City of St. Petersburg

Committee of the Whole

Meeting of November 20 2017 @ 8:00 a.m.

City Hall - Room 100

A. Call to Order – Council Chair Darden Rice

B. Discussion Items

   a. **2017 Management Evaluation – Water Resources Department**
      LA Consulting, Inc. – Harry Lorick, P.E. and Jeff Thurman, CPM

C. Next Meeting – December 14, 2017 @ 2:00 p.m.
   2018 Calendar and Election of Chair/Vice-Chair

D. Adjournment

Recommendations for the City of St. Petersburg's Water Resources Department

1. *Who is LA Consulting?*
2. *Review Approach*
3. *Recommendations with Support Information*

November 20, 2017

Harry Lorick, P.E., PWLF
Jeff Thurman, CPM

LA Consulting, Inc.

LA Consulting, Inc.

Helping Public Works...Work!

- ✓ Firm Founded -1993
- ✓ Management & Infrastructure
- ✓ APWA Presenter 57 Times
- ✓ Over 85 Systems Evaluated and Implemented
- ✓ Documented Improvement
- ✓ Hands On Implementation

We have one focus...
Assisting agencies to improve operations!

Some of our Relevant Clients

- *Volusia County (FL)*
- *Mesa Water District (CA)*
- *Ventura County Waterworks (CA)*
- *Simi Valley Waste Water (CA)*
- *Alameda County (CA)*
- *Orange County (CA)*
- *Hillsborough County (FL)*
- *St. Johns County (FL)*
- *Charlotte County (FL)*
- *City of Prescott Utilities (AZ)*
- *Ventura Water (CA)*
- *Reno/Sparks/Washoe (NV)*
- *West Valley Sanitation District (CA)*
- *Port of LA and LB (CA)*
- *Truckee Meadows Water District (NV)*

LAC projects have included water utilities, waste water, solid waste, stormwater, and other infrastructure.

LAC has made more presentations at the National APWA Conference in the last 10 years than any other firm in the Country!

Author of several articles … 81 that focus on efficiency with two more in the process. Lead author for APWA'S Administrative Manual Systems Section!

Why?
To evaluate operations for efficiency and identify opportunities by…

- ✓ **Determining, documenting and mapping current processes**
- ✓ **Identifying areas of strengths and weakness for improvement**
- ✓ **Recommend an action plan for improvement**
- ✓ **This will…**

Outline a "business like" direction to better manage the City of St. Petersburg's water and wastewater assets.

Project goals are to identify opportunities to improve using best management practices

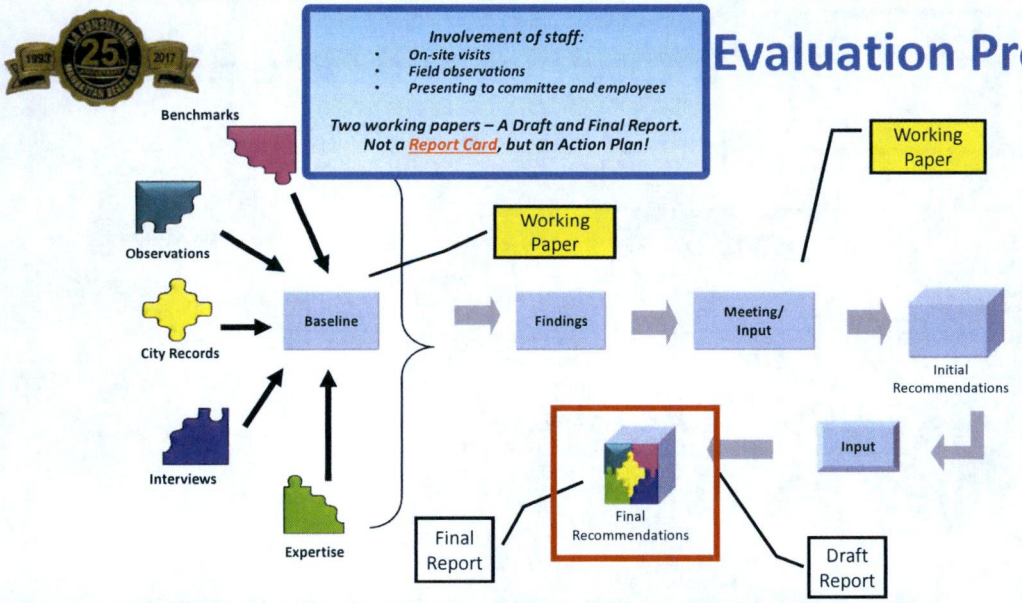
Task No.	St. Petersburg Water Resources / Task Description	MONTHS 1	2	3	4	5
Phase A. Management Evaluation						
Task 1	Project Initiation					
Task 2	Examination of Services and Field Review					
Task 3	Evaluate Opportunities for Improvement					
Task 4	Document and Present Findings					
Task 5	Prepare Draft Report					
Task 6	Document and Present Final Recommendations					
Task 7	Monthly Status And Quality Control					
Phase B. Employee Survey						
Task 8	Employee Survey					

This is not an audit, but an emphasis on optimizing performance and improving productivity.

