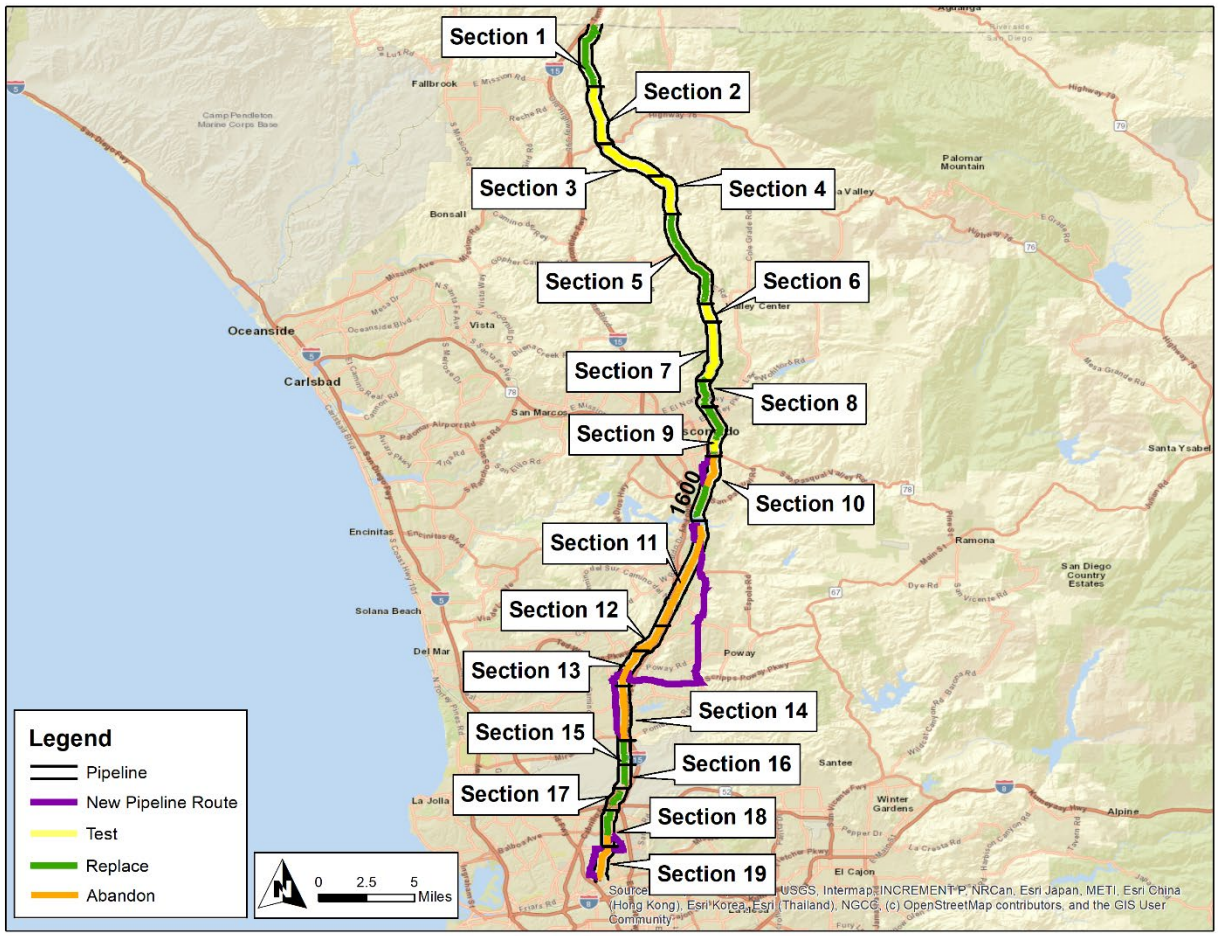


Figure 2: Satellite Image of Line 1600 Sections 11, 12, and 13

Figure 3: Overview Image of Line 1600 Sections 11, 12, and 13

Figure 4: Satellite Image of Line 1600 Section 11 Pomerado Road North Replacement Project

Figure 5: Overview Map of Line 1600 Section 11 Pomerado Road North Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	4.313 mi.	0.129 mi.	0.863 mi.	0.795 mi.	6.100 mi.
	22,773 ft.	679 ft.	4,557 ft.	4,198 ft.	32,208 ft.

SDG&E provided the Line 1600 Test or Replacement Plan[9] to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 11 [redacted] segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 11 [redacted] segment of Line 1600 as the most prudent option. During the

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[8] Values may not add to total due to rounding.

[9] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor."

Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced the previously existing pipeline by installing approximately 6.100 miles of new pipeline along [redacted] from [redacted] to the intersection of [redacted].
   b. The new [redacted] pipeline alignment was designed in coordination with the Line 1600 Section 12 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project.
   c. The Project Team installed 0.46 miles of associated distribution pipeline to ensure that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained.
   d. For system operational and reliability reasons, the abandonment of 8.7 miles was executed at the completion and as part of the construction of Line 1600 Section 13 Scripps Poway Replacement Project as the previously existing pipeline could not be isolated and abandoned until completion of this Project, Line 1600 Section 12 [redacted] South Replacement Project, and Line 1600 Section 13 Scripps Poway Replacement Project. The associated costs for the abandonment were shared between the three projects.
   e. The Project Team installed a 330 foot segment of pipeline utilizing a horizontal directional drill.
   f. The Project Team installed three new regulator stations.
   g. The Project Team installed 6.100 miles of fiber optic cable along the length of the new pipeline.
   h. The Project Team installed one new automated MLV.
   i. Incidental mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consists of a 5.305 mile Replacement with 6.100 miles of new pipeline, installation of 0.46 miles of associated distribution

piping, installation of three new regulator stations, installation of one new MLV, and the installation of 6.100 miles of fiber optic cable. The Accelerated and Incidental mileages consist of 0.129 miles and 0.863 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained. The new pipeline alignment was designed in coordination with the Line 1600 Section 12 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project. The route selected is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded that temporarily shutting in the line for tie-ins would be possible during summer conditions.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project required utilization of pressure control fittings to provide continued support to non-core customers during the tie-over of the new pipeline.
4. Community Impact: Multiple homes and businesses will require advance notice and coordination for construction activities.
5. Schedule Coordination: The Project Team coordinated installation of the new pipeline with the Line 1600 Section 12 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project for a new continuous

pipeline installation. The abandonment of the previously existing pipeline was scheduled to take place with the completion of all three projects.

6. Substructures: The Project Team identified multiple substructures prior to construction, that were incorporated into the design. This includes a large concrete box culvert storm drain structure that required horizontal directional drill installation.
7. Permit Conditions:
   a. The Project Team obtained permits from the City of San Diego for encroachment, traffic control, and potholing.
   b. The Project Team obtained permits from the City of Poway for encroachment, traffic control, and potholing.
8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
   b. The Project Team identified the risk of encountering contaminated soil and ground water that would require a permit for discharge. Hydrotest water will require treatment prior to discharge.
   c. The Project Team obtained approval for their Storm Water Pollution Prevention Plan (SWPPP) and a brush clearing permit near Lake Hodges.

C. Scope Changes

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $38,943,678.
2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/17/2021
Construction Completion Date	08/25/2022
NOP Date	04/08/2022

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $5,655,338 in change orders.

1. Permit: The City of Poway restricted the Construction Contractor from utilizing as much road plating per excavation, reducing the size of excavations possible and causing significant delays to the schedule. An additional crew was added to make up for delays, increasing costs.
2. Site Conditions: Due to pervasive granite rock obstructions, specialized excavators and rock breaking tools were required and brought onto the job site. These conditions caused significant delays to the schedule and increased cost of excavation.

Figure 6: Pipeline Installation by HDD to Avoid Box Culvert Storm Drain

Figure 7: Site of HDD Installation on [redacted]

Figure 8: New MLV and Chromatograph Shelter Along [redacted]

[redacted]

D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include commissioning of the new automated MLV and gas chromatograph, as well as final pave/restoration for the tie-in location at [redacted]. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at Ted Williams hydrotest yard which was shared with the Pomerado South project.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Project Coordination: The Project Team coordinated with Line 1600 Section 12 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project to install one continuous new pipeline and abandon the previously existing pipeline at once.
3. Land Use: Coordinated with the City of Poway to use property adjacent to the project site for hydrotest storage tanks, avoiding a more expensive configuration on the city street.
4. Engineering Design: The Project Team utilized drone footage to minimize traffic control and survey costs during the design phase.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $55,956,373. 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.

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 $74,609,320.

Table 4: Estimated and Actual Direct Costs and Variances[10]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,067,821	2,224,181	156,360
Materials	3,504,900	2,300,900	(1,201,814)
Mechanical Construction Contractor	38,943,678	41,060,363	2,116,685
Electrical Contractor	0	100,098	100,098
Construction Management & Support	2,940,139	4,361,719	1,422,225
Environmental	2,187,627	2,013,116	(174,511)
Engineering & Design	2,858,931	5,042,457	2,183,525
Project Management & Services	2,496,461	2,741,088	234,795
ROW & Permits	956,815	1,408,408	458,593
Total Direct Costs	55,956,373	61,252,329	5,295,956

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[11]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	9,690,840	7,995,901	(1,694,939)
AFUDC	4,039,860	4,571,999	532,139
Property Taxes	0	789,092	789,092
Total Indirect Costs	13,730,700	13,356,991	(373,709)
Total Direct Costs	55,956,373	61,252,329	5,295,956
Total Loaded Costs	69,687,073	74,609,320	4,922,248

The Actual Full-Time Equivalents[12] (FTEs) for this Project are 3.42.

[10] Values may not add to total due to rounding.
[11] Ibid.
[12] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time

D. Cost Impacts

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

At the completion of the Line 1600 Section 11 [redacted] Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were more than the preliminary estimate by $5,295,956. This variance can be attributed to several factors including: the City of Poway imposed restrictions on the length of road plating for each construction spread, thereby limiting the allowable excavation length from 1,200-feet to 600-feet at any given time, contributing to significant schedule delays. To mitigate these impacts, an additional crew was mobilized, which consequently increased overall project costs by approximately $1,975,000. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

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

E. Disallowance

There was no disallowance for this replacement project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 12 [redacted] Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[13]. Through this Replacement Project, SDG&E successfully replaced 5.305 miles of pipeline with 6.100 miles of pipeline in the City of San Diego, including the installation of 6.100 miles of fiber optic cable, 0.46 miles of distribution pipe, three new regulator stations, and one MLV. The total loaded cost of the Project is $74,609,320.

SDG&E executed this project prudently by rerouting the new pipeline to allow easier construction while avoiding major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, avoiding hydrotest storage in city streets, utilizing drone footage to minimize survey costs during the design phase, and coordinating design of the new installation and abandonment with other Line 1600 Projects.

End of Line 1600 Section 11 [redacted] Replacement Project Final Report

[13] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor

I. LINE 1600 SECTION 12 POMERADO ROAD SOUTH REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 12 [redacted] Replacement Project that consists of the replacement of 1.894 miles of previously existing pipeline with approximately 4.519 miles of new pipeline along [redacted] from [redacted] to [redacted]. This Project also includes the installation of one new mainline valve (MLV), one new regulator station, 1.366 miles of [redacted] distribution pipeline along [redacted], and the installation of 4.519 miles of fiber optic cable and associated equipment. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $60,800,388.

The Line 1600 Section 12 [redacted] Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	Section 12 [redacted]		
Project Type	Replacement		
Length	4.519 miles		
Location	San Diego, Poway		
Class	[redacted]		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[4]	[redacted]		
Construction Start	05/24/2021		
Construction Finish	07/25/2022		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[5]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	60,800,388	0	60,800,388

[1] See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

[2] D.14-06-007 at 16-17.

[3] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

[4] Predominant pipeline vintage

[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

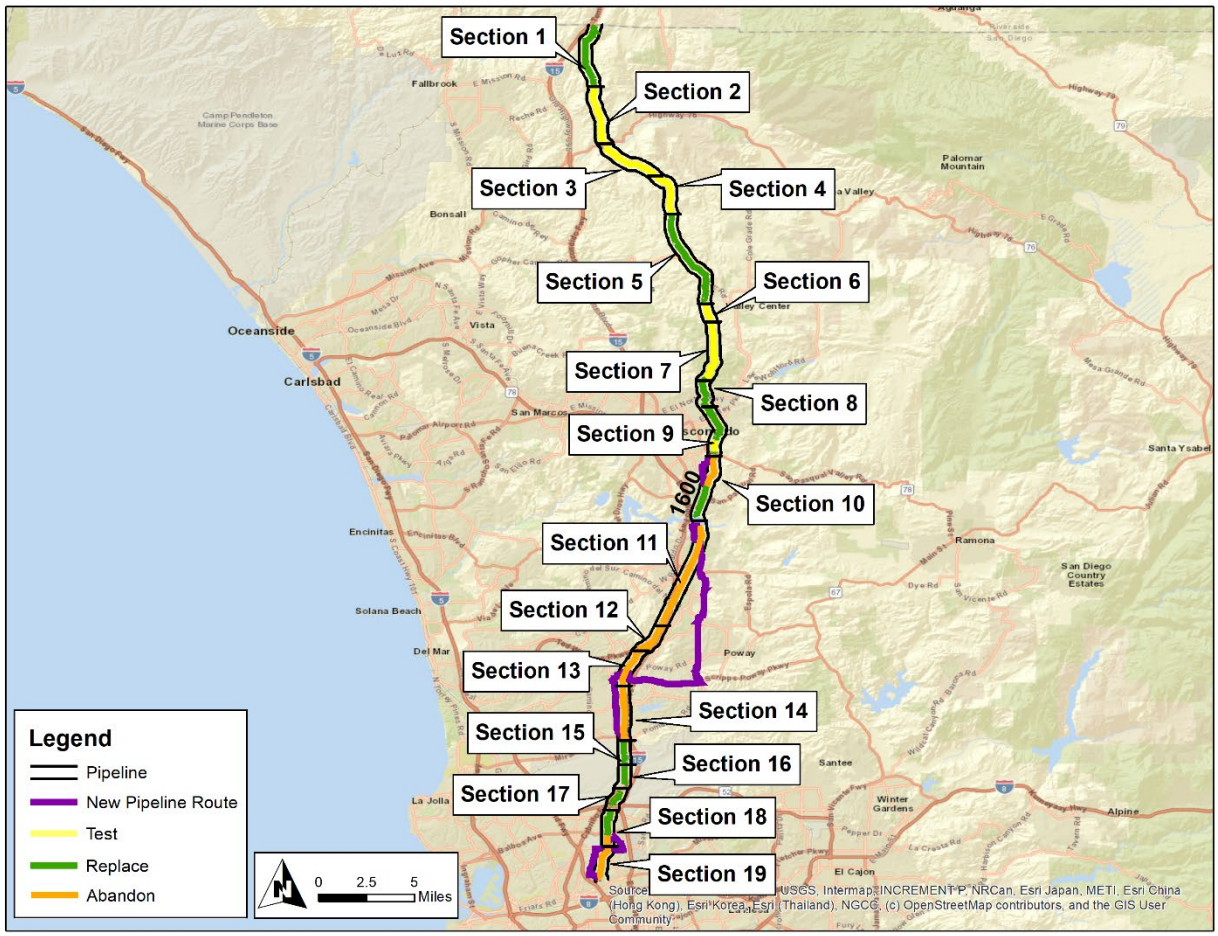


Figure 2: Satellite Image of Line 1600 Sections 11, 12, and 13

Figure 3: Overview Image of Line 1600 Sections 11, 12, and 13

[redacted]

Figure 4: Satellite Image of Line 1600 Section 12 [redacted] Replacement Project

Final Report for Line 1600 Section 12 [redacted] Replacement Project

Figure 5: Overview Map of Line 1600 Section 12 [redacted] Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Incidental	New	Total[7]
Final Mileage	1.459 mi.	0.472 mi.	2.587 mi.	4.519 mi.
	7,705 ft.	2,492 ft.	13,659 ft.	23,860 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 12 [redacted] segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 12 [redacted] segment of Line 1600 as the most prudent option. During the

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[7] Values may not add to total due to rounding.

Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:

   a. The Project Team replaced the previously existing pipeline by installing approximately 4.519 miles of new [redacted] pipeline along [redacted]. The Project also included associated distribution work necessary to maintain uninterrupted service and reliability to the distribution system in the area that is fed by Line 1600.
   b. To promote efficiency, the new [redacted] pipeline alignment was designed in coordination with the Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project.
   c. The Project Team installed 1.366 miles of [redacted] distribution pipeline along [redacted] to ensure that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained.
   d. For system operational and reliability reasons, the abandonment of 8.7 miles was executed at the completion and as part of the construction of Line 1600 Section 13 Scripps Poway Replacement Project as the previously existing pipeline could not be isolated and abandoned until completion of this Project, Line 1600 Section 11 [redacted] Replacement Project, and Line 1600 Section 13 Scripps Poway Replacement Project. The associated costs for the abandonment were shared between the three projects.
   e. The Project Team installed one 130 foot segment of pipeline utilizing a bore.
   f. The Project Team installed 4.519 miles of fiber optic cable and associated equipment, including an Optical Pipeline Monitoring (OPM) station, which oversees and communicates to Gas Control leak detection, early threat warning and continuously monitors for right-of-way intrusion, such as unanticipated 3rd party digging.
   g. The Project Team installed one new regulator station.

h. The Project Team installed one new automated MLV.
i. Incidental mileage was included for the constructability of the reroute.

2. Final Project Scope: The final project scope consists of a 1.894 mile Replacement with 4.519 miles of new [redacted] pipeline, installation of one new MLV, installation of 4.519 miles of fiber optic cable, installation of one new regulator station, and the installation of 1.364 miles of [redacted] distribution pipeline. The Incidental mileage consists of 0.472 miles.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained. The new pipeline alignment was designed in coordination with the Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project.

2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded that temporarily shutting in the line for tie-ins would be possible during summer conditions.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project Team determined that no customers would be impacted by the installation of the new pipeline.
4. Community Impact: Multiple schools, homes, and businesses required advance notice and coordination for construction activities.
5. Schedule Coordination: The Project Team coordinated installation of the new pipeline with the Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project for a new continuous pipeline installation. The abandonment of the previously existing pipeline was completed during the Line 1600 Section 13 [redacted] Replacement project.
6. Substructures: The Project Team identified multiple substructures prior to construction, that were incorporated into the design.
7. Traffic Control: The Project Team obtained approval for traffic control on [redacted].
8. Permit Conditions:
   a. The Project Team obtained permits from the City of San Diego for encroachment and traffic control.
   b. The Project Team obtained permits from the City of Poway for encroachment and traffic control.
   c. The Project Team obtained traffic control approval from Caltrans for pipeline installation along [redacted].
9. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.

b. The Project Team identified the risk of encountering contaminated soil and ground water that would require a permit for discharge. The Project Team also identified the need for hydrotest water treatment prior to discharge.
c. The Project Team obtained approval for their Storm Water Pollution Prevention Plan (SWPPP).

C. Scope Changes

Through engineering, design, and planning activities, 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 changed the design of the new MLV automation equipment installation to accommodate the Minor Development Review Application (MDRA) requirements from the City of Poway.

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 to prepare cost estimates based on a more detailed engineering design package, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E determined that a Performance Partner procurement strategy was the most appropriate delivery method. This structure is intended to incentivize adherence to schedule and budget commitments, promote efficiencies in construction sequencing, and establish a balanced risk-sharing framework between SDG&E and the contractor. SDG&E awarded the construction contract to the Performance Partner.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $27,864,041.
2. Construction Contractor's: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/24/2021
Construction Completion Date	07/25/2022
NOP Date	05/31/2022

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $2,300,000 in change orders.

1. Substructures:
   a. The Construction Contractor identified more unknown utilities than were accounted for in the initial estimate, increasing costs for additional potholing and schedule delays.
   b. The discovery of unknown utilities required the Construction Contractor to reroute the new pipeline installation in three locations and increase the depth of installation in one location.
2. Site Conditions: Due to pervasive granite rock obstructions, specialized excavators and rock breaking tools were required and brought onto the job site. These conditions caused significant delays to the schedule and increased cost of excavation.

Figure 6: Excavation and Trenching of Granite Rock

Figure 7: Lowering New Pipeline into Trench

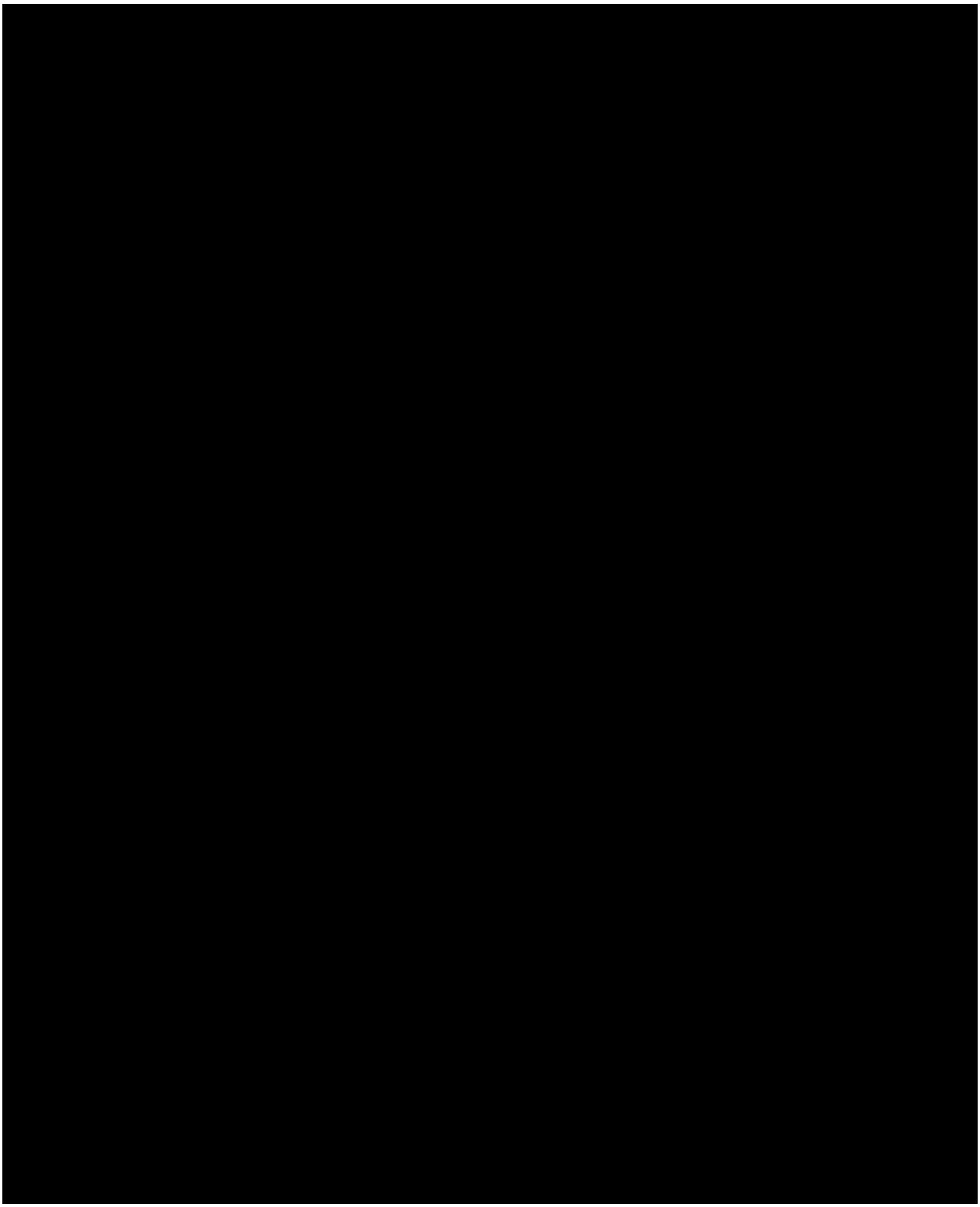
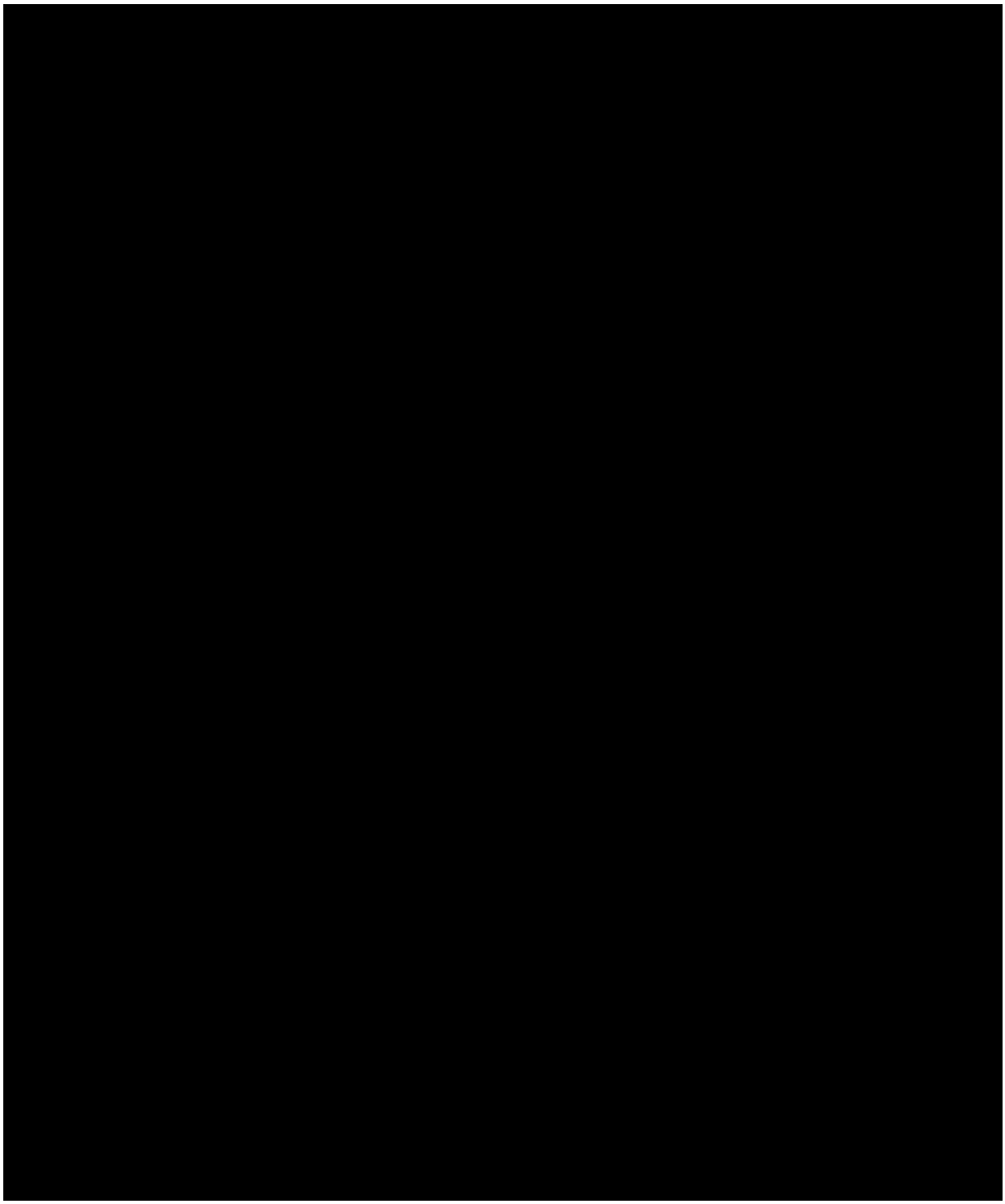


Figure 8: Fiber Optic Installation Above Pipeline



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, Optical Pipeline Monitoring (OPM)/ automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include landscape repair and commissioning of new automated MLV, as well as final restoration of new regulator station sense lines, final cap and grind paving of [redacted]. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at Ted Williams hydrotest yard which was shared with the Pomerado North project.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials:
   a. Bulk ordered pipe provided volume pricing for the [redacted] pipe.
   b. Nitrogen was used to test the new distribution piping to save on costs related to hydrotesting.
2. Project Coordination:
   a. The Project Team coordinated with Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 13 [redacted] Replacement Project to plan and install one continuous new pipeline and abandon the previously existing pipeline at once.
   b. The Project Team utilized laydown yards and hydrotesting layouts from the Line 1600 Section 11 [redacted] Replacement Project to minimize design and permitting costs.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $43,994,076. 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.

