In The Matter of the Application of Southern California Gas Company (U 904 G) for Authorization to Implement Revenue Requirement for Costs to Enable Commencement of Phase 2 Activities for Angeles Link	)

Application: A.24-12-XXX

Exhibit No: _____

[PUBLIC]

WORKPAPER TO

PREPARED DIRECT TESTIMONY

OF BRIAN WALKER

ON BEHALF OF

SOUTHERN CALIFORNIA GAS COMPANY

(CHAPTER 4 – ENGINEERING DESIGN)

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

December 20, 2024

Workpaper Supporting Chapter 4 (Engineering Design)

Table 1: Total Chapter 4 Angeles Link Phase 2 Cost by Category (in millions)

Phase 2 Angeles Link Costs	2025	2026	2027	2028	Total
Contracting Activities (Non-Labor)	$1.8	-	-	-	$1.8
Project Engineering Design Services (Non-Labor)	-	[redacted]	[redacted]	[redacted]	[redacted]
Permitting & Environmental (Non-Labor)	-	[redacted]	[redacted]	[redacted]	[redacted]
Land & Right-of-Way (Non-Labor)	-	[redacted]	[redacted]	[redacted]	[redacted]
Company Labor	$2.2	$5.3	$6.8	$3.3	$17.6
TOTAL DIRECT O&M COSTS	$4.0	$56.0	$86.0	$48.4	$194.4
TOTAL FULLY LOADED O&M COSTS[1]	$5.7	$61.5	$94.9	$53.4	$215.5

Overall Description

This Engineering Design Workpaper includes the cost and schedule forecast for Phase 2 that will advance Angeles Link through Front-End Engineering Design (FEED) and other activities identified in the Testimony of Brian Walker. The Phase 2 forecast includes costs associated with developing a preferred route and conducting the refined design, engineering, and environmental studies required to facilitate timely federal and state environmental reviews. Costs are also presented for contracting activities that will be completed prior to Phase 2 which will enable SoCalGas to secure competitive costs and promptly retain vendors to conduct critical-path work after a decision is issued in this Application. The selection of primary contractor services for both engineering design and environmental services needs to occur prior to starting the option selection and pre-FEED activities to maintain the proposed 30-month Phase 2 schedule following issuance of a CPUC decision in this proceeding.

Forecast Methodology

SoCalGas assembled the engineering design and project management activities forecast using inputs of Angeles Link's assumed scope, project deliverables, ARCHES/DOE timelines, subject matter expert judgment and experiences, and assumed execution plans. Project cost categories are incorporated in the Phase 2 FEED estimate and shown in the tables which include: project engineering design services, environmental and permitting, land and right-of-way, and company labor.

SoCalGas applies AACEi Recommended Practices 97R-18 and 18R-97 (Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Pipeline Transportation Infrastructure Industries and Cost Estimate Classification System – As Applied in Engineering,

[1] Loaders are applied to the total estimated costs; therefore, individual cost categories are only shown as direct costs.

Procurement, and Construction for the Process Industries, respectively) as a guideline for pipeline and compressor station project development. The cost sections below outline the project information and deliverables, by cost category, which are progressed through Pre-FEED and then through FEED. The costs outlined herein are based on the specific project scope and a detailed list of associated deliverables, as further described in the appendix. As the project advances through Pre-FEED and FEED phases, these costs may require revisions to reflect changes to identified deliverables, requirements changes, evolution of the defined project scope, and any new relevant information that arises during Phase 2.

SoCalGas utilized project information, industry standard practices, and subject matter expertise during the development of the Angeles Link Phase 2 forecast. SoCalGas leveraged Angeles Link Phase 1 studies which provided preliminary scoping information including routing configurations, pipeline design, demand, environmental analysis, and permitting requirements. A combination of activity and deliverable based, analogous, parametric, and expert judgment estimating is used for this FEED work. The estimating process incorporates adjustments for specific design requirements, such as area Class Locations,[2] High Consequence Areas,[3] alternative installations, and mainline valve spacing. Considering these inputs, a forecast was created by documenting all the required engineering deliverables for Angeles Link into a bottom-up, activity-based estimate, which was separated into 16 individual pipeline segments (inclusive of the Hub Segments) and two compressor stations to optimize the design efficiency.

