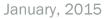


PNCWA Webinar

Computerized Maintenance Management Systems (CMMS) Benefits to Smaller Agencies







Presentation Outline

- Introduction Jeremy Coles
- What is a CMMS Brown and Caldwell (BC)
- How can a CMMS help my utility (BC)
 - Manage information about your assets
 - Manage work information and history
 - Track customer complaints
- How can a CMMS help my utility (BC)
 - Case Study Santa Barbara
- Case Study Tony Bisson, Clark Regional WWD (WA)
- What does a utility need to get started? BC
- Q&A Jeremy Coles



Our assets – their ownership and care





Agency assets – what we all would like to know.....

What do we own and where is it?

What condition is it in?

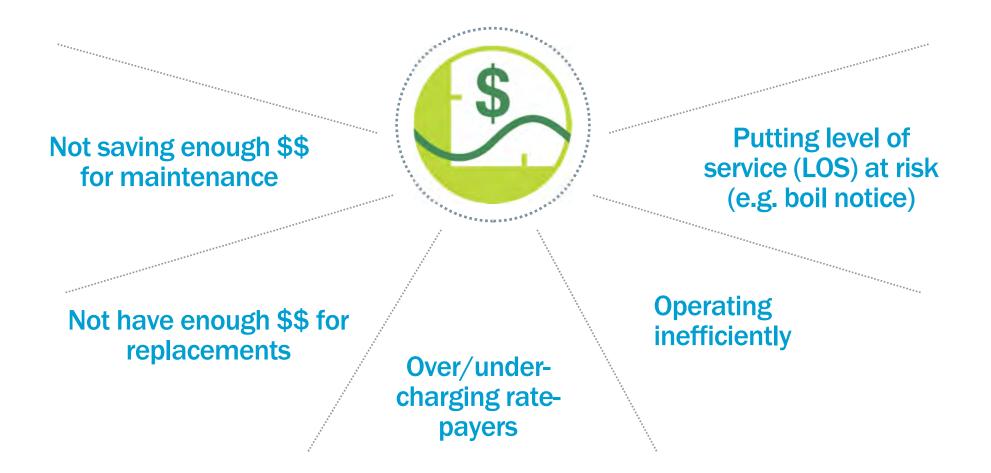
What are the likelihood and consequence of failure?

How should we maintain it?

Focus on critical assets Analyze how data is collected Work Orders (WO's) go to prioritized assets Better updates for financial forecasting (and rates) Basic

Advancec

Why is AM important?.....without it the owner could be:

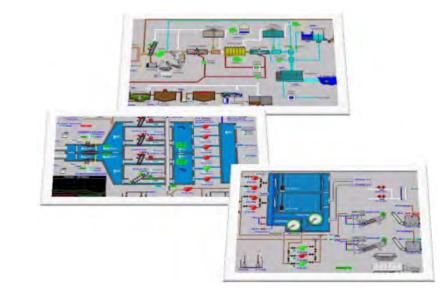


Data – best to store and manage asset information somewhere other than our heads.....

"With a lot of our staff nearing retirement, we risked losing all the knowledge in our heads. We realized we needed to capture and organize information in a whole new way."

> Greg Farmer, Operations Littleton/Englewood WWTP, Colorado





Brown and Caldwell



From "Effective Utility Management, a Primer for Water and Wastewater Utilities"

- Operational optimization timely, cost-effective, reliable operations (efficient work, right time)
- Infrastructure stability High service level, low cost, reliable/low risk water delivery
- Measurement and continuous improvement



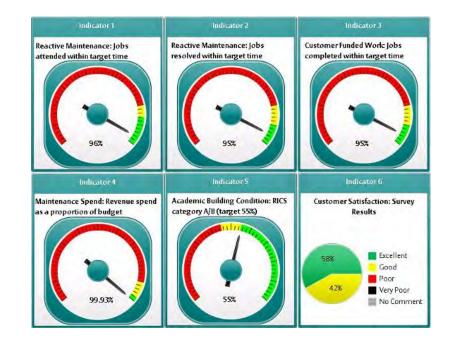


What is a CMMS system?



A software package designed to <u>manage</u> <u>high volumes</u> of asset information

- Data Driven
 - Houses the asset register
 - Detailed information about an agencies assets (size, HP, condition etc.)
 - Schedule and history of the work performed on those assets



Goals are to better manage our utilities – where does the CMMS fit in?



- 1. Agency policies and procedures
- 2. Equipment data
- 3. Work order control
- 4. Preventative maintenance practices
- 5. Materials control

CMMS systems strongly support these

CMMS systems - manage the detail of both assets and the work performed



- Detailed asset inventory
- Maintenance history
- Maintenance and budget planning tool
- Generates reports
- Dynamic/transactional
- What you own, what you've done, what you have to do

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How can a CMMS help my utility?





Even the smallest agencies can have thousands of assets worth hundreds of millions of \$\$\$

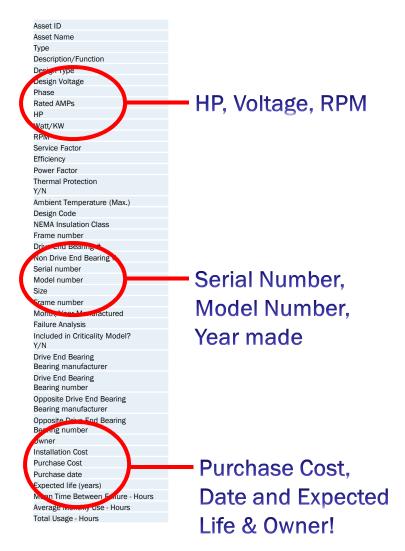
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"RAW-02-VTP-101-M"

400HP Motor 1 – Vertical Turbine Pump



Each individual asset has it's own set of detailed information



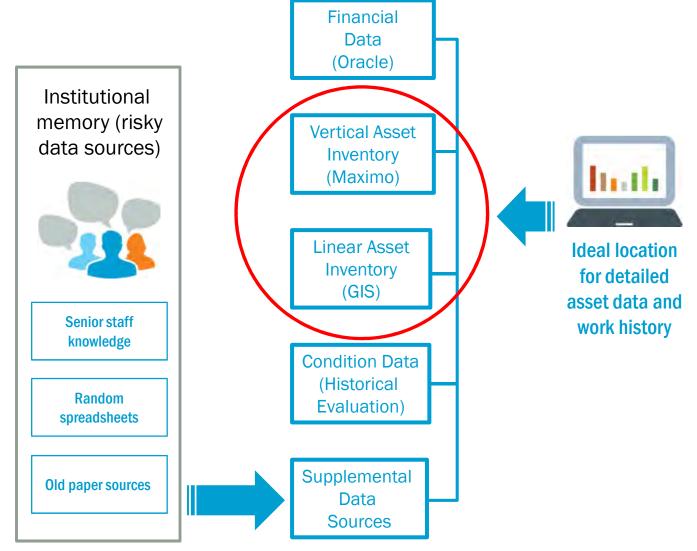
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Warranty Information – Effective Date, Expiration Date

Manufacturer & Vendor Information



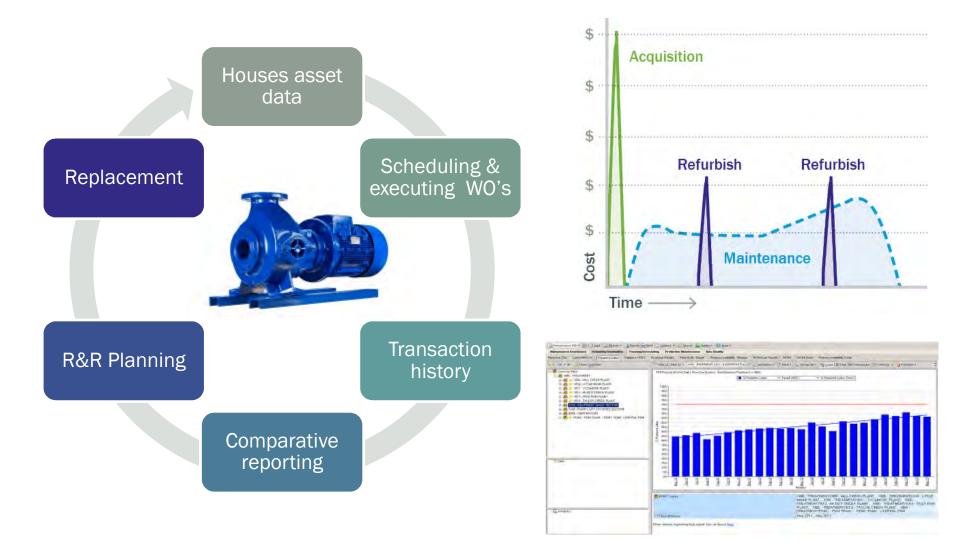
All of that asset information can live in many different places.....(or not be captured at all)



