

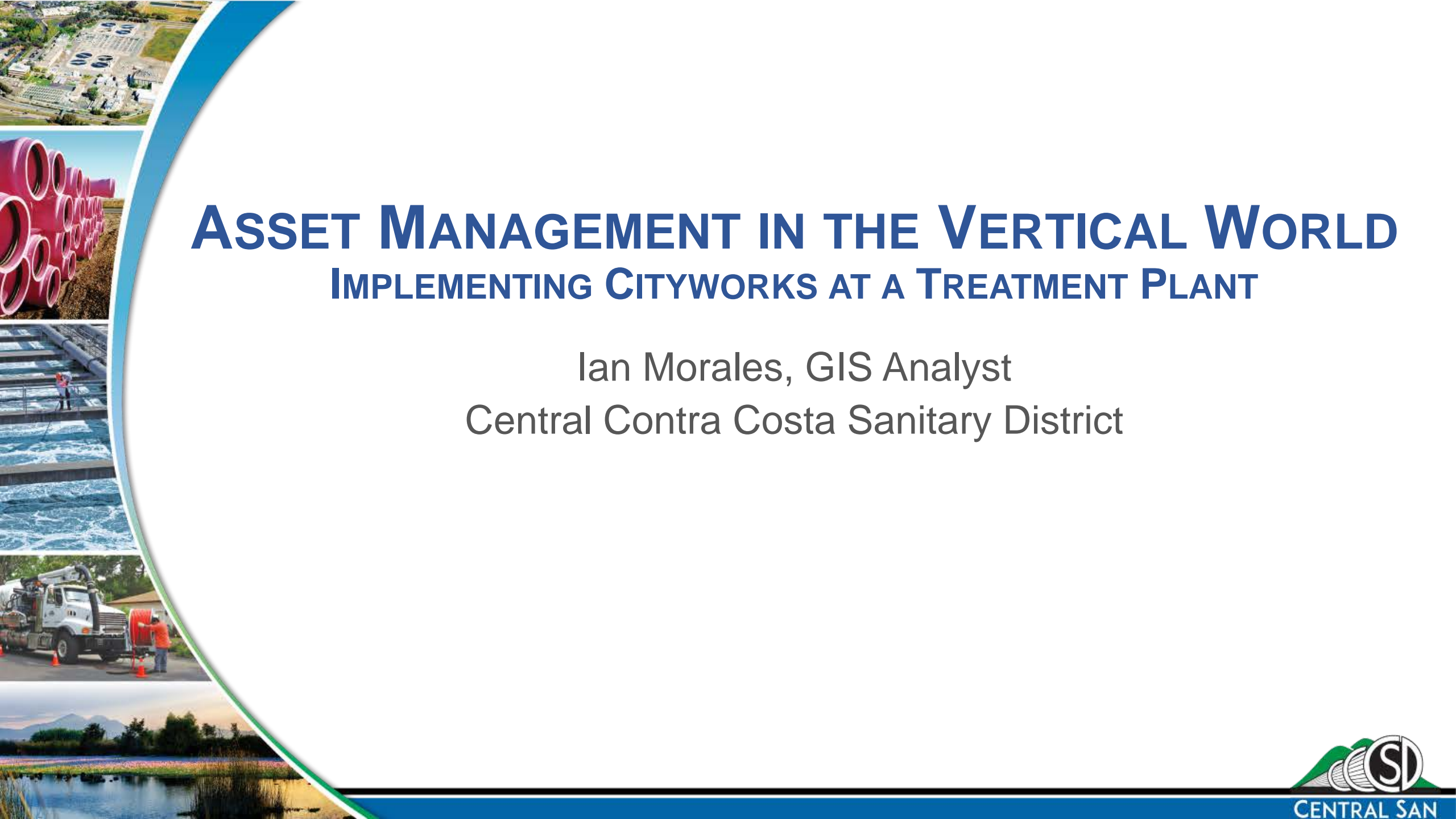
InfoShare Asset Management – Report to BACWA Board

InfoShare Asset Management Committee meeting on: 05/16/18
Executive Board Meeting Date: 06/15/18
Committee Chairs: Dana Lawson and Aaron Johnson

Committee Request for Board Action: None

Attendees: Aaron Johnson (DSRSD); Dana Lawson, Neil Meyer, PJ Turnham, Ian Morales (Central San); Andy Hall (City of Livermore); Robin Gamble Holley (Napa San)

Introductions <ul style="list-style-type: none">▪ See Above
Announcements <ul style="list-style-type: none">▪ BayWork is hosting an Asset Management Workshop on May 30 at the Napa Marriot. Robin Gamble Holley and Dana Lawson are both presenting.▪ Robin said that new NPDES permits are including language regarding asset management plans.
Presentations <ul style="list-style-type: none">▪ Ian Morales (GIS Analyst) gave a presentation on Central San’s implementation of Cityworks Asset Management System (AMS), which was also presented at the Cityworks conference in Salt Lake City May 9-11. The presentation covered the challenges, successes, and goals for the Treatment Plant’s asset management program.
Discussion <ul style="list-style-type: none">• Asset replacement lifecycle cost table• Ideas to engage more members? Future presentation or discussion topics? Aaron and Dana will discuss later and may create a survey to poll the membership.
Future Meetings <ul style="list-style-type: none">• 2018 Meeting Schedule: August 15, November 14• Please e-mail dlawson@centralsan.org or johnson@dsrsd.com if you can present at either meeting.
Next BACWA Asset Management InfoShare Group Meeting: August 15 at City of Livermore



ASSET MANAGEMENT IN THE VERTICAL WORLD

IMPLEMENTING CITYWORKS AT A TREATMENT PLANT

Ian Morales, GIS Analyst
Central Contra Costa Sanitary District



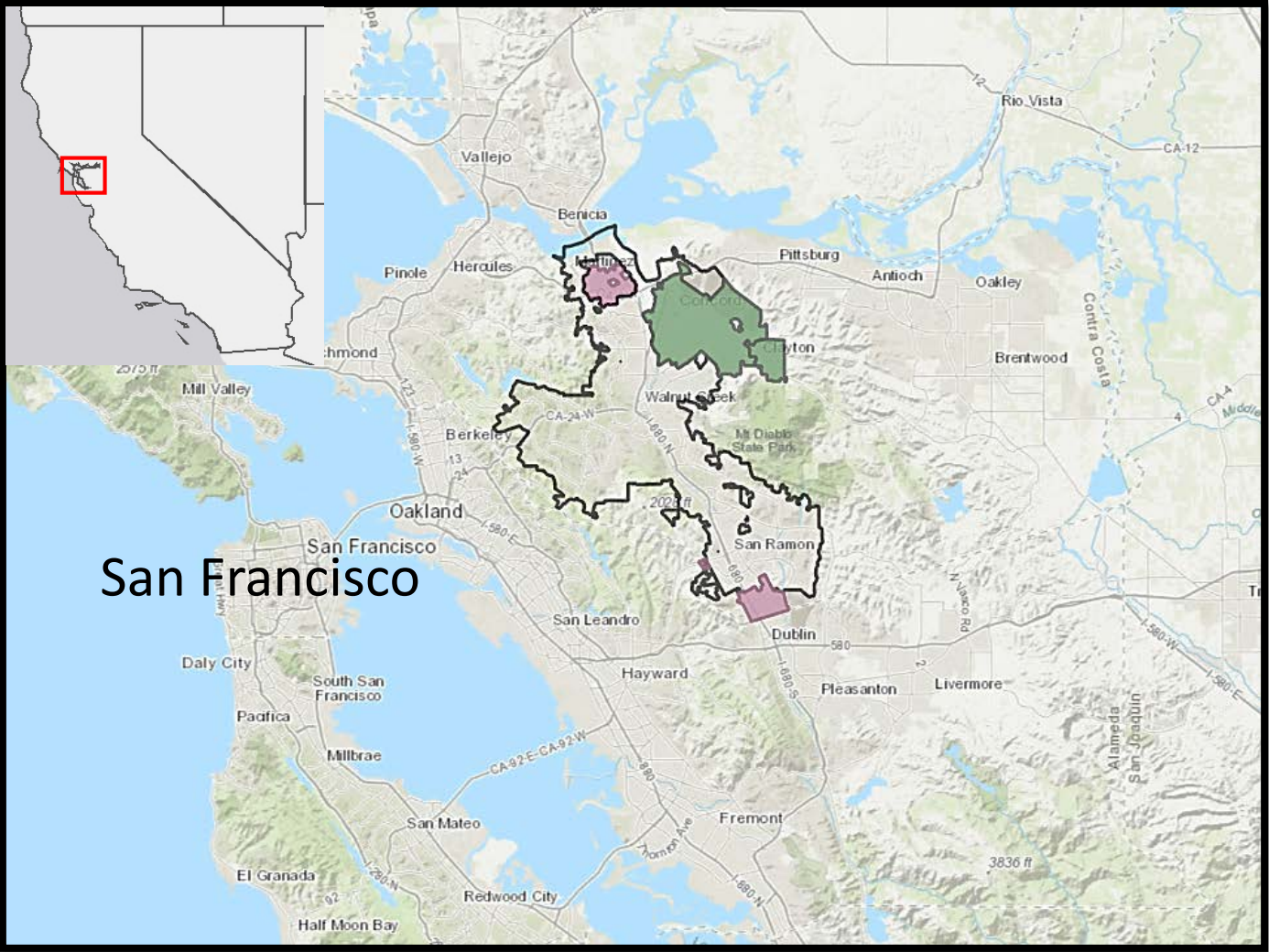
CENTRAL SAN

PRESENTATION OUTLINE

- Share our experience with Cityworks from the perspective of a Waste Water Treatment Plant
 - Who we are
 - Our Implementation
 - Additional needs and solutions
 - How we were successful



WHERE ARE WE?