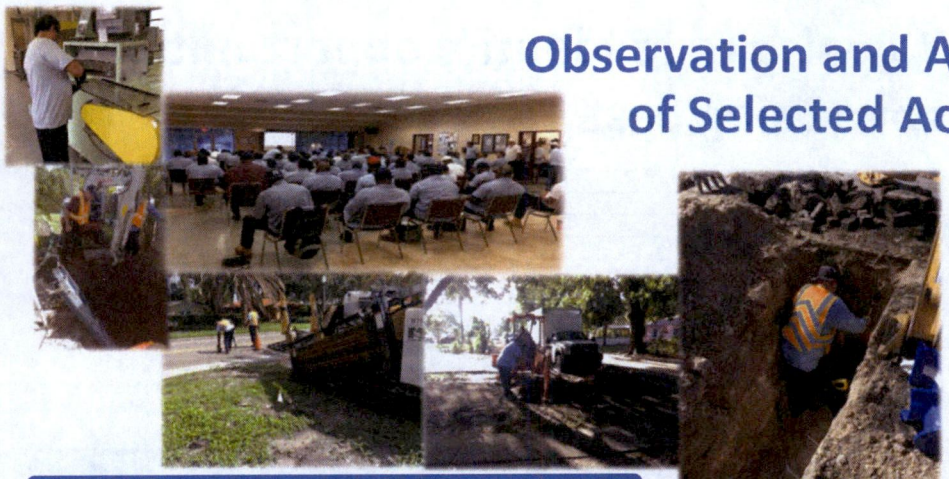
Evaluation Process

Involvement of staff:
- *On-site visits*
- *Field observations*
- *Presenting to committee and employees*

Two working papers – A Draft and Final Report. Not a Report Card, but an Action Plan!



A working paper is an information confirmation document, not a report.



Observation and Analysis of Selected Activities

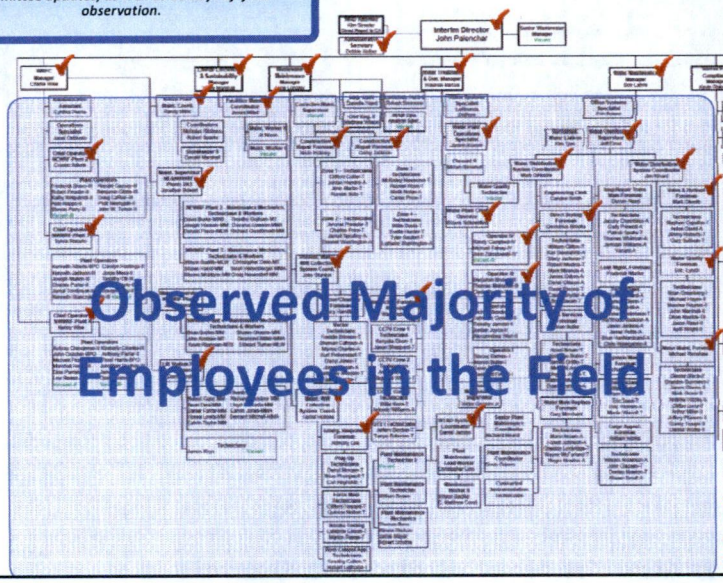
"We have received feedback and ideas from employees at all levels."

We conducted two surveys- one for all employees and another just the managers.

We have communicated with many employees and managers as well as performed several field visits.

58 in-person interviews, 22 presentations with 3 Council Committee updates, as well as 16 days of field observation.

Interviews and Field Reviews



Observed Majority of Employees in the Field

- Council Members, Kennedy and Kornell
- Public Works Administrator, C. Tankersley
- Kelly Kirschner, Vice President and Dean and William McKenna Eckerd College

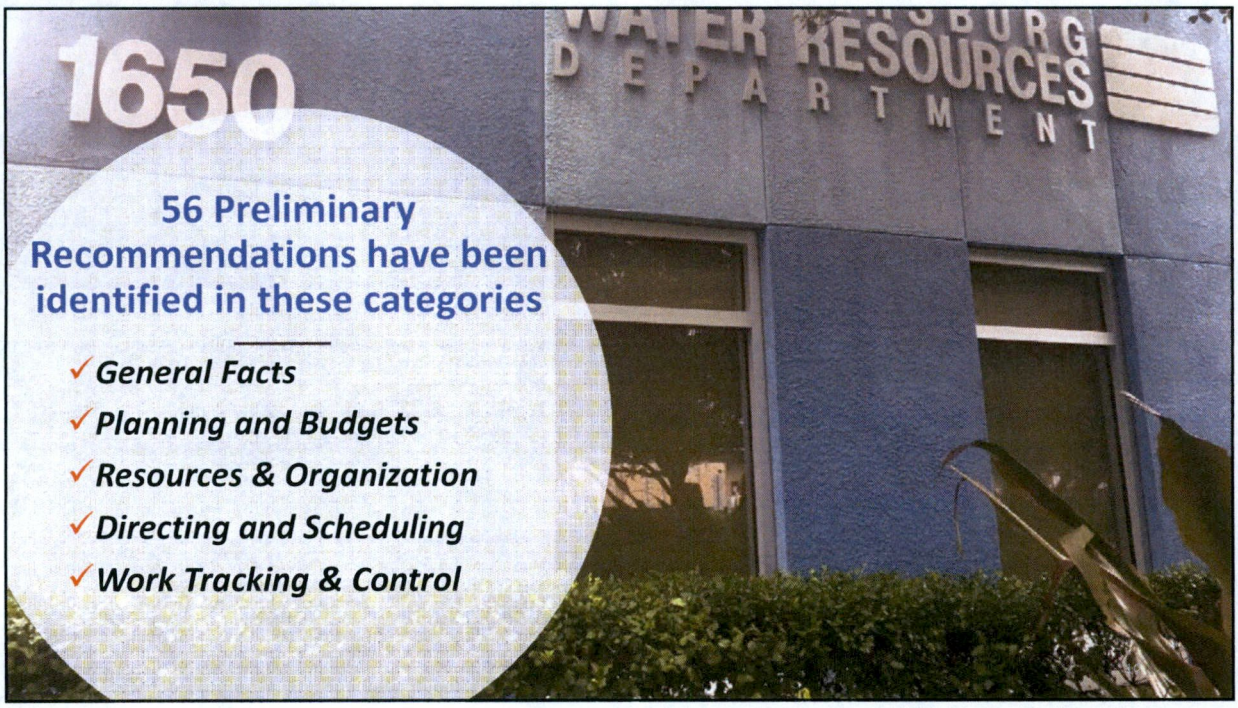
Number of employees
Equipment, Etc.