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 $60,800,388.

Table 4: Estimated and Actual Direct Costs and Variances[8]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	3,146,807	1,915,262	(1,231,544)
Materials	4,992,705	2,079,969	(2,912,736)
Mechanical Construction Contractor	29,149,852	31,306,605	2,156,753
Electrical Contractor	0	31,130	31,130
Construction Management & Support	2,004,708	2,265,483	260,775
Environmental	1,371,547	1,792,544	420,998
Engineering & Design	2,958,049	4,421,112	1,463,064
Project Management & Services	2,672,321	4,107,270	1,434,949
ROW & Permits	586,471	974,546	388,074
Total Direct Costs	46,882,459	48,893,922	2,011,463

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[9]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	5,806,734	8,404,646	2, 597912
AFUDC	2,526,944	2,980,623	453,679
Property Taxes	845,040	521,197	(323,843)
Total Indirect Costs	9,178,718	11,906,466	2,727,748
Total Direct Costs	46,882,459	48,893,922	2,011,463
Total Loaded Costs	56,061,177	60,800,388	4,739,211

[8] Values may not add to total due to rounding.
[9] Ibid.

The Actual Full-Time Equivalents[10] (FTEs) for this Project are 2.68.

D. Cost Impacts

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

At the completion of the Line 1600 Section 12 Pomerado South Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were greater than the preliminary estimate by $2,011,463. This variance can be attributed to several factors including: the City of Poway imposed restrictions on the length of road plating for each construction spread, thereby limiting the allowable excavation length from 1,200-feet to 600-feet at any given time, contributing to significant schedule delays; extensive granite rock conditions required the use of specialized excavation machinery and rock-breaking equipment, resulting in notable schedule delays from an estimated 136 days to actual construction duration of 200 days, which increased overall project costs.

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

Further, the Construction Contractor encountered a greater number of unknown utilities than initially estimated, necessitating additional potholing and causing schedule impacts, while also requiring pipeline rerouting at three locations and increased installation depth at one location, ultimately increasing costs. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for this replacement project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 12 [redacted] Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[11]. Through this Replacement Project, SDG&E successfully replaced 1.894 miles of pipeline with 4.519 miles of pipeline in the City of San Diego, including the installation of 4.519 miles of fiber optic cable and associated equipment, one regulator station, 1.364 miles of distribution pipe, and one MLV. The total loaded cost of the Project is $60,800,388.

SDG&E executed this project prudently by rerouting the new pipeline to allow easier construction while avoiding major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, utilizing nitrogen testing of distribution pipe to avoid hydrotest costs, coordinating design of the new installation and abandonment with other Line 1600 Projects, and sharing hydrotesting layouts with another Line 1600 Project.

End of Line 1600 Section 12 [redacted] Replacement Project Final Report

[11] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor

I. LINE 1600 SECTION 13 [redacted] REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations This report describes the activities associated with Line 1600 Section 13 [redacted] Replacement Project that consists of the replacement of 1.489 miles of previously existing pipeline with approximately 3.686 miles of new pipeline along [redacted]. This Project also includes the installation of approximately 3.643 miles of fiber optic along the new pipeline, one new automated mainline valve (MLV), tie-over of one existing regulator station, and the abandonment of previously existing pipeline and two MLVs. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $42,149,451.

The Line 1600 Section 13 [redacted] Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	**Section 13** [redacted]		
Project Type	Replacement		
Length	3.686 miles		
Location	San Diego, Poway		
Class	[redacted]		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[4]	[redacted]		
Construction Start	11/01/2021		
Construction Finish	11/10/2022		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[5]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	42,149,451	0	42,149,451

[4] Predominant pipeline vintage
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

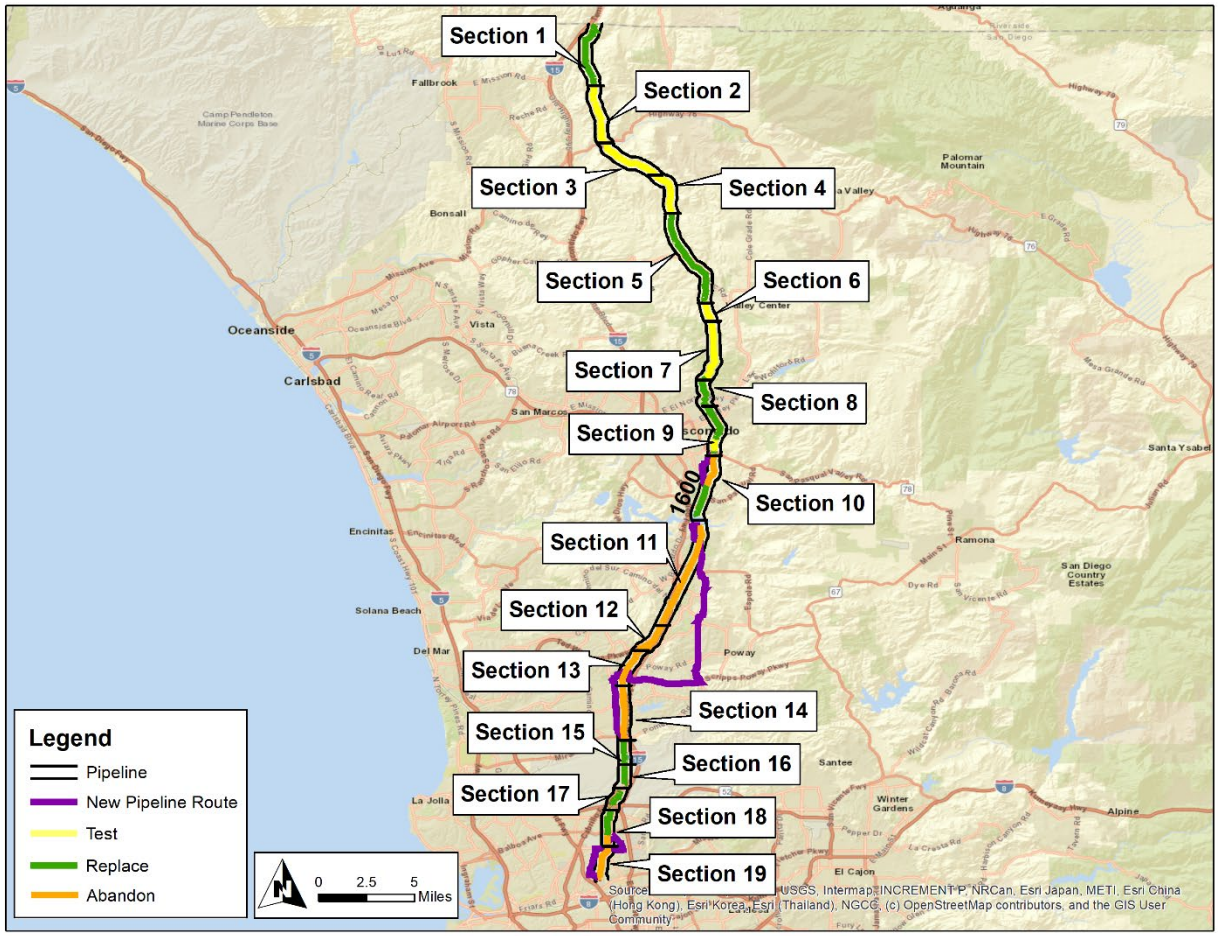


Figure 2: Satellite Image of Line 1600 Sections 11, 12, and 13

Final Report for Line 1600 Section 13 [redacted] Replacement Project

Figure 3: Overview Image of Line 1600 Sections 11, 12, and 13

Final Report for Line 1600 Section 13 [redacted] Replacement Project

Figure 4: Satellite Image of Line 1600 Section 13 Scripps Poway Parkway Replacement Project

Figure 5: Overview Map of Line 1600 Section 13 Scripps Poway Parkway Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	1.360 mi.	0.079 mi.	0.046 mi.	2.201 mi.	3.686 mi.
	7,199 ft.	417 ft.	243 ft.	11,621 ft.	19,462 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 13 [redacted] segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 13 Scripps Poway Parkway segment of Line 1600 as the most prudent option. During the

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[8] Values may not add to total due to rounding.

Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced the previously existing pipeline by installing approximately 3.686 miles of new pipeline along [redacted].
   b. The new pipeline alignment was designed in coordination with the Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 12 [redacted] Replacement Project.
   c. For system operational and reliability reasons, the abandonment of 8.7 miles was executed at the completion and as part of the construction of Line 1600 Section 13 Scripps Poway Replacement project as the previously existing pipeline could not be isolated and abandoned until completion of this Project, Line 1600 Section 11 [redacted] Replacement Project, and Line 1600 Section 12 [redacted] Replacement Project. The associated costs for the abandonment were shared between the three projects.
   d. The Project Team installed 3.686 miles of fiber optic cable along the length of the new pipeline.
   e. The Project Team installed one new automated MLV.
   f. The Project Team tied over one existing regulator station to the new pipeline.
   g. The Project Team abandoned two existing MLVs.
   h. Incidental mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consists of 3.686 miles of replacement pipeline, installation of one new automated MLV, installation of 3.686 miles of fiber optic cable, tie-over of one regulator station, abandonment of 8.7 miles of previously existing pipeline, and abandonment of two existing MLVs. The Accelerated and Incidental mileages consist of 0.079 miles and 0.046 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained. The new pipeline alignment was designed in coordination with the Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 12 [redacted] Replacement Project.
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded that temporarily shutting in the line during tie-ins would be possible during the non-heating season.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project required coordination with customers to reduce outages during the installation and tie over of the new pipeline.
4. Community Impact: The Project Team communicated with Multiple residents and businesses, providing advance notice and coordination for construction activities.
5. Schedule Coordination: The Project Team coordinated installation of the new pipeline with the Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 12 [redacted] Replacement Project for a new continuous pipeline installation. Since the Line 1600 Section 13 [redacted] Replacement Project was the last of the three to be executed, the abandonment of the previously existing pipeline was completed during this Project.

6. Substructures: The Project Team identified multiple substructures prior to construction including multiple large diameter water lines and storm drains on [redacted] that required adjustment of the design for the new pipeline alignment.
7. Traffic Control: The Project Team obtained permits from the City of San Diego, City of Poway, and Caltrans for traffic control.
8. Permit Conditions:
   a. The Project Team obtained permits from Caltrans for encroachment and open trench installation.
   b. Caltrans required additional depth for pipeline installation underneath Interstate 15.
   c. The Project Team obtained permits from the City of San Diego for encroachment.
   d. The City of San Diego required both westbound lanes of Scripps Poway Parkway to be fully repaved as a final restoration requirement.
   e. The Project Team obtained permits from the City of Poway for encroachment.
9. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
   b. The Project Team identified the requirement to avoid performing the regulator station tie-over during bird nesting season, removing the need for additional permitting.
   c. The Project Team identified the risk of encountering contaminated soil and ground water that would require a permit for discharge. Hydrotest water required treatment prior to discharge.
   d. The Project required a Storm Water Pollution Prevention Plan (SWPPP).

C. Scope Changes

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $26,713,440.
2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

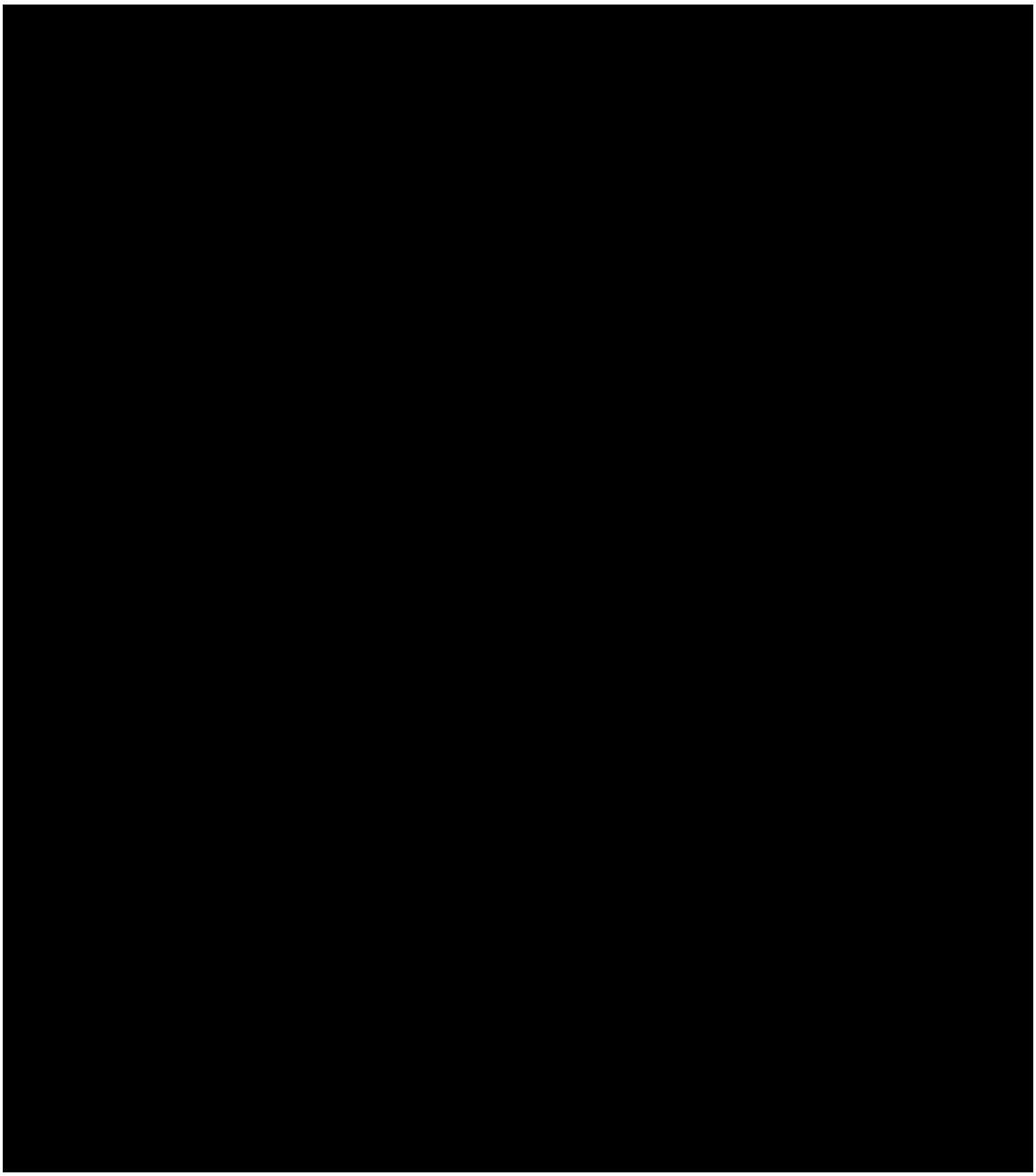
Construction Start Date	11/01/2021
Construction Completion Date	11/10/2022
NOP Date	06/01/2022

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $5,700,000 in change orders.

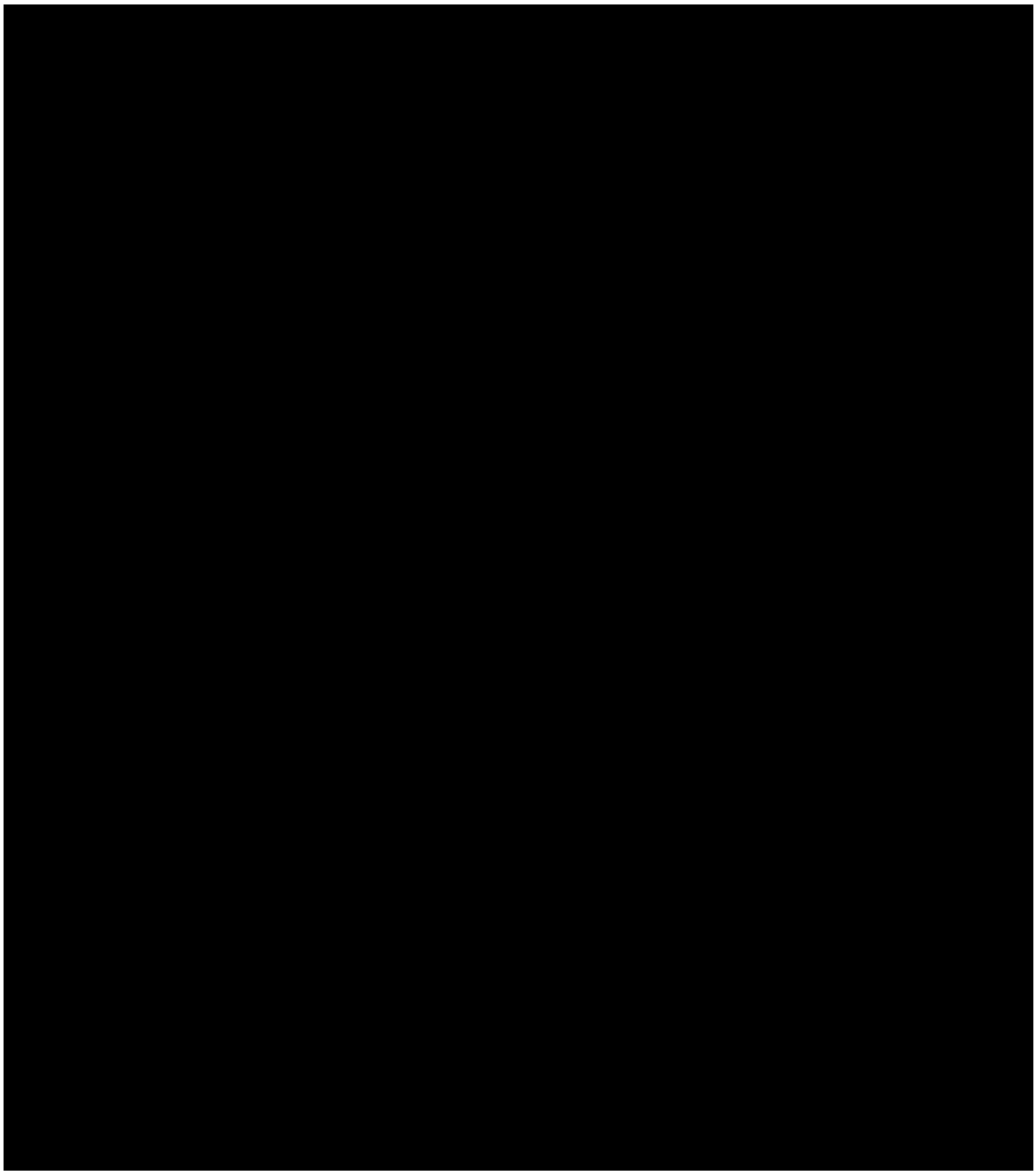
1. Project Coordination: The Project Team requested that the Construction Contractor perform additional work to complete tie-in of the new pipeline that was installed in this Project as well as the Section 11 [redacted] Replacement Project and Section 12 [redacted] Replacement Project. This included the energization of three new regulator stations, abandonment of three existing regulator stations, and tie-in to existing distribution pipeline.
2. Permit Conditions: The City of San Diego required paving work on [redacted] be performed at night, that resulted in incremental costs associated with night work and special acquisition of asphalt materials from supplier during non-standard work hours.

Figure 6: Specialized Breaker Equipment for Hard Rock Digging



Final Report for Line 1600 Section 13 [redacted] Replacement Project

Figure 7: Pipeline Installation on [redacted]



Final Report for Line 1600 Section 13 [redacted] Replacement Project

Figure 8: Pipe Installation on [redacted] Under Existing Utilities

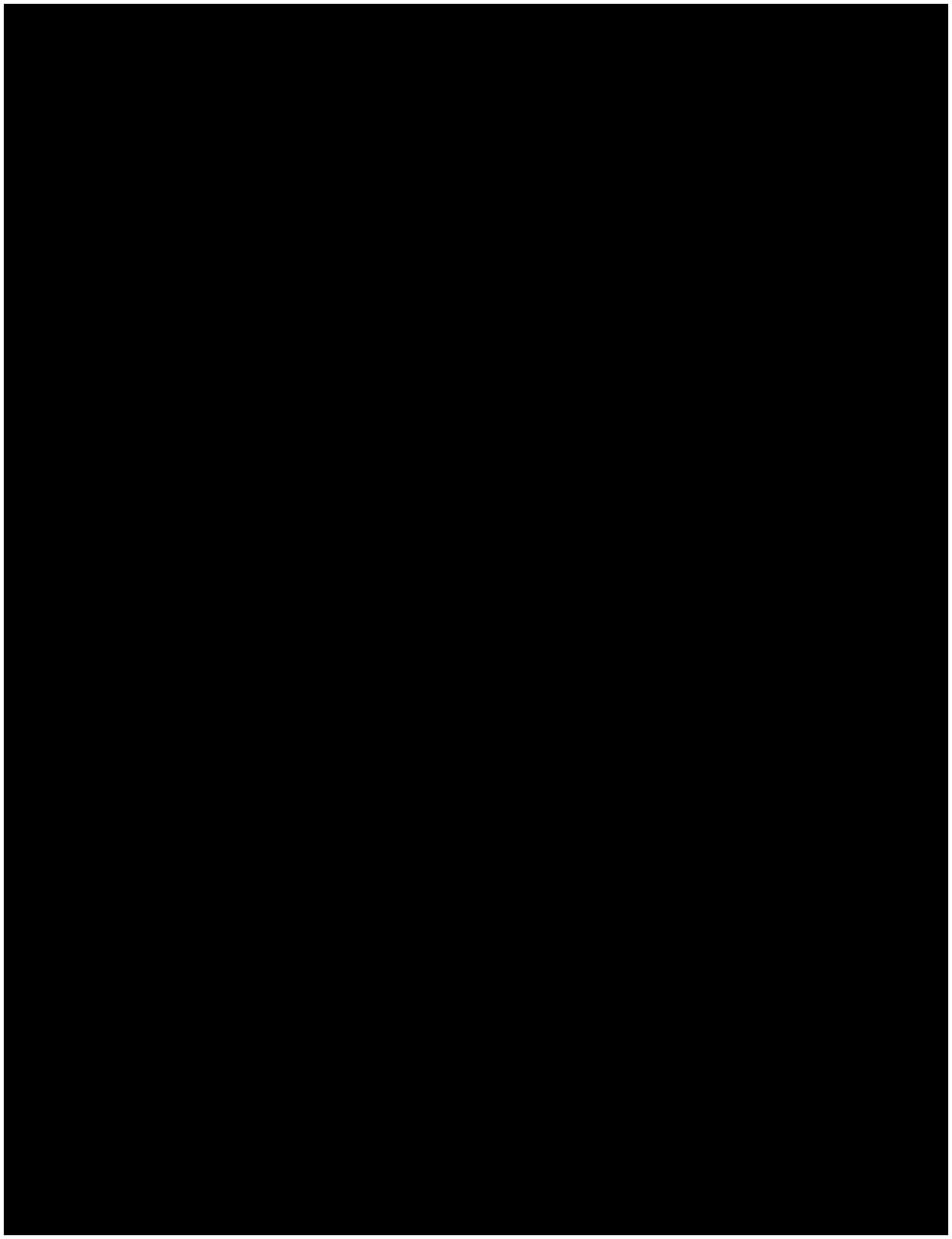


Figure 9: Completed MLV Vault Installation

[redacted]

Final Report for Line 1600 Section 13 [redacted] Replacement Project

Figure 10: Automated MLV Inside Vault

D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include wrap up and commissioning of the new automated MLV into new Line 1600, as well as final restoration of new regulator station and tie-over work on existing regulator stations, final cap and grind paving of [redacted] for the collective [redacted] projects. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at [redacted] hydrotest yard.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Land Use: The Project shared laydown yards with Pomerado South.
3. Permitting: The Project Team obtained Caltrans approval to install through open trench methods instead of bore.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $40,179,975. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project.

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 $42,149,451.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,700,453	1,644,683	(1,055,770)
Materials	2,204,665	1,403,431	(801,234)
Mechanical Construction Contractor	23,582,091	23,835,880	253,789
Electrical Contractor	0	139,013	139,013
Construction Management & Support	1,881,159	3,110,268	1,229,109
Environmental	1,317,213	947,857	(369,356)
Engineering & Design	2,126,198	2,781,076	654,878
Project Management & Services	2,100,695	1,907,844	(192,851)
ROW & Permits	699,817	681,299	(18,518)
Total Direct Costs	36,612,291	36,451,350	(160,941)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[10]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	5,594,485	3,478,274	(2,116,212)
AFUDC	1,651,669	1,886,574	234,905
Property Taxes	0	333,253	333,253
Total Indirect Costs	7,246,155	5,698,101	(1,548,054)
Total Direct Costs	36,612,291	36,451,350	(160,941)
Total Loaded Costs	43,858,446	42,149,451	(1,708,995)

[9] Values may not add to total due to rounding.
[10] Values may not add to total due to rounding.

The Actual Full-Time Equivalents[11] (FTEs) for this Project are 1.64.

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 13 Scripps Poway Parkway Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $160,941. This variance can be attributed to several factors including: unanticipated intersection paving requirement imposed by the City of San Diego led to incremental construction management and support costs associated with night work and special acquisition of asphalt materials from supplier during non-standard work hours; and due to scope coordination with Line 1600 Section 11 [redacted] Replacement Project and Line 1600 Section 12 [redacted] Replacement Project there was reduced company labor and project manager

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

support time. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for this replacement project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 13 [redacted] Replacement Project. Through this Replacement Project, SDG&E successfully replaced 1.476 miles of pipeline with 3.643 miles of pipeline in the cities of San Diego and Poway, including the installation of 3.643 miles of fiber optic cable, one automated MLV, tie-over of one regulator station, and the abandonment of approximately 8.7 miles of previously existing pipeline and two MLVs. The total loaded cost of the Project is $42,149,451.