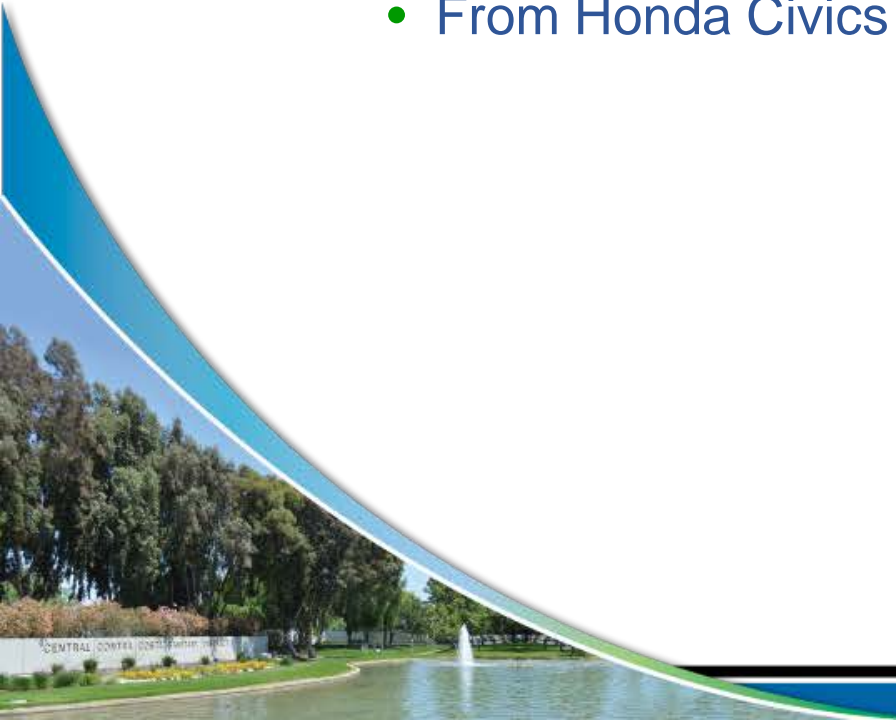
WHO WE ARE

- Central Contra Costa Sanitary District (Central San)
 - Special District Established in 1946
 - Waste water collection
 - More than 1500 miles of pipe
 - 18 Pump Stations
 - Waste Water Treatment
 - Avg. 44 million gallons per day (MGD)
 - Furnaces incinerate 200 tons of sludge per day
 - Recycled Water Processing and Distribution
 - ~1.5-2 MGD
 - Lab
 - Over 15,000 test per year
 - Some measure in parts-per-quadrillion



WHO WE ARE

- Household Hazardous Waste Collection Facility
 - Collect ~2 million pounds per year
 - ~90% is reused or recycled
- Fleet Shop
 - Repairs and Maintains over 200 vehicles and other equipment
 - From Honda Civics to trailers to a 33 ton Hydrovac truck



WHERE DID WE COME FROM?



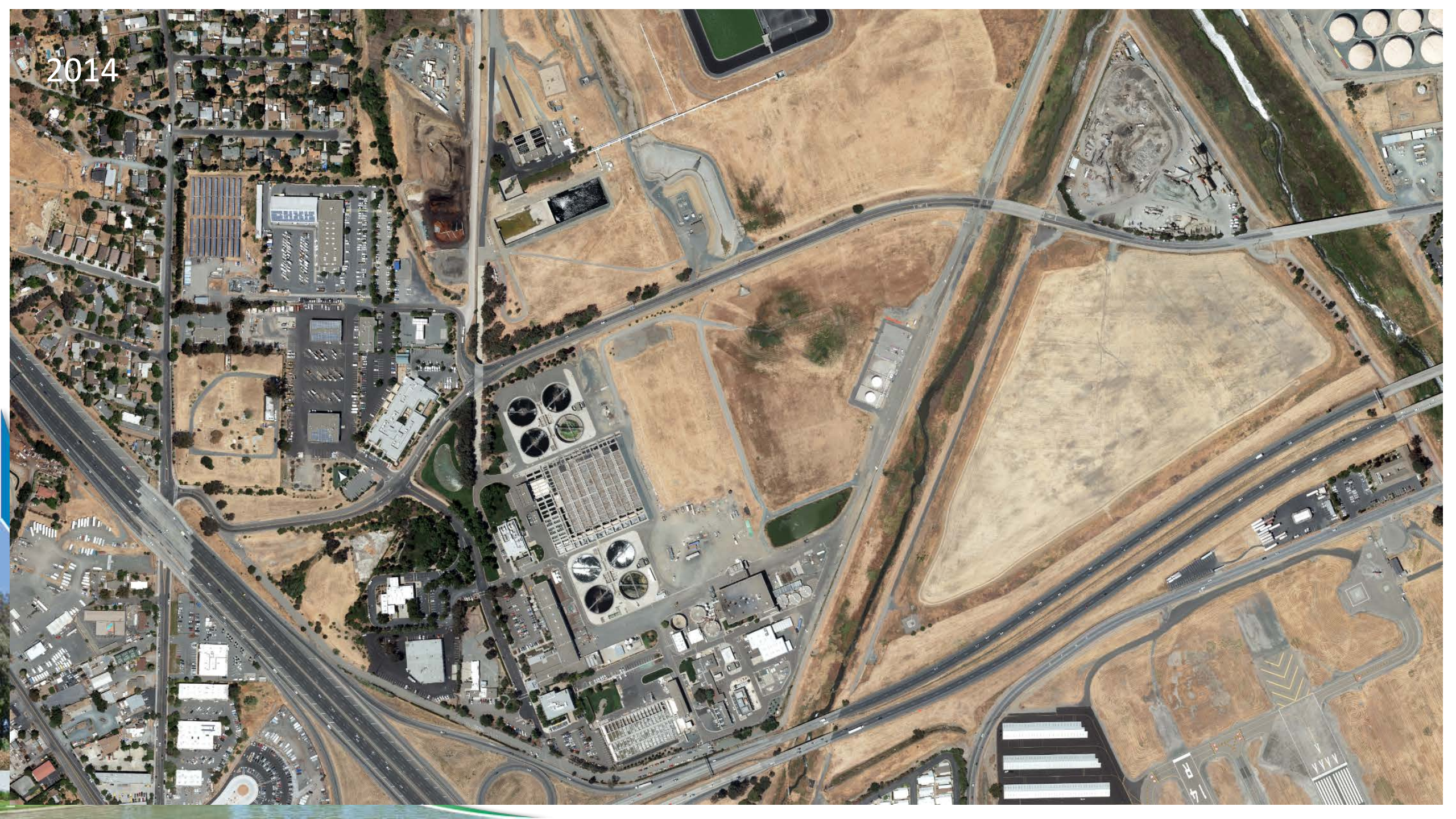
1946



1965



2014



CENTRAL SAN AND CITYWORKS



NEW ASSET MANAGEMENT SYSTEM

CITYWORKS

- Collection Systems Operations CMMS no longer vendor supported
 - Software customization = Stuck in old version
- Decrease CMMS software/databases/asset Registries used at Central San
- Treatment Plant needs are more complex
 - More complex systems and assets
 - More complex procedures
 - More complex regulations
 - More custom integrations with other software
 - Supervisory control and data acquisition (SCADA) - Dynac
 - Enterprise Resource Planning (ERP) – SunGard



