CITY OF SIMI VALLEY

Sanitation Asset Reliability Assessment and Financial Plan

Asset Management Plan Report

Final

APRIL 2011

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CITY OF
SIMI VALLEY

City of Simi Valley

SANITATION ASSET RELIABILITY ASSESSMENT AND FINANCIAL PLAN
ASSET MANAGEMENT PLAN REPORT

FINAL

April 2011

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CONDITION ASSESSMENT RESULTS, SEPTEMBER 14-15, 2010

Appendix A -- Condition Assessment Results, September 14-15, 2010

Component	Year Installed	Condition	Comments
Headworks			
Structural			
Bar Screen Building	1986	2	Wood-framed roof, painted plywood, CMU walls. Roof needs replacement. Few broken roof tiles (lightweight concrete). Wall anchorage may be insufficient. Paint in poor condition at ceiling.
Bar Screen Chamber	1986	2	Stop plate guides are starting to push inward due to hydrogen sulfide.
Headworks Effluent Box	1986	5	Currently bidding rehab work to occur in 2011. Major surface corrosion and exposed aggregate. Coating failure. Corrosion of members. Abandoned stop plate frames.
Electrical Vault	1986	3	Second box west of headworks. Concrete with CMU top walls. Minor surface corrosion.
Mechanical			
BAR SCREEN #1	2001	3	Rake unit and pin racks replaced. Regular maintenance. Misalignment, oil, and reduced structural integrity.
BAR SCREEN #2	2001	3	Rack, motor, and gear assembly were replaced with spare. Time consuming and costly. Both units must be operated simultaneously, not lead/standby.
BS COMPACTOR #1	2001	3	Placing shims and bolts for tolerances. Auger binds and shears. Building spares often.
BS COMPACTOR #2	2001	3	Minor leaking form water piping. Auger problems.
Odor Control			

Component	Year Installed	Condition	Comments
Mechanical & Structural			
ODOR CONTROL TOWER	1985	4	Not needed. Condition okay but not meeting design intent. Good for methane treatment, not for hydrogen sulfide treatment. Fan undersized, not enough venting. Manometer looks out of shape. Tank looks okay.
Grit Classifiers			
Structural			
Grit Chamber	1986	3	Exposed aggregate. Air piping needs replacement. Moderate corrosion inside influent channel and at grit chamber walls. Grit pump 1 and 2 base pads have spalling and corroded anchor bolts. Small spall at #2 influent stop plate guide.
Mechanical			
GRIT PUMP #1	2008	3	Replaced pump recently.
GRIT PUMP #2	2008	3	Replaced entire unit.
GRIT PUMP #3	1985	4	Coating peeling. Corrosion at coupling.
GRIT PUMP #4	1985	3	Coating peeling. Some corrosion.
GRIT CLASSIFIER #1	2001	2	Stainless material. Normal maintenance. Some discoloring.
GRIT CLASSIFIER #2	2001	2	Normal maintenance.
GRIT CLASSIFIER #3	2001	2	Normal maintenance.

Component	Year Installed	Condition	Comments
Primary Sedimentation			
Structural			
Primary Influent Channel	1986	4	Advanced deterioration noted. No foul air scrubbing. Moderate surface corrosion along entire channel. Requires repair and coating.
Influent Metering Structure	1986	2	Minor cracks and corrosion at beam seats.
Primary Sedimentation Basin 1	1986	2	Corrosion to structure and members.
Primary Sedimentation Basin 2	1986	2	Corrosion to structure and members.
Primary Sedimentation Basin 3	1986	2	Standby. No leaking cracks from Basin 2. Clarifier rehabilitation planned for 2011. Chains and flights scheduled to be rebuilt (part of normal maintenance). Making minor adjustments to avoid flight wear.
Grease Pit	1986	4	Located adjacent to north side of Grit Chamber 1. Small hairline cracks need to be sealed. Moderate surface corrosion and exposed aggregate.
Primary Effluent Channel	1986	4	Channel has aluminum covers and no air scrubbing. Moderate exposed aggregate and small pockets of severe corrosion inside channel. Severe corrosion to pipe supports inside channel.
Primary Sludge Pump Station	1987	2	Sealed cracks in wall. Duct penetration overcut through wall. Corroded conduit in two locations.
Primary Sedimentation Dry Well	1987	2	Minor to moderate corrosion at steel beam supports. Adjacent CMU retaining wall has cap grout damage and wall rotation.
Mechanical			
Slide Gates	1986	2	Gates in good condition. Have been operating within last year. Stem in good condition and without corrosion.
Primary Sed Basin 1 Mechanism	2008	2	Original mechanism has been replaced. New collectors, chains, and wear shoes. Actuators replaced five years ago and actuator brackets replaced one year ago. Corrosion visible on remainder.

Component	Year Installed	Condition	Comments
Primary Sed Basin 2 Mechanism	2008	2	Original was replaced with a stainless steel mechanism. New collectors, chains, and wear shoes. Actuators replaced five years ago and actuator brackets replaced one year ago.
Primary Sed Basin 3 Mechanism	2008	2	Mechanism is old and showing extensive wear. New collectors, chains, and wear shoes. Stainless steel troughs installed and in good shape. Actuators replaced five years ago and actuator brackets replaced one year ago.
PRIMARY SLUDGE PUMP #1	1987	3	Pumps are old, inefficient, and expensive to maintain. Frequent problems with clogged sludge pipes. Updated to mechanical seals this year. Some corrosion of pump. Good upkeep.
PRIMARY SLUDGE PUMP #2	1987	3	Pumps are old, inefficient, and expensive to maintain. Frequent problems with clogged sludge pipes. Updated to mechanical seals this year. Some corrosion of pump. Good upkeep.
Electrical&IC			
Influent Flow Meter	2006	2	Operating as intended.
Flow Equalization Basin			
Structural			
Flow Equalization Basin	1986	3	Minor corrosion and cracks, likely due to concrete mix, similar to Backwash Pond. Numerous superficial cracks repaired with sealant. Pump bases have concrete spalling. Large crack at inlet/outlet structure.
FEB Pump Station	2004	2	Small CMU control building. CMU wall cracking at north and south walls. Minor concrete cracking at top of apron slab.
Mechanical			
FEB PUMP #1	1987	3	Pumps need rebuilding twice a year and are inefficient. Frequent problems with plastic bag clogs would be alleviated with finer bar screens.

Component	Year Installed	Condition	Comments
FEB PUMP #2	1987	3	Pumps need rebuilding twice a year and are inefficient. Frequent problems with plastic bag clogs would be alleviated with finer bar screens.
FEB PUMP #3	1987	3	Pumps need rebuilding twice a year and are inefficient. Frequent problems with plastic bag clogs would be alleviated with finer bar screens.
Electrical&IC			
VFD FEB PUMP #1	2003	2	
VFD FEB PUMP #2	2003	2	
VFD FEB PUMP #3	2003	2	
FLOW METER #1	1987	3	
FLOW METER #2	1987	3	
FLOWMETER #3	1987	3	
BNR System			
Structural			
BNR Splitter Structure	2004	2	Just north of the East BNR tanks.
West BNR Basin 1	2004	1	CMU blocks used at influent to help improve flow split. MWH design.
West BNR Basin 2	2004	1	CMU blocks used at influent to help improve flow split.
West BNR Basin 3	2004	1	CMU blocks used at influent to help improve flow split. MWH design.
West BNR Basin 4	2004	1	CMU blocks used at influent to help improve flow split. MWH design.

Component	Year Installed	Condition	Comments
East Basin BNR TANK #1	1975	3	Minor spalling at influent opening.
East Basin BNR TANK #2	1975	3	Abundant spalling and cracking at the walkway between Basins 1 and 2. Some rebar corrosion at the outside edge of the walkway.
East Basin BNR TANK #3	1975	3	
West Basin Blower Building	2004	1	CMU walls, steel trusses, and metal deck.
East Basin Blower Building	1975	3	Formerly a primary sedimentation basin. Aluminum framing and covers added. Blower anchors loose. Electrical room ceiling crack repaired with epoxy injection. Leaking at conduit penetrations where repaired. Leaking in warehouse room; new building needed.
BNR Effluent to Secondary Clarifier Channel	1975	2	Concrete.
Mechanical			
Membranes	2005	3	
BNR MIXER #1A	2004	2	Mixing pattern is normal. Replaced 2 or 3 units in the past year.
BNR MIXER #1B	2004	2	Mixing pattern is good.
BNR MIXER #1C	2004	2	
BNR MIXER #2A	2004	2	
BNR MIXER #2B	2004	2	No noise. In good condition.
BNR MIXER #2C	2004	2	
BNR MIXER #3A	2004	2	Hoist vibrates.
BNR MIXER #3B	2004	2	

Component	Year Installed	Condition	Comments
BNR MIXER #3C	2004	2	
BNR MIXER #4A	2004	2	
BNR MIXER #4B	2004	2	
BNR MIXER #4C	2004	2	
West Side BNR BLOWER #1	2004	3	Filters are double stacked and get dirty often.
West side BNR BLOWER #2	2004	3	Filters are double stacked and get dirty often.
West side BNR Turblex Blower #3	2004	2	May be good to add another blowoff further downstream. Surging issues occur when switching from Spencer to Turblex.
West Side BNR Turblex Blower #4	2004	2	May be good to add another blowoff further downstream. Surging issues occur when switching from Spencer to Turblex.
East Basin BNR BLOWER #1	2004	2	Offline/standby. In good shape
East Basin BNR BLOWER #2	2004	2	
East Basin BNR BLOWER #4	2004	2	Does not make unusual noise when running.
East Basin BNR BLOWER #5	2004	2	Needs new bearings.
East Basin BNR BLOWER #6	2004	2	Does not make unusual noise when running.
CRANE BNR BLOWER BLDG.	1975	3	Not a lot of clearance at bottom of stairs for hauling larger items. Some corrosion.
BNR RECYCLE PUMP #1	2004	2	
BNR RECYCLE PUMP #2	2004	2	
BNR RECYCLE PUMP #3	2004	2	

Component	Year Installed	Condition	Comments
BNR RECYCLE PUMP #4	2004	2	
Electrical&IC			
BNR BLOWER #1 VFD 660	2004	2	
BNR BLOWER #2 VFD 670	2004	2	
BNR BLOWER #3 Soft Start 680	2008	1	
BNR BLOWER #4 Soft Start 690	2008	1	
Secondary Clarification			
Structural			
WAS Pump Station	1977	2	Concrete.
Secondary Clarifier 1	1971	2	Concrete.
Secondary Clarifier 2	1971	2	Concrete. Out of service.
Secondary Clarifier 3	1976	2	Concrete.
Secondary Clarifier 4	1987	2	Concrete.
Mechanical			
SEC. SLUDGE COLLECTOR #1	1971	3	Gear box is well maintained. Main bearings may need maintenance. Some corrosion at center drive. Normal wear.
SEC. SLUDGE COLLECTOR #2	1971	3	Out of service. Some corrosion. Normal wear.

Component	Year Installed	Condition	Comments
SEC. SLUDGE COLLECTOR #3	1977	3	Some algae growth on scum beach. Normal wear.
SEC. SLUDGE COLLECTOR #4	1987	3	Runs backwards; not as efficient but works. Normal wear.
SEC. SKIMMER PUMP #1	2000	3	Submersible sump pump.
SEC. SKIMMER PUMP #2	2000	3	Submersible sump pump.
RAS PUMP #1	2001	2	Rebuilt in 2006. RAS header is spiral wound pipeline, installed in the 1970's. Header has some corrosion.
RAS PUMP #2	2001	2	Rebuilt in 2006.
RAS PUMP #3	2001	2	Rebuilt in 2006.
RAS PUMP #4	2001	2	Rebuilt in 2006.
RAS PUMP #5	2001	2	Rebuilt in 2006.
RAS PUMP #6	2001	2	Rebuilt in 2006.
WAS PUMP #1	2005	2	Replaced sometime between 2005 and 2009.
WAS PUMP #2	2005	2	Replaced sometime between 2005 and 2009.
ALUM FEED PUMP	1977	2	
Electrical&IC			
VFD 51002 RAS #1	1998	2	
VFD 51003 RAS #2	1998	2	
VFD 51004 RAS #3	1998	2	

Component	Year Installed	Condition	Comments
VFD 53010 RAS #4	1998	2	
VFD 53020 RAS #5	1998	2	
VFD RAS #6	1998	2	
VFD WAS PUMP #1	2005	3	Inside MCC. Alarms are good.
VFD WAS PUMP #2	2005	3	Inside MCC. Alarms are good.

Filtration

Structural

Filter Building (7-1)	1977	3	South side gates problematic. NW corner of concrete slab replaced twice due to settlement. Minor damage at guardrail ties across expansion joint. Guardrail post spalling. Slab heaving and significant cracking at expansion joint. Leak on N end structure.
Filter Control Building	1977	2	CMU walls and wood-framed roof. Wood-framed roof anchorage to wall not likely.
Applied Filter Sump	1977	3	At west side of Filter Building. Pump bases cracked. Large crack at stair. Several cracks in west filter wall.
Secondary Diversion Structure	1977	4	Wall is often overtopped, causing process short circuiting. Concrete cracking; concrete mix suspected. Large cracks in dividing wall. Significant cracking between top slab and perimeter wall; appears to occur along construction joint repairs.
Waste Backwash Pond	1977	2	Minor cracks likely due to concrete mix, similar to Flow Equalization Basin. Numerous superficial cracks repaired with sealant.

Mechanical

Component	Year Installed	Condition	Comments
Filter Media	2006	3	Media and underdrains replaced in 2006.
Filter Applied Pump #1	1977	4	Flapper check valves fail and there is backflow into equipment. Pumps have run backwards. Some overheating. Many replacements. Cannot be rebuilt.
Filter Applied Pump #2	1977	4	See comments for Filter Applied Pump #1.
Filter Applied Pump #4	1977	4	See comments for Filter Applied Pump #1.
Filter Water Outlet Valves	1977	3	May not be sealing properly.
FILTER B/W WATER PUMP #1	1977	2	Original motor. Pump was replaced.
BACKWASH AIR BLOWER #1	1978	2	Low run time (less than 10 min/day). Some problems but does not run enough to heat up. Bases were rebuilt due to normal corrosion; frames rotted away but were replaced. Corrosion. Support equipment okay. Parts available.
BACKWASH AIR BLOWER #2	1978	2	Very little run time. Corrosion. Support equipment okay. Parts available.
B/W UNDERDRAIN PUMP #1	2002	2	
B/W UNDERDRAIN PUMP #2	2002	2	
WASTE BACKWASH H2O PUMP #1	2002	2	
WASTE BACKWASH H2O PUMP #2	2002	2	
WASTE BACKWASH H2O PUMP #3	2002	2	

Electrical&IC

VFD APPLIED PUMP #1	1988	5	Motor installed in 1988. Motor is not an inverter-duty motor and is very hot when running. VFD and spare parts are obsolete. Pulsar radar used for controlling the pumps.

Component	Year Installed	Condition	Comments
VFD APPLIED PUMP #2	1988	5	See comments for VFD Applied Pump #1.
VFD APPLIED PUMP #4	1978	5	Obsolete spare parts. Overheats.

Chlor/Dechlor

Structural

Chlorine Building	1986	2	Wood-framed roof and soffit. Wall anchorage is likely an issue.
Sodium Hypochlorite Tank #1	2002	2	Containment area in good condition.
Sodium Hypochlorite Tank #2	2002	2	Containment area in good condition.
Chemical Tank (Old)	1986	2	At north side of Chlorine Building. Tanks are not anchored for seismic.
Chlorine Contact Basin (Old)	1986	3	Steel pipe is leaking significantly inside the basin. Leaking 3Water line under slab. 2" of slab settlement occuring at east side. Grout cracked at base plate of crane column and piping at east side.
Chlorine Contact Basin (New)	2002	2	Sealant is failed at all gates. Welding failed at west gate frame brace. Corrosion coated. Wind blew out several t-bar panels which have not been replaced.

Mechanical & Structural

SODIUM BISULFITE TANK	2002	1	

Mechanical

Sodium Hypochlorite Feed Pump #1	2002	3	Some corrosion and noise. Has had some repairs. Some noise.
Sodium Hypochlorite Feed Pump #2	2002	3	Has had some repairs.

Component	Year Installed	Condition	Comments
Sodium Hypochlorite Feed Pump #3	2002	3	
1 TON CRANE @ CL2 CONTACT CHAMBER	1986	2	Original crane. Corrosion.
CRANE CL2/SO2 (2 TON)	2002	2	
Electrical&IC			
Micro 2000 Dosage Analyzer #1	2008	2	
Micro 2000 Dosage Analyzer #2	2008	2	
ATI Residual Chlorination analyzer	2009	1	
ATI Residual Chlorination	2008	1	

Outfall

Structural

Outfall Structure		2	Discharges into Arroyo Simi. Inspected from above and appeared to be in good condition. No interior inspection. Corrosion coated. Minor corrosion to grating support beams which seems to occur where the aluminum grating bears on the steel beam.

DAFT

Structural

Component	Year Installed	Condition	Comments
DAFT #1	1977	3	Well-painted. Rehabilitated with plastic panels. Evidence of leakage at exterior wall.
DAFT #2	1980	3	Rehabilitated with plastic panels. Major cracking. Some minor exposed aggregate along inside perimeter at the liquid level. Cracking at pump base. Evidence of leakage at exterior wall.
Mechanical & Structural			
FIBERGLASS POLYMER MIXING TANK	1971	3	Can run but not in use. Would be good to have redundancy. Corrosion of tank base anchorage. Major cracking at pump base and slab.
PLASTIC POLYMER STORAGE TANK	1971	2	See fiberglass tank (alum tank).
Mechanical			
TWAS SKIMMER DRIVE #1	2008	2	
TWAS SKIMMER DRIVE #2	2008	2	
COLLECTOR DRIVE #1&2	1977	3	Currently out of service through rebuild. Collection mechanism and skimmer look good.
COLLECTOR DRIVE #3	1977	3	Rebuilt in 2008. In service. Collection mechanism and skimmer look good.
TWAS PUMP #1	2008	1	VFD, level controlled.
TWAS PUMP #2	2008	1	

Digestion

Structural

Component	Year Installed	Condition	Comments
Anaerobic Digester #3	1988	3	Cracks and wear on roof. Internal piping needs eval. Possible gas leak. Condition similar to Digester #4. Evidence of steel corrosion at top of wall. Evidence of leakage and corrosion around manway.
Anaerobic Digester #4	1988	3	Cracks and wear on roof. Internal piping needs eval. Possible gas leak. Evidence of corrosion around manway. Delamination of thin layer of concrete at top slab in several areas. Cracking at pump and pipe support pads.
Sludge Holding Tank	1987	2	PVC lined. Deterioration, exposed aggregate. Roof corroded beyond repair. Asphalt should be replaced with concrete. Asphalt at west side is in very poor condition. Grout at cover curbs is in poor condition.
Mechanical & Structural			
FERRIC CHLORIDE TANK	2006	5	Inadequate containment for ferric spill. CMU is not appropriate for chemical containment without an adequate coating or liner. Well-painted.
Mechanical			
SLUDGE FEED PUMP #1	1988	2	
SLUDGE FEED PUMP #2	1988	2	
SLUDGE FEED PUMP #3	1988	2	Some coating missing. Running and sounds good.
ROTARY SCREEN #1	1994	2	Parts replaced. HDPE lined.
ROTARY SCREEN #2	1994	2	Parts replaced. HDPE lined.
SCREENED SLUDGE TRANSFER PUMP #1	2009	2	Original unit replaced. Struvite problem in sludge line. Different pipe material may be needed.
SCREENED SLUDGE TRANSFER PUMP #2	2009	2	Rebuilt twice. Struvite problem in sludge line. Different pipe material may be needed.

Component	Year Installed	Condition	Comments
SLUDGE CIRC. PUMP DIGESTER #3	2009	1	Upgraded. Replaced with mechanical seals. Can run. Support equipment okay.
SLUDGE CIRC. PUMP DIGESTER #4	2009	1	Upgraded. Can run. Support equipment okay.
HOT WATER BOILER A	2008	3	Boilers operate in sequence, two at time. Various diagnostic error messages.
HOT WATER BOILER B	2008	3	Boilers operate in sequence, two at time. Various diagnostic error messages.
HOT WATER BOILER C	2008	3	Boilers operate in sequence, two at time. Various diagnostic error messages.
BOILER HEAT LOOP PUMP #1	1964	2	Past failure in heat loop. Difficult to determine condition. Pipe gallery preferred. Corrosion.
BOILER HEAT LOOP PUMP #2	1977	2	Past failure in heat loop. Difficult to determine condition. Pipe gallery preferred. Corrosion.
H.W. HEX. CIR. PUMP #3	1988	1	
H.W. HEX CIRC. PUMP #4	1988	1	
GAS CIR. COMP. #1	1988	2	Rebuilt and upgraded to stainless steel.
GAS CIR. COMP. #2	1988	2	Rebuilt and upgraded to stainless steel.
GAS CIR. COMP. #3	1988	2	Rebuilt and upgraded to stainless steel.
WASTE GAS BURNER	1977	4	Original 1977 unit. Heavy concrete cracking at pit. Pilot light rebuilt. Re-engineered.
CHEMICAL PUMP (FERRIC) #1	2006	2	Recently rebuilt. Need to program VFD.
CHEMICAL PUMP (FERRIC) #2	2010	5	Not in use. Trial unit, needs to be replaced.
CRANE 4 TON	1988	1	Not in service, but waiting for parts.

Component	Year Installed	Condition	Comments
Electrical&IC			
VFD SLUDGE FEED PUMP #1	1989	4	Obsolete. Alarms are good.
VFD SLUDGE FEED PUMP #2	1989	4	Obsolete. Alarms are good.
VFD SLUDGE FEED PUMP #3	1989	4	Obsolete. Alarms are good.
Dewatering			
Mechanical			
BOOSTER PUMP #1	2008	2	Has been replaced since original.
BOOSTER PUMP #2	2008	2	Has been replaced since original.
BOOSTER PUMP #3	1987	2	Oldest of booster pumps.
BELT PRESS #1	1987	2	Operates as intended but frequent repairs needed. Replaced most parts. Corrosion.
BELT PRESS #2	1987	2	Operates as intended but frequent repairs needed. Corrosion.
BELT PRESS #3	1974	2	Backup unit. Operates as intended but frequent repairs needed.
CONVEYOR #1	1987	2	Showing signs of metal fatigue. Replacement should consider conveyance directly to drying beds. Normal wear. Support equipment okay. Parts available.
CONVEYOR #2	1987	2	Showing signs of metal fatigue. Replacement should consider conveyance directly to drying beds. Support equipment okay. Parts available.
POLYMER TRANSFER PUMP	2007	4	Transfers from makeup to batch tank. A lot of repairs. Not in use. New progressing cavity.

Component	Year Installed	Condition	Comments
Polymer Transfer Pump	2008	1	Primary pump to sludge storage tank.
FILTRATE RETURN PUMP #1	2008	1	
FILTRATE RETURN PUMP #2	2008	1	
AIR HANDLING UNIT #1		4	Ventilation upgraded. Two units on the roof; one unit over workshop (to be changed).

Sludge Drying

Structural

Sludge Drying Pad	1988	2	

Plant Power

Structural

Electrical Building - Westside	1975	2	Wood-framed roof. Potential seismic deficiency with wall anchorage to CMU walls. Roof has leaks.
MCC Electrical Building	1998	2	Wood-framed roof anchorage to wall potentially inadequate.
Emergency Generator Building	1986	1	Part of building is c. 1972. Wood-framed roof. Roof in good condition. Minor cracks in floor. Wall anchorage may be inadequate for seismic loading per current code. About 5% of the sound attenuation foam has fallen out.

Electrical&IC

Component	Year Installed	Condition	Comments
Distribution Panel DEP	1978	4	In Equipment Room of Ops Building. Falling apart. Obsolete parts.
MCC Primary		4	Feeds Primary Sludge Pumps.
MCC-A	1977	5	In Admin Building Boiler Room. Underrated. Should be replaced with ArcFlash-identified MCCs.
MCC-D1	2009	1	Leaks on ceiling directly above MCC.
MCC-LA	1978	4	In Chemical Chlorine Building. Critical indications and alarms are good.
MCC-N	1989	3	In Dewatering Building.
SWBD MA	1977	4	Main breaker obsolete. ArcFlash study recommended replacement of GE Type ECS trip unit with modern retrofit.
MCC-B1	1977	5	Life safety concern based on short circuit study. Over 30 years old and underrated. Should be replaced with 65kA equipment. Alarms are good.
MCC-B2	1977	5	Life safety concern based on short circuit study. Over 30 years old and underrated. Should be replaced with 65kA equipment. Alarms are good.
MCC-C1	1977	5	Life safety concern based on short circuit study. Over 30 years old and underrated. Should be replaced with 65kA equipment. Alarms are good.
MCC-C2	1977	5	Life safety concern based on short circuit study. Over 30 years old and underrated. Should be replaced with 65kA equipment. Alarms are good.
MCC-D	1973	5	In MCC Building. Over 30 years old and underrated. Should be replaced with 65kA equipment. Alarms are good.
MCC-DCC	1988	4	Life safety concern based on short circuit study. Alarms are good. Breaker has been purchased to replace main breaker.
MCC-E	1978	5	In MCC Building. Life safety concern based on short circuit study. Alarms are good. Breaker has been purchased to replace main breaker.
MCC-F	1978	5	In MCC Building. Life safety concern based on short circuit study. Alarms are good. Breaker has been purchased to replace main breaker.

Component	Year Installed	Condition	Comments
MCC-G	1978	5	In Filter MCC Building. Life safety concern based on short circuit study. Alarms are good.
MCC-H	1978	4	In Filter MCC Building. Alarms are good.
MCC-J	1978	4	In Filter MCC Building. Trips the main breaker when one of the load breakers are opened. Alarms are good.
MCC-L	1978	4	In Chemical Chlorine Building. Critical indications and alarms are good.
MCC-P	2004	3	Short circuit study recommended increasing STPU from 2 to 4.
DIESEL GEN SET CAT 3512C TA	2007	2	Can power total plant. Good exhaust filter.
HONDA GENERATOR 5000S	2009	1	Relatively new.
SWBD GEN	2007	5	Condition 5 based on ArcFlash study. Not protected from overloads by generator circuit breaker.
ATS E		5	Condition 5 based on ArcFlash study. Not protected from overloads by generator circuit breaker.
SWBD MSB		4	Main breaker obsolete. STPU and STD were reduced based on ArcFlash study. Small loss of selectivity. ArcFlash study recommended replacement of GE Type ECS trip unit with modern retrofit.

Plant Water

Mechanical

3 WHP PUMP #4	1977	2	Looks good.
3 WHP PUMP #5	1977	2	Looks good.
3 WHP PUMP #6	1977	2	Looks good.

Component	Year Installed	Condition	Comments
Electrical&IC			
3 WHP FLOW METER	1977	2	
Admin/Other			
Structural			
Administration Building	1972	2	Wood-framed roof with CMU walls. Wood beam at north side has areas of dry rot. Anchorage of wood-framing to CMU walls may be inadequate for seismic.
Main Control Building (K)		1	CMU walls and wood-framed roof. Wall anchorage observed from framing to large top plate.
Maintenance Building		2	Numerous expansions. Some problems with roof and HVAC duct work and drainage system.
Reclaimed Water PS			
Structural			
Reclaimed Water Pump Station	1997	2	Minor corrosion at steel base plates for tanks. Tanks are corrosion coated.
Mechanical			
RECLAIMED WATER PUMP STATION	1997	2	
RECLAIMED WATER STORAGE CONTROL	1997	2	Level/pressure control on Tank # 2 only. Support equipment okay.

Component	Year Installed	Condition	Comments
RECLAIMED WATER PUMP #1	1997	2	Too big for the demand and turned on too often. Only one of the two pumps needs to run at a time - not enough customers.
RECLAIMED WATER PUMP #2	1997	2	Too big for the demand and turned on too often. Only one of the two pumps needs to run at a time - not enough customers.
RECLAIMED WATER TANKS & VALVES	1997	3	Some corrosion. Can't isolate air and/or water between two tanks. Compressor corrosion. Support equiment okay.
Main Circuit Breaker		4	ArcFlash study recommended upgrade to 600MCM feeder cable.

Wood Ranch Pump Station

Structural			
Sitework	1989	1	
Wet Well	1989	2	
PUMP STATION (Building)	1989	1	Replacement underway.
Mechanical			
PUMP #1	1987	1	Wemco. 10 hp. Corrosion at pipe joints. Replacement underway.
PUMP #2	1983	1	Wemco. 10 hp. Corrosion at pipe joints. Replacement underway.
Mech & Elec			
Emergency Generator	1989	1	Replacement underway.

Component	Year Installed	Condition	Comments
Electrical&IC			
Automatic Transfer Switch	1989	1	Replacement underway.
Instrumentation	1989	1	Replacement underway.

Big Sky Pump Station

Structural			
Building	2005	2	
Overflow Vault	2005	2	
Sitework	2005	2	
Wet Well	2005	2	
Mechanical			
Pump 1	2005	2	3 hp. Blowoff valve has some corrosion.
Pump 2	2005	2	3 hp. Blowoff valve has some corrosion.
Mech & Elec			
Emergency Generator	2005	2	
Electrical&IC			
Automatic Transfer Switch	2005	2	208V, 3-phase panel. Good condition.

Component	Year Installed	Condition	Comments
Instrumentation	2005	2	

Arroyo/Madero Pump Station

Structural			
Sitework	1995	2	
Wet Well	1995	2	
Mechanical			
Pump 1	1995	2	Flygt. 3 hp. 1700 rpm. Regular maintenance.
Pump 2	1995	2	Flygt. 3 hp. 1700 rpm. Regular maintenance.
Electrical&IC			
PLC Cabinet	1998	2	
VFD	1998	2	Saftronics. 230 VAC. For both pumps.