SDG&E executed this project prudently by rerouting the new pipeline to allow easier construction while avoiding major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, coordinating design of the new installation and abandonment with other Line 1600 Projects, and installing through open trench methods.

End of Line 1600 Section 13 [redacted] Replacement Project Final Report

I. LINE 1600 SECTION 14 BLACK MOUNTAIN REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 14 Black Mountain Replacement Project, that consists of the replacement of 3.576 miles of previously existing pipeline with approximately 4.192 miles of new pipeline along [redacted] from the intersection of [redacted]. This Project also includes the installation of 0.88 miles of associated distribution piping, the installation of three mainline valves (MLV), and the replacement of two regulator stations. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $63,705,730.

The Line 1600 Section 14 Black Mountain Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing . However, pursuant to Commission direction , the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan . The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Final Report for Line 1600 Section 14 Black Mountain Replacement Project

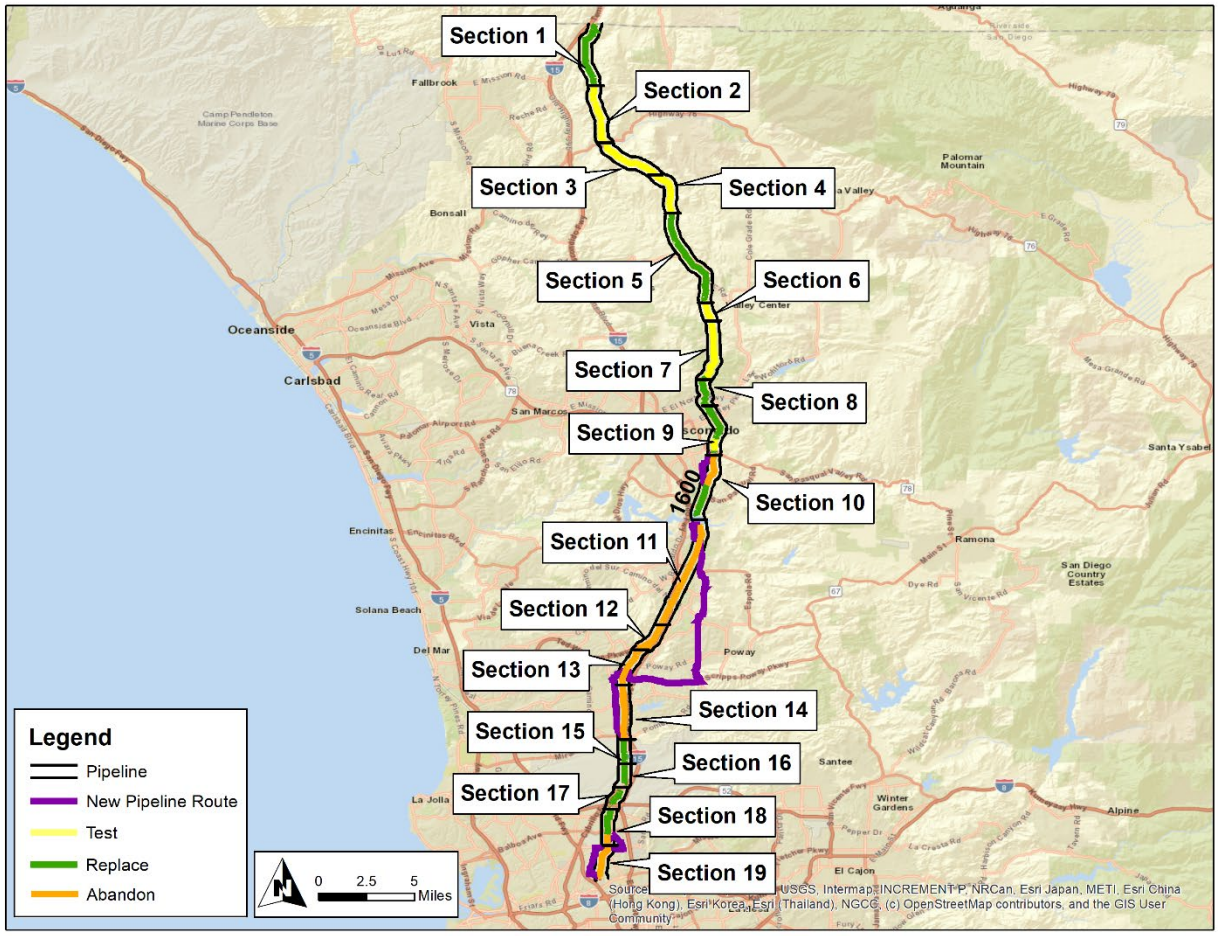
Table 1: General Project Information

Project Name	Section 14 Black Mountain		
Project Type	Replacement		
Length	4.192 miles		
Location	San Diego		
Class	[redacted]		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[1]	[redacted]		
Construction Start	04/13/2020		
Construction Finish	04/30/2021		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[2]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	63,705,730	0	63,705,730
Disallowed Costs	12,310	0	12,310

[1] Predominant pipeline vintage.
[2] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



Final Report for Line 1600 Section 14 Black Mountain Replacement Project

Figure 2: Satellite Image of Line 1600 Section 14 Black Mountain Replacement Project

Final Report for Line 1600 Section 14 Black Mountain Replacement Project

Figure 3: Overview Map of Line 1600 Section 14 Black Mountain Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[3]

	Criteria	Accelerated[4]	Incidental	New	Total[5]
Final Mileage	2.722 mi.	0.082 mi.	0.769 mi.	0.618 mi.	4.192 mi.
	14,372 ft.	433 ft.	8,754 ft.	4,060 ft.	22,134 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 14 Black Mountain segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 14 Black Mountain segment of Line 1600 as the most prudent option. During the Engineering, Design, and

[3] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[4] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[5] Values may not add to total due to rounding.

Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced the previously existing pipeline by abandoning and removing 3.576 miles of pipeline and installing 4.192 miles of new pipeline along [redacted] from the intersection of [redacted] and [redacted] to the intersection of [redacted] and [redacted]. The Project then hydrotested the newly installed pipeline after installation.
   b. The Project Team installed a 164-foot segment of pipeline utilizing three bores.
   c. The Project installed two new regulator stations at the intersection of [redacted] and [redacted] and at the intersection of [redacted] and [redacted].
   d. The Project Team installed 4.192 miles of fiber optic cable.
   e. The Project Team installed three new MLVs, one of which was automated.
      i. Two manual MLVs were installed
   f. The Project Team installed 0.88 miles of associated distribution pipeline to ensure that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained.
   g. Incidental mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consisted of a 3.576 mile Replacement with 4.192 miles of new pipeline, installation of 0.88 miles of associated distribution piping, installation of two new regulator stations, installation of three new MLVs, and 4.192 miles of fiber optic cable. The Accelerated and Incidental mileages consist of 0.082 and 0.769 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The Project Team planned the new pipeline alignment in a manner that system reliability is not compromised and the existing reliability of service that customers currently receive from the previously existing pipeline is maintained. The new pipeline alignment was designed to avoid private property and stay within existing franchise right of way (ROW).
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded that shutting in the line would not be possible due to noncore customers served by the pipeline.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project Team determined that service would need to be temporarily interrupted during the tie-over of the new pipeline.
4. Community Impact: Multiple homes and businesses will require advance notice and coordination for construction activities.
5. Schedule Coordination: The Project Team coordinated with a telecommunications utility and another SDG&E project in the area to reduce the frequency of customer and community impacts.
6. Substructures: The Project Team identified multiple substructures prior to construction, that were incorporated into the design.
7. Permit Conditions:
   a. The Project Team obtained permits from the City of San Diego for encroachment, traffic control, sidewalk blockage, and noise.

b. The Project Team obtained permits from Caltrans for encroachment and traffic control.

8. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations
   b. The Project Team identified the risk of encountering contaminated soil and ground water that would require a permit for discharge. Hydrotest water required treatment prior to discharge.

C. Scope Changes

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 to prepare cost estimates based on a more detailed engineering design package, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E determined that a Performance Partner procurement strategy was the most appropriate delivery method. This structure is intended to incentivize adherence to schedule and budget commitments, promote efficiencies in construction sequencing, and establish a balanced risk-sharing framework between SDG&E and the contractor. SDG&E awarded the construction contract to the Performance Partner.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $26,778,461.
2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	04/13/2020
Construction Completion Date	04/30/2021
NOP Date	03/05/2021

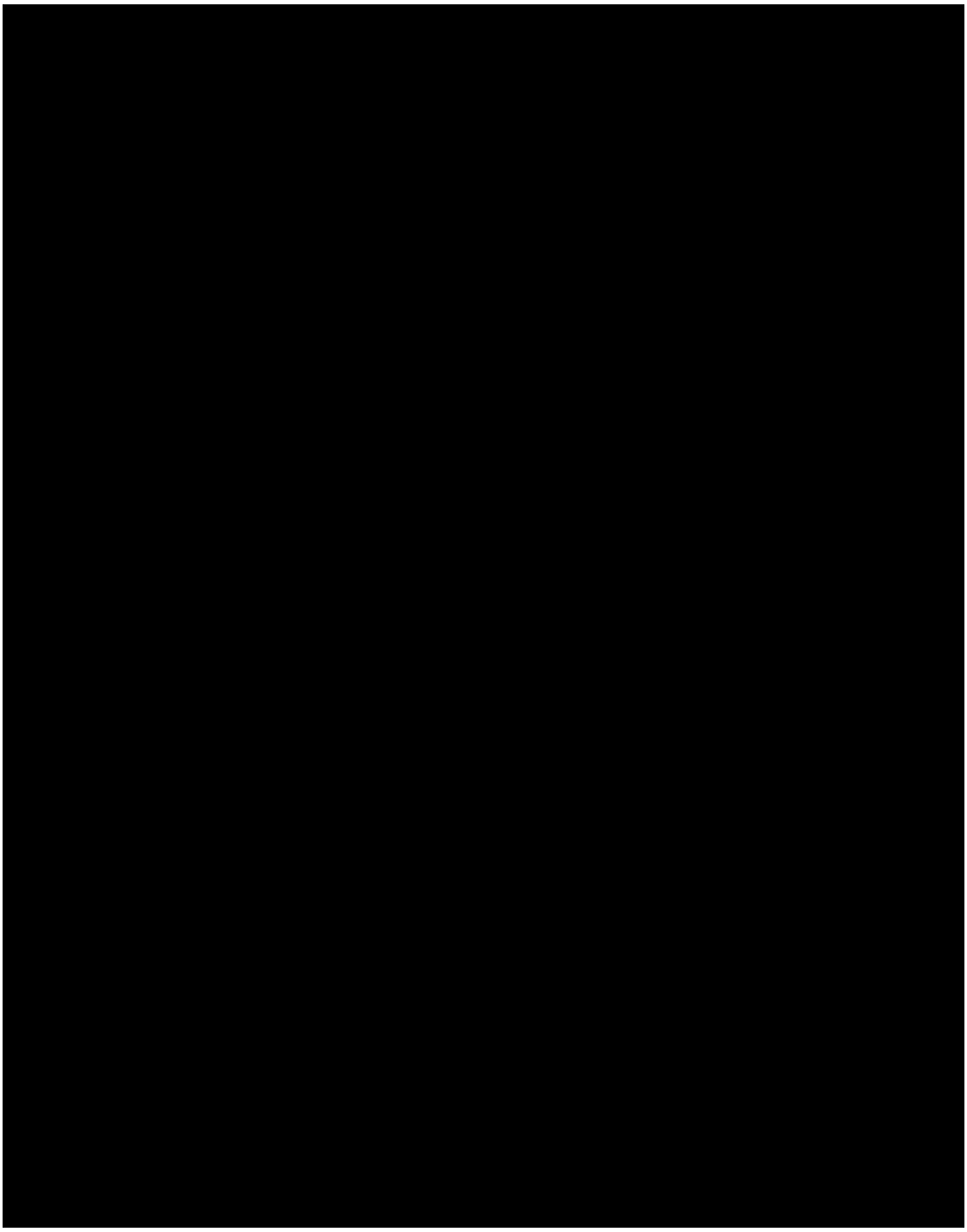
C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $8,465,000 in change orders.

1. Site Conditions: Due to pervasive unanticipated rocky conditions in multiple non-contiguous locations, specialized excavators and rock breaking equipment were required and brought onto the job site. An additional third-party contractor was also hired to help assist with rocky conditions. These conditions caused significant delays to the schedule, resulting in increased cost of excavation from equipment and labor.

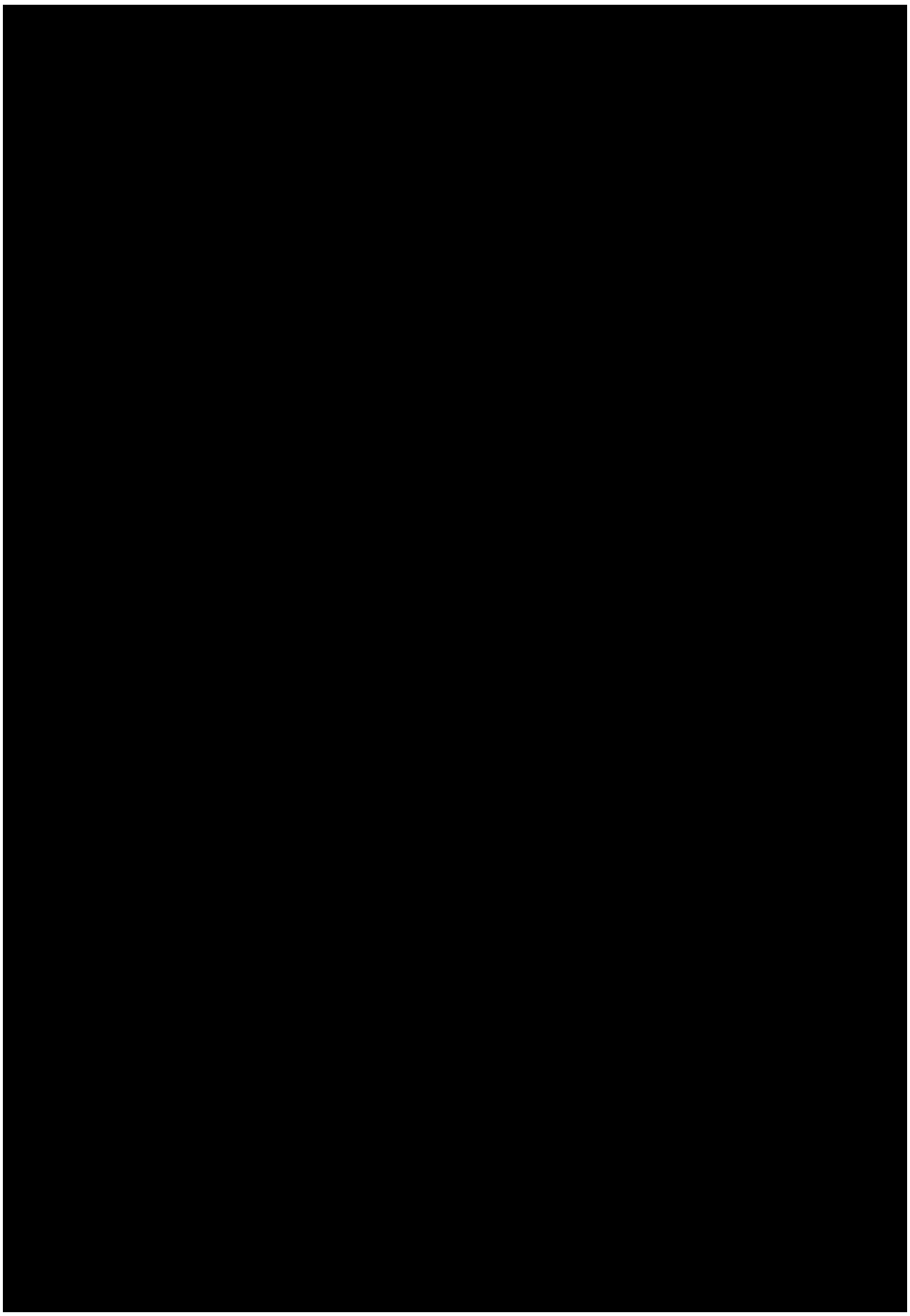
Final Report for Line 1600 Section 14 Black Mountain Replacement Project

Figure 4: Side Boom Lowering Double Joints into Trench along Black Mountain



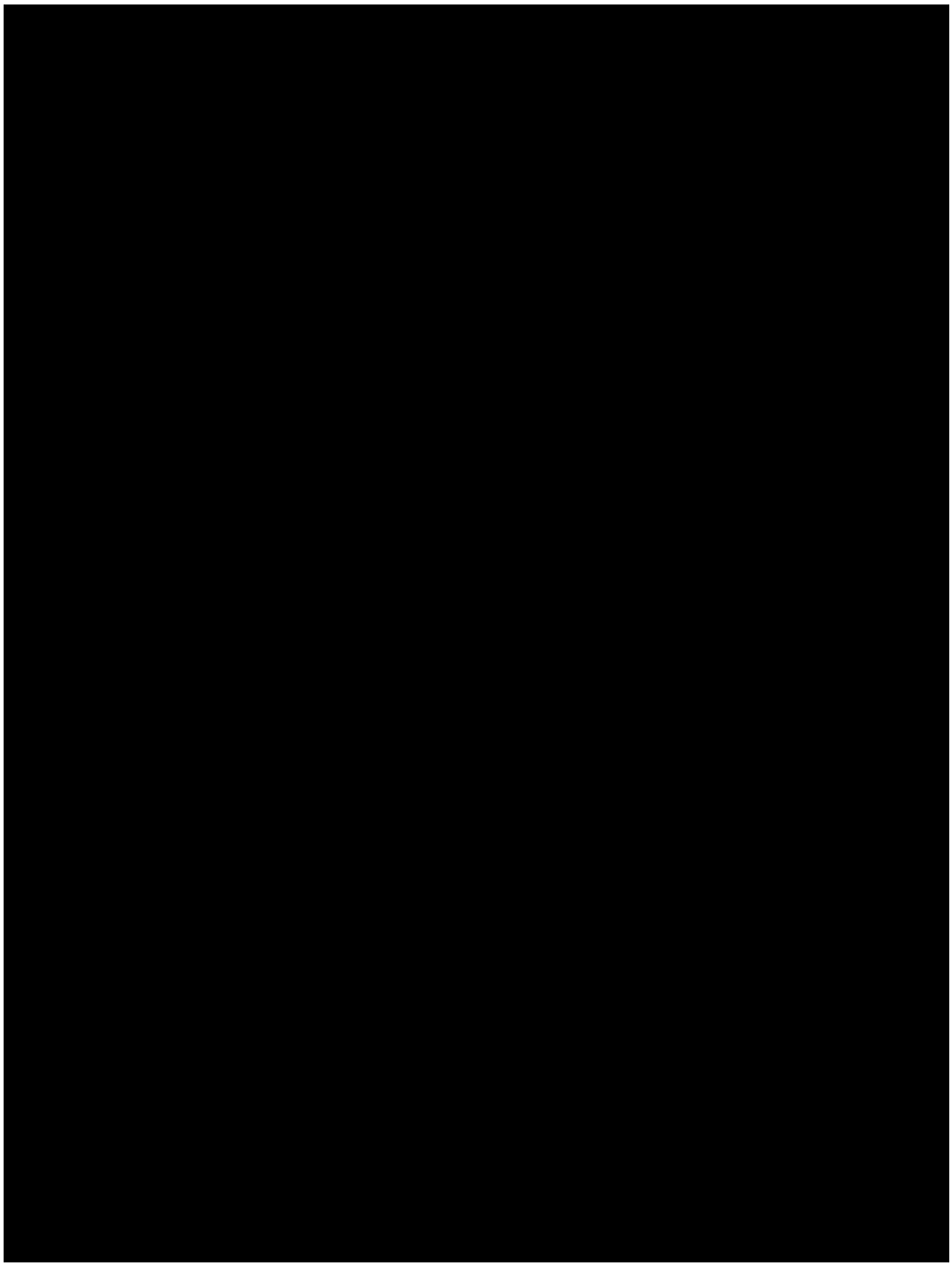
Final Report for Line 1600 Section 14 Black Mountain Replacement Project

Figure 5: Wheel Grinder Breaking Through Hard Soil



Final Report for Line 1600 Section 14 Black Mountain Replacement Project

Figure 6: Rock Breaking Equipment Breaking Through Blue Granite



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include wrap up and commissioning of new automated MLV, as well as final restoration of new regulator station and tie-over work on existing regulator stations, final cap and grind paving of [redacted], and completion of AC mitigation scope, deep well anode installation and rectifier tie-over scope at [redacted]. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at Via Excelencia yard.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the Engineering, Design, and Planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Future Maintenance:
   a. Additional valves were installed at the north and south tie-in locations to allow future tie-ins to be completed with minimal customer impact and to avoid the need for costly fittings and associated service.
   b. A new isolation valve was installed outside of Caltrans ROW for future maintenance and access to a connected distribution line.
   c. Secured easements for automated mainline valves and one of the distribution regulator stations to avoid the risk of franchise agreement relocations in the future.
3. Permit Conditions: The Project Team negotiated with the City of San Diego to defer final grind and cap for potholing activity on Miramar Road until the end of construction project.
4. Project Coordination: During detailed engineering and design, the Project Team coordinated with other teams who recently completed projects in the vicinity of the Black Mountain project. The Project Team was able obtain as-builts, survey information, and pothole data for portions of the alignment to reduce the number of required potholes or slot trenches.
5. Land Use: The Project Team changed the alignment of the new pipeline slightly to avoid the need for Federal easements.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and Engineering, Design, and Planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $42,309,368. 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.

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 $63,705,730.

Final Report for Line 1600 Section 14 Black Mountain Replacement Project

Table 4: Estimated and Actual Direct Costs and Variances[6]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,726,396	2,234,041	(492,355)
Materials	2,411,628	2,402,781	(8,847)
Mechanical Construction Contractor	24,887,149	37,437,782	12,550,633
Electrical Contractor	0	96,550	96,550
Construction Management & Support	1,659,142	4,448,418	2,789,275
Environmental	939,344	1,388,170	448,826
Engineering & Design	2,636,106	3,535,975	899,869
Project Management & Services	3,001,866	2,429,708	(572,158)
ROW & Permits	1,059,506	966,401	(93,105)
Total Direct Costs	39,321,137	54,939,825	15,618,688

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	4,747,401	5,111,955	364,554
AFUDC	2,839,153	3,130,965	291,812
Property Taxes	461,356	522,984	61,628
Total Indirect Costs	8,047,910	8,765,905	717,994
Total Direct Costs	39,321,137	54,939,825	15,618,688
Total Loaded Costs	47,369,047	63,705,730	16,336,683

The Actual Full-Time Equivalents[8] (FTEs) for this Project are 4.58.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

Pervasive unanticipated rocky conditions drove several first order impacts, including added costs to the mechanical contractor and a slowdown to the original construction schedule. These conditions then produced second order effects, most notably the need for prolonged Construction Management support. This field-driven change resulted in an additional 85 days of construction, changes to planned pipeline construction from open trench to bores, directly increasing final construction costs.

Mid-construction steps including detailed engineering support, mobilization of specialty boring equipment and shoring, and updated survey work, enabled SDG&E to avoid demobilizing the mechanical construction contractor but also revealed the anticipated rate of construction progress would be slower than estimated in the TIC estimate due primarily to the significant presence of rock throughout the alignment. These unforeseen subsurface conditions increased construction complexity and costs. As a result, the total project cost was updated based on final contractor bid pricing and a revised Total Installed

Cost (TIC) estimate that reflects the refined design, procurement, and construction requirements identified through these efforts.

At the completion of the Line 1600 Section 14 Black Mountain Replacement Project, Actual Direct Costs exceeded the preliminary estimate by $15,618,688. This variance is attributable to a variety of factors including:

1. Mechanical Construction Contractor:
   a. Activities to address or mitigate conditions encountered during construction are detailed in Section III, Part C and resulted in approximately $8,465,000 in change orders. Detailed change order information is provided below:
      i While geotechnical studies were conducted, Extensive unanticipated rocky subsurface conditions were encountered in multiple locations along the pipeline alignment and required the use of specialized excavators and the involvement of an additional specialized third-party contractor. These unforeseen conditions resulted in a cost increase of $3,964,000 and a schedule delay of 106 days.
      ii Across multiple locations, the Project Team determined during construction that some pipeline segments originally planned to be executed via open trench methods would be infeasible due to factors such as rocky subsurface conditions, groundwater, unstable excavation conditions, and existing utilities. As a result, the Mechanical Construction Contractor and SDG&E agreed to switch to hammer bore installations, which required additional excavation, shoring, specialized equipment, and mitigation measures such as submersible pumps. These conditions led to a cost increase of $1,406,000 and a schedule impact of 69 days.
   b. COVID-19 sanitation measures at the Line 1600 Black Mountain Replacement Project site required daily cleaning and disinfecting. These enhanced sanitation efforts were performed by a third-party cleaning company and remained in place until COVID-19 restrictions were lifted, resulting in a cost increase of $74,000.

c. Increased labor-related costs were driven by updated construction labor rates per union agreement, extended work hours during COVID-19, and additional staffing needs to manage project documentation updates. Collectively, these changes resulted in additional labor expenses of approximately $1,169,000.

d. SDG&E directed the construction contractor to realign the [redacted] gas main through the median island. The original design proposed a hammer bore beneath a [redacted] storm drain; however, drilling operations encountered unanticipated rocky subsurface conditions, which made it infeasible to complete the bore. As a result, SDG&E revised the design to install the replacement gas main over the storm drain. This design change created an elevation conflict, necessitating the relocation of an existing [redacted] water line. These design changes resulted in approximately $117,000 beyond the original project scope.

2. Construction Management & Support:

a. Construction duration was originally estimated as 180 days, while actual duration was 265 working days with increased number of working hours per day, primarily due to rocky subsurface conditions, which significantly slowed productivity. This resulted in an estimated increased cost of $1,330,000 for inspectors, field engineers, and other construction management support.

3. Environmental:

a. The Mechanical Construction Contractor was required to bring in an Unexploded Ordinance Monitor due to the project site formerly being used as a bombing and training field by the United States military which increased costs by approximately $34,000. At least two practice bombs were encountered during construction requiring temporary suspension of work directed by the bomb squad in order to safely remove the devices.

4. Engineering & Design:
   a. The Project utilized enhanced engineering and design, drafting, and 3D modeling during project closeout, using the company's new standard design software to improve accuracy, safety and integration into completion drawings. This resulted in an increase in engineering and design costs of approximately $401,000. The original estimate was based on the existing simpler design standard and did not account for these requirements and associated costs.