Baseline

Finding - Observation, comparison and/or opportunity.

Recommendation 1- Action to improve work process or resource availability for both efficiency and effectiveness.

Goal today is to review the preliminary recommendations and solicit feedback.



Overview of 56 recommendations

- Employee involvement, training and empowerment
- Automated systems and managing data
- Business best practices
- Physical facilities layout
- Accountability and clarity establishment
- Organization, resources and budget
- Transparency and promotion

Some of the Many Innovative Concepts

- Intentional training program for Wastewater
- Use of P-Tech College for training and staff development
- Increased WW Capacity underway
- Remote Facility Condition Inspections
- Combination of QTV and CCTV
- Use of reclaimed water vs. outflow
- Uni-Directional Flushing
- Exclusive use of deep wells and reclaimed WW disposal
- Maintenance management system
- Centralize warehouse
- Some PMs are planned in the WAM system
- SCADA overlaid with actual photo of plant
- 24-hr production of sludge
- Proactively addressing infiltration of stormwater into WW collection system using manhole inserts
- Wastewater Collections systems on the year award
- Certified Laboratory for water and wastewater functions
- SCADA data on monitors at the Water Reclamation Facilities is overlaid with actual photos of the plant assets
- Certifications come with incentive pay & promotional opportunity

The Department is already performing many good and innovative practices, which demonstrates a philosophy of change and capability for continuous improvement.

<u>Recommendation</u> 1: Establish employee teams to review the various improvement opportunities and annual plans.

Utilize the teams on an annual basis to assist in the review of work methods, quality control, annual plans and equipment needs, as well as other key processes.

<u>Recommendation</u> 2: Utilize all available technology and improvement tools with experienced leadership to obtain American Public Works Association (APWA) accreditation.

City Mission Statement

"...to provide efficient and effective public services that protect and enhance sustainability of our environment and the quality of life in St. Petersburg."

st.petersburg

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Link to Source

Objective Measures and Indicators

Performance Measure	2013 Actuals	2014 Actuals	2015 Actuals	2016 Estimates	2017 Forecast Target
Customer Feedback *% of Customers*					
Reclaimed Water Pressure	.21%	.27%	.32%	.82%	0
Water Quality	.06%	.06%	.14%	.14%	0
Sanitary Sewer Overflows	6	11	18	12	0
Potable Water Consumption *(mgd)*	80	80	82	79	79
Reclaimed Water Usage *(mgd)*	16.34	16	16	18	16
Residential Customer in Lowest Tier *Gallon/Day %*	82%	82%	81	81	81

Performance measures are effective based.

Performance measures used by the City are all effective based, yet mission statement indicates efficiency as part of Department's direction.

<u>Recommendation</u> 3: Develop specific goals and objectives for all groups, which includes quantifiable efficiency and effective performance measures which link to the vision and mission statements, with employee teams providing input.

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Albert Whitted Water Reclamation Facility (AWWRF) Operation Alternative Report

- Prepared and Submitted by Camp Dresser and McKee Inc. (CDM)- *October 2010*
- Executive Summary with six sections and appendices
- Three alternatives compared:
  1. Keep AWWRF Operational
  2. Flow Diversion to SWWRF (and AWWRF out-of-service/demolished)
  3. Flow split and diversion to both SWWRF and NWWRF (and AWWRF out-of-service/demolished)

A key driver for the evaluation was in response to the FDEP guidance for managing the City's reject water via reject water storage rather than direct disposal via the existing injection wells.

The report recommended that the City proceed with the conceptual design of flow diversion using SWWRF as the receiving facility while expressing some concerns about current capacity.

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CH2M Hill Review of 2012-2015 Flows

- 181 instances PHF > 40 mgd—current maximum SWWRF hydraulic design—out of more than 333,000 total values (< 0.1%)
- 6 periods
  - June 24th – 26th, 2012
  - August 21st – 22nd, 2012
  - July 2nd – 6th, 2013
  - September 24th – 27th, 2013
  - September 28th – 30th, 2014
  - July 27th – August 8th, 2015
- Single highest value was 60.72-mgd which occurred on 9-25-13.
- 2015 peak flow event, the headworks was bypassed during periods over four days.
- Operations estimated peak flow during this time at 65-mgd.

Key design parameters suggested ( )are both higher than industry criteria but lower than one of FDEP's default parameters ( ) and higher for other ( ).

CH2M Hill outlined historical flows and provided the City with analysis.

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Recent Major Discharges Cited

- Aug 2-10, 2015 = 31.5 M gallons
- Jun 6-9, 2016 = 9.8 M gallons
- Aug 31-Sep 13, 2016 =
  - 78-93 M gallons@ AWF and 58M gallons @NW
  - +220 M gallons partially treated injected in NW
  - +561 M gallons partially treated injected in SW

In years 15-16, an unpermitted discharge onto Eckerd College Property.

<u>Recommendation</u> 4: Monitor continual leak detection and I/I program, report status monthly to the Department Administrator. Benchmark infiltration rates against those of agencies in other Florida coastal communities and determine the existence of gaps.

Stormwater infiltration is considerable during significant storm events with as much as 2/3 of the water in the wastewater systems coming from stormwater. A consultant outlined historical flows and provided the City with analysis.