ABOVEGROUND RISK SUMMARY

Process	Component	Vulnerability	Criticality	Risk
Digestion	CHEMICAL PUMP (FERRIC) #2	0.67	3.85	2.57
Digestion	FERRIC CHLORIDE TANK	0.40	5.05	2.02
Plant Power	MCC-B1	0.33	5.95	1.98
Plant Power	MCC-B2	0.33	5.95	1.98
Plant Power	MCC-C1	0.33	5.95	1.98
Plant Power	MCC-C2	0.33	5.95	1.98
Plant Power	MCC-D	0.33	5.95	1.98
Plant Power	MCC-E	0.33	5.95	1.98
Plant Power	MCC-F	0.33	5.95	1.98
Plant Power	MCC-G	0.33	5.95	1.98
Plant Power	ATS E	0.33	4.6	1.53
Plant Power	SWBD GEN	0.33	3.85	1.28
Filtration	VFD APPLIED PUMP #4	0.33	2.05	0.68
Digestion	WASTE GAS BURNER	0.11	5.8	0.64
Filtration	VFD APPLIED PUMP #1	0.33	1.9	0.63
Filtration	VFD APPLIED PUMP #2	0.33	1.9	0.63
Headworks	Headworks Effluent Box	0.20	2.65	0.53
Arroyo/Madero Pump Station	Pump 1	0.16	3.25	0.52
Arroyo/Madero Pump Station	Pump 2	0.16	3.25	0.52
Big Sky Pump Station	Pump 1	0.16	3.25	0.52
Big Sky Pump Station	Pump 2	0.16	3.25	0.52
Wood Ranch Pump Station	PUMP #1	0.14	3.25	0.46
Wood Ranch Pump Station	PUMP #2	0.14	3.25	0.46
Plant Power	Distribution Panel DEP	0.11	3.55	0.39
Filtration	Filter Media	0.13	3.1	0.39
Dewatering	FILTRATE RETURN PUMP #1	0.14	2.35	0.34
Dewatering	FILTRATE RETURN PUMP #2	0.14	2.35	0.34
Plant Power	MCC-DCC	0.06	5.95	0.33

Process	Component	Vulnerability	Criticality	Risk
BNR System	BNR MIXER #1A	0.16	2.05	0.33
BNR System	BNR MIXER #1B	0.16	2.05	0.33
BNR System	BNR MIXER #1C	0.16	2.05	0.33
BNR System	BNR MIXER #2A	0.16	2.05	0.33
BNR System	BNR MIXER #2B	0.16	2.05	0.33
BNR System	BNR MIXER #2C	0.16	2.05	0.33
BNR System	BNR MIXER #3A	0.16	2.05	0.33
BNR System	BNR MIXER #3B	0.16	2.05	0.33
BNR System	BNR MIXER #3C	0.16	2.05	0.33
BNR System	BNR MIXER #4A	0.16	2.05	0.33
BNR System	BNR MIXER #4B	0.16	2.05	0.33
BNR System	BNR MIXER #4C	0.16	2.05	0.33
Chlor/Dechlor	Sodium Hypochlorite Feed Pump #1	0.08	3.85	0.32
Chlor/Dechlor	Sodium Hypochlorite Feed Pump #2	0.08	3.85	0.32
Chlor/Dechlor	Sodium Hypochlorite Feed Pump #3	0.08	3.85	0.32
Grit Classifiers	GRIT PUMP #3	0.11	2.8	0.31
Filtration	Filter Applied Pump #1	0.11	2.65	0.29
Filtration	Filter Applied Pump #2	0.11	2.65	0.29
Filtration	Filter Applied Pump #4	0.11	2.65	0.29
Plant Power	MCC-H	0.06	5.2	0.29
Plant Power	MCC-J	0.06	5.2	0.29
Plant Power	MCC-L	0.06	5.2	0.29
Plant Power	MCC-LA	0.06	5.2	0.29
Digestion	CHEMICAL PUMP (FERRIC) #1	0.07	3.85	0.29
Primary Sedimentation	Influent Flow Meter	0.07	3.85	0.29
Digestion	HOT WATER BOILER A	0.08	3.4	0.28
Digestion	HOT WATER BOILER B	0.08	3.4	0.28
Digestion	HOT WATER BOILER C	0.08	3.4	0.28
Chlor/Dechlor	Micro 2000 Dosage Analyzer #1	0.07	3.55	0.26
Chlor/Dechlor	Micro 2000 Dosage Analyzer #2	0.07	3.55	0.26

Process	Component	Vulnerability	Criticality	Risk
Dewatering	AIR HANDLING UNIT #1	0.11	2.35	0.26
Dewatering	POLYMER TRANSFER PUMP	0.11	2.35	0.26
Filtration	Filter Water Outlet Valves	0.08	3.1	0.26
Big Sky Pump Station	Emergency Generator	0.06	4.6	0.26
Dewatering	BELT PRESS #1	0.07	3.4	0.25
Dewatering	BELT PRESS #2	0.07	3.4	0.25
Dewatering	BELT PRESS #3	0.07	3.4	0.25
Filtration	FILTER B/W WATER PUMP #1	0.07	3.4	0.25
Arroyo/Madero Pump Station	PLC Cabinet	0.11	2.2	0.24
Big Sky Pump Station	Instrumentation	0.11	2.2	0.24
Chlor/Dechlor	ATI Residual Chlorination	0.07	3.55	0.24
Chlor/Dechlor	ATI Residual Chlorination analyzer	0.07	3.55	0.24
Flow Equalization Basin	FEB PUMP #1	0.08	2.8	0.23
Flow Equalization Basin	FEB PUMP #2	0.08	2.8	0.23
Flow Equalization Basin	FEB PUMP #3	0.08	2.8	0.23
Grit Classifiers	GRIT PUMP #1	0.08	2.8	0.23
Grit Classifiers	GRIT PUMP #2	0.08	2.8	0.23
Grit Classifiers	GRIT PUMP #4	0.08	2.8	0.23
Primary Sedimentation	PRIMARY SLUDGE PUMP #1	0.08	2.8	0.23
Primary Sedimentation	PRIMARY SLUDGE PUMP #2	0.08	2.8	0.23
Reclaimed Water PS	RECLAIMED WATER TANKS & VALVES	0.08	2.8	0.23
Secondary Clarification	SEC. SLUDGE COLLECTOR #1	0.08	2.8	0.23
Secondary Clarification	SEC. SLUDGE COLLECTOR #2	0.08	2.8	0.23
Secondary Clarification	SEC. SLUDGE COLLECTOR #3	0.08	2.8	0.23
Secondary Clarification	SEC. SLUDGE COLLECTOR #4	0.08	2.8	0.23
Wood Ranch Pump Station	Emergency Generator	0.05	4.6	0.23
Reclaimed Water PS	RECLAIMED WATER PUMP STATION	0.07	3.1	0.23
Secondary Clarification	ALUM FEED PUMP	0.07	3.1	0.23
Digestion	H.W. HEX CIRC. PUMP #4	0.07	3.4	0.23
Digestion	H.W. HEX. CIR. PUMP #3	0.07	3.4	0.23

Process	Component	Vulnerability	Criticality	Risk
Plant Power	DIESEL GEN SET CAT 3512C TA	0.06	4	0.22
Wood Ranch Pump Station	Instrumentation	0.10	2.2	0.22
BNR System	BNR RECYCLE PUMP #1	0.07	2.95	0.22
BNR System	BNR RECYCLE PUMP #2	0.07	2.95	0.22
BNR System	BNR RECYCLE PUMP #3	0.07	2.95	0.22
BNR System	BNR RECYCLE PUMP #4	0.07	2.95	0.22
Digestion	GAS CIR. COMP. #1	0.07	2.95	0.22
Digestion	GAS CIR. COMP. #2	0.07	2.95	0.22
Digestion	GAS CIR. COMP. #3	0.07	2.95	0.22
Plant Power	MCC-P	0.04	5.2	0.22
Plant Power	SWBD MA	0.06	3.85	0.21
Plant Power	SWBD MSB	0.06	3.85	0.21
Dewatering	BOOSTER PUMP #1	0.07	2.8	0.21
Dewatering	BOOSTER PUMP #2	0.07	2.8	0.21
Dewatering	BOOSTER PUMP #3	0.07	2.8	0.21
Dewatering	CONVEYOR #1	0.07	2.8	0.21
Dewatering	CONVEYOR #2	0.07	2.8	0.21
Digestion	ROTARY SCREEN #1	0.07	2.8	0.21
Digestion	ROTARY SCREEN #2	0.07	2.8	0.21
Primary Sedimentation	Primary Sed Basin 3 Mechanism	0.07	2.8	0.21
Reclaimed Water PS	RECLAIMED WATER PUMP #1	0.07	2.8	0.21
Reclaimed Water PS	RECLAIMED WATER PUMP #2	0.07	2.8	0.21
Reclaimed Water PS	RECLAIMED WATER STORAGE CONTROL	0.07	2.8	0.21
Digestion	SLUDGE FEED PUMP #3	0.07	2.65	0.20
Chlor/Dechlor	SODIUM BISULFITE TANK	0.04	4.9	0.20
BNR System	West side BNR Turblex Blower #3	0.06	3.4	0.19
BNR System	West Side BNR Turblex Blower #4	0.06	3.4	0.19
Admin/Other	Administration Building	0.02	8.5	0.19
Secondary Clarification	SEC. SKIMMER PUMP #1	0.08	2.2	0.18
Secondary Clarification	SEC. SKIMMER PUMP #2	0.08	2.2	0.18

Process	Component	Vulnerability	Criticality	Risk
Filtration	Filter Building (7-1)	0.03	7.3	0.18
Arroyo/Madero Pump Station	Sitework	0.06	3.25	0.18
Big Sky Pump Station	Sitework	0.06	3.25	0.18
Digestion	SLUDGE CIRC. PUMP DIGESTER #3	0.07	2.65	0.18
Digestion	SLUDGE CIRC. PUMP DIGESTER #4	0.07	2.65	0.18
BNR System	West Side BNR BLOWER #1	0.06	2.8	0.18
BNR System	West side BNR BLOWER #2	0.06	2.8	0.18
Digestion	BOILER HEAT LOOP PUMP #1	0.07	2.35	0.17
Digestion	BOILER HEAT LOOP PUMP #2	0.07	2.35	0.17
Plant Water	3 WHP PUMP #4	0.07	2.35	0.17
Plant Water	3 WHP PUMP #5	0.07	2.35	0.17
Plant Water	3 WHP PUMP #6	0.07	2.35	0.17
Secondary Clarification	RAS PUMP #1	0.07	2.35	0.17
Secondary Clarification	RAS PUMP #2	0.07	2.35	0.17
Secondary Clarification	RAS PUMP #3	0.07	2.35	0.17
Secondary Clarification	RAS PUMP #4	0.07	2.35	0.17
Secondary Clarification	RAS PUMP #5	0.07	2.35	0.17
Secondary Clarification	RAS PUMP #6	0.07	2.35	0.17
Secondary Clarification	WAS PUMP #1	0.07	2.35	0.17
Secondary Clarification	WAS PUMP #2	0.07	2.35	0.17
DAFT	COLLECTOR DRIVE #1&2	0.08	2.05	0.17
DAFT	COLLECTOR DRIVE #3	0.08	2.05	0.17
Flow Equalization Basin	FLOW METER #1	0.08	2.05	0.17
Flow Equalization Basin	FLOW METER #2	0.08	2.05	0.17
Flow Equalization Basin	FLOWMETER #3	0.08	2.05	0.17
Headworks	BAR SCREEN #1	0.08	2.05	0.17
Headworks	BAR SCREEN #2	0.08	2.05	0.17
Big Sky Pump Station	Automatic Transfer Switch	0.04	4.6	0.17
BNR System	East Basin Blower Building	0.03	6.55	0.16
Digestion	SLUDGE FEED PUMP #2	0.07	2.2	0.16

Process	Component	Vulnerability	Criticality	Risk
Wood Ranch Pump Station	Sitework	0.05	3.25	0.16
Filtration	Filter Control Building	0.02	7.3	0.16
Primary Sedimentation	Primary Effluent Channel	0.03	4.75	0.16
Primary Sedimentation	Primary Influent Channel	0.03	4.75	0.16
Dewatering	Polymer Transfer Pump	0.07	2.35	0.16
BNR System	East Basin BNR BLOWER #1	0.06	2.8	0.16
BNR System	East Basin BNR BLOWER #2	0.06	2.8	0.16
BNR System	East Basin BNR BLOWER #4	0.06	2.8	0.16
BNR System	East Basin BNR BLOWER #5	0.06	2.8	0.16
BNR System	East Basin BNR BLOWER #6	0.06	2.8	0.16
Primary Sedimentation	Primary Sludge Pump Station	0.02	7	0.16
DAFT	FIBERGLASS POLYMER MIXING TANK	0.05	3.1	0.16
Wood Ranch Pump Station	Automatic Transfer Switch	0.03	4.6	0.15
Digestion	SCREENED SLUDGE TRANSFER PUMP #1	0.07	2.05	0.15
Digestion	SCREENED SLUDGE TRANSFER PUMP #2	0.07	2.05	0.15
Filtration	WASTE BACKWASH H2O PUMP #1	0.07	2.05	0.15
Filtration	WASTE BACKWASH H2O PUMP #2	0.07	2.05	0.15
Filtration	WASTE BACKWASH H2O PUMP #3	0.07	2.05	0.15
Grit Classifiers	GRIT CLASSIFIER #1	0.07	2.05	0.15
Grit Classifiers	GRIT CLASSIFIER #2	0.07	2.05	0.15
Grit Classifiers	GRIT CLASSIFIER #3	0.07	2.05	0.15
Admin/Other	Maintenance Building	0.02	6.7	0.15
Chlor/Dechlor	Chlorine Building	0.02	6.7	0.15
Plant Power	MCC Electrical Building	0.02	6.7	0.15
Filtration	BACKWASH AIR BLOWER #1	0.06	2.65	0.15
Filtration	BACKWASH AIR BLOWER #2	0.06	2.65	0.15
Odor Control	ODOR CONTROL TOWER	0.07	2.2	0.15
BNR System	West Basin Blower Building	0.02	7.3	0.15
Digestion	Anaerobic Digester #3	0.03	5.8	0.15

Process	Component	Vulnerability	Criticality	Risk
Digestion	Anaerobic Digester #4	0.03	5.8	0.15
BNR System	CRANE BNR BLOWER BLDG.	0.05	2.8	0.14
Admin/Other	Main Control Building (K)	0.02	6.7	0.13
Plant Power	Emergency Generator Building	0.02	6.7	0.13
Filtration	Secondary Diversion Structure	0.03	4	0.13
Plant Water	3 WHP FLOW METER	0.07	1.75	0.13
Big Sky Pump Station	Building	0.02	5.65	0.13
BNR System	BNR Effluent to Secondary Clarifier Channel	0.02	5.5	0.12
Headworks	BS COMPACTOR #1	0.08	1.45	0.12
Headworks	BS COMPACTOR #2	0.08	1.45	0.12
Primary Sedimentation	Primary Sedimentation Basin 3	0.02	5.35	0.12
BNR System	East Basin BNR TANK #1	0.03	4.75	0.12
DAFT	TWAS SKIMMER DRIVE #1	0.07	1.6	0.12
DAFT	TWAS SKIMMER DRIVE #2	0.07	1.6	0.12
Digestion	SLUDGE FEED PUMP #1	0.07	1.6	0.12
Filtration	B/W UNDERDRAIN PUMP #1	0.07	1.6	0.12
Filtration	B/W UNDERDRAIN PUMP #2	0.07	1.6	0.12
Primary Sedimentation	Primary Sed Basin 1 Mechanism	0.07	1.6	0.12
Primary Sedimentation	Primary Sed Basin 2 Mechanism	0.07	1.6	0.12
Primary Sedimentation	Slide Gates	0.07	1.6	0.12
Plant Power	HONDA GENERATOR 5000S	0.05	2.35	0.12
Grit Classifiers	Grit Chamber	0.03	4.6	0.12
Wood Ranch Pump Station	PUMP STATION (Building)	0.02	5.65	0.11
Arroyo/Madero Pump Station	Wet Well	0.02	5.05	0.11
Big Sky Pump Station	Wet Well	0.02	5.05	0.11
Wood Ranch Pump Station	Wet Well	0.02	5.05	0.11
Digestion	CRANE 4 TON	0.04	2.8	0.11
DAFT	DAFT #1	0.03	4.45	0.11
DAFT	DAFT #2	0.03	4.45	0.11
DAFT	PLASTIC POLYMER STORAGE TANK	0.04	2.5	0.11

Process	Component	Vulnerability	Criticality	Risk
Arroyo/Madero Pump Station	VFD	0.04	2.95	0.11
Headworks	Bar Screen Building	0.02	4.9	0.11
BNR System	East Basin BNR TANK #2	0.03	4.3	0.11
Chlor/Dechlor	Chlorine Contact Basin (Old)	0.03	4.3	0.11
Filtration	Applied Filter Sump	0.03	4.3	0.11
DAFT	TWAS PUMP #1	0.07	1.6	0.11
DAFT	TWAS PUMP #2	0.07	1.6	0.11
Chlor/Dechlor	Chemical Tank (Old)	0.02	4.75	0.11
Primary Sedimentation	Primary Sedimentation Dry Well	0.02	4.6	0.10
Chlor/Dechlor	Sodium Hypochlorite Tank #1	0.02	4.45	0.10
Chlor/Dechlor	Sodium Hypochlorite Tank #2	0.02	4.45	0.10
Digestion	Sludge Holding Tank	0.02	4.45	0.10
Plant Power	Electrical Building - Westside	0.02	4.45	0.10
BNR System	West BNR Basin 1	0.02	4.9	0.10
BNR System	West BNR Basin 2	0.02	4.9	0.10
BNR System	West BNR Basin 3	0.02	4.9	0.10
BNR System	West BNR Basin 4	0.02	4.9	0.10
Big Sky Pump Station	Overflow Vault	0.02	4.3	0.10
BNR System	East Basin BNR TANK #3	0.03	3.7	0.09
Primary Sedimentation	Primary Sedimentation Basin 1	0.02	4.15	0.09
Primary Sedimentation	Primary Sedimentation Basin 2	0.02	4.15	0.09
Chlor/Dechlor	CRANE CL2/SO2 (2 TON)	0.04	2.05	0.09
Chlor/Dechlor	Chlorine Contact Basin (New)	0.02	4	0.09
Digestion	VFD SLUDGE FEED PUMP #1	0.06	1.6	0.09
Digestion	VFD SLUDGE FEED PUMP #2	0.06	1.6	0.09
Digestion	VFD SLUDGE FEED PUMP #3	0.06	1.6	0.09
Outfall	Outfall Structure	0.02	4	0.09
Reclaimed Water PS	Reclaimed Water Pump Station	0.02	4	0.09
Flow Equalization Basin	FEB Pump Station	0.02	3.85	0.09
Secondary Clarification	WAS Pump Station	0.02	3.85	0.09

Process	Component	Vulnerability	Criticality	Risk
Filtration	Waste Backwash Pond	0.02	3.7	0.08
Secondary Clarification	Secondary Clarifier 1	0.02	3.7	0.08
Secondary Clarification	Secondary Clarifier 2	0.02	3.7	0.08
Secondary Clarification	Secondary Clarifier 3	0.02	3.7	0.08
Secondary Clarification	Secondary Clarifier 4	0.02	3.7	0.08
Flow Equalization Basin	Flow Equalization Basin	0.03	3.1	0.08
BNR System	BNR BLOWER #1 VFD 660	0.04	2.05	0.08
BNR System	BNR BLOWER #2 VFD 670	0.04	2.05	0.08
Flow Equalization Basin	VFD FEB PUMP #1	0.04	2.05	0.08
Flow Equalization Basin	VFD FEB PUMP #2	0.04	2.05	0.08
Flow Equalization Basin	VFD FEB PUMP #3	0.04	2.05	0.08
BNR System	BNR Splitter Structure	0.02	3.4	0.08
Chlor/Dechlor	1 TON CRANE @ CL2 CONTACT CHAMBER	0.04	1.6	0.07
BNR System	BNR BLOWER #3 Soft Start 680	0.03	2.05	0.07
BNR System	BNR BLOWER #4 Soft Start 690	0.03	2.05	0.07
Primary Sedimentation	Grease Pit	0.03	2.05	0.07
Headworks	Electrical Vault	0.03	2.65	0.07
Primary Sedimentation	Influent Metering Structure	0.02	2.95	0.07
Secondary Clarification	VFD 51002 RAS #1	0.04	1.6	0.06
Secondary Clarification	VFD 51003 RAS #2	0.04	1.6	0.06
Secondary Clarification	VFD 51004 RAS #3	0.04	1.6	0.06
Secondary Clarification	VFD 53010 RAS #4	0.04	1.6	0.06
Secondary Clarification	VFD 53020 RAS #5	0.04	1.6	0.06
Secondary Clarification	VFD RAS #6	0.04	1.6	0.06
Headworks	Bar Screen Chamber	0.02	2.65	0.06
Secondary Clarification	VFD WAS PUMP #1	0.04	1	0.04
Secondary Clarification	VFD WAS PUMP #2	0.04	1	0.04
Sludge Drying	Sludge Drying Pad	0.02	1.6	0.04

REPLACEMENT COST ESTIMATES FOR ABOVEGROUND ASSETS DUE FOR RENEWAL IN 10 YEARS (ADDITIONAL TO SPECIFIED NEAR-TERM PROJECTS)

Appendix C - Replacement Cost Estimates for Assets Due for Renewal in Ten Years (Additional to Specified Near-Term Projects)

Process	Asset	Year Due	Direct Replacement Cost(1)	Total Replacement Cost(2)
Fiscal Year: 11/12				
BNR System	Membranes	11/12	$6,975	$10,000
Digestion	CHEMICAL PUMP (FERRIC) #2	11/12	$8,000	$12,000
Fiscal Year: 12/13				
Big Sky Pump Station	Pump 1	12/13	$15,000	$22,000
Big Sky Pump Station	Pump 2	12/13	$15,000	$22,000
Fiscal Year: 13/14				
Secondary Clarification	WAS PUMP #1	13/14	$35,000	$51,000
Secondary Clarification	WAS PUMP #2	13/14	$35,000	$51,000
Arroyo/Madero Pump Station	Pump 1	13/14	$15,000	$22,000
Arroyo/Madero Pump Station	Pump 2	13/14	$15,000	$22,000
Fiscal Year: 14/15				
BNR System	BNR MIXER #1A	14/15	$10,500	$16,000
BNR System	BNR MIXER #1B	14/15	$10,500	$16,000
BNR System	BNR MIXER #1C	14/15	$10,500	$16,000
BNR System	BNR MIXER #2A	14/15	$10,500	$16,000
BNR System	BNR MIXER #2B	14/15	$10,500	$16,000
BNR System	BNR MIXER #2C	14/15	$10,500	$16,000
Filtration	Filter Applied Pump #1	14/15	$68,000	$98,000
Filtration	Filter Applied Pump #2	14/15	$68,000	$98,000
Filtration	Filter Applied Pump #4	14/15	$68,000	$98,000
Filtration	VFD APPLIED PUMP #1	14/15	$21,000	$31,000

Process	Asset	Year Due	Direct Replacement Cost(1)	Total Replacement Cost(2)
Filtration	VFD APPLIED PUMP #2	14/15	$21,000	$31,000
Filtration	VFD APPLIED PUMP #4	14/15	$21,000	$31,000
Dewatering	FILTRATE RETURN PUMP #1	14/15	$8,000	$12,000
Dewatering	FILTRATE RETURN PUMP #2	14/15	$8,000	$12,000
Big Sky Pump Station	Instrumentation	14/15	$30,000	$43,000
Fiscal Year: 15/16				
BNR System	BNR MIXER #3A	15/16	$10,500	$16,000
BNR System	BNR MIXER #3B	15/16	$10,500	$16,000
BNR System	BNR MIXER #3C	15/16	$10,500	$16,000
BNR System	BNR MIXER #4A	15/16	$10,500	$16,000
BNR System	BNR MIXER #4B	15/16	$10,500	$16,000
BNR System	BNR MIXER #4C	15/16	$10,500	$16,000
Dewatering	BELT PRESS #1	15/16	$200,000	$380,000
Dewatering	BOOSTER PUMP #1	15/16	$11,000	$16,000
Dewatering	POLYMER TRANSFER PUMP	15/16	$16,000	$23,000
Arroyo/Madero Pump Station	PLC Cabinet	15/16	$30,000	$43,000
Fiscal Year: 16/17				
Grit Classifiers	GRIT PUMP #1	16/17	$25,000	$36,000
Grit Classifiers	GRIT PUMP #2	16/17	$25,000	$36,000
Grit Classifiers	GRIT PUMP #3	16/17	$25,000	$36,000
Grit Classifiers	GRIT PUMP #4	16/17	$25,000	$36,000
Primary Sedimentation	PRIMARY SLUDGE PUMP #1	16/17	$35,000	$51,000
Primary Sedimentation	PRIMARY SLUDGE PUMP #2	16/17	$35,000	$51,000
Flow Equalization Basin	FEB PUMP #1	16/17	$45,000	$65,000
Flow Equalization Basin	FEB PUMP #2	16/17	$45,000	$65,000
Flow Equalization Basin	FEB PUMP #3	16/17	$45,000	$65,000

Process	Asset	Year Due	Direct Replacement Cost(1)	Total Replacement Cost(2)
Flow Equalization Basin	FLOW METER #1	16/17	$9,000	$13,000
Flow Equalization Basin	FLOW METER #2	16/17	$9,000	$13,000
Flow Equalization Basin	FLOWMETER #3	16/17	$9,000	$13,000
Secondary Clarification	SEC. SKIMMER PUMP #1	16/17	$10,000	$15,000
Secondary Clarification	SEC. SKIMMER PUMP #2	16/17	$10,000	$15,000
Secondary Clarification	SEC. SLUDGE COLLECTOR #2	16/17	$178,000	$339,000
Secondary Clarification	SEC. SLUDGE COLLECTOR #3	16/17	$178,000	$339,000
Secondary Clarification	SEC. SLUDGE COLLECTOR #4	16/17	$178,000	$339,000
Chlor/Dechlor	Sodium Hypochlorite Feed Pump #1	16/17	$10,000	$15,000
Chlor/Dechlor	Sodium Hypochlorite Feed Pump #2	16/17	$10,000	$15,000
Chlor/Dechlor	Sodium Hypochlorite Feed Pump #3	16/17	$10,000	$15,000
Digestion	HOT WATER BOILER A	16/17	$25,000	$36,000
Digestion	HOT WATER BOILER B	16/17	$25,000	$36,000
Digestion	HOT WATER BOILER C	16/17	$25,000	$36,000
Dewatering	CONVEYOR #1	16/17	$68,000	$130,000
Fiscal Year: 17/18				
Primary Sedimentation	Influent Flow Meter	17/18	$18,000	$26,000
Primary Sedimentation	Slide Gates	17/18	$66,000	$179,000
BNR System	BNR RECYCLE PUMP #1	17/18	$45,000	$65,000
BNR System	BNR RECYCLE PUMP #2	17/18	$45,000	$65,000
BNR System	BNR RECYCLE PUMP #3	17/18	$45,000	$65,000
BNR System	BNR RECYCLE PUMP #4	17/18	$45,000	$65,000
Secondary Clarification	ALUM FEED PUMP	17/18	$10,000	$15,000
Filtration	B/W UNDERDRAIN PUMP #1	17/18	$9,000	$13,000
Filtration	B/W UNDERDRAIN PUMP #2	17/18	$9,000	$13,000
Filtration	FILTER B/W WATER PUMP #1	17/18	$53,000	$76,000
Filtration	WASTE BACKWASH H2O PUMP #1	17/18	$53,000	$76,000

Process	Asset	Year Due	Direct Replacement Cost(1)	Total Replacement Cost(2)
Filtration	WASTE BACKWASH H2O PUMP #2	17/18	$53,000	$76,000
Filtration	WASTE BACKWASH H2O PUMP #3	17/18	$53,000	$76,000
Chlor/Dechlor	Micro 2000 Dosage Analyzer #1	17/18	$11,000	$16,000
Chlor/Dechlor	Micro 2000 Dosage Analyzer #2	17/18	$11,000	$16,000
DAFT	TWAS SKIMMER DRIVE #1	17/18	$338,000	$643,000
DAFT	TWAS SKIMMER DRIVE #2	17/18	$338,000	$643,000
Digestion	BOILER HEAT LOOP PUMP #1	17/18	$4,000	$6,000
Digestion	BOILER HEAT LOOP PUMP #2	17/18	$4,000	$6,000
Digestion	CHEMICAL PUMP (FERRIC) #1	17/18	$8,000	$12,000
Digestion	GAS CIR. COMP. #1	17/18	$90,000	$129,000
Digestion	GAS CIR. COMP. #2	17/18	$90,000	$129,000
Digestion	GAS CIR. COMP. #3	17/18	$90,000	$129,000
Digestion	SLUDGE FEED PUMP #1	17/18	$19,000	$28,000
Digestion	SLUDGE FEED PUMP #2	17/18	$19,000	$28,000
Digestion	SLUDGE FEED PUMP #3	17/18	$19,000	$28,000
Dewatering	BELT PRESS #2	17/18	$200,000	$380,000
Dewatering	BOOSTER PUMP #2	17/18	$11,000	$16,000
Plant Water	3 WHP PUMP #4	17/18	$38,000	$55,000
Plant Water	3 WHP PUMP #5	17/18	$68,000	$98,000
Plant Water	3 WHP PUMP #6	17/18	$68,000	$98,000
Wood Ranch Pump Station	PUMP #1	17/18	$15,000	$22,000
Wood Ranch Pump Station	PUMP #2	17/18	$15,000	$22,000
Fiscal Year:	**18/19**			
Grit Classifiers	GRIT CLASSIFIER #1	18/19	$100,000	$143,000
Grit Classifiers	GRIT CLASSIFIER #2	18/19	$100,000	$143,000
Grit Classifiers	GRIT CLASSIFIER #3	18/19	$100,000	$143,000
Primary Sedimentation	Primary Sed Basin 1 Mechanism	18/19	$35,000	$67,000

Process	Asset	Year Due	Direct Replacement Cost(1)	Total Replacement Cost(2)
Primary Sedimentation	Primary Sed Basin 2 Mechanism	18/19	$35,000	$67,000
Primary Sedimentation	Primary Sed Basin 3 Mechanism	18/19	$35,000	$67,000
BNR System	West Side BNR BLOWER #1	18/19	$65,000	$124,000
BNR System	West side BNR BLOWER #2	18/19	$65,000	$124,000
Secondary Clarification	SEC. SLUDGE COLLECTOR #1	18/19	$178,000	$339,000
Filtration	Filter Water Outlet Valves	18/19	$66,000	$126,000
Chlor/Dechlor	ATI Residual Chlorination	18/19	$5,000	$8,000
Chlor/Dechlor	ATI Residual Chlorination analyzer	18/19	$5,000	$8,000
DAFT	TWAS PUMP #1	18/19	$7,000	$11,000
DAFT	TWAS PUMP #2	18/19	$7,000	$11,000
Digestion	H.W. HEX CIRC. PUMP #4	18/19	$4,000	$6,000
Digestion	H.W. HEX. CIR. PUMP #3	18/19	$4,000	$6,000
Digestion	SLUDGE CIRC. PUMP DIGESTER #3	18/19	$96,000	$138,000
Digestion	SLUDGE CIRC. PUMP DIGESTER #4	18/19	$96,000	$138,000
Dewatering	CONVEYOR #2	18/19	$68,000	$130,000
Dewatering	Polymer Transfer Pump	18/19	$16,000	$23,000
Fiscal Year:	**19/20**			
BNR System	East Basin BNR BLOWER #1	19/20	$65,000	$124,000
BNR System	East Basin BNR BLOWER #2	19/20	$65,000	$124,000
BNR System	East Basin BNR BLOWER #4	19/20	$65,000	$124,000
BNR System	East Basin BNR BLOWER #5	19/20	$65,000	$124,000
BNR System	East Basin BNR BLOWER #6	19/20	$65,000	$124,000
BNR System	West side BNR Turblex Blower #3	19/20	$160,000	$304,000
BNR System	West Side BNR Turblex Blower #4	19/20	$160,000	$304,000
Filtration	BACKWASH AIR BLOWER #1	19/20	$50,000	$95,000
Filtration	BACKWASH AIR BLOWER #2	19/20	$50,000	$95,000
Digestion	VFD SLUDGE FEED PUMP #1	19/20	$10,000	$15,000