E. Disallowance

For this replacement project, SDG&E identified 26 feet of pipe as being installed after 1955 and lacking records that provide the minimum information necessary to demonstrate compliance with then-applicable industry standards or regulatory strength testing and recordkeeping requirements. Of the pipeline that was replaced, 26 feet of Phase 1A pipe is disallowed. Therefore, a $12,310 reduction to rate base was calculated based on SoCalGas and SDG&E's system average cost of pressure testing at the time the pipeline was returned to service.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 14 Black Mountain Replacement Project. Through this Replacement Project, SDG&E successfully replaced 3.576 miles of pipeline with 4.192 miles of pipeline in the City of San Diego, including the installation of 4.192 miles of fiber optic cable, 0.88 miles of distribution pipe, two new regulator stations, and three MLVs. The total loaded cost of the Project is $63,705,730.

SDG&E executed this project prudently by rerouting the new pipeline to allow easier construction while avoiding major customer and community impacts.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, installing additional valves for future maintenance, reducing the need for pre-construction potholing and surveying by utilizing survey and pothole data from recently completed projects, and successfully negotiated with the City of San Diego to defer redundant street repair during potholing activities.

End of Line 1600 Section 14 Black Mountain Replacement Project Final Report

I. LINE 1600 SECTION 15 MCAS NORTH REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 15 Marine Corps Air Station (MCAS) North Replacement Project that consists of the replacement of 1.036 miles of previously existing pipeline with approximately 1.125 miles of new pipeline and fiber optic cable along [redacted] from [redacted] to just south of [redacted]. This Project also includes the installation of a new regulator station and 0.746 miles of associated distribution piping to serve an existing MCAS Miramar meter set. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $17,225,293.

The Line 1600 Section 15 MCAS North Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

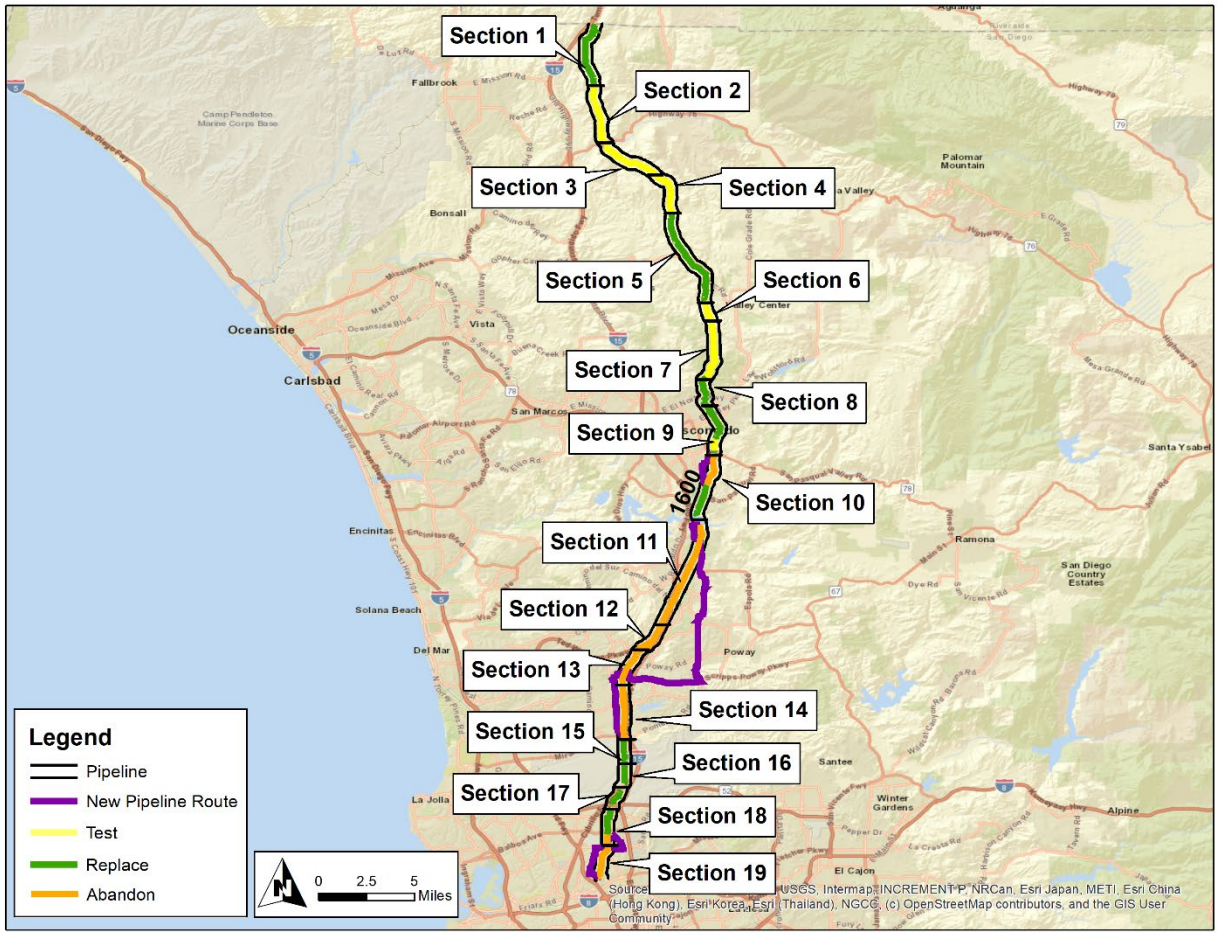
Table 1: General Project Information

Project Name	**Section 15 MCAS North**		
Project Type	Replacement		
Length	1.125 miles		
Location	MCAS Miramar, City of San Diego		
Class	1 and 3		
MAO*P*	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[4]	[redacted]		
Construction Start	05/08/2023		
Construction Finish	12/15/2023		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[5]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	17,225,293	0	17,225,293

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



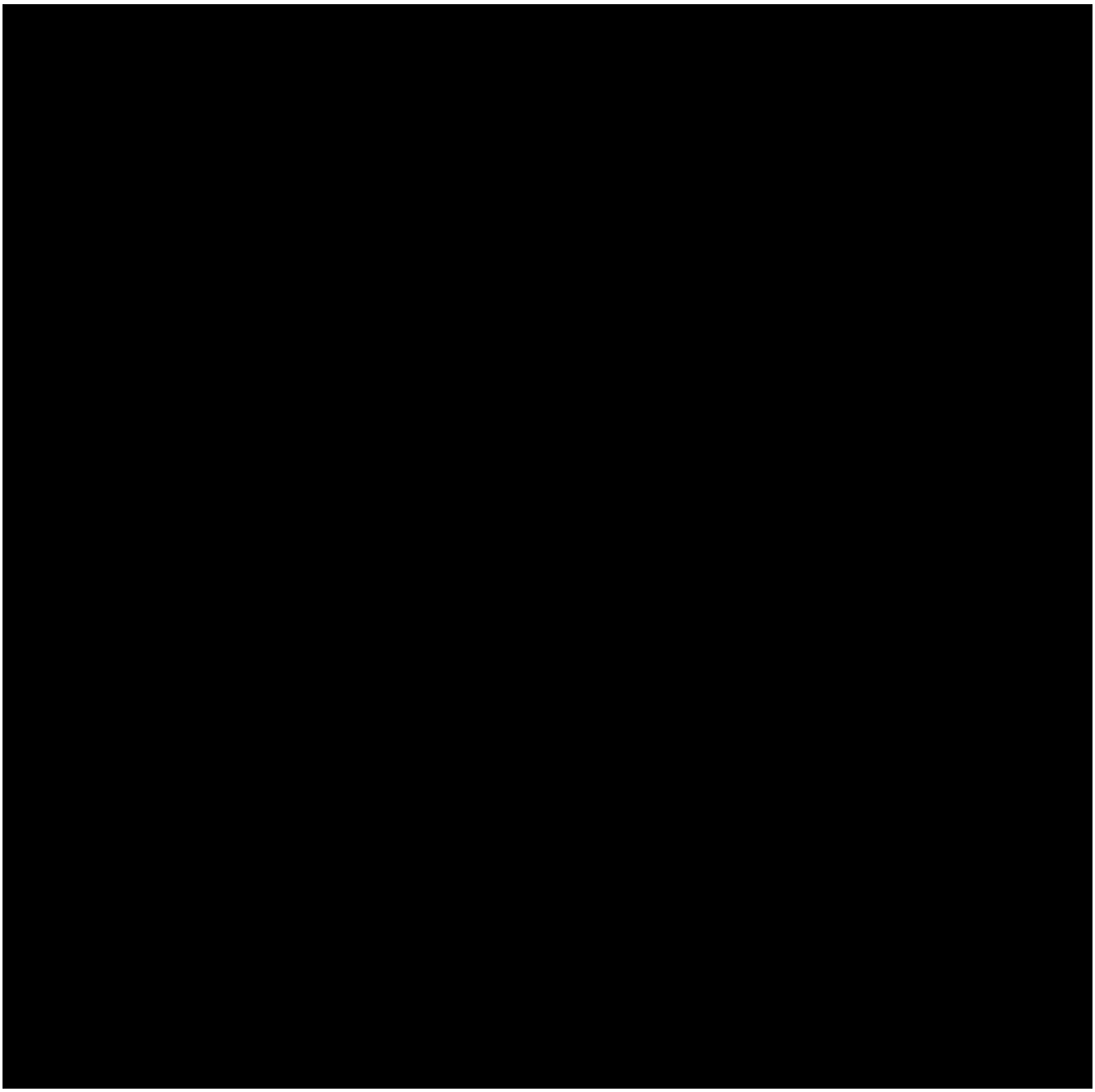
Final Report for Line 1600 Section 15 MCAS North Replacement Project

Figure 2: Satellite Image of Line 1600 Section 15 MCAS North Replacement Project

Final Report for Line 1600 Section 15 MCAS North Replacement Project

Figure 3: Overview Map of Line 1600 Section 15 MCAS North Replacement Project

Figure 4: Overview Map of Line 1600 Section 15 MCAS North Replacement Project and Line 1600 Section 16 MCAS Central Replacement Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	0.739 mi.	0.292 mi.	0.006 mi.	0.089 mi.	1.125 mi.
	3,902 ft.	1,542 ft.	32 ft.	470 ft.	5,940 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 15 MCAS North segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 15 MCAS North

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[8] Values may not add to total due to rounding.

segment of Line 1600 as the most prudent option. During the Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced 1.036 miles of previously existing pipeline by installing 1.125 miles of new pipeline along [redacted] from [redacted] to just south of [redacted].
   b. The Project Team installed a new regulator station and associated vault near the intersection of [redacted] and [redacted] along with 0.746 miles of associated distribution piping to serve an existing meter set within the MCAS Miramar Military Base. This maintained reliability of service to customers currently downstream of the previously existing pipeline and also increased SDG&E's accessibility to company assets that serve the existing meter set, previously located in high security areas within the Military Base.
   c. The Project Team hydrotested the newly installed [redacted] pipeline within this segment along with the Line 1600 Section 16 MCAS Central Replacement Project. The Project also included a separate nitrogen strength test for the newly installed associated distribution pipeline.
   d. The Project Team installed approximately 1.125 miles of fiber optic cable along the length of the new [redacted] pipeline.
   e. Accelerated and Incidental mileage within the Line 1600 Section 15 MCAS North Replacement Project was included for the constructability of the reroute, executed to accommodate MCAS Miramar's preferred location of the pipeline, outside of restricted security zones and environmentally sensitive lands. SDG&E and MCAS Miramar previously had an easement agreement in place for pipeline within the Military Base. At the time for renewal of the easement agreement, SDG&E accommodated the request of various entities to reroute the pipeline.
2. Final Project Scope: The final project scope consists of a 1.036 mile replacement with 1.125 miles of new pipeline, installation of a new regulator station and 0.746 miles of

associated distribution piping, as well as installation of approximately 1.125 miles of fiber optic cable. The Accelerated and Incidental mileages consist of 0.292 miles and 0.006 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: At the request of various agencies including the MCAS Miramar Military Base, the Project Team planned the new pipeline alignment to avoid MCAS Miramar high security zones and environmentally sensitive areas, resulting in pipeline installations within the public right of way (ROW). This was executed in a manner that system reliability is not compromised and the existing reliability of service that customers within the Military Base currently receive from the previously existing pipeline is maintained.
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in provided an alternative source of feed was established for the downstream Military Base.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project required CNG support to maintain feed to residential and commercial customers along with critical military infrastructure within the isolation segment. Through close coordination of tie-in work, the Project was executed in a manner that reduced the timeframe for CNG support, reducing overall costs for the Project.

4. Community Impact: The Project Team provided constant communication to nearby businesses due to minimal impacts including limiting driveway access while maintaining normal traffic on major roads.
5. Schedule Coordination: The Project Team executed this Project in conjunction with Line 1600 Section 16 MCAS Central Replacement Project and Line 1600 Section 17 MCAS South Replacement Project to allow for efficiencies. The Project Team also coordinated with other SDG&E projects to ensure project activities did not materially impact the system or result in customer outages.
6. Substructures: The Project Team researched existing records and performed survey to identify multiple substructures within the construction alignment and included them in the Project design.
7. Permit Conditions:
   a. The Project Team obtained permits from the City of San Diego for right of way encroachment, street and sidewalk blockage, and traffic control.
   b. The Project Team obtained an encroachment permit and traffic control plan (TCP) approval from Caltrans.
   c. The Project Team adhered to additional construction requirements mandated by the federal government within a newly obtained MCAS Miramar Easement Acquisition Agreement, granted during this Project's timeline. The requirements included details on how project personnel could access the base and specific height requirements near the project area.
8. Land Use:
   a. The Project Team obtained two temporary right of entry (TRE) agreements from private property owners to utilize land as laydown area.
   b. The Project Team completed extensive activities and requirements to obtain a new MCAS Miramar Easement Acquisition Agreement. This effort was initiated in 2020, well in advance of construction execution for the Project, however multiple factors extended receipt date of the Agreement including reviews and approvals from various local entities, as well as communications and meetings with

government agencies throughout the country. Final receipt of this Agreement was delayed due to additional MCAS Miramar requests, extended environmental review terms, exhibit creation, survey data research and collection, plat and legal developments and comments for the final easement agreement package.

9. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline tie-in locations, including regulator station tie-over locations, as well as grout fill locations.
   b. The Project required nesting bird surveys during the construction timeframe.
   c. The Project required any hydrologic features adjacent to the work areas, including vernal pools, road ruts and drainages, to be delineated with exclusion fencing prior to the start of construction.
   d. The Project required Storm Water Pollution Prevention Plan (SWPPP), Hydrotest Water Discharge Permit, Ground Water Discharge Permit.
   e. The Project disposed of hydrotest water via sanitary sewer discharge locations approved by the City of San Diego, outlined under an acquired Water Discharge Permit.
   f. The Project's MCAS Miramar Easement Acquisition Agreement required a Categorical Exclusion Decision Memorandum from MCAS Miramar Committee for Land and Airspace Management Policy (CLAMP) Tier 1 determining the Project satisfied the National Environmental Policy Act (NEPA) Committee review requirements and ultimately was classified as a Categorical Exclusion (CATEX).
10. Constructability: The Project required four excavations to access the abandoned pipeline for grout fill activities.

C. Scope Changes

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, SDG&E entered into a competitive bidding process to select a Construction Contractor. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $7,910,480.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/08/2023
Construction Completion Date	12/15/2023
NOP Date	09/14/2023

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $490,000 in change orders.

1. Substructures: During construction, the Project Team encountered the following:
   a. Unknown and unmarked storm drains, foreign utilities, vault, and box culvert causing schedule delays and alignment adjustments.
   b. Unknown and unmarked Federal Aviation Administration (FAA) communication lines. The Project Team coordinated and communicated extensively with the FAA to ensure communications were not impacted. These additional efforts incorporated use of ground penetrating radar (GPR) equipment, hand-digging, and additional potholing to locate the unmarked FAA communication lines.
2. Field Design Changes: Due to various unknown and unmarked substructures encountered during construction, the Project required alignment and profile adjustments of the pipeline to be installed.
3. Permits Conditions: Through initial design considerations and eventual negotiations with the City of San Diego, the Project Team eliminated the requirement to perform final grind and cap for the portions of alignment located within the shoulder of the roadway, resulting in cost savings.

Figure 5: New Regulator Station and Associated Vault

Figure 6: Trenching along Shoulder of [redacted]

Figure 7: New Pipeline Installation

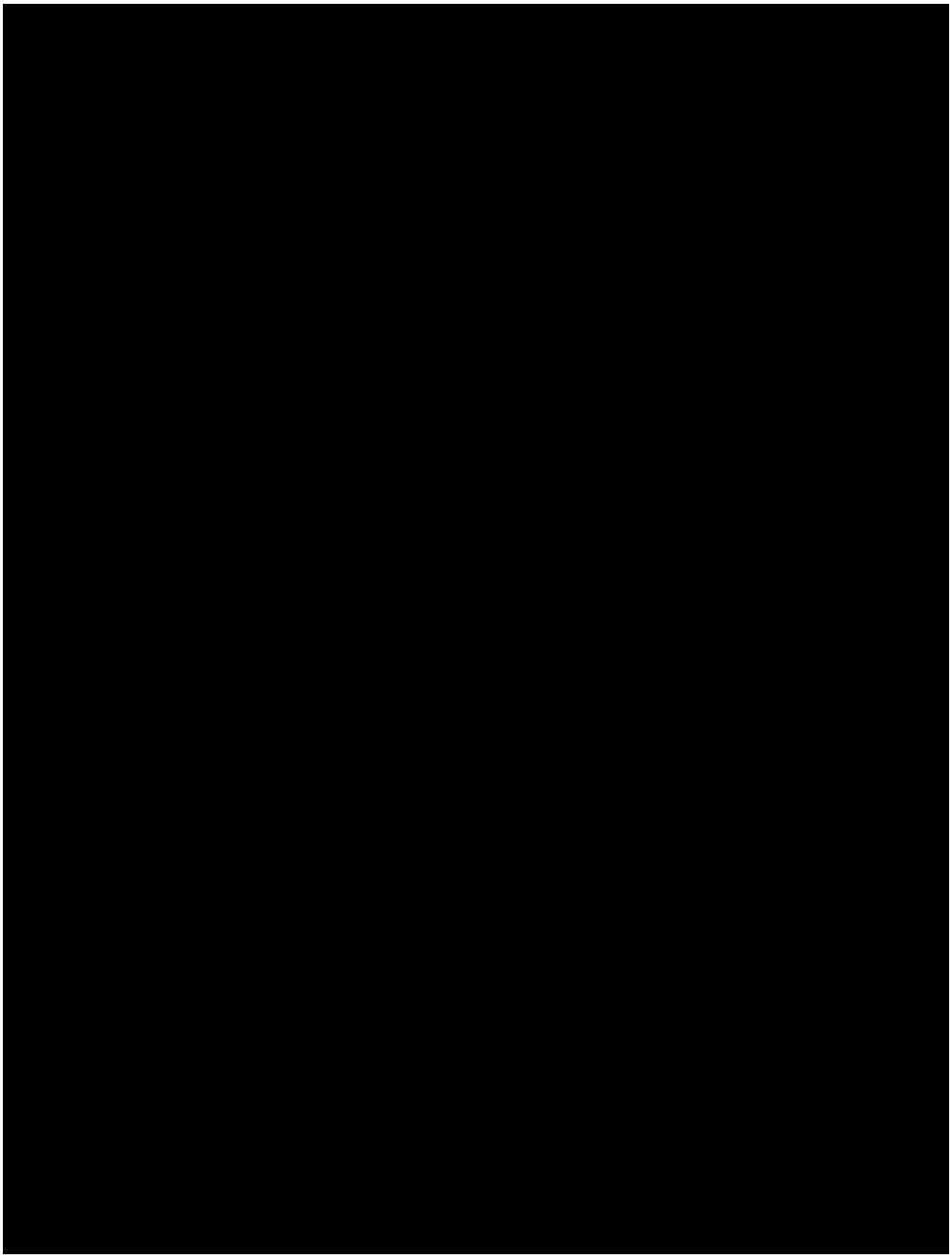


Figure 8: Open Excavations for New Pipeline Installation

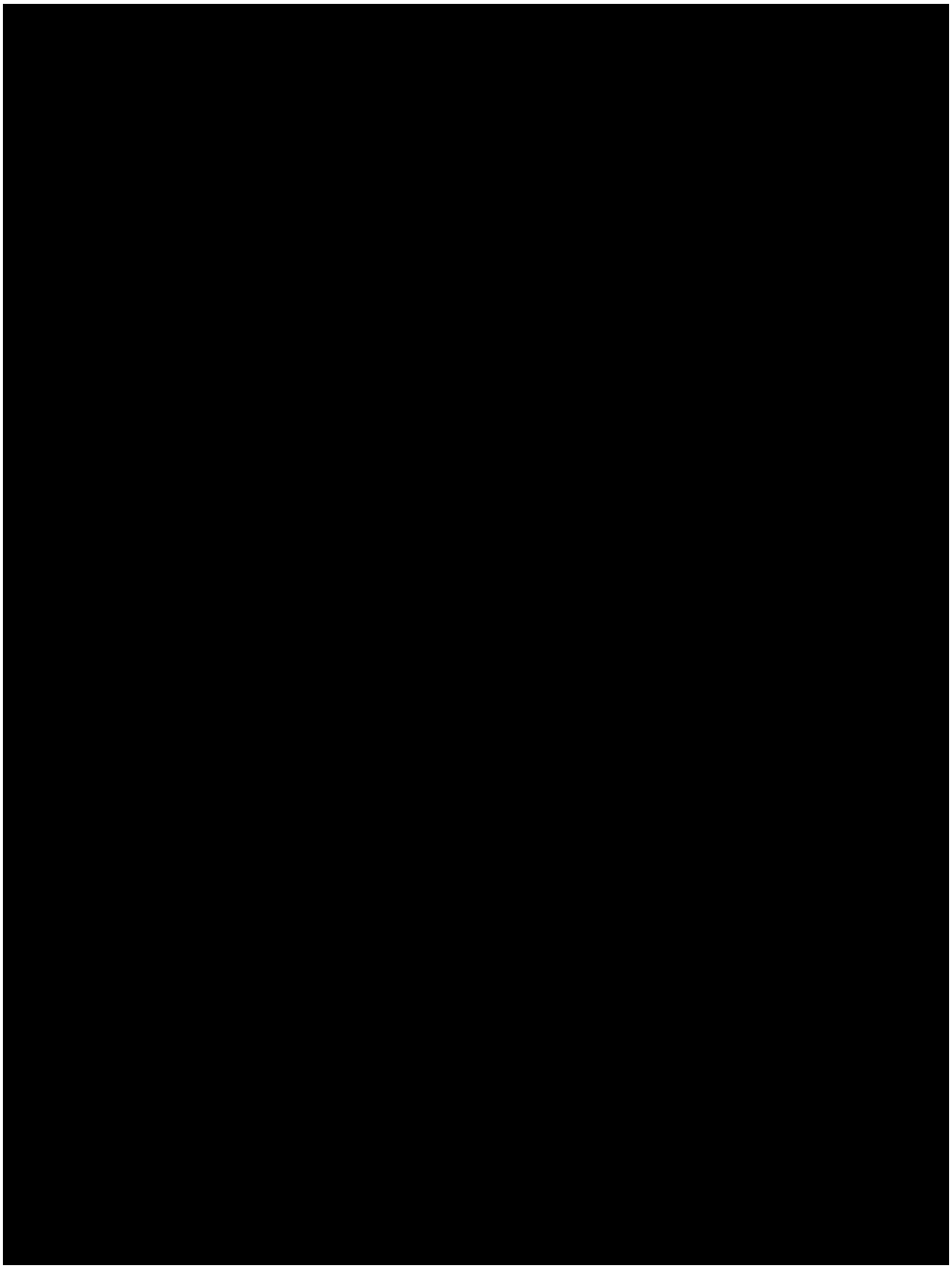
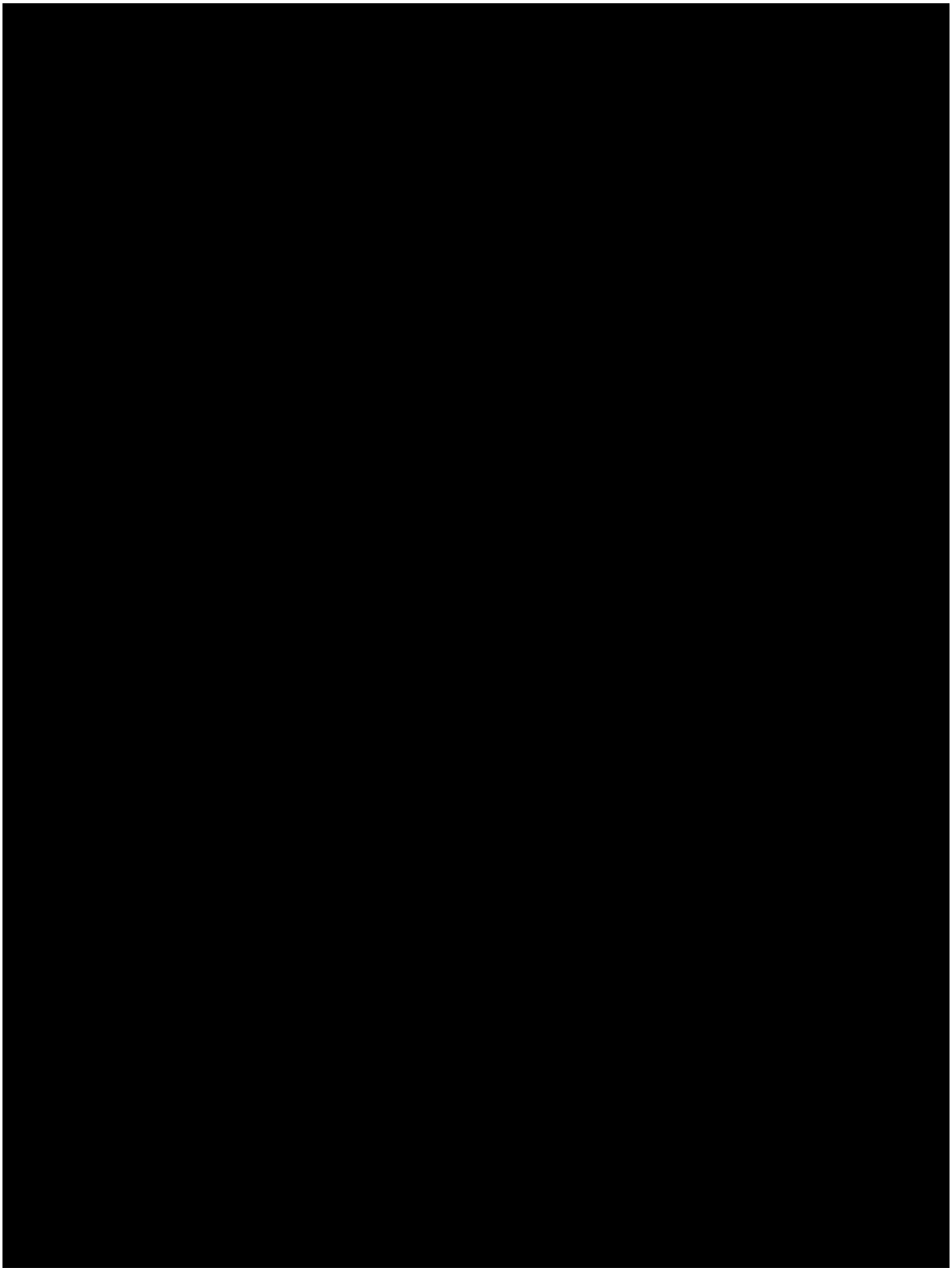


Figure 9: Lowering of New Pipeline into Excavation



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include final cap and grind paving of [redacted]. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at Kyocera laydown yard shared with MCAS Central and MCAS South projects.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Construction Execution:
   a. The Project Team diligently released for bid and executed this Project in conjunction with other Line 1600 Replacement Projects. This resulted in various efficiencies including utilizing the same Construction Contractor, optimizing the bidding process as well as reducing overall mobilization and construction costs. Since various pricing scenarios for the three MCAS projects was requested together, the Project Team was able to optimize pricing options for each project.
   b. The Project Team conducted extensive coordination with various internal departments to propose an execution plan for this Project that could utilize the same isolation segment and window as the Line 1600 Section 16 MCAS Central Replacement Project. Ultimately approved by all required stakeholders, this execution plan greatly reduced costs for alternative sources of feed and tie-over operations.
   c. The Project Team carefully planned and executed combined mainline hydrotests for this segment and the adjacent Line 1600 Section 16 MCAS Central Replacement Project, providing efficiencies and savings for both projects.
2. Permit Conditions: As previously stated, through initial design considerations and eventual negotiations with the City of San Diego, the Project Team eliminated the requirement to perform final grind and cap for the portions of alignment located within the shoulder of the roadway, resulting in cost savings.