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2017 Consent Order

- Proposed by DEP September 16, 2016 and completed in 2017
- Response to unpermitted discharges in 2015/16
- Requires capacity upgrades including:
  - Feb 2018 – SW headworks bypass and disc filters; injection well(s)
  - Feb 2018 – NW effluent filter; injection well
  - Jun 2018 – Update Water Master Plan
  - Sep 2019 – SW expand headworks, add clarifier & filters
  - Other reports including Albert Facility justification and plan, flow mitigation report, hydraulic model update, bi-annual implementation report
  - Inflow /Infiltration funding $14 million annually for 5 years
  - Lateral replacement ordinance
  - Update CMOM

The 2017 Consent Order requires additional penalties, capacity improvements, follow-up studies and accountability reports to be performed; as well as CMOM updated.

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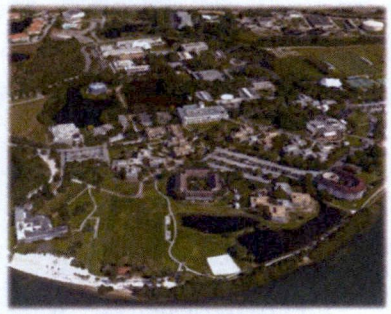
Eckerd College

- Established 1958
- 1,808 Full-time students
- Ranked 122 in National Liberal Arts colleges by US News
- Adjacent to SW Treatment plant
- Concerns exist over drainage and project coordination



The events of 2015/2016 also impacted Eckerd College and neighboring communities.

Some flooding occurred on streets (Avenue of States) and athletic fields, with partially treated effluent mixed with stormwater.

Concerns were expressed over the 2015/2016 unpermitted effluent releases to Boca Ciega Bay.

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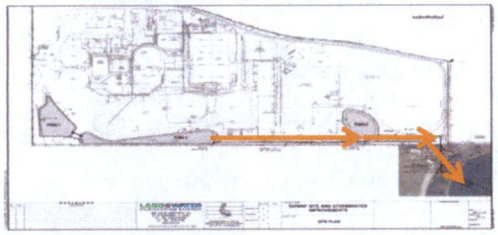
WRFSW Drainage Stormwater and Site Plans



500 Year Flood Map

The plan of draining the SWWRF away from the central part of the campus, along with new storage facilities under construction and some detention may reduce risk, yet still may need enhancements for emergency situations.

<u>Recommendation</u> 5: Implement plan to provide drainage of the SWWRF to the east.

Conduct an independent analysis to determine probability of future overflows and system capacity to manage stormwater events, communicate results all major stake holders.

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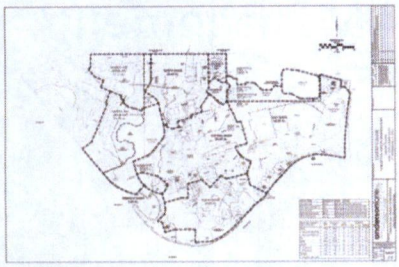
Master Drainage Plan for Eckerd College



Natural drainage from some of the SWWRF area flows though the College campus. The drainage system that is in place at the College with various inlets, stormwater structures, and watercourses may restrict some flows and could be enhanced.

Recommendation 6: Suggest to the College a drainage study for determining the capability of their stormwater system for handling high storm flows.

Through study discover opportunities to improve capacity and understand ramification of their stormwater capacity to manage large storms.

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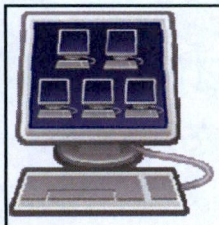

SCADA systems

Tools used for monitoring and controlling processes.

Much of the reporting still requires manual confirmation efforts at the water treatment facility and pumping stations.

The accuracy, timing and presentation of wastewater lift station information is questioned.

Recommendation 7: Utilize enhanced SCADA capabilities to reduce redundancy of manual data recording for key processes in water and wastewater.

Require operator involvement in all SCADA modifications with signoff by appropriate supervisor.

WAM Work Management

Work and Asset Management (WAM) system in 2007 replaced Cartegraph

- Asset inventory hierarchy
- Service requests and work orders
- Seven (7) Divisions
  - ADMIN, ECD, WRD, WRF, WSM, WTD, & WWM
- 96 asset types; 60 failure codes and 47 repair codes with some activity tracking
- FY16 reported 116,682 tasks at $13,455,006.

Some integration with other systems such as Novilon used by meter readers

The WAM database was initially configured with full contribution of Water Maintenance and limited participation from others, yet is now utilized by the other operational Divisions.

Recommendation 8: Integrate existing systems with WAM to automate work order tracking.

Assign technical staff to utilize direct input from each group to configure system for all functional users.

Recommendation 9: Independently review the capability of WAM to provide the functions needed for water and wastewater plant operations.

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LIMS and LINKO System

LIMS database used to manage laboratory functions - managed by a combination of IT and EC staff.

If the system was properly configured, some manual and time-consuming processes may not be necessary

LINKO - specialty software for Grease and Pretreatment (G/P) and is complex.

The main tool in this G/P operation though *groups use WAM.*

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Recommendation 10: Update and configure the LIMS' Element module to eliminate manual processing and monitoring.

Assign technical support from ASM to directly support Element and LINKO with guidance by ECD staff. Integrate scientific requirements with IT functionary.

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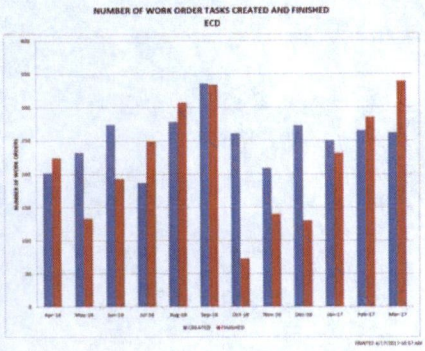

ECD tracks and closes work orders mainly for sampling

Environmental Compliance Division (ECD) data collected in the WAM is minimal and review of information for any decision making is nonexistent.