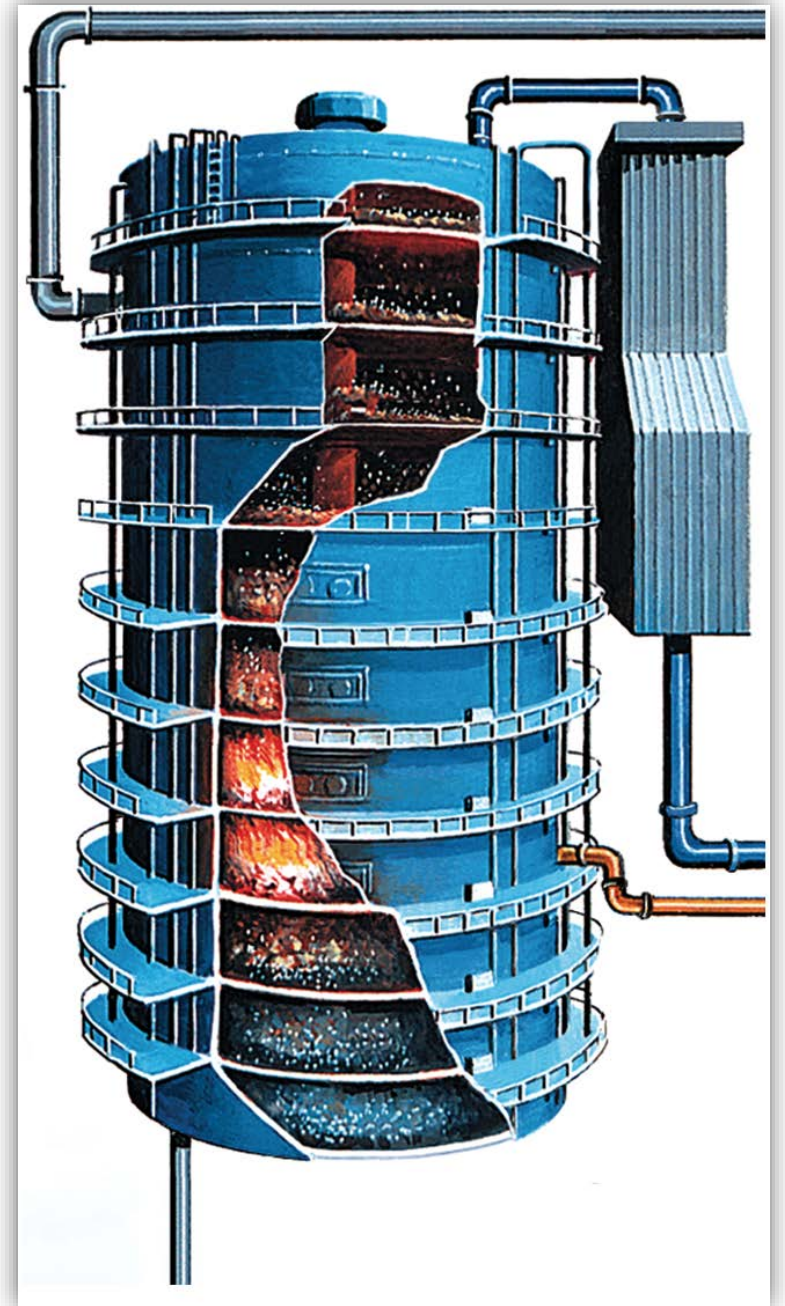
COMPLEXITY IN PHOTOS



COMPLEXITY IN PHOTOS



COMPLEXITY IN PHOTOS



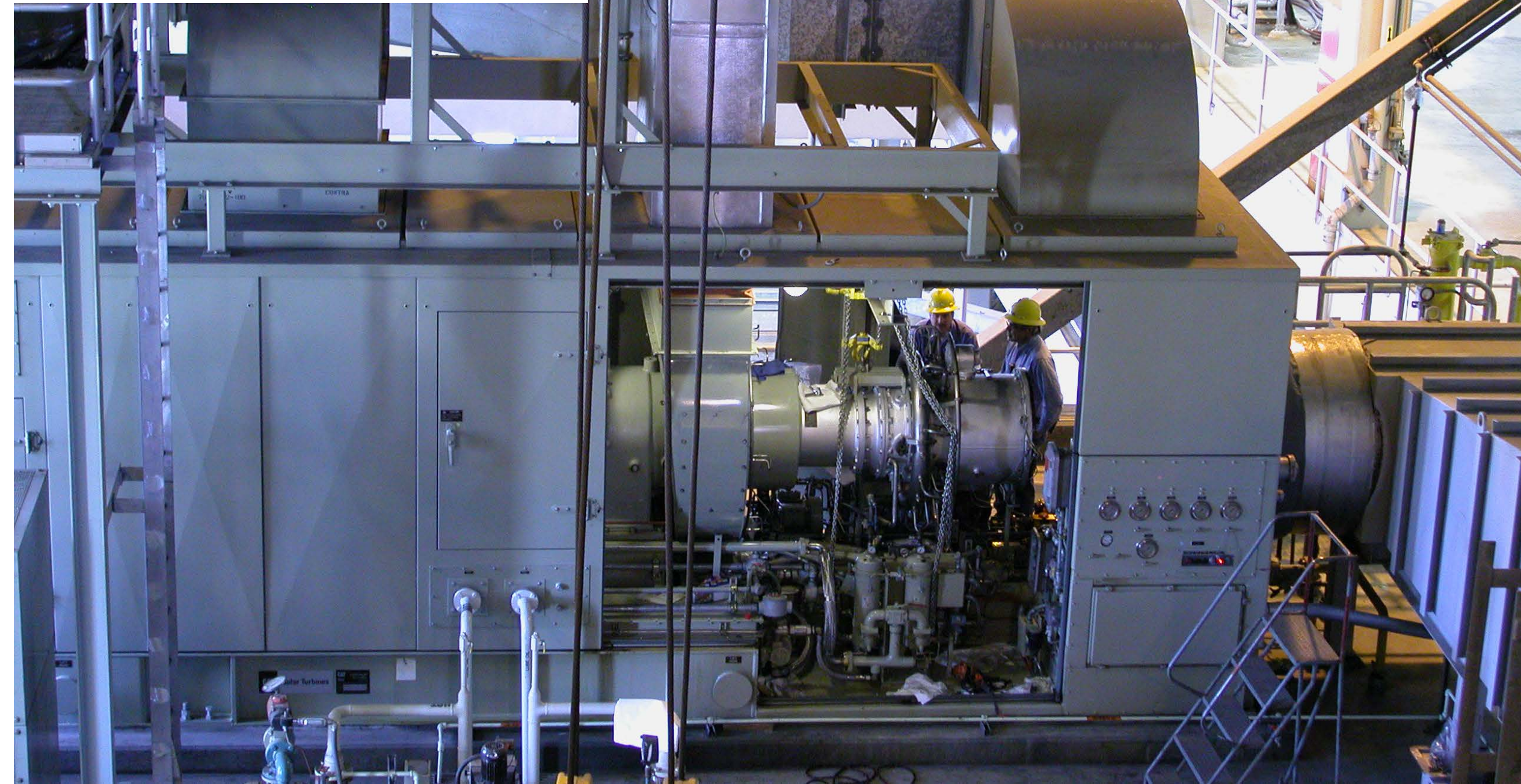
COMPLEXITY IN PHOTOS



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OUR IMPLEMENTATION TREATMENT PLANT



OUR IMPLEMENTATION

- Project Kick-off:
 - July 2015
- Go-live:
 - January 2017
- Implementation partner:
 - Woolpert
- Shops using Cityworks:
 - Mechanic, Electrical, Instrumentation, Machine, Building and Grounds, Control Systems
 - Operations, Lab, Engineering



OUR IMPLEMENTATION

EXAMPLE: WORK ORDER



Quality Assurance

NA	Tasks Complete
NA	Inspections Closed
7 / 10	Required Fields Filled In
1	Asset(s) Attached
1	Labor Hours Entered
<input type="checkbox"/>	Equipment Unit-Hours Entered
<input type="checkbox"/>	Material Units Entered

Location Information

Legacy Id: 74192 Scum Pump 2 East, Thickened

Location Details: SCB 3rd Floor East Scum pump/VFD

X Location: 6,110,308.005 Y Location: 2,189,458.830

Custom Fields

Category: FAIL CODES - PUMP

Failure	
Cause	
Action	

Work Order

Description: Troubleshoot/Repair

Number: 416158

Entity Type: TPPUMP

Category: Reactive

Initiated By: Keeton, Bonnie Date: 04/27/2018 06:51 AM

Status: In Progress Priority: Low - Time Permitting

Shop: Electrical

Requested By: Keeton, Bonnie Supervisor: Sullivan, Sean

Submit To: Diethelm, Steven Date: 05/01/2018 05:38 AM

Projected Start: 04/27/2018 06:51 AM Projected Finish: 05/11/2018 06:51 AM

Compliance WO?: Planner Update?:

Actual Start: 05/01/2018 03:00 PM Actual Finish: 05/01/2018 04:00 PM

Expense Type: Maintenance

Instructions: Please look into speed on East scum pump. Currently set at min. of 5Hz which is what it was set to for the pumps fan to cool motor. Have noticed on previous notes on this asset that things were changed. And was hoping to be able to lower the

Comments:

Assets

Total Entities: 1

Asset	Legacy Id	Asset ID	Location	Warrant
<input type="checkbox"/>	TPPUMP	74192 Scum Pump 2 East, Thicke	3140	SCB-3 Scum Area

- Pink rows indicate inventory still under warranty.

Update Work Order XY when adding/removing assets?

Related Work Activities

Service Requests

Add Request:

Inspections

Add Inspection:

Work Orders

Parent:

Create Child Work Order

Attachments

+ Add attachment... Remove all attachments

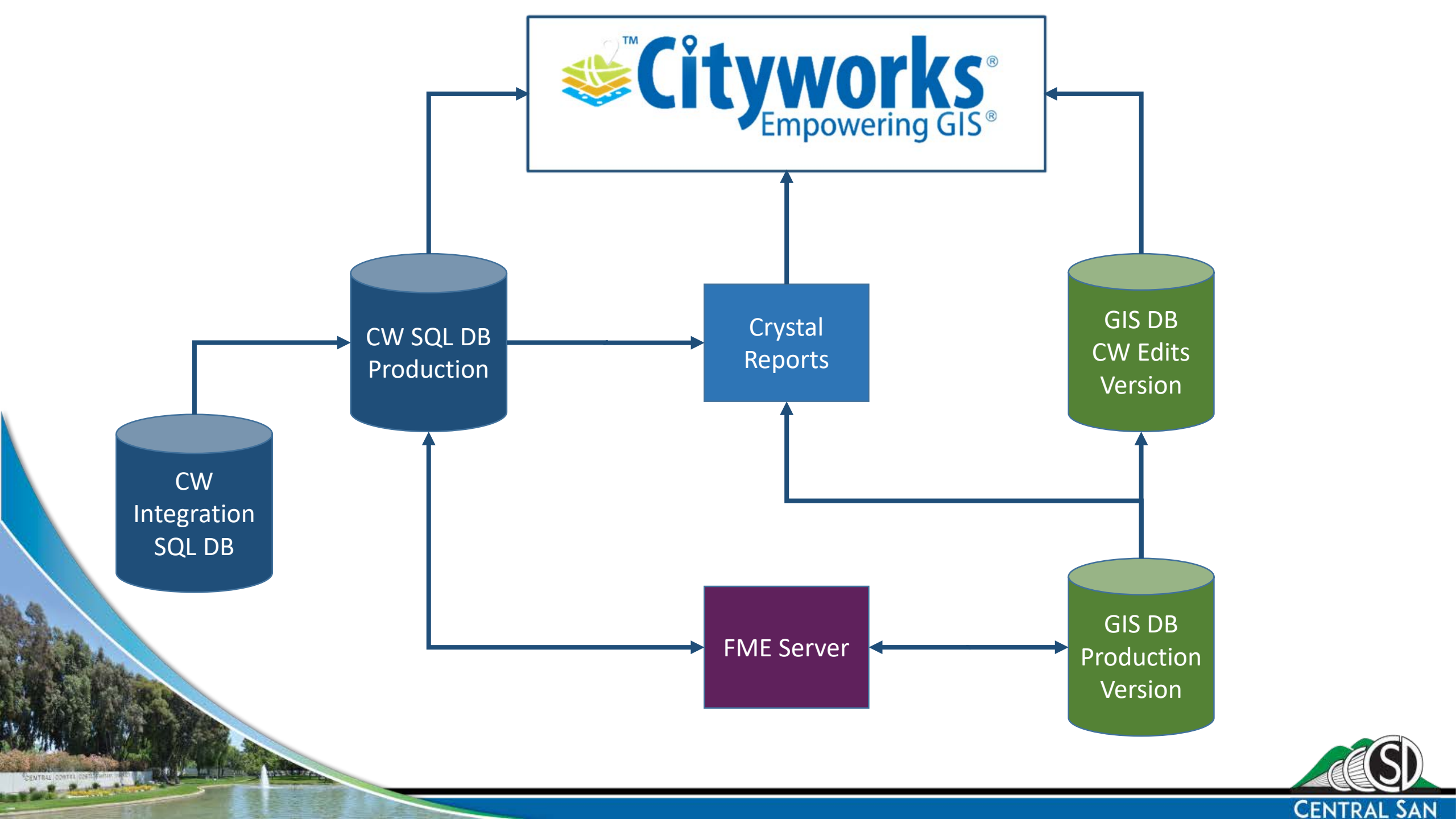
DOC PUMPB.TXT 3.85 KB 04/27/2018 06:51 AM

