



P A S A D E N A
Water & Power

Pasadena

PHASE I

Non-Potable Project

April 12, 2016

Presenter
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Complex Challenges | Innovative Solutions

Presentation Overview

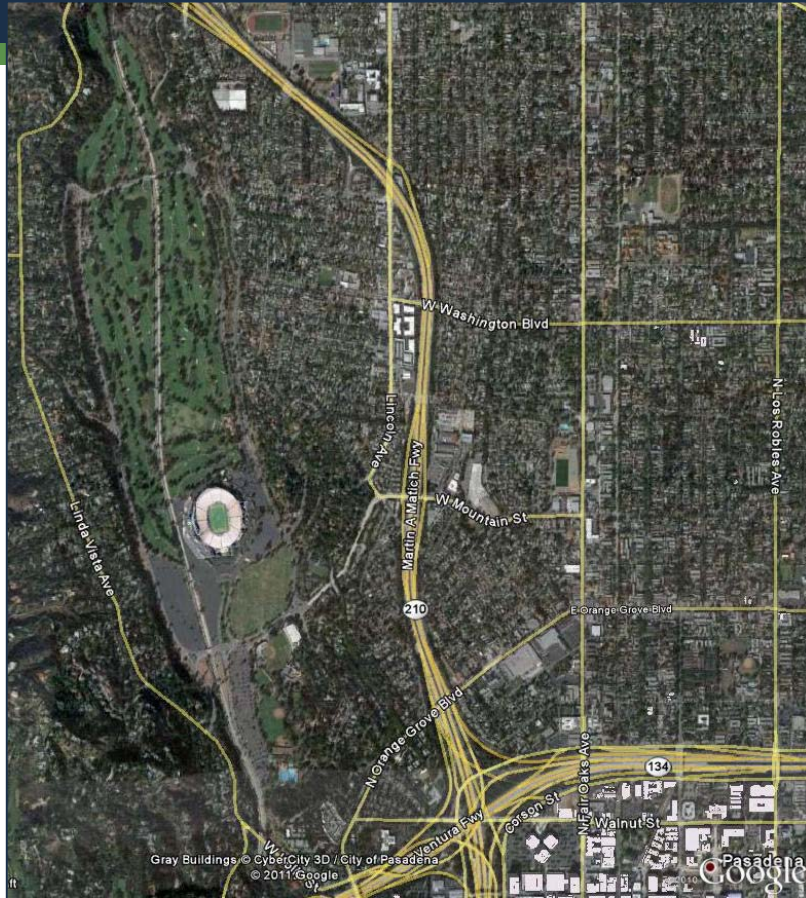
Phase I Overview

- Customers