<u>Recommendation</u> 11: Discontinue ECD's utilization of the WAM system and monitor work with Element module and LINKO systems, freeing up labor resources.

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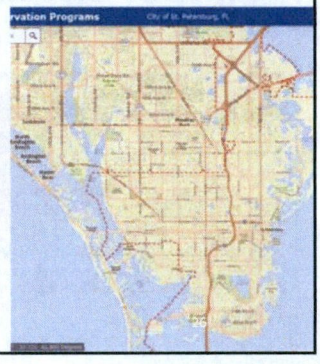
GIS and Mapping

The GIS system exists yet is fully utilized by only a few groups in the Division.

The locations of water and sewer facilities are documented uses combination of GIS and CADD intersection drawing that are used by various employees in the field. The updating of the water locations in the CADD drawings are not current and staff have backlog that is growing.

- Detailed GIS Database
- **SewerStorwater**
  - *PressurizedMain*
  - *GravityMain*
  - *Manhole*
  - *CleanOut*
  - *LateralLine*
  - *NetworkStructure*
  - *Fitting*
- **WaterDistribution**
  - *Main*
  - *Hydrant*
  - *FireService*
  - *SystemValve*
  - *ControlValve*
  - *Fitting*
  - *NetworkStructure*

Interactive mapping tools available to customers online.



<u>Recommendation</u> 12: Establish super-users group to increase training, assist in configuration and enhance GIS and WAM skills within the Department collaborating with other City employees.

<u>Recommendation</u> 13: Establish process for integrating water intersection drawings in CADD with GIS. As a priority assign additional resources to eliminate CADD backlog and expedite a systematic review by engineer and publish monthly.

Work Planning and Budgets

- ✓Assets
- ✓Activities
- ✓Budgets
- ✓Performance Measures

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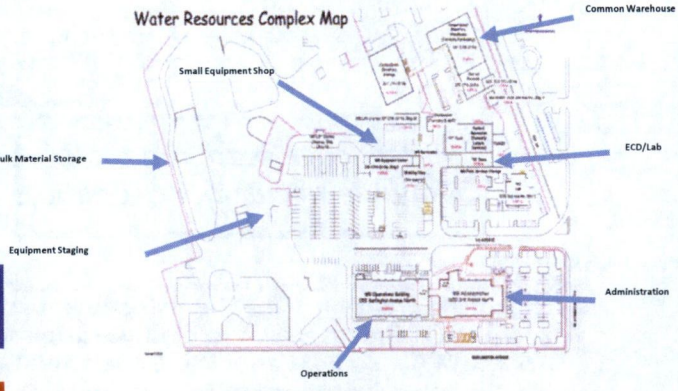
Water Resources Administrative Complex

1650 3rd Ave N, St. Petersburg

Water Resources Administrative Complex has multiple backup generators that operate independently with some different one's powering portions of the same building. One generator is located adjacent to the lab and creates fumes which impact work done on samples.

ECD Laboratory physical facilities have some significant physical and environmental discrepancies that may impact performance.

<u>Recommendation</u> 14: Develop and implement an integrated system of generators on the main campus that support each other.



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ECD Laboratory physical facilities have some significant physical and environmental discrepancies that may impact performance.

<u>Recommendation</u> 15: Fund and implement physical improvements to ECD infrastructure.

This would include moving the emergency support generator, insulating building, and updating the environmental control systems.

Consider enhancement of facility to house all ECD employees in one location.

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Cosme Water Treatment Facility

- Power loss and maintaining pressure is critical
- Electrical upgrade is underway and will utilized generators in support
- Asset planning done on case by case basis
- Three tanks are not being utilized
- Use human decision making rather SCADA

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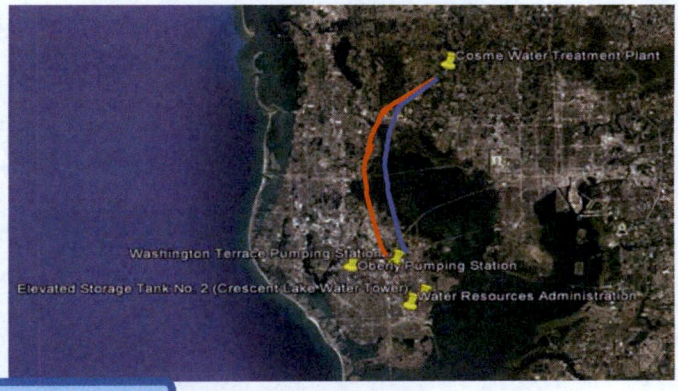
Water Locations



Cosme Water Treatment is approximately 25 miles or 40 minutes to the Oberly Pumping Station and Washington Terrace Pumping Stations.

Recommendation 16: Develop plan to provide direct measurement along pipelines from the Cosme Water Treatment Facility to pump stations.

This will allow for additional monitoring and inspection capability.

Water lines are on shown for concept only and are not exact locations.

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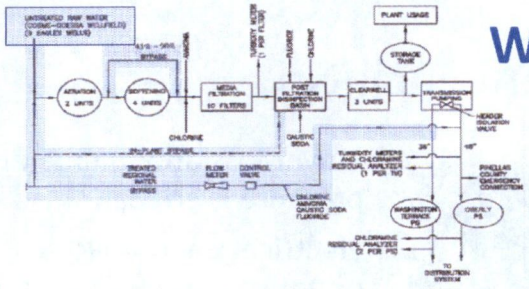
Water Treatment Process



Blended water comes from Tampa Bay Water.

In the past, water from Tampa Bay Water has bypassed the Cosme Plant flowing directly to the Pump Stations.