- 1: QA Panel
- 2: UCFs
- 3: Predefined Comments
- 4: Base/Custom XML modification
- 5: Template Documents
- 6: Custom Fields

OUR IMPLEMENTATION

OUR CURRENT DATABASE AND SERVERS





ADDITIONAL NEEDS AND SOLUTIONS FOR OUR CITYWORKS IMPLEMENTATION



ADDITIONAL NEEDS

- **Functionality:**
 - Easily search for assets
 - Asset info not visible in Inbox
- **Infrastructure Enhancement:**
 - Asset type consolidation
 - Updating asset attributes
 - Improved asset and work order mapping
- **Integrations:**
 - Integrating with SCADA and ERP
 - Some assets move...SCADA doesn't know
- **Brand new system = New processes.**



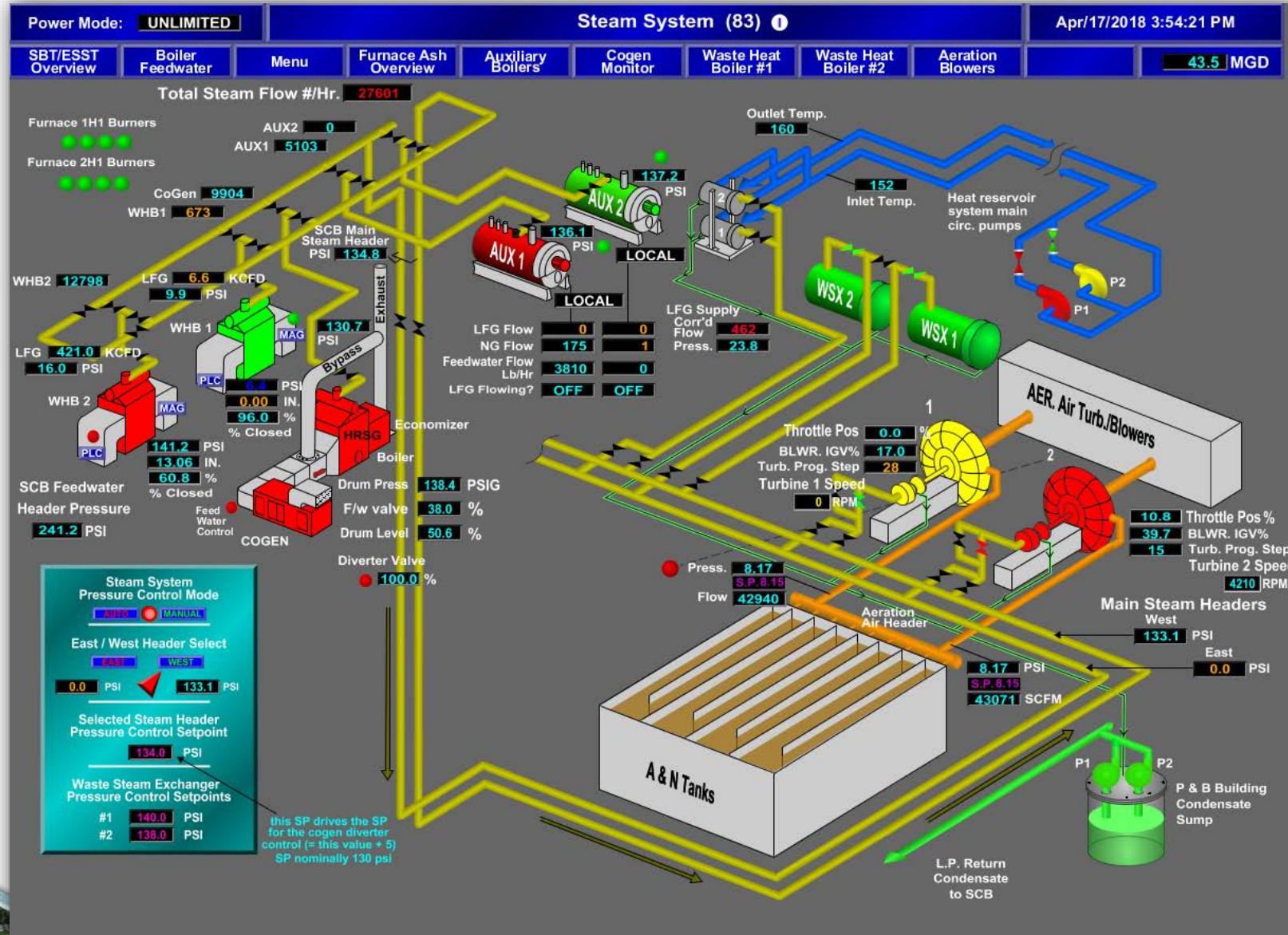
EASILY SEARCH ASSETS

Name Plate and ID Tag



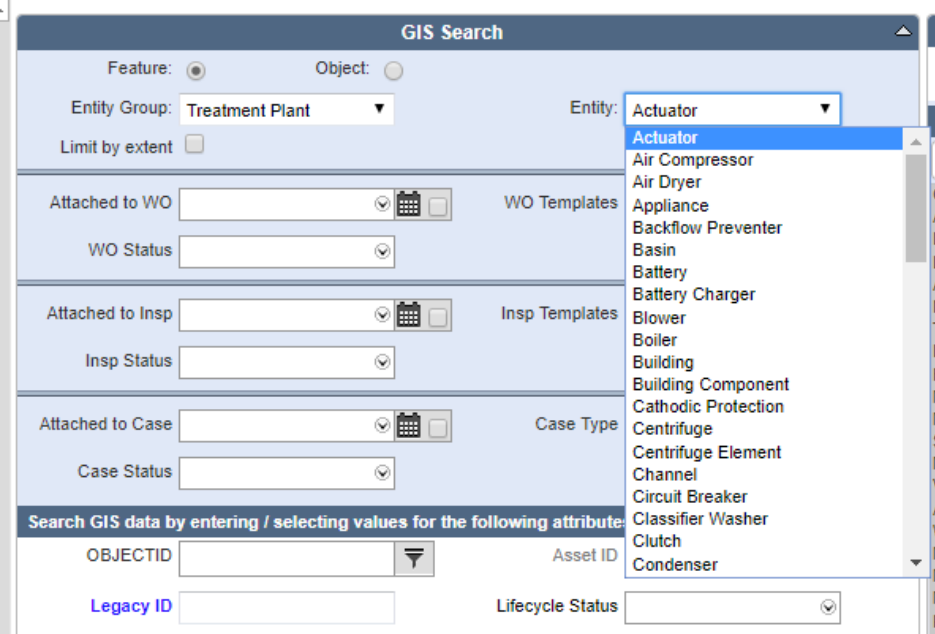
EASILY SEARCH ASSETS

Steam System Representation in Dynac



EASILY SEARCH ASSETS

- Only search one asset type in Asset Search
 - >70 asset types
 - Not familiar with data structure
 - Previous system only has one asset type
- Staff know legacy equipment numbers semi-intelligent
 - Number in SCADA, Drawings, Lockouts
- Previous system had “fake” assets
- Not using map – too slow to search



The screenshot displays the 'GIS Search' interface. At the top, there are radio buttons for 'Feature' and 'Object'. Below this, the 'Entity Group' is set to 'Treatment Plant' and the 'Entity' dropdown is open, showing a list of asset types including 'Actuator', 'Air Compressor', 'Air Dryer', 'Appliance', 'Backflow Preventer', 'Basin', 'Battery', 'Battery Charger', 'Blower', 'Boiler', 'Building', 'Building Component', 'Cathodic Protection', 'Centrifuge', 'Centrifuge Element', 'Channel', 'Circuit Breaker', 'Classifier Washer', 'Clutch', and 'Condenser'. The 'Actuator' option is currently selected. Below the dropdown, there are several search filters: 'Attached to WO' with a calendar icon, 'WO Status', 'Attached to Insp' with a calendar icon, 'Insp Status', 'Attached to Case' with a calendar icon, and 'Case Status'. At the bottom, there are input fields for 'OBJECTID', 'Asset ID', 'Legacy ID', and 'Lifecycle Status'.

