

Tab 1

Agenda Item: Presentation on SLAR-CC Preliminary Design Report

Objective: Summarize the SLAR-CC Preliminary Design Report.

Background: The Salt Lake Aqueduct Replacement – Cottonwoods Conduit (SLAR-CC, or “Cottonwoods Connection”) project is currently in design with construction anticipated beginning January 2024. Construction of the pipeline must be complete by June 30, 2025 to enable Salt Lake City to begin replacement of the Big Cottonwood Water Treatment Plant (BCWTP). Staff anticipates a regular series of updates, discussions, and decisions with the Engineering Committee and Board of Trustees throughout design.

With this agenda item, staff wishes to discuss the recently completed Preliminary Design Report (PDR). The PDR represents the 30% completion of the design, a major milestone for the project. At the 30% design milestone, all basic parameters associated with the project have been identified and defined. These decisions are documented in a series of eleven technical memorandum. The technical memorandum makeup the content of the PDR and include:


- *Level of Service* defining overall goals for operations and maintenance, seismic resiliency, hydraulic performance, and controls communications.
- *Pipeline Materials* evaluating various types of pipe materials and selecting materials that will provide resilience and reliability for a minimum service life of 50 years or more.
- *System Operations* presenting a unified system operational strategy to meet the Level of Service goals.
- *Hydraulic Analysis* informing the optimum size of the pipelines and all major appurtenances.
- *Survey* establishing the basic survey control and coordinate systems for all design efforts.
- *Pipeline Alignment* identifying the basis for determining the initial alignment options, a weighted multi-criteria evaluation, resulting in selection of a recommended alignment.
- *Permitting* summarizing the anticipated permits for the project.
- *Corrosion* recommending materials and corrosion protection options to protect the pipeline from “Very Corrosive” to “Extremely Corrosive” soils found in the project.
- *Design Criteria* informing all of the various design decisions made for the project.
- *Constructability* providing a description of the various factors and considerations to ensure constructability and reduce risks during project bidding and construction.
- *Cost Opinion* developing an AACE International Class 3 Cost Opinion of the project costs. A class 3 opinion has an uncertainty of -20% to +30%.

Staff have been intimately involved in the preparation of the 30% design and are continuing the design process with the design consultant to reach the next major milestone of 60% design. The design consultant continues to make progress using the decisions made in the PDR to further reduce the uncertainty of project parameters and increase the detail of the design.

Committee Activity: This presentation was made to the Engineering Committee on April 4, 2023.

Attachment:

- Presentation Slides
- Salt Lake Aqueduct Replacement - Cottonwoods Connection – Preliminary Design Report, February 28, 2023 (provided electronically)

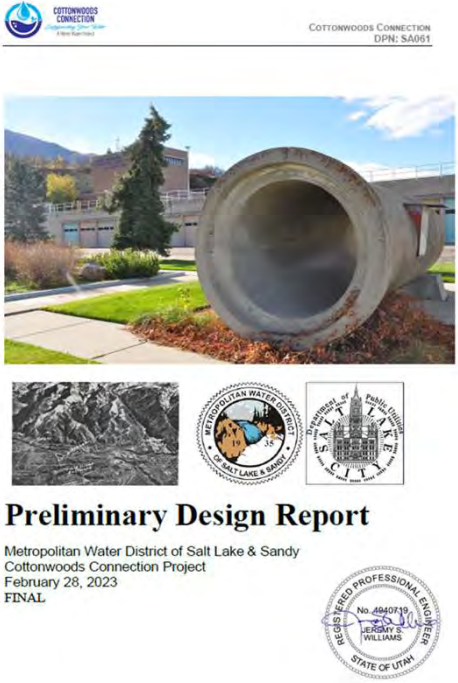


COTTONWOODS CONNECTION
Safeguarding Your Water
A Metro Water Project

Salt Lake Aqueduct Replacement Cottonwoods Connection

Preliminary Design Report Summary

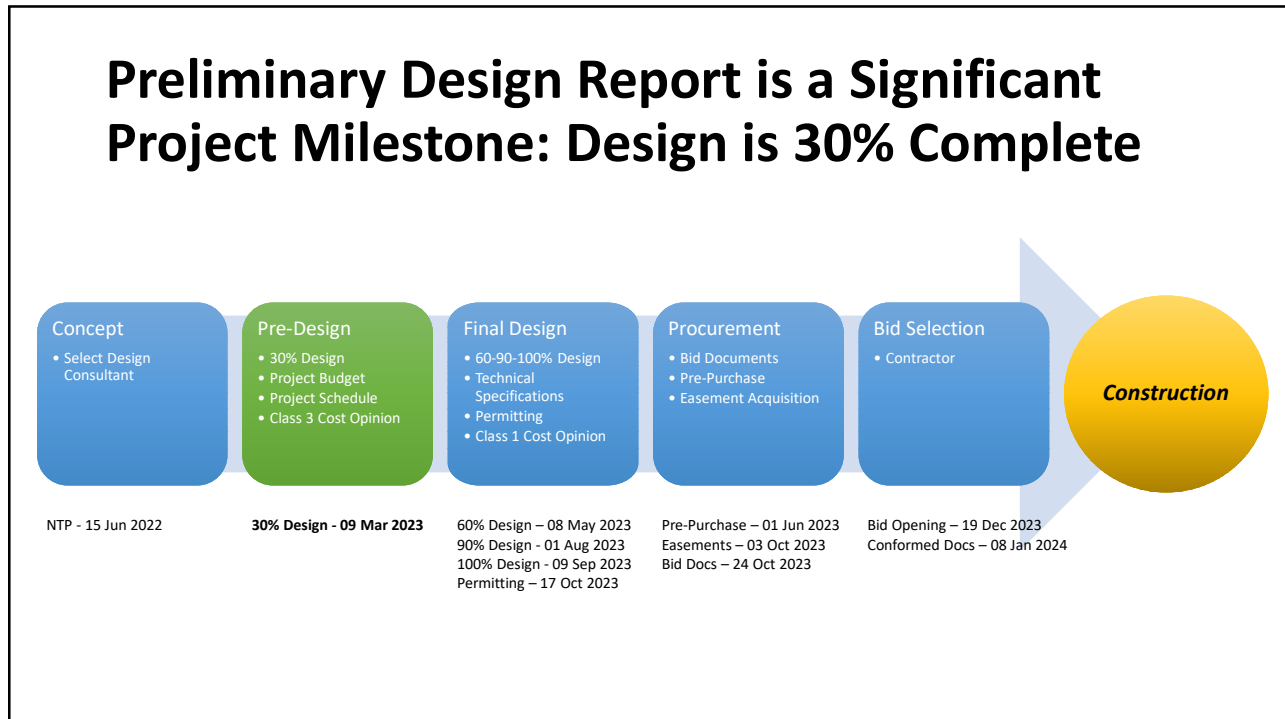
Engineering Committee Briefing
04 April 2023



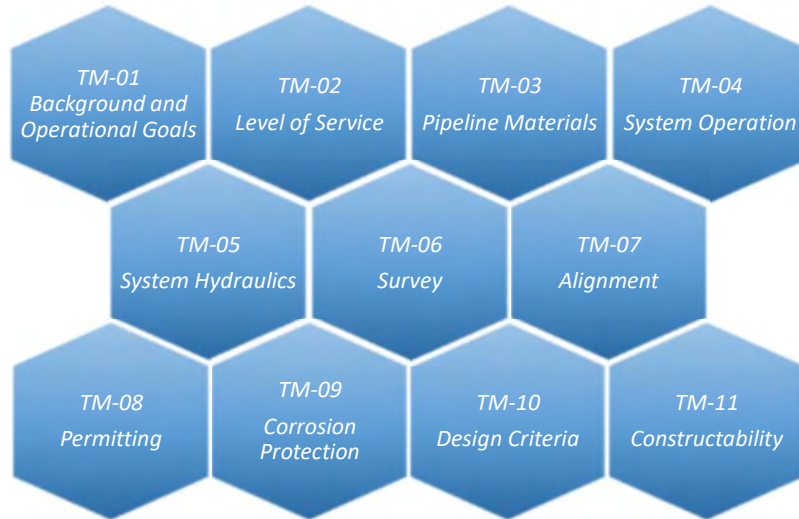
COTTONWOODS CONNECTION
DPN: SA061

Preliminary Design Report

Metropolitan Water District of Salt Lake & Sandy
Cottonwoods Connection Project
February 28, 2023
FINAL