- Facilities
- Hydraulics

Design Challenges

- Pipeline
- Appurtenances

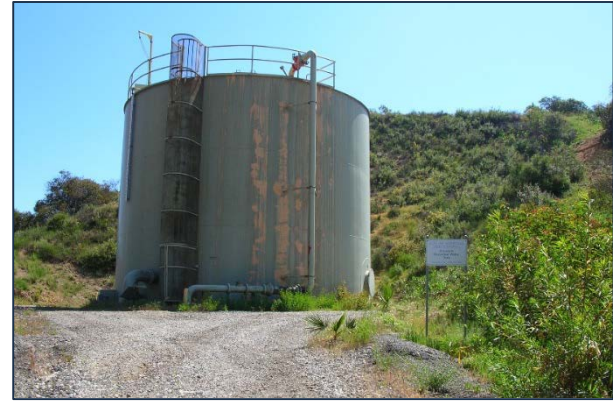
Phase I Overview - Customers



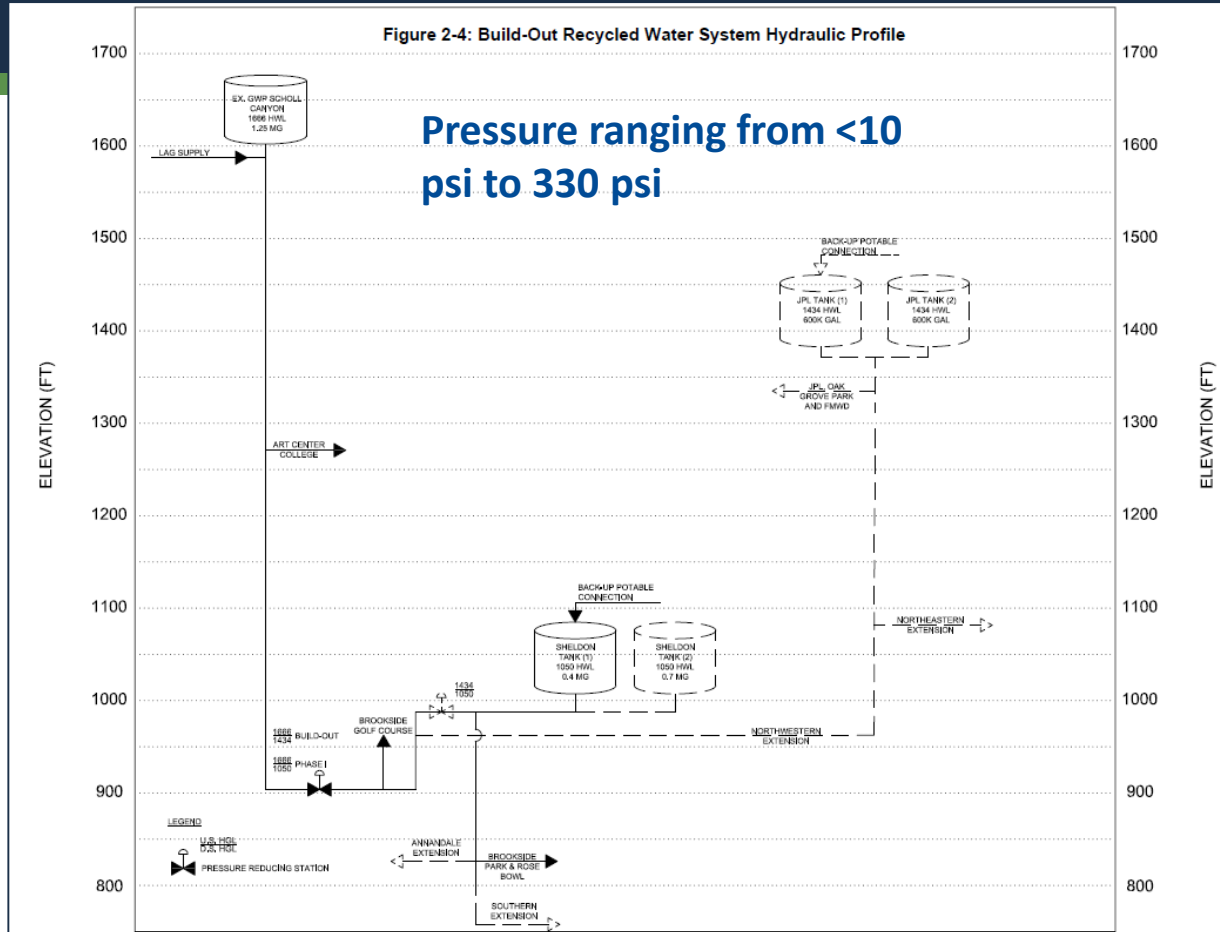
Brookside GC: 550 AFY
Brookside Park: 110 AFY
Rose Bowl Stadium: 15 AFY
Art Center College: 30 AFY