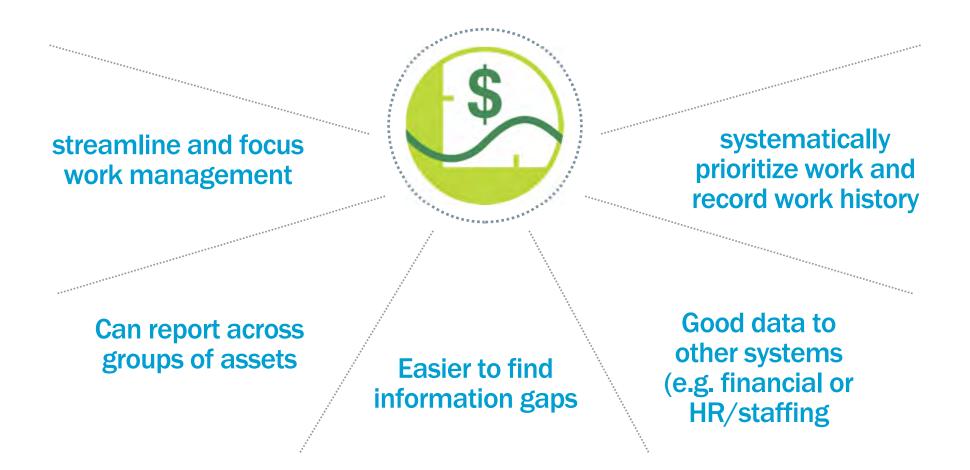
CMMS systems provide a clean & standardized platform for information management

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CMMS can track the full life of each asset and report on it (and across all assets)



If my CMMS was fully populated with asset and work information benefits can include...



Maintenance work

Scheduling, completing, tracking and reporting

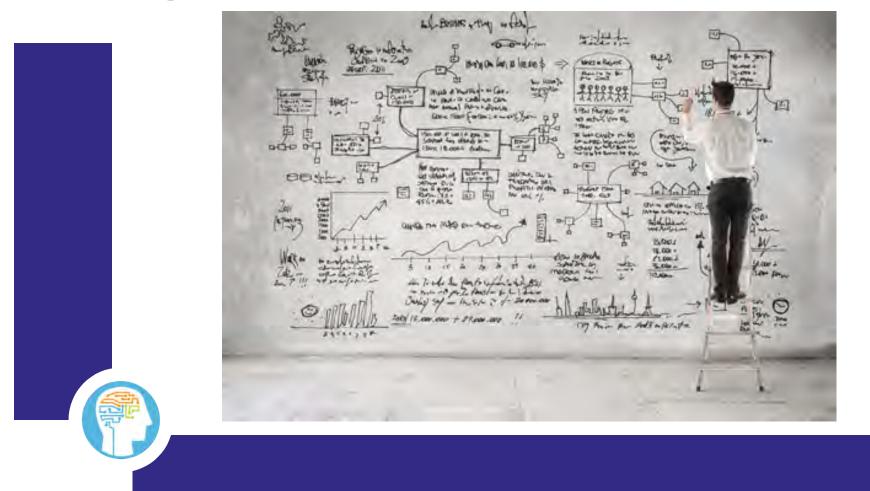








Prioritizing, managing and reporting on work can be tough to track



CMMS systems help organize work management (and show trends)

- Preventative Maintenance (PM's)
- Corrective Maintenance (CM's)
- Predictive Maintenance (PDM's)
- Emergencies (out of service/shutdowns etc.)



 Want to comply with warranties and perform the RIGHT amount of maintenance over the asset lifecycle



CMMS - Planning, tracking and executing PM's (warranty and beyond)

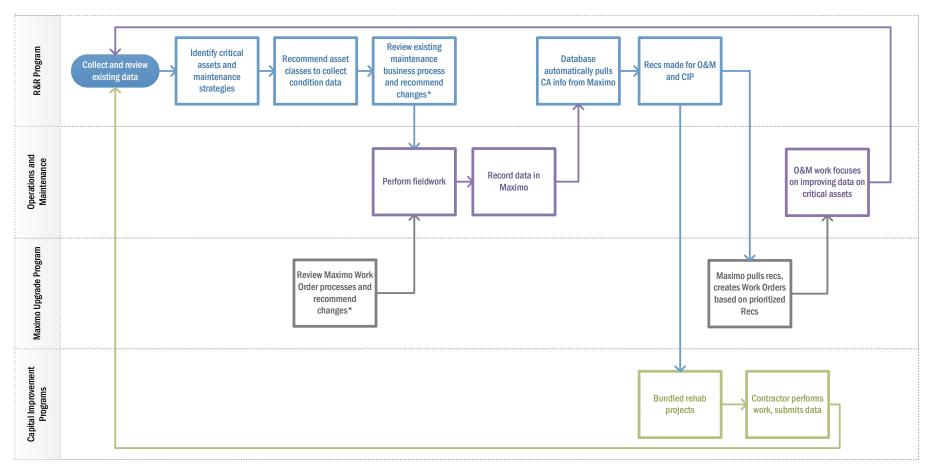


- One asset
- One maintenance schedule
- One start date



- Thousands of assets
- Different maintenance schedules
- Different start dates
- Reporting & regulatory requirements

CMMS systems provide a vehicle for work structure including schedules, prompts etc.



* This is an ongoing process that will take several iterations before the process changes are made

Key Performance Indicators (KPI's) – prove you are efficient.....or that you need more resources

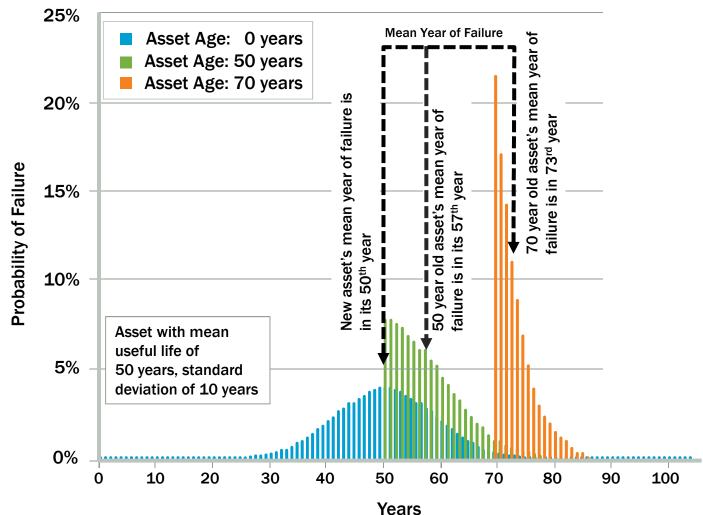
Measurement	Goals**
Work Order Backlog	Planned 6 weeks (SMRP 5.4.8) Ready to schedule 2-3 weeks (SMRP 5.4.9)
Overtime	<5% (SMRP 5.5.8)
Preventive Maintenance Complianc	e >90% (SMRP 5.4.14)
Schedule Compliance	>90% (SMRP 5.4.4) Report as to why the schedule was broken (equipment not ready, emergency breakdown, staffing etc)
Planned Maintenance Ratio	85% (AWWA benchmark)
Reactive Work	<10% (SMRP 5.4.1)
Mean Time Between Failure (start on critical assets)	Higher the better. Don't want failures between PM's
Budgeted vs Actual	95%-100% of Budget
and Caldwell	* *THE SOCIETY FOR MAINTENANCE AND RELIABILITY PROFESSIONALS