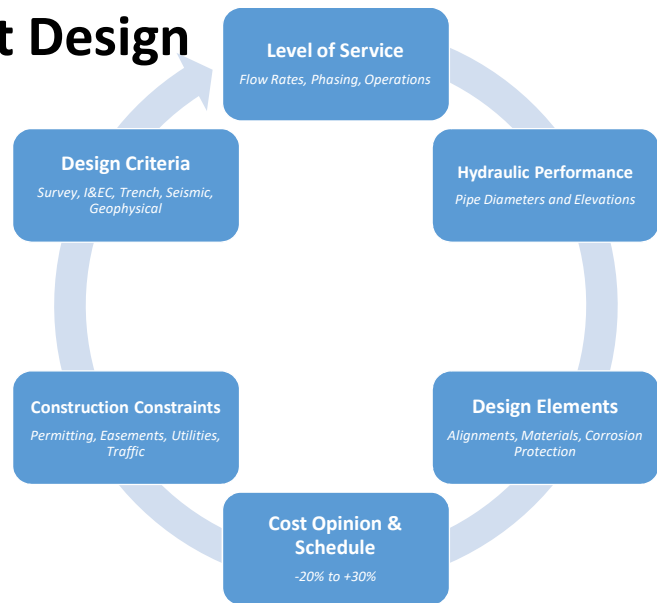
Preliminary Design Report is Presented as a Series of Eleven Technical Memorandum

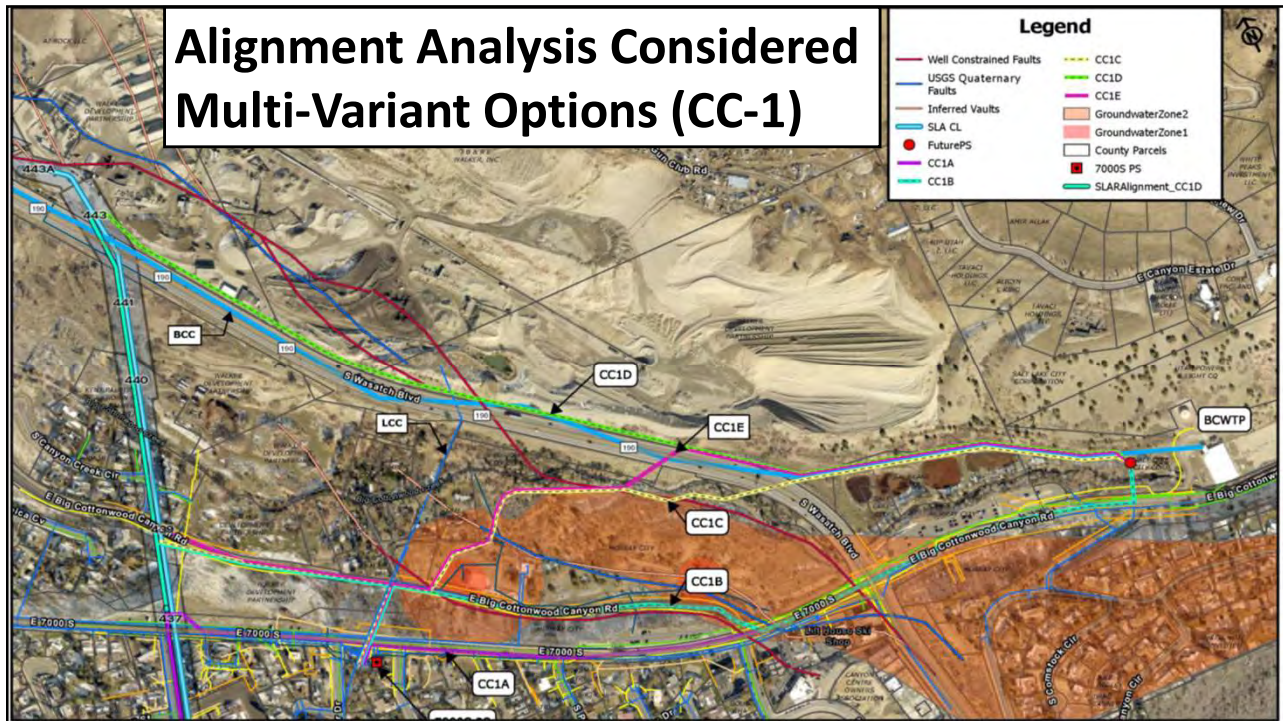
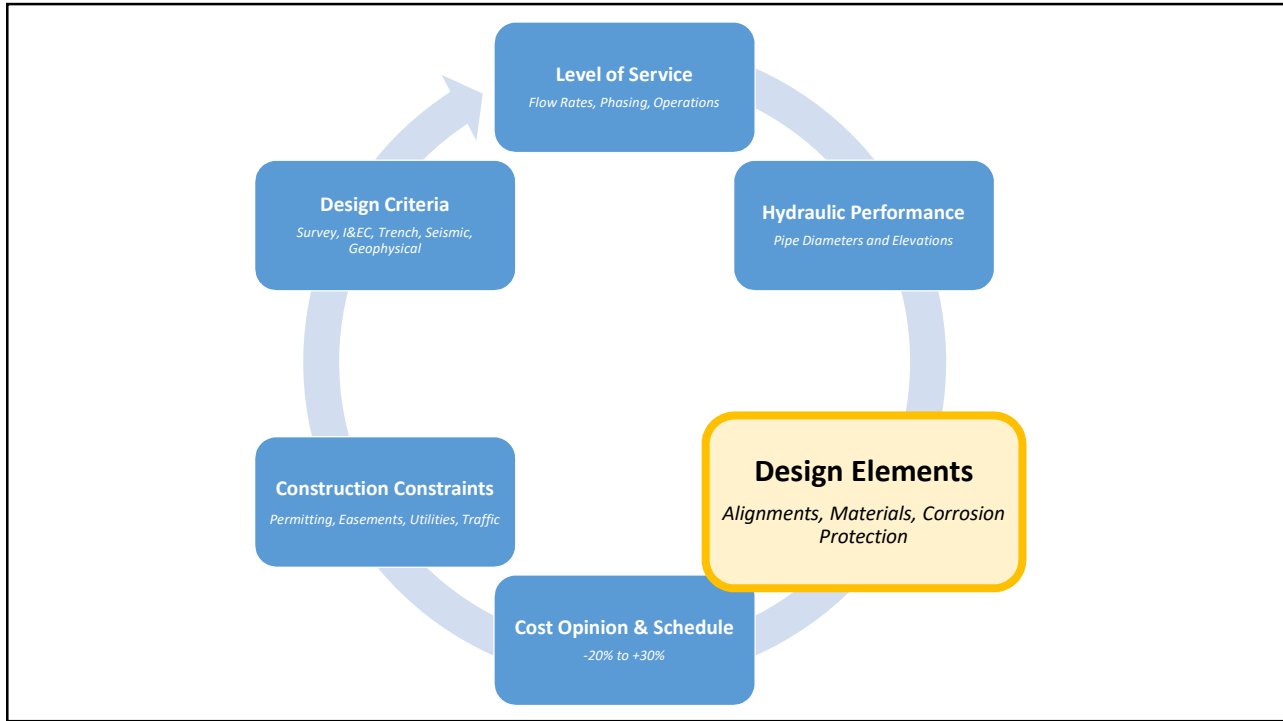