Phase I Overview – Facilities Summary

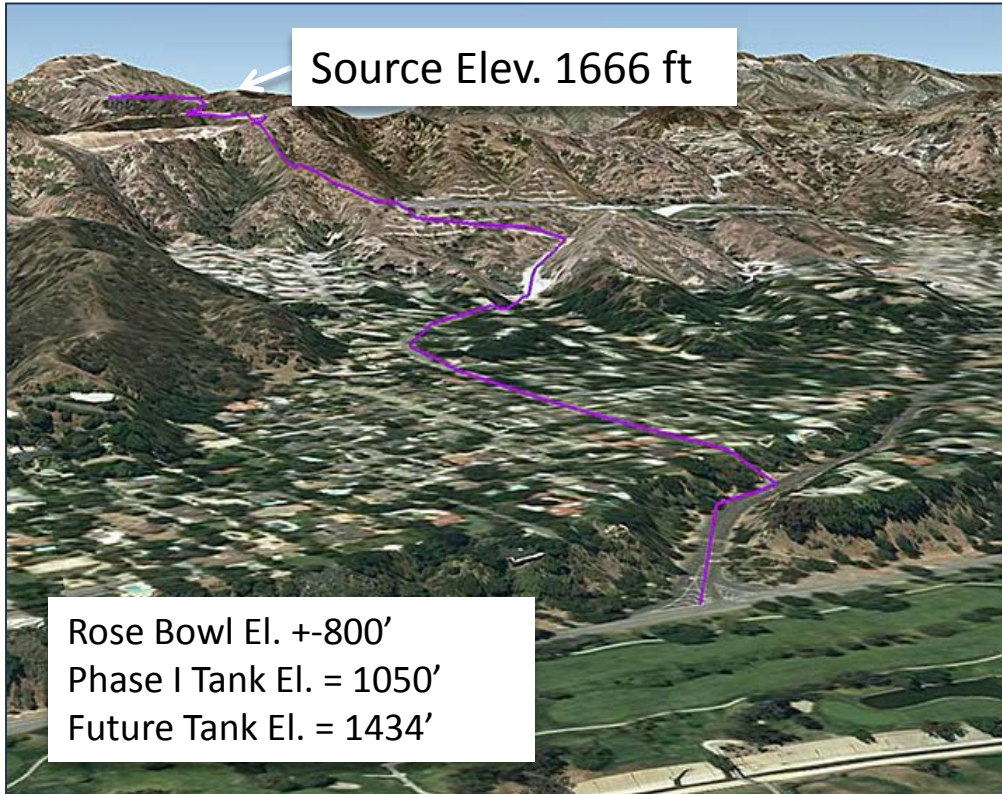
- 20,000 LF of 20-inch and 24-inch Pipeline
- Pressure Reducing Station
- 400,000-gallon Storage Tank



Phase I Overview – Hydraulics



Phase I Overview - Hydraulics



30-inch: 3.8 ft/s

24-inch: 6.0 ft/s

20-inch: 8.6 ft/s

Cost Savings @ \$20/in/ft
= \$1.6 - \$4M

Presentation Overview

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Design Challenges – Pipeline

Considerations for Material, Wall T and Joints

- Pressure
- External loading
- Installation quality (pipe zone compaction)
- Seismic recommendations
- Pipeline geometry outside the street areas
- Clearance to water mains

Recommendations

- Steel (high pressure areas), min. 0.25" t
- Steel or Ductile Iron (Lower Pressure Areas)
- Fully restrained pipeline
 - Welded joints for steel
 - Restrained push-on joints for DIP



Design Challenges – Hillside Installation

CHALLENGES

- Steep Slopes (3:1 H:V)
- Narrow Ridgeline
- Erosion
- Access for maintenance



SOLUTIONS

- Confirm Constructability
- Concrete Anchor Blocks @ 100'
- Specify Barricades Ea. Side
- Erosion Control Mat + Hydroseed
- No Appurtenances



Design Challenges – Isolation Valves

Valve Selection

- AWWA valves up to 250 psi
- ANSI-rated HP BFVs

Careful Locating/Spacing

- AWWA 150B BFV = \$4k
- AWWA 250B BFV = \$5k
- **ANSI HP BFV = \$18k**
- **Plug Valves = \$20k +**