3. Environmental: The Project Team obtained one combined Categorical Exclusion Decision Memorandum from MCAS CLAMP Tier 1 for all three Line 1600 MCAS Replacement Projects; Section 15 MCAS North, Section 16 MCAS Central, and Section 17 MCAS South. The Project Team's efforts to obtain a combined decision resulted in cost savings for all three projects.
4. Materials: The Project Team ordered [redacted] pipe in bulk, providing volume pricing.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $16,455,701. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project.

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 $17,225,293.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,809,540	789,012	(2,020,527)
Materials	778,403	670,129	(108,274)
Construction Contractor	7,910,480	8,684,410	773,930
Construction Management & Support	738,784	1,086,170	347,385
Environmental	1,025,464	704,565	(320,898)
Engineering & Design	880,433	1,439,515	559,082
Project Management & Services	1,880,156	1,043,802	(836,354)
ROW & Permits	432,442	421,902	(10,540)
Total Direct Costs	16,455,701	14,839,505	(1,616,197)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[10]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	2,749,093	1,201,458	(1,547,635)
AFUDC	1,023,237	1,015,226	(8,011)
Property Taxes	788,361	169,104	(619,256)
Total Indirect Costs	4,560,691	2,385,788	(2,174,902)
Total Direct Costs	16,455,701	14,839,505	(1,616,197)
Total Loaded Costs	21,016,392	17,225,293	(3, 791,099)

The Actual Full-Time Equivalents[11] (FTEs) for this Project are 1.41.

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

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring

At the completion of the Line 1600 Section 15 MCAS North Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $1,616,197. This variance can be attributed to several factors including: the Project Team created a combined isolation and hydrotest with Line 1600 Section 16 MCAS Central Replacement Project ultimately increasing efficiencies for company oversight and stakeholder contributions; coordination with the Line 1600 Section 16 MCAS Central Replacement Project and Line 1600 Section 17 MCAS South Replacement Project allowed for an consolidating the bidding process by incentivizing construction contractors to bid for more overall work with a lower price per project as discussed in Section IV. Part A, environmental permitting efficiencies, as well as reduced project development and project management costs; and the reroute of the pipeline out of environmentally sensitive areas and into public ROW lowered total environmental and land costs. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for Line 1600 Section 15 MCAS North Replacement Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 15 MCAS North Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[12]. Through this Replacement Project, SDG&E successfully replaced 1.036 miles of pipeline with 1.125 miles of pipeline within the San Diego County, including the installation of 1.125 miles of fiber optic cable, 0.746 miles of associated distribution piping, and one new regulator station. The total loaded cost of the Project is $17,225,293.

SDG&E executed this project prudently by rerouting the pipeline to avoid restricted security zones and environmentally sensitive lands within MCAS Miramar and instead placing the new pipeline within public ROW, allowing for easier construction during the Project while avoiding major customer and community impacts.

SDG&E engaged in prudent cost savings and avoidance efforts by utilizing volume pricing from bulk ordered pipe, bidding out and executing various activities for this Project simultaneously or in conjunction with adjacent projects to reduce construction costs.

End of Line 1600 Section 15 MCAS North Replacement Project Final Report

[12] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

I. LINE 1600 SECTION 16 MCAS CENTRAL REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. The pipeline is primarily routed across Class 3 locations and traverses some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 16 Marine Corps Air Station (MCAS) Central Replacement Project that consists of the replacement of 1.301 miles of previously existing pipeline with approximately 1.451 miles of new pipeline along [redacted] from just south of [redacted] to Kearny Villa Pressure Limiting Station (PLS). The Project also includes the installation of 0.083 miles of associated distribution piping to serve an existing customer within the segment and 1.451 miles of fiber optic cable. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $18,185,624.

The Line 1600 Section 16 MCAS Central Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing . However, pursuant to Commission direction , the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan . The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Final Report for Line 1600 Section 16 MCAS Central Replacement Project

Table 1: General Project Information

Project Name	Section 16 MCAS Central		
Project Type	Replacement		
Length	1.451 miles		
Location	MCAS Miramar, City of San Diego		
Class	[redacted]		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[1]	[redacted]		
Construction Start	05/22/2023		
Construction Finish	12/15/2023		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[2]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	18,185,624	0	18,185,624

[1] Predominant pipeline vintage.
[2] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects

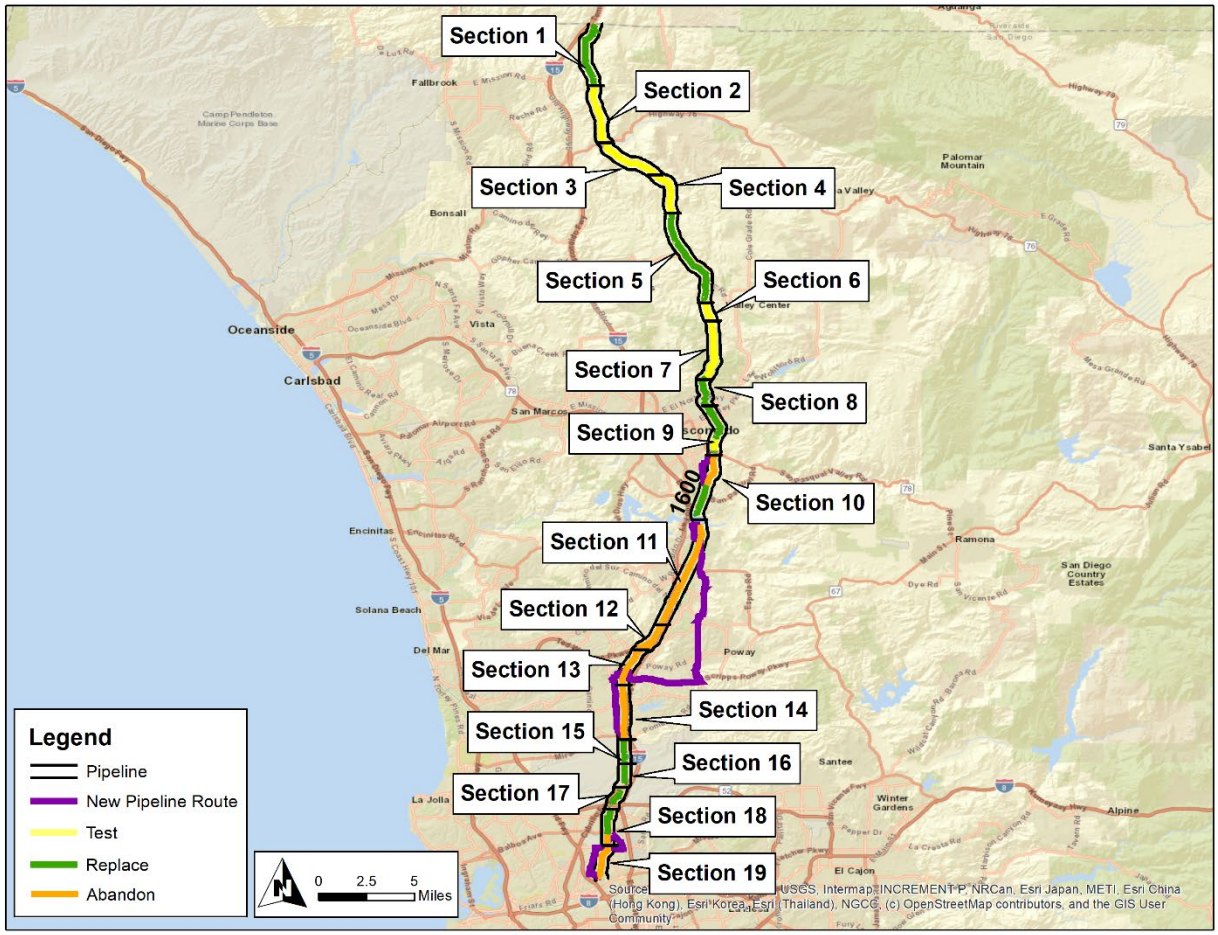
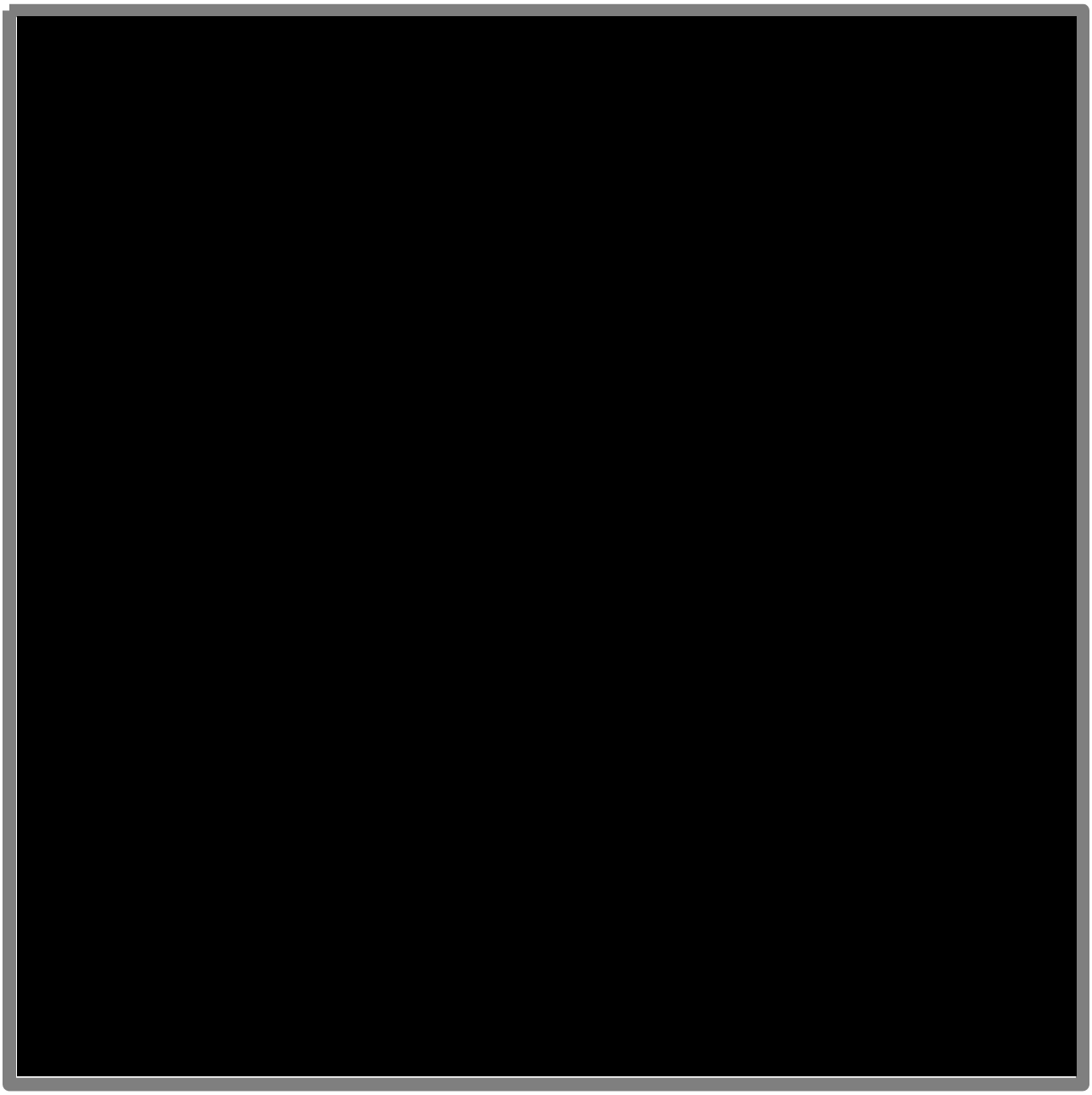


Figure 2: Satellite Image of Line 1600 Section 16 MCAS Central Replacement Project

Figure 3: Overview Map of Line 1600 Section 15 MCAS Central Replacement Project

Figure 4: Overview Map of Line 1600 Section 15 MCAS North Replacement Project and Line 1600 Section 16 MCAS Central Replacement Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[3]

	Accelerated[4]	Incidental	New	Total[5]
Final Mileage	1.310 mi.	0.019 mi.	0.123 mi.	1.451 mi.
	6,917 ft.	100 ft.	649 ft.	7,661 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 16 MCAS Central segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the

[3] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[4] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[5] Values may not add to total due to rounding.

approved Plan alternative, SDG&E determined replacing the Section 16 MCAS Central segment of Line 1600 as the most prudent option. During the Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

Engineering, Design, and Constructability:

a. The Project Team replaced 1.301 miles of previously existing pipeline by installing two segments, totaling 1.451 miles of new pipeline along [redacted] from just south of [redacted] to Kearny Villa PLS. One of the installation segments included 280 feet of new [redacted] pipeline within [redacted] casing installed via jack and bore to cross Johnson Creek.
b. The Project Team installed 0.083 miles of new associated distribution pipeline to maintain service to a large commercial customer.
c. The Project Team hydrotested the newly installed [redacted] pipeline and associated distribution lateral pipeline using two hydrotests, one of which was combined with the Line 1600 Section 15 MCAS North Replacement Project.
d. The Project Team installed approximately 1.27 miles of fiber optic cable along the length of the new [redacted] pipeline. The Project included three additional installation segments for encased fiber optic cable, totaling 0.672 miles, to connect adjacent fiber optic segments.
e. The Project Team included reconfiguration of the permanent access road to Kearny Villa PLS to allow for replacement pipeline installation and for improved future access.
f. Accelerated and Incidental mileage within the Line 1600 Section 16 MCAS Central Replacement Project was included for the constructability of the reroute, executed to accommodate MCAS Miramar's preferred location of the pipeline, outside of restricted security zones and environmentally sensitive lands. SDG&E's primary easement for the Line 1600 pipeline within the Military Base was set to expire in 2022. In the process of obtaining the new easement agreement, SDG&E

considered all these factors and accommodated the request of various entities to reroute the pipeline.

2. Final Project Scope: The final project scope consists of a 1.301 mile replacement with 1.451 miles of new pipeline, installation of approximately 1.451 miles of fiber optic cable, and installation of 0.083 miles of associated distribution piping. The Accelerated and Incidental mileages consist of 1.310 miles and 0.019 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: At the request of various agencies including the MCAS Miramar Military Base, the Project Team planned the new pipeline alignment to avoid MCAS Miramar high security zones and environmentally sensitive areas, resulting in pipeline installations within the public right of way (ROW). This was executed in a manner that system reliability was not compromised and the existing reliability of service that customers within the Military Base currently received from the previously existing pipeline was maintained.
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in however gas service to a large commercial customer within the isolation segment would need to be maintained through alternative means.

3. Customer Impact: Per the gas transmission and distribution system analyses, the Project required CNG support to maintain feed to a large commercial customer within the isolation segment.
4. Community Impact: The Project Team mitigated community impacts by managing traffic effectively during construction and avoided impacts to nearby flight operations by conforming with equipment height restrictions.
5. Schedule Coordination: The Project Team executed this Project in conjunction with Line 1600 Section 15 MCAS North Replacement Project and Line 1600 Section 17 MCAS South Replacement Project to allow for efficiencies. The Project Team also coordinated with other SDG&E projects to ensure project activities did not materially impact the system or result in customer outages.
6. Substructures: The Project Team researched existing records and performed survey to identify multiple substructures within the construction alignment and included them in the Project design.
7. Permit Conditions:
   a. The Project Team obtained permits from the City of San Diego for right of way encroachment, grading, and traffic control. The Project Team coordinated extensively with the City of San Diego and provided various revisions of submitted documentation in efforts to obtain approvals in a timely manner.
   b. The Project Team obtained encroachment permits and traffic control plans (TCP) from Caltrans. Receipt of one of the encroachment permits for the [redacted] crossing was delayed and included various conditions of approval that added to the scope of work, including conduits to be installed via Horizontal Directional Drilling (HDD) within Caltrans ROW, removal of any lost deck found within the open bridge cell, and the installation of two soffit access openings.
   c. The Project Team adhered to additional construction requirements mandated by the federal government within a newly obtained MCAS Miramar Easement Acquisition Agreement, granted during this Project's timeline. The requirements

included details on how project personnel could access the base and specific height requirements near the project area.

8. Land Use:
   a. The Project Team obtained temporary right of entry (TRE) agreements from private property landowners to utilize land as laydown area.
   b. The Project Team completed extensive activities and requirements to obtain a new MCAS Miramar Easement Acquisition Agreement. This effort was initiated in 2020, well in advance of construction execution for the Project, however multiple factors extended receipt date of the Agreement including reviews and approvals from various local entities, as well as communications and meetings with government agencies throughout the country. Final receipt of this Agreement was delayed due to additional MCAS Miramar requests, extended environmental review terms, exhibit creation, survey data research and collection, plat and legal developments and comments for the final easement agreement package.
9. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline tie-in locations, including regulator station tie-over locations, as well as grout fill locations.
   b. The Project required nesting bird surveys during the construction timeframe.
   c. The Project required any hydrologic features adjacent to the work areas, including vernal pools, road ruts and drainages, to be delineated with exclusion fencing prior to the start of construction.
   d. The Project required Storm Water Pollution Prevention Plan (SWPPP), Hydrotest Water Discharge Permit, Ground Water Discharge Permit.
   e. The Project Team disposed of hydrotest water via sanitary sewer discharge locations approved by the City of San Diego, outlined under an acquired Water Discharge Permit.
   f. The Project's MCAS Miramar Easement Acquisition Agreement required a Categorical Exclusion Decision Memorandum from MCAS Miramar Committee for

Land and Airspace Management Policy (CLAMP) Tier 1 determining the Project satisfied the National Environmental Policy Act (NEPA) Committee review requirements and ultimately was classified as a Categorical Exclusion (CATEX).

10. Constructability:
    a. The new pipeline was installed as two replacement segments that tied into a 1981-installed segment of pipe that traversed [redacted]. In effort to minimize pipeline shutdown time and additional costs associated with maintaining customer feed, the Project Team conducted individual hydrotests for the two segments.
    b. The Project Team included 280 feet of new [redacted] pipeline within [redacted] casing installed via jack and bore to cross [redacted].
    c. The Project required additional pipeline offset due to alignment adjustments to circumvent sensitive environmental areas between [redacted] and Kearny Villa PLS, including wetlands, vernal pools, and endangered fairy shrimp habitat.
    d. The Project Team included the rough grading portion for reconfiguration of the permanent access road to Kearny Villa PLS to allow for replacement of the pipeline and for improved future access. The reconfiguration was performed in conjunction with the Line 1600 Section 17 MCAS South Replacement Project and was reasonably incorporated into the scope of the projects since the existing access road was susceptible to flooding, resulting in vernal pools with significant environmental restrictions that impacted SDG&E's ability to operate and maintain Kearny Villa PLS.
    e. The Project required installation of 1.27 miles of fiber optic cable along the new pipeline installation. The Project also included three additional installation segments for encased fiber optic cable, totaling 0.672 miles, to connect adjacent fiber optic segments and minimize the number of independent monitoring stations. The additional installations were completed via open trench, HDD, and within an open bridge cell across [redacted].

f. The Project required two excavations to access the abandoned pipeline for grout fill activities.

C. Scope Changes

Through engineering, design, and planning activities, 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. Scope Increase: An additional 467 foot segment was transferred to this Project from the Line 1600 Section 17 MCAS South Replacement Project. This resulted in additional scope and mileage.
2. Alignment Deviation: Due to the [redacted] natural waterway at [redacted] and concerns over seismic integrity over the [redacted], the Project required deviation from the original alignment and incorporated pipeline installations via jack and bore.

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, SDG&E entered into a competitive bidding process to select a Construction Contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $7,704,732.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted] that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/22/2023
Construction Completion Date	12/15/2023
NOP Date	09/14/2023

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $700,000 in change orders.

1. Permits Conditions:
   a. Through initial design considerations and eventual negotiations with the City of San Diego, the Project Team eliminated the requirement to perform final grind and cap for the portions of alignment located within the shoulder of the roadway, resulting in cost savings.
   b. Due to a prolonged review process and various conditions of approval, a Caltrans encroachment permit at the [redacted] crossing resulted in both schedule changes and scope additions. Since the permit was received after the pipeline Construction Contractor was demobilized, the additional scope of work was released for bid and was executed by a different Construction Contractor, that ultimately resulted in additional costs to the Project.

Figure 5: Installation of Casing Pipe via Jack and Bore

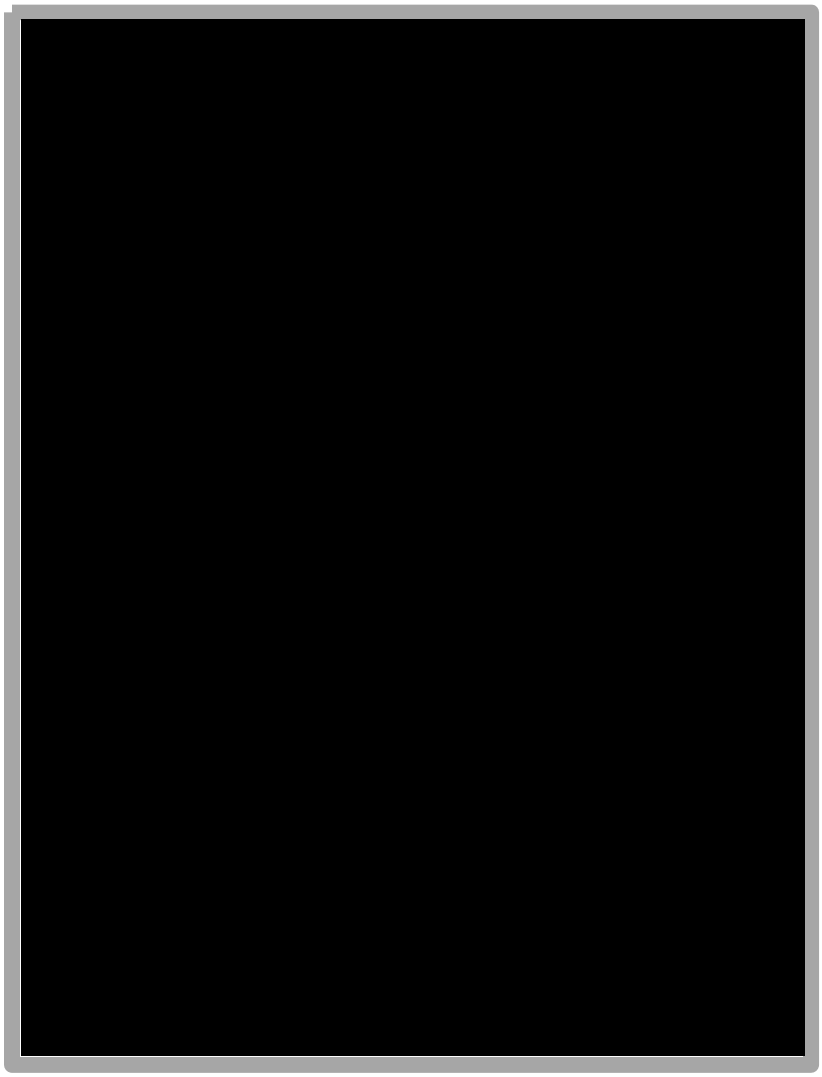
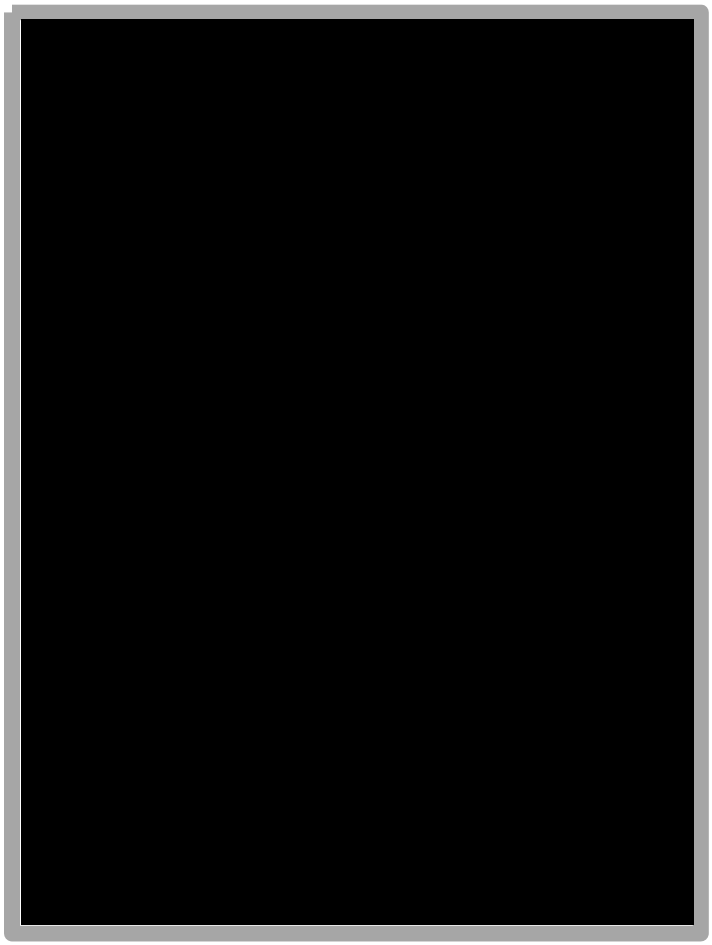


Figure 6: Pipe Installation along [redacted]

Figure 7: Pipe Installation in Open Trench



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include final installation of fiber optic cable within SR-163 overpass and final grind and cap paving of [redacted]. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at Kyocera laydown yard shared with MCAS North and MCAS South projects.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Construction Execution:
   a. The Project Team diligently released for bid and executed this Project in conjunction with other Line 1600 Replacement Projects. This resulted in various efficiencies including utilizing the same Construction Contractor, optimizing the bidding process as well as reducing overall mobilization and construction costs. Since various pricing scenarios for the three MCAS projects was requested together, the Project Team was able to optimize pricing options for each project.
   b. The Project Team conducted extensive coordination with various internal departments to propose an execution plan for this Project that could utilize the same isolation segment and window as the Line 1600 Section 15 MCAS North Replacement Project. Ultimately approved by all required stakeholders, this execution plan greatly reduced costs for alternative sources of feed and tie-over operations.
   c. The Project Team carefully planned and executed combined mainline hydrotests for this segment and the adjacent Line 1600 Section 15 MCAS North Replacement Project, providing efficiencies and savings for both projects
2. Environmental: The Project Team obtained one combined Categorical Exclusion Decision Memorandum from MCAS CLAMP Tier 1 for all three Line 1600 MCAS Replacement Projects; Section 15 MCAS North, Section 16 MCAS Central, and Section 17 MCAS South. The Project Team's efforts to obtain a combined decision resulted in cost savings for all three projects.