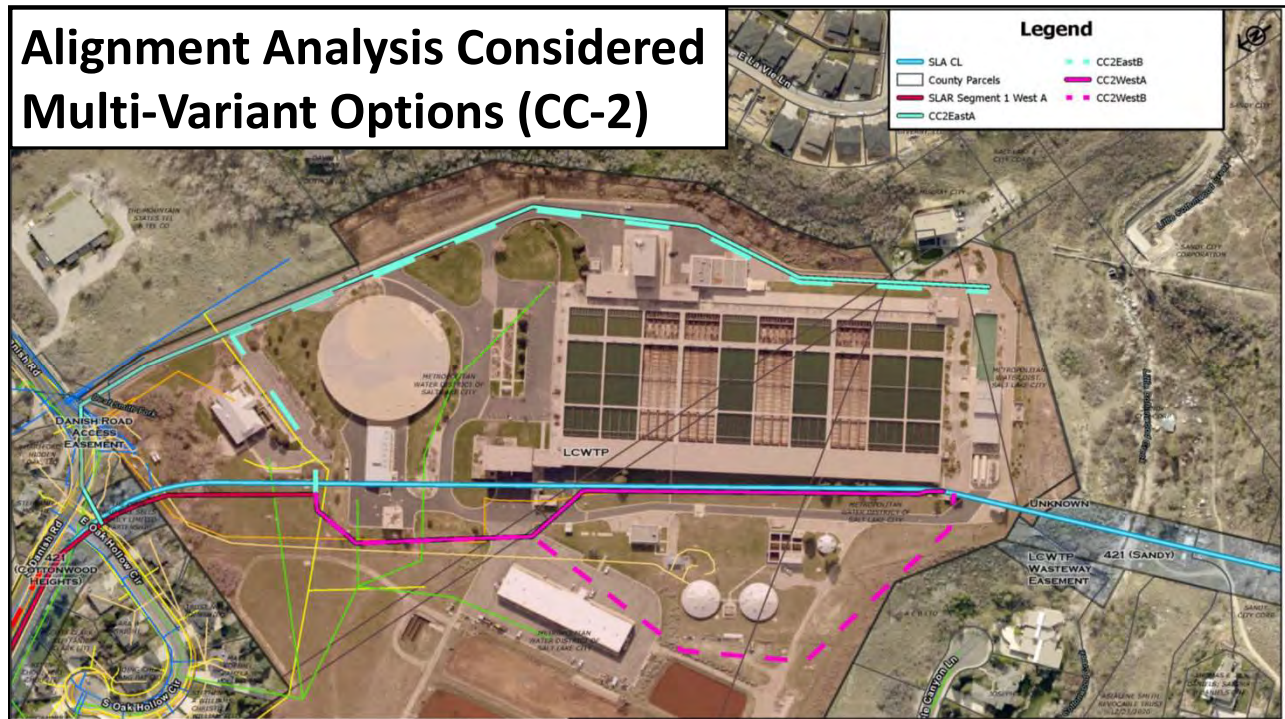
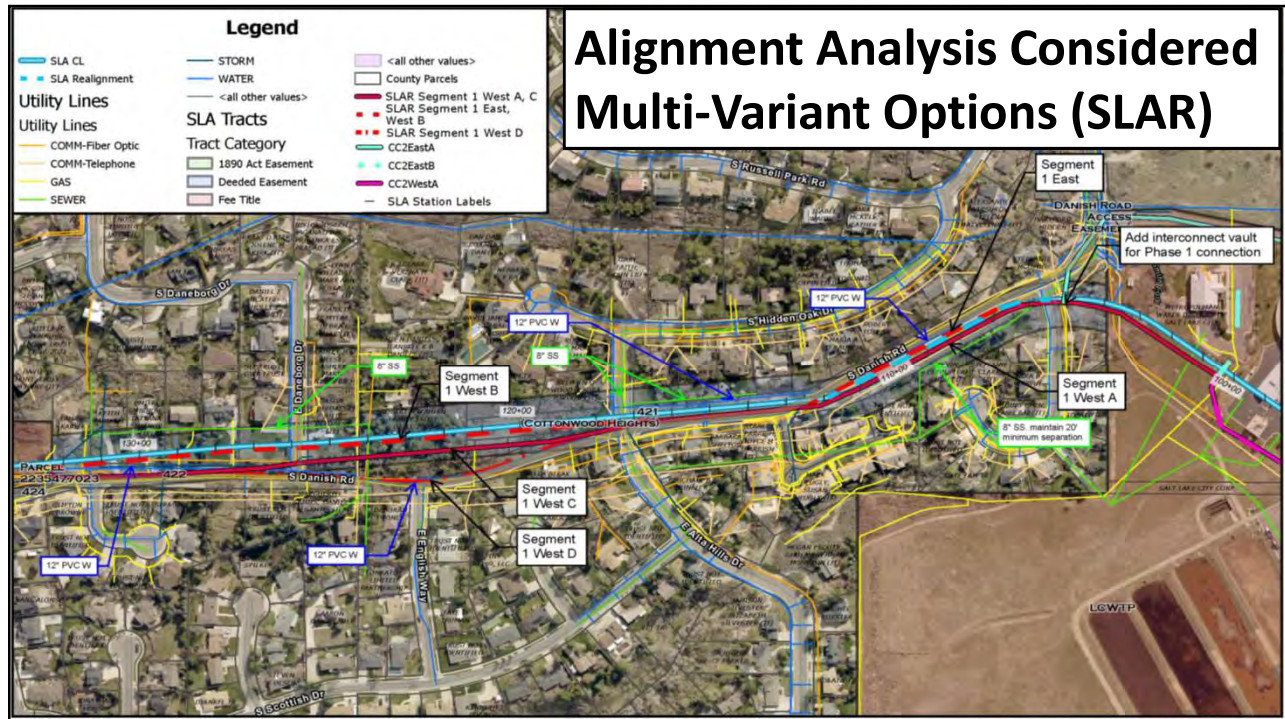
Technical Memorandum Combine into a Comprehensive Project Design

Desired Outcomes of 30% Design

- Define Project Scope and Budget
- Finalize Design Criteria
- Identify Fatal Flaws
- Understand Constraints
- Mitigate Project Risk







Key Criteria Focuses Multi-Variant Alignment Analysis Recommendation

Criteria	Title	Description	Considerations	Weighting
1	Reliability	Reliable operations and facility life	Reliability scores for each option take into consideration factors that could have an impact on the reliable operation and facility life for the pipe including functionality of equipment. The factors taken into account include non-seismic and seismic events, slope stability, and consequences of failure.	40%
2	Reparability	Ease of repair	This criterion measures how easily and quickly repairs can be made to the SLAR and CC pipelines and appurtenances if required. Considerations taken into account include accessibility of the pipeline(s) and appurtenances/vaults, the materials needed to repair the facilities, and the duration of potential repairs which considers the previous two items.	20%
3	Operations and Maintenance	Ease of operation and maintenance	The operation and maintenance (O&M) criterion scores each option based on the effort required for O&M staff to conduct standard O&M activities for/on the pipeline(s) and their appurtenances. Considerations for this criterion include level of access for service vehicles for routine maintenance and major repairs, access into potential appurtenance vaults, level of security of the pipeline and appurtenances, and ability for future pigging operations. This criterion also takes into account what potential effects an option will have on pipeline hydraulics.	20%
4	Environmental	Level of environmental encroachment, land impacts, residential impacts	Environmental impact scores for each option are based on how the given option might impact the environment (natural and manmade), how complex permitting may be, and the impacts to local traffic and the community during construction. The level of surface impacts to local residents is considered under this criterion as well.	10%
5	Implementation/Construction	Ease in Constructability / Property and Right-of-Way / Schedule	This criterion measures the level of difficulty of pipeline construction for the segment. Considerations include construction area space and restrictions, potential limitations on working seasons and hours, overall complexity/constraints of option construction and anticipated impact on schedule, existing utility relocations and/or shutdowns. Other considerations include existing easement and or right-of-way language and limitations (single versus multiple pipelines), requirement to purchase additional permanent easement or right-of-way, requirement for temporary construction easement.	10%
				100%

Alignment Analysis Optimizes Pipeline Alignment



Pipeline Material, Size, and Corrosion Protection from Hydraulic and Geophysical Analysis

CC-1: Along Fort Union Blvd

- 36-inch Diameter, 5/8-inch to 1-inch Wall Thickness

CC-2: At LCWTP

- 36-inch Diameter, 1/4-inch Wall Thickness

SLAR: from LCWTP to 10 MG Reservoir

- 72-inch Diameter, 5/8-inch Wall Thickness

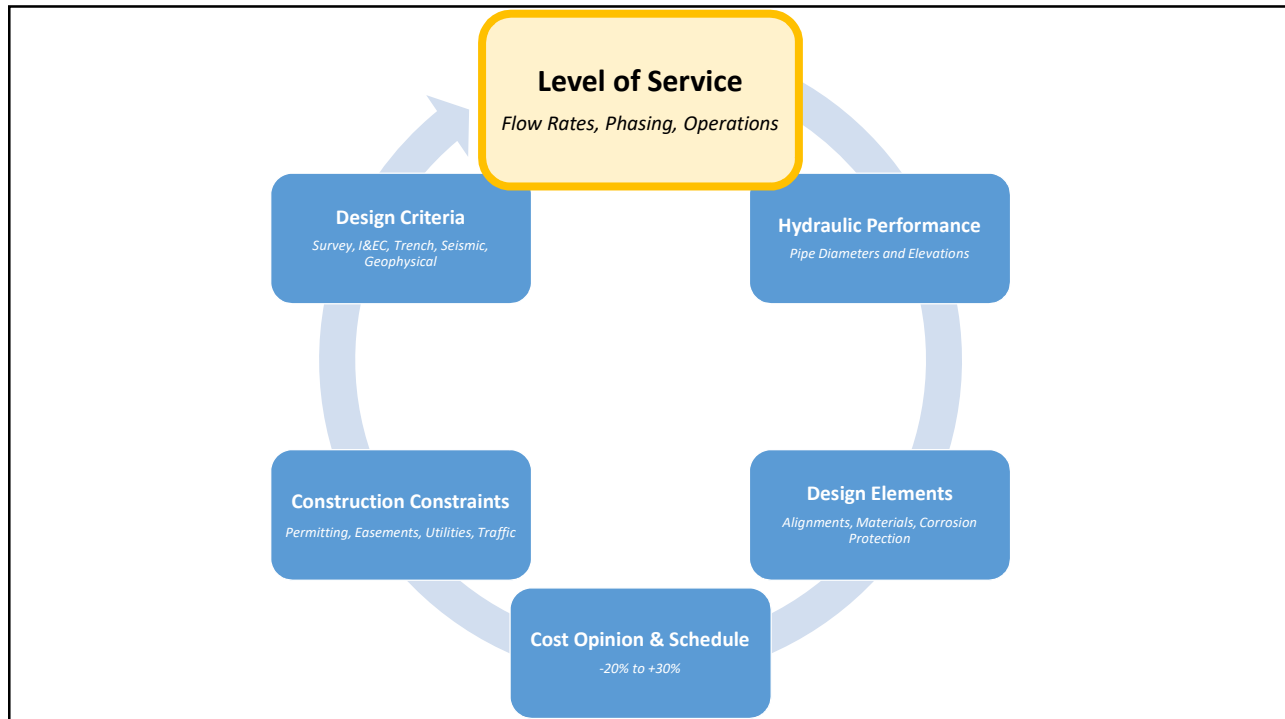
SLAR: from 10 MG Reservoir to Fort Union Blvd