SUCIEI Y FUR MAINTENANCE AND RELIABILITY PROFESSIONALS

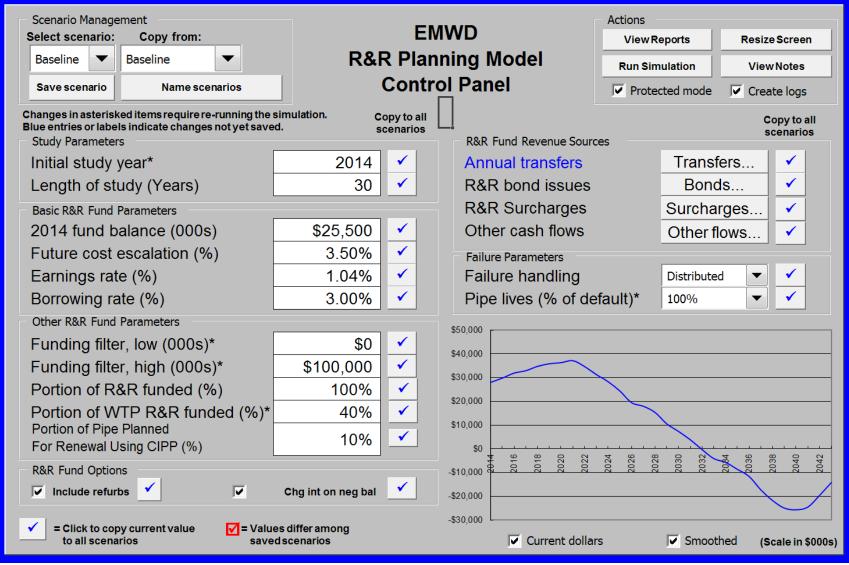
CMMS reports can show performance against industry benchmarks.....and trends

BI-Cycle - Us_221300_04 - Performance KPIs (Design)	Print 🔂 Options + 🔑 Search 🕼 Admin + 🚱 Help + WO Cost and Pe +
Maintenance Dashboard Reliability/Availability Planning	Scheduling Predictive Maintenance
Proactive Cost Labor and Material Cost Proactive Labor Failure	es ys PM's Percent Proactive Strategy Results Plant Availability - Repair Plant Availability - Restore RCM Availability Results MTBF
Crews by Plant Crews by Plan	KPI-Percent of Work that is Proactive (Labor) Best Business Practices (>= 80%) Image: Strength and Strengthand and Strength and Strength and Strength and Strength and Stren
V File	15% 10% 5% 0%
🕞 Group By	신뢰 11 신뢰 11 신뢰 12 신뢰 12 신뢰 13 신뢰 13
	WWT Crews 1006 - TREATMENT/1009 - MILL CREEK PLANT, 1006 - TREATMENT/1010 - LITTLE MIAMI PLANT, 1006 - TREATMENT/1011 - SYCAMORE PLANT, 1006 - TREATMENT/1012 - MUDDY CREEK PLANT, 1006 - TREATMENT/1013 - POLK RUN PLANT, 1006 - TREATMENT/1014 - TAYLOR CREEK PLANT, 1006 -

Organized CMMS information (pipe age, condition, material etc.) supports Replacement and Rehabilitation (R&R) modeling

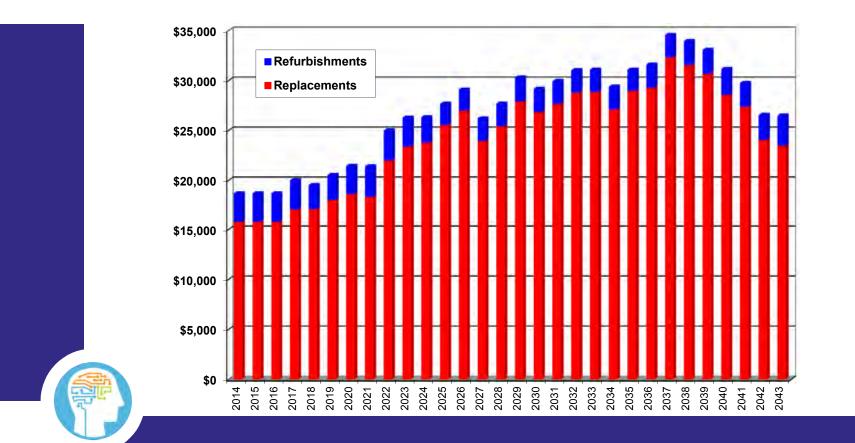


More realistic R&R planning supports financial forecasts.....

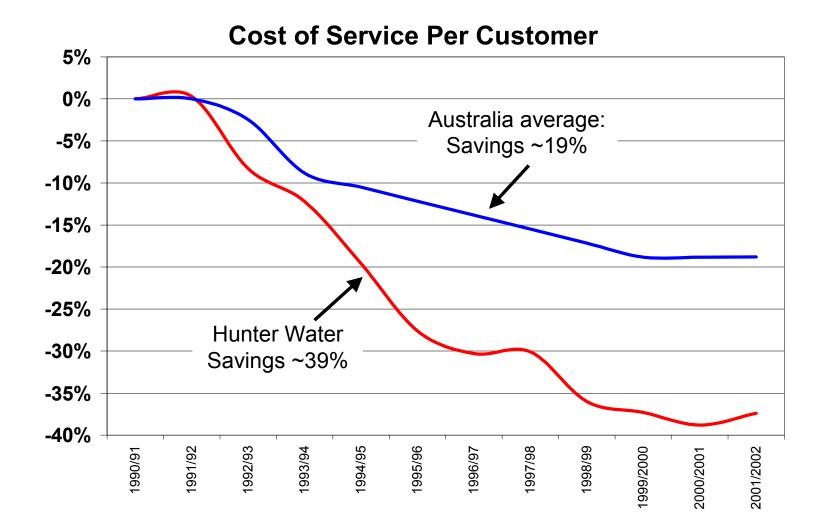




Which leads to more accurate and defensible rate adjustments and CIP funding



Opportunity to capitalize on (and quantify) savings





Case Study – Allan Scott – Santa Barbara





Benefits to Small Agencies

- Provides visibility and transparency
 - Management understands what is happening in the field
 - Field crews understand what is important for effective utility management
- Collect reliable data to measure performance
 - Workload backlog
 - Productivity
 - Effectiveness of preventative maintenance
 - Improves focus on critical assets
 - True O&M costs
- Standardize O&M practices
 - Extend useful life and reduce O&M-related equipment failures
 - Facilitates continual improvement
 - Captures system O&M knowledge
 - Streamline work practices

Santa Barbara Case Study

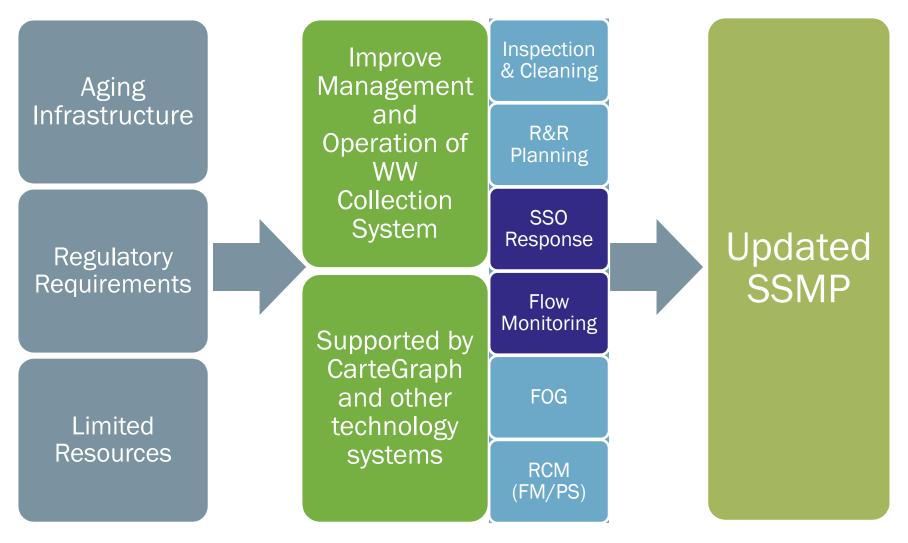
- Implemented Cartegraph CMMS for Sewer Collection System Group and for Water Distribution
- About
 - 95,000 customers
 - 260 miles of gravity sewers
 - 298 miles of water distribution pipe