Other bypass process are also used within the Plant.

Purchases water from TBW, which is provided from different sources, providing inconsistency in the water quality blend as a result is treated differently at Cosme.

Purchased water occasionally by-passed the Cosme plant and been conveyed from TBW directly to pumping stations.

All other TBW customers provide less treatment than city.

Recommendation 17: Retain support for a complete independent and external cost/benefit evaluation of Cosme.

Include review various options for supplying potable water by conducting financial analysis with benefits and cost.

Benchmark against other TBW agencies' treatment facilities approach and differentiate their process methods.

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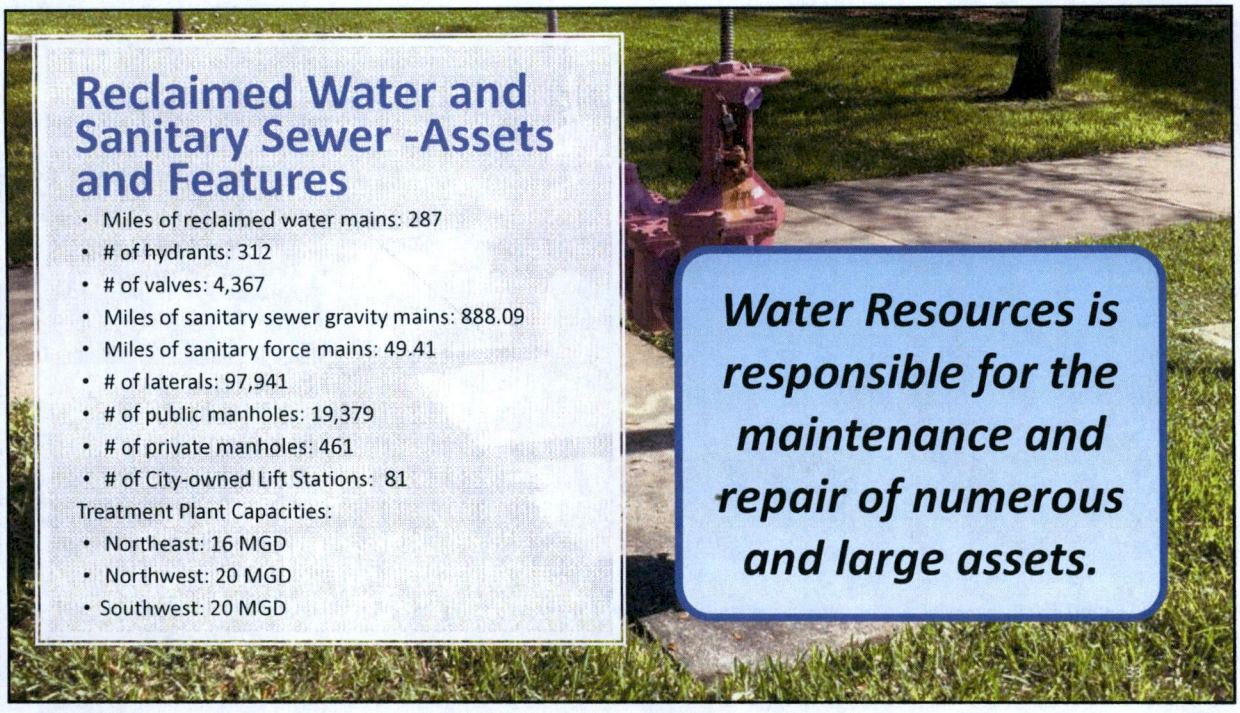
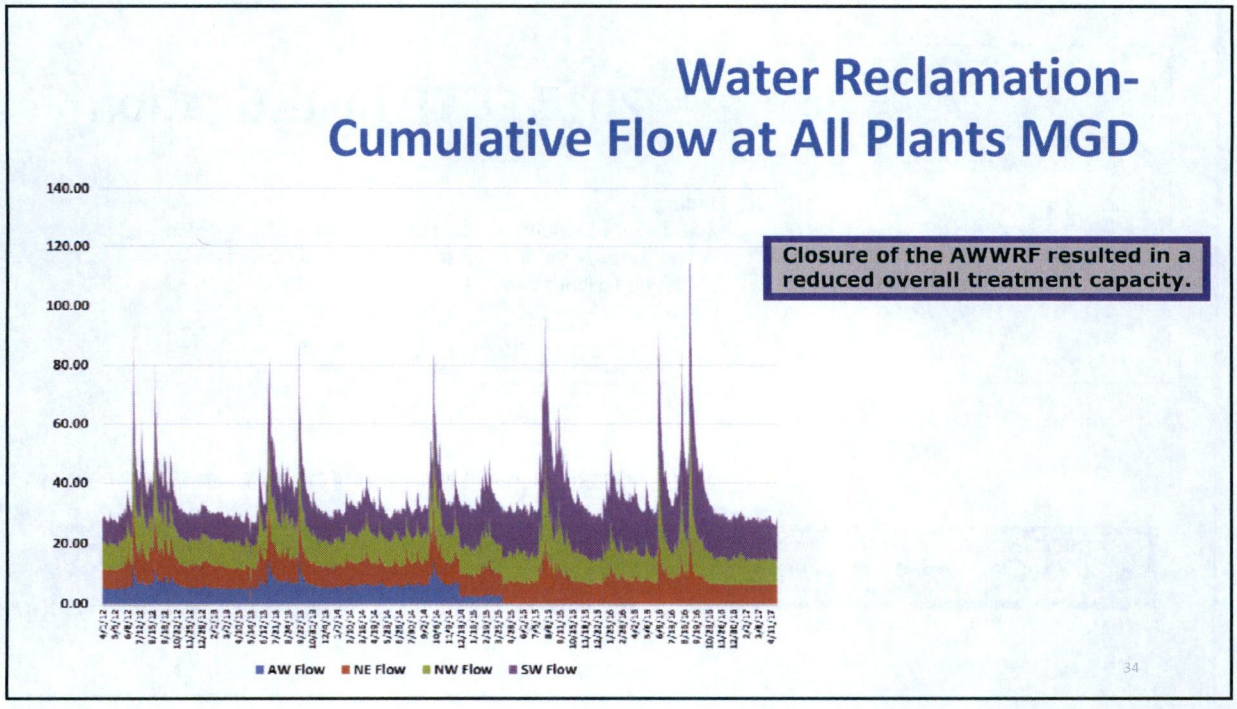
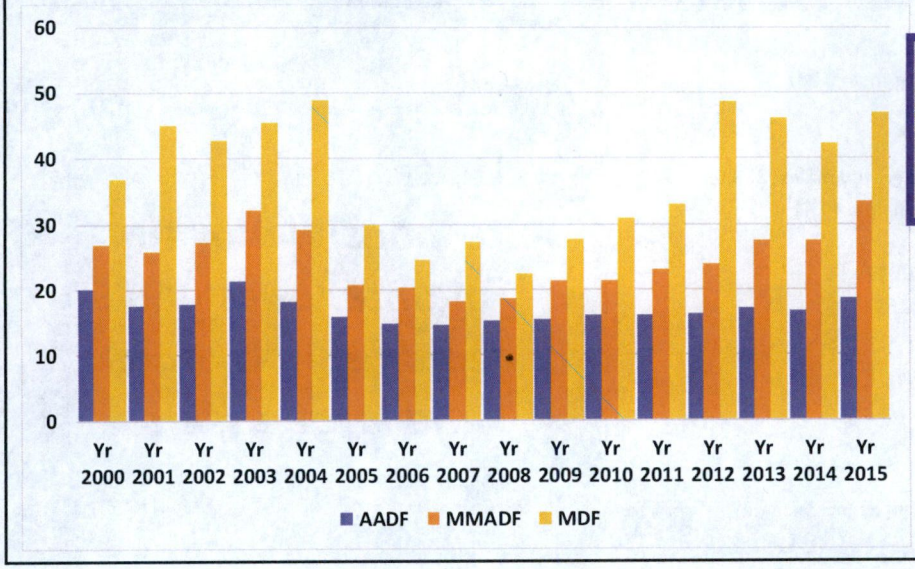