Other Considerations

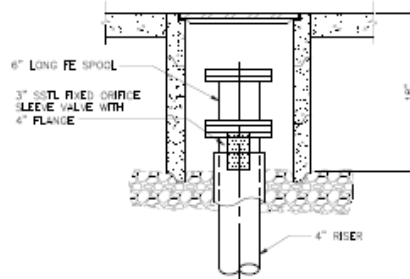
- Joint/Flange Type
- Actuator Design
- Valve bypass for filling
- Materials
- Manufacturers



VALVE SCHEDULE									
VALVE ID	DWG	STATION/ LOCATION	VALVE TYPE	FUNCTION	DESIGN OPERATING PRESSURE* (PSI)	VALVE PRESSURE CLASS OR PRESSURE RATING	DIAMETER	ACTUATOR	ADDITIONAL REQUIREMENTS
PIPELINE ISOLATION VALVES									
BFV-1-A	PP-1	10+00	AWWA BFV	LINE A ISOLATION	150	CLASS 150B	24-INCH	MANUAL, BURIED NUT	
BFV-2-B	PP-3	40+91	AWWA BFV	LINE B ISOLATION	150	CLASS 150B	20-INCH	MANUAL, BURIED NUT	4" VALVE BYPASS REQUIRED PER DETAIL 6/GC-2.
BFV-3-B	PP-4	52+52	AWWA BFV	LINE B ISOLATION	200	CLASS 250B	20-INCH	MANUAL, BURIED NUT	4" VALVE BYPASS REQUIRED PER DETAIL 6/GC-2.
BFV-4-B	PP-6	67+73	HIGH PERFORMANCE BFV	LINE B ISOLATION	300	ANSI CLASS 300	20-INCH	MANUAL, BURIED NUT	4" VALVE BYPASS REQUIRED PER DETAIL 6/GC-2.
BFV-5-B	PP-8	83+84	HIGH PERFORMANCE BFV	LINE B ISOLATION	350	ANSI CLASS 300	20-INCH	MANUAL, BURIED NUT	4" VALVE BYPASS REQUIRED PER DETAIL 6/GC-2.
BFV-6-D	PP-16	189+45	AWWA BFV	LINE D ISOLATION	150	CLASS 150B	20-INCH	MANUAL, BURIED NUT	
BFV-7-D	PP-17	206+25	AWWA BFV	LINE D ISOLATION	150	CLASS 150B	20-INCH	MANUAL, BURIED NUT	
BFV-8-D	PP-19	229+00	AWWA BFV	LINE D ISOLATION	150	CLASS 150B	20-INCH	MANUAL, BURIED NUT	
GV-1-B	PP-4	52+46	GATE VALVE	ART CENTER SVC ISOLATION	200	250 PSI	4-INCH	MANUAL, BURIED NUT	
GV-2-C	PP-14	158+00	GATE VALVE	CONISTON LATERAL ISOLATION	250	250 PSI	16-INCH	MANUAL, BURIED NUT	
GV-3-D	PP-16	189+25	GATE VALVE	DEL MONTE LATERAL ISOLATION	150	250 PSI	10-INCH	MANUAL, BURIED NUT	
GV-4-D	PP-20	236+20	GATE VALVE	ROSE BOWL SVC ISOLATION	150	250 PSI	6-INCH	MANUAL, BURIED NUT	
GV-5-D	PP-21	245+77	GATE VALVE	LOT H SVC ISOLATION	150	250 PSI	6-INCH	MANUAL, BURIED NUT	
GV-6-D	PP-21	247+88.50	GATE VALVE	BROOKSIDE PK SVC ISOLATION	150	250 PSI	8-INCH	MANUAL, BURIED NUT	
GV-7-E	PP-22	260+00	GATE VALVE	LINE E ISOLATION	150	250 PSI	8-INCH	MANUAL, BURIED NUT	
GV-8-F	PP-12	127+26	GATE VALVE	BROOKSIDE GC SVC ISOLATION	150	250 PSI	16-INCH	MANUAL, BURIED NUT	
FACILITY VALVES									