SoCalGas procured an experienced engineering design firm that then completed a detailed review of each of these pipeline segments, identifying specific requirements for design, including but not limited to necessary surveys, alternative installation requirements (e.g., Horizontal Directional Drilling, Jack and Bore, etc.), and valve counts. The engineering design firm was then able to utilize historical engineering data and technical expertise to assign design hours for each pipeline segment based on mileage and Class Location. The engineering firm then developed a deliverables list based on assigned disciplines and forecasted hours to complete specific plans, studies, reports, and drawings based on SoCalGas's Project Delivery Model (PDM), industry standards (e.g. ASME B31.12), AACEi Estimating Recommended Practices, and past project experience.

During development of the Phase 2 forecast, SoCalGas internal subject matter experts, including Project Managers and Engineers, Environmental and Permitting specialists, and Land and Right-of-Way specialists, were engaged extensively within key areas of preliminary pipeline design. These stakeholders informed the forecast by providing additional information and review regarding the deliverables required in their realm of expertise and provided expected hours associated with these deliverables. They also supported reviewing an internal staffing plan that was parametrically estimated based on a forecasted level

[2] Class Location refers to a regulatory designation for natural gas transmission pipelines that indicates the level of human population within a certain distance on either side of the line.

[3] A High Consequence Area is a location that is specially defined in pipeline safety regulations as an area where pipeline releases could have greater consequences to health and safety or the environment.

of effort. The staffing plan was detailed to the discipline level using the schedule, historical project support data, and expert judgment.
Lastly, SoCalGas and key stakeholders provided input on their respective forecast details, methodologies, and how these relate to the overall project risk profile. SoCalGas engages subject matter experts in various fields to review risk variables (assumptions on scope and productivity for contractors, environmental services costs, permit conditions, etc.). These experts discuss the known and unknown variances for these cost components (e.g., discussing project-specific concerns that drive engineering costs, environmental costs, land rights acquisitions, permit conditions, etc.). The stakeholders then utilize the experience and knowledge in their field of expertise to develop a consensus of potential outcomes. These outcomes were then incorporated into a Monte Carlo risk simulation. As a result of the contingency calculation, a contingency of approximately 24% was developed to account for uncertainties identified and recorded within the project risk register at the time the forecast was created.

Schedule

During the process of developing the most recent cost estimate, a Phase 2 engineering schedule was developed. The schedule is based on preliminary assumptions, such as assumed production rates (how quickly work can be performed), number of engineering teams supporting Angeles Link, schedule predecessors (i.e., required to be performed before another activity can start), etc. The forecast assumes a 30-month timeline for Phase 2 following a CPUC decision, starting from January 2026 through June 2028. As the schedule advances and the scope evolves, the schedule may be adjusted to incorporate new requirements, insights from studies, analyses, research, and any relevant information that emerges in Phase 2.

Table 2: Contracting Activities (in millions)

Contracting Activities	2025	2026	2027	2028	Total
DIRECT NON-LABOR	$1.8	-	-	-	$1.8

Assumptions

For contracting activities to be completed in 2025, SoCalGas will develop and advance its contracting strategy, assess potential service providers, develop contract technical exhibits, and execute a Request for Proposal (RFP) process which will culminate with the selection of vendors. In order to complete these activities, SoCalGas has forecasted a nominal amount of support comprising company labor and non-labor. The forecast is based on a staffing plan that leverages the expected level of effort needed to complete these activities. The level of effort that is estimated is based on input from project teams which derived information from historical projects or proposals from contractors and consultants.

Table 3: Project Engineering Design Services (in millions)

Engineering Design Services	2026	2027	2028	Total
DIRECT NON-LABOR	[redacted]	[redacted]	[redacted]	[redacted]

Assumptions

The project engineering design services category includes non-labor costs associated with engineering and design services, project management services, surveying services, and outreach services to complete the Pre-FEED and FEED component of Phase 2. Engineering and design services include the development of civil engineering for site layouts, structural engineering for foundation and steel requirements, electrical and mechanical systems design, instrumentation and control (I&C), and pipeline-specific engineering. These engineering services ensure that every component of the project is designed to meet technical specifications, safety standards, and regulatory requirements. This category also includes project management within engineering to coordinate these diverse disciplines. To provide additional context, the extensive project management and design work in this category includes activities such as the assessment and confirmation of project parameters to provide a scope of work and project execution plan, site visits, development and review of feature studies, development of a pipeline profile, determination of pipeline characteristics and material specifications (e.g., maximum and minimum allowable test pressures, diameter, wall thickness), routing development, and determination of additional pipeline infrastructure (e.g., compressor stations, mainline valves, regulator stations), amongst other activities.