Reclaimed Water and Sanitary Sewer -Assets and Features
• Miles of reclaimed water mains: 287
• # of hydrants: 312
• # of valves: 4,367
• Miles of sanitary sewer gravity mains: 888.09
• Miles of sanitary force mains: 49.41
• # of laterals: 97,941
• # of public manholes: 19,379
• # of private manholes: 461
• # of City-owned Lift Stations: 81
Treatment Plant Capacities:
• Northeast: 16 MGD
• Northwest: 20 MGD
• Southwest: 20 MGD
Water Resources is responsible for the maintenance and repair of numerous and large assets.
33


Water Reclamation- Cumulative Flow at All Plants MGD
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AW Flow
NE Flow
NW Flow
SW Flow
Closure of the AWWRF resulted in a reduced overall treatment capacity.
34

Volume Averages for SWWRF and AWWRF



Combined flow and rates of the SWWRF and AWWRF varied, with 2000-2004 values being somewhat similar to 2011-2015 flow and rates.

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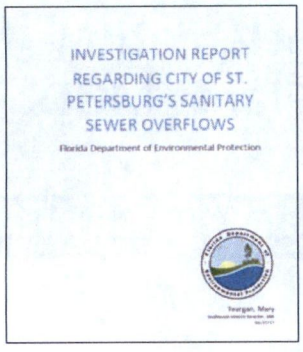

2017 FDEP Investigation

Findings

Many factor contributed - Capacity, excessive inflows, , planning, high ground water , high tide and storm surge and storm flows.

All Pinellas facilities had overflows

Actual SSO volumes were hard to determine

And The closing of the Albert Whitted Water Reclamation Facility (AWWRF) in April 2014 has been alleged as the reason for St. Petersburg's SSOs in 2015-2016. The closure of the AWWRF was a contributing factor to the SSOs, but the flows into the system could not have been completely managed even if the AWWRF facility had been functioning as a treatment plant during this period. The Northwest Water Reclamation Facility (NWWRF) did not receive additional flow due to the closure of the AWWRF, and yet it experienced overflows during 2016. This supports the conclusion that operation of the AWWRF would not have prevented SSOs in St. Petersburg during 2015-2016, but that it likely would have resulted in lower volumes of SSOs. However, the quality of the water and whether there would have been actual discharges to Tampa Bay are not known.

AWWRF being closed would have reduced but not prevented the overflows

The Florida Department of Environmental protection (FDEP) indicated that during storm events in 2015/2016, all Pinellas County Facilities had overflows and AWWRF closing was a contributing factor but not completely the sole reason for the City's overflows.

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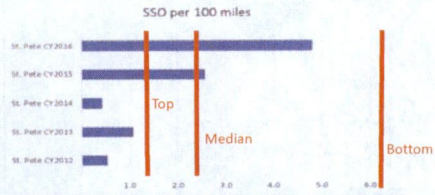
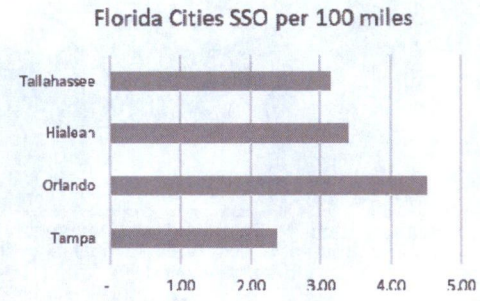
Sanitary Sewer Overflows (SSOs)



AWWA Top Quartile 1.2
AWWA Median 2.5
AWWA Bottom Quartile 6.9

Sanitary System Overflows (SSO) have been increasing and in 2016 exceed median AWWA benchmarks.