Process	Asset	Year Due	Direct Replacement Cost(1)	Total Replacement Cost(2)
Digestion	VFD SLUDGE FEED PUMP #2	19/20	$10,000	$15,000
Digestion	VFD SLUDGE FEED PUMP #3	19/20	$10,000	$15,000
Dewatering	BELT PRESS #3	19/20	$200,000	$380,000
Dewatering	BOOSTER PUMP #3	19/20	$11,000	$16,000
Plant Power	SWBD MSB	19/20	$60,000	$162,000
Fiscal Year: 20/21				
DAFT	FIBERGLASS POLYMER MIXING TANK	20/21	$25,000	$48,000
Plant Power	MCC-J	20/21	$45,000	$122,000

10-YEAR BELOWGROUND SANITATION ASSET REHABILITATION CIP

10-Year Belowground Sanitation Asset Rehabilitation CIP

OBJECTID_1	FEATURE_ID	STREET_NAME	FROM_	TO_	PIPE_LENGTH	SIZE_	MATERIAL	ORIG_CONST	REP_YR	VULN	RISK	EST_REHAB_COST	EST_REPLACE_COST	CIP_PROJECT	CIP_YEAR
2323	M201033	ALSCOT AVE	BNODE	M20-154	24	8	CIP	1980	2012	0.167	0.667	$ 2,100	$ 6,962	8	2012
2194	M191049	UNK	M19-177	M19-188	340	10	ACP	1964	2012	0.417	2.229	$ 214,344	$ 112,658	8	2012
2149	M191092	WILLIAMS WY	M19-183	M19-181	368.89999	12	ACP	1964	2012	0.714	3.821	$ 93,820	$ 132,840	8	2012
2219	M191024	UNK	M19-192	M19-191	396.5	12	ACP	1964	2012	0.313	1.672	$ 56,377	$ 156,163	8	2012
2237	M191006	LOS ANGELES AVE	M20-121	M19-131	374	14	ACP	1973	2012	0.128	1.071	$ 131,947	$ 192,087	8	2012
5071	P161004	BEAUMONT ST	P17-111	P16-141	309.79999	10	ACP	1962	2012	0.833	4.458	$ 102,217	$ 86,448	8	2012
5085	P171074	MOHAVE DR	P17-113	P17-112	346	12	ACP	1979	2012	0.526	2.816	$ 118,948	$ 104,989	8	2012
					2159.19998							$ 719,753	$ 792,147	**8 Total**	
3572	O61032	UNK	O6-113	O6-108	446	33	ACP	1962	2012	0.833	7.583	$ 306,549	$ 398,004	9	2012
4519	P51004	UNK	P5-101	P5-103	543.40002	33	ACP	1962	2012	0.833	7.583	$ 382,148	$ 445,011	9	2012
4552	P61001	UNK	P6-102	P5-101	484.70001	33	ACP	1962	2012	0.833	7.583	$ 319,326	$ 396,940	9	2012
4536	P61017	UNK	P6-110	P6-102	466.29999	33	ACP	1962	2012	0.833	7.583	$ 319,279	$ 381,871	9	2012
					1940.40002							$ 1,327,302	$ 1,621,826	**9 Total**	
1853	M151040	UNK	M15-121	M15-120	402.29999	20	ACP	1963	2012	0.556	5.056	$ 308,674	$ 192,276	10	2012
1834	M151059	UNK	M15-123	M15-122	380	20	ACP	1963	2012	0.556	5.056	$ 261,391	$ 181,618	10	2012
1835	M151058	UNK	M15-125	M15-124	331.89999	20	ACP	1963	2012	0.556	5.056	$ 89,304	$ 158,629	10	2012
1832	M151061	SHOPPING LN	M15-127	M15-126	396.39999	20	ACP	1963	2012	0.556	5.056	$ 219,594	$ 189,456	10	2012
1859	M151034	SHOPPING LN	M15-128	M15-127	254	20	ACP	1963	2012	0.556	5.056	$ 154,005	$ 121,397	10	2012
1897	M161044	UNK	M16-122	M16-127	266	18	ACP	1963	2012	0.556	4.639	$ 136,571	$ 150,537	10	2012
1888	M151005	SHOPPING LN	M16-124	M15-128	249	20	ACP	1963	2012	0.556	5.056	$ 161,385	$ 154,475	10	2012
1894	M161047	MARLIN DR	M16-125	M16-124	285	18	ACP	1963	2013	0.500	4.175	$ 138,810	$ 161,289	10	2012
1926	M161015	MARLIN DR	M16-126	M16-125	269	18	ACP	1963	2013	0.5	4.175	$ 136,186	$ 117,749	10	2012
					2833.59997							$ 1,605,920	$ 1,427,425	**10 Total**	
					6933.19997							$ 3,652,975	$ 3,841,398		**2012 Total**
1660	M121010	SYCAMORE DR	M12-111	M12-116	105	14	ACP	1964	2012	0.313	2.609	$ 61,476	$ 48,912	11	2013
1609	M121061	SYCAMORE DR	M12-116	M12-131	396	14	ACP	1964	2012	0.417	3.479	$ 152,117	$ 174,596	11	2013
1648	M121022	SYCAMORE DR	M12-143	M12-147	252	14	ACP	1964	2012	0.417	3.479	$ 97,868	$ 111,106	11	2013
1646	M121024	SYCAMORE DR	M12-147	M12-150	252	14	ACP	1964	2012	0.313	2.609	$ 132,494	$ 111,106	11	2013
1647	M121023	SYCAMORE DR	M12-150	M12-155	224.10001	14	ACP	1964	2012	0.417	3.479	$ 76,814	$ 98,805	11	2013
2894	N121013	SYCAMORE DR	N12-144	N12-152	266	12	ACP	1964	2012	0.417	2.229	$ 44,833	$ 93,541	11	2013
2901	N121006	SYCAMORE DR	N12-152	M12-106	273.20001	12	ACP	1964	2012	0.417	2.229	$ 109,391	$ 96,073	11	2013
					1768.30002							$ 674,993	$ 734,139	**11 Total**	
1639	M121031	UNK	M12-107	M12-106	114.3	10	ACP	1964	2013	0.313	1.672	$ 78,002	$ 36,983	12	2013
2212	M191031	UNK	M19-108	M19-122	152.39999	10	ACP	1964	2013	0.313	1.672	$ 48,002	$ 49,310	12	2013
1392	M91066	SORREL ST	M9-149	M9-148	342.10001	10	VCP	1963	2013	0.102	0.546	$ 199,621	$ 95,461	12	2013
2463	N61018	UNK	N6-102	N6-100	396	10	ACP	1963	2013	0.556	2.972	$ 264,249	$ 110,501	12	2013
3999	O131072	UNK	O13-126	O13-148	399.10001	10	RCP	1973	2013	0.124	0.776	$ 189,596	$ 127,799	12	2013
4173	O151056	TAPO CANYON RD	O15-148	O15-134	269	12	ACP	1971	2013	0.152	0.811	$ 93,870	$ 94,596	12	2013
5123	P171036	UNK	P17-107	P17-111	356.10001	10	ACP	1963	2013	0.417	2.229	$ 54,255	$ 109,274	12	2013
5500	Q151003	TAPO CANYON RD	Q15-155	P15-100	221	12	ACP	1971	2013	0.152	0.811	$ 140,980	$ 77,716	12	2013
					2250.00002							$ 1,068,575	$ 701,641	**12 Total**	
1769	M141051	E LOS ANGELES AVE	M14-117	M14-116	421	36	ACP	1972	2013	0.139	1.264	$ 473,562	$ 559,222	13	2013
1768	M141052	E LOS ANGELES AVE	M14-118	M14-117	488	30	ACP	1972	2013	0.139	1.264	$ 354,234	$ 452,474	13	2013
1767	M141053	E LOS ANGELES AVE	M14-119	M14-118	469	30	ACP	1972	2013	0.139	1.264	$ 357,156	$ 434,857	13	2013
1745	M141075	E LOS ANGELES AVE	M14-120	M14-119	518	30	ACP	1971	2013	0.152	1.379	$ 410,316	$ 480,290	13	2013
1812	M141008	E LOS ANGELES AVE	M15-107	M14-120	450	30	ACP	1971	2013	0.152	1.379	$ 333,053	$ 417,240	13	2013
1842	M151051	E LOS ANGELES AVE	M15-109	M15-108	485.5	24	ACP	1971	2013	0.152	1.379	$ 495,474	$ 359,498	13	2013
1903	M161038	E LOS ANGELES AVE	M16-113	M16-112	450.10001	24	ACP	1971	2013	0.152	1.379	$ 304,001	$ 333,285	13	2013
1986	M171001	E LOS ANGELES AVE	M17-103	M16-107	400	18	ACP	1964	2013	0.313	2.609	$ 183,456	$ 226,371	13	2013
5131	P171028	TEXAS AVE	P17-110	P17-120	287	18	ACP	1971	2013	0.114	0.949	$ 143,648	$ 167,787	13	2013
					3968.60001							$ 3,054,900	$ 3,431,023	**13 Total**	
					7986.90005							$ 4,798,469	$ 4,866,803		**2013 Total**
1481	M101039	ERRINGER RD	M10-103	M10-111	88	12	ACP	1969	2014	0.185	0.991	$ 62,270	$ 32,219	14	2014
1452	M91007	PATRICIA AVE	M10-119	M9-125	505.5	33	ACP	1971	2014	0.152	1.379	$ 389,468	$ 413,974	14	2014
1535	M111061	E LOS ANGELES AVE	M11-107	M11-106	485.5	33	ACP	1972	2014	0.139	1.264	$ 411,144	$ 540,229	14	2014

OBJECTID_1	FEATURE_ID	STREET_NAME	FROM_	TO_	PIPE_LENGTH	SIZE_	MATERIAL	ORIG_CONST	REP_YR	VULN	RISK	EST_REHAB_COST	EST_REPLACE_COST	CIP_PROJECT	CIP_YEAR
1540	M111056	E LOS ANGELES AVE	M11-108	M11-107	466	33	ACP	1972	2014	0.139	1.264	$ 394,630	$ 518,530	14	2014
1542	M111054	E LOS ANGELES AVE	M11-109	M11-108	478	33	ACP	1972	2014	0.139	1.264	$ 404,792	$ 531,883	14	2014
1541	M111055	E LOS ANGELES AVE	M11-110	M11-109	444.5	33	ACP	1972	2014	0.139	1.264	$ 376,423	$ 494,607	14	2014
1586	M111010	E LOS ANGELES AVE	M12-108	M11-110	238	36	ACP	1972	2014	0.139	1.264	$ 268,992	$ 320,907	14	2014
1638	M121032	E LOS ANGELES AVE	M12-109	M12-108	488	36	ACP	1972	2014	0.139	1.264	$ 551,547	$ 657,995	14	2014
1637	M121033	E LOS ANGELES AVE	M12-110	M12-109	500	36	ACP	1972	2014	0.139	1.264	$ 552,678	$ 674,175	14	2014
8692	M121013	E LOS ANGELES AVE	M12-111	M12-110	457	36	PVC	1972	2042	0.032	0.294	$ 558,329	$ 607,042	14	2014
1656	M121014	E LOS ANGELES AVE	M12-112	M12-169	390	36	ACP	1972	2014	0.139	1.264	$ 569,631	$ 518,044	14	2014
1656	M121014	E LOS ANGELES AVE	M12-112A	M12-111	14	36	ACP	1972	2014	0.139	1.264	$ 15,823	$ 15,823	14	2014
1685	M131038	E LOS ANGELES AVE	M13-111	M13-110	510	36	ACP	1972	2014	0.139	1.264	$ 565,110	$ 687,658	14	2014
1684	M131039	E LOS ANGELES AVE	M13-112	M13-111	520	36	ACP	1972	2014	0.139	1.264	$ 582,063	$ 701,142	14	2014
1683	M131040	E LOS ANGELES AVE	M13-113	M13-112	502	36	ACP	1972	2014	0.139	1.264	$ 562,850	$ 676,872	14	2014
					6086.5							$ 6,265,750	$ 7,391,100	**14 Total**	
					6086.5							$ 6,265,750	$ 7,391,100		**2014 Total**
3568	O61036	UNK	O6-118	O6-116	299	33	ACP	1962	2015	0.625	5.688	$ 197,644	$ 266,823	15	2015
3591	O61013	UNK	O6-134	O6-133	366	20	ACP	1963	2015	0.556	5.056	$ 206,184	$ 212,941	15	2015
3648	O71009	W EASY ST	O7-112	O7-111	404	36	ACP	1971	**2015**	0.152	1.379	$ 480,025	$ 571,708	15	2015
3604	O71053	UNK	O7-115	O6-134	366	20	ACP	1963	2015	0.556	5.056	$ 150,518	$ 212,941	15	2015
4521	P51002	UNK	P5-100	P5-102	542.70001	48	ACP	1971	2015	0.152	1.379	$ 635,936	$ 673,275	15	2015
4551	P61002	UNK	P6-101	P5-100	496.79999	48	ACP	1971	2015	0.152	1.379	$ 582,150	$ 616,331	15	2015
					2474.5							$ 2,252,456	$ 2,554,019	**15 Total**	
7414	K111055	ROYAL AVE	K11-114	K11-113	198	20	ACP	1963	2015	0.417	3.792	$ 115,874	$ 126,949	16	2015
7398	K111069	ROYAL AVE	K11-115	K11-114	181.3	20	ACP	1963	2015	0.417	3.792	$ 83,507	$ 116,242	16	2015
32	K121076	ROYAL AVE	K12-116	K12-119	265	20	ACP	1977	2015	0.098	0.892	$ 155,531	$ 164,402	16	2015
63	K121046	ROYAL AVE	K12-117	K12-115	296	20	ACP	1977	2015	0.098	0.892	$ 171,290	$ 189,782	16	2015
771	L131057	ROYAL AVE	L13-129	L13-133	223	20	ACP	1977	2015	0.098	0.892	$ 148,645	$ 138,345	16	2015
760	L131068	ROYAL AVE	L13-130	L13-134	293.89999	20	ACP	1977	2015	0.098	0.892	$ 172,383	$ 182,331	16	2015
792	L131036	ROYAL AVE	L13-132	L13-131	275	20	ACP	1977	2015	0.098	0.892	$ 126,665	$ 170,605	16	2015
764	L131064	ROYAL AVE	L13-138	L13-143	448.39999	20	ACP	1963	2015	0.417	3.792	$ 255,805	$ 287,494	16	2015
827	L131001	ROYAL AVE	L13-143	L12-150	399.10001	20	ACP	1963	2015	0.556	5.056	$ 261,184	$ 247,595	16	2015
848	L141014	ROYAL AVE	L14-105	L14-114	365.29999	20	ACP	1977	2015	0.098	0.892	$ 217,607	$ 226,626	16	2015
841	L141020	ROYAL AVE	L14-119	L14-120	277	20	ACP	1975	2015	0.111	1.011	$ 126,204	$ 171,846	16	2015
					3221.99998							$ 1,834,695	$ 2,022,218	**16 Total**	
1311	M81077	5TH ST	M8-114	M8-111	162	24	ACP	1962	2015	0.625	5.688	$ 113,824	$ 128,609	17	2015
1294	M81094	5TH ST	M8-159	M8-130	366	24	ACP	1962	2015	0.833	7.583	$ 203,851	$ 251,462	17	2015
1303	M81085	VENTURA AVE	M8-172	M8-171	356	24	ACP	1962	2015	0.833	7.583	$ 220,906	$ 229,378	17	2015
2603	N81015	E EASY ST	N8-128	N8-127	138	36	acp	1971	2015	0.152	1.379	$ 186,165	$ 153,822	17	2015
2598	N81020	E EASY ST	N8-136	N8-137	259	33	ACP	1970	2015	0.167	1.517	$ 257,301	$ 243,810	17	2015
					1281							$ 982,048	$ 1,007,081	**17 Total**	
					6977.49998							$ 5,069,199	$ 5,583,318		**2015 Total**
607	L101002	ROYAL AVE	L10-114	L9-148	421	24	ACP	1961	2016	1.000	9.100	$ 289,347	$ 301,243	100	2016
555	L101054	ROYAL AVE	L10-115	L10-114	406	24	ACP	1961	2016	1.000	9.100	$ 279,038	$ 290,510	100	2016
591	L101018	ROYAL AVE	L10-116	L10-115	203.60001	24	ACP	1961	2016	1.000	9.100	$ 139,931	$ 145,684	100	2016
590	L101019	ROYAL AVE	L10-117	L10-116	300	24	ACP	1961	2016	1.000	9.100	$ 206,186	$ 214,663	100	2016
589	L101020	ROYAL AVE	L10-118	L10-117	296.70001	24	ACP	1961	2016	1.000	9.100	$ 203,917	$ 212,301	100	2016
588	L101021	ROYAL AVE	L10-120	L10-118	301.20001	24	ACP	1961	2016	1.000	9.100	$ 207,010	$ 215,521	100	2016
587	L101022	ROYAL AVE	L10-131	L10-120	400	24	ACP	1961	2016	1.000	9.100	$ 284,885	$ 296,188	100	2016
505	L91047	ROYAL AVE	L9-143	L9-142	396	24	ACP	1961	2016	1.000	9.100	$ 303,189	$ 314,379	100	2016
541	L91011	ROYAL AVE	L9-144	L9-143	231	24	ACP	1961	2016	1.000	9.100	$ 176,860	$ 183,387	100	2016
540	L91012	ROYAL AVE	L9-145	L9-170	120	24	ACP	1961	2016	1.000	9.100	$ 91,875	$ 95,266	100	2016
8642	L91019	ROYAL AVE	L9-146	L9-171	70	24	ACP	1961	2011	1	9.1	$ 53,594	$ 55,572	100	2016
507	L91045	ROYAL AVE	L9-147	L9-146	320	24	ACP	1961	2016	1.000	9.100	$ 245,001	$ 254,043	100	2016
8643	L91046	ROYAL AVE	L9-148	L9-172	10	24	ACP	1961	2011	1	9.1	$ 6,873	$ 7,155	100	2016
8638	L91012	ROYAL AVE	L9-170	L9-144	52	24	ACP	1961	2011	1	9.1	$ 39,813	$ 41,282	100	2016
533	L91019	ROYAL AVE	L9-171	L9-145	300	24	ACP	1961	2016	1.000	9.100	$ 229,689	$ 238,166	100	2016

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506	L91046	ROYAL AVE	L9-172	L9-147	335	24	ACP	1961	2016	1.000	9.100	$ 238,591	$ 248,057	100	2016
					4162.50003							$ 2,995,799	$ 3,113,418	**100 Total**	
1913	M161028	E LOS ANGELES AVE	DE	M16-102	10	14	ACP	1963	2013	0.333	2.783	$ 3,531	$ 4,409	101	2016
1912	M161029	E LOS ANGELES AVE	DE	M16-102	17	12	ACP	1963	2013	0.333	1.783	$ 3,177	$ 5,978	101	2016
1936	M161005	TAPO ST	DE	M16-124	10	12	ACP	1963	2013	0.333	1.783	$ 1,869	$ 3,517	101	2016
472	L81008	4TH ST	L8-107	M8-175	320	10	ACP	1964	2014	0.250	1.563	$ 57,689	$ 106,031	101	2016
419	L81061	4TH ST	L8-114	L8-107	296	10	ACP	1964	2014	0.250	1.563	$ 53,363	$ 98,079	101	2016
437	L81043	FIRST ST	L8-129	L8-118	274	24	ACP	1962	2012	0.500	4.550	$ 204,904	$ 212,646	101	2016
417	L81063	4TH ST	L8-131	L8-114	286.79999	10	ACP	1964	2014	0.250	1.563	$ 60,640	$ 103,967	101	2016
453	L81027	4TH ST	L8-138	L8-131	246.60001	10	ACP	1964	2014	0.250	1.563	$ 56,257	$ 93,510	101	2016
452	L81028	4TH ST	L8-143	L8-138	46	10	ACP	1964	2014	0.250	1.563	$ 8,958	$ 15,907	101	2016
455	L81025	BRYSON AVE	L8-155	L8-142	272	10	ACP	1964	2014	0.250	1.563	$ 49,036	$ 90,126	101	2016
8691	M111038	UNK	M11-101	M11-112	286	12	ACP	1964	2014	0.25	1.563	$ 62,063	$ 109,194	101	2016
1533	M111063	YSRELLA AVE	M11-111	M11-123	399	12	ACP	1964	2014	0.250	1.563	$ 80,331	$ 146,084	101	2016
1856	M151037	BUYERS ST	M15-126	M15-123	80	20	ACP	1963	2013	0.333	3.033	$ 34,424	$ 38,235	101	2016
8733	M161013	E LOS ANGELES AVE	M16-121	M16-122	35	18	ACP	1963	2013	0.333	2.783	$ 18,041	$ 19,807	101	2016
1924	M161017	MARLIN DR	M16-127	M16-126	70	18	ACP	1963	2013	0.333	2.783	$ 27,109	$ 30,641	101	2016
8717	M171038	UNK	M17-126	M17-139	61	16	ACP	1964	2014	0.25	2.088	$ 23,895	$ 28,158	101	2016
8713	M181099	UNK	M18-178	M18-189	86	14	ACP	1964	2014	0.25	2.088	$ 30,727	$ 38,275	101	2016
8644	M81061	FIRST ST	M8-180	M8-181	110	24	ACP	1962	2012	0.5	4.55	$ 82,261	$ 85,369	101	2016
8739	N61059	UNK	N6-134	N6-103	154	27	ACP	1962	2012	0.5	4.55	$ 104,882	$ 108,666	101	2016
					3059.4							$ 963,155	$ 1,338,599	**101 Total**	
579	L101030	ERRINGER RD	L10-106	L10-112	365.29999	20	ACP	1963	2015	0.417	3.792	$ 216,809	$ 234,214	102	2016
586	L101023	ERRINGER RD	L10-141	L10-131	354	20	ACP	1961	2016	1.000	9.100	$ 215,355	$ 232,222	102	2016
670	L111008	ELIZONDO AVE	L11-138	L11-136	286	10	ACP	1963	2015	0.556	2.972	$ 36,601	$ 79,806	102	2016
1566	M111030	HEYWOOD ST	M11-147	M11-146	340	14	ACP	1963	2015	0.556	4.639	$ 105,942	$ 135,780	102	2016
1748	M141072	BOLIVAR CT	M14-100	M14-111	154.10001	12	ACP	1970	2016	0.167	0.892	$ 21,364	$ 46,759	102	2016
1751	M141069	UNK	M14-114	M14-100	155.89999	12	ACP	1970	2016	0.167	0.892	$ 21,614	$ 47,306	102	2016
1927	M161014	UNK	M16-100	M16-101	70.5	10	ACP	1965	2015	0.200	1.070	$ 9,022	$ 19,673	102	2016
1896	M161045	UNK	M16-101	M16-114	302.29999	10	ACP	1965	2015	0.200	1.070	$ 56,180	$ 101,848	102	2016
2035	M181066	UNK	M18-182	M18-178	405	14	ACP	1964	2015	0.313	2.609	$ 144,704	$ 180,246	102	2016
2945	N131036	ROSALIE ST	N13-160	N13-161	220.8	10	ACP	1964	2015	0.417	2.229	$ 38,086	$ 71,441	102	2016
2600	N81018	UNK	N8-148	N8-147	60.9	10	ACP	1965	2015	0.200	1.070	$ 10,979	$ 20,179	102	2016
3797	O101038	ERRINGER RD	O10-119	O10-132	326	10	ACP	1970	2016	0.167	0.892	$ 56,231	$ 105,480	102	2016
3782	O101053	ERRINGER RD	O10-132	O10-155	330.39999	10	ACP	1970	2016	0.167	0.892	$ 56,990	$ 106,903	102	2016
3794	O101041	COCHRAN ST	O10-154	O10-150	256	10	ACP	1970	2016	0.167	0.892	$ 44,157	$ 82,831	102	2016
3785	O101050	COCHRAN ST	O10-155	O10-154	251.3	10	ACP	1970	2016	0.167	0.892	$ 43,346	$ 81,310	102	2016
3927	O121044	COCHRAN ST	O12-126	O12-131	46	12	DIP	1980	2015	0.222	1.189	$ 8,596	$ 16,176	102	2016
					3924.49997							$ 1,085,978	$ 1,562,174	**102 Total**	
					11146.4							$ 5,044,932	$ 6,014,191		**2016 Total**
476	L81004	FIRST ST	L8-106	M8-180	306	24	ACP	1962	2017	0.500	4.550	$ 228,834	$ 237,480	103	2017
436	L81044	FIRST ST	L8-118	L8-106	309	24	ACP	1962	2017	0.500	4.550	$ 231,077	$ 239,809	103	2017
442	L81038	FIRST ST]	L8-132	L8-129	18	24	ACP	1962	2017	0.500	4.550	$ 13,461	$ 13,969	103	2017
550	L91002	ROYAL AVE	L9-139	L8-132	406	24	ACP	1962	2017	0.500	4.550	$ 303,616	$ 315,088	103	2017
8637	L91053	ROYAL AVE	L9-140	L9-139	160	24	ACP	1962	2012	0.5	4.55	$ 119,652	$ 124,173	103	2017
499	L91053	ROYAL AVE	L9-141	L9-140	241	24	ACP	1962	2017	0.500	4.550	$ 180,225	$ 187,035	103	2017
500	L91052	ROYAL AVE	L9-142	L9-141	346	24	ACP	1962	2017	0.500	4.550	$ 258,747	$ 268,524	103	2017
1514	M101006	HEYWOOD ST	M11-140	M10-137	287.70001	14	ACP	1963	2017	0.556	4.639	$ 74,704	$ 99,953	103	2017
1568	M111028	HEYWOOD ST	M11-145	M11-144	338	14	ACP	1963	2017	0.556	4.639	$ 105,318	$ 134,981	103	2017
1309	M81079	5TH ST	M8-117	M8-114	185	24	ACP	1962	2017	0.500	4.550	$ 118,583	$ 123,811	103	2017
1297	M81091	5TH ST	M8-130	M8-117	366	24	ACP	1962	2017	0.500	4.550	$ 234,603	$ 244,945	103	2017
1292	M81096	VENTURA AVE	M8-170	M8-169	346	24	ACP	1962	2017	0.625	5.688	$ 227,944	$ 237,720	103	2017
1317	M81071	VENTURA AVE	M8-171	M8-170	356	24	ACP	1962	2017	0.625	5.688	$ 228,193	$ 238,252	103	2017
1328	M81060	VENTURA AVE	M8-173	M8-172	360.70001	24	ACP	1962	2017	0.500	4.550	$ 269,740	$ 279,932	103	2017
1327	M81061	FIRST ST	M8-181	M8-173	156	24	ACP	1962	2017	0.500	4.550	$ 116,660	$ 121,068	103	2017