3. Permit Conditions:
   a. Through initial design considerations and eventual negotiations with the City of San Diego, the Project Team eliminated the requirement to perform final grind and cap for the portions of alignment located within the shoulder of the roadway, resulting in cost savings.
   b. The Project Team proactively requested an Encroachment Policy Exemption Request from Caltrans to install un-encased pipeline within Caltrans Right of Way via open trench.
4. Materials: The Project Team ordered [redacted] pipe in bulk, providing volume pricing.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $16,704,064. 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.

SDG&E estimated Indirect Costs of the Project based on the estimated Direct Costs and other project related variables.

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 $18,185,624.

Table 4: Estimated and Actual Direct Costs and Variances[6]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,757,704	793,190	(1,964,514)
Materials	649,647	641,754	(7,893)
Construction Contractor	7,704,732	9,544,333	1,839,602
Construction Management & Support	693,111	789,858	96,747
Environmental	1,433,670	614,104	(819,567)
Engineering & Design	1,056,061	1,610,164	554,103
Project Management & Services	2,001,271	1,078,629	(922,643)
ROW & Permits	407,868	514,676	106,809
Total Direct Costs	16,704,064	15,586,708	(1,117,356)

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	3,415,732	1,231,278	(2,184,454)
AFUDC	1,342,281	1,172,748	(169,532)
Property Taxes	479,945	194,890	(285,055)
Total Indirect Costs	5,237,958	2,598,916	(2,639,042)
Total Direct Costs	16,704,064	15,586,708	(1,117,356)
Total Loaded Costs	21,942,022	18,185,624	(3,756,399)

The Actual Full-Time Equivalents[8] (FTEs) for this Project are 1.09.

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

C. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 16 MCAS Central Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $1,117,356. This variance can be attributed to a variety of factors including: the Project Team created a combined isolation and hydrotest with Line 1600 Section 15 MCAS North Replacement Project ultimately increasing efficiencies for company oversight and stakeholder contributions; and coordination with the Line 1600 Section 15 MCAS North Replacement Project and Line 1600 Section 17 MCAS South Replacement Project allowed for an consolidating the bidding process by incentivizing construction contractors to bid for more overall work with a lower price per project as discussed in Section IV. Part A, environmental permitting efficiencies, as well as reduced project development and project management costs. Overall project costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

D. Disallowance

There was no disallowance for Line 1600 Section 16 MCAS Central Replacement Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 16 MCAS Central Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[9]. Through this Replacement Project, SDG&E successfully replaced 1.301 miles of pipeline with 1.451 miles of pipeline within the San Diego County, including the installation of 1.451 miles of fiber optic cable and 0.083 miles of associated distribution piping. The total loaded cost of the Project is $18,185,624.

SDG&E executed this project prudently by rerouting the pipeline to avoid restricted security zones and environmentally sensitive lands within MCAS Miramar and instead placing the new pipeline within public ROW, allowing for easier construction during the Project, while also increasing future pipeline accessibility and public safety.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, bidding out and executing various activities for this Project simultaneously or in conjunction with adjacent projects to reduce construction costs, and continuously optimizing construction activities to reduce cost, where applicable.

End of Line 1600 Section 16 MCAS Central Replacement Project Final Report

[9] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

I. LINE 1600 SECTION 17 MCAS SOUTH REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 17 Marine Corps Air Station (MCAS) South Replacement Project that consists of the replacement of 0.753 miles of previously existing pipeline with approximately 0.903 miles of new pipeline and installation of fiber optic cable along [redacted] from Kearny Villa Pressure Limiting Station (PLS) near [redacted]. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $13,699,411.

The Line 1600 Section 17 MCAS South Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

Final Report for Line 1600 Section 17 MCAS South Replacement Project

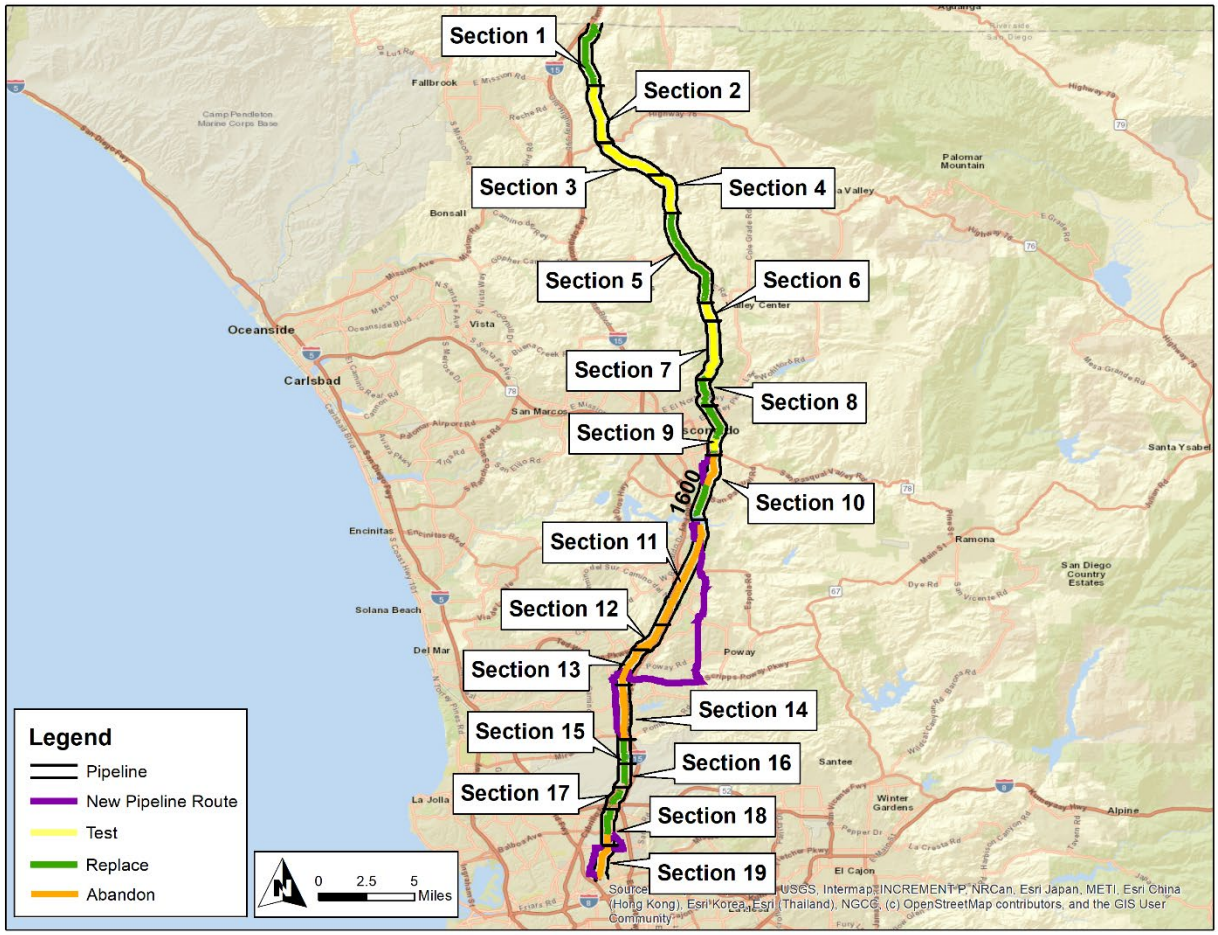
Table 1: General Project Information

Project Name	Section 17 MCAS South		
Project Type	Replacement		
Length	0.903 miles		
Location	MCAS Miramar, City of San Diego		
Class	[redacted]		
MAOP	[redacted]		
Pipe Grade	[redacted]		
Wall Thickness	[redacted]		
Pipe Vintage[4]	[redacted]		
Construction Start	08/08/2023		
Construction Finish	11/22/2023		
Original Pipe Diameter	[redacted]		
Nominal Pipe Diameter	[redacted]		
Original SMYS[5]	[redacted]		
New SMYS	[redacted]		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	13,669,411	0	13,669,411

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



Final Report for Line 1600 Section 17 MCAS South Replacement Project

Figure 2: Satellite Image of Line 1600 Section 17 MCAS South Replacement Project

Final Report for Line 1600 Section 17 MCAS South Replacement Project

Figure 3: Overview Map of Line 1600 Section 17 MCAS South Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Accelerated[7]	Incidental	New	Total[8]
Final Mileage	0.733 mi.	0.026 mi.	0.144 mi.	0.903 mi.
	3879 ft.	137 ft.	760 ft.	4,768 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the [redacted] vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 17 MCAS South segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 17 MCAS South

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.

[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.

[8] Values may not add to total due to rounding.

segment of Line 1600 as the most prudent option. During the Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced 0.753 miles of previously existing pipeline by installing 0.903 miles of new pipeline along [redacted] from Kearny Villa PLS near [redacted].
   b. The Project Team installed approximately 0.77 miles of fiber optic cable along the length of the new [redacted] pipeline, as well as an additional 0.33 miles of fiber optic cable via horizontal directional drilling across [redacted] in order to connect to adjacent fiber optic segments.
   c. The Project Team included reconfiguration of the permanent access road to Kearny Villa PLS to allow for replacement pipeline installation and for improved future access.
   d. Accelerated and Incidental mileage within the Line 1600 Section 17 MCAS South Replacement Project was included for the constructability of the reroute, executed to accommodate MCAS Miramar's preferred location of the pipeline, outside of restricted security zones and environmentally sensitive lands. SDG&E and MCAS Miramar previously had an easement agreement in place for pipeline within the Military Base. At the time for renewal of the easement agreement, SDG&E accommodated the request of various entities to reroute the pipeline.
2. Final Project Scope: The final project scope consists of a 0.753 mile replacement with 0.903 miles of new pipeline, reconfiguration of the Kearny Villa PLS access road, as well as installation of approximately 0.903 miles of fiber optic cable. The Accelerated and Incidental mileage consists of 0.733 miles and 0.026 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: At the request of various agencies including the MCAS Miramar Military Base, the Project Team planned the new pipeline alignment to avoid MCAS Miramar high security zones and environmentally sensitive areas, resulting in pipeline installations within the public right of way (ROW). This was executed in a manner that system reliability was not compromised and the existing reliability of service that customers received from the previously existing pipeline was maintained.
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in however system adjustments were required to maintain capacity and service throughout other segments of Line 1600.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project Team coordinated with customers on Line 1600 that would be minimally impacted from the isolation of this segment, and proactively communicated any anticipated changes to their gas service.
4. Community Impact: The Project Team notified various nearby locations of project activities and schedules, including notification to the public via newspaper advertisement.
5. Schedule Coordination: The Project Team executed this Project in conjunction with Line 1600 Section 15 MCAS North Replacement Project and Line 1600 Section 16 MCAS Central Replacement Project to allow for efficiencies. The Project Team also

coordinated with other SDG&E projects to ensure project activities did not materially impact the system or result in customer outages.

6. Substructures: The Project Team researched existing records and survey results and identified multiple substructures within the construction alignment prior to construction; these were included in the Project design.
7. Permit Conditions:
   a. The Project Team obtained permits from the City of San Diego for right of way encroachment, grading, and traffic control. The Project Team coordinated extensively with the City of San Diego and provided various revisions of submitted documentation in efforts to obtain approvals in a timely manner.
   b. The Project Team obtained an encroachment permit and traffic control plan (TCP) approval from Caltrans. This included an Excavation Encroachment Policy Exception (EPE) that allowed the installation of un-encased pipeline within Caltrans ROW via open trench. The Project Team coordinated extensively with Caltrans and provided various revisions to submitted documentation in efforts to obtain approvals in a timely manner.
   c. The Project Team adhered to additional construction requirements mandated by the federal government within a newly obtained MCAS Miramar Easement Acquisition Agreement, granted during this Project's timeline. The requirements included details on how project personnel could access the base and specific height requirements near the project area.
8. Land Use:
   a. The Project Team obtained a temporary right of entry (TRE) agreements from private property landowners to utilize land as laydown area.
   b. The Project Team completed extensive activities and requirements to obtain a new MCAS Miramar Easement Acquisition Agreement. This effort was initiated in 2020, well in advance of construction execution for the Project, however multiple factors extended receipt date of the Agreement including reviews and approvals from various local entities, as well as communications and meetings with government

agencies throughout the country. Final receipt of this Agreement was delayed due to additional MCAS Miramar requests, extended environmental review terms, exhibit creation, survey data research and collection, plat and legal developments and comments for the final easement agreement package.

9. Environmental:
   a. The Project Team completed typical abatement activities at all pipeline tie-in locations as well as grout fill locations.
   b. The Project required active biological survey during the beginning of the construction timeframe.
   c. The Project required any hydrologic features adjacent to the work areas, including vernal pools, road ruts and drainages, to be delineated with exclusion fencing prior to the start of construction.
   d. The Project required Storm Water Pollution Prevention Plan (SWPPP).
   e. The Project's MCAS Miramar Easement Acquisition Agreement required a Categorical Exclusion Decision Memorandum from MCAS Miramar Committee for Land and Airspace Management Policy (CLAMP) Tier 1 determining the Project satisfied the National Environmental Policy Act (NEPA) Committee review requirements and ultimately was classified as a Categorical Exclusion (CATEX).
10. Constructability:
   a. The Project required two excavations to access the abandoned pipeline for grout fill activities.
   b. The Project required transport of hydrotest water to a company facility to be properly treated and disposed.
   c. The Project Team included final pipeline installation and final grading for reconfigurations of the permanent access road to Kearny Villa PLS to allow for replacement of the pipeline and for improved future access. The reconfiguration was performed in conjunction with the Line 1600 Section 16 MCAS Central Replacement Project and was reasonably incorporated into scope of the projects since the existing access road was susceptible to flooding, resulting in vernal pools

with significant environmental restrictions that impacted SDG&E's ability to operate and maintain Kearny Villa PLS.

d. The Project required installation of fiber optic cable along the new pipeline installation, as well as an additional installation of fiber optic cable via HDD parallel to a segment of Line 1600 that crosses [redacted]. The additional installation was to ensure fiber optic connectivity to adjacent segments of the pipeline.

C. Scope Changes

Through engineering, design, and planning activities, 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. A notable change in scope made after the preliminary cost estimate was developed and approved is the original Line 1600 Section 17 MCAS South Replacement Project scope included a 467 foot segment that was transferred from this Project to the Line 1600 Section 16 MCAS Central Replacement Project. This resulted in a single hydrotest segment for this Project, reducing overall costs and increasing construction efficiencies.

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, SDG&E entered into a competitive bidding process to select a construction contractor, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E concluded that a competitive bid procurement strategy was an appropriate contracting approach given the presence of multiple qualified contractors with relevant experience, crew capabilities, and equipment availability. The competitive bidding process provides transparency, encourages price competition, and supports cost control through enhanced visibility into contractor pricing and change order development, while also promoting improved schedule reliability and helping achieve best value for the project. SDG&E awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $7,046,531.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	08/08/2023
Construction Completion Date	11/22/2023
NOP Date	10/19/2023

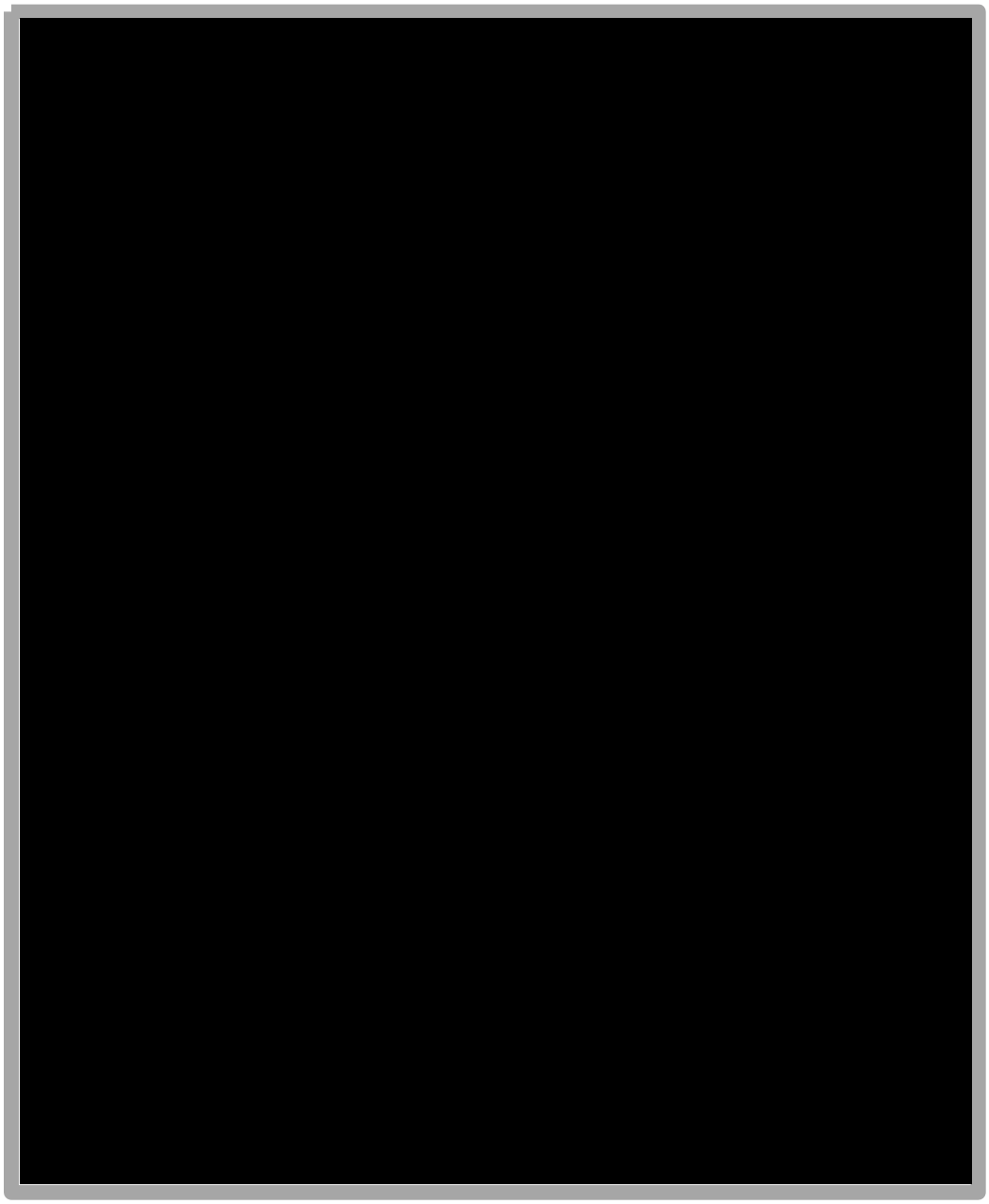
C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $76,000 in change order credits.

1. Field Design Changes:
   a. The Project Team initially planned for two double stopple bypasses to maintain system reliability during the construction phase of the Project. Through further analysis, customer coordination and optimization, a new isolation plan was developed incorporating backfeed from the Mission City Gate Station, allowing a full isolation of this segment without having to install double stopple bypasses. This resulted in a cost reduction and credit for the Project.
   b. The Project Team initially planned for a full installation of a temporary access road near [redacted], however during construction, the Project Team worked with the construction contractor to optimize access space required, reducing the scope of the temporary access road. This resulted in a cost reduction and credit for the Project.
2. Other: The Project required 24-hour security personnel at Kearny Villa PLS throughout a two-week period during the line seasoning activities for the new pipeline.

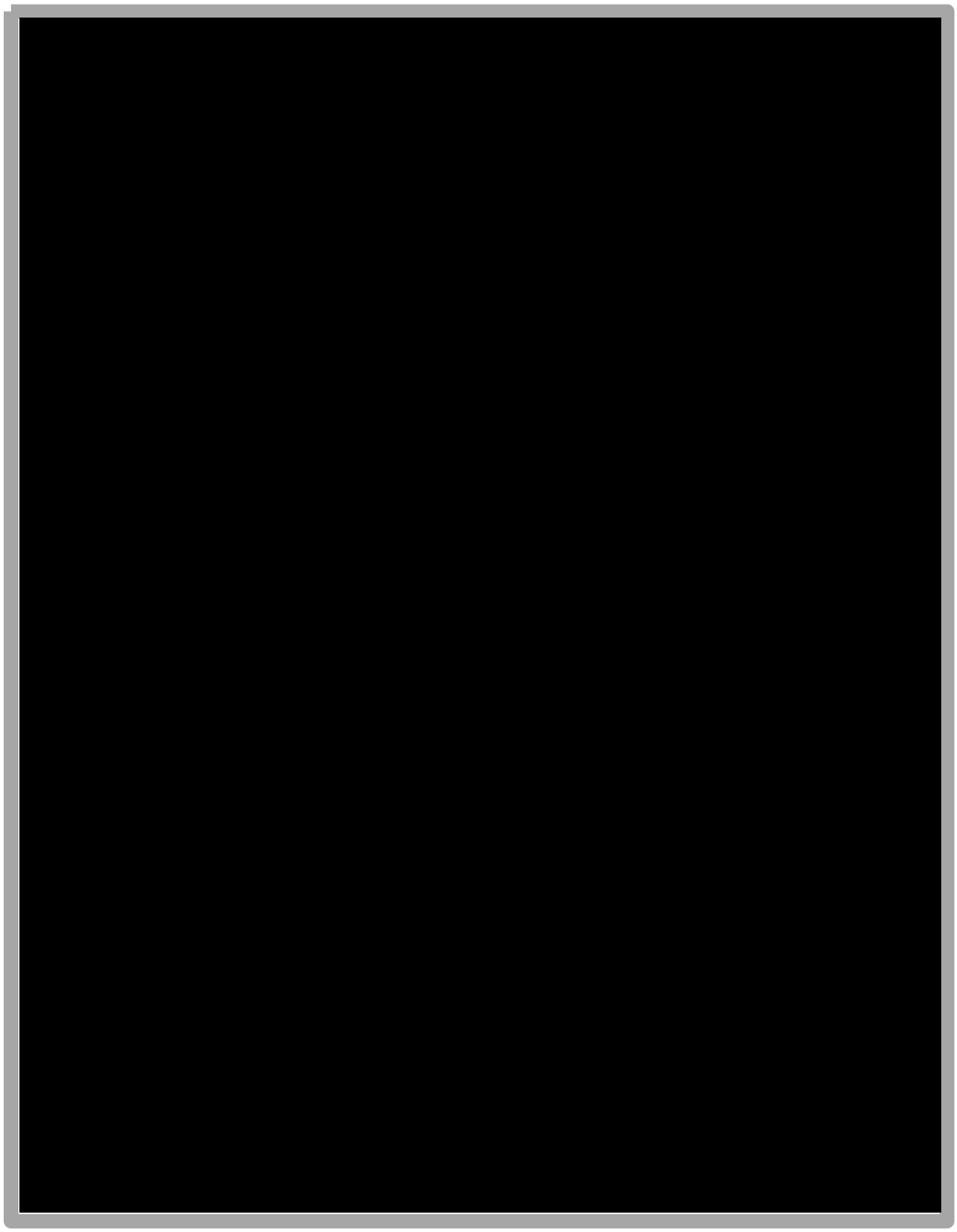
Final Report for Line 1600 Section 17 MCAS South Replacement Project

Figure 4: Open Trench Pipeline Install



Final Report for Line 1600 Section 17 MCAS South Replacement Project

Figure 5: Pipeline Install with Temporary Access Road

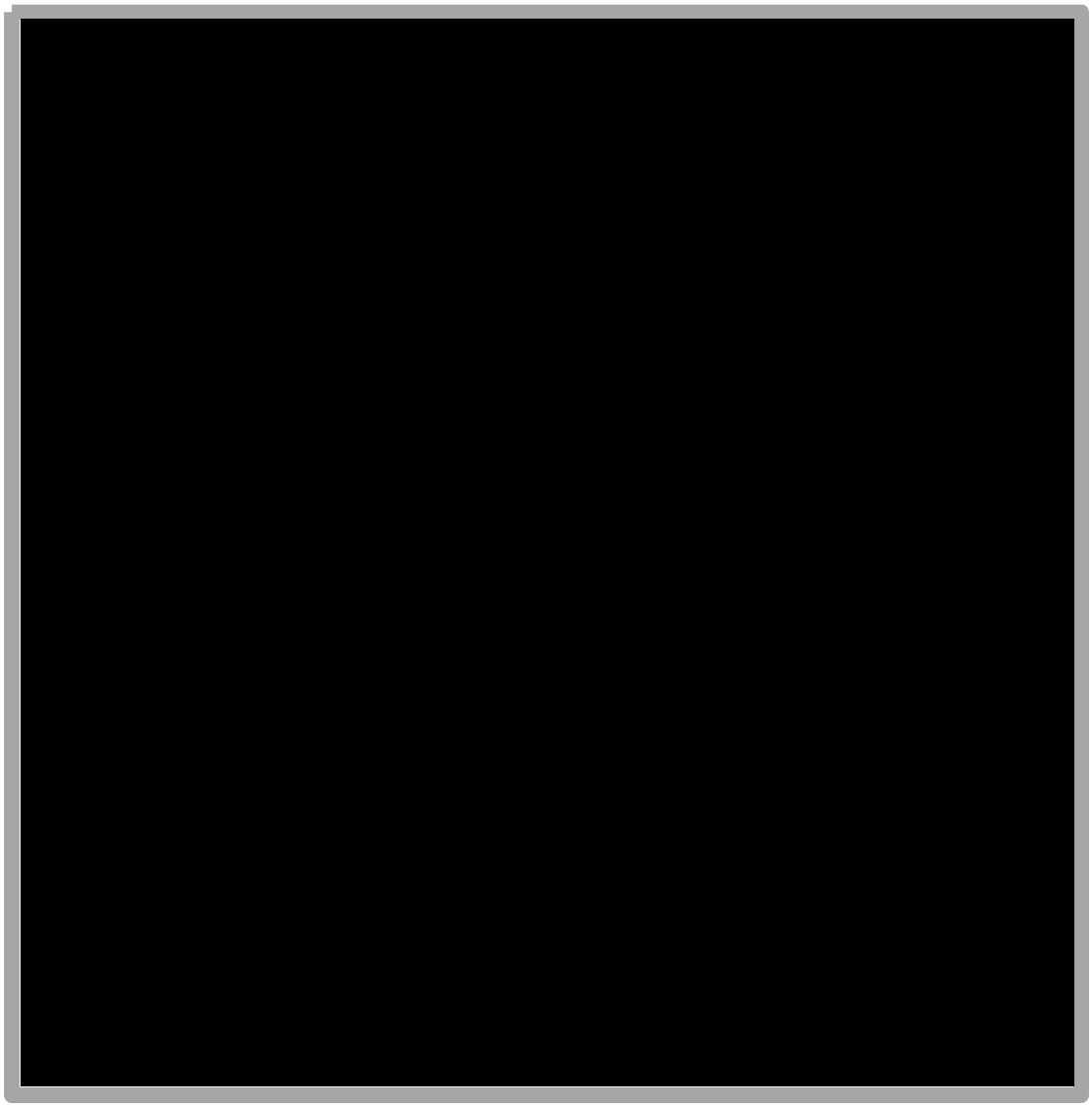


Final Report for Line 1600 Section 17 MCAS South Replacement Project

Figure 6: North Tie-In

Final Report for Line 1600 Section 17 MCAS South Replacement Project

Figure 7: South Tie-In



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include final cap and grind paving of [redacted], and final restoration at Kearny Villa Pressure Limiting Station (KVPLS) . Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at Kyocera laydown yard shared with MCAS North and MCAS Central projects.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Construction Execution: The Project Team diligently released for bid and executed this Project in conjunction with other Line 1600 Replacement Projects. This resulted in various efficiencies including utilizing the same Construction Contractor, optimizing the bidding process as well as reducing overall mobilization and construction costs. Since various pricing scenarios for the three MCAS projects was requested together, the Project Team was able to optimize pricing options for each project.
2. Environmental: The Project Team obtained one combined Categorical Exclusion Decision Memorandum from MCAS CLAMP Tier 1 for all three Line 1600 MCAS Replacement Projects; Section 15 MCAS North, Section 16 MCAS Central, and Section 17 MCAS South. The Project Team's efforts to obtain a combined decision resulted in cost savings for all three projects.
3. Materials: The Project Team ordered [redacted] pipe in bulk, providing volume pricing.
4. Scope Change: During the construction phase, the Project Team diligently incorporated field changes that resulted in overall cost savings for the Project. including:
    a. By completing additional analysis, extensive customer coordination, and system optimization, the Project Team pursued a new isolation plan and avoided the need for two double stopple bypasses. This change in plan eliminated significant labor and material associated with the installation of double stopple bypasses, resulting in a cost avoidance for the Project.

b. The Project Team worked with the Construction Contractor to optimize access space required on the south extent of the Project, ultimately reducing the scope of the temporary access road installation near [redacted]. This resulted in a cost reduction and credit for the Project.