Key Challenges

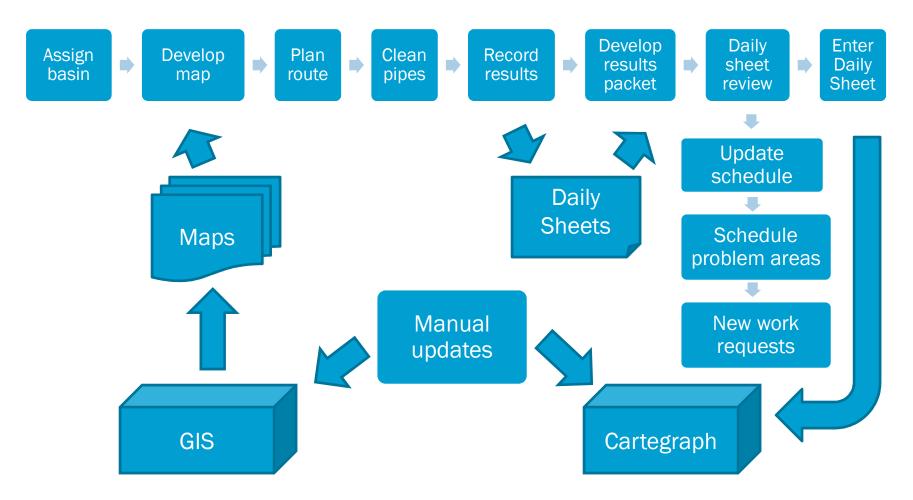
- Waste water SSO consent decree requiring increased performance for sewer pipe cleaning and inspection
- Aging water infrastructure and O&M resource limitations raised concerns over effectiveness of O&M program and identification of future needs.

Standard Workflows Supported by Technology Helped Santa Barbara Achieve its Goals

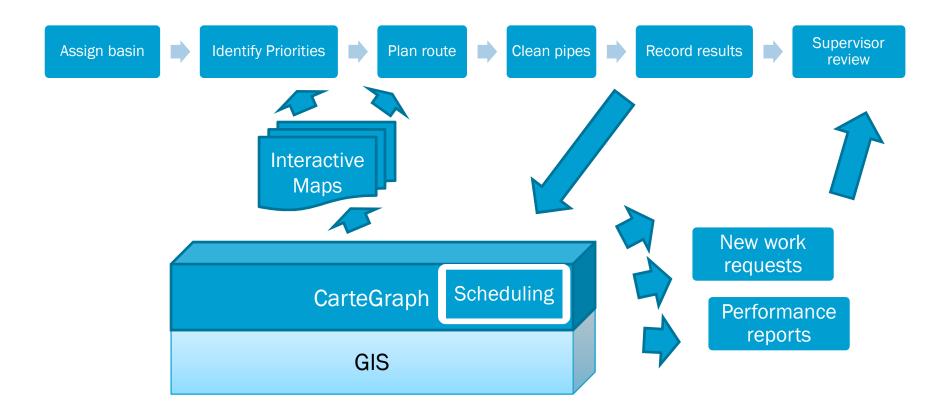


Brown and Caldwell

Streamlining Work Practices By Aligning Technology and Data With Efficient Work Processes



Streamlining Work Practices By Aligning Technology and Data With Efficient Work Processes



Preventative Maintenance Metrics

	User	Requested R	eporting Dat	e Range (i.e.	1/12 to 1	2/12)				
Facility	PMs Planned	PMs Completed	%PMs Completed	Hours Estimated	Hours Actual	Hours Actual vs. Estimated	PMs Total Hours	CMs Total Hours	% CMs vs. PMs	CM/PM vs. PMs Completed
Bothin Pump Station	89	67	75%	40	67	168%	40	67	168%	167 : 75
Escondido Pump Station	88	67	76%	88	67	76%	88	67	76%	76:76
Rocky Nook Pump Station	78	67	86%	99	67	68%	99	67	68%	67:85
Alameda Well	140	130	93%	170	130	76%	170	130	76%	76:92
San Roque Well	150	130	87%	120	130	108%	120	130	108%	108 : 86

- **PMs Planned:** The number of schedule PMs for the time period defines the overall maintenance plan.
- PMs Completed: How many of the planned PMs were actually completed?
- %PMs Completed: How well was the plan followed?
- Hours Estimated: Number of planned hours for preventative maintenance
- Actual Hours: Number of hours spent on preventative maintenance
- Hour Actual vs. Estimated: How close is the plan to the actual execution?
- **PMs total hours:** Same as Actual Hours.
- CMs Total Hours: Number of hours spent on corrective maintenance.
- % CMs vs. PMs: Helps identify high areas of unplanned maintenance.
- **CM/PM vs PMs Completed:** Compares areas of high unplanned maintenance with how effective the planned preventative maintenance program is being executed.

Performance Analysis of Preventative and Corrective Maintenance

Station Number	PM Count	CM Count	Total	% CM	Tota	al Cost	Un	it Cost
20	124	28	152	18%	\$	58,000	\$	381.58
21	169	129	298	43%	\$	179,000	\$	600.67
22	110	18	128	14%	\$	55,000	\$	429.69
23	102	5	107	5%	\$	41,000	\$	383.18
24	100	8	108	7%	\$	27,000	\$	250.00
25	104	6	110	5%	\$	41,000	\$	372.73
26	115	18	133	14%	\$	42,000	\$	315.79
27	108	10	118	8%	\$	120,000	\$:	1,016.95
28	119	47	166	28%	\$	185,000	\$:	1,114.46
29	144	32	176	18%	\$	102,000	\$	579.55

- Where are my highest failure rates and why?
- Where are my most expensive maintenance costs?
- Which assets are the most expensive to maintain?
- What changes can I make to reduce failure rates?
- What do I need to do to reduce costs of my problem assets?

Accomplishments for Collections

- Improved business processes (pipe cleaning, CCTV inspection, FOG Management, SSO Response, R&R planning)
- Improved use of GIS and CMMS
 - "Dynamic" cleaning schedules
 - Risk-based CCTV inspections
 - Streamlined SSO documentation
 - Implemented Sewer Lateral Inspection Program
 - Implementing R&R Program

Collections Results

- New processes and systems in use for 2 years
- Decreased annual SSOs over 40% (on average)
- Successfully meeting Consent Decree requirements
- On track to clean entire system over 5 years
- On track to inspect entire system over 10 years
- Developed new Sewer CIP process that is managed by Engineering instead of Collection Systems
- Formalized FOG Restaurant Inspection program
- Developed Sewer Lateral Inspection Program
- Updated and audited Sewer System Management Plan

Accomplishments for Water Distribution

- Early stages of implementation
- Developing visibility of what it really takes to maintain system
- Standardized work processes improves performance and versatility
- Starting to see and react to patterns, inefficiencies and costs
- Improved communication and visibility between work groups and management



Case Study – Tony Bisson, Clark Regional WW District





Today's Topics

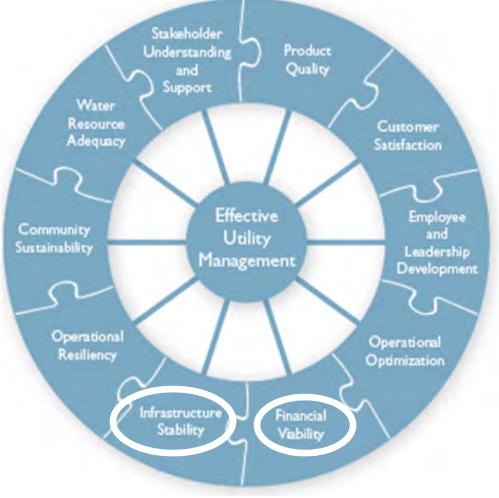
- Vision
- Program Development
- Buy In
- Existing Data
- Staff usage
- Engineering and Maintenance working together!
- Condition Assessment
- Asset Risk
- Project Scoring
- Next Steps