- 60-inch Diameter, 5/8-inch Wall Thickness

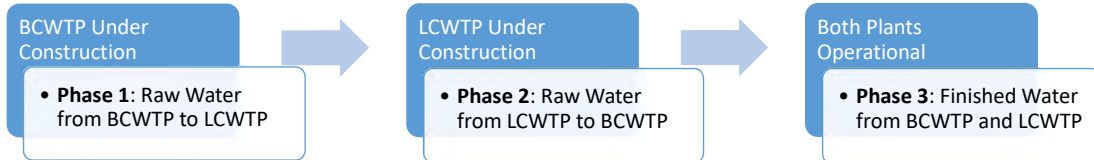


Welded Steel Pipe

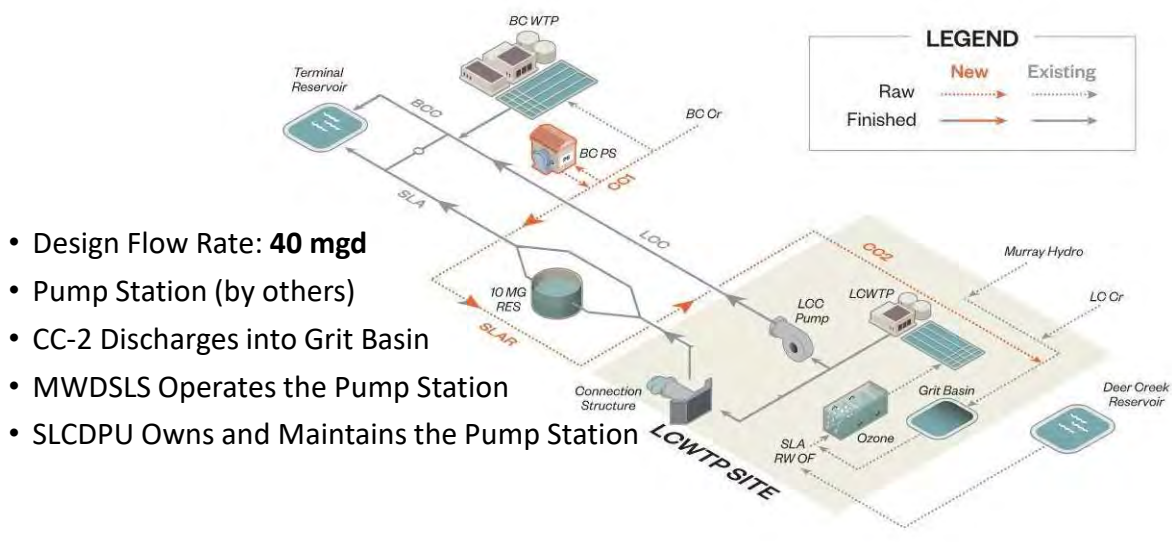
- **AWWA C200**
- **Bonded Dielectric Coating**
- **Mortar Lining**
- **Impressed Current Cathodic Protection**