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2419	N61059	UNK	N6-121	N6-134	403	27	ACP	1962	2017	0.500	4.550	$ 274,464	$ 284,366	103	2017
2548	N71001	STRATHEARN PL	N7-132	N6-137	356	27	ACP	1962	2017	0.500	4.550	$ 242,455	$ 251,201	103	2017
2538	N71011	STRATHEARN PL	N7-133	N7-132	360.10001	27	ACP	1962	2017	0.500	4.550	$ 307,280	$ 316,128	103	2017
4546	P61007	UNK	O6-101	P6-110	458.5	33	ACP	1962	2017	0.5	4.55	$ 347,979	$ 375,483	103	2017
3570	O61034	UNK	O6-108	O6-101	458.5	33	ACP	1962	2017	0.500	4.550	$ 347,979	$ 375,483	103	2017
3574	O61030	UNK	O6-116	O6-113	450	33	ACP	1962	2017	0.500	4.550	$ 374,579	$ 401,574	103	2017
3567	O61037	UNK	O6-121	O6-118	119	33	ACP	1962	2017	0.500	4.550	$ 99,055	$ 106,194	103	2017
5048	P161027	UNK	P16-136	P16-135	102.6	10	ACP	1962	2017	0.625	3.344	$ 13,130	$ 28,630	103	2017
5046	P161029	UNK	P16-137	P16-136	267.89999	10	ACP	1962	2017	0.625	3.344	$ 34,285	$ 74,756	103	2017
5023	P161052	BEAUMONT ST	P16-138	P16-137	239.39999	10	ACP	1962	2017	0.625	3.344	$ 30,637	$ 66,803	103	2017
5031	P161044	BEAUMONT ST	P16-139	P16-138	252.60001	10	ACP	1962	2017	0.625	3.344	$ 32,327	$ 70,486	103	2017
5030	P161045	BEAUMONT ST	P16-140	P16-139	237.39999	10	ACP	1962	2017	0.625	3.344	$ 30,381	$ 66,245	103	2017
5018	P161057	BEAUMONT ST	P16-141	P16-140	240.60001	10	ACP	1962	2017	0.625	3.344	$ 30,791	$ 67,138	103	2017
4522	P51001	UNK	P5-103	BNODE	516.79999	33	ACP	1962	2017	0.625	5.688	$ 392,226	$ 423,228	103	2017
					8643.80001							$ 5,268,928	$ 5,774,455	**103 Total**	
					8643.80001							$ 5,268,928	$ 5,774,455		**2017 Total**
3637	O71020	UNK	BNODE	BNODE	7	20	ACP	1963	**2013**	0.333	3.033	$ 3,739	$ 4,073	104	2018
3638	O71019	UNK	BNODE	O7-115	10	20	ACP	1963	2013	0.333	3.033	$ 5,342	$ 5,818	104	2018
106	K121005	ROYAL AVE	K12-113	K11-115	345.29999	20	ACP	1963	2018	0.333	3.033	$ 197,766	$ 214,218	104	2018
65	K121044	ROYAL AVE	K12-114	K12-113	148.39999	20	ACP	1963	2018	0.333	3.033	$ 84,994	$ 92,065	104	2018
562	L101047	ERRINGER RD	L10-100	L10-106	426.10001	20	ACP	1963	2018	0.333	3.033	$ 252,895	$ 273,197	104	2018
571	L101038	ELIZONDO AVE	L10-107	L10-106	173.39999	10	ACP	1963	2018	0.333	1.783	$ 32,225	$ 58,420	104	2018
581	L101028	ELIZONDO AVE	L10-108	L10-107	151.39999	10	ACP	1963	2018	0.333	1.783	$ 23,588	$ 46,459	104	2018
556	L101053	ELIZONDO AVE	L10-109	L10-108	226	10	ACP	1963	2018	0.333	1.783	$ 28,923	$ 63,064	104	2018
582	L101027	ELIZONDO AVE	L10-111	L10-109	221	10	ACP	1963	2018	0.333	1.783	$ 28,283	$ 61,669	104	2018
580	L101029	ERRINGER ST	L10-112	L10-130	362.60001	20	ACP	1963	2018	0.333	3.033	$ 215,207	$ 232,483	104	2018
572	L101037	ROYAL AVE	L10-130	L10-131	28.4	20	ACP	1963	2018	0.333	3.033	$ 16,856	$ 18,209	104	2018
635	L111043	ELIZONDO AVE	L11-128	L11-129	256.70001	10	ACP	1964	2018	0.417	2.604	$ 39,993	$ 78,772	104	2018
636	L111042	ELIZONDO AVE	L11-129	L11-130	256.70001	10	ACP	1964	2018	0.417	2.604	$ 39,993	$ 78,772	104	2018
637	L111041	ELIZONDO AVE	L11-130	L11-131	255.3	10	ACP	1964	2018	0.417	2.604	$ 39,775	$ 78,343	104	2018
619	L111059	ELIZONDO AVE	L11-131	L11-133	214.3	10	ACP	1964	2018	0.417	2.229	$ 27,425	$ 59,799	104	2018
676	L111002	ELIZONDO AVE	L11-132	L10-111	349.20001	10	ACP	1963	2017	0.556	2.972	$ 44,689	$ 97,442	104	2018
624	L111054	ELIZONDO AVE	L11-133	L11-137	214.3	10	ACP	1963	2017	0.556	2.972	$ 27,425	$ 59,799	104	2018
610	L111068	ELIZONDO AVE	L11-136	L11-132	288.20001	10	ACP	1963	2017	0.556	2.972	$ 36,883	$ 80,420	104	2018
667	L111011	ELIZONDO AVE	L11-137	L11-138	183.60001	10	ACP	1963	2017	0.556	2.972	$ 23,496	$ 51,232	104	2018
1045	L201016	KATHERINE RD.	L20-128	L20-127	255.10001	12	ACP	1973	2018	0.128	0.801	$ 53,820	$ 95,859	104	2018
1475	M101045	ERRINGER RD	M10-134	M10-141	268.79999	16	ACP	1963	2018	0.333	2.783	$ 105,293	$ 124,079	104	2018
1472	M101048	HEYWOOD ST	M10-135	M10-134	276.89999	16	ACP	1963	2018	0.333	2.783	$ 108,466	$ 127,818	104	2018
1494	M101026	HEYWOOD ST	M10-136	M10-135	69	16	ACP	1963	2018	0.333	2.783	$ 23,752	$ 28,575	104	2018
1470	M101050	HEYWOOD ST	M10-137	M10-136	223.89999	16	ACP	1963	2018	0.333	2.783	$ 77,074	$ 92,722	104	2018
1516	M101004	ERRINGER RD	M10-141	L10-100	286.5	16	ACP	1963	2018	0.333	2.783	$ 119,029	$ 139,051	104	2018
1569	M111027	YSRELLA AVE	M11-123	M11-131	333	12	ACP	1963	2018	0.333	2.083	$ 56,204	$ 111,080	104	2018
1570	M111026	YSRELLA AVE	M11-131	M11-144	396	12	ACP	1963	2018	0.417	2.604	$ 66,837	$ 132,096	104	2018
1581	M111015	HEYWOOD ST	M11-141	M11-140	255	14	ACP	1963	2018	0.333	2.783	$ 66,214	$ 88,592	104	2018
1582	M111014	HEYWOOD ST	M11-142	M11-141	255	14	ACP	1963	2018	0.333	2.783	$ 66,214	$ 88,592	104	2018
1583	M111013	HEYWOOD ST	M11-143	M11-142	255	14	ACP	1963	2018	0.333	2.783	$ 79,456	$ 101,835	104	2018
1538	M111058	HEYWOOD ST	M11-144	M11-143	256.5	14	ACP	1963	2018	0.333	2.783	$ 79,924	$ 102,434	104	2018
1567	M111029	HEYWOOD ST	M11-146	M11-145	338	14	ACP	1963	2018	0.417	3.479	$ 105,318	$ 134,981	104	2018
1765	M141055	ROSALIE ST	M14-109	M14-110	256	10	ACP	1964	2018	0.417	2.229	$ 32,762	$ 71,435	104	2018
1766	M141054	ROSALIE ST	M14-110	M14-108	258	10	ACP	1964	2018	0.417	2.229	$ 33,018	$ 71,993	104	2018
1758	M141062	UNK	M14-129	M14-132	269	20	ACP	1963	2018	0.333	3.033	$ 115,749	$ 128,566	104	2018
1760	M141060	UNK	M14-131	M14-130	311.20001	20	ACP	1963	2018	0.333	3.033	$ 133,908	$ 148,735	104	2018
1843	M151050	UNK	M15-120	M15-119	400	20	ACP	1963	2018	0.417	3.792	$ 172,118	$ 191,176	104	2018
1855	M151038	UNK	M15-122	M15-125	80	20	ACP	1963	2018	0.417	3.792	$ 34,424	$ 38,235	104	2018
1854	M151039	UNK	M15-124	M15-121	127	20	ACP	1963	2018	0.417	3.792	$ 54,647	$ 60,698	104	2018

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1914	M161027	E LOS ANGELES AVE	M16-102	M16-105	59	15	ACP	1963	2018	0.333	2.783	$ 21,667	$ 26,317	104	2018
2039	M181062	STOW ST	M18-108	M18-121	294.5	10	ACP	1968	2018	0.125	0.669	$ 50,798	$ 95,288	104	2018
2768	N111070	N JUSTIN AVE	N11-100	N11-104	69.8	10	ACP	1967	2017	0.143	0.893	$ 10,875	$ 21,419	104	2018
2770	N111068	N JUSTIN AVE	N11-104	N11-113	301.89999	10	ACP	1967	2017	0.143	0.893	$ 47,035	$ 92,642	104	2018
2773	N111065	BIRCHFIELD ST	N11-106	N11-105	292.10001	10	ACP	1968	2018	0.125	0.781	$ 45,508	$ 89,635	104	2018
2802	N111036	N JUSTIN AVE	N11-113	N11-121	255.60001	10	ACP	1967	2017	0.143	0.893	$ 39,822	$ 78,435	104	2018
2797	N111041	N JUSTIN AVE	N11-121	N11-130	258.5	10	ACP	1967	2017	0.143	0.893	$ 40,273	$ 79,324	104	2018
2798	N111040	N JUSTIN AVE	N11-130	N11-138	253	10	ACP	1967	2017	0.143	0.893	$ 39,417	$ 77,637	104	2018
2793	N111045	N JUSTIN AVE	N11-138	N11-149	261	10	ACP	1967	2017	0.143	0.893	$ 40,663	$ 80,092	104	2018
2808	N111030	N JUSTIN AVE	N11-149	N11-161	253	10	ACP	1967	2017	0.143	0.764	$ 32,378	$ 70,598	104	2018
2971	N131010	ROSALIE ST	N13-161	N14-161	220.8	10	ACP	1964	2018	0.417	2.229	$ 28,257	$ 61,613	104	2018
2987	N141074	TRACY AVE	N14-119	N14-126	323.29999	10	ACP	1967	2017	0.143	0.893	$ 50,369	$ 99,209	104	2018
3308	N181072	STOW ST	N18-145	N18-166	340	10	ACP	1968	2018	0.125	0.669	$ 43,512	$ 94,875	104	2018
3375	N181005	STOW ST	N18-166	M18-108	340	10	ACP	1968	2018	0.125	0.669	$ 43,512	$ 94,875	104	2018
3861	O111057	N JUSTIN AVE	O11-150	O11-159	264.29999	10	ACP	1967	2017	0.143	0.764	$ 45,589	$ 85,516	104	2018
3916	O111002	N JUSTIN AVE	O11-159	N11-100	419	10	ACP	1967	2017	0.143	0.893	$ 77,868	$ 141,166	104	2018
3592	O61012	UNK	O6-130	O6-131	244	20	ACP	1963	2018	0.333	3.033	$ 118,025	$ 129,651	104	2018
3554	O61050	UNK	O6-133	O6-130	366	20	ACP	1963	2018	0.333	3.033	$ 177,038	$ 194,477	104	2018
3607	O71050	UNK	O7-117	BNODE	353.29999	20	ACP	1963	2018	0.333	3.033	$ 225,414	$ 242,247	104	2018
3621	O71036	E EASY ST	O7-119	O7-117	393.39999	12	ACP	1963	2018	0.417	2.229	$ 90,111	$ 154,942	104	2018
5122	P171037	DALHART AVE	P17-109	P17-107	417.5	10	ACP	1963	2018	0.417	2.229	$ 53,430	$ 116,501	104	2018
					15267.79999							$ 4,075,282	$ 5,859,266	**104 Total**	
					15267.79999							$ 4,075,282	$ 5,859,266		**2018 Total**
634	L111044	ELIZONDO AVE	L11-127	L11-128	127.4	10	ACP	1964	2019	0.250	1.563	$ 19,848	$ 39,095	105	2019
2091	M181010	UNK	L19-100	M18-185	347.60001	14	ACP	1964	2019	0.250	2.088	$ 124,195	$ 154,700	105	2019
948	L191047	UNK	L19-101	L19-100	280.29999	14	ACP	1964	2019	0.250	2.088	$ 119,364	$ 143,963	105	2019
1502	M101018	PATRICIA AVE	M10-124	M10-123	425	33	ACP	1971	2019	0.114	1.034	$ 437,009	$ 462,504	105	2019
1565	M111031	HEYWOOD ST	M11-148	M11-147	218	14	ACP	1964	2019	0.313	2.609	$ 67,927	$ 87,059	105	2019
1556	M111040	HEYWOOD ST	M11-149	M11-148	252	14	ACP	1964	2019	0.313	2.609	$ 78,521	$ 100,637	105	2019
1555	M111041	HEYWOOD ST	M11-150	M11-149	252	14	ACP	1964	2019	0.250	2.088	$ 65,435	$ 87,550	105	2019
1623	M121047	HILLDALE AVE	M12-100	M12-105	52	10	ACP	1964	2019	0.250	1.338	$ 8,101	$ 15,957	105	2019
1610	M121060	UNK	M12-101	M12-107	142.8	10	ACP	1964	2019	0.250	1.338	$ 18,275	$ 39,847	105	2019
1622	M121048	HILLDALE AVE	M12-103	M12-102	271.39999	10	ACP	1964	2019	0.250	1.338	$ 34,733	$ 75,732	105	2019
1621	M121049	HILLDALE AVE	M12-104	M12-103	265.89999	10	ACP	1964	2019	0.250	1.338	$ 34,029	$ 74,198	105	2019
1614	M121056	HILLDALE AVE	M12-105	M12-104	148.7	10	ACP	1964	2019	0.313	1.672	$ 23,167	$ 45,631	105	2019
1606	M121064	SYCAMORE DR	M12-131	M12-141	396	14	ACP	1964	2019	0.250	2.088	$ 139,843	$ 174,596	105	2019
1649	M121021	SYCAMORE DR	M12-141	M12-143	273.39999	14	ACP	1964	2019	0.250	2.088	$ 96,548	$ 120,541	105	2019
1668	M121002	HEYWOOD ST	M12-148	M11-150	242.2	14	ACP	1964	2019	0.250	2.088	$ 62,890	$ 84,145	105	2019
1605	M121065	HEYWOOD ST	M12-155	M12-148	394.5	14	ACP	1964	2019	0.250	2.088	$ 139,313	$ 173,934	105	2019
1662	M121008	HILLDALE AVE	M13-100	M12-100	256.29999	10	ACP	1964	2019	0.250	1.338	$ 39,931	$ 78,649	105	2019
1810	M141010	UNK	M14-104	M14-107	244	12	ACP	1964	2019	0.250	1.338	$ 33,828	$ 74,038	105	2019
1774	M141046	UNK	M14-105	M14-128	465	15	ACP	1964	2019	0.313	2.609	$ 181,113	$ 217,763	105	2019
1809	M141011	UNK	M14-107	M14-105	115	12	ACP	1964	2019	0.250	1.338	$ 15,944	$ 34,895	105	2019
1808	M141012	UNK	M14-108	M14-105	145	14	ACP	1964	2019	0.250	2.088	$ 37,651	$ 50,376	105	2019
1723	M141097	UNK	M14-111	M14-104	241	12	ACP	1964	2019	0.250	1.338	$ 33,412	$ 73,128	105	2019
1851	M151042	E LOS ANGELES AVE	M15-111	M15-110	485.60001	24	ACP	1971	2019	0.114	1.034	$ 345,850	$ 359,572	105	2019
1935	M161006	E LOS ANGELES AVE	M16-110	M16-109	357	24	ACP	1971	2019	0.114	1.034	$ 254,260	$ 264,348	105	2019
1931	M161010	E LOS ANGELES AVE	M16-112	M16-111	450	24	ACP	1971	2019	0.114	1.034	$ 320,496	$ 333,211	105	2019
1967	M171020	E LOS ANGELES AVE	M17-114	M17-103	398.39999	18	ACP	1964	2019	0.250	2.088	$ 218,129	$ 238,234	105	2019
1968	M171019	UNK	M17-116	M17-114	400	18	ACP	1964	2019	0.250	2.088	$ 174,136	$ 194,321	105	2019
1964	M171023	UNK	M17-119	M17-116	400	18	ACP	1964	2019	0.250	2.088	$ 174,136	$ 194,321	105	2019
1974	M171013	UNK	M17-121	M17-119	400	18	ACP	1964	2019	0.250	2.088	$ 174,136	$ 194,321	105	2019
1979	M171008	UNK	M17-125	M17-121	400	18	ACP	1964	2019	0.250	2.088	$ 174,136	$ 194,321	105	2019
1948	M171039	UNK	M17-127	M17-126	243	16	ACP	1964	2019	0.250	2.088	$ 95,187	$ 112,170	105	2019
1952	M171035	UNK	M17-129	M17-132	242	18	ACP	1964	2019	0.250	2.088	$ 119,572	$ 131,784	105	2019

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OBJECTID_1	FEATURE_ID	STREET_NAME	FROM_	TO_	PIPE_LENGTH	SIZE_	MATERIAL	ORIG_CONST	REP_YR	VULN	RISK	EST_REHAB_COST	EST_REPLACE_COST	CIP_PROJECT	CIP_YEAR
1959	M171028	UNK	M17-130	M17-125	257.79999	18	ACP	1964	2019	0.250	2.088	$ 112,231	$ 125,240	105	2019
1958	M171029	UNK	M17-132	M17-130	103	18	ACP	1964	2019	0.313	2.609	$ 50,892	$ 56,090	105	2019
2037	M181064	STOW ST	M18-129	M18-133	54.3	10	ACP	1965	2019	0.250	1.338	$ 10,696	$ 18,899	105	2019
2099	M181002	UNK	M18-159	M17-127	166	16	ACP	1964	2019	0.250	2.088	$ 65,025	$ 76,626	105	2019
2071	M181030	UNK	M18-163	M18-159	383.10001	16	ACP	1964	2019	0.250	2.088	$ 159,162	$ 185,936	105	2019
2072	M181029	UNK	M18-166	M18-163	378.39999	16	ACP	1964	2019	0.250	2.088	$ 157,209	$ 183,654	105	2019
2073	M181028	UNK	M18-168	M18-166	134.8	16	ACP	1964	2019	0.250	2.088	$ 56,004	$ 65,424	105	2019
2053	M181048	UNK	M18-169	M18-168	243.60001	16	ACP	1964	2019	0.250	2.088	$ 101,205	$ 118,230	105	2019
2056	M181045	UNK	M18-170	M18-169	366.60001	16	ACP	1964	2019	0.313	2.609	$ 152,307	$ 177,927	105	2019
2055	M181046	UNK	M18-171	M18-170	379.10001	16	ACP	1964	2019	0.250	2.088	$ 157,500	$ 183,994	105	2019
2032	M181069	UNK	M18-185	M18-182	92	14	ACP	1964	2019	0.250	2.088	$ 32,871	$ 40,945	105	2019
2126	M191112	N VERA CT	M19-109	M19-108	303.5	10	ACP	1964	2019	0.250	1.338	$ 38,841	$ 84,690	105	2019
2233	M191010	UNK	M19-112	M19-113	74.2	10	ACP	1964	2019	0.250	1.338	$ 13,377	$ 24,586	105	2019
2234	M191009	N VERA CT	M19-113	M19-109	143.60001	10	ACP	1964	2019	0.250	1.338	$ 22,372	$ 44,066	105	2019
2188	M191055	UNK	M19-157	M19-164	66.1	10	ACP	1964	2019	0.313	1.672	$ 11,034	$ 21,019	105	2019
2174	M191068	UNK	M19-164	M19-194	186	10	ACP	1964	2019	0.250	1.338	$ 31,048	$ 59,147	105	2019
2156	M191086	WILLIAMS WY	M19-181	M19-185	368.89999	12	ACP	1964	2019	0.250	1.338	$ 72,047	$ 132,840	105	2019
2150	M191091	WILLIAMS WY	M19-187	M19-183	317.60001	12	ACP	1964	2019	0.313	1.672	$ 57,433	$ 109,772	105	2019
2151	M191090	WILLIAMS WY	M19-188	M19-187	326.70001	12	ACP	1964	2019	0.313	1.672	$ 59,079	$ 112,917	105	2019
990	L191006	YOSEMITE AVE	M19-191	L19-101	34.1	14	ACP	1964	2019	0.250	2.088	$ 14,521	$ 17,514	105	2019
2216	M191027	UNK	M19-193	M19-192	281.79999	12	ACP	1964	2019	0.313	1.672	$ 55,036	$ 101,475	105	2019
2329	M201027	CHRISTINE AVE	M20-107	M20-106	262	10	ACP	1964	2019	0.250	1.563	$ 40,819	$ 80,398	105	2019
2342	M201014	CHRISTINE AVE	M20-108	M20-107	274	10	ACP	1964	2019	0.250	1.563	$ 42,688	$ 84,081	105	2019
2341	M201015	CHRISTINE AVE	M20-109	M20-108	258	10	ACP	1964	2019	0.250	1.563	$ 40,195	$ 79,171	105	2019
2236	M191007	UNK	M20-117	M19-112	129	10	ACP	1964	2019	0.250	1.338	$ 23,256	$ 42,744	105	2019
2831	N111007	N JUSTIN AVE	N11-161	M11-101	254.2	10	ACP	1964	2019	0.250	1.338	$ 32,531	$ 70,933	105	2019
2890	N121017	SYCAMORE DR	N12-103	N12-116	325	12	ACP	1964	2019	0.250	1.338	$ 60,730	$ 114,289	105	2019
2891	N121016	SYCAMORE DR	N12-116	N12-126	386	12	ACP	1964	2019	0.313	1.672	$ 72,129	$ 135,740	105	2019
2892	N121015	SYCAMORE DR	N12-126	N12-137	386	12	ACP	1964	2019	0.313	1.672	$ 72,129	$ 135,740	105	2019
2893	N121014	SYCAMORE DR	N12-137	N12-144	282	12	ACP	1964	2019	0.250	1.338	$ 52,695	$ 99,168	105	2019
2562	N81056	E EASY ST	N8-127	N8-126	398	36	acp	1971	2019	0.114	1.034	$ 473,025	$ 443,633	105	2019
					16946.89999							$ 6,201,202	$ 7,852,431	**105 Total**	
					16946.89999							$ 6,201,202	$ 7,852,431		**2019 Total**
2326	M201030	ALSCOT AVE	BNODE	M20-136	25	8	CIP	1980	2020	0.100	0.400	$ 3,478	$ 7,253	106	2020
2320	M201036	CORY ST	BNODE	M20-135	25	8	CIP	1980	2020	0.100	0.400	$ 3,478	$ 7,253	106	2020
6163	I51023	N WOOD RANCH PKWY	I5-124	I5-123	98.3	16	CIP	1986	2020	0.104	0.87	$ 38,506	$ 45,376	106	2020
1482	M101038	E LOS ANGELES AVE	M10-104	M10-103	498.60001	36	ACP	1972	2020	0.104	0.948	$ 709,109	$ 672,287	106	2020
1479	M101041	ERRINGER RD	M10-111	M10-116	312	12	ACP	1969	2019	0.111	0.594	$ 58,301	$ 109,717	106	2020
1513	M101007	E LOS ANGELES AVE	M11-105	M10-104	471	33	ACP	1972	2020	0.104	0.948	$ 495,840	$ 524,094	106	2020
1616	M121054	E LOS ANGELES AVE	M12-113	M12-112	518	36	ACP	1972	2020	0.104	0.948	$ 736,699	$ 698,445	106	2020
1682	M131041	E LOS ANGELES AVE	M13-114	M13-113	518	36	ACP	1972	2020	0.104	0.948	$ 736,699	$ 698,445	106	2020
1680	M131043	E LOS ANGELES AVE	M13-116	M13-115	440	36	ACP	1972	2020	0.104	0.948	$ 616,954	$ 584,460	106	2020
1818	M141002	E LOS ANGELES AVE	M14-115	M13-116	425.0955401	36	ACP	1972	2020	0.104	0.948	$ 596,055	$ 564,662	106	2020
1770	M141050	E LOS ANGELES AVE	M14-116	M14-115	413	36	ACP	1972	2020	0.104	0.948	$ 579,096	$ 548,596	106	2020
2083	M181018	STOW ST	M18-121	M18-129	21.1	10	ACP	1965	2020	0.200	1.070	$ 4,156	$ 7,344	106	2020
2040	M181061	STOW ST	M18-133	M18-136	373	10	ACP	1965	2020	0.200	1.070	$ 73,470	$ 129,819	106	2020
2014	M181087	STOW ST	M18-136	M18-144	265	10	ACP	1965	2020	0.200	1.070	$ 44,235	$ 84,268	106	2020
2067	M181034	STOW ST	M18-152	M18-171	400.89999	10	ACP	1965	2020	0.200	1.250	$ 78,074	$ 138,637	106	2020
1323	M81065	FIRST ST	M9-102	M8-102	54	10	ACP	1969	2019	0.111	0.594	$ 10,636	$ 18,794	106	2020
1405	M91053	FIRST ST	M9-108	M9-102	78	10	ACP	1969	2019	0.111	0.594	$ 15,364	$ 27,147	106	2020
1442	M91017	E LOS ANGELES AVE	M9-109	M9-108	296	10	ACP	1969	2019	0.111	0.594	$ 58,303	$ 103,020	106	2020
1403	M91055	E LOS ANGELES AVE	M9-110	M9-109	297.10001	10	ACP	1969	2019	0.111	0.594	$ 58,520	$ 103,402	106	2020
3010	N141051	TRACY AVE	N14-126	N14-139	375.10001	10	ACP	1970	2020	0.100	0.625	$ 58,439	$ 115,105	106	2020
3013	N141048	HIETTER AVE	N14-136	N14-148	272	10	ACP	1970	2020	0.100	0.625	$ 42,377	$ 83,467	106	2020
3011	N141050	TRACY AVE	N14-139	N14-151	382.29999	10	ACP	1970	2020	0.100	0.625	$ 59,561	$ 117,314	106	2020

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OBJECTID_1	FEATURE_ID	STREET_NAME	FROM_	TO_	PIPE_LENGTH	SIZE_	MATERIAL	ORIG_CONST	REP_YR	VULN	RISK	EST_REHAB_COST	EST_REPLACE_COST	CIP_PROJECT	CIP_YEAR
3036	N141027	HIETTER AVE	N14-148	N14-158	245.3	10	ACP	1970	2020	0.100	0.625	$ 38,217	$ 75,274	106	2020
3058	N141006	TRACY AVE	N14-151	M14-108	410.60001	10	ACP	1970	2020	0.100	0.535	$ 52,547	$ 114,575	106	2020
3062	N141002	HIETTER AVE	N14-158	M14-102	245.3	10	ACP	1970	2020	0.100	0.535	$ 31,392	$ 68,449	106	2020
2561	N81057	E EASY ST	N8-126	N8-124	134	36	acp	1970	2020	0.100	0.910	$ 159,260	$ 149,364	106	2020
3793	O101042	ERRINGER RD	O10-101	O10-105	311	10	ACP	1970	2020	0.1	0.535	$ 53,644	$ 100,626	106	2020
3788	O101047	ERRINGER RD	O10-105	O10-118	341	10	ACP	1970	2020	0.1	0.535	$ 58,819	$ 110,333	106	2020
3795	O101040	MARVEL AVE	O10-150	O10-158	55	10	ACP	1969	2019	0.111	0.594	$ 9,487	$ 17,796	106	2020
4217	O151011	TAPO CANYON RD	O15-101	O15-107	264	12	ACP	1971	2019	0.114	0.608	$ 49,332	$ 92,838	106	2020
4171	O151058	TAPO CANYON RD	O15-107	O15-118	471	12	ACP	1971	2019	0.114	0.608	$ 88,012	$ 165,631	106	2020
4214	O151014	TAPO CANYON RD	O15-126	O15-131	208	12	ACP	1971	2019	0.114	0.608	$ 38,868	$ 73,145	106	2020
4226	O151002	WINIFRED ST	O15-140	N15-104	245.7	18	ACP	1971	2019	0.114	0.949	$ 131,243	$ 143,642	106	2020
4237	O161043	KADOTA ST	O16-114	O16-116	395	10	ACP	1971	2019	0.114	0.608	$ 73,408	$ 133,080	106	2020
4243	O161037	PROPOSED	O16-127	O16-139	399.20001	10	ACP	1971	2019	0.114	0.608	$ 68,858	$ 129,164	106	2020
4225	O151003	COCHRAN ST	O16-134	O15-141	341	18	ACP	1971	2019	0.114	0.949	$ 182,148	$ 199,356	106	2020
4407	O181008	STOW ST	O18-130	O18-136	52	8	CIP	1979	2019	0.111	0.544	$ 7,475	$ 15,326	106	2020
3830	O101005	ERRINGER RD	P10-128	O10-101	334	10	ACP	1970	2020	0.1	0.535	$ 57,611	$ 108,068	106	2020
4968	P151012	TAPO CANYON RD	P15-113	P15-114	60	12	ACP	1971	2019	0.114	0.608	$ 11,212	$ 21,099	106	2020
4977	P151003	TAPO CANYON RD	P15-125	O15-101	272	12	ACP	1971	2019	0.114	0.608	$ 50,827	$ 95,651	106	2020
5033	P161042	ALAMO ST	P16-144	P16-143	200	18	ACP	1971	2019	0.114	0.949	$ 103,093	$ 113,186	106	2020
4275	O161005	KADOTA ST	P16-166	O16-101	175.39999	10	ACP	1971	2019	0.114	0.608	$ 22,447	$ 48,944	106	2020
5012	P161063	ALAMO ST	P16-170	P16-169	375	15	ACP	1971	2019	0.114	0.949	$ 137,713	$ 167,269	106	2020
5127	P171032	TEXAS AVE	P17-102	P17-106	358	10	ACP	1971	2019	0.114	0.608	$ 45,815	$ 99,898	106	2020
					12450.99556							$ 6,548,777	$ 7,631,620	**106 Total**	
					12450.99556							$ 6,548,777	$ 7,631,620		**2020 Total**
44	K121065	ROYAL AVE	K12-106	K12-108	305.10001	20	ACP	1977	2021	0.098	0.892	$ 174,742	$ 189,279	107	2021
80	K121030	ROYAL AVE	K12-108	K12-116	305.10001	20	ACP	1977	2021	0.098	0.892	$ 174,742	$ 189,279	107	2021
793	L131035	ROYAL AVE	L13-131	L13-130	283.5	20	ACP	1977	2021	0.098	0.892	$ 162,371	$ 175,879	107	2021
1170	M71104	E LOS ANGELES AVE	M7-107	M7-106	394.5	27	RCP	1961	2021	0.091	0.827	$ 339,795	$ 349,488	107	2021
1162	M71112	E LOS ANGELES AVE	M7-108	M7-107	396	27	RCP	1961	2021	0.091	0.827	$ 341,087	$ 350,817	107	2021
1382	M81006	E LOS ANGELES AVE	M9-103	M8-103	96	39	ACP	1971	2021	0.091	0.827	$ 152,770	$ 143,702	107	2021
1444	M91015	E LOS ANGELES AVE	M9-104	M9-103	302	39	ACP	1971	2021	0.091	0.827	$ 480,588	$ 452,062	107	2021
1443	M91016	E LOS ANGELES AVE	M9-105	M9-104	283	39	ACP	1971	2021	0.091	0.827	$ 450,352	$ 423,621	107	2021
4181	O151047	ANGELA ST	N15-100	O15-147	311	21	ACP	1971	2021	0.091	0.827	$ 140,513	$ 155,557	107	2021
3150	N151077	ANGELA ST	N15-101	N15-100	309	21	ACP	1971	2021	0.091	0.827	$ 139,609	$ 154,557	107	2021
3113	N151032	ANGELA ST	N15-102	N15-101	391	21	ACP	1971	2021	0.091	0.827	$ 198,588	$ 217,502	107	2021
3114	N151031	ANGELA ST	N15-103	N15-102	387	21	ACP	1971	2021	0.091	0.827	$ 196,556	$ 215,277	107	2021
3072	N151071	ANGELA ST	N15-104	N15-103	411.89999	21	ACP	1971	2021	0.091	0.827	$ 209,203	$ 229,128	107	2021
8724	N71010	E EASY ST	N7-105	N7-151	398	39	ACP	1971	2021	0.091	0.827	$ 512,444	$ 474,850	107	2021
2509	N71039	E EASY ST	N7-113	N7-105	423	39	acp	1971	2021	0.091	0.827	$ 544,632	$ 504,677	107	2021
2539	N71010	E EASY ST	N7-151	O7-118	467	39	acp	1971	2021	0.091	0.827	$ 601,284	$ 557,173	107	2021
2542	N71007	E EASY ST	N8-123	N7-122	396.5	36	acp	1971	2021	0.091	0.827	$ 471,242	$ 441,961	107	2021
2559	N81059	E EASY ST	N8-124	N8-123	244	36	acp	1971	2021	0.091	0.827	$ 289,995	$ 271,976	107	2021
2567	N81051	E EASY ST	N8-129	N8-128	225	36	acp	1971	2021	0.091	0.827	$ 270,418	$ 253,802	107	2021
2571	N81047	E EASY ST	N8-138	N8-139	280	33	ACP	1971	2021	0.091	0.827	$ 250,895	$ 267,691	107	2021
3625	O71032	E EASY ST	O7-118	O7-116	400	39	ACP	1971	2021	0.091	0.827	$ 520,805	$ 483,023	107	2021
					7008.60001							$ 6,622,631	$ 6,501,300	**107 Total**	
					7008.60001							$ 6,622,631	$ 6,501,300		**2021 Total**