Table 4: Permitting and Environmental (in millions)

Permitting & Environmental	2026	2027	2028	Total
DIRECT NON-LABOR	[redacted]	[redacted]	[redacted]	[redacted]

Assumptions

Consideration of environmental constraints is essential to the Pre-FEED and FEED process as considerable upfront planning, and detailed project assessments (in-field project assessments if and when necessary) are necessary to identify a preferred route. This category includes non-labor costs for environmental and permitting subject matter experts to complete a desktop review of route options, refine potential environmental constraints identified in Phase 1 studies, support submittal and receipt of required ministerial permits to support Phase 2 ground activities, and perform field work to ground-truth potential impacts identified during the desktop analysis (primarily related to biological and cultural resources). Key Environmental tasks include protocol-level biological surveys, cultural fieldwork, emissions calculations, noise measurements, and traffic studies. These activities will help inform and develop the proposed schedule and costs to complete the Environmental and Permitting requirements of the project and incorporate them into the Class 3 Estimate developed at the end of FEED. The objective of this work is to

design the proposed project in compliance with regulatory requirements and minimize environmental impacts throughout the project lifecycle.

Table 5: Land and Right-of-Way (in millions)

Land & ROW	2026	2027	2028	Total
DIRECT NON-LABOR	[redacted]	[redacted]	[redacted]	[redacted]

Assumptions

Land and Right-of-Way (ROW) is essential in project development during the Pre-FEED and FEED component of Phase 2 and includes non-labor costs associated with pre-acquisition due diligence activities related to identification of the preferred route. The specific deliverables associated with Land and ROW incorporate the development of a preliminary land acquisition plan, refining ownership and existing ROW analyses conducted in Phase 1 studies, a detailed title review of private parcels with temporary and permanent easement acquisition needs identified through engineering and design, preliminary land valuation analysis, development of a land acquisition cost estimate, and acquiring private owner consents to facilitate necessary survey activities.

Table 6: Company Labor (in millions)

Phase 2 Angeles Link Costs	2025	2026	2027	2028	Total
DIRECT LABOR	$2.2	$5.3	$6.8	$3.3	$17.6

Assumptions

SoCalGas's primary project objective is to successfully execute Phase 2 of Angeles Link on schedule and at reasonable cost, while producing quality deliverables and meeting applicable engineering standards and regulatory requirements. To achieve this objective, SoCalGas requires a well-trained and qualified internal team comprised of project management, engineering, construction management, project controls, quality risk and compliance, safety, procurement, environmental, communication, and stakeholder outreach personnel to manage the project in accordance with SoCalGas's Project Delivery Model (PDM) and oversee compliance with quality assurance requirements. In calculating the total estimated Labor cost for the Pre-FEED and FEED component of Phase 2, the following company labor was considered:

Departments	Approximate Forecasted SCG Company Labor Hours	Forecasted Average FTEs[4]
Project Management, Safety, and Document Control	55,500	11
Project Controls and Estimating	33,500	6
Construction Management and Project Field Management	1,000	0.2
Gas Engineering and Quality Management	34,500	7
Environmental and Permitting Services	35,000	7
Land Services	9,500	2
Public Affairs and Outreach	500	0.1
Grand Total	**169,500**	**32**

Appendix

At the time the forecast was developed, SoCalGas created the below deliverable counts by stakeholder and discipline type for reference, which summarizes the various plans, studies, reports, and drawings that are anticipated to be required based on SoCalGas's Project Delivery Model (PDM), industry standards (e.g. ASME B31.12), AACE Estimating Recommended Practices, and past project experience. These counts are approximate, and it is important to note some deliverables are global and cover all segments and/or stations while other deliverables may require detailed analysis, drawing sheets, studies, and reporting for each of the 16 pipeline segments and/or two compressor stations. Creating and maintaining these technical documents is an iterative process. It requires SoCalGas to continuously refine and update deliverables as new studies, analyses, research, and information become available. This ongoing effort supports accuracy and maintaining relevant project documentation throughout the planning phase, accommodating evolving requirements and insights gained from research and stakeholder feedback. As Angeles Link progresses and scope maturity increases, deliverables may be added, changed, and removed from the project.