5. Permit Conditions: The Project Team proactively requested and obtained an excavation EPE from Caltrans to install pipeline within Caltrans Right of Way without casing via open trench. This installation method is preferred due to increased safety throughout the life of the pipeline as well as minimized costs for the Project and long-term recurring maintenance.
6. Other: The Project Team coordinated extensively with permitting agencies to obtain approval of fiber optic cable installations for the Project. These approvals avoided the installation of a new fiber optic station and additional costs required for ongoing station maintenance.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $15,743,494. 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.

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 $13,699,411.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,668,785	756,880	(1,911,905)
Materials	607,171	541,672	(65,498)
Construction Contractor	7,046,531	5,974,022	(1,072,509)
Construction Management & Support	798,185	641,496	(156,689)
Environmental	1,477,075	396,607	(1,080,469)
Engineering & Design	758,565	1,663,799	905,233
Project Management & Services	2,107,174	958,311	(1,148,863)
ROW & Permits	280,007	734,470	454,463
Total Direct Costs	15,743,494	11,667,257	(4,076,237)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[10]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	2,357,348	1,086,149	(1,271,199)
AFUDC	805,454	808,706	3,253
Property Taxes	822,203	137,299	(684,904)
Total Indirect Costs	3,985,004	2,032,154	(1,952,850)
Total Direct Costs	15,743,494	11,667,257	(4,076,237)
Total Loaded Costs	19,728,499	13,699,411	(6,029,087)

[9] Values may not add to total due to rounding.
[10] Ibid.

The Actual Full-Time Equivalents[11] (FTEs) for this Project are 1.16.

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 17 MCAS South Replacement Project, Actual Direct Costs were less than the preliminary estimate by $4,076,237. This variance can be attributed to a variety of factors including: coordination with the Line 1600 Section 16 MCAS Central Replacement Project and Line 1600 Section 15 MCAS North Replacement Project allowed for consolidating the bidding process by incentivizing construction contractors to bid for more overall work with a lower price per project as discussed in Section IV. Part A, environmental permitting efficiencies, as well as reduced project development and project management costs; and through strategic project planning and management, construction productivity was higher than anticipated, reducing the

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

construction duration by approximately two months. As a result, overall costs were reduced for the construction contractor, project management, and environmental support.

E. Disallowance

There was no disallowance for Line 1600 Section 17 MCAS South Replacement Project as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 17 MCAS South Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[12]. Through this Replacement Project, SDG&E successfully replaced 0.753 miles of pipeline with 0.903 miles of pipeline within the San Diego County, including the installation of 0.903 miles of fiber optic cable, and one new permanent access road. The total loaded cost of the Project is $13,699,411.

SDG&E executed this project prudently by rerouting the pipeline to avoid restricted security zones and environmentally sensitive lands within MCAS Miramar and instead placing the new pipeline within public ROW, allowing for easier construction during the Project, while also increasing future pipeline accessibility and public safety.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe, bidding out and executing various activities for this Project simultaneously or in conjunction with adjacent projects to reduce construction costs, and continuously optimizing construction activities to reduce cost, where applicable. Through these efforts, the total loaded costs for this Project were less than originally estimated.

End of Line 1600 Section 17 MCAS South Replacement Project Final Report

[12] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

I. LINE 1600 SECTION 18 KEARNY MESA REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 18 Kearny Mesa Replacement Project that consists of the replacement of 2.025 miles of previously existing pipeline with 2.245 miles of new pipeline along [redacted], installation of approximately 0.606 miles of new [redacted] transmission pipeline, replacement of approximately 0.417 miles of [redacted] distribution pipeline, removal of one mainline valve (MLV), installation of two new regulator stations, the tie over of one existing regulator station, installation of one new rectifier, and installation of 2.245 miles of fiber optic cable within the City of San Diego. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $29,637,855.

The Line 1600 Section 18 Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing[1]. However, pursuant to Commission direction[2], the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan[3]. The scope of work completed for this project is consistent

1 See Amended December 2, 2011 Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E.

2 D.14-06-007 at 16-17.

3 D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor.

with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Table 1: General Project Information

Project Name	Section 18		
Project Type	Replacement		
Length	2.245 miles		
Location	Kearny Mesa		
Class	[redacted]		
MAOP			
Pipe Grade			
Wall Thickness			
Pipe Vintage[4]			
Construction Start	06/01/2020		
Construction Finish	01/15/2021		
Original Pipe Diameter			
Nominal Pipe Diameter			
Original SMYS[5]			
New SMYS			
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	29,637,855	0	29,637,855

[4] Predominant pipeline vintage.
[5] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

B. Maps and Images

Figure 1: Overview Map of Line 1600 Bundle Projects

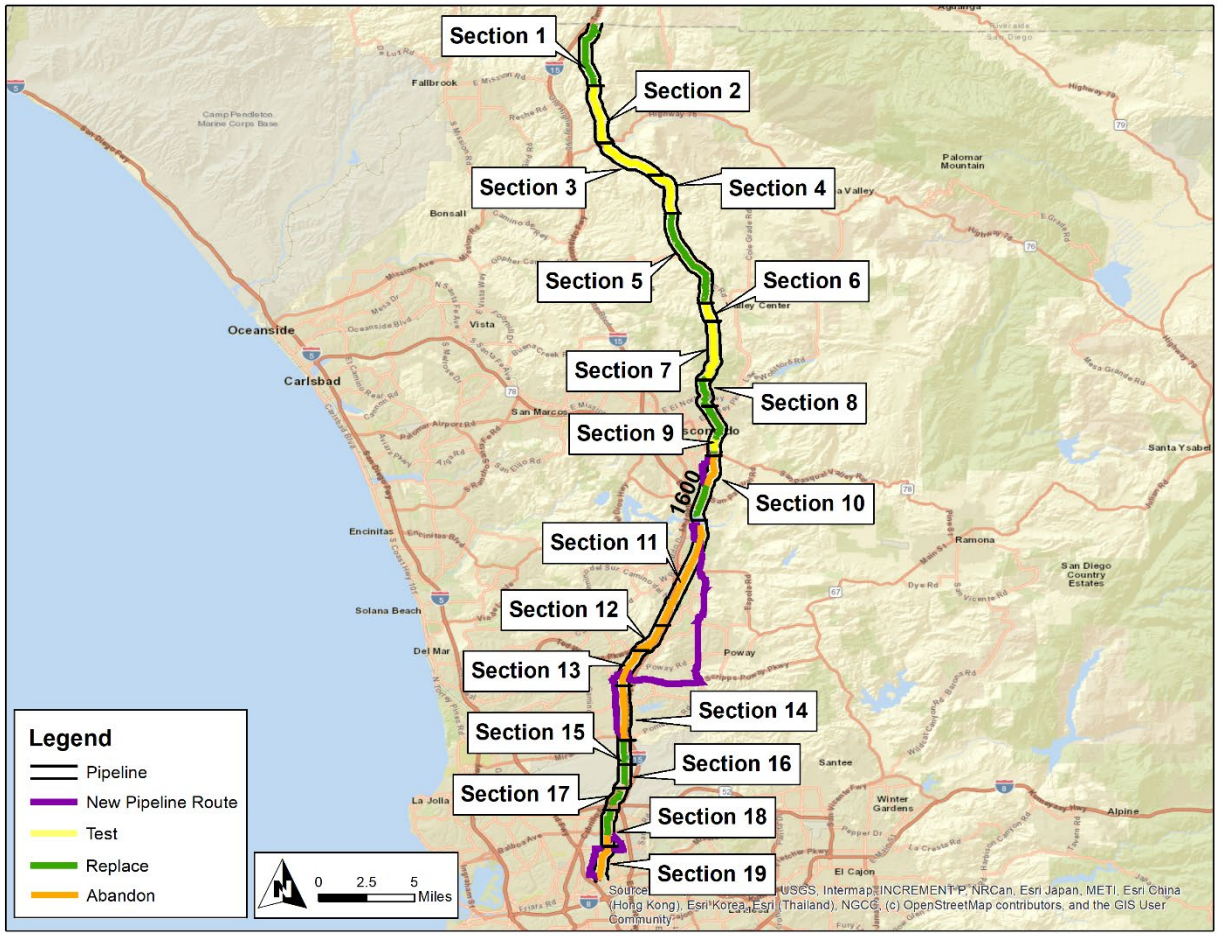


Figure 2: Overview Map of Line 1600 Section 18 Kearny Mesa Replacement Project and Line 1600 Section 19 Serra Mesa Replacement Project

Final Report for Line 1600 Section 18 Kearny Mesa Replacement Project

Figure 3: Satellite Image of Line 1600 Section 18 Kearny Mesa Replacement Project

Final Report for Line 1600 Section 18 Kearny Mesa Replacement Project

Figure 4: Overview Map of Line 1600 Section 18 Kearny Mesa Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[6]

	Criteria	Accelerated[7]	Incidental	Total[8]
Final Mileage	1.413 mi.	0.084 mi.	0.528 mi.	2.025 mi.
	7,461 ft.	444 ft.	2,788 ft.	10,692 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the [redacted] vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 18 Kearny Mesa segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 18 Kearny Mesa segment of Line 1600 as the most prudent option. During the Engineering, Design, and

[6] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[7] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[8] Values may not add to total due to rounding.

Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project replaced 2.025 miles of previously existing pipeline by installing 2.245 miles of new pipeline along [redacted].
   b. The Project installed approximately 2.245 miles of fiber optic cable along the length of the new [redacted] pipeline
   c. The Project included the installation of 0.606 miles of new [redacted] transmission pipeline and replacement of 0.417 miles of [redacted] distribution pipeline.
   d. The Project included the removal of one MLV, installation of two regulator stations, tie-over of one existing regulator station, and the installation of one new rectifier.
   e. The Project included a reroute within city franchise to improve accessibility for routine maintenance and emergency response. To limit the impacts, the route selected was located in the franchised roadway, outside of culturally sensitive areas and private property identified along the existing route.
   f. Existing pipe was abandoned in place. The pipe under two roadways was grout filled.
   g. Replacement and tieover of existing regulator stations was necessary to continue service.
   h. Accelerated and Incidental mileage was included for reroute constructability.
2. Final Project Scope: The final project scope consists of a 2.025 mile Replacement with 2.245 miles of new pipeline, installation of approximately 0.606 miles of new [redacted] transmission line on Line 1034, replacement of approximately 0.417 miles of [redacted] distribution main, removal of one MLV, installation of two new regulator stations, the tieover of one existing regulator station, installation of one rectifier, and installation of approximately 2.245 miles of fiber optic cable. The Accelerated and Incidental mileages consist of 0.084 miles and 0.528 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The original 20 foot wide easement area had been developed since 1949, when the pipeline was first installed, and is closely bordered with homes and businesses. In addition, part of the original pipeline crossed an airport in environmentally sensitive lands with limited access. The Project included a reroute within city franchise to improve accessibility for routine maintenance and emergency response. To limit the impacts, the route selected was located in the franchised roadway, outside of culturally sensitive areas and private property identified along the existing route.
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in with utilization of a temporary bypass, as long as surrounding pipelines were not being worked on simultaneously.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project originally required a temporary bypass during tie-in to maintain service to a large customer, but it was not necessary due to the Project Team cooperating with the customer.
4. Community Impact: The Project Team mitigated community impacts by managing traffic effectively during construction.
5. Schedule Coordination: The Project Team coordinated the project schedule with PSEP Line 1600 Section 19 Serra Mesa Replacement Project to allow for efficiencies by sharing laydown yards and resources.

6. Substructures: The Project Team researched existing records and performed survey to identify multiple substructures within the construction alignment and included them in the Project design.
7. Permit Conditions: The Project Team obtained multiple permits from the City of San Diego including encroachment, traffic control, sidewalk blockage, water discharge and noise.
8. Land Use: The Project Team obtained Temporary Right of Entry (TRE) for the main laydown yard and working space for distribution pipeline and tie-in work.
9. Environmental:
    a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
    b. The Project Team identified the risk of encountering contaminated soil and ground water, as well as the need to treat hydrotest water and ground water prior to discharge.
    c. The Project Team planned for water treatment and disposal of approximately 225,000 gallons of water within municipal sewer for their hydrotest. Any water encountered during trenching would be stored in water tanks and discharged to land.
    d. The Project Team obtained approval for Non-hazardous Waste Containment and Disposal.
10. Valves: The Project Team removed one existing MLV from the pipeline.
11. Constructability: The abandonment of the previously existing pipeline was coordinated with the abandonment activities of the Line 1600 Section 19 Serra Mesa Replacement Project.

C. Scope Changes

Through engineering, design, and planning activities, 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. During planning activities, an engineering study concerning nearby AC powerlines determined that mitigation measures needed to be installed to avoid pipeline system impact and to enhance safety for operations personnel.

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 to prepare cost estimates based on a more detailed engineering design package, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E determined that a Performance Partner procurement strategy was the most appropriate delivery method. This structure is intended to incentivize adherence to schedule and budget commitments, promote efficiencies in construction sequencing, and establish a balanced risk-sharing framework between SDG&E and the contractor. SDG&E awarded the construction contract to the Performance Partner.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $18,439,831.

2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	06/15/2020
Construction Completion Date	01/15/2021
NOP Date	11/21/2020

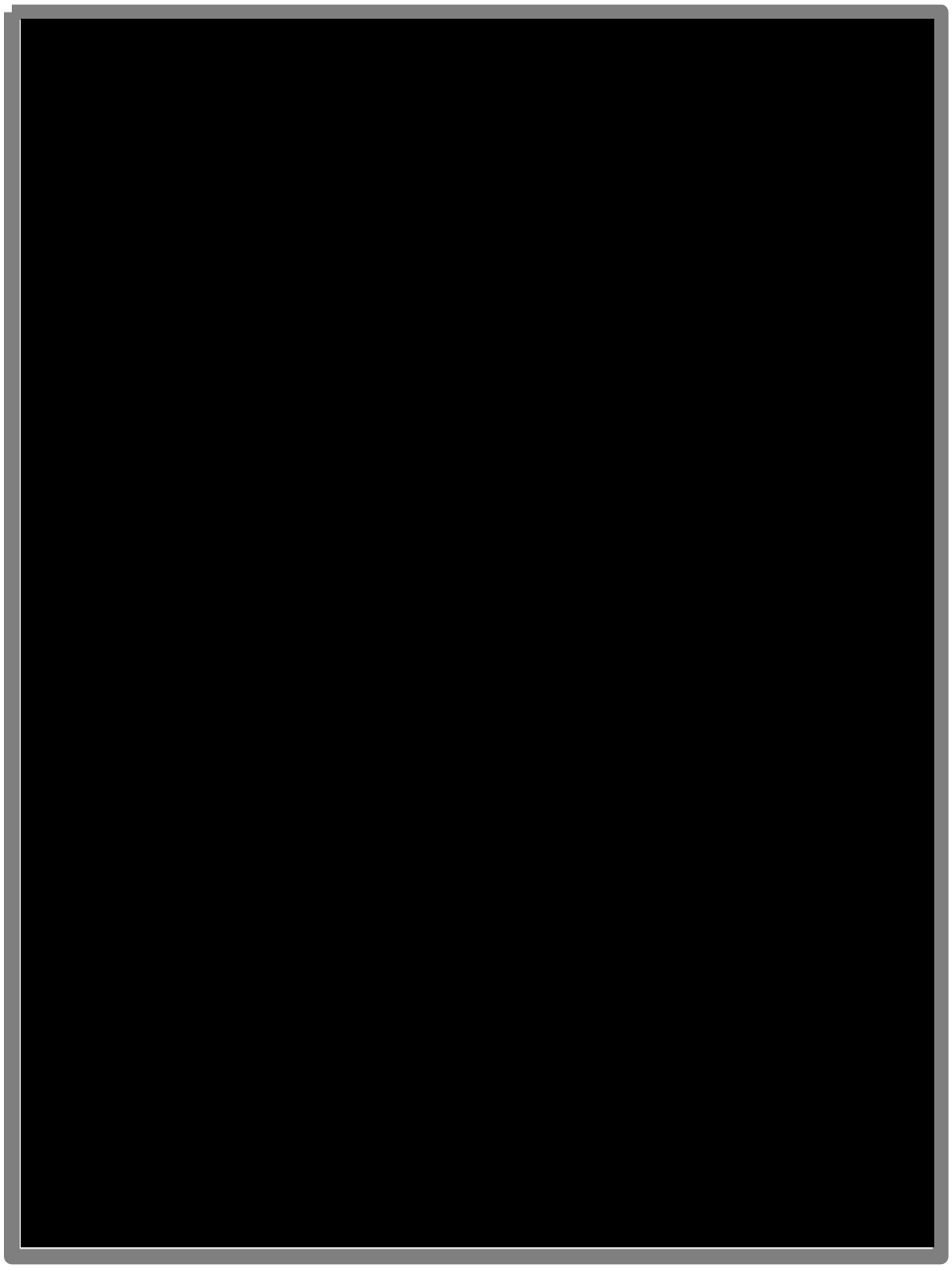
C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $830,000 in change orders.

1. Site Restoration: The Project Team identified wider areas that required more grind and cap than initially estimated, requiring approximately 77,000 square feet of additional grind and cap.
2. Traffic Control: The Project Team identified additional traffic loops that required restoration beyond initially estimated.
3. Other:
   a. In accordance with the Construction Contractors union agreement, the hourly union labor rates were adjusted following the acceptance of the Target Price Estimate provided to the Project Team.
   b. The Project Team performed three cutouts of vintage Line 1600 pipeline for laboratory and testing analysis to further inform on the performance and material characteristics of remaining vintage Line 1600 segments.

Figure 5: Trench Shoring along [redacted]

Figure 6: Lowering Elbow into Trench along [redacted]



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include final site restoration of areas affected by construction of the replacement [redacted] pipeline as well as the branch [redacted] transmission line, new plastic pipeline improvements associated with the project, tie-overs to existing regulator station locations, final cap and grind paving of [redacted], private property containing the new [redacted] transmission line, and completion of AC mitigation scope, deep well anode installation and new rectifier installation scope at [redacted]. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at National University and Solar Turbines yards shared with Serra Mesa project.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Schedule Coordination: Coordination with Line 1600 Section 19 Serra Mesa Project allowed for efficiencies with coordination of hydrotest, line seasoning, and tie-in schedules, as well as shared use of laydown yards and hydrotest water. The coordination of tie-in schedule also removed the need for a planned bypass.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the amount of $30,643,033. 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.

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 $29,637,855.

Table 4: Estimated and Actual Direct Costs and Variances[9]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,032,634	1,282,191	(750,442)
Materials	1,389,095	1,577,092	187,997
Construction Contractor	18,439,831	15,975,060	(2,464,771)
Construction Management & Support	1,410,631	1, 891,196	480,565
Environmental	698,903	586,829	(112,075)
Engineering & Design	1,848,616	2,090,767	242,152
Project Management & Services	2,900,775	1,363,621	(1,537,154)
ROW & Permits	1,922,550	392,657	(1,529,893)
Total Direct Costs	30,643,036	25,159,412	(5,483,621)

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[10]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	3,609,485	3,338,986	(270,500)
AFUDC	1,732,745	976,008	(756,737)
Property Taxes	1,666	163,449	161,783
Total Indirect Costs	5,343,897	4,478,443	(865,454)
Total Direct Costs	30,643,036	25,159,412	(5,483,621)
Total Loaded Costs	35,986,931	29,637,855	(6,349,075)

The Actual Full-Time Equivalents[11] (FTEs) for this Project are 3.65.

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

D. Cost Impacts

There was no disallowance as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 18 Kearny Mesa Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[12]. Through this Replacement Project, SDG&E successfully replaced 2.025 miles of pipeline with 2.245 miles of new pipeline in the City of San Diego. and installed two regulator stations. The total loaded cost of the Project is $29,637,855.

SDG&E executed this project prudently through rerouting the pipeline within city franchise to improve accessibility for routine maintenance and emergency response. To limit the impacts, the route selected was located in the franchised roadway, outside of culturally sensitive areas and private property identified along the existing route.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe. The Project also coordinated with the PSEP Line 1600 Section 19 Serra Mesa Replacement Project allowing for the coordination of hydrotest, line seasoning, and tie-in schedules, as well as shared use of laydown yards and hydrotest water.

End of Line 1600 Section 18 Kearny Mesa Replacement Project Final Report

[12] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor

I. LINE 1600 SECTION 19 SERRA MESA REPLACEMENT PROJECT

A. Background and Summary

Line 1600 is a [redacted] diameter transmission line that is approximately 49.5 miles in length, beginning in Rainbow at the San Diego/Riverside County line and terminating in the City of San Diego. The pipeline traverses through agricultural land, commercial areas, and residential neighborhoods, and is primarily located in Class 3 locations and some Class 1 and 2 locations. This report describes the activities associated with Line 1600 Section 19 Serra Mesa Replacement Project, that consists of the replacement of 1.978 miles of previously existing pipeline with 4.397 miles of new pipeline along [redacted] within the City of San Diego. This Project also includes the installation of one automated mainline valve (MLV) and one manual MLV, replacement of two existing regulator stations, tie over of two existing regulator stations to the new pipeline, and installation of 4.397 miles of fiber optic cable. The specific attributes of this Project are detailed in Table 1 below. The total loaded cost of the Project is $46,778,248.

The Line 1600 Section 19 Serra Mesa Replacement Project is a component of Line 1600, that was identified in San Diego Gas & Electric's 2011 PSEP filing . However, pursuant to Commission direction , the Utilities then submitted the Pipeline Safety Reliability Project (PSRP) through a separate application to address Line 1600 by proposing a new transmission line and reclassifying the existing line to distribution service; following the rejection of this proposal by the Commission, the Utilities were instructed to submit a hydrotest or replacement plan . The scope of work completed for this project is consistent with the scope of work identified in the approved 2018 Line 1600 Test or Replacement Plan.