ASSET RELIABILITY ASSESSMENT AND FINANCIAL PLAN WORKSHOP PRESENTATIONS

CITY OF SIMI VALLEY

Asset Reliability Assessment and Financial Plan

Kickoff Meeting

August 3, 2010

carollo
Engineers...Working Wonders With Water™

Agenda

1. Introductions and Meeting Purpose
2. Project Team and Communications
3. Scope of Work and Deliverables
4. Schedule Milestones, Meeting Dates, and Responsibilities
5. Information/Data Needs and Availability
6. Asset Reliability Assessment
7. Action Items and Next Steps

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Project Team

1. Carollo's Project Team
   a. Dan Baker – Project Manager
   b. Patrick White – Partner-in-Charge
   c. Mariel Attento – Local Office Manager
   d. Rebecca Overacre – Reliability Assessment Lead
   e. Kaumudi Atapattu – Financial Plan Lead
   f. Bill Tomerlin – O&M Specialist
2. City's Project Team
   a. Mike Kang – Project Manager
   b. Joe Deakin – Asst. Public Works Director
   c. Steve Benjamin
   d. Alan Krieger
   e. Frank Hernandez
   f. Jim Langley
   g. Marlon Villarama

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Project Communications

1. Carollo Main Contact – Dan Baker
   - (858) 245-7678
   - dbaker@carollo.com
2. City Main Contact – Mike Kang
   - (805) 583-6473
   - mkang@simivalley.org
3. Carollo Local Office
   - 100 Rancho Road
   - Suite 25
   - Thousand Oaks, CA 91362
   - (805) 418-9069
   - mattento@carollo.com

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Scope of Work and Deliverables

Task 1 – Project Management

1.1 – Kickoff Workshop

1.2 – Project Status Reports

Deliverables:

- Kick-off Workshop Presentation and Minutes
- Monthly Status Reports

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Scope of Work and Deliverables

Task 2 – Strategy Development

2.1 – Review Existing Documentation

2.2 – Define Asset Management Strategy

Deliverables:

- Asset Management Strategy Workshop
- Presentation and Minutes
- Asset Reliability Decision Framework Technical Memo

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Scope of Work and Deliverables

Task 3 – Reliability Assessment

3.1 – Develop Asset Inventory and Perform Condition Assessment

3.2 – Determine Remaining Useful Life Estimates

3.3 – Conduct Risk and Reliability Assessment

Deliverables:

- Asset Inventory and Classification System
- Remaining Useful Life Estimates
- Vulnerability, Criticality, and Risk Scores
- Reliability Assessment Summary Technical Memo

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Scope of Work and Deliverables

Task 4 – CIP Development and Asset Valuation

4.1 – Develop R&R Cost Estimates

4.2 – Develop Prioritized CIP

4.3 – Determine Asset Valuation

Deliverables:

- Asset Replacement Cost Estimates
- Prioritized R&R CIP and Asset Valuation Technical Memo
- CIP and Financial Planning Tools

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Scope of Work and Deliverables

Task 5 – Financial Planning

5.1 – Determine Baseline Costs and Expenses

5.2 – Review Existing Rates and Structure

5.3 – Prepare Proposition 218 Engineer's Report

Deliverables:

- Baseline Costs and Expenses Summary
- Existing Rates and Fee Structure Review
- Draft Proposition 218 Engineer's Report

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Scope of Work and Deliverables

Task 6 – Asset Management Plan Report

6.1 – Draft Asset Management Plan Report

6.2 – Final Asset Management Plan Report

Deliverables:

- Draft Asset Management Plan Report
- Final Asset Management Plan Report

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Schedule, Milestones, Meetings

1. Asset Management Strategy Workshop – 8/12
2. Asset Reliability Decision Framework – 8/24 Deliv. & Review

3. Condition Assessment of WQCP and SLS– Est. 9/8-9/23
4. Reliability Assessment Workshop – 10/6
5. Reliability Assessment Summary – 10/18 Deliv. & Review

6. R&R CIP Review Workshop – 11/8
7. R&R CIP and Asset Valuation – 11/9 Deliverable and Review

8. Financial Planning Workshop – 11/29

9. Draft AMP Report – 12/13/10 Deliverable and Review
10. Final AMP Report – 1/17/11 Deliverable and Review

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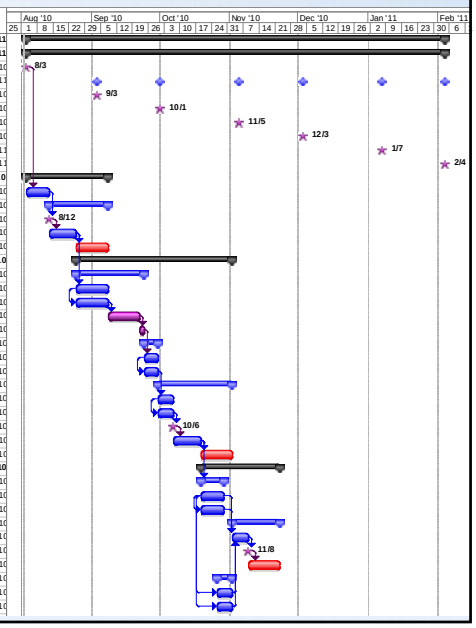
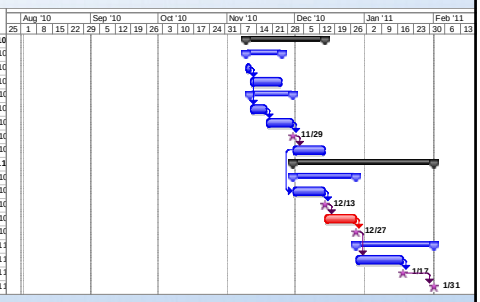
Schedule

ID	Task Name	Duration	Start	Finish
1	**Sanitation Asset Reliability Assessment and Financial Plan**	**133 days**	**Tue 8/3/10**	**Fri 2/4/11**
2	**Task 1 - Project Management**	**133 days**	**Tue 8/3/10**	**Fri 2/4/11**
3	1.1 Kickoff Workshop	0 days	Tue 8/3/10	Tue 8/3/10
4	1.2 Project Status Reports	110 days	Fri 9/3/10	Fri 2/4/11
5	Monthly Status Report 1	0 days	Fri 9/3/10	Fri 9/3/10
6	Monthly Status Report 2	0 days	Fri 10/1/10	Fri 10/1/10
7	Monthly Status Report 3	0 days	Fri 11/5/10	Fri 11/5/10
8	Monthly Status Report 4	0 days	Fri 12/3/10	Fri 12/3/10
9	Monthly Status Report 5	0 days	Fri 1/7/11	Fri 1/7/11
10	Monthly Status Report 6	0 days	Fri 2/4/11	Fri 2/4/11
11	**Task 2 - Strategy Development**	**26 days**	**Tue 8/3/10**	**Tue 9/7/10**
12	2.1 Review Existing Documentation	8 days	Tue 8/3/10	Thu 8/12/10
13	2.2 Define Asset Management Strategy	18 days	Thu 8/12/10	Tue 9/7/10
14	Asset Management Strategy Workshop	0 days	Thu 8/12/10	Thu 8/12/10
15	Document Asset Reliability Decision Framework	8 days	Fri 8/13/10	Tue 8/24/10
16	City Review of Asset Reliability Decision Framework	10 days	Wed 8/25/10	Tue 9/7/10
17	**Task 3 - Reliability Assessment**	**49 days**	**Wed 8/25/10**	**Mon 11/1/10**
18	3.1 Develop Asset Inventory and Perform Condition Assessment	22 days	Wed 8/25/10	Thu 9/23/10
19	Develop Above-Ground Asset Inventory and Classification	10 days	Wed 8/25/10	Tue 9/7/10
20	Develop Below-Ground Asset Inventory and Classification	10 days	Wed 8/25/10	Tue 9/7/10
21	Conduct Condition Assessment of WQCP	10 days	Wed 9/8/10	Tue 9/21/10
22	Conduct Condition Assessment of Sewer Lift Stations	2 days	Wed 9/22/10	Thu 9/23/10
23	3.2 Determine Remaining Useful Life Estimates	4 days	Fri 9/24/10	Wed 9/29/10
24	Determine Above-Ground EvRUL/EcRUL Estimates	4 days	Fri 9/24/10	Wed 9/29/10
25	Determine Below-Ground EvRUL/EcRUL Estimates	4 days	Fri 9/24/10	Wed 9/29/10
26	3.3 Conduct Risk and Reliability Assessment	23 days	Thu 9/30/10	Mon 11/1/10
27	Develop Above-Ground Criticality, Vulnerability, and Risk Scores	5 days	Thu 9/30/10	Wed 10/6/10
28	Develop Below-Ground Criticality, Vulnerability, and Risk Scores	5 days	Thu 9/30/10	Wed 10/6/10
29	Reliability Assessment Workshop	0 days	Wed 10/6/10	Wed 10/6/10
30	Develop Summary of Reliability Assessment	8 days	Thu 10/7/10	Mon 10/18/10
31	City Review of Reliability Assessment Summary	10 days	Tue 10/19/10	Mon 11/1/10
32	**Task 4 - CIP Development and Asset Valuation**	**25 days**	**Tue 10/19/10**	**Mon 11/22/10**
33	4.1 Develop R&R Cost Estimates	8 days	Tue 10/19/10	Thu 10/28/10
34	Develop Above-Ground Rehab/Replacement Cost Estimates	8 days	Tue 10/19/10	Thu 10/28/10
35	Develop Below-Ground Rehab/Replacement Cost Estimates	8 days	Tue 10/19/10	Thu 10/28/10
36	4.2 Develop Prioritized CIP	15 days	Tue 11/2/10	Mon 11/22/10
37	Develop Prioritized CIP List	5 days	Tue 11/2/10	Mon 11/8/10
38	R&R CIP Review Workshop	0 days	Mon 11/8/10	Mon 11/8/10
39	City Review of R&R CIP and Asset Valuation	10 days	Tue 11/9/10	Mon 11/22/10
40	4.3 Determine Asset Valuation	5 days	Tue 10/26/10	Mon 11/1/10
41	Develop Above-Ground Asset Valuation	5 days	Tue 10/26/10	Mon 11/1/10
42	Develop Below-Ground Asset Valuation	5 days	Tue 10/26/10	Mon 11/1/10



Schedule

ID	Task Name	Duration	Start	Finish
43	**Task 5 - Financial Planning**	**25 days**	**Tue 11/9/10**	**Mon 12/13/10**
44	5.1 Determine Baseline Costs and Expenses	12 days	Tue 11/9/10	Wed 11/24/10
45	Obtain Financial Information from City	2 days	Tue 11/9/10	Wed 11/10/10
46	Project Baseline Costs and Expenses	10 days	Thu 11/11/10	Wed 11/24/10
47	5.2 Review Existing Rates and Structure	13 days	Thu 11/11/10	Mon 11/29/10
48	Review Existing Rates and Fees Structure	5 days	Thu 11/11/10	Wed 11/17/10
49	Develop Rates and Fees Recommendations	8 days	Thu 11/18/10	Mon 11/29/10
50	Financial Planning Workshop	0 days	Mon 11/29/10	Mon 11/29/10
51	5.3 Prepare Proposition 218 Engineer's Report	10 days	Tue 11/30/10	Mon 12/13/10
52	**Task 6 - Asset Management Plan Report**	**45 days**	**Tue 11/30/10**	**Mon 1/31/11**
53	6.1 Draft Asset Management Plan Report	20 days	Tue 11/30/10	Mon 12/27/10
54	Develop Draft AMP Report	10 days	Tue 11/30/10	Mon 12/13/10
55	Submit Draft AMP Report	0 days	Mon 12/13/10	Mon 12/13/10
56	City Review of Draft AMP Report	10 days	Tue 12/14/10	Mon 12/27/10
57	Draft AMP Report Review Meeting	0 days	Mon 12/27/10	Mon 12/27/10
58	6.2 Final Asset Management Plan Report	25 days	Tue 12/28/10	Mon 1/31/11
59	Incorporate Draft AMP Report Comments	15 days	Tue 12/28/10	Mon 1/17/11
60	Submit Final AMP Report	0 days	Mon 1/17/11	Mon 1/17/11
61	Final AMP Report Presentation	0 days	Mon 1/31/11	Mon 1/31/11



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Information / Data Needs

1. Previous Reports
   a. WQCP Condition Assessment ✓
   b. Sewer Trunk Rehabilitation Plan
   c. Electrical Performance Study
   d. Electrical Arc Flash Hazard Analysis
2. Facility Data/Documentation
   a. Equipment Mechanical List ✓
3. Maintenance History
4. GIS Data
5. Financial Information
   a. Sanitation Rates and Charges ✓
6. Other Information/Data Needs

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Asset Reliability Assessment

1. Conduct Condition Assessment
2. Determine Vulnerability Ratings ("Likelihood of Failure")
3. Assign Criticality Ratings ("Consequence of Failure")
4. Develop Overall Risks and Prioritization

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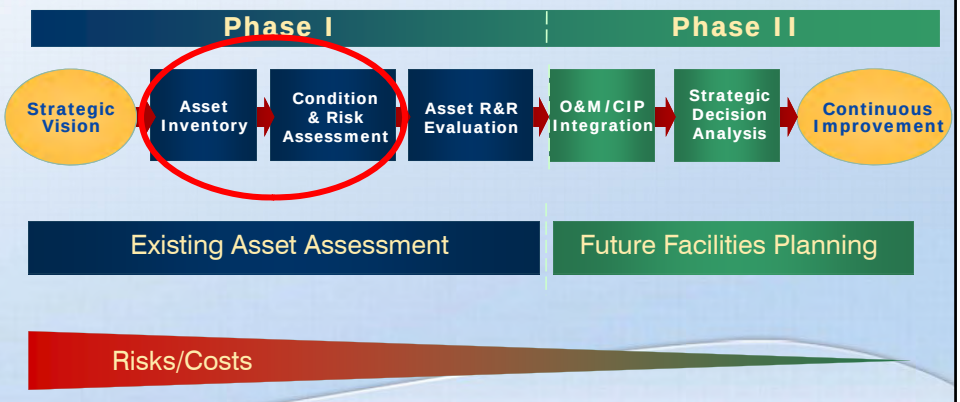
Overall Asset Management Approach Minimizes Both Risks and Costs

Asset Management Process



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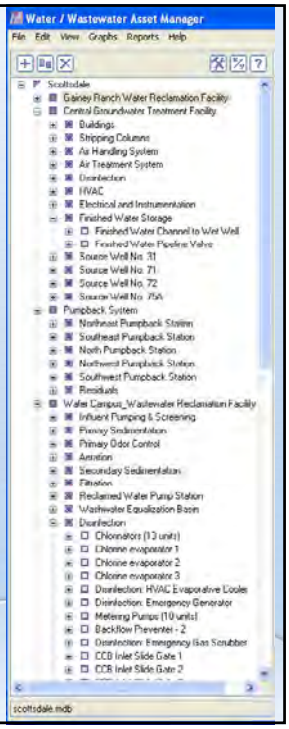
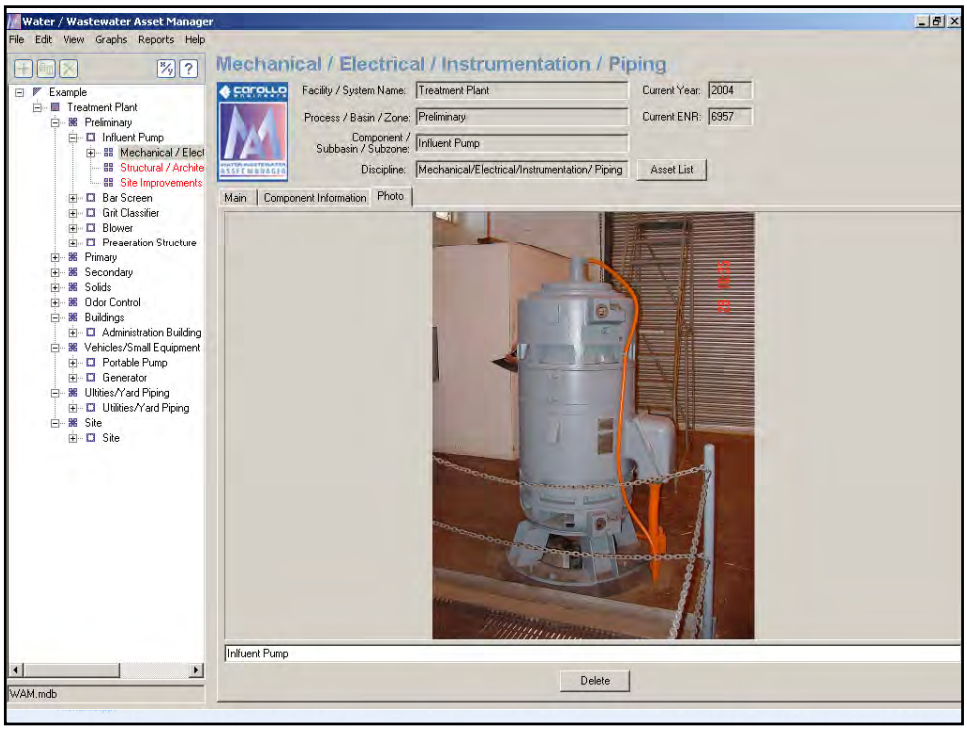
Step 2 – Asset Inventory

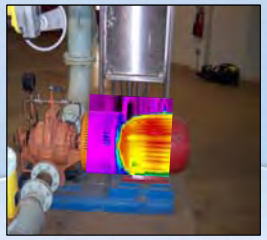
1. Classification system for assets
2. Identify assets: in-the-field, historical records, CMMS, GIS, FIS and other systems
3. Compile information on assets, including design standards, installation year, and costs
4. Set appropriate risk and prioritization criteria





Step 3 – Condition / Risk Assessment

1. Multi-discipline
2. Physical indicators/ measurable scale
3. Examine performance
4. Assess
   a. condition
   b. useful life
   c. vulnerability
   d. criticality
   e. risk
   f. maintenance costs
   g. salvage value
5. Determine priorities



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Condition Assessments Conducted by Discipline Experts

Zone 7 Water Agency, CA

City of Scottsdale, AZ

City of Stockton, CA

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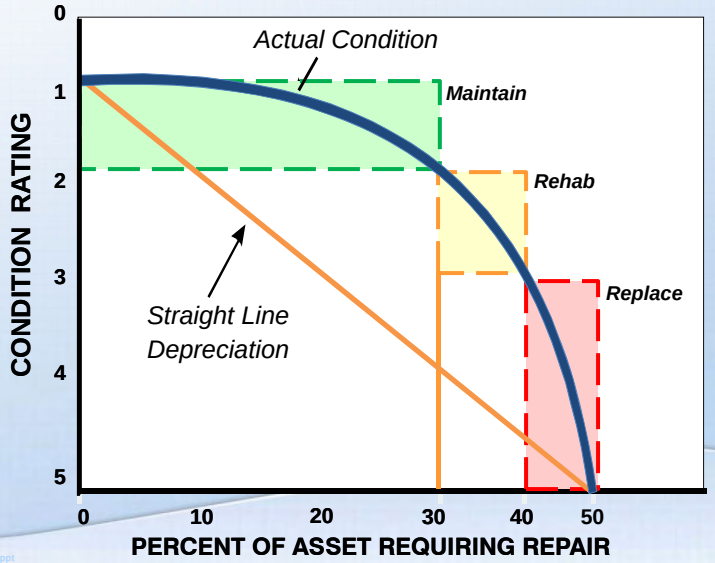
Asset Risk Determined by Vulnerability and Criticality

1. Risk = Vulnerability x Criticality
2. Vulnerability: Likelihood of asset failure
   a. Criteria aligned with asset condition and/or attributes (e.g. age)
   b. Probability of failure
3. Criticality: Consequence of asset failure
   a. Criteria aligned with level of service goals
   b. Parameters of public health and safety, effect on customers, environment, & cost

Asset Vulnerability (Likelihood of Failure)



Condition 1 – Very Good

1. Generally installed within the last 1-2 years
2. Does not require maintenance
3. Has none of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 2 – Minor Defects

1. Generally installed within the last 2-10 years
2. Requires minimal maintenance
3. May or may not have one of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 3 – Moderate Maintenance

1. Generally installed within the last 10-20 years
2. Requires moderate maintenance
3. Has several of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 4 – Requires Renewal

1. Generally installed within the last 15-25 years
2. Requires regular, intensive maintenance
3. Has many of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 5 - Unserviceable

1. Generally installed more than 25 years ago
2. Needs to be replaced or not functional
3. Replacement parts are not readily available
4. Technological advances have made the asset obsolete

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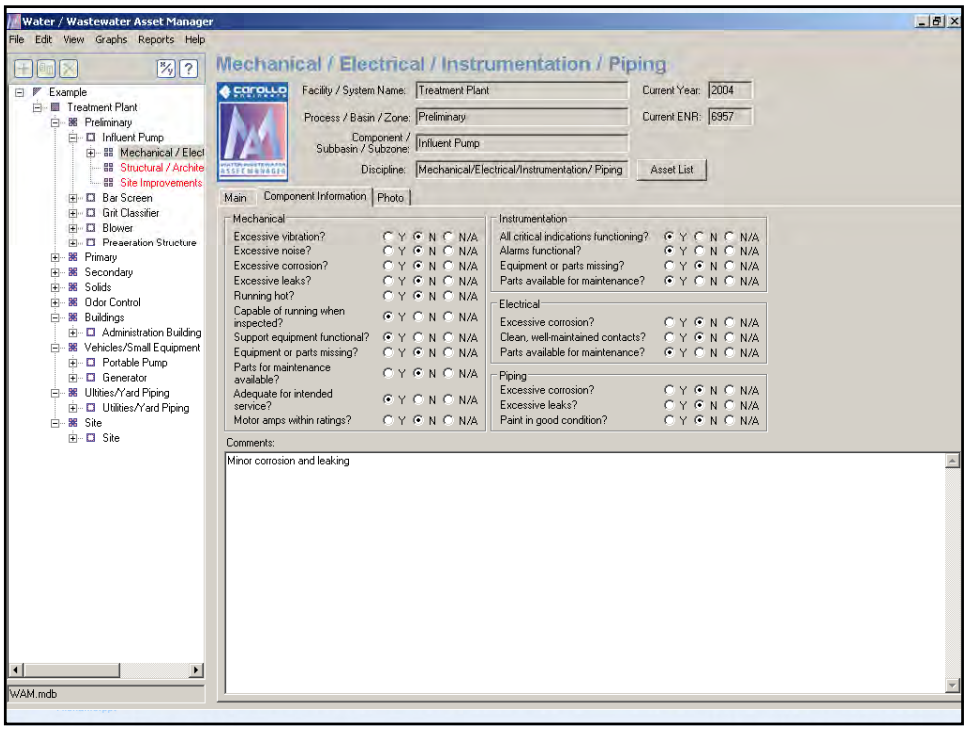

Asset Criticality (Consequence of Failure)

1. Criticality factors are aligned with Level of Service Goals
2. Consequence of failure of an asset:
   a. Public Health and Safety
   b. Effect on Customers
   c. Effect on Environment
   d. Cost of Repairs
   e. Other Factors
3. Overall criticality is sum of components

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Example Criticality Matrix

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health and Safety for Public and Employees	**X%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life
Financial Impact	**X%**	Absorbed within budget line item < $xx,xxx			May require transfer between departments, new borrowing, or impact rates > $xxx,xxx
Impact on Environment or Regulatory Compliance	**X%**	100% compliance with permits & no impact on environment	Violation but no enforcement action &/or minor impact on environment	Violation with minor enforcement action &/or moderate impact on environment	Enforcement action with fines &/or major impact on environment
Effect on Treatment Ability and Customers	**X%**	No impacts on treatment or customers	Minor disruption	Short-term impact; substantial disruption	Long-term impact; area-wide disruption
Ability to Respond and Return Asset to Service	**X%**	Redundant asset available or service restored in < x			Not able to restore service for > x

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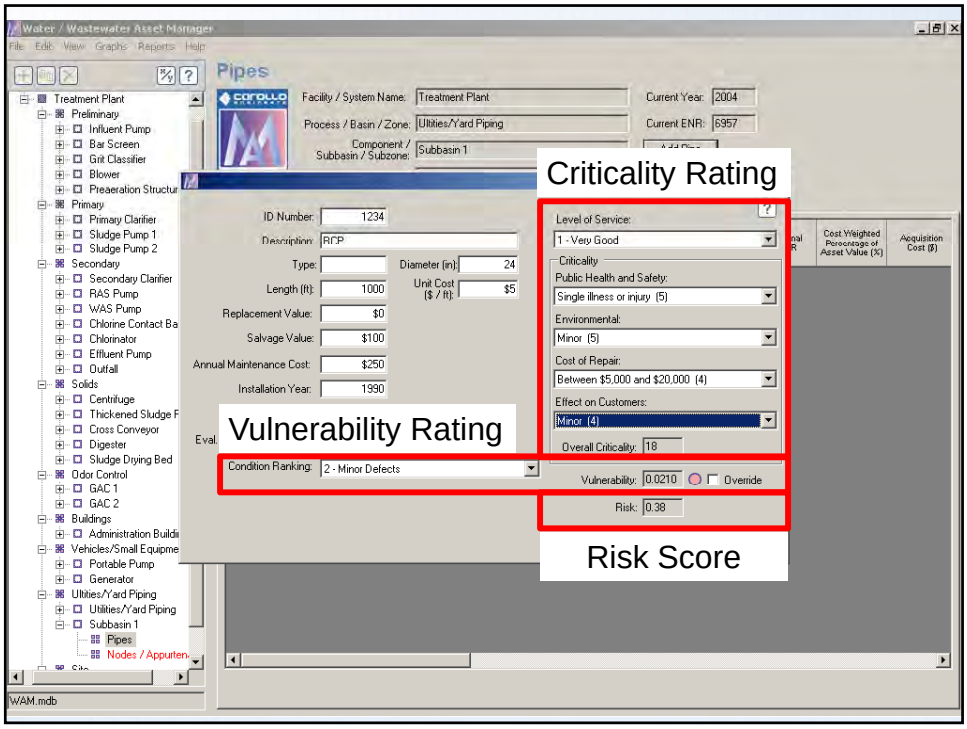
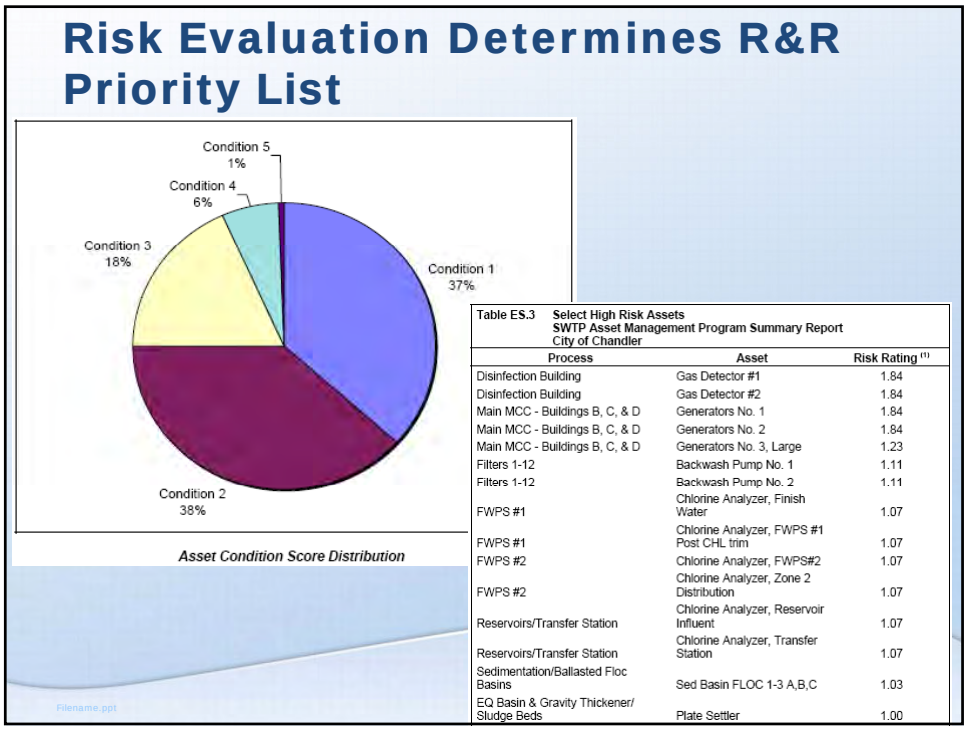
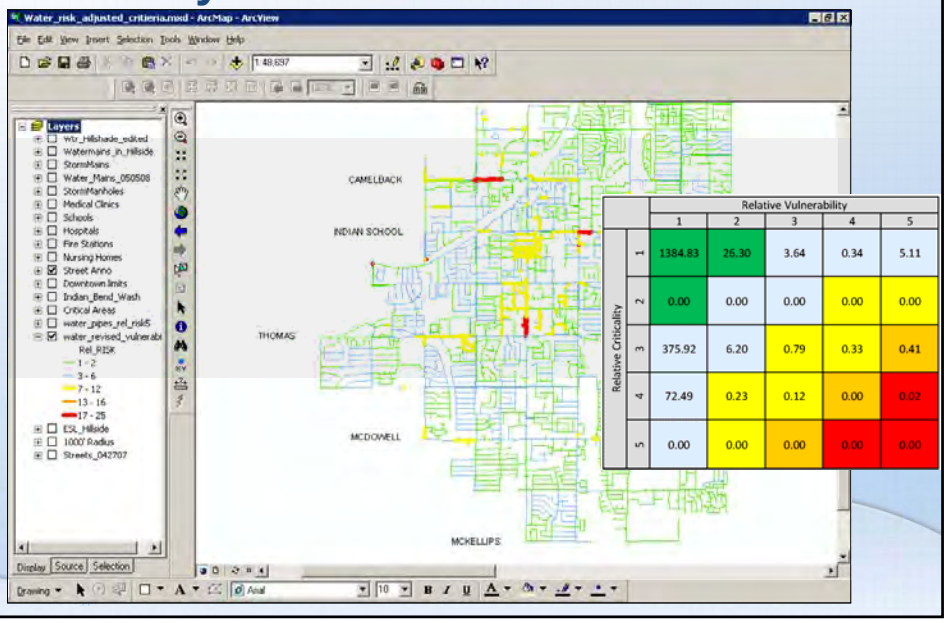