Design Challenges – Blowoffs

- Type (wharf hydrant or sump)
- Isolation Valve Type
 - AWWA GV < 250 psi
 - *Plug Valve* > 250 psi
- Location
 - Close to major drainage feature
 - Spacing – duration to drain
- Cavitation Considerations



BELOW GROUND SUMP WITH FIXED SLEEVE VALVE*

*SEE BELOW GROUND SUMP DETAIL FOR BALANCE OF INFORMATION.

BLOWOFF SCHEDULE					
BO ID	DWG	STATION	DESIGN OPERATING PRESSURE*	BO Size	OUTLET CONFIGURATION
BO-1-A	PP-1	10+11	150	4-INCH	BELOW GROUND SUMP
BO-2-B	PP-3	40+10	150	4-INCH	BELOW GROUND SUMP
BO-3-B	PP-4	52+49	200	4-INCH	BELOW GROUND SUMP
BO-4-B	PP-6	67+70	300	4-INCH	BELOW GROUND SUMP WITH FIXED SLEEVE VALVE
BO-5-B	PP-7	82+67	300	4-INCH	BELOW GROUND SUMP
BO-6-B	PP-8	84+24	350	4-INCH	BELOW GROUND SUMP
BO-7-B	PP-9	99+58	350	4-INCH	BELOW GROUND SUMP
BO-8-B	PP-10	112+93	350	4-INCH	BELOW GROUND SUMP
BO-9-C	PP-11	122+50	350	4-INCH	BELOW GROUND SUMP
BO-10-C	PP-12	136+14	350	4-INCH	BELOW GROUND SUMP
BO-11-D	PP-16	189+42	150	4-INCH	ABOVE GROUND WHARF HYDRANT
BO-12-D	PP-17	206+22	150	4-INCH	BELOW GROUND SUMP
BO-13-D	PP-19	228+97	150	4-INCH	ABOVE GROUND WHARF HYDRANT
BO-14-D	PP-20	232+27	150	4-INCH	ABOVE GROUND WHARF HYDRANT
BO-15-D	PP-21	247+92	150	4-INCH	BELOW GROUND SUMP WITH FIXED SLEEVE VALVE
BO-16-F	PP-11	124+25	150	4-INCH	BELOW GROUND SUMP
BO-17-E	PP-22	261+20	150	4-INCH	BELOW GROUND SUMP

*MINIMUM PRESSURE RATING BO ISOLATION VALVES, FIRE PLUG VALVES (WHERE APPLICABLE), FIXED SLEEVE VALVES (WHERE APPLICABLE), COUPLINGS, RESTRAINTS AND BO PIPING SHALL BE THE DESIGN OPERATING PRESSURE SHOWN IN THE SCHEDULE. REFER TO THE PIPE SCHEDULE FOR MINIMUM BLOWOFF PIPE THICKNESS OR PRESSURE CLASS.

Design Challenges – CAV's

- Pressure Ratings/Isolation Valve Specs
- Sizing/locating
 - Air Release at high points
 - Normal Filling/Draining
 - Surge
 - Gravity Flow/Rupture (AWWA M51 vs. largest outlet)
- Redundancy
 - Dual CAV's at key locations
 - Standpipe at upstream tank
- Engineer's calculations backed up by ARI (manf) calcs