10 Attributes of Effectively Managed Utilities



• Financial Viability

- Understand full life-cycle cost of utility
- Establish & maintain effective balance between:
 - Long-term debt
 - Asset values
 - Operations / maintenance expenditures
 - Operating revenues
- Establish predictable rates (consistent with community expectations / acceptability) adequate to recover costs
- Provide for reserves
- Maintain support from bond rating agencies
- Plan / invest for future needs

- Infrastructure Stability
 - Understand condition of & costs associated with critical infrastructure assets
 - Maintain / enhance condition of all assets
 - Over long-term at lowest possible life-cycle cost
 - Acceptable risk consistent with customer, community & regulator-supported service levels
 - Consistent with anticipated growth & system reliability goals
 - Assure asset repair, rehabilitation & replacements are coordinated to minimize disruptions & other negative consequences

- Customer Focused
 - Meet customer expectations public values survey
- Environmental Stewardship / Protecting Water Resources
 - Proactive management of the system minimizes backups, I&I and unexpected pipe failures
- Financial Responsibility
 - Stable rates
 - Staffing and workload planning
 - Minimize the high cost of emergency repairs and overflows
 - Prioritizing limited resources Fix the Worst First!
- Responsible Management
 - Practicality of managing 9,500 main line pipes segments
- Supporting Economic Development
 - Reliable sewer system
 - Targeted investments

 Develop a ground level record system capable of Work order and asset management

AND

- Critical Sewers Analysis
- Condition Assessment
- Asset Risk
- Project Prioritization Process
- Program Level Project Scoping
- Documentation

- Program Outline
 Identify Existing Data
 - GIS and CCTV Investments
 - Historical data and "tribal Knowledge"
 - ☑ Critical Sewer Analysis
 - Consequence of Failure (GIS Analysis)
 - Asset Condition
 - Probability of Failure (CCTV Data)

- Program Outline
 - Asset Risk
 - Combining Condition and Criticality (GIS Analysis)
 - Develop Prioritization Concept
 - ☑ Define R&R Projects
 - ✓ Prioritize R&R Projects
 - Project Priority Array

Existing Data

Gaining Staff Buy In



Non Tech Savvy?



Giving Ownership

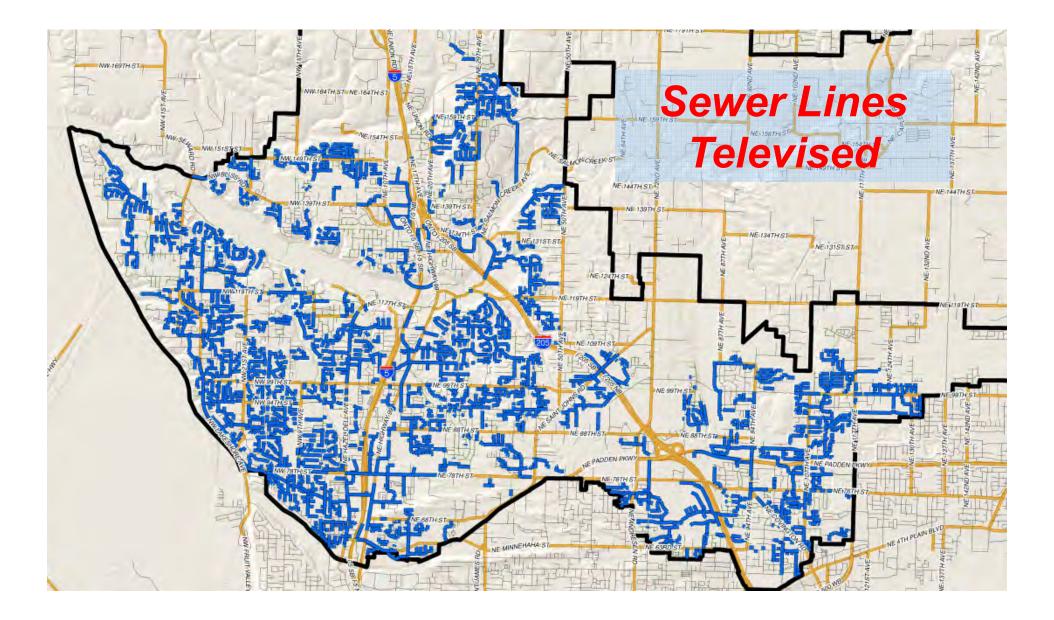


Existing Data

- Identify Existing Data
 - Assets
 - GIS
 - Hand written WO
 - Asset Condition
 - CCTV Data
 - 475 miles of CCTV in Maintenance Management System (Granite & Lucity)
 - Data collected since 2005, 95% of main lines
 - All lines televised at some point
 - Tribal Knowledge of known defects



Existing Data

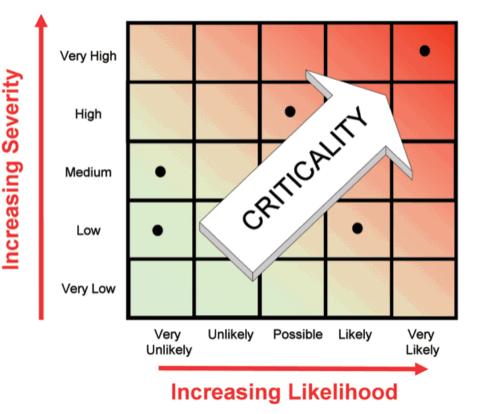


An example of non Work Order usage:

Critical Sewer Analysis

Defining Criticality

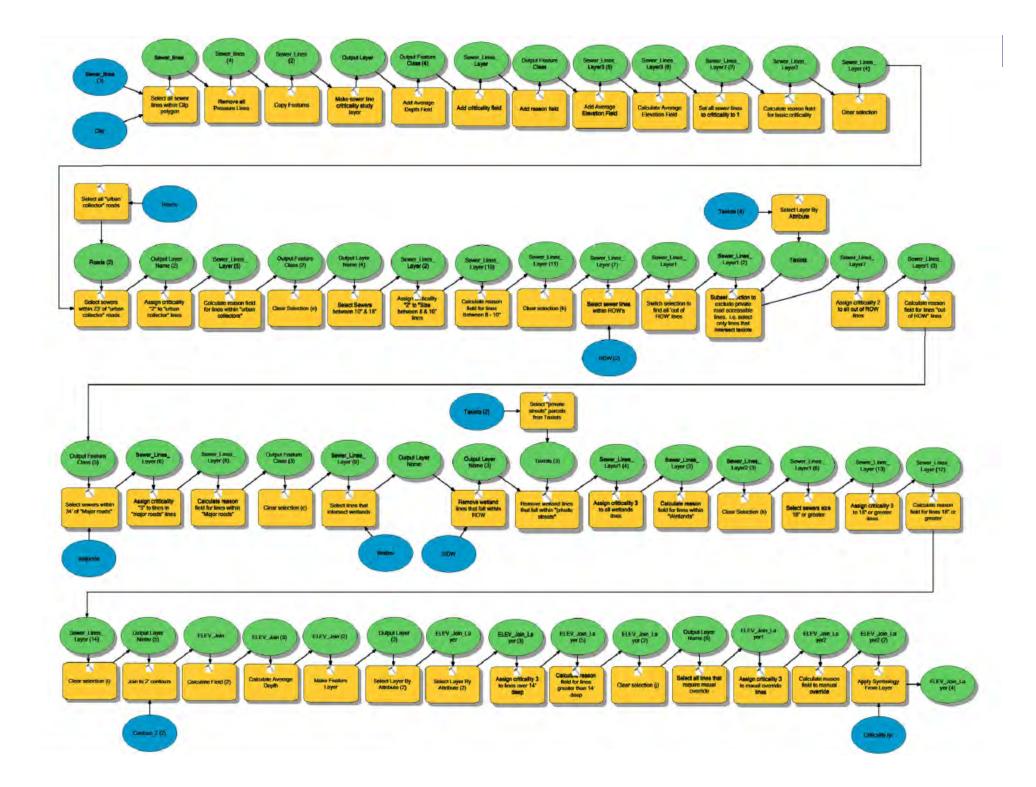
 1 to 3 scoring scale based on potential impact of asset failures or "consequence of failure"