EASILY SEARCH ASSETS

ENTITYIDENTIFIER Table

Solution:

- Exploit the Entity Lookup Tool
 - FME - Populate the ENTITYIDENTIFIER table weekly
 - Only In-service, spare assets
 - Java Script to modify tool buttons
 - Disable “Create WO” until search
 - Remove “Create INS”

	ENTITYIDENTIFIERID	ENTITYIDENTIFIER	ENTITYUID	ENTITYTYPE
1	1	22226	404	TPACTUATOR
2	2	22228	406	TPACTUATOR
3	3	23195	461	TPACTUATOR
4	4	49023	1532	TPACTUATOR
5	5	101189	4012	TPACTUATOR
6	6	101190	4013	TPACTUATOR
7	7	101402	4052	TPACTUATOR
8	8	101728	4098	TPACTUATOR
9	9	114114	4512	TPACTUATOR
10	10	114124	4518	TPACTUATOR
11	11	114134	4524	TPACTUATOR
12	12	114154	4530	TPACTUATOR
13	13	114164	4536	TPACTUATOR

Entity Lookup

Search Clear Create WO Create Insp

Asset Number Lookup

52120| Search Clear Create WO

Id	Kind	Description
412035	WO	PM Condensate Pump 1 Month
410402	WO	PM Condensate Pump 1 Month
407478	WO	PM Condensate Pump 1 Month



ASSET NAME NOT VISIBLE IN INBOX

- Asset Name/Info not in Inbox
 - Asset info not visible in WO search
- Staff very familiar with Legacy number and name
- Location Details insufficient
- Many assets have same location
- Map insufficient for the vertical assets

TP - Maintenance work orders on hold

Open Print Expand Configure Map

<input type="checkbox"/>	Wo	Entity Type	Description	Priority	Status	Submit To	Proj Start Date	Proj Finish Date	Actual Start	Shop	Category	Supervisor	In
<input type="checkbox"/>	371893	TPINSTRUMENT	Troubleshoot/Repair	3	ON HOLD	Francis, Timothy				INSTRUMENT	PREVENTIVE	Borrelli, Steve	Up
<input type="checkbox"/>	389481	TPVALVE	Troubleshoot/Repair	3	ON HOLD	Diethelm, Steven		2017-09-20 8:11 AM	2017-07-06 12:00 PM	ELEC SHOP	CORRECTIVE	Parker, Don	Wh
<input type="checkbox"/>	394789	TPBUILDING	Troubleshoot/Repair	4	ON HOLD			2018-04-30 3:23 PM		ELEC SHOP	CORRECTIVE	Parker, Don	Re
<input type="checkbox"/>	371031	TPSHOPEQUIPMENT	Manufacture	4	ON HOLD	Bowers, Bill	2017-02-03 11:37 AM	2018-04-27 2:00 PM	2017-02-09 9:30 AM	MACHINE	NON-MAINTENANCE	Sutherland, Lee	Mo
<input type="checkbox"/>	374272	TPGRINDER	Manufacture	3	ON HOLD	Benedetti, Mark	2017-02-15 5:05 PM	2018-04-27 2:05 PM		MACHINE	CORRECTIVE	Sutherland, Lee	Ple
<input type="checkbox"/>	375617	TPBUILDING	Troubleshoot/Repair	3	ON HOLD	Serrato, Paul	2017-02-23 11:38 AM	2018-06-30 11:38 AM	2017-02-23 12:00 PM	MECHANICAL	REACTIVE	Mahoney, Matt	ple
<input type="checkbox"/>	382237	TPVALVE	Troubleshoot/Repair	4	ON HOLD	Ford, Thomas	2017-04-13 4:13 PM	2018-02-28 4:13 PM		MECHANICAL	CORRECTIVE	Mahoney, Matt	Ple

Rows 100

1 - 56 of 56

ASSET NAME NOT VISIBLE IN INBOX

Solution:

- Populate asset's "Address" field with "Legacy ID"
 - Legacy number and name
- Update XML
 - Change "WO Address" label to "Legacy ID"
- Include field in WO saved search

The screenshot displays two panels. The top panel, titled 'Location Information', shows 'Legacy Id: 74081 CFG Rotate Element A' and 'Location Details: SCB-3C FG 4'. Below are input fields for 'X Location' and 'Y Location'. The bottom panel, titled 'Assets', shows 'Total Entities: 1' and a table with columns: Asset, Legacy Id, Asset ID, and Location. A single row is highlighted in pink, representing an asset under warranty.

Asset	Legacy Id	Asset ID	Location
TPCENTRIFUGEELEMENT	74081 CFG Rotate Element A	5544	SCB-3C FG 4

- Pink rows indicate inventory still under warranty.

The screenshot shows a table titled 'TP -DCP Maintenance Key Perf Indicators (Past Due)'. The table has columns: Wo, Description, Status, Legacy Id, and Sub. The rows list various maintenance tasks with their respective IDs, descriptions, and statuses.

Wo	Description	Status	Legacy Id	Sub
403051	Centrifugal Pump Condition Inspection	ASSIGNED	54117, 54118 1W Pumps 1 & 2	Wat
410161	Condition Inspection	INITIATED	73133 Wet Scrubber 1 Medusa Valve	
370519	Condition Inspection	INITIATED		
412325	Fuel Tank Condition Inspection	INITIATED	44521 Hypo Tank 2	
412243	Fuel Tank Condition Inspection	INITIATED	81223 Air Receiver Tank 3 - DAF	
410166	PD Pump Condition Inspection	INITIATED	Cake Pumps packing	

ASSET TYPE CONSOLIDATION

- Previous system all assets in one asset type
- At Go-live >90 asset types
 - Woolpert recommended 40 asset types
- Plant Staff focused on discrete function rather than generalized function
 - Ex: HVAC Heater, HVAC AC, HVAC Chiller, HVAC Coil, HVAC Equipment
 - Ex: 11 asset types for Instruments
 - Did not fully utilize the “Type” field
- More assets types = more administration in Cityworks and in GIS



ASSET TYPE CONSOLIDATION

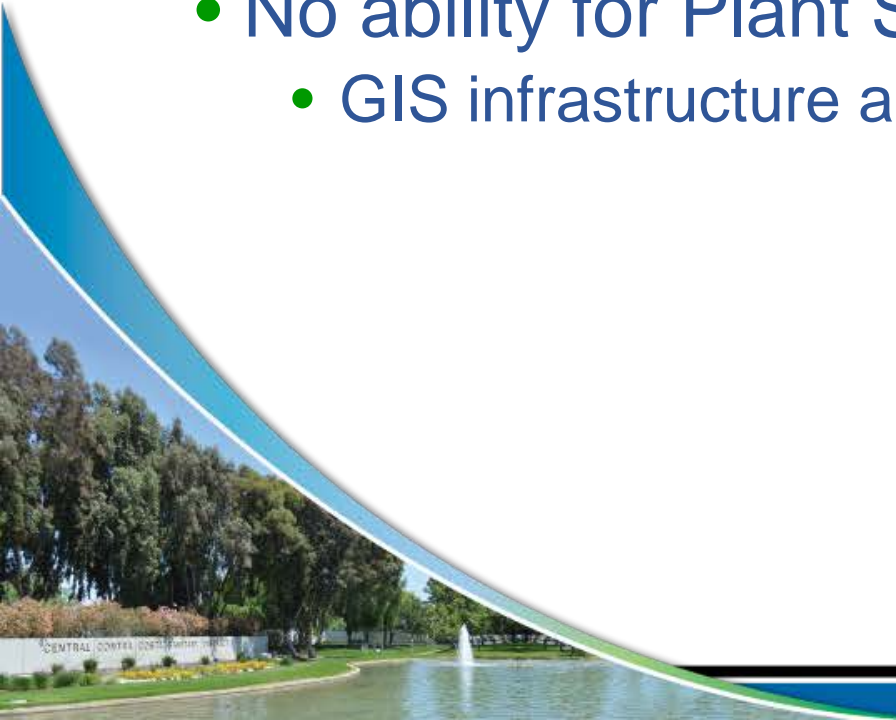
Solution:

- Facilitate meetings to discuss advantages of consolidation
- Use FME to consolidate to ~70 asset types
 - Including work order templates, custom fields, relationship classes
 - Update all existing WOs to add the consolidated asset types
- Simplified asset registry. Easier to search assets.
 - Decrease site and DB administration



ASSET ATTRIBUTE UPDATES

- Updating asset attributes takes a week or more
 - GIS QA/QC
 - Rotating asset's data (location) not adjusted in real-time
- Data edits not communicated effectively
- No ability for Plant Staff to manage own asset data
 - GIS infrastructure and QA/QC tools lacking