Water / Wastewater Asset Manager
Pipes
Criticality Rating
Vulnerability Rating
Risk Score

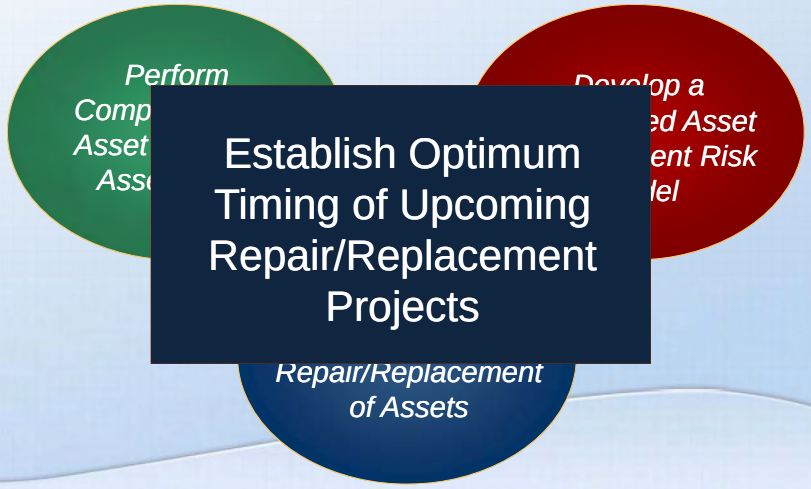

Risk Evaluation Determines R&R Priority List
Condition 5
1%
Condition 4
6%
Condition 3
18%
Condition 1
37%
Condition 2
38%
Asset Condition Score Distribution
Table ES.3 Select High Risk Assets
SWTP Asset Management Program Summary Report
City of Chandler
Process | Asset | Risk Rating (1)
Disinfection Building | Gas Detector #1 | 1.84
Disinfection Building | Gas Detector #2 | 1.84
Main MCC - Buildings B, C, & D | Generators No. 1 | 1.84
Main MCC - Buildings B, C, & D | Generators No. 2 | 1.84
Main MCC - Buildings B, C, & D | Generators No. 3, Large | 1.23
Filters 1-12 | Backwash Pump No. 1 | 1.11
Filters 1-12 | Backwash Pump No. 2 | 1.11
FWPS #1 | Chlorine Analyzer, Finish Water | 1.07
FWPS #1 | Chlorine Analyzer, FWPS #1 Post CHL trim | 1.07
FWPS #2 | Chlorine Analyzer, FWPS#2 | 1.07
FWPS #2 | Chlorine Analyzer, Zone 2 Distribution | 1.07
Reservoirs/Transfer Station | Chlorine Analyzer, Reservoir Influent | 1.07
Reservoirs/Transfer Station | Chlorine Analyzer, Transfer Station | 1.07
Sedimentation/Ballasted Floc Basins | Sed Basin FLOC 1-3 A,B,C | 1.03
EQ Basin & Gravity Thickener/ Sludge Beds | Plate Settler | 1.00

Risk Evaluation Determines R&R Priority List

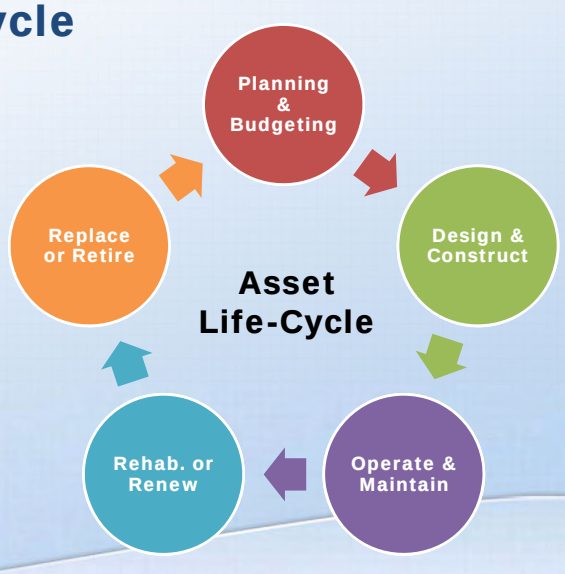


Relative Criticality	Relative Vulnerability 1	2	3	4	5
1	1384.83	26.30	3.64	0.34	5.11
2	0.00	0.00	0.00	0.00	0.00
3	375.92	6.20	0.79	0.33	0.41
4	72.49	0.23	0.12	0.00	0.02
5	0.00	0.00	0.00	0.00	0.00

Asset Management Programs Address Many Different Objectives

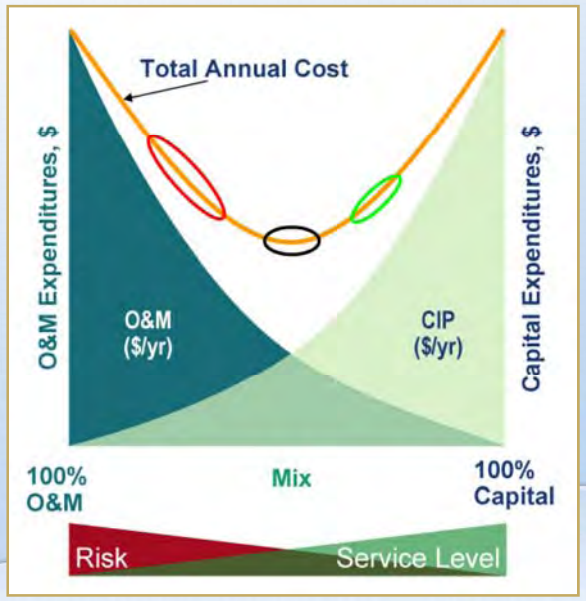


AM Addresses Complete Asset Life-Cycle

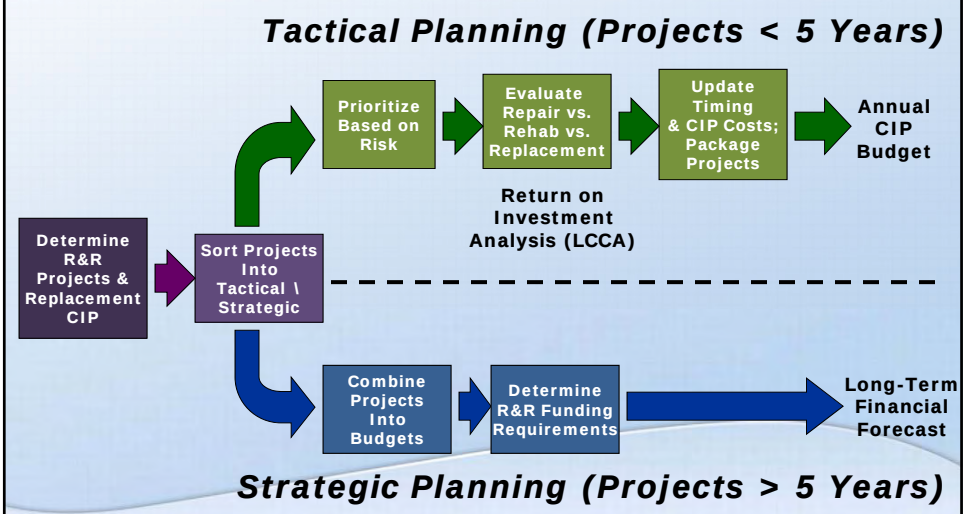


. . .resulting in lowest total cost of ownership

Balancing O&M and CIP Expenditures



AM Program Provides Framework for Annual R&R CIP Planning



Action Items and Next Steps

1. Obtain Remaining Information/Data
2. Develop Above- and Below-Ground Asset Inventories
3. Schedule WQCP and Lift Station Condition Assessment
4. Next Meeting – Asset Management Strategy Workshop
5. KJ Staff Report – M.Kang
6. Water Prop 218 Engineer's Report – J. Deakin
7. Coordinate with T.Taylor on Strategy Meeting

CITY OF SIMI VALLEY

Asset Reliability Assessment and Financial Plan Strategy Workshop

Carollo Engineers

August 12, 2010

Engineers...Working Wonders With Water™

Strategy Workshop Agenda

1. Meeting Purpose
2. Asset Reliability Assessment
3. Remaining Useful Lives
4. Replacement Cost Estimates
5. Action Items and Next Steps

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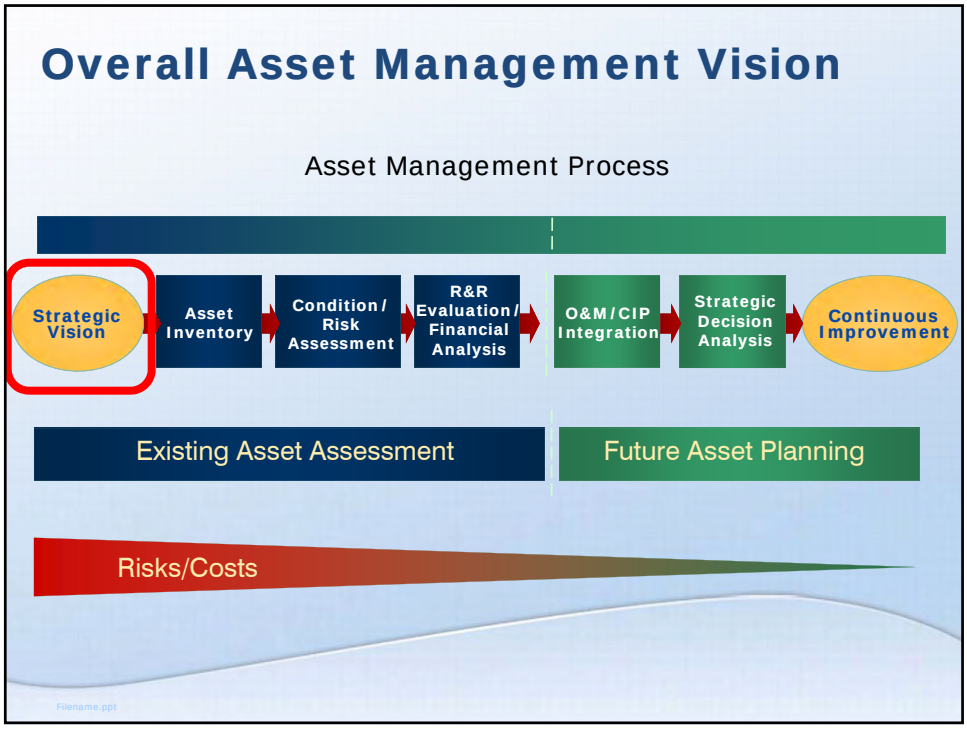
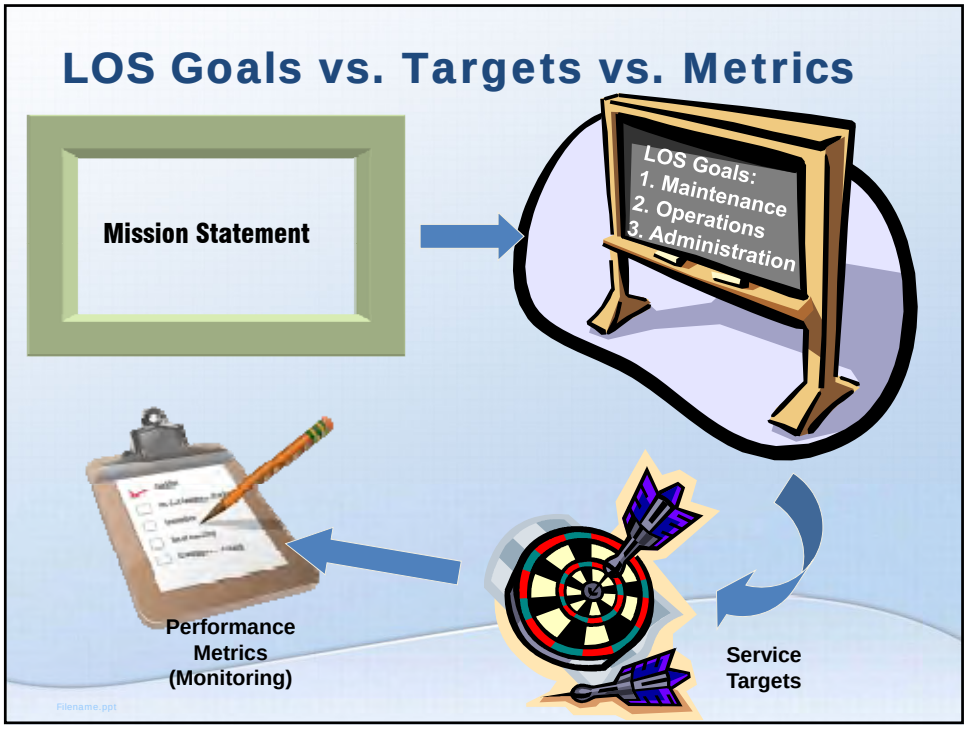


Strategic Vision

1. Confirm mission and goals
2. Define organization
   a. Goals/objectives/policies
   b. Improved communication
   c. Integrated functions
3. Refine user needs
   a. Financial/Budgeting
   b. R&R Requirements
   c. CIP Planning
4. Successful strategies lead to efficiency and educated decision making
5. Define acceptable levels of risk



City Mission and Vision

- Mission – To deliver excellent service to our community by providing a safe and healthy living environment, sound fiscal management, responsive customer service, and an atmosphere that encourages community involvement and volunteerism through a local government that is accessible, efficient, and accountable to its citizens.

Purpose of Level of Service Goals

1. Determines criticality/consequence factors and weighting
2. Influences asset prioritization
3. Redefines failure as "not meeting specified level of service goal"
4. Justifies expenditures through upholding LOS commitment (business case)
5. Justifies benefits of the Asset Management Program through improved performance (minimize risk/cost, maximize return)
6. Supports overall mission, vision, and utility-wide performance measures

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Example Qualserve AM-Related Performance Indicators

1. System Renewal/Replacement Rate
   a. Total actual expenditures or funds reserved for R&R / Total present worth
2. Disruption of Sewer Service
   a. # of customers experiencing disruption / total customers
3. Sewer System Integrity
   a. # of failures / total miles of pipes
4. Operations and Maintenance Cost Ratios
   a. O&M cost per account
   b. O&M cost per MG collected
   c. O&M cost of treatment per MG collected
5. Planned Maintenance Ratio
   a. Hrs. of planned maintenance / total hrs. maintenance
   b. Cost of planned maintenance / total cost of maintenance

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System Renewal/Replacement Rate (%)

	25th	Median	75th
Wastewater pipelines			
Combined Service Providers	0.6	2.4	10.9
Western Providers	0.6	2.1	7.7
Providers for 100,000-500,000	1.5	4.4	15.0

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Planned Maintenance Ratios (hours)

	25th	Median	75th
Wastewater			
Combined Service Providers	39.3	58.1	75.8
Western Providers	48.3	63.7	80.6
Providers for 100,000-500,000	30.9	52.8	66.3

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Sanitation Division High-Level LOS Goals

1. Operations & Maintenance
   a. Proactively operate and maintain sanitation assets to extend asset life at least possible cost
2. Engineering/Planning
3. Financial
4. Customers/Community
5. Environmental
6. Regulatory

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Asset Reliability Assessment

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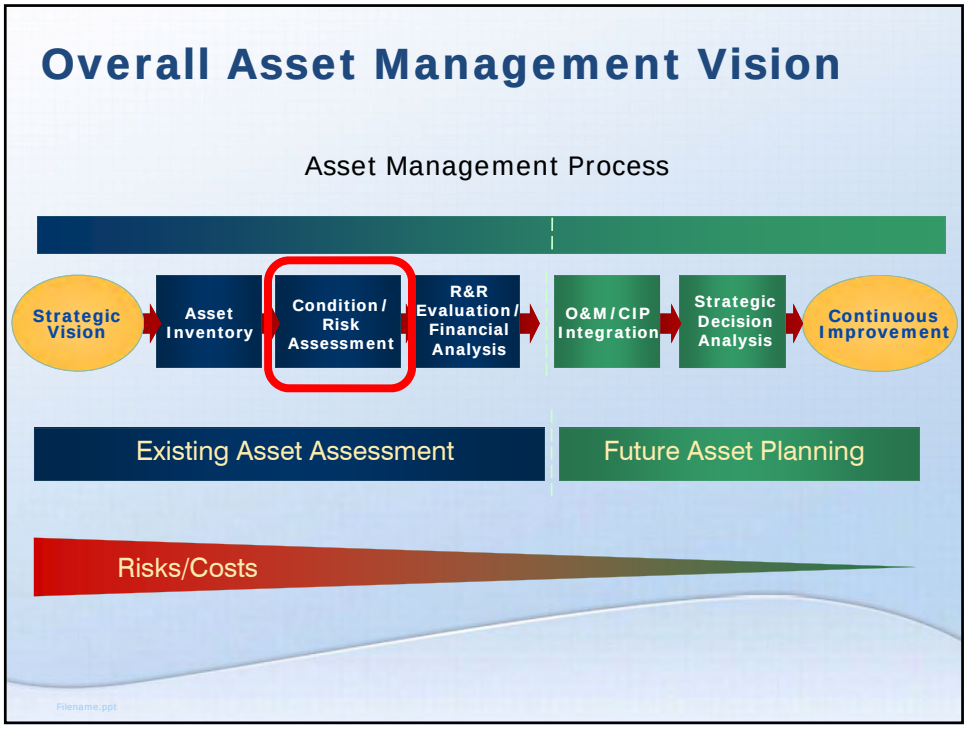
Overall Asset Management Vision
Asset Management Process
Strategic Vision
Asset Inventory
Condition / Risk Assessment
R&R Evaluation / Financial Analysis
O&M / CIP Integration
Strategic Decision Analysis
Continuous Improvement
Existing Asset Assessment
Future Asset Planning
Risks/Costs

Asset Risk Determined by Vulnerability and Criticality
1. Risk = Vulnerability x Criticality
2. Vulnerability: Likelihood of asset failure
a. Criteria aligned with asset condition and/or attributes (e.g. age)
b. Probability of failure
3. Criticality: Consequence of asset failure
a. Criteria aligned with level of service goals
b. Parameters of public health and safety, effect on customers, environment, & cost
Likelihood
Consequence

Asset Criticality (Consequence of Failure)

1. Criticality factors are aligned with Level of Service Goals
2. Consequence of failure of an asset:
   a. Public Health and Safety
   b. Effect on Customers
   c. Effect on Environment
   d. Cost of Repairs
   e. Other Factors
3. Overall criticality is sum of components

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Example Criticality Matrix

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health & Safety of Public and Employees	**15%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life or widespread outbreak of illnesses
Compliance with Regulations	**25%**	100% compliance with permits	Violation but no enforcement action	Violation with minor enforce-ment action	Enforcement action with fines
Financial Impact on Utility	**15%**	Absorbed within budget line item < $5,000	Absorbed within current budget $5,000 to $25,000	May require transfer from reserves $25,000 to $150,000	May require new borrowing or impact rates > $150,000
Public Confidence	**20%**	No events or loss of public confidence	Minor event with limited news coverage	Short-term event; substantial loss of public confidence	Long-term event; major news event permanent loss of public confidence
Service Delivery	**25%**	No breaks, outages, or T&O complaints	No breaks or outages, infrequent T&O complaints	Short duration breaks or outages; occasional T&O complaints	Numerous breaks, outages; widespread T&O complaints

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Example Criticality Matrix

	Low	Medium	High
ENVIRONMENTAL	No effect on environment.	Minor impact on environment.	Major impact on environment.
	No effect on regulatory compliance.	Violation but no enforcement action.	Violation with enforcement action.
ECONOMIC	Repair costs can be absorbed within operating budget.	Repair costs likely require special purchases.	Repair costs likely require special purchases with approval.
	No effect on plant processes.	Failure causes burden on downstream processes < 1 day.	Failure causes burden on downstream processes > 1 day.
	Minor property damage.	Moderate property damage.	High destruction.
SOCIAL	No health or safety concerns.	Injury with no lost time or medical attention.	Injury with lost time and medical attention.
	No affect on public confidence.	Minor negative publicity.	Widespread negative publicity.
	Minor complaints.		Claims.

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Another Example Criticality Matrix

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Public Health & Safety	**20%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life
Compliance with Regulations	**20%**	100% compliance with permits	Violation but no enforcement action	Violation with minor enforce-ment action	Enforcement action with fines
Financial Impact	**10%**	Absorbed within budget line item < $5,000	Absorbed within current budget $5,000 to $25,000	May require transfer from reserves $25,000 to $150,000	May require new borrowing or impact rates > $150,000
Disruption to the Community / Public Image	**15%**	No social or economic impact	Minor disruption (e.g. traffic, dust, noise)	Short-term impact; substantial disruption	Long-term impact; area-wide disruption
Service Delivery	**20%**	No breaks, outages, or T&O complaints	No breaks or outages, infrequent T&O complaints	Short duration breaks or outages; occasional T&O complaints	Numerous breaks, outages; widespread T&O complaints
Ability to Respond and Return Asset to Service	**15%**	Restore service in < 2 hours	Service restored in 2 to 8 hours	Service restored in 8 to 24 hours	Not able to restore service for > 24 hours

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Example Sewer Criticality Matrix

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health and Safety for Public and Employees	**30%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life
		Pipes 6" and smaller	Pipes 12" and smaller	Pipes within 1000ft of critical facilities; Pipes larger than 12"	No pipes
Financial Impact	**15%**	Absorbed within budget line item < $5,000	Absorbed within current budget and under GM signature $5,000 to $75,000	Requires Council approval $75,000 to $150,000	May require new borrowing, or impact rates > $150,000
		No pipes	Manholes; Pipes 12" and smaller	Pipes 18" and smaller	Pipes larger than 18"
Impact on Environment or Regulatory Compliance	**25%**	100% compliance with permits & no impact on environment	Violation but no enforcement action &/or minor impact on environment	Violation with minor enforcement action &/or moderate impact on environment	Enforcement action with fines &/or major impact on environment
		No pipes	Pipes 8" and smaller	Pipes in Santa Ana River drainage	Pipes in protected natural habitat
Service Delivery and Effect on Customers / Public Confidence	**30%**	No impacts on service delivery or customers	Minor disruption	Short-term impact &/or substantial disruption	Long-term impact &/or area-wide disruption
		No pipes	Pipes 8" and smaller	Pipes 12" and smaller	Pipes larger than 12"

Sanitation Plant Criticality Matrix

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health and Safety for Public and Employees	**25%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life
Financial Impact	**20%**	Absorbed within budget line item < $10,000	Absorbed within current budget and under GM signature $10,000 to $25,000	Requires Council approval $25,000 to $100,000	Requires Council approval, new borrowing, or impact rates > $100,000
Impact on Environment or Regulatory Compliance	**10%**	100% compliance with permits & no impact on environment	Violation but no enforcement action &/or minor impact on environment	Violation with minor enforcement action &/or moderate impact on environment	Enforcement action with fines &/or major impact on environment
Effect on Service to Customers	**30%**	No impacts on service to customers	Minor disruption	Short-term impact; substantial disruption	Long-term impact; area-wide disruption
Ability to Respond and Return Asset to Service	**15%**	Redundant asset available or service restored in < 2 hours	Service restored in 2 to 8 hours	Service restored in 8 to 24 hours	Not able to restore service for > 24 hours

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Sanitation Sewer System Criticality

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health and Safety for Public and Employees	**30%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life
		Pipes 6" and smaller	Pipes 12" and smaller	Pipes within 1000ft of critical facilities; Pipes larger than 12"	No pipes
Financial Impact	**25%**	Absorbed within budget line item < $10,000	Absorbed within current budget and under GM signature $10,000 to $25,000	Requires Council approval $25,000 to $100,000	Requires Council approval, new borrowing, or impact rates > $100,000
		No pipes	Manholes; Pipes 12" and smaller	Pipes 18" and smaller	Pipes larger than 18"
Impact on Environment or Regulatory Compliance	**15%**	100% compliance with permits & no impact on environment	Violation but no enforcement action &/or minor impact on environment	Violation with minor enforcement action &/or moderate impact on environment	Enforcement action with fines &/or major impact on environment
		No pipes	Pipes 8" and smaller	Pipes in drainage area	Pipes in protected natural habitat
Effect on Service to Customers / Public Confidence	**30%**	No impacts on service delivery or customers	Minor disruption	Short-term impact &/or substantial disruption	Long-term impact &/or area-wide disruption
		No pipes	Pipes 8" and smaller	Pipes 12" and smaller	Pipes larger than 12"

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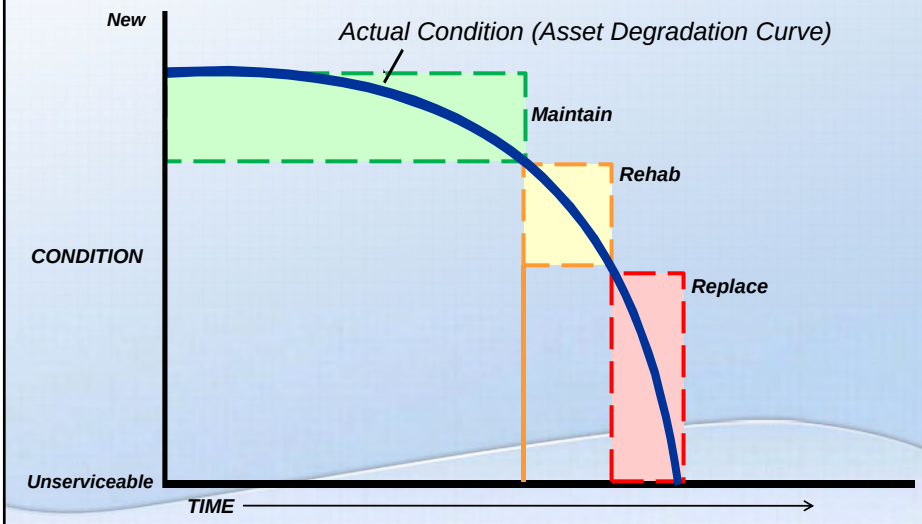
Asset Vulnerability (Likelihood of Failure)



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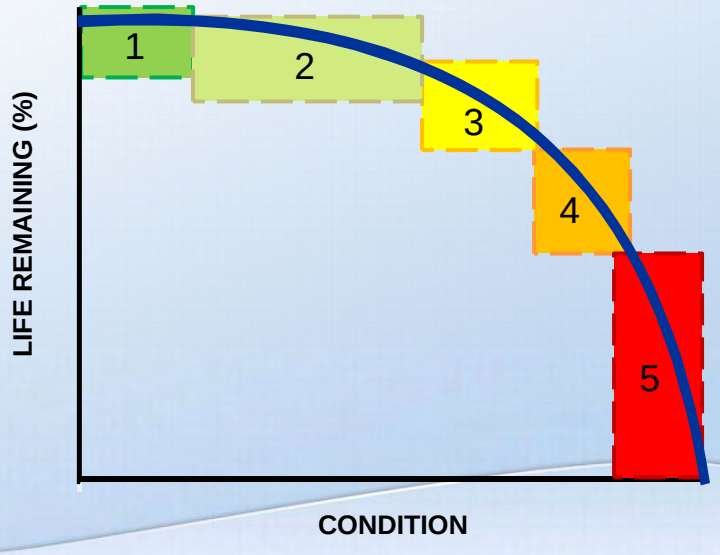
Condition Rankings

Condition Ranking	Description
1	Very Good (0% renewal required)
2	Good (5% renewal required)
3	Fair (10-20% renewal required)
4	Poor (20-30% renewal required)
5	Very Poor (>50% renewal required)

Adapted from the International Infrastructure Management Manual (IIMM), Edition 2006

Condition and Asset Decay Curve



Condition 1 – Very Good

1. Generally installed within the last 1-2 years
2. Does not require immediate maintenance
3. Has none of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 2 – Minor Defects

1. Generally installed within the last 2-10 years
2. Requires minimal maintenance
3. May or may not have one of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 3 – Moderate Maintenance

1. Generally installed within the last 10-20 years
2. Requires moderate maintenance
3. Has several of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 4 – Requires Renewal

1. Generally installed within the last 15-25 years
2. Requires regular, intensive maintenance
3. Has many of the following attributes:
   a. Excessive noise
   b. Excessive vibration
   c. Excessive corrosion
   d. Excessive leaks
   e. Running hot

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Condition 5 - Unserviceable

1. Generally installed more than 25 years ago
2. Needs to be replaced or not functional
3. Replacement parts are not readily available
4. Technological advances have made the asset obsolete

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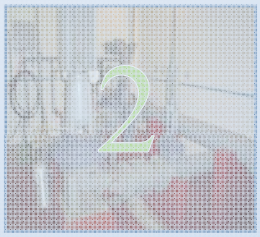
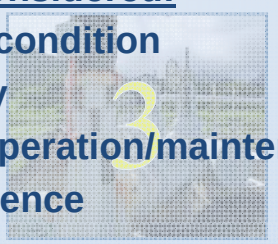
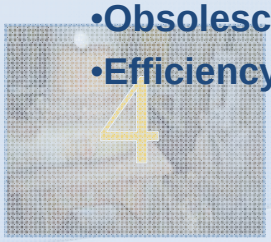
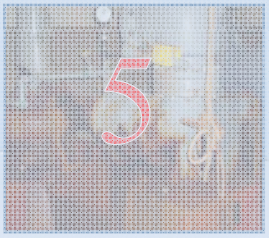
Condition Examples









<u>Factors considered:</u>

- **Physical condition**
- **Reliability**
- **Ease of operation/maintenance**
- **Obsolescence**
- **Efficiency**

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KJ Criticality and Pipe Rating Factors

- Rehabilitation Schedule based on 3 factors – Modified PACP Score + Prob. of Failure Factor + Risk Factor
  - Immediate Rehabilitation >= 675
  - Rehab in 3 to 5 years = 600 to 674
  - Rehab in 5 to 10 years = 450 to 599
  - Rehab in 10 to 20 years = 275 to 449
  - Rehab in 20 or more years = < 300

1. Modified PACP Score (110 to 550)
   a. Structural Rating Score (1 to 5)
   b. Operational and Maintenance Score (1 to 5)
   c. Structural Score and O&M Score (2 digits) x 10

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KJ Criticality and Pipe Rating Factors

2. Probability of Failure Factor (0 to 310)
   a. Age
      - >= 40 years = 150
      - 30-40 years = 75
      - 20-30 years = 40
      - 8-20 years = 10
      - < 8 years = 0
   b. Pipe Material
      - ACP = 60
      - RCP = 50
      - DIP/CIP = 20
      - VCP = 10
      - PVC/TRUSS = 0
   c. AC Condition Rating (ACP only)
      - AC1 – Slight Deterioration = 50
      - AC2 – Moderate Deterioration = 75
      - AC3 – Severe Deterioration = 100

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KJ Criticality and Pipe Rating Factors

3. Risk Factors (0 to 110)
   a. Pipe Diameter
      - >= 40 in. = 50
      - 25-40 in. = 40
      - 10-25 in. = 20
      - <10 in. = 0
   b. Pipe Location
      - Within 200 feet of waterways or environmentally sensitive areas = 40
      - Crossing under railroad = 30
      - Crossing under major roadways = 50
      - Servicing or crossing under business districts/tourist attractions = 60

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Remaining Useful Lives

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Definitions

1. Original Useful Life (OUL)
2. Remaining Useful Life (RUL)
3. Evaluated Remaining Useful Life (EvRUL)
4. Economic Remaining Useful Life (EcRUL)

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Original Useful Life (OUL) – Above-Ground

Asset Category	Subcategory	Original Useful Life(1)
Civil/Sitework		50
Structural		50
	Concrete	50
	Fiberglass	25
	Steel	25
	Plastic	10
Mechanical		25
	Valves	35
	Pumps – Water	20
	Pumps – Wastewater	15
	Chemical Equipment	15
	Coolers/ACs/fans	15
	Bar Screens	10
Electrical		30
Instrumentation		15

(1)These defaults are based on values from the International Infrastructure Management Manual (IIMM), Edition 2006, USEPA guides, other industry references, and Carollo project experience.