Level of Service Defines the Life-Cycle Phases of the Project

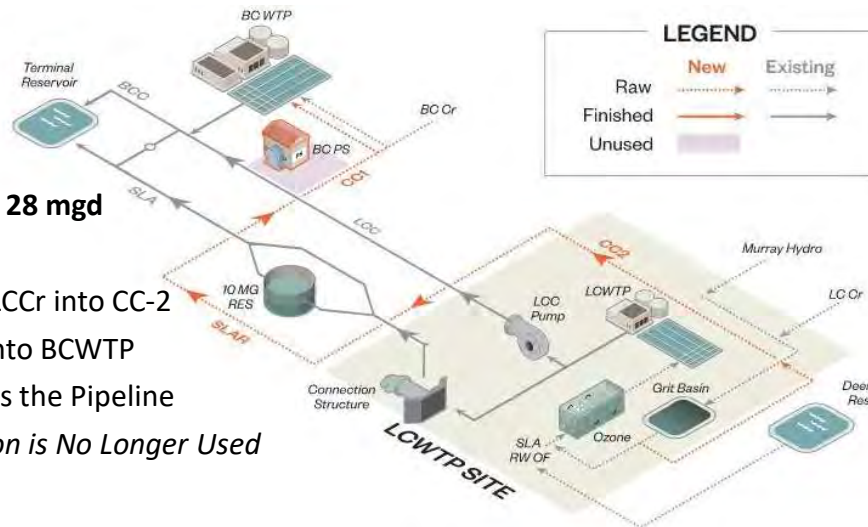


Phase 1: Raw Water from BCWTP to LCWTP



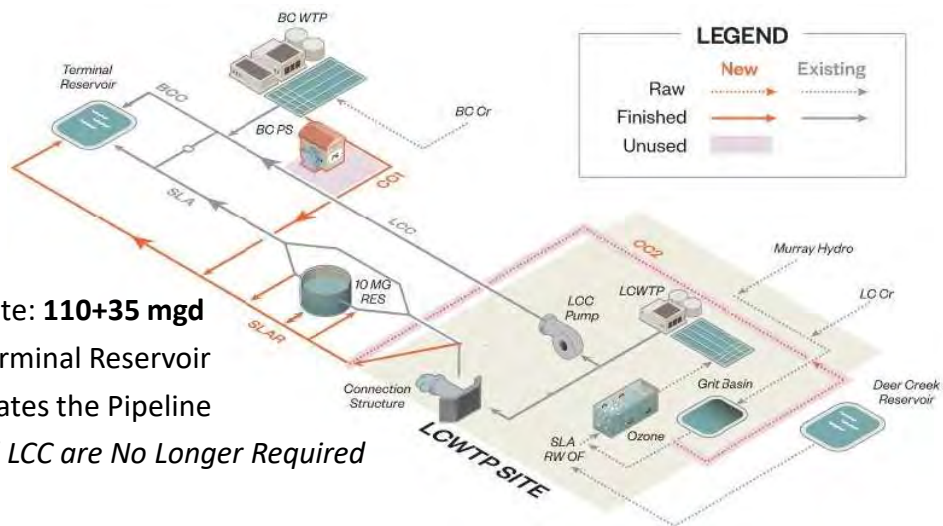
Phase 2: Raw Water from LCWTP to BCWTP

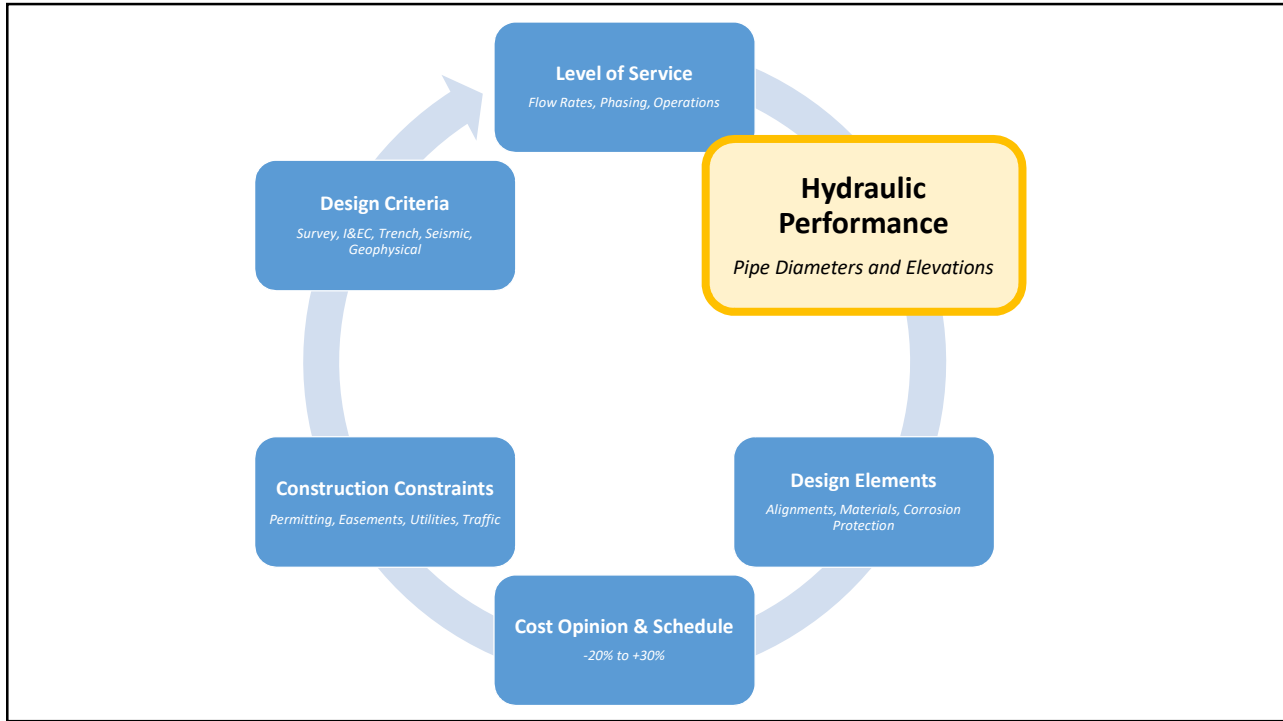
- Design Flow Rate: **28 mgd**
- Gravity Flow
- Raw Water from LCCr into CC-2
- CC-1 Discharges into BCWTP
- MWDSLS Operates the Pipeline
- *Note: Pump Station is No Longer Used*



Phase 3: Finished Water from LCWTP

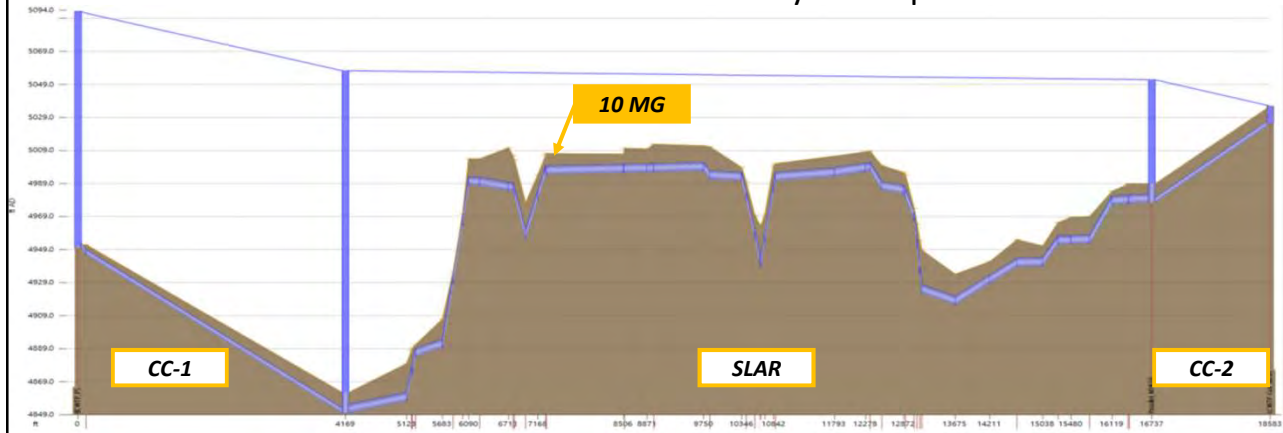
- Gravity Flow
- Design Flow Rate: **110+35 mgd**
- Extended to Terminal Reservoir
- MWDSLS Operates the Pipeline
- *Note: CC-2 and LCC are No Longer Required*





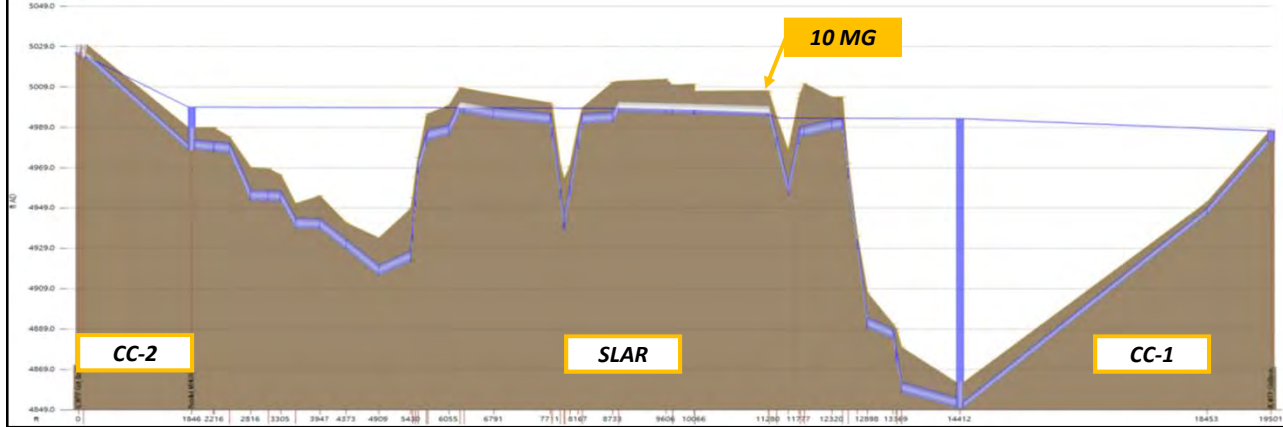
Phase 1: Pumped HGL from BCPS to LCWTP

- **Pumped Head = 161.4 ft**
- **BCPS HGL = 5109.4**
- Flow Rate = 40 mgd
- Velocity = 8.8 fps



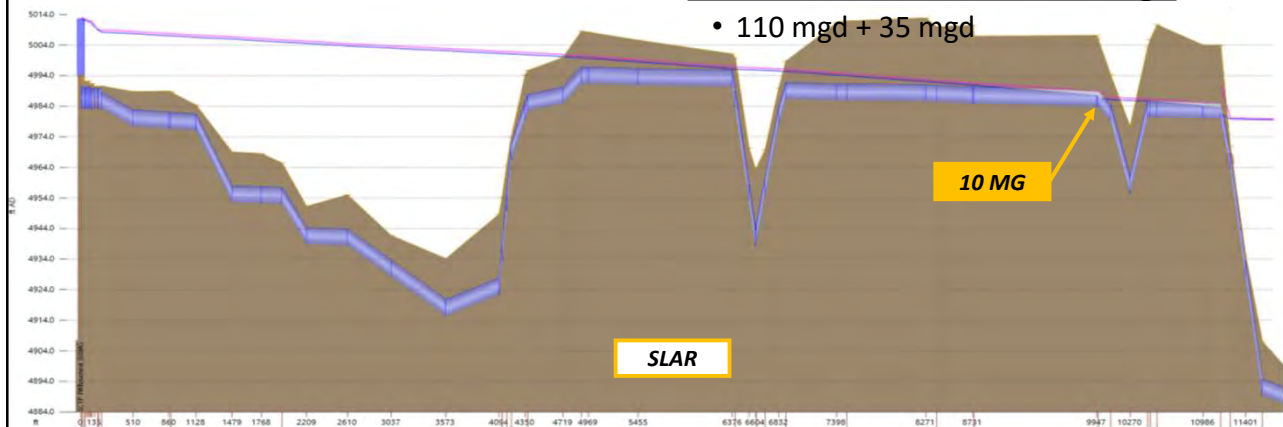
Phase 2: Gravity HGL from LCWTP to BCWTP