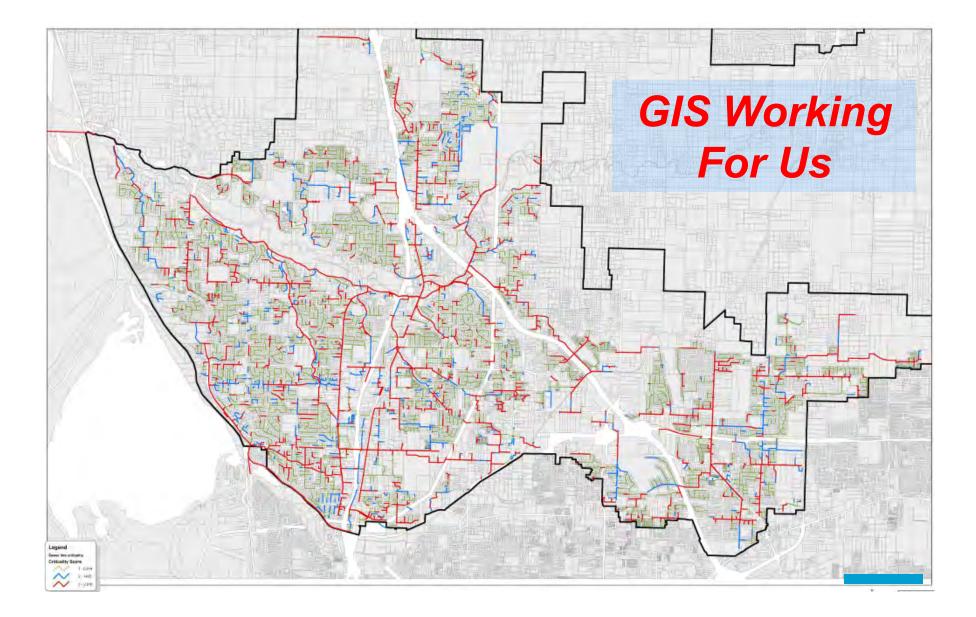


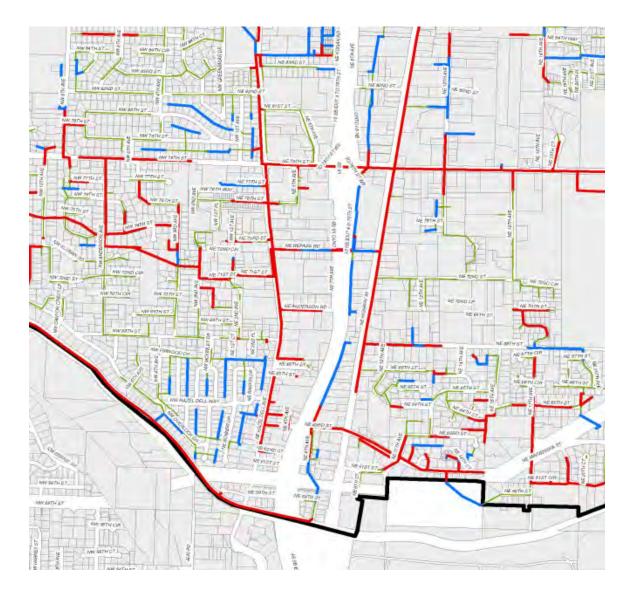
Score of 3 includes pipes:

- in major roads (parkways, arterials)
- in environmentally sensitive areas
 - Includes all difficult to access canyon lines
- Greater than 18" diameter
- More than 14' deep
- Score of 2 includes pipes:
 - In urban collectors
 - Inaccessible lines
 - 10" to 18 " diameter
- Score of 1 includes all other pipes

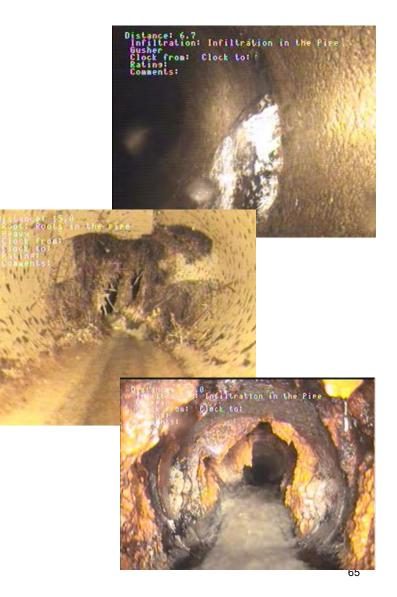








- CCTV Data
 - Infiltration / Inflow
 - Structural Cracks / Shears
 - Sags
 - Roots
 - Fats, Oils, Grease (FOG)



CCTV Data Collected from Cues CCTV trucks.



CCTV Data Scoring "Weight"

I V/Lamp Struc	the second se	Later and Area				-1
			,	1	ye/Bldg Bldg Sump	os
	Structure Rating 1					د ر
	1	2	5			
		2			20	
	0					-
	1	<u> </u>				-
	~					
					75	
					75	
	3				75	
	0				23	
	0					
	15		50	60	75	
	30	50	70			
Clean Out						
CONTINUE DS						
CONTINUE US						
Crack	1	2	5	10	20	
Deposits						
End Inspection						
H2S Erosion	25	30	50	60		
Joint - Infiltration	5	6	25		50	-
12.14 H	()		0.000		1.44	
	CONTINUE DS CONTINUE US Crack Deposits End Inspection H2S Erosion	Crack-Radial 1 Crack-Horizontal 1 Broken Pipe 30 Collapsed Pipe 0 Wye Service 0 Break-in Conn 100 Extended Tap 1 Offset 0 Gapped Joint 0 Roots 1 Debris 0 Grease 0 Corrosion 3 Scaling 3 Sag 1 Infiltration 0 Other 0 Pipe Seal 5 Belly in Pipe 15 Cavity 30 Clean Dut CONTINUE DS CONTINUE DS CONTINUE DS Corack 1 Deposits 1 End Inspection H2S Erosion	Crack-Radial 1 2 Crack-Horizontal 1 2 Broken Pipe 30 50 Collapsed Pipe 0 0 Wye Service 0 0 Broken Pipe 0 0 Wye Service 0 0 Broken Conn 100 125 Extended Tap 1 5 Offset 0 0 Roots 1 5 Debris 0 0 Grease 0 0 Corrosion 3 6 Sag 1 2 Inflitation 0 0 New Manhole 0 0 Other 0 0 Pipe Seal 5 10 Belly in Pipe 15 25 CONTINUE DS 20 50 Controluce 25 30	Crack-Radial 1 2 5 Crack-Horizontal 1 2 5 Broken Pipe 30 50 70 Collapsed Pipe 0 0 0 Wye Service 0 0 0 Break-in Conn 100 125 150 Extended Tap 1 5 10 Diffset 0 0 25 Roots 1 5 10 Debris 0 0 25 Roots 1 5 10 Debris 0 0 0 Corrosion 3 6 10 Scaling 3 6 10 Sag 1 2 5 Infiltration 0 0 0 New Marhole 0 0 0 Other 0 0 0 Piej Seal 5 10 20 Belly in Pipe 15	Crack-Radial 1 2 5 10 Crack-Horizontal 1 2 5 10 Broken-Pipe 30 50 70 100 Collapsed Pipe 0 0 0 200 Wey Service 0 0 0 0 200 Wey Service 0 0 0 0 0 0 Break-in Conn 1000 125 150 175 Extended Tap 1 5 10 25 Offset 0 0 25 70 Gasped Joint 0 0 25 70 Gasped Joint 0 <	Crack-Pradial 1 2 5 10 20 Crack-Horizontal 1 2 5 10 20 Crack-Horizontal 1 2 5 10 20 Colapsed Pipe 0 0 0 200 400 Colapsed Pipe 0 0 0 200 400 Colapsed Pipe 0 0 0 0 0 0 Colapsed Pipe 0 0 0 0 0 0 0 Breakein Conn 100 125 150 175 200 120 Graped Joint 0 0 25 70 120

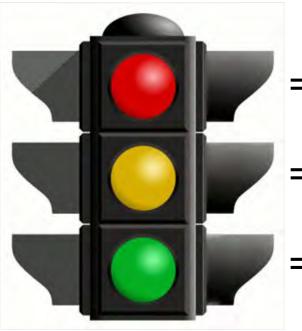
Sewer TV Inspection - Unnamed Filter Set