ASSET ATTRIBUTE UPDATES

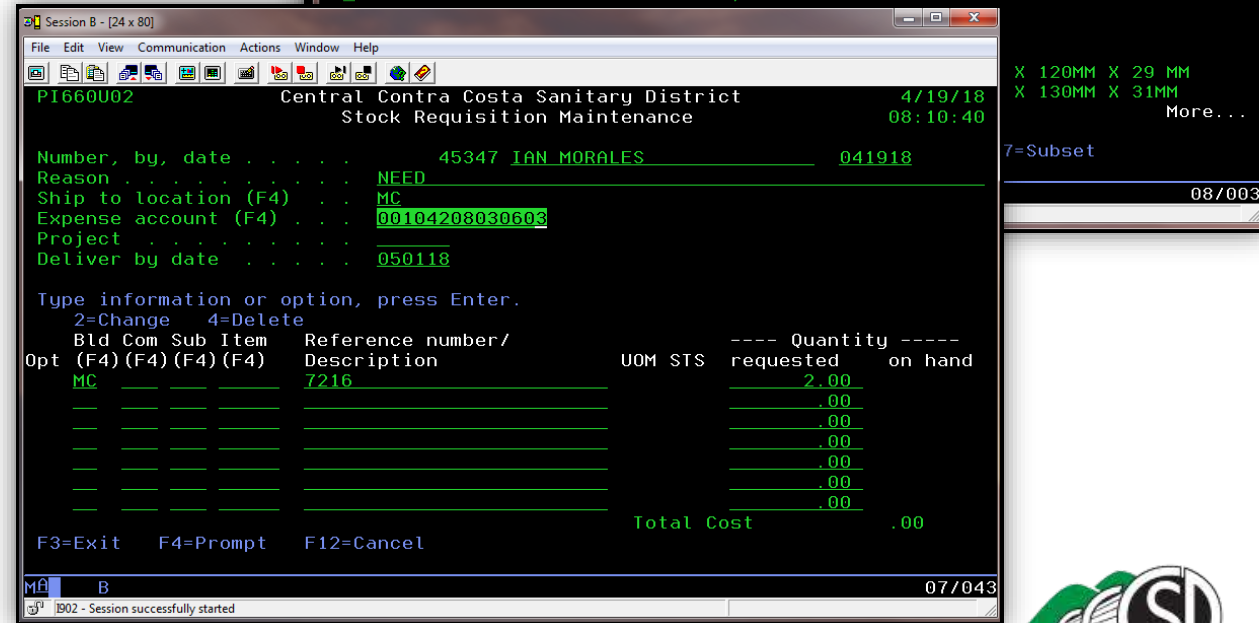
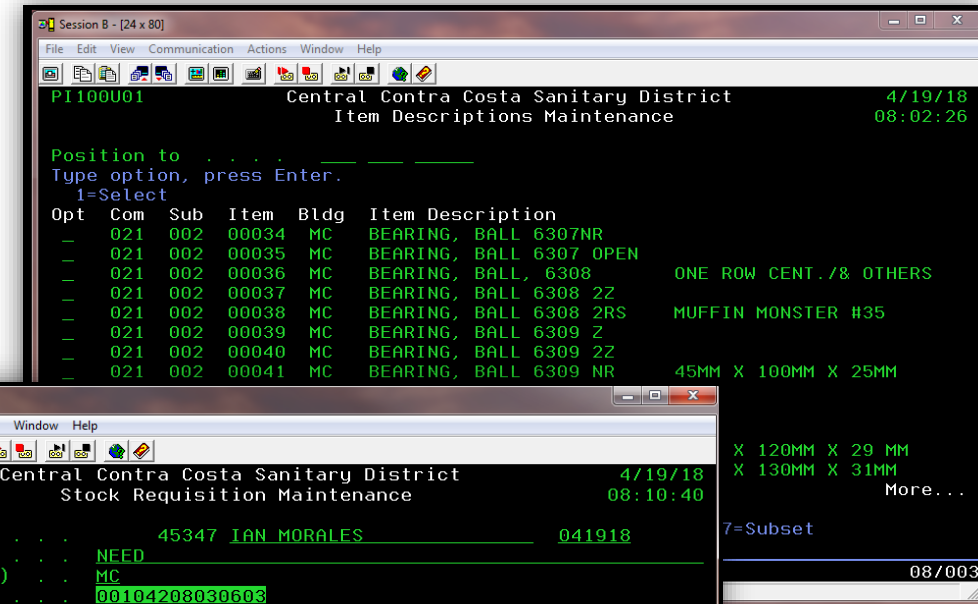
Solution:

- Version GIS database
 - Give proper rights
 - Republish map service
- Enable asset attribute editing in Cityworks
 - Allow real-time attribute edits by stewards
 - Inspection forms
 - Asset Viewer



INTEGRATING WITH OUR ERP

- All treatment plant materials managed by warehouse
 - Warehouse not using Cityworks Storeroom
 - SunGard HTE – Our financial system
- Staff request parts, warehouse staff enters “issue ticket”
 - Enters work order with ticket



INTEGRATING WITH OUR ERP

Solution:

- Script runs nightly looking at SunGard material transactions
- Populates Cityworks MATERIALCOSTACT table

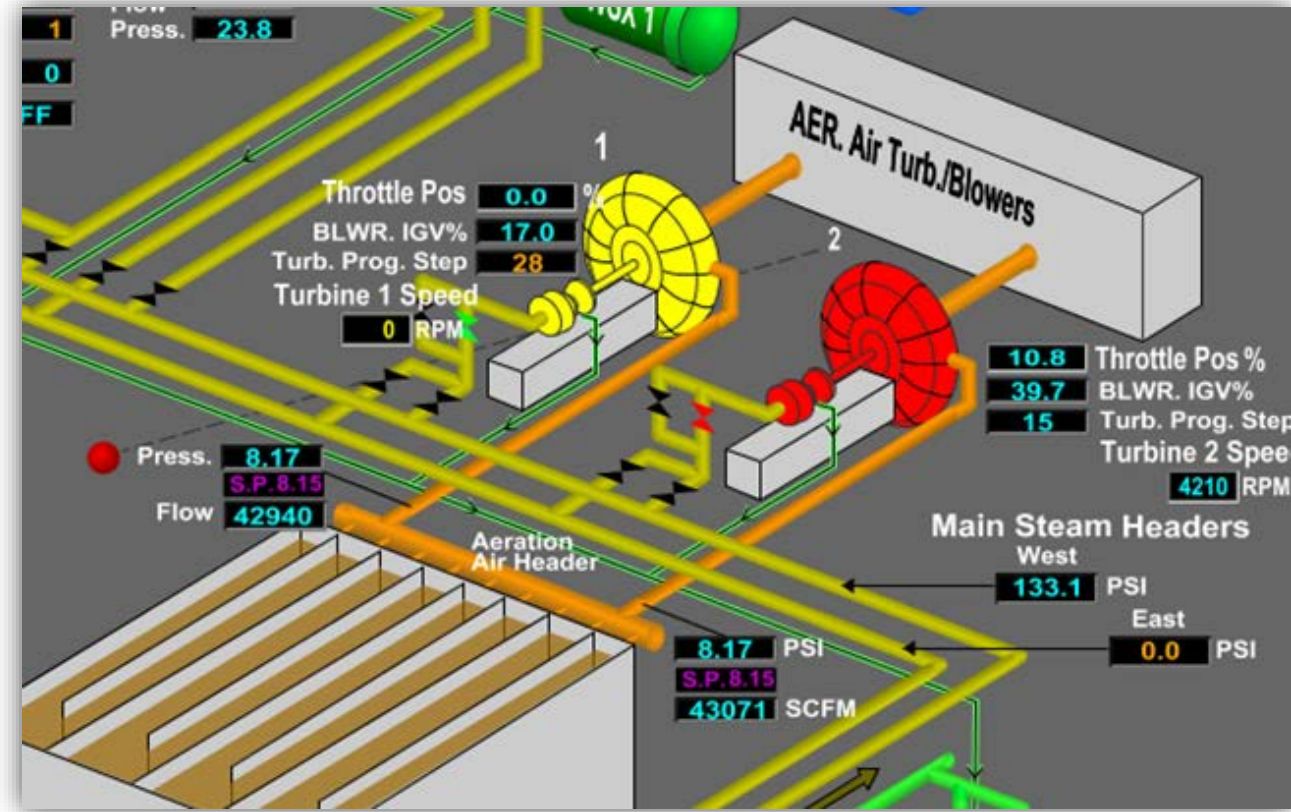
MATERIALCOSTACT Table

	MATERIALCOSTID	WORKORDERID	DESCRIPTION	UNITSREQUIRED	COST	SOURCE	STOCKMODIFIED	ENTITYUID	ENTITYTYPE	MATERIALSID	MATERIALUID	ACCTNUM	TRANSDATE
603	667	369497	FILTER, WATER CLEAR B...	0.50	18.897750	SunGard Integration	N	974	TPAPPLIAN...	0		0010440830...	2017-02-07 23:55:12.427
604	668	369497	FILTER, WATER CLEAR B...	0.50	18.897750	SunGard Integration	N	909	TPBUILDING	0		0010440830...	2017-02-07 23:55:12.567
605	669	371212	BREATHER, DESICCANT ...	2.00	161.520000	SunGard Integration	N	2789	TPPUMP	0		0010440830...	2017-02-07 23:55:12.583
606	670	371212	BREATHER, DESICCANT ...	1.00	66.106800	SunGard Integration	N	2789	TPPUMP	0		0010440830...	2017-02-07 23:55:12.597
607	671	371126	TEE, GALV 3/4"	1.00	4.824100	SunGard Integration	N	2385	TPPUMP	0		0010440830...	2017-02-07 23:55:12.630
608	672	371126	CLAMP, PIPE, 3/4" 316S.S.	2.00	6.889600	SunGard Integration	N	2385	TPPUMP	0		0010440830...	2017-02-07 23:55:12.630
609	674	371274	Recondition motor	1.00	6940.000...	Koffler Electrical Inc	N			0	PO 044814	001-04-20-730	2017-01-23 10:32:00.000
610	676	371226	3" CI Wye	1.00	13.110000	P-Card	N			0	order # 690859	NULL	2017-02-08 13:00:44.637
611	677	371226	3" c.i. pipe	1.00	60.000000	P-Card	N			0	order # 690859		2017-02-08 13:00:44.000
612	678	366698	Oil [Supreme 5W-30]	1.00	3.060000	FLEET	Y	120	FLVEHICLE	375	FL-31.01.004		2017-02-07 12:00:00.000
613	679	371212	BUSHING, BRASS REV. B	2.00	461.850000	SunGard Integration	N	2789	TPPUMP	0		0010440830...	2017-02-08 23:55:09.963
614	680	371279	ADAPTER, PVC 1"SOC X ...	2.00	6.096600	SunGard Integration	N	3490	TPODORC...	0		0010440830...	2017-02-08 23:55:10.060
615	681	371279	ADAPTER, PVC 1"SOC X ...	2.00	6.838200	SunGard Integration	N	3490	TPODORC...	0		0010440830...	2017-02-08 23:55:10.060
616	682	371279	COUPLING, SCH 80 PVC 1"	3.00	8.309400	SunGard Integration	N	3490	TPODORC...	0		0010440830...	2017-02-08 23:55:10.073



INTEGRATING WITH SCADA

- Readings in control system tracked by physical position, named by the asset “legacy” number
 - SCADA receives reading from PLC, which tracks location by “PointId”
- Asset readings in Cityworks on EUID



INTEGRATING WITH SCADA

Solution:

- Use Metrics API
- Create intermediate table with both the legacy number and EUID
- Nightly script takes value from SCADA, finds corresponding EUID, populates ASSETREADING table
- However, Cityworks can only track on unit of measure for readings