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Original Useful Life (OUL) – Below-Ground

Material	Original Useful Life
Asbestos Cement Pipe (ACP)	60
Cast Iron Pipe (CIP)	65
Ductile Iron Pipe (DIP)	75
Polyvinyl Chloride Plastic (PVC)	85
Acrylonitrile Butadiene Styrene Plastic (ABS)	85
Vitrified Clay Pipe (VCP)	100
Manholes	75

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Remaining Useful Life (RUL)

1. Based on year installed
2. Often negative (many assets exceed their expected useful life)

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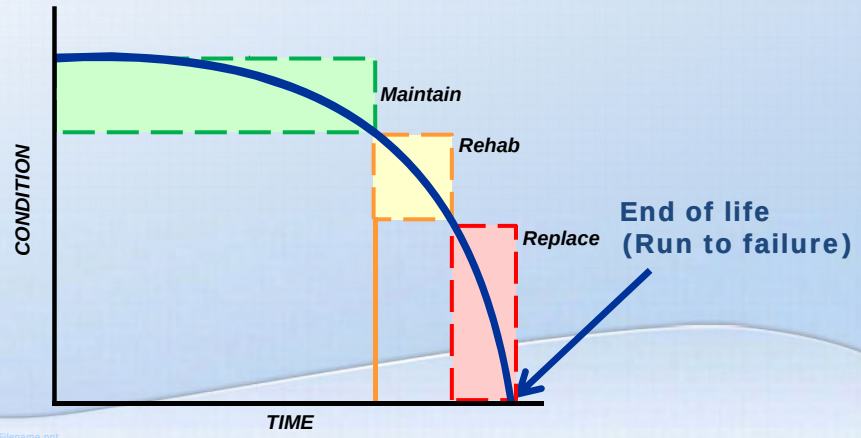
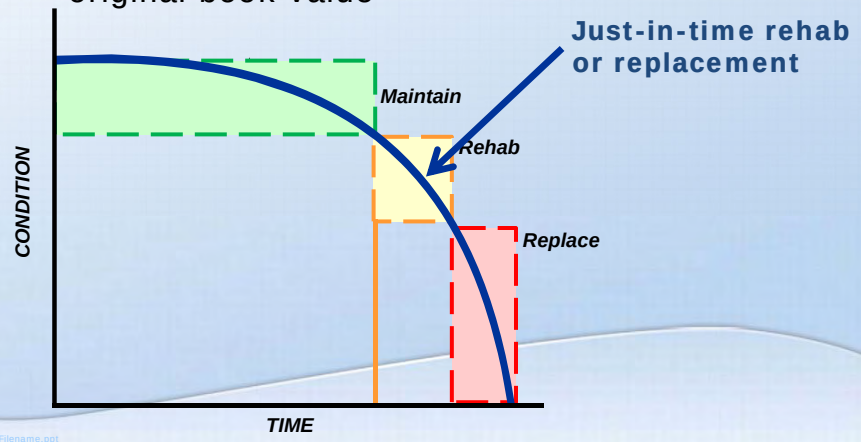
Evaluated Remaining Useful Life (EvRUL)

1. Based on condition ranking
2. Estimated time to asset failure



Economic Remaining Useful Life (EcRUL)

1. Based on condition ranking
2. Estimated time to economic failure = 50% of original book value



Replacement Cost Estimates

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Replacement Costs

1. Based on cost to replace asset in today's dollars and current technology.
2. Costs based on engineer's estimates for similar projects, adjusted for time and location.

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Cost Estimates Built with Bottom-Up, Top-Down Approach

Top down approach:

- Unit process totals compared to Carollo's Facility Cost Curves
- Overall site/facility value is verified

Bottom up approach:

- Replacement costs estimated for each asset
- Estimates based on multiple sources
  - Over 50,000 items in Carollo's Unit Price Catalog
  - Vendors, project references

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Project Cost Factors Based on Complexity

1. **Internal** – Replacement can be handled entirely in-house with City staff
2. **External** – Outside services are required
   a. **Simple** – Vendor or specialist installed, minimal design
   b. **Complex** – Full design required, contractor staging

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Sanitation Guidelines for Cost Designation

1. Internal – Replacement can be handled entirely in-house
   a. All pumps < 20 hp?
   b. Other?
2. External – Outside services are required
   a. Simple – Vendor or specialist installed, minimal design
      - All chemical equipment?
      - All electrical equipment?
      - Other?
   b. Complex – Full design required, contractor staging

Project Cost Factors: Direct

Factor	Description	Internal Project	External Project	
			Simple	Complex
Demolition	Destruction and removal of existing asset.	0%	5%	10%
Ancillary Support	Lumped cost of low value items not included as assets such as sump pumps, seal water pumps, small valves, service-air piping, hoses, etc.	20%	20%	20%
Construction and Estimating Contingency	Unforeseen or unanticipated project costs involved in the design details and installation of the new asset.	10%	10%	15%
	Subtotal	**30%**	**35%**	**45%**
General Conditions	Mobilization and demobilization, contractor temporary facilities, contractor's field supervision, and bonds and insurance.	0%	10%	15%
	Subtotal	**30%**	**49%**	**67%**
Contractor Overhead and Profit Margin	General contractor home office overheads and profit.	0%	12%	12%
Total Direct Cost Factor		**30%**	**66%**	**87%**

Project Cost Factors: Indirect

Sales Tax Rate	Sales tax of 9.25 percent applied to half of direct cost.	4.63%	4.63%	4.63%
Engineering, Legal, Administrative, and Project Contingencies	Engineering (design and services during construction), legal, and administrative costs reflect assistance with permitting and financing.	5%	10%	40%
Total Indirect Cost Factor		**9.63%**	**14.63%**	**44.63%**
Total Direct and Indirect Multipliers (Compounded)		**1.43**	**1.90**	**2.70**

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Below-Ground Replacement Cost

1. Indirect Cost Factors
   a. General Conditions – 15%
   b. Contingency – 30%
   c. Contractor Overhead & Profit – 15%
2. Cost Assumptions
   a. Sewer replacement pipe material is extra strength VCP
   b. Sewer Pipe Depth = 8 ft
   c. Vertical Shoring
   d. 3" AC Pavement on 6" ABC
   e. Trench Width = OD + 9 inches each side
   f. Pipe Base = 4" for 10" OD and Less
   g. Pipe Base = 6" for 12" OD and More
   h. No corrosion protection
   i. Sales Tax @ 8.75% is included in Material Cost for Pipe & Earthwork
   j. Cost does not include Engineering Design (10%) or Construction Management (10%) Fees

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KJ Unit Cost for Pipe Rehabilitation

1. Base CIPP Cost - $/LF
2. Bypass Pumping (varies by pipe diameter)
   a. Major Streets – 10 to 80%
   b. Typical Street – 5 to 50%
3. Utility and Traffic Control
   a. Major Streets – 15%
   b. Typical Streets – 5%
4. Groundwater
   a. If High – 0 to 10%
5. Laterals
   a. $/Lateral - $7,500
   b. $/Intruding Lateral - $400
6. Spot Repairs
   a. $/Obstruction - $6,000
   b. If infiltration $/LF = $10
7. Engineering and Administrative = 20%
8. Contingency Costs = 20%
9. Risk Assessment Costs for Bypass Pumping and Traffic = 0 to 50%

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Next Steps and Action Items

1. Develop above- and below-ground asset inventories
2. Confirm WQCP and Lift Station Condition Assessment Dates
3. Next Meeting – Reliability Assessment Workshop (tentatively Oct. 4th)
4.
5.

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CITY OF SIMI VALLEY

Asset Reliability Assessment and Financial Plan

Reliability Workshop

Carollo Engineers
October 11, 2010

Engineers...Working Wonders With Water™

Reliability Workshop Agenda

1. Meeting Purpose
2. Above-Ground Assets
   a. Vulnerability
   b. Criticality
   c. Risk
3. Below-Ground Assets
   a. Vulnerability
   b. Criticality
   c. Risk
4. Next Steps

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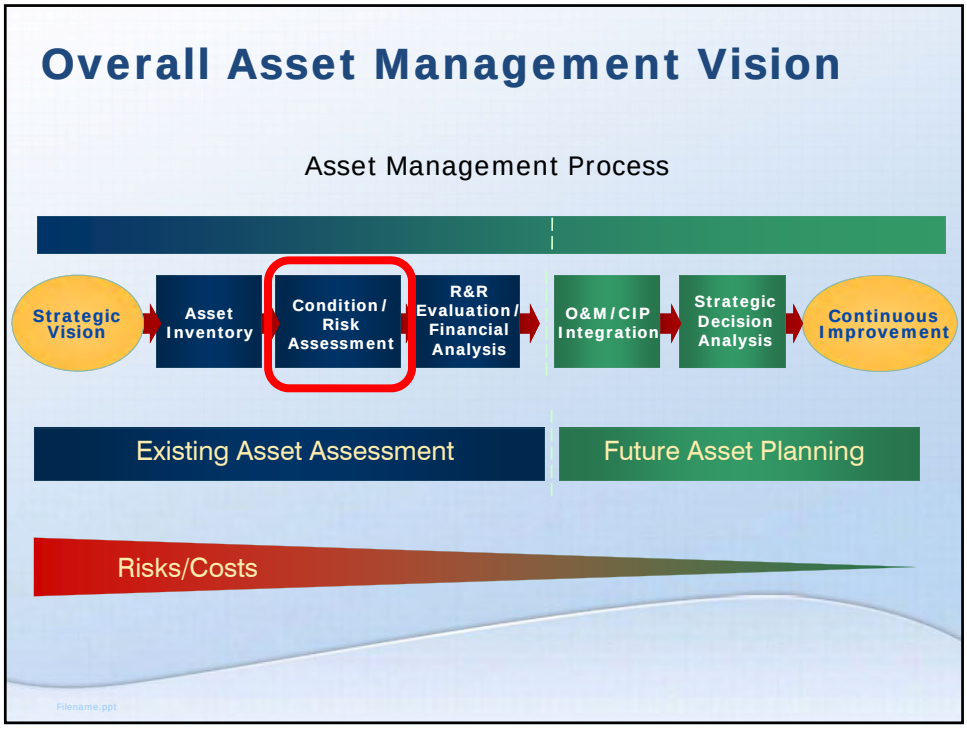
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R&R Evaluation / Financial Analysis
O&M / CIP Integration
Strategic Decision Analysis
Continuous Improvement
Existing Asset Assessment
Future Asset Planning
Risks/Costs

Above-Ground
Asset Reliability Assessment

Above-Ground Condition

1. Plant is well-maintained but aging
2. Structural condition and seismic concerns
3. Electrical concerns as noted in ArcFlash Study
4. Mechanical concerns indicate need for various projects throughout
5. No issues noted at lift stations (good condition or under construction)

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Condition Rankings

Condition Ranking	Description
1	Very Good (0% renewal required)
2	Good (5% renewal required)
3	Fair (10-20% renewal required)
4	Poor (20-30% renewal required)
5	Very Poor (>50% renewal required)

Adapted from the International Infrastructure Management Manual (IIMM), Edition 2006

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Above-Ground Asset Condition Ranking Summary

Asset Vulnerability (Likelihood of Failure)

- Vulnerability =
  1 / Evaluated Remaining Useful Life
- Original Useful Life =
  Industry standards + Simi Valley specific
- Evaluated Remaining Useful Life =
  Condition Fraction x Original Useful Life

Original Useful Life (OUL) – Above-Ground

Asset Category	Subcategory	Original Useful Life(1)
Civil/Sitework		50
Structural		50
	Concrete	50
	Fiberglass	25
	Steel	25
	Plastic	10
Mechanical		25
	Valves	35
	Pumps – Water	20
	Pumps – Wastewater	15
	Chemical Equipment	15
	Coolers/ACs/fans	15
	Bar Screens	10
Electrical		30
Instrumentation		15

(1)These defaults are based on values from the International Infrastructure Management Manual (IIMM), Edition 2006, USEPA guides, other industry references, and Carollo project experience.

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Asset Criticality (Consequence of Failure)

1. Criticality factors are aligned with Level of Service Goals
2. Consequence of failure of an asset:
   a. Health and Safety for Public and Employees
   b. Financial Impact / Cost of Repairs
   c. Impact on Environment and Regulatory Compliance
   d. Service Delivery and Effect on Customers / Public Confidence
3. Overall criticality is weighted sum of components

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Above-Ground Criticality

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health and Safety for Public and Employees	**25%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life
Financial Impact	**20%**	Absorbed within budget line item < $10,000	Absorbed within current budget and under GM signature $10,000 to $25,000	Requires Council approval $25,000 to $100,000	Requires Council approval, new borrowing, or impact rates > $100,000
Impact on Environment or Regulatory Compliance	**10%**	100% compliance with permits & no impact on environment	Violation but no enforcement action &/or minor impact on environment	Violation with minor enforcement action &/or moderate impact on environment	Enforcement action with fines &/or major impact on environment
Effect on Service to Customers	**30%**	No impacts on service to customers	Minor disruption	Short-term impact; substantial disruption	Long-term impact; area-wide disruption
Ability to Respond and Return Asset to Service	**15%**	Redundant asset available or service restored in < 2 hours	Service restored in 2 to 8 hours	Service restored in 8 to 24 hours	Not able to restore service for > 24 hours

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Above-Ground Criticality

1. Highly critical assets mostly electrical, buildings, chemical
2. Generally higher criticality at beginning of plant
   a. Safety, less recourse
   b. Exception: Filtration overflow and CCBs

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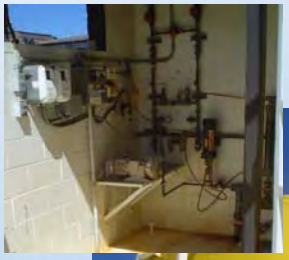
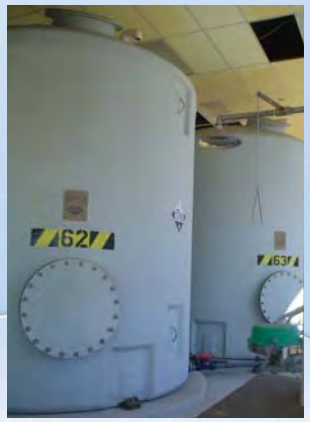
Above-Ground Risk

1. Highest risk assets
   a. Ferric Chloride System
   b. Noted MCCs
   c. Chlor/Dechlor System





Preliminary Projects - Electrical

1. Recommend Preliminary Design Study
2. MCCs A, B1, B2, C1, C2, D, E, F, and G
3. Code issues, need to redesign

Preliminary Projects - Structural

- Seismic concern: insufficient wall anchorage
  - Operations Building
  - Chlorination Building
  - Bar Screen Building
  - Westside Electrical Building
  - Digester Control Building

Filename.ppt

Preliminary Projects – Structural, cont.

- Condition concerns
  - Influent Splitter and Channel
  - Maintenance Workshop
  - Operations Building Roof

Filename.ppt

Preliminary Projects – Structural, cont.

- Condition concerns, cont.
  - Filter Gallery
  - Sludge Storage Lagoon

Filename.ppt

Preliminary Projects - Mechanical

- Headworks
  - Bar screen reliability
  - Screen size
  - Ventilation

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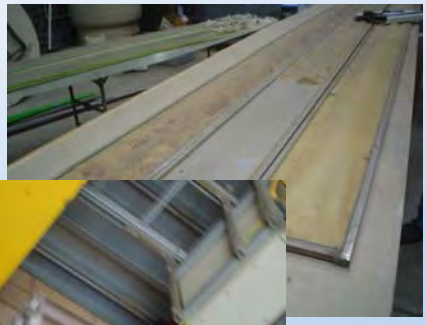
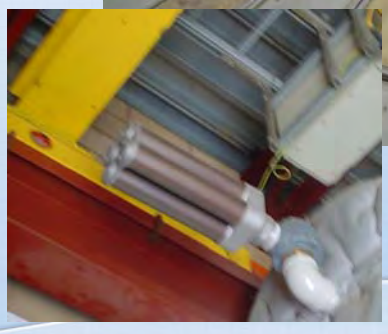
Preliminary Projects – Mechanical

- BNRs
  - Mixers
  - Blower surge issue
  - Membranes





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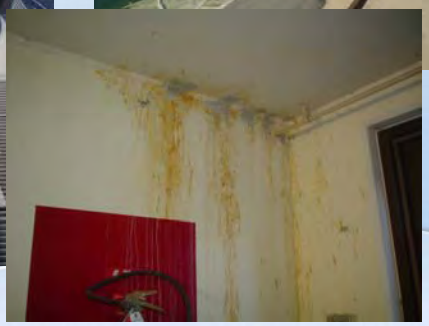
Preliminary Projects - Mechanical

- Filtration
  - Overflow issues
  - Gate work



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Preliminary Projects - Mechanical

- Reclaimed Water PS
- Digester Equipment
- Struvite

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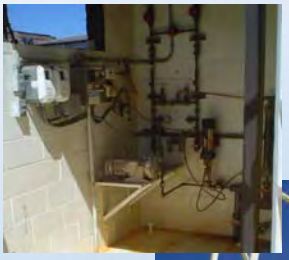
Preliminary Projects - Mechanical

- Chlor/Dechlor
- Ferric System



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Preliminary Projects - Mechanical

- Misc. Valves/Actuators
- Plant Water

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Preliminary Projects - Demolition

- Digesters 1 and 2
- Other out of service components

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Below-Ground
Asset Reliability Assessment

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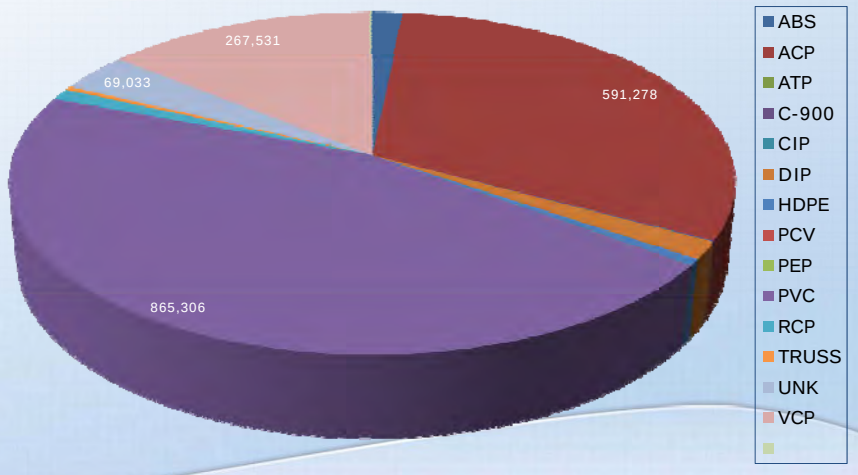
Below-Ground Asset Inventory

Pipe Material Types by Length (feet)



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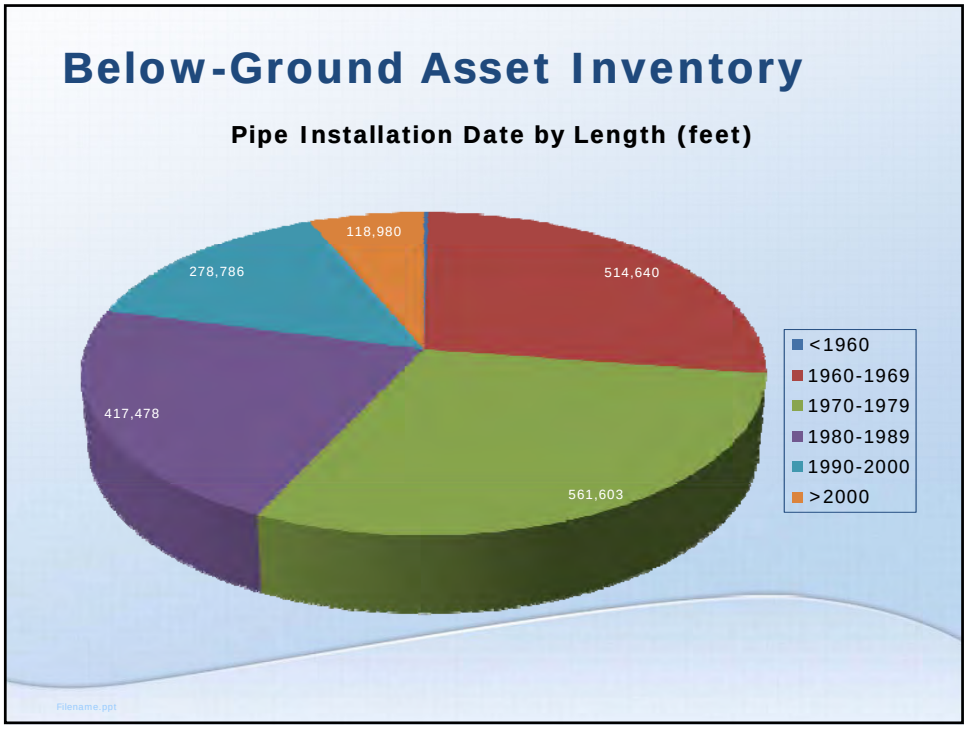
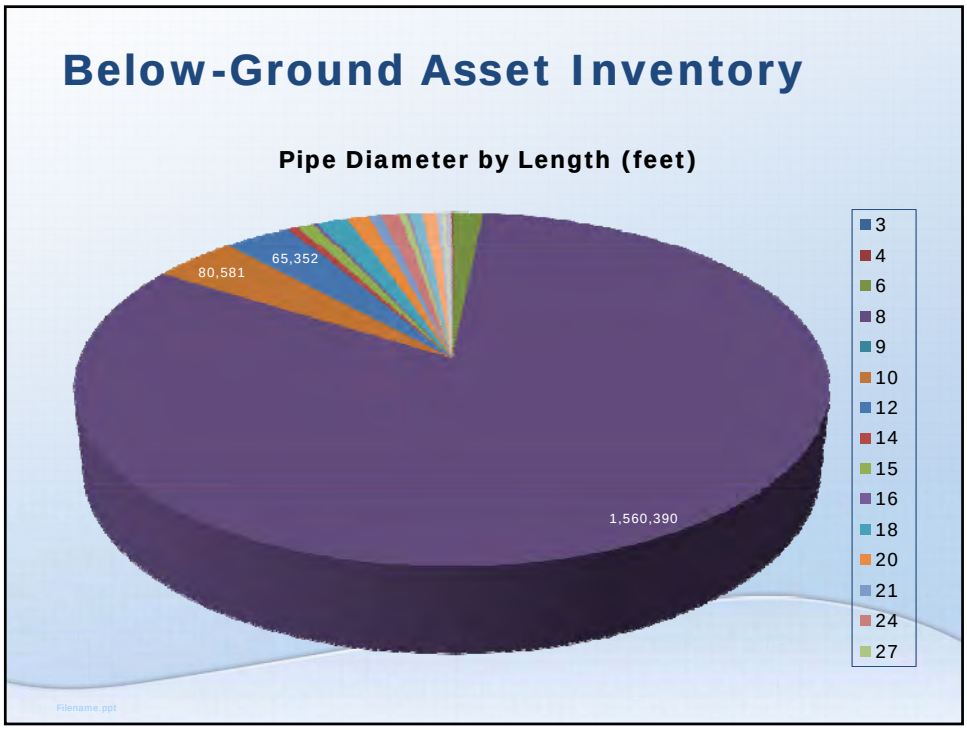
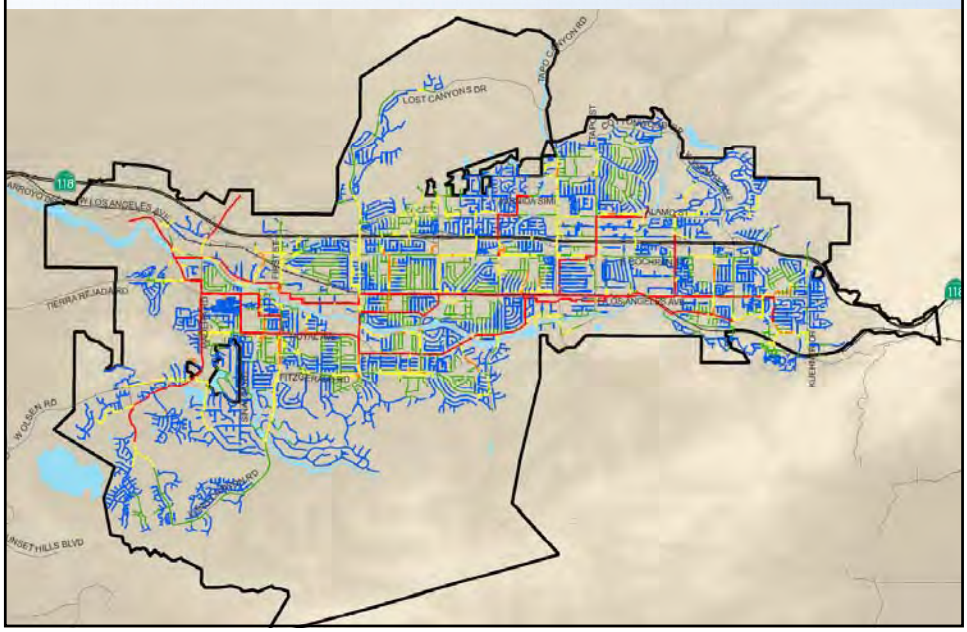

Below-Ground Asset Inventory
Pipe Installation Date by Length (feet)
118,980
514,640
278,786
417,478
561,603
<1960
1960-1969
1970-1979
1980-1989
1990-2000
>2000
Filename.ppt


Below-Ground Asset Inventory
Pipe Diameter by Length (feet)
65,352
80,581
1,560,390
3
4
6
8
9
10
12
14
15
16
18
20
21
24
27
Filename.ppt

Collection System Criticality

Level of Service / Criticality Category	Weight	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health and Safety for Public and Employees	**30%**	No injuries or adverse health effects	No lost-time injuries or medical attention	Lost-time injury or medical attention	Loss of life
		Pipes 6" and smaller	Pipes 12" and smaller	Pipes within 1000 ft of critical facilities; Pipes larger than 12"	No pipes
Financial Impact	**25%**	Absorbed within budget line item < $25,000	Absorbed within current budget and under GM signature $25,000 to $100,000	Requires Council approval $100,000 to $250,000	May require new borrowing, or impact rates > $250,000
		No pipes	Manholes; Pipes 12" and smaller	Pipes 18" and smaller	Pipes larger than 18"
Impact on Environment or Regulatory Compliance	**15%**	100% compliance with permits & no impact on environment	Violation but no enforcement action &/or minor impact on environment	Violation with minor enforcement action &/or moderate impact on environment	Enforcement action with fines &/or major impact on environment
		No pipes	Pipes 8" and smaller	Pipes 12" and smaller OR Pipes within 100 ft of drainage area	Pipes larger than 12"
Service Delivery and Effect on Customers / Public Confidence	**30%**	No impacts on service delivery or customers	Minor disruption	Short-term impact &/or substantial disruption	Long-term impact &/or area-wide disruption
		No pipes	Pipes 8" and smaller	Pipes 12" and smaller OR Pipes within 50 ft of railroad or major road	Pipes larger than 12"

Pipe Criticality



Asset Vulnerability (Likelihood of Failure)

- Vulnerability =
  1 / Remaining Useful Life
- Remaining Useful Life =
  Original Useful Life – (2010 – Installation Year)
- Original Useful Life =
  Industry standards/research + Simi Valley specific
- Evaluated Remaining Useful Life =
  Condition Fraction x Remaining Useful Life
- Condition Fractions

Modified PACP	Condition	Fraction
< 200	1	0
< 300	2	0.1
< 400	3	0.2
< 500	4	0.4
> 500	5	0.9

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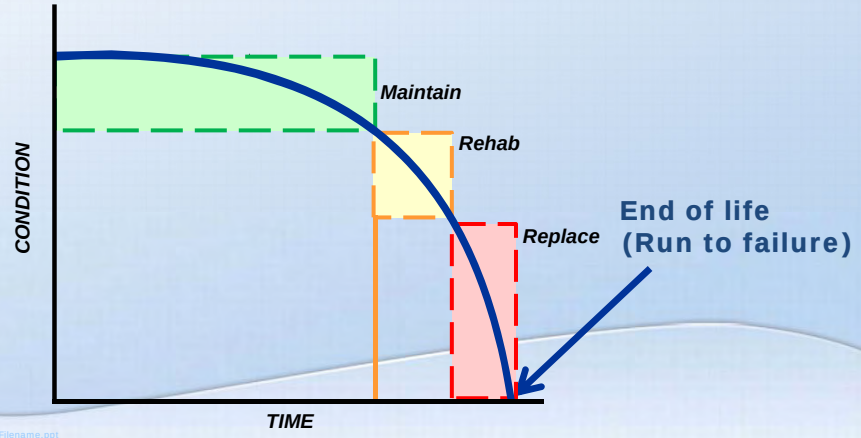
Evaluated Remaining Useful Life (EvRUL)