COMBINATION AIR VALVE SCHEDULE							
CAV ID	DWG	STATION/ LOCATION	DESIGN OPERATING PRESSURE*	AIR VALVE PIPING DIAMETER	MIN LARGE ORIFICE SIZE	MIN SMALL ORIFICE SIZE	INSTALLATION CONFIGURATION
PIPELINE CAVS							
CAV-1-B	PP-3	40+96	150	6-INCH	6-INCH	3/16-INCH	DUAL, ABOVE GROUND (ORIFICE SIZES ARE FOR EACH OF TWO VALVES)
CAV-2-B	PP-4	53+55	200	4-INCH	4-INCH	1/8-INCH	ABOVE GROUND
CAV-3-B	PP-6	67+76	285	4-INCH	3-INCH	3/32-INCH	ABOVE GROUND
CAV-4-B	PP-7	79+22	350	4-INCH	2-INCH	3/32-INCH	ABOVE GROUND
CAV-5-B	PP-8	83+48	350	4-INCH	2-INCH	3/32-INCH	ABOVE GROUND
CAV-6-B	PP-9	93+29	350	4-INCH	2-INCH	3/32-INCH	ABOVE GROUND
CAV-7-B	PP-10	107+97	350	4-INCH	3-INCH	3/32-INCH	ABOVE GROUND
CAV-8-C	PP-12	131+53	350	4-INCH	2-INCH	3/16-INCH	ABOVE GROUND
CAV-9-C	PP-12	133+27	350	4-INCH	2-INCH	3/16-INCH	ABOVE GROUND
CAV-10-C	PP-13	146+54	300	4-INCH	3-INCH	1/4-INCH	DUAL, ABOVE GROUND (ORIFICE SIZES ARE FOR EACH OF TWO VALVES)
CAV-11-C	PP-14	159+50	300	4-INCH	3-INCH	1/4-INCH	DUAL, ABOVE GROUND (ORIFICE SIZES ARE FOR EACH OF TWO VALVES)
CAV-12-D	PP-16	189+48	150	4-INCH	3-INCH	3/16-INCH	ABOVE GROUND
CAV-13-D	PP-17	206+28	150	4-INCH	4-INCH	3/16-INCH	ABOVE GROUND
CAV-14-D	PP-19	229+03	150	4-INCH	2-INCH	1/8-INCH	ABOVE GROUND
CAV-15-D	PP-20	235+72	150	4-INCH	3-INCH	1/8-INCH	ABOVE GROUND
CAV-16-D	PP-21	244+32	150	4-INCH	2-INCH	1/8-INCH	ABOVE GROUND
FACILITY CAVS							
CAV-1-SCH	C-1	SCHOLL SITE	150	4-INCH	4-INCH	5/16-INCH	ABOVE GROUND
CAV-1-PRS	M-2	PRS/BOOSTER	350	NOT APPLICABLE	1-INCH	5/64-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.
CAV-2-PRS	M-2	PRS/BOOSTER	350	NOT APPLICABLE	1-INCH	5/64-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.
CAV-3-PRS	M-2	PRS/BOOSTER	350	NOT APPLICABLE	2-INCH	3/32-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.
CAV-4-PRS	M-2	PRS/BOOSTER	150	NOT APPLICABLE	1-INCH	5/64-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.
CAV-5-PRS	M-2	PRS/BOOSTER	150	NOT APPLICABLE	1-INCH	5/64-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.
CAV-6-PRS	M-2	PRS/BOOSTER	150	NOT APPLICABLE	1-INCH	5/64-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.
CAV-7-PRS	M-2	PRS/BOOSTER	150	NOT APPLICABLE	1-INCH	5/64-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.
CAV-8-PRS	M-2	PRS/BOOSTER	150	NOT APPLICABLE	2-INCH	3/32-INCH	INSTALL ON EXPOSED PIPING, SEE DETAIL 8/GM-1.

*MINIMUM PRESSURE RATING OF CAVS, CAV ISOLATION VALVES, COUPLINGS, RESTRAINTS AND AIR VALVE PIPING SHALL BE THE DESIGN OPERATING PRESSURE SHOWN ON THE DRAWING.





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THANK YOU | QUESTIONS?

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