US Structure	43-180			1	0.00	Pipe ID	34
DS Structure	43-167	Le	akeshore Trunk		11.00	TV Rec#	23
Alt Pipe ID	3474		Flow Basin	-		Most Recent Ins	pect
# of TV Con	VCR Counter	5 Location Text	Description Text	Rating (1-5)	Start Clock	Document Available	La *
8.00		LOCATION TON	START US	0	STON GIOGN	No	
8.70			Grease	3		No	
39.20			Root-in-Joint	1		Yes	
41.80			Root-in-Joint	4		Yes	
44.40			LAT	Ó	2	No	
51.00			Root-in-Joint	1	2	Yes	
62.70			LAT	Ó	10	No	
94.00	ì		Root-in-Joint	3		Yes	
102.30			Root-in-Joint	3		Yes	B
105.40			Root-in-Lateral	1	10	Yes	E
105.40			LAT	0	2	No	
105.40			LAT	0	10	Yes	
108.60	1		Root-in-Joint	3		Yes	
117.90			Root-in-Joint	5		Yes	
120.80			Root-in-Joint	5		Yes	
127.00)		Root-in-Joint	5		Yes	
130.00			Root-in-Joint	5		Yes	
133.50			Root-in-Joint	5		Yes	1
136.50			Root-in-Joint	1		Yes	
148.30			LAT	0	10	No	
153.80)		Root-in-Joint	1		No	(÷)
				-			+
* III							

- 9 %

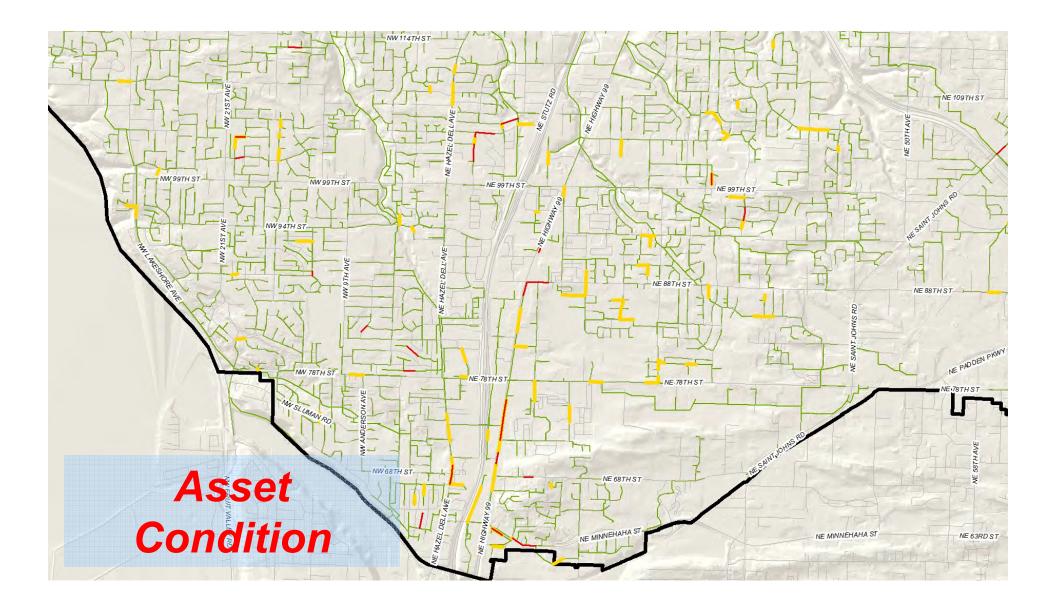
	43-180			0.00	Pipe ID	34	
DS Structure	43-167 Lakesho		re Trunk	TV Rec#	2:		
Alt Pipe ID			ow Basin		Most Recent Inspec	t 🗆	
et-up Pipes Overall Condit	1.			hab Custom Comment Quick Rating Struct		Collapsed/Blocked	N
	Total	Remaining	Rating	Quick Rating OM		Max Obs #	23
Structural	635	635	369.8	Quick Rating Total		Max Obs Len (ft)	171.7
Flow	0.000	0.000	0.000	Pipe Rating Struct			
Cleaning	630	630	366.9	Pipe Rating OM			
				Pipe Rating Total			
dditional Work							
Task # A	dditional Task Te	ext Assign	ned To Text	Completed Text			

CCTV Data Simplified Based on Score



- = Failing: Imminent failure
- = Poor: Monitor, proactive repairs
- = Good: No concerns