1. Based on condition ranking
2. Estimated time to asset failure



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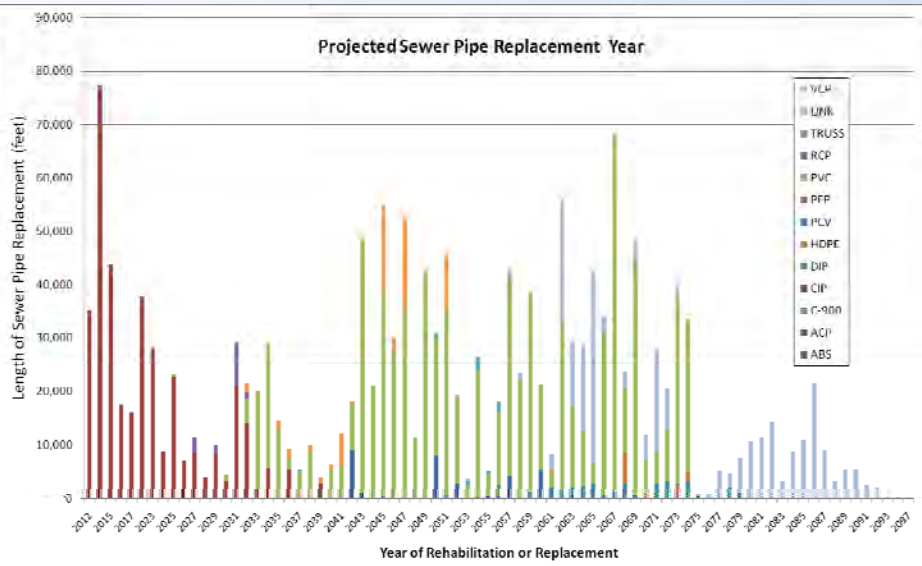
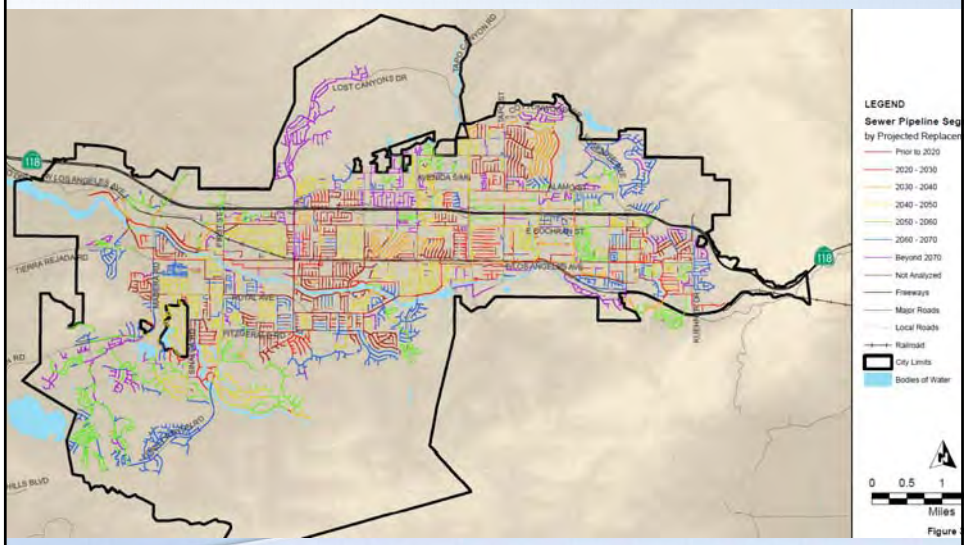
Original Useful Life (OUL) – Below-Ground

Material Type	Original Useful Life
Acrylonitrile Butadiene Styrene Plastic (ABS)	70
Asbestos Cement Pipe (ACP)	50
Cast Iron Pipe (CIP)	40
Ductile Iron Pipe (DIP)	75
Polyvinyl Chloride Plastic (PVC)	70
Reinforced Concrete Pipe (RCP)	60
Vitrified Clay Pipe (VCP)	100
High Density Polyethylene Pipe (HDPE)	70
Truss Pipe	70
C-900	70
Polyethylene Pipe (PEP)	70
Unknown	70

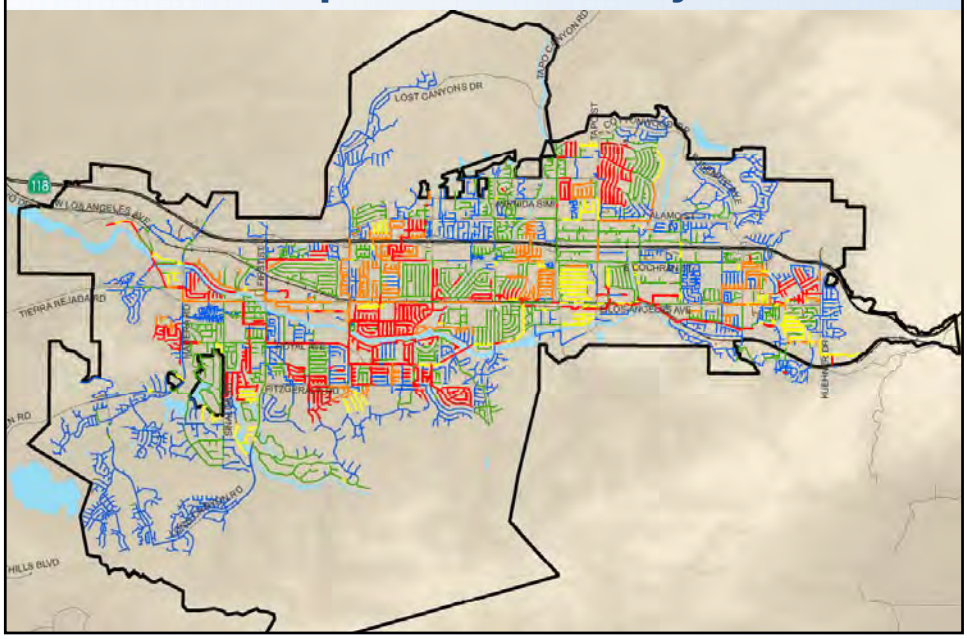
Projected Pipe Replacement Year



Projected Pipe Replacement Year



Pipe Vulnerability



Asset Risk Determined by Vulnerability and Criticality

1. Risk = Vulnerability x Criticality
2. Vulnerability: Likelihood of asset failure
   a. Criteria aligned with asset condition and/or attributes (e.g. age)
   b. Probability of failure
3. Criticality: Consequence of asset failure
   a. Criteria aligned with level of service goals
   b. Parameters of public health and safety, effect on customers, environment, & cost

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KJ Pipe Risk Factors

- Rehabilitation Schedule based on 3 factors = Modified PACP Score + Prob. of Failure Factor + Risk Factor
  - Immediate Rehabilitation >= 675
  - Rehab in 3 to 5 years = 600 to 674
  - Rehab in 5 to 10 years = 450 to 599
  - Rehab in 10 to 20 years = 275 to 449
  - Rehab in 20 or more years = < 300

1. Modified PACP Score (110 to 550)
   a. Structural Rating Score (1 to 5)
   b. Operational and Maintenance Score (1 to 5)
   c. Structural Score and O&M Score (2 digits) x 10

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KJ Pipe Rating Factors

2. Probability of Failure Factor (0 to 310)
   a. Age
      - >= 40 years = 150
      - 30-40 years = 75
      - 20-30 years = 40
      - 8-20 years = 10
      - < 8 years = 0
   b. Pipe Material
      - ACP = 60
      - RCP = 50
      - DIP/CIP = 20
      - VCP = 10
      - PVC/TRUSS = 0
   c. AC Condition Rating (ACP only)
      - AC1 – Slight Deterioration = 50
      - AC2 – Moderate Deterioration = 75
      - AC3 – Severe Deterioration = 100

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KJ Pipe Rating Factors

3. Risk Factors (0 to 110)
   a. Pipe Diameter
      - >= 40 in. = 50
      - 25-40 in. = 40
      - 10-25 in. = 20
      - <10 in. = 0
   b. Pipe Location
      - Within 200 feet of waterways or environmentally sensitive areas = 40
      - Crossing under railroad = 30
      - Crossing under major roadways = 50
      - Servicing or crossing under business districts/tourist attractions = 60

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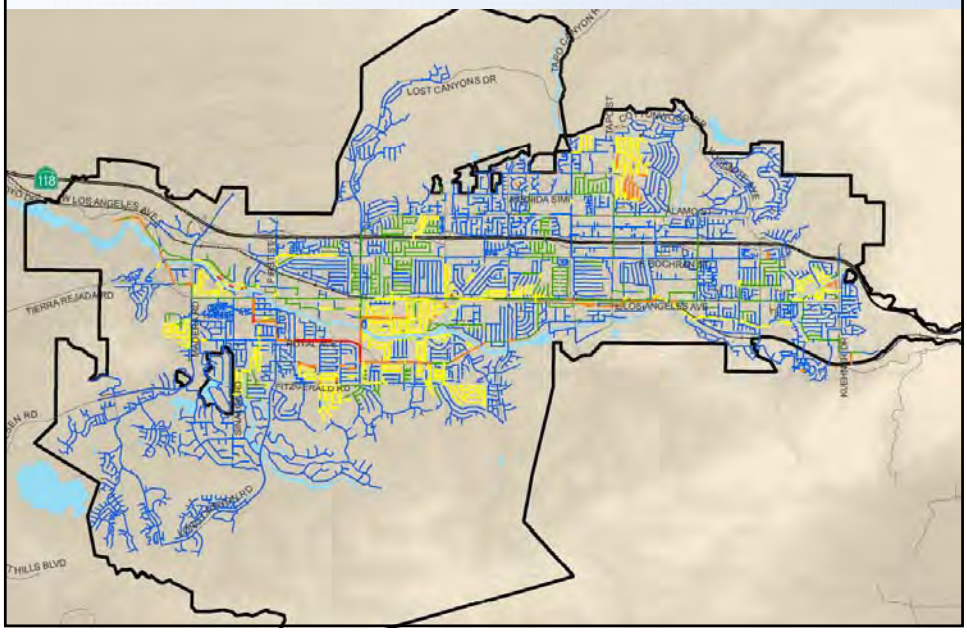
Pipe Risk



Next Steps and Action Items

1. City criticality review for above-ground assets
2. Carollo misc. follow-up items
3. Ostara process information – cost estimates
4. Review force mains – criticality
5. Truss pipe – look at original useful life
6. Identify/breakdown ACP pipe – possibly based high groundwater areas and/or sags
7. Compare against trunk sewer rehab program

CITY OF SIMI VALLEY

Asset Reliability Assessment and Financial Plan
Financial Plan Workshop

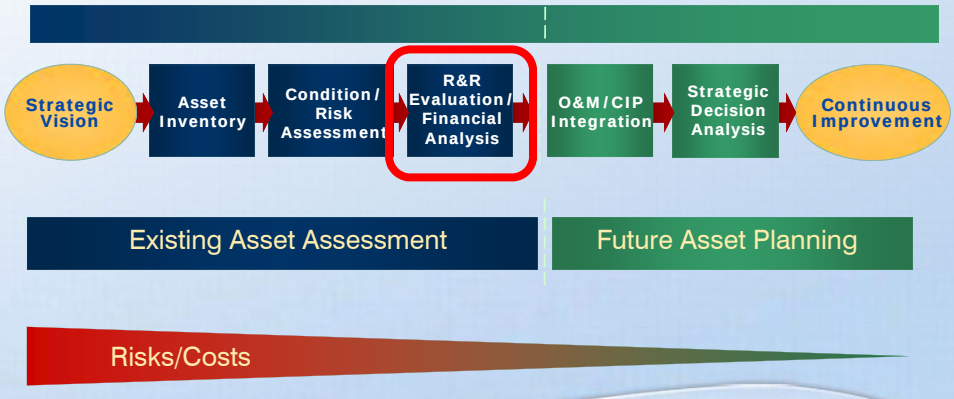
Carollo Engineers

December 2, 2010

carollo
Engineers...Working Wonders With Water™

Overall Asset Management Vision

Asset Management Process



R&R Cash Flow Needs

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Above-Ground Tactical Project Summary

Project	Estimated Total Project Costs(1)
Electrical Pre-Design Study	$136,000
Seismic Retrofits	$856,000
Structural Condition Issues	$544,000
New Maintenance Workshop	$1,400,000
Bar Screens and Washer Compactors	$2,214,000
Headworks Ventilation	$106,000
BNR Mixers	$120,000
Reclaimed Water PS	$60,000
Digester Rehabilitation	$2,500,000
Struvite Pipe Replacements	$300,000

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Above-Ground Tactical Project Summary (cont.)

Project	Estimated Total Project Costs(1)
Chlorine Feed Pumps	$63,000
Ferric Containment	$875,000
Plant Water Study	$100,000
Plant Water Rehab	$555,000
Digester 1 and 2 Demolition	$1,050,000
Demolition, miscellaneous mechanical	$200,000
Total without Electric Project Placeholder	**$11,079,000**
Electrical Project Budgetary Placeholder	$6,500,000
Total	**$17,579,000**

Notes: Costs reflect planning level cost estimates. Costs are presented in November 2010 dollars, ENR 8921.

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Above-Ground R&R Cost Estimates

Year	Est. Replace. Cost
2011	$1,569,246
2012	$1,217,711
2013	$11,524,250
2014	$1,948,200
2015	$1,514,450
2016	$4,344,920
2017	$3,398,160
2018	$459,800
2019	$0
2020	$47,500
TOTAL	**$26,024,240**

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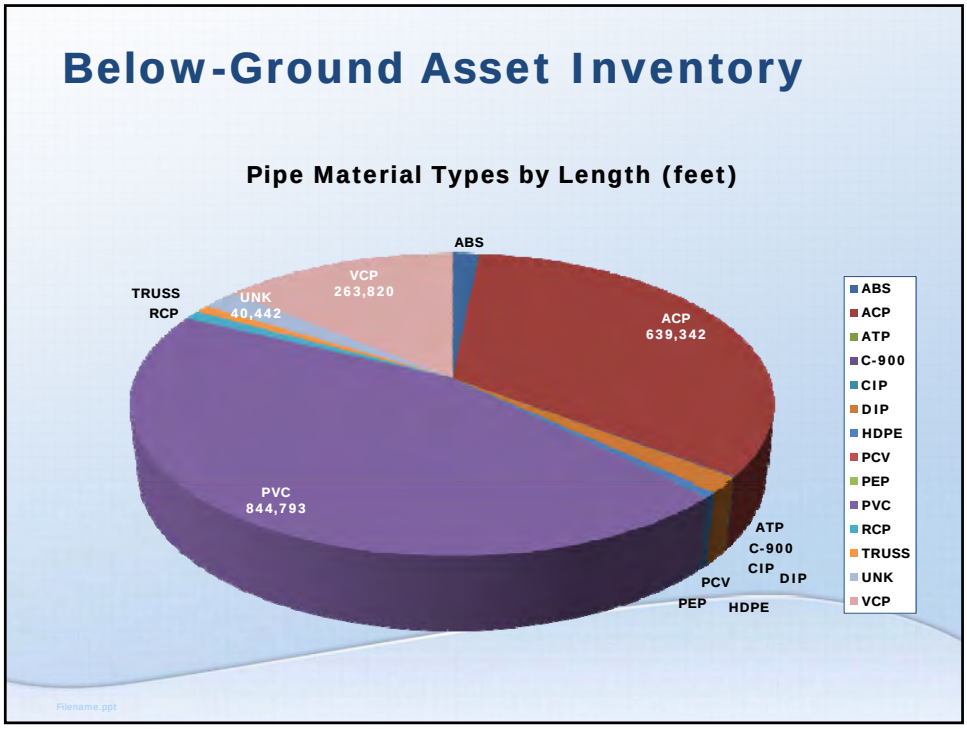
Below-Ground Asset Inventory
Pipe Material Types by Length (feet)
ABS
ACP 639,342
ATP
C-900
CIP
DIP
HDPE
PCV
PEP
PVC 844,793
RCP
TRUSS
UNK 40,442
VCP 263,820
ABS
ACP
ATP
C-900
CIP
DIP
HDPE
PCV
PEP
PVC
RCP
TRUSS
UNK
VCP
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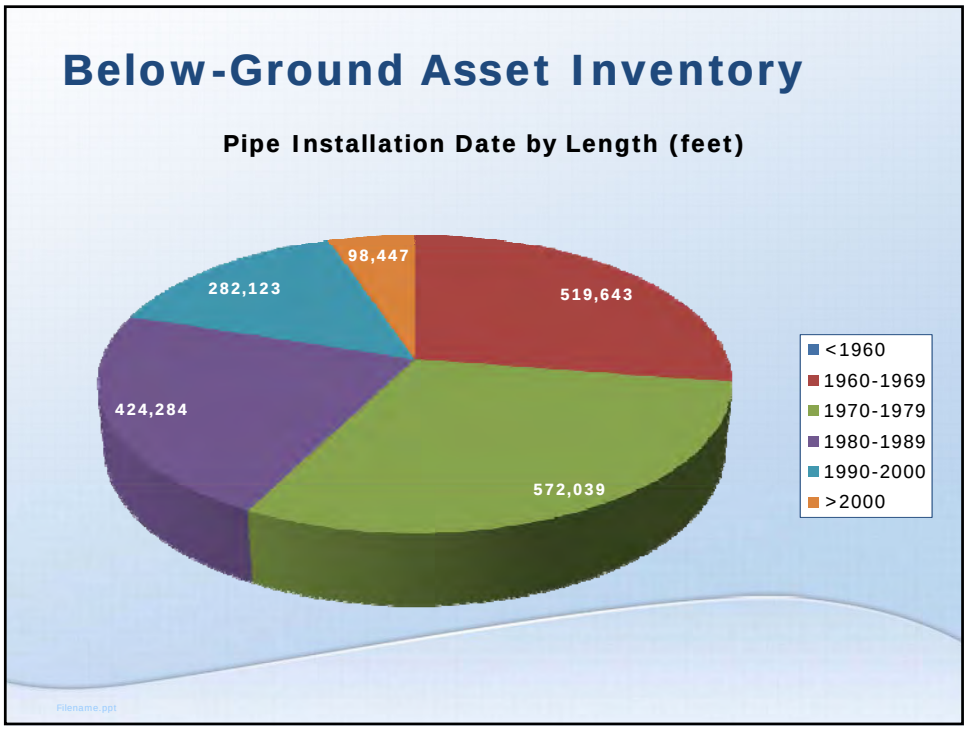
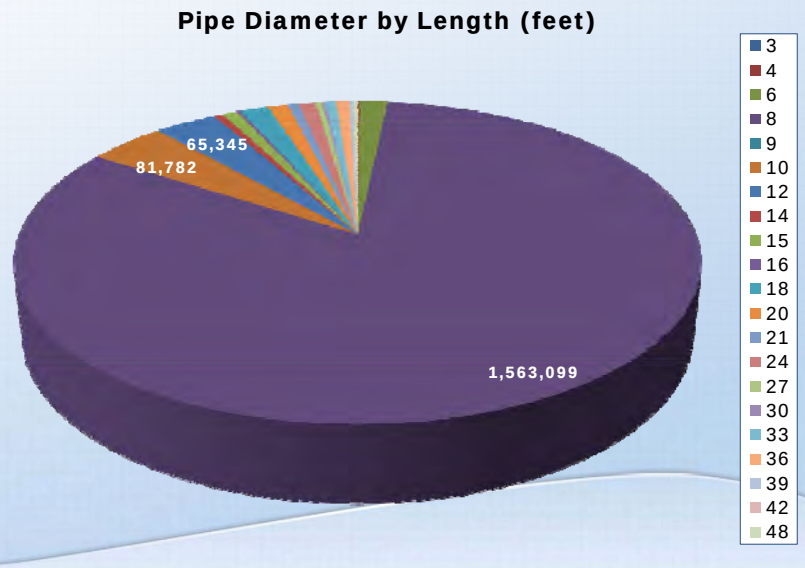

Below-Ground Asset Inventory
Pipe Installation Date by Length (feet)
98,447
519,643
282,123
424,284
572,039
<1960
1960-1969
1970-1979
1980-1989
1990-2000
>2000
Filename.ppt

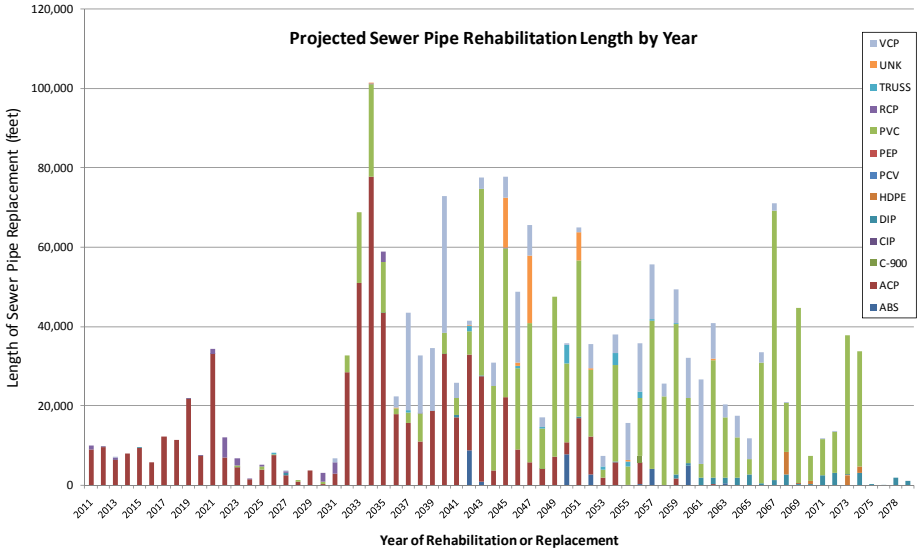
Below-Ground Asset Inventory



Original Useful Life (OUL) – Below-Ground

Material Type	Original Useful Life
Acrylonitrile Butadiene Styrene Plastic (ABS)	70
Asbestos Cement Pipe (ACP)	50
ACP – 8-inch Dia. or Less	70
Cast Iron Pipe (CIP)	40
Ductile Iron Pipe (DIP)	75
Polyvinyl Chloride Plastic (PVC)	70
Reinforced Concrete Pipe (RCP)	60
Vitrified Clay Pipe (VCP)	75
High Density Polyethylene Pipe (HDPE)	70
Truss Pipe	70
C-900	70
Polyethylene Pipe (PEP)	70
Unknown	75

Projected Pipe Replacement Year



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Sewer Pipe Unit Cost Estimates

1. Assumptions
   a. All sewer pipes will be rehabilitated with CIPP liners due to the large amount of ACP
   b. Addition percentages based on Kennedy-Jenks sewer trunk rehab cost estimates
   c. Engineering & Administrative= 35%
   d. Contractor Overhead & Profit = 15%
   e. Contingency (includes sags, laterals, misc.) = 35%
   f. Manholes
      - 6,365 Manholes
      - 1,882,592 LF Sewer Pipe
      - Average = 1 Manhole / 296 LF Sewer Pipe
      - Construction Cost = $5,600 / Manhole
      - Total Replacement Cost = $35,644,000

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Sewer Pipe Unit Cost Estimates – Rehabilitation and Replacement

Pipe Size	CIPP Install Cost ($/in. dia./LF)	CIPP Base Install Unit Cost	PVC Replace Base Install Unit Cost	Bypass Major Street	Bypass Typical Street	Traffic Control Major Street	Traffic Control Typical Street	Groundwater Yes	Groundwater No	Pipe Size	Risk 1-Env	Risk 2-RR	Risk 3-Street	Risk 4-School /Hospital	Risk 5-GW
3	$5	$50	$120	15%	10%	15%	5%	10%	0%	3	25%	37%	50%	65%	65%
4	$5	$50	$122	15%	10%	15%	5%	10%	0%	4	25%	37%	50%	65%	65%
6	$5	$50	$126	15%	10%	15%	5%	10%	0%	6	25%	37%	50%	65%	65%
8	$5	$50	$131	15%	10%	15%	5%	10%	0%	8	25%	37%	50%	65%	65%
9	$5	$60	$136	15%	10%	15%	5%	10%	0%	9	25%	37%	50%	65%	65%
10	$5	$60	$141	15%	10%	15%	5%	10%	0%	10	25%	37%	50%	65%	65%
12	$5	$65	$154	15%	10%	15%	5%	10%	0%	12	25%	37%	50%	65%	65%
14	$5	$112	$159	30%	20%	15%	5%	10%	0%	14	25%	37%	50%	65%	65%
15	$5	$120	$162	30%	20%	15%	5%	10%	0%	15	20%	30%	40%	50%	50%
16	$7	$128	$166	30%	20%	15%	5%	10%	0%	16	20%	30%	40%	50%	50%
18	$7	$144	$171	60%	40%	15%	5%	10%	0%	18	18%	25%	30%	35%	35%
20	$7	$160	$186	60%	40%	15%	5%	10%	0%	20	18%	25%	30%	35%	35%
21	$7	$168	$194	60%	40%	15%	5%	10%	0%	21	18%	25%	30%	35%	35%
24	$7	$192	$207	60%	40%	15%	5%	10%	0%	24	18%	25%	30%	35%	35%
27	$7	$216	$229	70%	40%	15%	5%	10%	0%	27	15%	18%	20%	25%	25%
30	$7	$240	$253	70%	40%	15%	5%	10%	0%	30	15%	18%	20%	25%	25%
33	$8	$264	$296	80%	50%	15%	5%	10%	0%	33	15%	18%	20%	25%	25%
36	$10	$360	$320	80%	50%	15%	5%	10%	0%	36	13%	15%	18%	20%	20%
39	$10	$390	$339	80%	50%	15%	5%	10%	0%	39	13%	15%	18%	20%	20%
42	$10	$420	$361	80%	50%	15%	5%	10%	0%	42	13%	15%	18%	20%	20%
48	$10	$480	$405	80%	50%	15%	5%	10%	0%	48	13%	15%	18%	20%	20%

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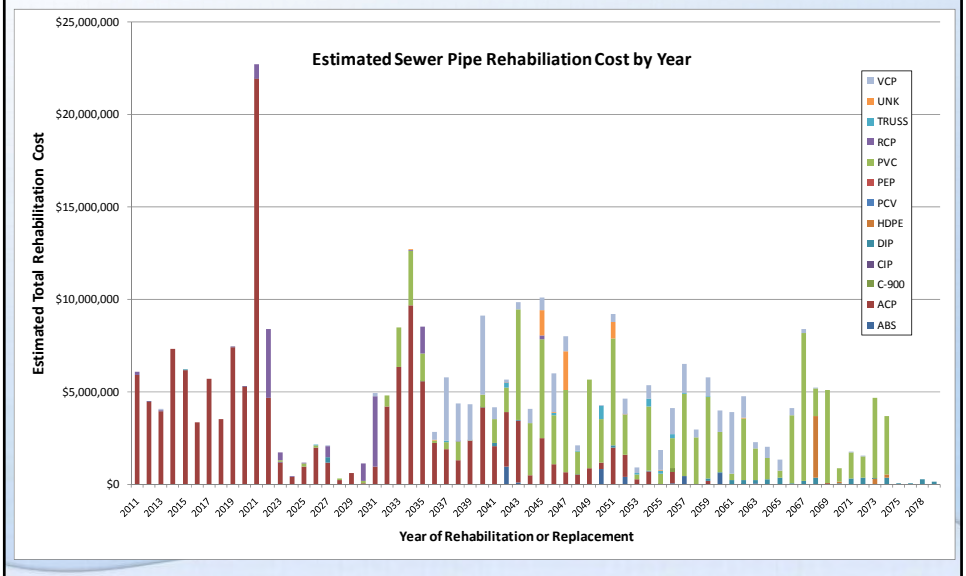
Below-Ground Strategic R&R CIP



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Below-Ground R&R Cost Estimates

Year	Est. Rehab. Cost	Est. Replace. Cost
2011	$6,106,032	$6,688,108
2012	$4,448,849	$5,240,895
2013	$4,094,373	$4,601,892
2014	$7,308,146	$7,578,921
2015	$6,189,389	$6,550,145
2016	$3,346,042	$3,702,771
2017	5,691,536	$6,747,998
2018	$3,500,489	$4,722,395
2019	$7,403,376	$9,705,774
2020	$5,314,157	$5,738,872
2021	*$22,719,772*	$23,969,064
TOTAL (2011-2079)	**$315,475,622**	Pipes = $581,902,000 Manholes = $35,644,000 **Total = $617,546,000**

Replacement Reserve Requirements

Planning Horizon

1. Capital Improvement Program – 5 Years
2. R&R Cost Estimates for 1 Replacement Cycle
   a. Below-Ground – 70 Years
   b. Above-Ground – 50 Years
3. Replacement Reserves – 10 Years

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Guiding Policies

1. Inflation
2. Interest Income
3. Debt vs. Cash
4. Operations Reserve Transfers

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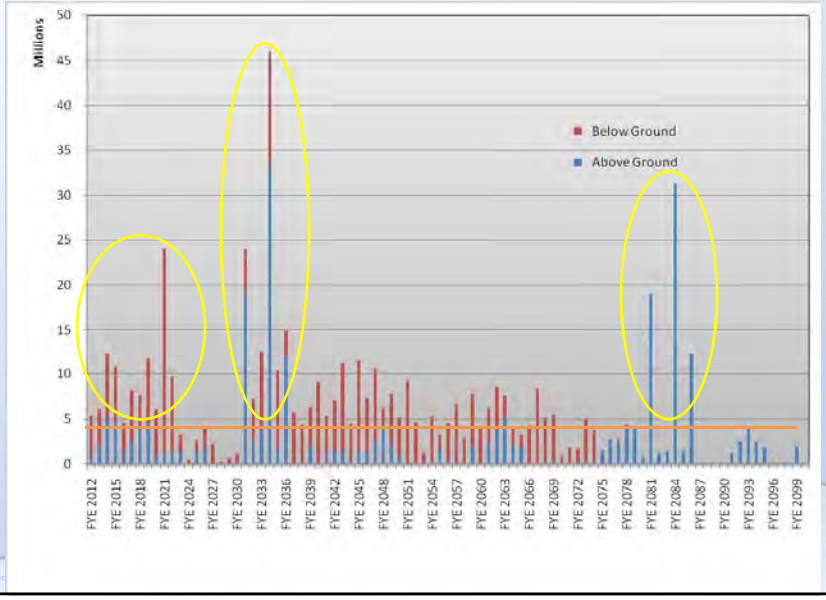
Large up-front needs and peaks



R&R Reserve Fund Model

- Key Assumptions
  - Existing Customers

	Number	EDU Multiple	Total EDUs
Singe Family Residential	32,212	1.00	32,212
Multipfamily Residential	3,241	0.75	2,431
Industrial/Commercial	1,018		6,185
Total EDUs			**40,828**

  - Customer Growth

	2010 - 2015	2015 - 2020	2020 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2040 +
Account Growth	5.3%	1.7%	1.6%	1.1%	0.8%	0.7%	0.2%

R&R Reserve Fund Model

- Key Assumptions (Cont.)
  - Beginning Balance
    - $(983,773) in FY 2012
  - Interest Income
  - Transfer Availability

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Next Steps and Action Items

1.
2.

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