Final Report for Line 1600 Section 19 Serra Mesa Replacement Project

Table 1: General Project Information

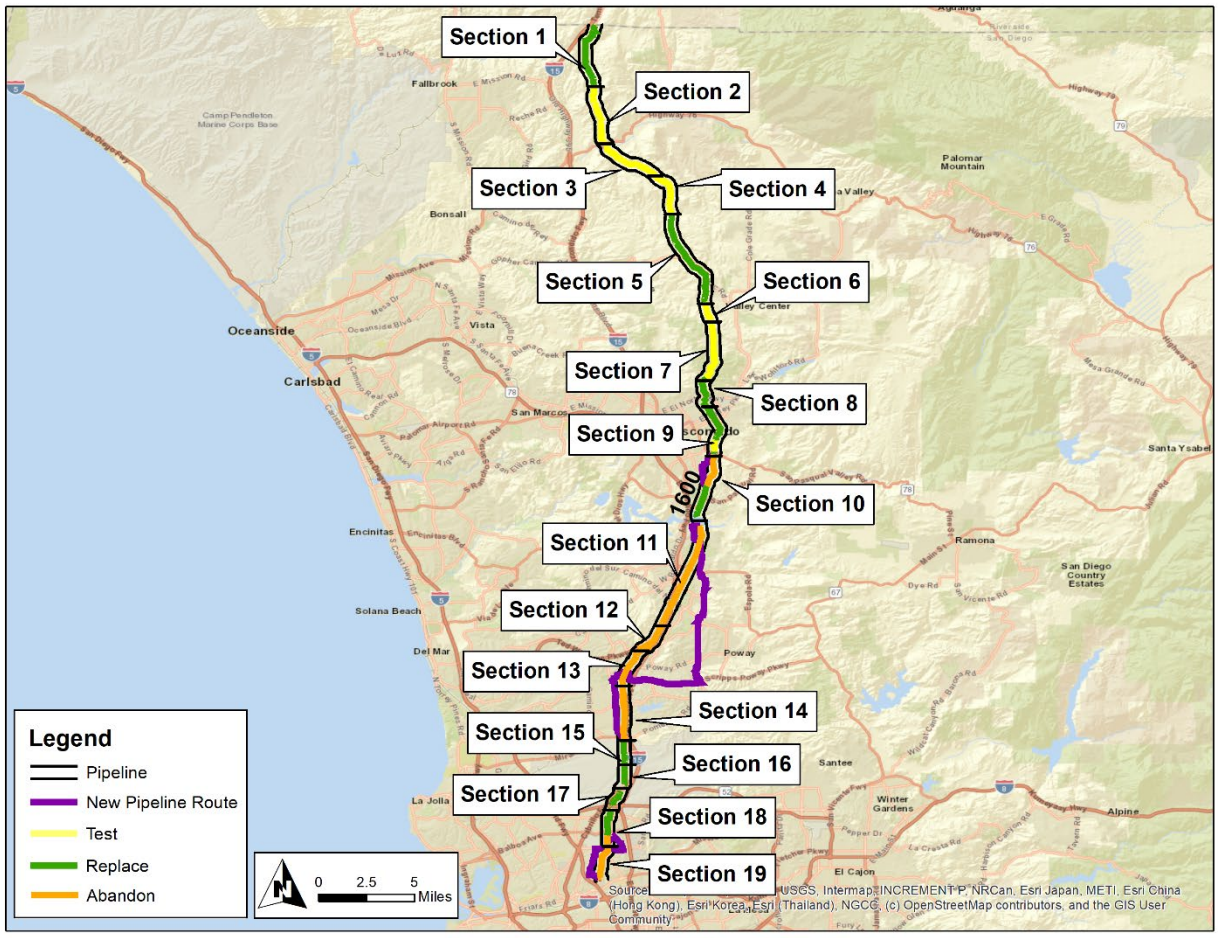
Project Name	Section 19		
Project Type	Replacement		
Length	4.397 miles		
Location	Serra Mesa		
Class	[redacted]		
MAOP			
Pipe Grade			
Wall Thickness			
Pipe Vintage[1]			
Construction Start	06/01/2020		
Construction Finish	01/15/2021		
Original Pipe Diameter			
Nominal Pipe Diameter			
Original SMYS[2]			
New SMYS			
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	46,778,248	0	46,778,248

[1] Predominant pipeline vintage.
[2] Highest percentage of Specified Minimum Yield Strength (SMYS) of Category 4 Criteria pipe.

Final Report for Line 1600 Section 19 Serra Mesa Replacement Project

B. Maps and Images

Figure 1: Overview Map of Line 1600 Hydrotest and Replacement Projects



Final Report for Line 1600 Section 19 Serra Mesa Replacement Project

Figure 2: Satellite Image of Line 1600 Section 19 Serra Mesa Replacement Project

Final Report for Line 1600 Section 19 Serra Mesa Replacement Project

Figure 3: Overview Map of Line 1600 Section 19 Serra Mesa Replacement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Table 2: Mileage Information[3]

	Criteria	Accelerated[4]	Incidental	New	Total[5]
Final Mileage	1.825 mi.	0.152 mi.	0.049 mi.	2.370 mi.	4.397 mi.
	9,636 ft.	803 ft.	259 ft.	12,514 ft.	23,216 ft.

SDG&E provided the Line 1600 Test or Replacement Plan to the California Public Utilities Commission (CPUC) to determine the appropriate course of action for Line 1600. The CPUC approved the proposed design alternative in the Plan that generally called for replacing sections of Line 1600 in HCAs and hydrotesting sections of Line 1600 in non-HCAs (Replace in HCA/Test in non-HCA alternative). The approved Plan alternative was to be executed through the detailed development and implementation of the 19 Line 1600 projects described in the Plan. As part of the detailed design for this project, SDG&E considered a variety of factors, including but not limited to customer and community impacts, costs, constructability, environmental considerations, necessary connections to supply the distribution system, pipeline attributes influencing safety, all weather accessibility for maintenance and emergency response, the ability to effectively accommodate modern in-line inspection tools, industry standards as well as the risks and benefits of pressure testing versus replacement of the 1949 vintage Line 1600 A.O. Smith electric flash welded pipe. SDG&E replaced the Section 19 Serra Mesa segment as outlined in the approved Plan. Through comprehensive analysis and as outlined in the approved Plan alternative, SDG&E determined replacing the Section 19 Serra Mesa

[3] Total mileage of the completed project differs from the mileage of the pipe addressed due to realignment of the pipeline route.
[4] Accelerated mileage includes Phase 2 pipe. The Accelerated mileage was included to realize efficiencies and to enhance project constructability.
[5] Values may not add to total due to rounding.

segment of Line 1600 as the most prudent option. During the Engineering, Design, and Planning phase, SDG&E further refined the scope. This progression of the project scope is summarized as follows:

1. Engineering, Design, and Constructability:
   a. The Project Team replaced 1.978 miles of previously existing pipeline by installing 4.397 miles of new pipeline along [redacted] in the City of San Diego.
   b. The Project Team installed approximately 4.397 miles of fiber optic cable along the length of the new [redacted] pipeline
   c. The Project Team included the installation of one automated MLV and one manual MLV, replacement of two existing regulator stations, and the tie-over of two existing regulator stations.
   d. The Project Team included a reroute within city franchise to improve accessibility for routine maintenance and emergency response. To limit the impacts, the route selected was located in the franchised roadway, outside of culturally sensitive areas and private property identified along the existing route.
   e. Existing pipe was abandoned in place and pipe under roadways was grout filled.
   f. Accelerated and Incidental mileage was included for the constructability of the reroute.
2. Final Project Scope: The final project scope consists of a 1.978 mile Replacement with 4.397 miles of new pipeline, installation of one automated MLV, one manual MLV, replacement of two existing regulator stations, tie over of two existing regulator stations to the new pipeline, and the installation of 4.397 miles of fiber optic cable. The Accelerated and Incidental mileages consist of 0.152 miles and 0.049 miles, respectively.

B. Engineering, Design, and Planning Factors

SDG&E reviewed pipeline drawings and other information, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, including reviewing public records and potholing of the area to confirm the presence of underground utilities and substructures, and completed a pre-design site walk. Key factors that influenced the engineering, design, and the preparation of the preliminary cost estimate of the Project are as follows:

1. Reroute: The original 20-foot-wide easement area had been developed since 1949, when the pipeline was first installed, and is closely bordered with homes and businesses. In addition, part of the original pipeline crossed an airport in environmentally sensitive lands with limited access. The Project included a reroute within city franchise to improve accessibility for routine maintenance and emergency response. The original alignment including crossing the [redacted], as well as environmentally sensitive areas. To limit the impacts, the route selected was located in the franchised roadway, outside of culturally sensitive areas and private property identified along the existing route.
2. System Analysis: The Project Team completed reviews of the gas pipeline system to evaluate project feasibility and concluded the line could be shut-in with the utilization of a temporary bypass, as long as surrounding pipelines were not being worked on simultaneously.
3. Customer Impact: Per the gas transmission and distribution system analyses, the Project Team determined that service could be maintained to customers by utilizing a temporary bypass during the tie-in.
4. Community Impact: Traffic control would be required during construction activity for local businesses remained open and ingress and egress roads remained accessible during working hours.

5. Schedule Coordination: The Project Team coordinated with the PSEP Line 1600 Section 18 Kearny Mesa Replacement Project for hydrotest, line seasoning, and tie-in schedules, as well as shared use of laydown yards and hydrotest water.
6. Substructures: The Project Team identified multiple utilities prior to construction and included them within the Project design.
7. Permit Conditions: The Project Team obtained multiple permits from the City of San Diego including encroachment, traffic control, sidewalk blockage, water discharge and noise.
8. Land Use: The Project Team did not identify any risks or need to change the design due to Land Use availability.
9. Environmental:
    a. The Project Team completed typical abatement activities at all pipeline retrofit locations, tie-in, and test head locations.
    b. The Project Team identified the risk of encountering contaminated soil and ground water, as well as the need to treat hydrotest water and ground water prior to discharge.
10. Valves: The Project Team installed one new automated MLV and one new manual MLV.
11. Constructability: The abandonment of the previously existing pipeline was coordinated with the abandonment activities of the Line 1600 Section 18 Kearny Mesa Replacement Project.

C. Scope Changes

Through engineering, design, and planning activities, 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. During planning activities, an engineering study concerning nearby AC powerlines determined that mitigation measures needed to be installed to avoid pipeline system impacts and to enhance safety for operations personnel.

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 to prepare cost estimates based on a more detailed engineering design package, that included the updated design described in the discussion of notable Scope Changes above. Given the project's unique characteristics and schedule requirements, SDG&E determined that a Performance Partner procurement strategy was the most appropriate delivery method. This structure is intended to incentivize adherence to schedule and budget commitments, promote efficiencies in construction sequencing, and establish a balanced risk-sharing framework between SDG&E and the contractor. SDG&E awarded the construction contract to the Performance Partner.

1. SDG&E's Preliminary Construction Cost Estimate: SDG&E's preliminary cost estimate for construction was $23,519,214.
2. Construction Contractor's Bid: The Construction Contractor's cost estimate was [redacted], that was [redacted] than SDG&E's preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	06/01/2020
Construction Completion Date	01/15/2021
NOP Date	11/21/2020

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $1,539,000 in change orders.

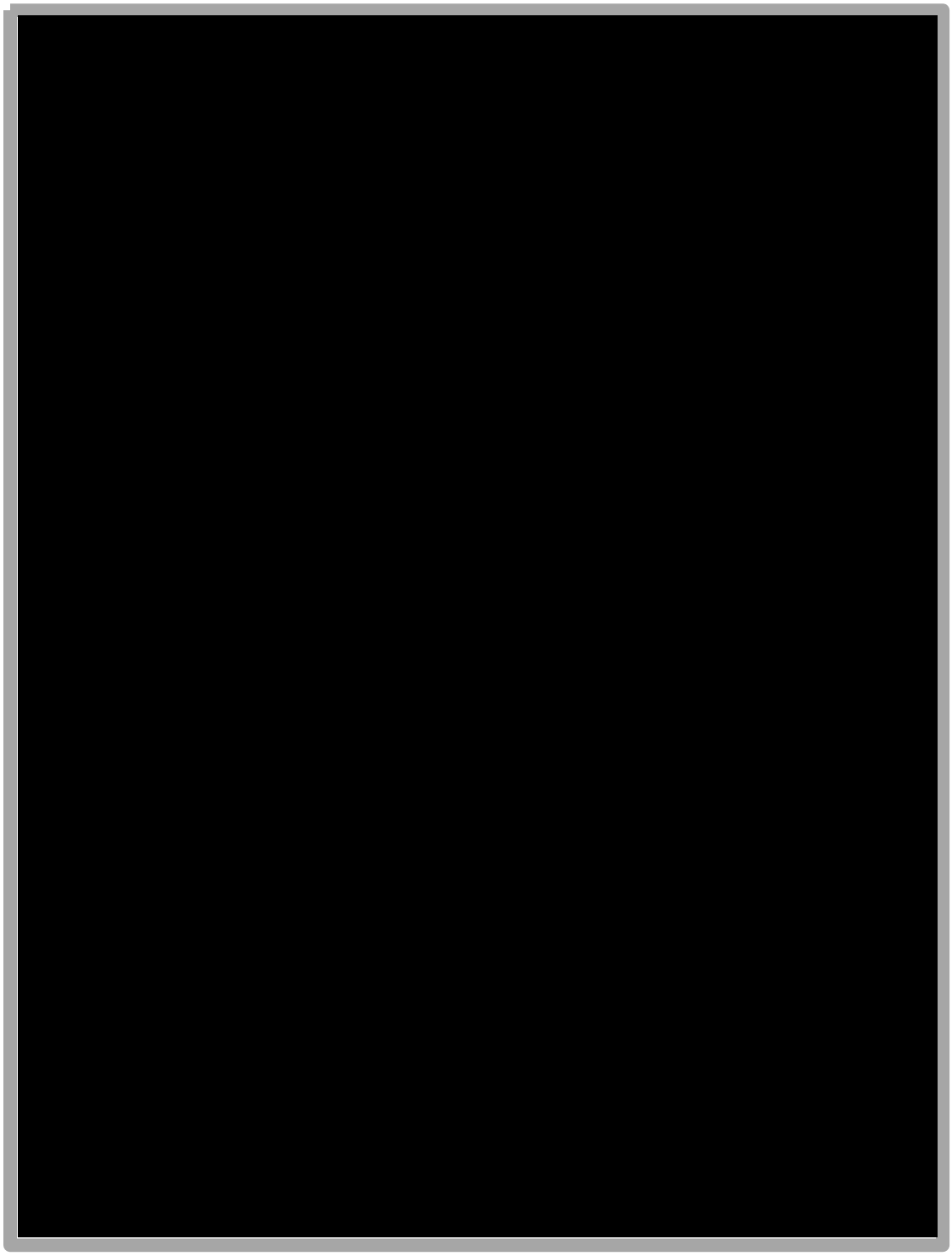
1. Site Restoration:
   a. The Project Team increased the depth of asphalt paving by an additional 4-inches from the initial plan to meet permit requirements.
   b. The Project Team expanded grind and cap to wider areas than the initial plan, resulting in approximately 30,000 square feet of additional paving.
2. Substructures: The Construction Contractor increased excavation depth at three locations due to unmarked substructures.
3. Other:
   a. The Construction Contractor revised hourly union labor rates following the acceptance of the Target Price Estimate provided to the Project Team.
   b. The Project Team also incorporated AC Powerline Mitigation in areas with nearby high voltage power lines crossing or paralleling Line 1600.

Final Report for Line 1600 Section 19 Serra Mesa Replacement Project

Figure 4: Completed Weld at Serra Mesa

Final Report for Line 1600 Section 19 Serra Mesa Replacement Project

Figure 5: Backfilling Trench



D. Commissioning and Site Restoration

Commissioning activities include final inspection, drying of the pipeline after the hydrostatic pressure test, purging of natural gas into the pipeline, and placement of the pipeline back into service, pipeline odorization, a leak patrol of the pipeline, validating, and testing of fiber optic system, transportation and disposal of hydrotest water and hazardous material, restoration of the sites including final pavement grind and cap and striping of affected street locations, curb and gutter repair, landscape and irrigation repair, final soil restoration and hydroseeding of dirt locations, pipeline marker installation, automated MLV Site Acceptance Test (SAT) and Point to Point (PTP) test to validate communications and automated Gas Control functionality, and site demobilization including laydown yards, and closeout of jurisdictional permits with relevant agency inspectors including removal of Underground Services Alert (USA) mark out. Closeout activities include development of final completion drawings, finalization of a reconciliation package documenting project work as well as material and test records, and updates to company recordkeeping systems such as GIS and pipeline databases to reflect the completed scope of work. When all project activities have been completed, the project is then financially closed out.

Site restoration activities include final site restoration of new automated MLV, new regulator stations, tie-overs to existing regulator stations locations, final pavement grind and cap of [redacted], and SDG&E-owned [redacted], and completion of AC mitigation scope, deep well anode installation at [redacted]. Site demobilization includes removal of all equipment, environmental BMPs, gravel, shaker plates, water tanks, construction trailers, temporary fencing, security cameras, generators, ice machines, and restoration at National University and Solar Turbines yards shared with Serra Mesa project.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SDG&E exercised due diligence in the planning, design, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team conducted a site visit to identify and incorporate discernible site conditions into the engineering, design, and planning of the Project. Specific examples of cost avoidance actions taken on this project are:

1. Materials: Bulk ordered pipe provided volume pricing for the [redacted] pipe.
2. Schedule Coordination: Coordination with Line 1600 Section 18 Kearny Mesa Project allowed for the coordination of hydrotest, line seasoning, and tie-in schedules, as well as shared use of laydown yards and hydrotest water.
3. Future Maintenance: Electrolysis Test Stations (ETS) were installed out of the roadway to improve accessibility for routine maintenance, reducing future traffic control costs.

B. Cost Estimate

Based on the preliminary design, once the project scope was confirmed and engineering, design, and planning activities were underway, SDG&E prepared an estimate of the Direct Costs of the Project in the August 2020 Cost Filing in the amount of $41,939,048. 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.

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 $46,778,248.

Table 4: Estimated and Actual Direct Costs and Variances[6]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	2,500,471	1,665,889	(834,581)
Materials	2,791,995	2,024,591	(767,404)
Mechanical Construction Contractor	25,755,059	26,489,276	734,217
Electrical Contractor		228,548	228,548
Construction Management & Support	2,190,716	2,885,000	694,284
Environmental	985,322	792,158	(193,164)
Engineering & Design	2,893,568	2,884,866	(8,702)
Project Management & Services	3,303,782	2,217,418	(1,086,364)
ROW & Permits	1,518,135	1,077,490	(440,645)
Total Direct Costs	41,939,048	40,265,236	(1,673,812)

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

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	5,124,750	3,986,807	(1,137,943)
AFUDC	2,158,055	2,177,854	19,799
Property Taxes	762	348,351	347,590
Total Indirect Costs	7,283,567	6,513,012	(770,555)
Total Direct Costs	41,939,048	40,265,236	(1,673,812)
Total Loaded Costs	49,222,614	46,778,248	(2,444,366)

[6] Values may not add to total due to rounding.
[7] Values may not add to total due to rounding.

The Actual Full-Time Equivalents[8] (FTEs) for this Project are 5.9.

D. Cost Impacts

Consistent with one of the overarching objectives of Line 1600 to maximize the cost effectiveness of safety enhancement investments, SDG&E effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Line 1600 Section 19 Serra Mesa Replacement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $1,673,812. This variance can be attributed to several factors including: coordination with the Line 1600 Section 18 Kearny Mesa Project allowed for shared efforts and reduced costs for construction contractor, project management, and laydown yard acquisition; and environmental requirements were reduced due to drought conditions that led to minimal presence of vernal pools with standing water that would have needed to be avoided during construction. Overall project

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

costs demonstrated effective project management and disciplined execution, with Actual Direct Costs delivered on budget compared to the approved preliminary estimate.

E. Disallowance

There was no disallowance for as there were no post-1955 segments included in the Project without records that provide the minimum information to demonstrate compliance with then applicable industry standards or regulatory strength testing and recordkeeping requirements.

V. CONCLUSION

SDG&E enhanced the safety of their integrated natural gas transmission system by prudently executing the Line 1600 Section 19 Serra Mesa Replacement Project, consistent with the approved 2018 Line 1600 Test or Replacement Plan[9]. Through this Replacement Project, SDG&E successfully replaced 1.978 miles of pipeline with 4.397 miles of new pipeline in the City of San Diego, including the installation of one automated MLV, one manual MLV, and two regulator stations. The total loaded cost of the Project is $46,778,248.

SDG&E executed this project prudently through rerouting the pipeline within city franchise to improve accessibility for routine maintenance and emergency response. To limit the impacts, the route selected was located in the franchised roadway, outside of culturally sensitive areas and private property identified along the existing route.

SDG&E engaged in prudent cost avoidance efforts by utilizing volume pricing from bulk ordered pipe and reducing difficulties of future maintenance with easily accessible ETS stations. The Project also coordinated with the PSEP Line 1600 Section 18 Kearny Mesa Replacement Project allowing for the coordination of hydrotest, line seasoning, and tie-in schedules, as well as shared use of laydown yards and hydrotest water.

End of Line 1600 Section 19 Serra Mesa Replacement Project Final Report

[9] D.18-06-028, Ordering Paragraph 7, required SDG&E and SoCalGas to "submit to Safety and Enforcement Division a hydrostatic test or replacement plan pertaining to the existing 49.7 miles of Line 1600 in its present corridor

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

DECLARATION OF DEVIN ZORNIZER REGARDING CONFIDENTIALITY OF CERTAIN DATA PURSUANT TO D.21-09-020

I, Devin Zornizer, do declare as follows:

1. I am the Vice President of the Infrastructure Project Delivery organization for Southern California Gas Company (SoCalGas). I have reviewed the confidential information included within the SDG&E Exhibit SDGE-06 Gas Major Projects Supplemental Workpaper Volumes I, IV, and V for the 2028 General Rate Case (GRC) proceeding (A.26-05-XXX). I am personally familiar with the facts in this Declaration and, if called upon to testify, I could and would testify to the following based upon my personal knowledge and/or information and belief.

2. I hereby provide this Declaration in accordance with Decision ("D.") 21-09-020 and General Order ("GO") 66-D, Revision 2 to demonstrate that the confidential information ("Protected Information") provided in the SDG&E Exhibit SDGE-06 Gas Major Projects Supplemental Workpaper Volumes I, IV, and V is within scope of the data protected as confidential under applicable law.

3. In accordance with the narrative justification provided in Attachment A, the Protected Information should be protected from public disclosure.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my knowledge.

Executed this 12th day of June, 2026, at Los Angeles, California.

E-SIGNED by Devin Zornizer
on 2026-06-12 07:26:15 PDT

Devin Zornizer
Infrastructure Project
Delivery SoCalGas

ATTACHMENT A

SDGE Request for Confidentiality on the following information in the response to the 2028 General Rate Case Supplemental Workpaper Volumes I, IV, and V of Devin Zornizer, Exhibit SDGE-06 ("Gas Major Projects")

Location of Protected Information	Legal Citations	Narrative Justification
All grey highlighted Pipeline attributes (i.e., SMYS, MAOP, diameter, pressure, grade) in the following attachments: SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume I CONFIDENTIAL SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume IV CONFIDENTIAL SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume V CONFIDENTIAL	California Public Records Act (CPRA) Exemption, Gov't Code § 6254(ab) ("Critical infrastructure information, as defined in Section 131(3) of Title 6 of the United States Code, that is voluntarily submitted to the Office of Emergency Services for use by that office"); CPRA Exemption, Gov't Code § 6254(k) ("Records, the disclosure of which is exempted or prohibited pursuant to federal or state law"): • 6 U.S.C. §§ 131(3), 133(a)(1)(E); • 6 CFR §§ 29.2(b), 29.8 (defining CII and restricting its disclosure); • 18 CFR § 388.113(c); FERC Orders 630, 643, 649, 662, 683, and 702 (defining CEII); • Critical Energy Infrastructure Information, 68 Fed. Reg. 9862 (Dep't of Energy Mar. 3, 2003) (final rule) (listing what gas information qualifies as CEII); • FERC's Guidelines for Filing Critical Energy/Electric Infrastructure Information, February 21, 2017; available at: https://www.ferc.gov/sites/default/files/2020-04/CEII-Filing-guidelines.pdf • 18 C.F.R. § 157.14(a)(8-10); • 18 C.F.R. § 157.18(c); • 18 C.F.R. § 260.8 (FERC Form 567); • 49 CFR §§ 1520.5, 1520.9 (defining SSI and restricting its disclosure); • *Chowdhury v. Nw. Airlines Corp.*, 226 F.R.D. 608 (N.D. Cal. 2004); • PHMSA Guidelines, Federal Register Vol. 81, No. 120, June 22, 2016, pg 40764; • CPRA Exemption, Gov't Code § 6254(ab) (Critical Infrastructure Information)	These engineering design values of a proposed or existing critical infrastructure could potentially be used to determine the criticality of a gas facility and identify vulnerabilities of the gas delivery network. The value can be used to identify the volume of gas present in an area and ascertain the relative potential consequences of intentional acts against the gas transportation and distribution network.
All grey highlighted Vendor information. (Contracts, Vendor bid and pricing information including rates and invoices, customer and vendor proprietary information). in the following attachments:	California Public Records Act ("CPRA") Gov't Code § 6254(k) ("Records the disclosure of which is exempted or prohibited pursuant to federal or state law") • D.11-01-36, 2011 WL 660568 (2011) (confidential prices and contract terms specifically negotiated with a program vendor is proprietary and commercially sensitive and should remain confidential).	Based on input received by the vendor, and based on SDGE position, the produced documents are proprietary and represent and contain information that is proprietary, commercially sensitive, trade secrets, and content not intended for public disclosure. Vendor contracting efforts involve communications and work product which is intended only for access by

SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume IV CONFIDENTIAL SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume V CONFIDENTIAL		designated parties. Public disclosure would pose potential negative impacts and/or harm to the vendors, and/or inhibit SDG&E's efforts to reduce costs for customers by obtaining competitive pricing from vendors.
All grey highlighted Pipeline Locational Information (i.e., GPS coordinates, pipeline location) in the following attachments: SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume I CONFIDENTIAL SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume IV CONFIDENTIAL SDGE-06-WP-S Supplemental Workpapers to Prepared Direct Testimony of Gas Major Projects – Volume V CONFIDENTIAL	CPRA Exemption, Gov't Code § 7927.705 ("Records, the disclosure of which is exempted or prohibited pursuant to federal or state law") • 18 CFR § 388.113(c) (defining CEII) • FERC Order Nos. 630, 643, 649, 662, 683, and 702 (defining CEII) • FAST Act - Critical Electric Infrastructure Security, Pub. L. 114-94, amended December 4, 2015 (protecting **electric** infrastructure) • FERC Order 833 (including amendments to the CEII regulations, required by The FAST Act) • Critical Energy Infrastructure Information, 68 Fed. Reg. 9857, 9862 (Dep't of Energy Mar. 3, 2003) (final rule) (listing what **gas** information qualifies as CEII) • FERC's Guidelines for Filing Critical Energy/Electric Infrastructure Information, (Feb. 21, 2017), *available at* https://www.ferc.gov/sites/default/files/2020-04/CEII-Filing-guidelines.pdf ◦ Exhibits G, G-1, G-II of pipeline certificate applications. 18 CFR § 157.14 ◦ Exhibit V of abandonment applications. 18 CFR § 157.18 ◦ FERC Form 567. 18 CFR § 260.8 • CPUC Res. L-436, at 8 (stating CPUC will "refrain from making available to the public detailed maps and schematic diagrams showing the location of specific utility regulator stations, valves, and similar facilities") • Cal. Pub. Util. Code § 364(d) ("The commission may, consistent with other provisions of law, withhold from the public information generated or obtained pursuant to this section that it deems would pose a security threat to the public if disclosed.") CPRA Exemption, Gov't Code § 7922.000 (Balancing Test)	GPS coordinates and pipeline location are identified as confidential because the data would provide sufficient information to be used by a third party to excavate or access above ground facilities without notifying the utility through the local Underground Service Alert (USA) or could be used to identify locations for illegal tapping or other acts that could impact the safety of residents.