[4] Forecasted average FTEs are calculated using the forecasted SCG company labor hours, assuming a 30-month schedule. FTEs were derived by dividing the forecasted company labor hours over the 2.5-year (30-month) schedule to get the average labor hours per year and then further dividing that value by the 2,080 working hours/year of a full-time employee to get the total FTE count. Note: Average FTEs provided for reference. Average FTEs will vary from month to month depending on the specific activities occurring during Pre-FEED and FEED.

Table 6: Forecasted Number of Project Deliverables by Type

Pipeline / Compressor Station / Both	Stakeholder Type	Discipline Type	Approx. Forecasted Engineering Services Hours	Forecasted Average FTEs[5]	Preliminary Pre-FEED/FEED Deliverable Packages	Preliminary Drawing / Document Counts
Compressor Station	Engineering	General	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Project Management	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Process	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Civil	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Structural	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Architectural	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Piping	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Mechanical	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Electrical	[redacted]	[redacted]	[redacted]	[redacted]
Compressor Station	Engineering	Instrumentation and Controls (I&C)	[redacted]	[redacted]	[redacted]	[redacted]
Pipeline	Engineering	Pipeline	[redacted]	[redacted]	[redacted]	[redacted]
Pipeline	Engineering	Project Management	[redacted]	[redacted]	[redacted]	[redacted]
Pipeline	Engineering	Process	[redacted]	[redacted]	[redacted]	[redacted]
Pipeline	Engineering	Mechanical	[redacted]	[redacted]	[redacted]	[redacted]
Pipeline	Engineering	Instrumentation and Controls (I&C)	[redacted]	[redacted]	[redacted]	[redacted]
Pipeline	Engineering	Electrical	[redacted]	[redacted]	[redacted]	[redacted]
Pipeline	Engineering	Civil, Structural, Survey and Architectural	[redacted]	[redacted]	[redacted]	[redacted]
Both	Environmental		[redacted]	[redacted]	[redacted]	[redacted]
Both	Land		[redacted]	[redacted]	[redacted]	[redacted]
Grand Total			[redacted]	[redacted]	[redacted]	[redacted]

[5] Forecasted average FTEs are calculated using the forecasted Engineering Service hours, assuming a 30-month schedule following a CPUC decision. FTEs were derived by dividing the forecasted company labor hours over the 2.5-year (30-month) schedule to get the average labor hours per year and then further dividing that value by 2,080 working hours/year of a full-time employee to get the total FTE count. Note: average FTEs will vary from month to month depending on the specific activities occurring during Pre-FEED and FEED.

Summary description of disciplines listed in Table 6.

Discipline	Description
General	General engineering services that do not fall under specific disciplines, such as overall project coordination and integration.
Process	Process engineering services, including flow diagrams, process simulations, and design of process systems.
Civil	Engineering services for earthworks, roads, drainage, grading, geotechnical investigations, and other civil works.
Structural	Engineering services for the design and analysis of structural components, including steel supports, foundations, and frameworks.
Architectural	Design and planning services related to the architectural aspects of the project, including buildings and non-process structures.
Piping	Engineering and design services specific to compressor station piping, including route selection, flow analysis, and material selection. Also including design and layout of piping systems within the project, including pipe stress analysis and material specifications.
Mechanical	Engineering services focused on mechanical systems, including rotating equipment, HVAC, and utilities.
Electrical	Design and engineering services for electrical systems, including single line diagrams, power distribution layouts, lighting, and grounding.
Instrumentation & Controls (I&C)	Services related to the design and integration of instrumentation and control systems for the pipeline and compressor stations.
Project Management	Oversight and management services provided to ensure project objectives are met and required deliverables are completed, including schedule monitoring, cost control, and reporting.
Pipeline	Engineering and design services specific to the pipeline, including route selection, flow analysis, and material selection. Also including design and layout of piping systems within the project, including pipe stress analysis and material specifications.
Environmental	Refer to Table 4 and associated description.
Land & ROW	Refer to Table 5 and associated description.

Survey - Surveying services required for the project, including topographical and geotechnical surveys.
Substations - Design and engineering services for electrical substations required for the compressor stations.