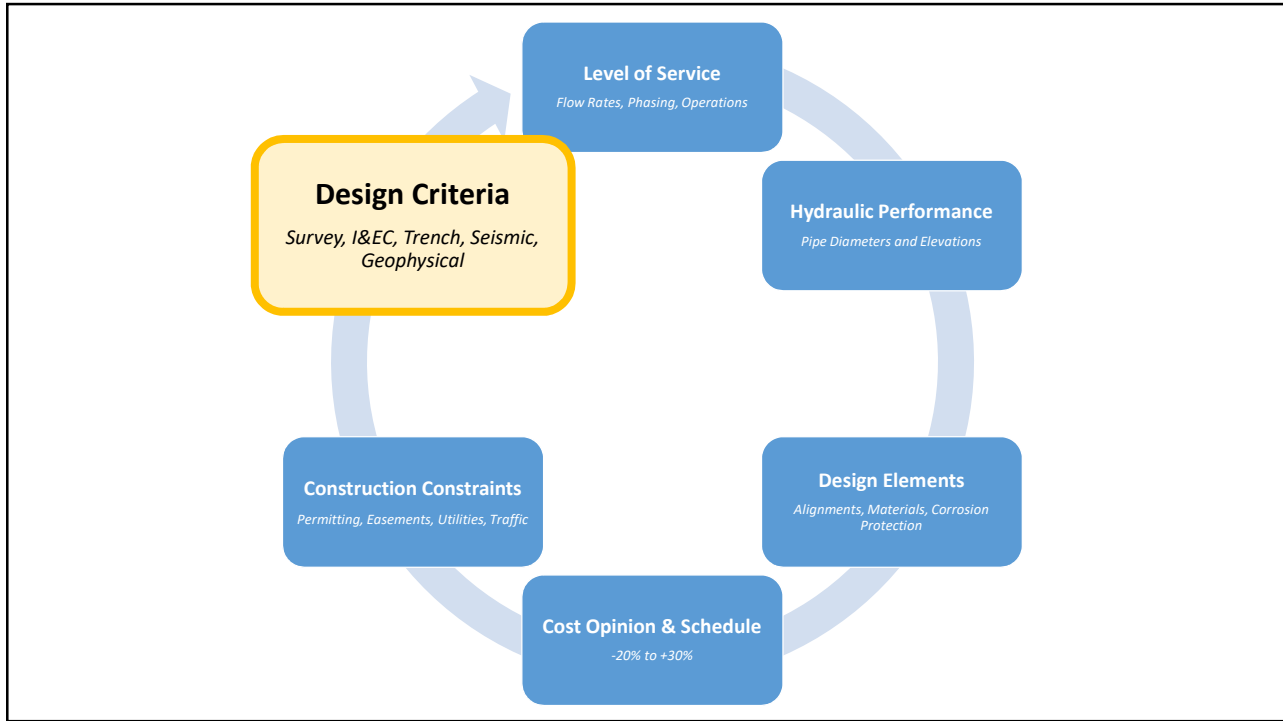
- Flow Control at 10 MG Reservoir
- LCWTP HGL = 5030.65
- Flow Rate = 28 mgd (maximum)
- **Velocity = 3.3 fps**



Phase 3: Gravity HGL from LCWTP to Fort Union Blvd.

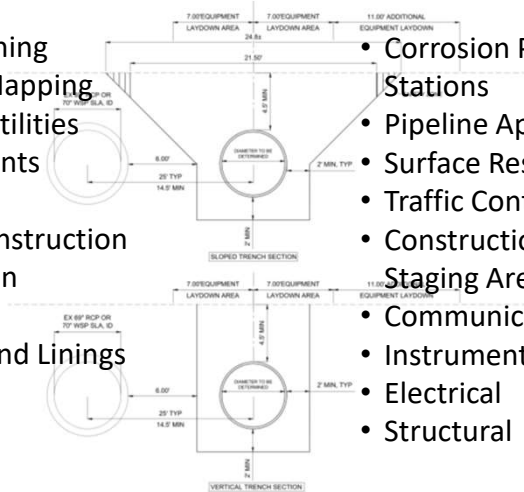
- Assumes SLAR Extended to TR
- Flow Control at 10 MG Reservoir
- Flow Balanced at Fort Union Blvd.
- **Combined Flow Rate = 145 mgd**
- 110 mgd + 35 mgd





Design Criteria Finalized for Numerous Design Elements

- Earthwork and Trenching
- Survey Control and Mapping
- Existing Subsurface Utilities
- Easement Requirements
- Bends and Curves
- Pipe Material and Construction
- Pipe Structural Section
- Pipe Testing
- Protective Coatings and Linings
- Corrosion Protection Facilities/Test Stations
- Pipeline Appurtenances
- Surface Restoration
- Traffic Control Plans
- Construction Access Roads and Staging Areas
- Communication Conduit
- Instrumentation and Control
- Electrical
- Structural



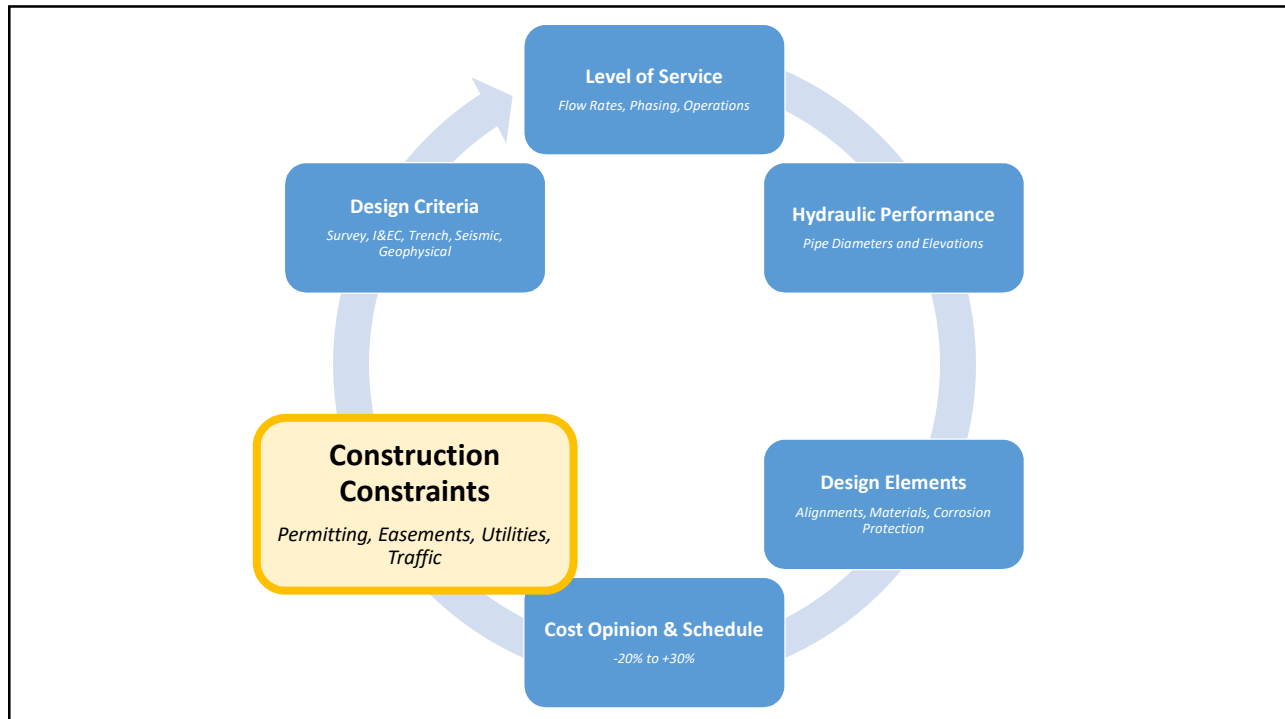
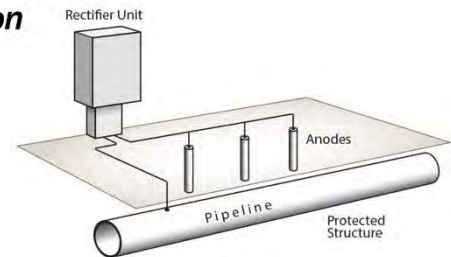
Corrosion Investigation Informs Pipeline Materials and Protection