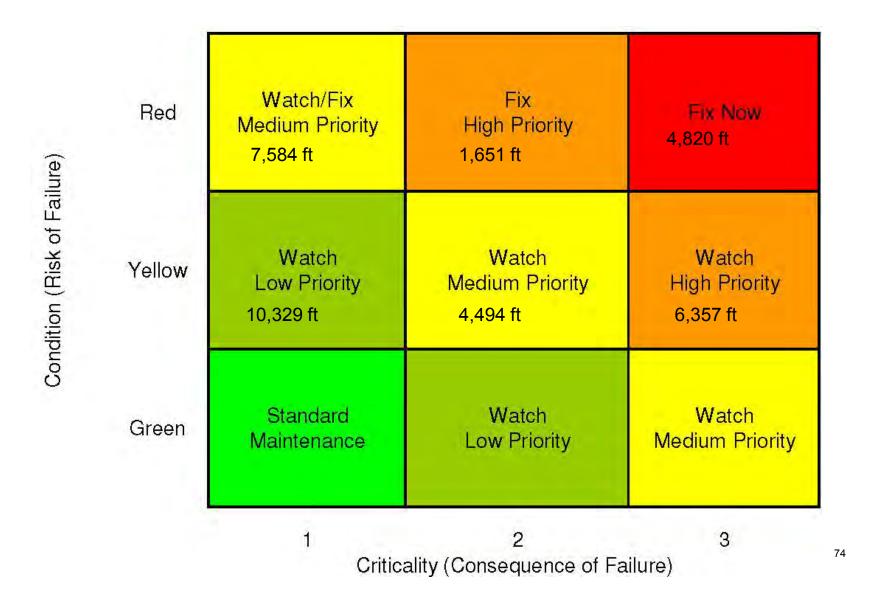
Asset Assessment

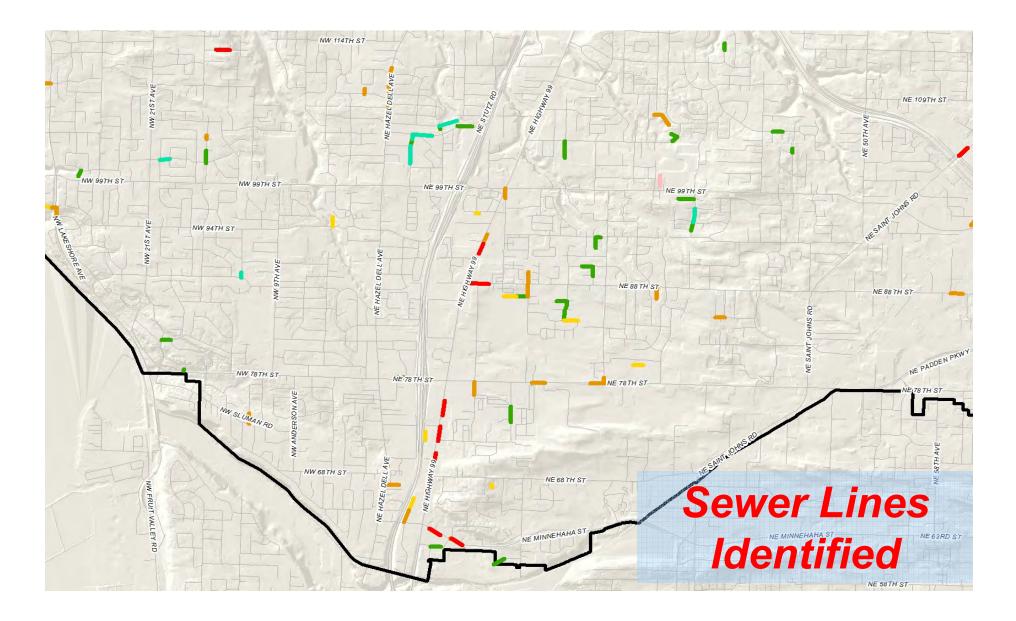


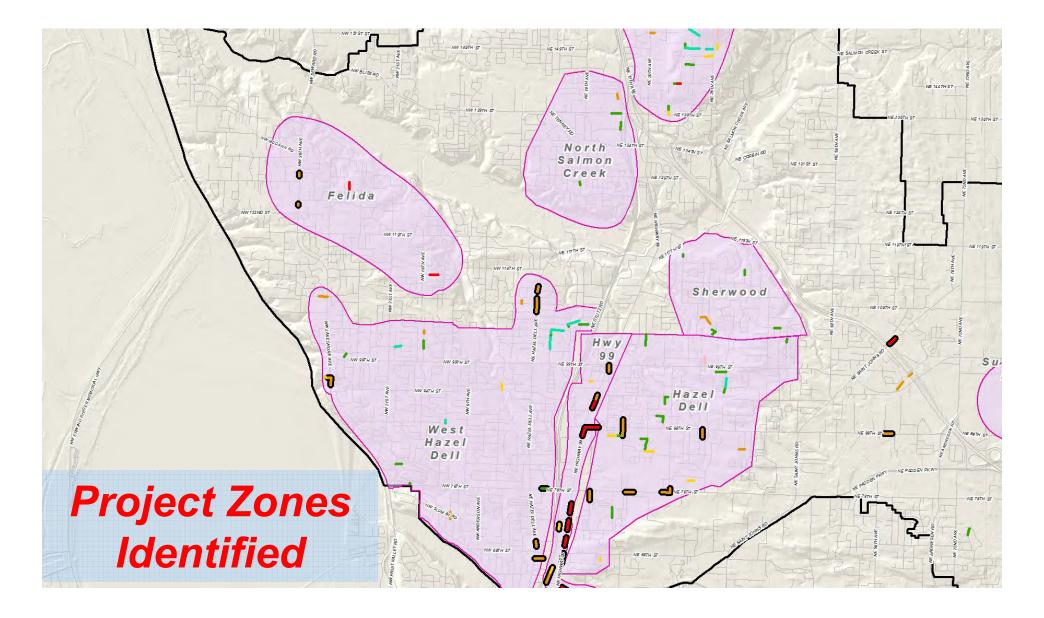
Asset Risk

- Integrating Criticality & Condition
 - Criticality Consequence of Failure
 - Score 1, 2, or 3
 - Condition Risk of Failure
 - Score Red, Yellow, Green
 - Extra point, or fraction of a point added for hot spots.

Asset Risk = Criticality + Condition

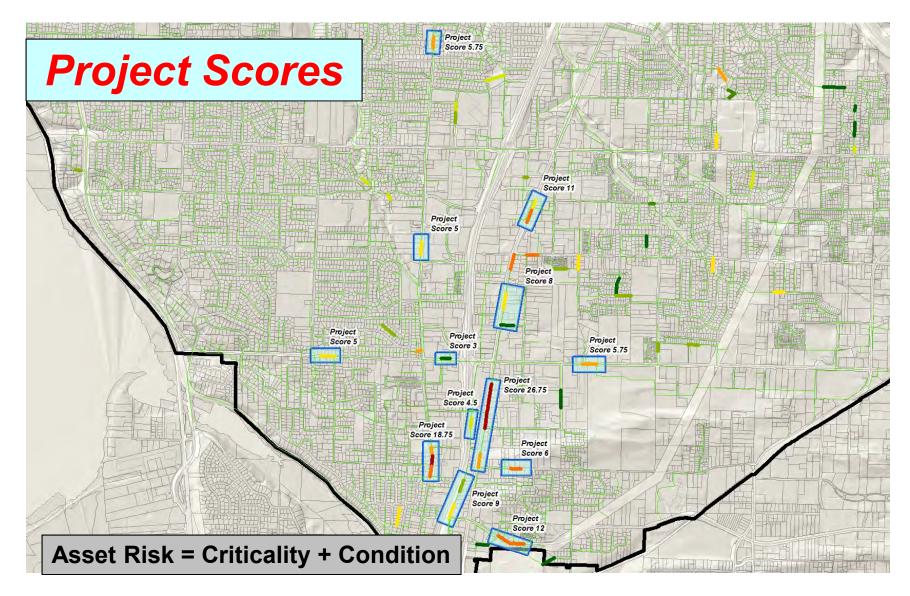






Project Scoring

Project Scoring



Next Steps

Lucity Rehab module

• Expand on our use of the rehab module.

Task VO Task Code	1115	point repairs	main dig up	%1/I Removed		Unpaved 🗍	Easy	Difficult 15000.00
Rehab Units	3 Ead	sh	- 7	Min Rehab Length	3	Paved	15000.00	20000.00
Rehab Class			- 3	Pt Repair Min Dist 🛛 🗍	1	Heavy Traffic 📗	20000.00	20000.00
wa of we	aved-Easy F	Paved-Easy	Heavy-Easy	Unpaved-Diff	Paved-Diff	Heavy-Diff	Cost>10Ft	
Dia/ Unp								
Dia Unp								

Next Steps

- Project Priority Array
- Capital Project component
- Pump Stations
- Force Mains
- Rework codes/weights to work with



Lessons Learned

- You have more data collected than you realize even before implementation
- Staff support and Management buy in is crucial to any systems success
- CMMS systems, once populated, save time, money.
- Adds quantifiable data to back rehab needs and cost allocation.
- Provides an easily searchable data base to provide history on work/assets, customer issues and inquires, and any other data you may want to "gather"



CMMS systems - What does a utility need to get started?





AM programs – agency specific, one size does not fit all - CMMS systems are just one component



- Consequence of ٠ Failure (COF) and Probability of Failure (POF)
- Focus on a • critical asset class to collect additional data
- Update CMMS
- Update financial

- COF and POF
- Asset Management • **Program Evaluation** (AMPE)
- Business Process Analysis (BPA)
- Collect additional data
- Update CMMS

 - Update financial

- COF+ and POF+
- BRE
- AMPE
- Teams
- **BPA**
- BCE
- SAMPs
- Resiliency
- IS0
- IIMM
- ISI **CMMS** Financial

Getting started – CMMS implementations are journeys.....not destinations

- Identify & Evaluate
 - Existing data sources and inventories
 - Existing work practices
 - Look for gaps (e.g. collections, vertical, work history etc.)
 - How are you currently reporting (communicating with decision makers)?
- 1st round goals for system
 - Consolidated asset database
 - Basic work management
 - Basic reporting

Starting slowly and simply is the key to success!

Choose a CMMS system that meets your agencies needs/goals now.....but is expandable

Evaluation considerations

- Flexible reporting
- Modular (can add assets/users)
- Ease of use
- Vendor support
- Mobile applications
- Cost

PRODUCT Attribute	Advantis	Infor	Hansen	GBA Master Series	CityWorks	MUNIS Work Management	Maximo
Plant-Asset Focused		×	*				1
Linear-Asset Focused	1	4		1	4		4
Client-Server		-	1.	N.	. 1		
Web-Based	1	× .	1				1
Relative Cost of Licensing & Implementation	Med	High	Med	Med	Med	Low	High

Learn from others.....and find a champion

Benchmark

- What systems are neighboring/similar agencies using?
- How is it working for them?
- Information sharing/user group potential
- Identify an internal "champion(s)"
 - Day jobs will continuously get in the way
 - One or more individuals needs to be focused on the effort and own it
 - Other departments (e.g. IT) will need to be on board
 - Business processes needed to support the tools



CMMS systems – Benefits Recap





Benefits to Small Agencies

- Collect reliable data to measure performance
 - Workload backlog
 - Productivity
 - Effectiveness of preventative maintenance
 - Improves focus on critical assets
 - True O&M costs

Standardize O&M practices

- Extend useful life and reduce O&M-related equipment failures
- Facilitates continual improvement
- Captures system O&M knowledge
- Streamline work practices

Benefits to Small Agencies (cont.)

- Quantify needs to decision makers
 - demonstrate the need for more resources
 - prove warranty compliance or regulatory compliance
 - Support rate adjustments to decision makers
- Provides visibility and transparency
 - Management understands what is happening in the field
 - Field crews understand what is important for effective utility management









Questions