Integration Table

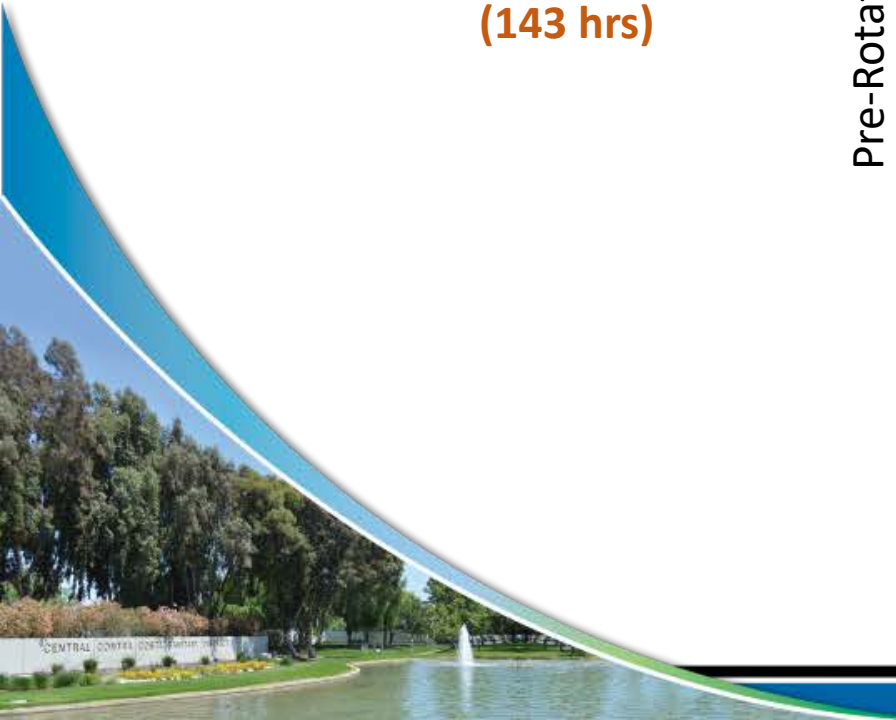
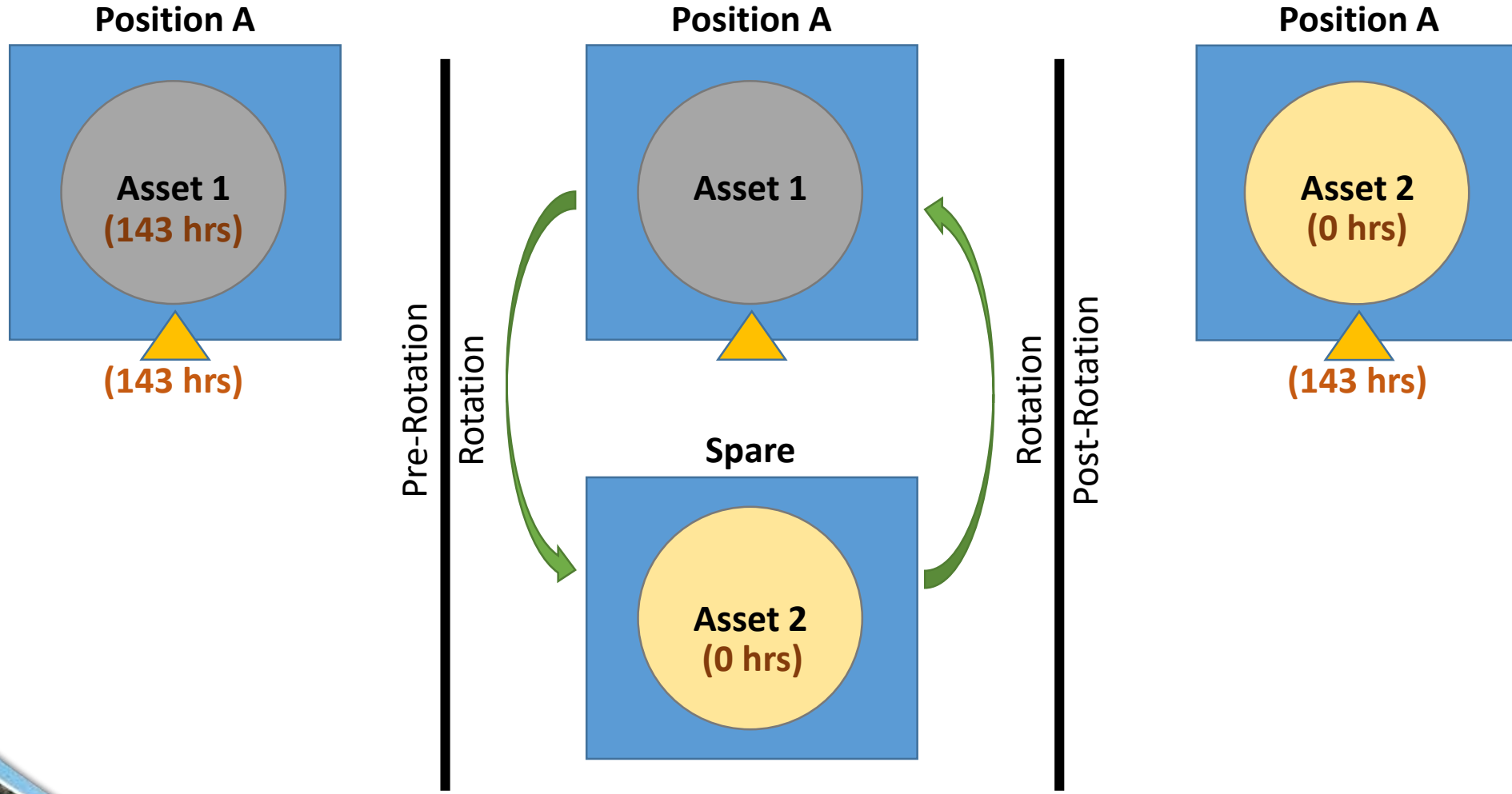
	ReadingId	PointId	Last_Retrieved_Reading	Last_Retrieved_Reading_Date	Current_Reading	Current_Reading_Date	Reading_Change	Total_Reading_Recorded_In_CW
289	289	160	36974.0000	2018-04-20 19:05:08.000	36988.0000	2018-04-21 19:05:07.000	14.0000	102523.0000
290	290	160	36988.0000	2018-04-21 19:05:07.000	37002.0000	2018-04-22 19:05:07.000	14.0000	102537.0000
291	291	160	37002.0000	2018-04-22 19:05:07.000	37017.0000	2018-04-23 19:05:10.000	15.0000	102552.0000
292	292	160	37017.0000	2018-04-23 19:05:10.000	37031.0000	2018-04-24 19:05:12.000	14.0000	102566.0000
293	293	160	37031.0000	2018-04-24 19:05:12.000	37045.0000	2018-04-25 19:05:10.000	14.0000	102580.0000
294	294	160	37045.0000	2018-04-25 19:05:10.000	37059.0000	2018-04-26 19:05:09.000	14.0000	102594.0000
295	295	160	37059.0000	2018-04-26 19:05:09.000	37074.0000	2018-04-27 19:05:11.000	15.0000	102609.0000
296	296	160	37074.0000	2018-04-27 19:05:11.000	37089.0000	2018-04-28 19:05:22.000	15.0000	102624.0000
297	297	160	37089.0000	2018-04-28 19:05:22.000	37104.0000	2018-04-29 19:05:22.000	15.0000	102639.0000

SOME ASSETS MOVE...SCADA DOESN'T KNOW

- Rotating assets – Spare equipment
- SCADA tracks runtime based on position (remember that legacy number?), not discrete asset
 - Asset reading based on EUID
 - Rotated-in asset would have previous asset's hours
- WO generated from Asset Readings module not correct



SOME ASSETS MOVE...SCADA DOESN'T KNOW



SOME ASSETS MOVE...SCADA DOESN'T KNOW

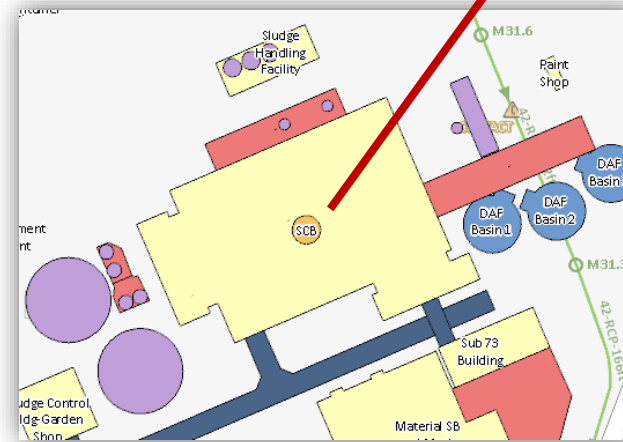
Solution:

- Remove/Install WO
 - GIS Update (a UCF)
- Real-time attribute editing
 - Remove/Update Legacy number
- GIS QA/QC process
- “Wizard” to reset SCADA integration runtime hours table
 - In development