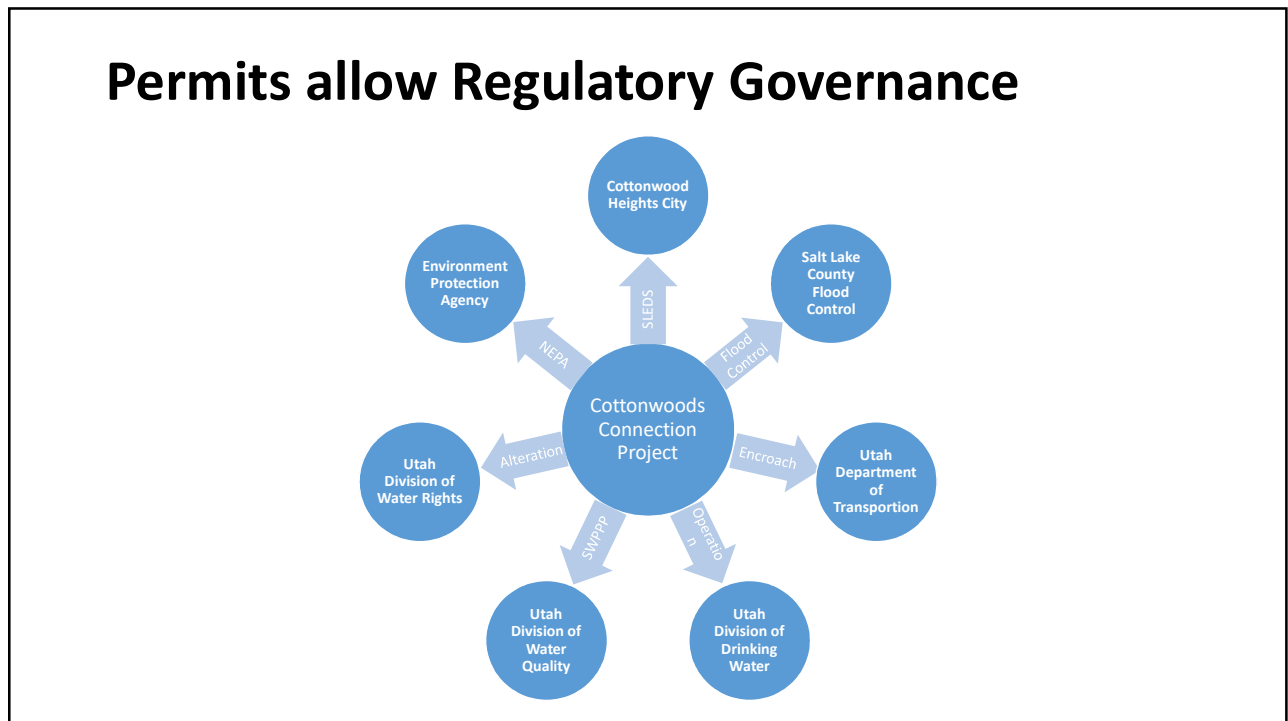
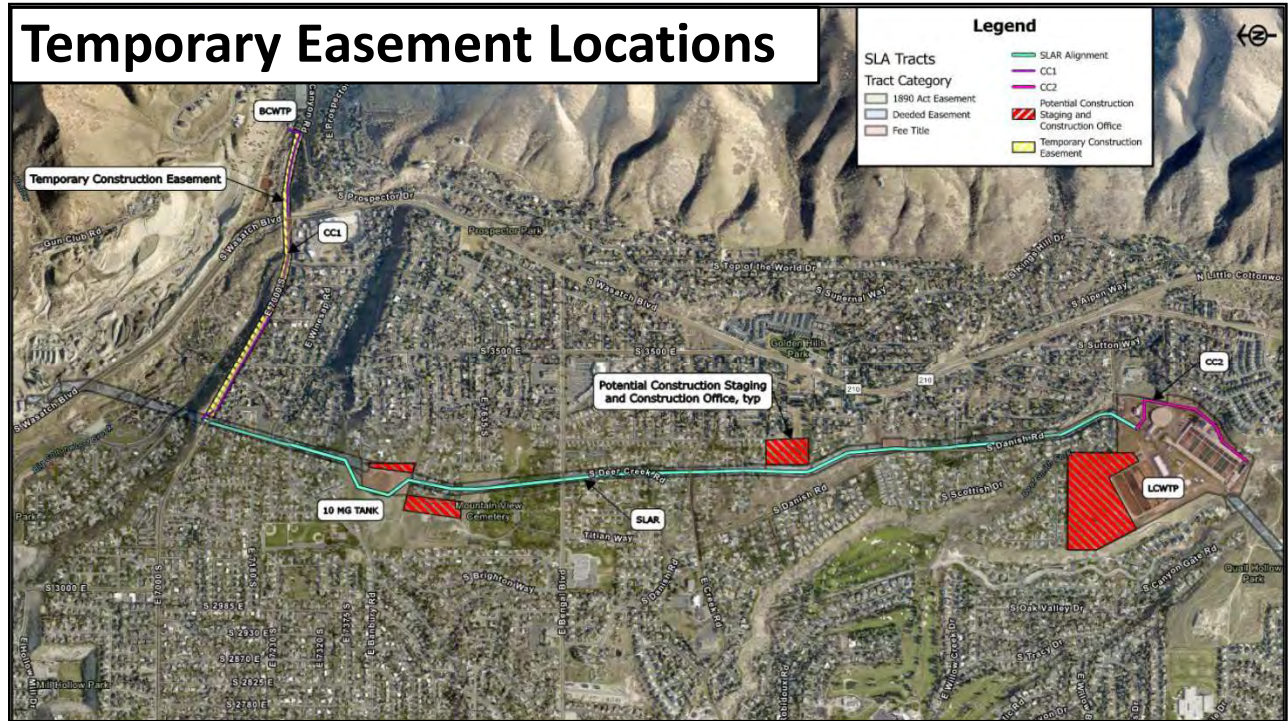
- 21 Test Holes Developed
- Soil Resistivity
- Soil pH
- Sulfates
- Chlorides
- Total Soluble Salts
- Pipe Failure Prediction Modeling
- DC Current Interference
- AC Current Interference

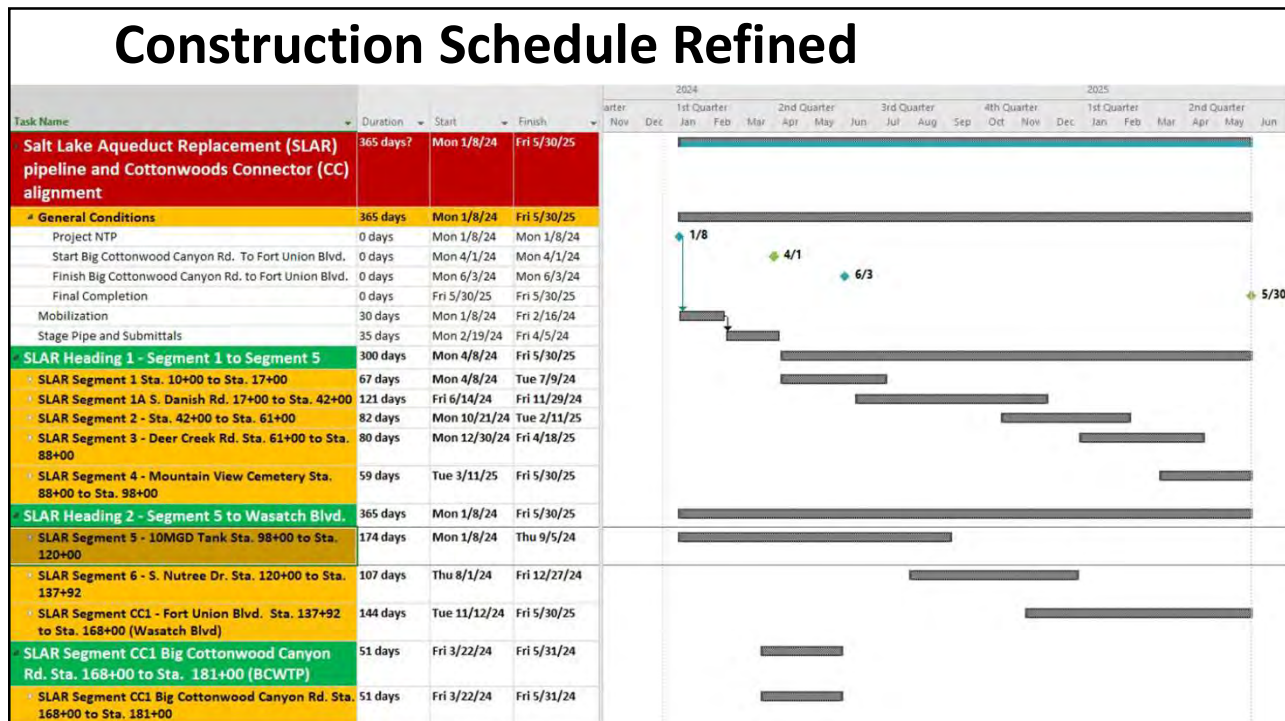
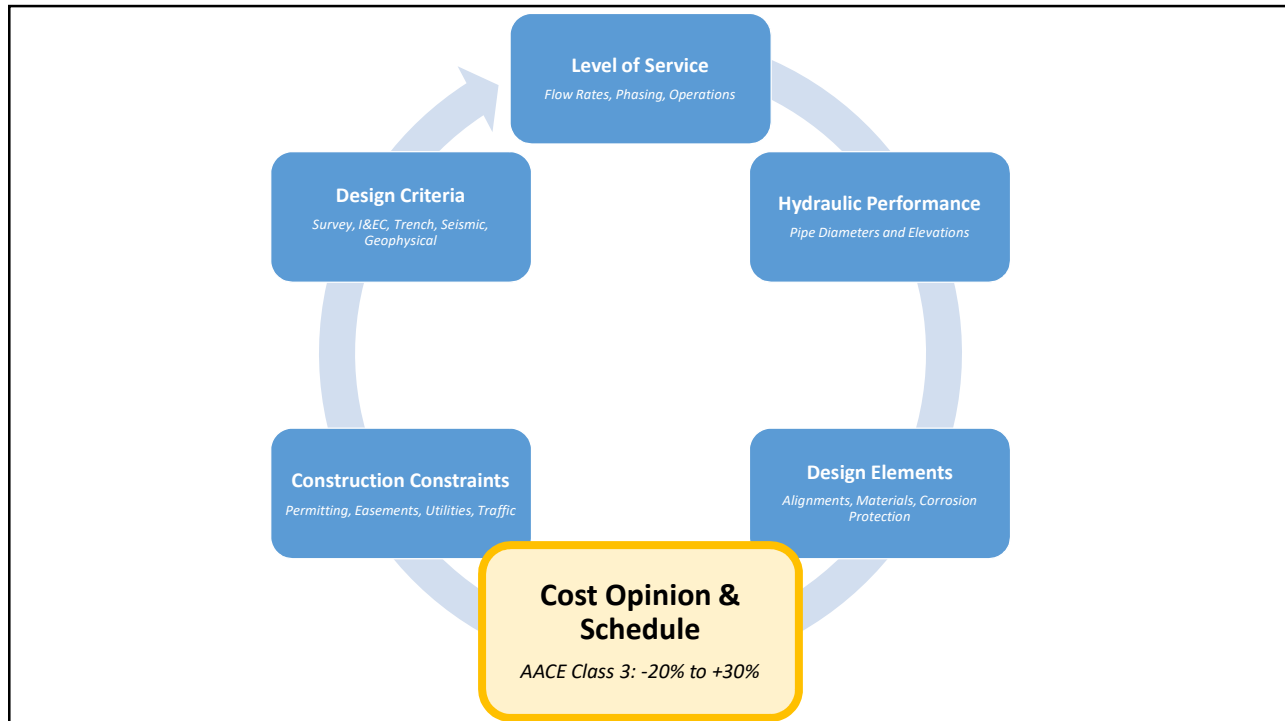


Welded Steel Pipe

- **AWWA C200**
- **Bonded Dielectric Coating**
- **Mortar Lining**
- **Impressed Current Cathodic Protection**







AACE Class 3

Cost Opinion:

- \$42.5M

Range (-20%: +30%)

- \$34.0M – \$55.2M

Description	SLAR Open Country	SLAR Road Work	SLAR Private Property	SLAR Tunnels	SLAR Construction Area	CC1 Open Country	CC1 Road Work	CC2 Open Country	CC2 Road Work	CC2 Private Property	Total
Div 02 Existing Conditions	\$ 38,896	\$ 162,437	\$ 316,842	\$ -	\$ 8,700	\$ 10,332	\$ -	\$ 80,859	\$ -	\$ 202	\$ 602,449
Div 03 Concrete	\$ -	\$ -	\$ -	\$ -	\$ 231,070	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 231,070
Div 28 Electrical	\$ 495,314	\$ 122,442	\$ 568,318	\$ -	\$ -	\$ 160,700	\$ 288,878	\$ 6,681	\$ 2,033	\$ 181,122	\$ 1,776,739
Div 31 Earthwork	\$ 1,509,859	\$ 451,972	\$ 1,163,772	\$ -	\$ 124,360	\$ 101,336	\$ 215,112	\$ 4,524	\$ 1,517	\$ 114,410	\$ 3,706,652
Div 32 Exterior Improvements	\$ 96,475	\$ 171,752	\$ 1,267,412	\$ -	\$ 8,804	\$ 20,003	\$ 68,200	\$ -	\$ 308	\$ 29,845	\$ 1,657,458
Div 33 Utilities	\$ 839,879	\$ 1,513,651	\$ 1,019,254	\$ 432,700	\$ 254,740	\$ 225,987	\$ 836,004	\$ 58,285	\$ 73,925	\$ 379,843	\$ 5,634,228
Subtotal:	\$ 2,979,922	\$ 2,422,224	\$ 4,355,597	\$ 432,700	\$ 628,524	\$ 534,338	\$ 1,397,203	\$ 69,729	\$ 77,983	\$ 719,344	\$ 13,607,597
Small Tools (Applied on Labor) 2.0%	en	\$ 1,331,716	\$ 1,311,378	\$ 2,084,568	\$ 71,182	\$ 170,063	\$ 245,303	\$ 729,557	\$ 11,486	\$ 28,081	\$ 382,506
Incidental Overtime (Applied on Labor) 10.0%	en	\$ 1,331,716	\$ 1,311,378	\$ 2,084,568	\$ 71,182	\$ 170,063	\$ 245,303	\$ 729,557	\$ 11,486	\$ 28,081	\$ 382,506
General Conditions 10.0%	en	\$ 3,008,457	\$ 2,579,820	\$ 4,387,280	\$ 441,332	\$ 650,012	\$ 583,774	\$ 1,484,750	\$ 71,118	\$ 81,356	\$ 761,645
Direct and Indirect Costs Total:	\$ 3,367,192	\$ 2,837,582	\$ 4,837,018	\$ 489,466	\$ 715,913	\$ 669,152	\$ 1,633,225	\$ 78,229	\$ 89,430	\$ 837,869	\$ 15,430,685
Add-On / Mark-Up											
Labor Escalation at 5% annually 5.0%	en	\$ 1,557,199	\$ 1,835,987	\$ 2,414,383	\$ 111,400	\$ 245,720	\$ 311,380	\$ 913,869	\$ 17,098	\$ 30,991	\$ 444,832
Material/Equipment Escalation at 5% annually 5.0%	en	\$ 1,749,904	\$ 1,201,558	\$ 2,422,633	\$ 374,005	\$ 456,284	\$ 297,783	\$ 719,364	\$ 60,260	\$ 52,500	\$ 382,408
Subcontractor Overhead, Profit and Fee 25.0%	en	\$ 387,271	\$ 305,541	\$ 522,549	\$ 52,448	\$ 77,244	\$ 85,807	\$ 176,439	\$ 8,811	\$ 9,668	\$ 92,510
Prime Contractor Overhead 10.0%	en	\$ 321,644	\$ 275,893	\$ 470,205	\$ 47,201	\$ 65,519	\$ 69,227	\$ 158,706	\$ 7,609	\$ 8,701	\$ 81,459
Prime Contractor Profit 10.0%	en	\$ 3,538,980	\$ 3,034,822	\$ 5,173,240	\$ 519,210	\$ 784,713	\$ 651,494	\$ 1,748,751	\$ 83,067	\$ 65,711	\$ 609,945
Subtotal:	\$ 4,337,266	\$ 3,721,488	\$ 6,343,751	\$ 636,688	\$ 937,739	\$ 788,952	\$ 2,141,975	\$ 102,588	\$ 117,387	\$ 1,099,787	\$ 20,236,569
Bond and Insurance 3.0%	en	\$ 130,788	\$ 112,219	\$ 191,292	\$ 19,189	\$ 28,277	\$ 24,090	\$ 64,690	\$ 3,539	\$ 3,333	\$ 61,323
Design Contingency 25.0%	en	\$ 1,122,596	\$ 963,217	\$ 1,641,929	\$ 164,791	\$ 242,711	\$ 209,776	\$ 554,598	\$ 28,555	\$ 30,378	\$ 284,394
Pre-purchase pipe materials	\$ 8,200,000	\$ 1,310,000	\$ 5,940,000	\$ -	\$ -	\$ 880,000	\$ 1,200,000	\$ 20,000	\$ 10,000	\$ 290,000	\$ 15,890,000
Corrosion Protection	\$ 39,000	\$ 0,000	\$ 43,000	\$ 105,000	\$ -	\$ 80,000	\$ 80,000	\$ 3,000	\$ 1,000	\$ 69,000	\$ 416,000
Total (rounded):	\$ 11,881,090	\$ 6,135,000	\$ 14,693,000	\$ 824,000	\$ 1,214,000	\$ 2,014,000	\$ 3,972,000	\$ 153,000	\$ 162,000	\$ 1,712,000	\$ 42,445,600

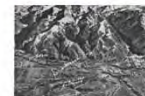
Note: Project Assumptions NTP 11/24/24 549 CDD (18 months)

Preliminary Design Report Indicates Design is 30% Complete

- Level of Service is Agreed Upon
 - Flow Rates, Phasing Plans, Operational Protocols
- Hydraulic Performance is Quantified
- Major Design Elements are Defined
 - Material and Corrosion Protection
 - Corridor Alignments
 - Pipe Diameters
- Design Criteria is Finalized
- Construction Constraints Documented
 - Permitting, Easements, Utilities, Traffic Control
- Class 3 Cost Opinion (-20% to +30%) and Schedule
 - Pre-Purchase Strategy



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