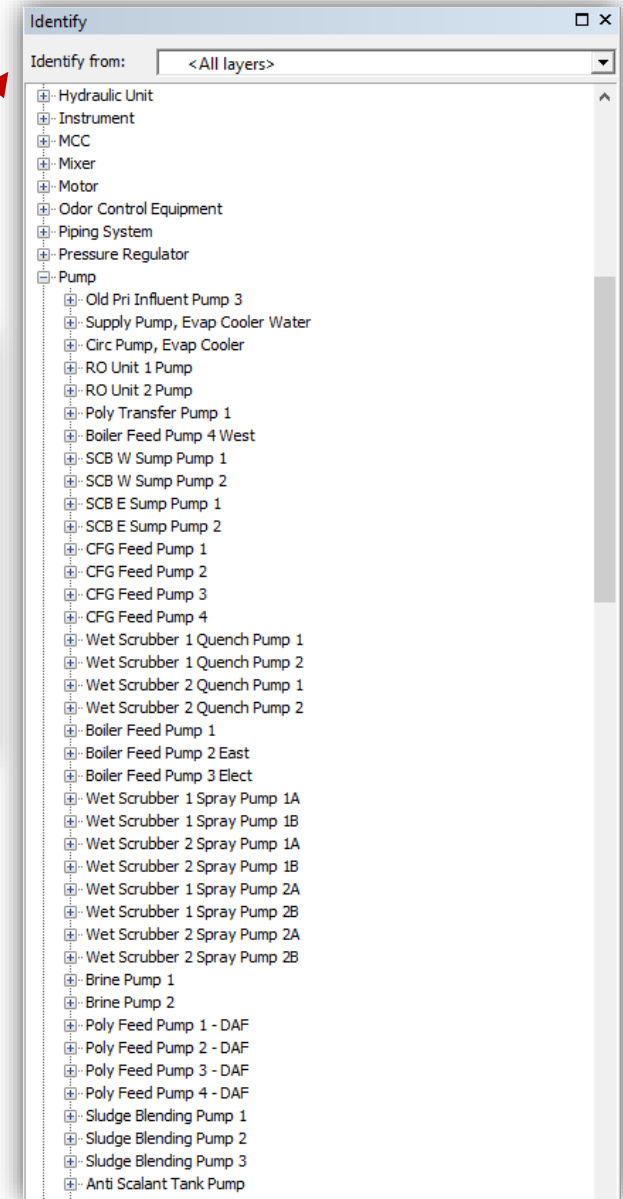


VISUALIZING ASSETS AND WORK ORDERS ON MAP

- Most assets as Objects
- Related asset WO show at center of Parent Feature
 - Might be several levels “up”
- Staff not using the map
 - Selecting related assets slow
 - Not accustomed to using a map
 - Doesn't show actual location of asset



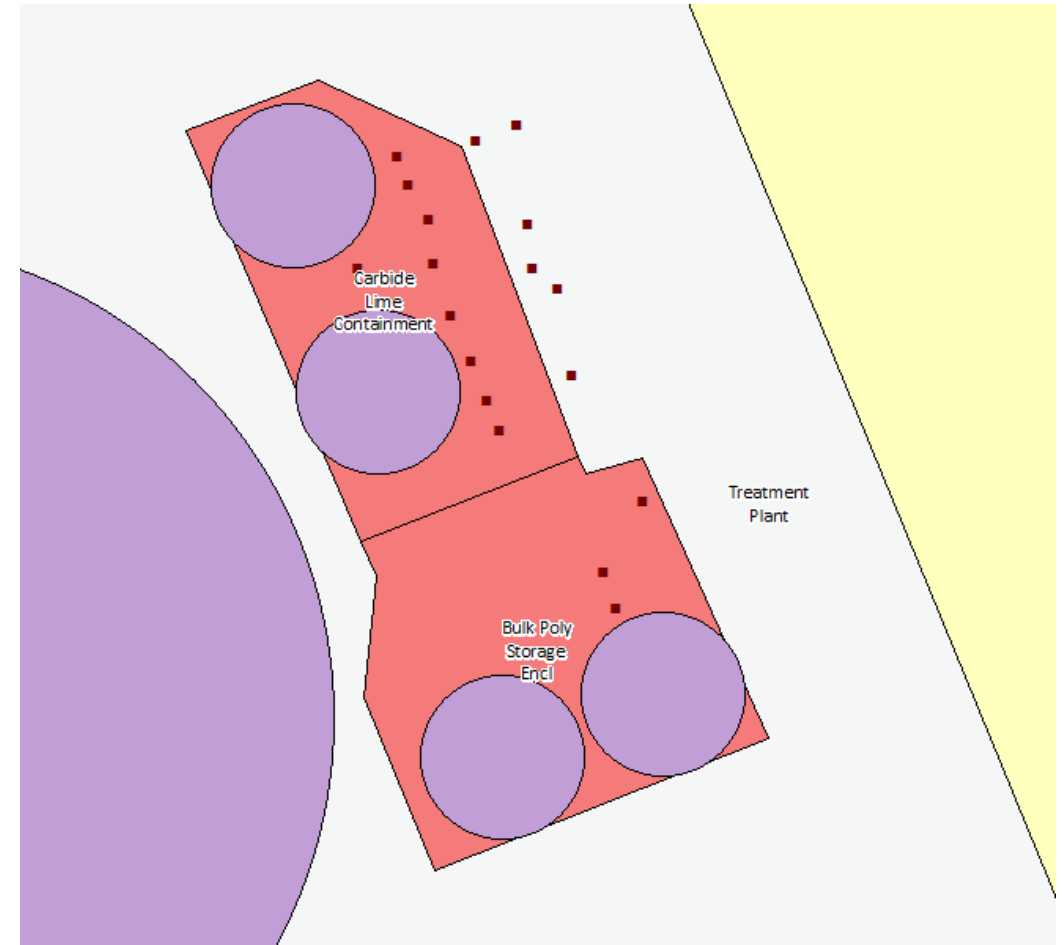
Solids Conditioning Building (SCB)
has 100s of Assets related to it



VISUALIZING ASSETS AND WORK ORDERS ON MAP

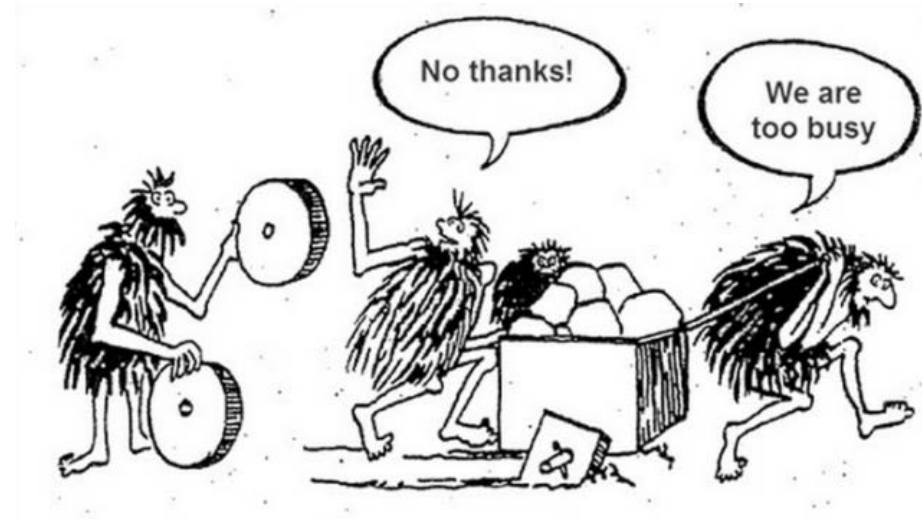
Solution:

- Convert all object tables to feature classes
 - Used FME and Python
 - Move assets to correct geographical location
- Relationships still exist/work
- Map more useful



NEW SYSTEM AND PROCESSES

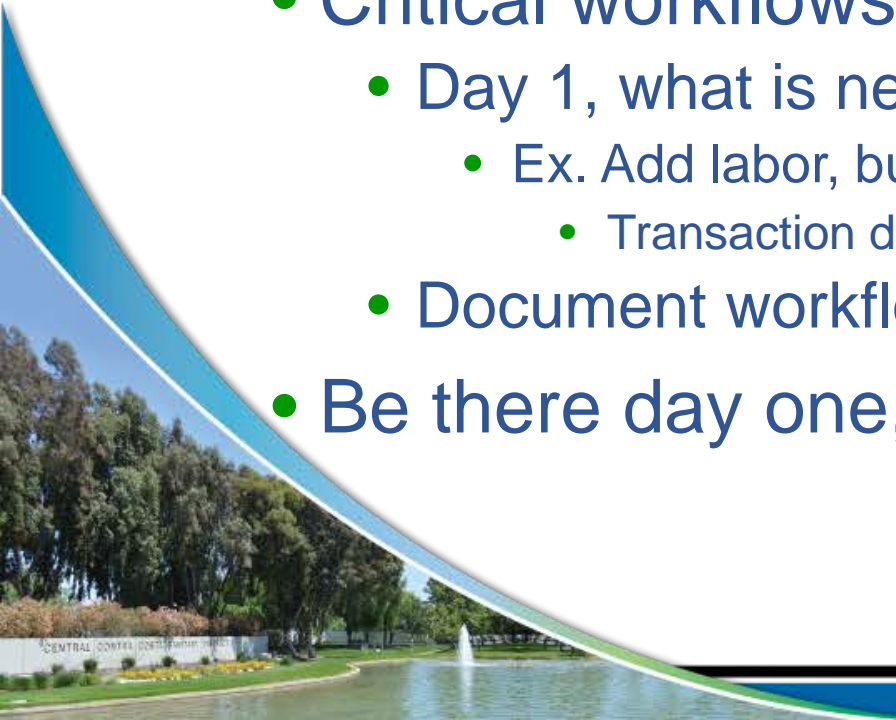
- New software
 - Many staff resistant to using software and computers
- New processes
 - No more paper
 - No admins to enter in notes and hours
- New Terminology
- Who's the champion? Decision Maker?
- Skeptical Staff



NEW SYSTEM AND PROCESSES

Solution (on going):

- Get site ready for use
 - Ex. Set up inboxes
- Training
- Critical workflows for users
 - Day 1, what is necessary
 - Ex. Add labor, but not how to add labor date
 - Transaction date satisfactory because labor is entered each day minimum
 - Document workflows so staff can refer to them
- Be there day one, and two, and three of “Go-Live”



HOW WE WERE SUCCESSFUL

- Did not take staff and new processes for granted
 - Software might not be a strong user skill
 - Changes disrupt long established practices and culture
- Training. Training. Training.
 - Formal and Informal
- User group meetings
- Available. Consistently present. Patient.
- Empower users
- Did not set it and forget it
 - Poor habits
 - Bad data
 - Cityworks not being used...at all



THANK YOU QUESTIONS?

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