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Water Reclamation- NWWRF

7500 26th Ave N, St.

- FDEP Operating Permit: FLA 128821 (Expires 9-30-2020)
- Permit Capacity: 20 mgd
- Average Annual Flow (2016): 11.09 mgd
- Average Sent to Distribution (2016): 7.27 mgd
- Average Sent to Wells (2016): 2.99 mgd

Reclaimed Water
- 2- 5 million Gallon Storage Tanks
- 4- High Service Pumps

Biosolids
- Dewatered Solids: 13.6%
- Dry tons per day: 4.02

Enhancements are underway with new Disc filter and injection well as well as slurry planned to be pumped to SW.

Two of the plants (SWWRF and NWWRF) have major improvements underway mandated by the CO.

These plants had significant overflows during the large storms in 2015/2016.

<u>Recommendation</u> 18: Publish evaluation of impact of the AWWRF closing.

Perform an external capacity analysis study confirming adequacy of new improvements to meet future storm flows.

Evaluate if these improvements will reduce collection system wet weather overflows.

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The City is constructing a bio-solid to energy regeneration facility at the SWWRF, and will receive piped sludge from the NWWRF and NEWRF.

These plants currently produce and haul sludge twenty-four hours a day.

Recommendation 19: Retain external support for a complete and updated cost benefit analysis of the bio-solid project.

Documenting the actual cost/benefit for implementing the bio-solid project at the SWWRF.

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Activities Performed- Wastewater Collection Maintenance

Corrective Maintenance

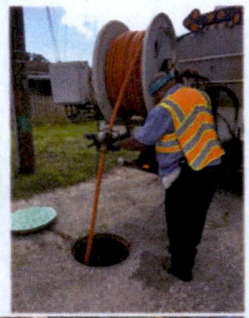
- Gravity Main Spot Repairs
- Gravity Main Replacements
- Gravity Main Install New
- Manhole Repairs
- Manhole Ring & Cover Replacements
- Force Main Replacements
- Service Laterals- Install New
- Service Laterals- Replace
- Service Laterals- Install Cleanout
- Restoration- Sod
- Restoration- Other

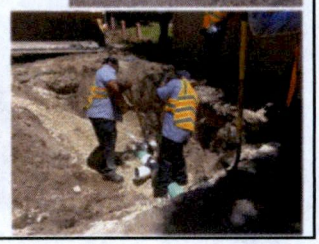
Preventative Maintenance

- Vactor Line Cleaning
- CCTV Inspection
- Quick TV Inspection
- Smoke Testing
- Dyed Water Testing
- Force Main Pigging
- Force Main Line Valve Exercise
- Force Main Air Release Cleaning/Replacement
- Manhole Inspection
- Root Control Chemical Foaming
- Root Control- Cutting & Removal
- Manhole Inflow Shield Installation

SOPs recently revised.
Originals copied from the City of Tampa.

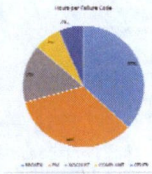
Orangeburg pipes have a considerably short life cycle, and have been used for residential laterals but are creating failure issues. The new Consent Order is requiring a lateral responsibility study.

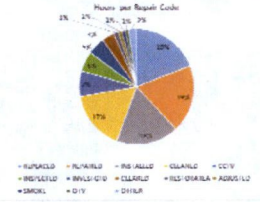


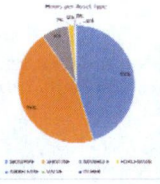


Recommendation 20: Establish program to include incentives for encouraging all users to replace Orangeburg pipe laterals, with approved material.

Wastewater Maintenance







Activity is combination of major failure code, repair code and asset resulting in over 1000 combinations.

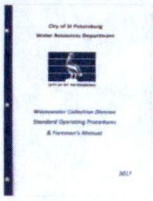
Recommendation 21: Define activities with accomplishment units for all work performed to allow for unit cost and productivity determination, monitor utilizing employee teams.

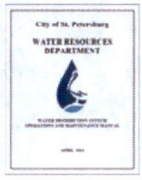
49% of work orders with time reported have an activity of "O"
50% of work orders with time reported lack an activity reported
25.65 FTE average annually over the time period of 55 positions

41

Standard Operating Procedures

- Revised May of 2017
- Public Notification
- Emergency Response
- Revised April of 2017
- SOPs and Water Quality
- SDWA Compliance and Personnel Training





Some Standard Operating Procedures (SOP) exist for many key functions, yet lack consistency in format with other groups and integration with WAM.

These SOPs also include documentation of the use of work zone safety methods, yet it has been observed that field crews inconsistently utilize.

Well outlined Standard Operating Procedures (SOP) exist for many key functions, yet lack integration with WAM.

Recommendation 22: Annually establish and update work guidelines and SOP's for all major activities within all group except for ECD.

Include anticipated production rates, crew mix, resources, methodology and quality control steps utilizing employee teams.

Integrate directly within the WAM system.

Monitor the non compliance with SOP safety shoring and develop methods to help insure adherence.

42

Water and Wastewater Pipe Asset Data

WATER :
- 96,310 GIS segments
- Only 307 segments (~.32%) reporting length.
- 10,479 segments (10.9%) missing installation date/age

SEWER :
- 23,983 GIS segments
- 122 segments missing Length value
- Only 1,001 pipe segments (~4.3 %) with reported installation date

Most water pipes incomplete missing length.
About 10% missing install date.
Most sewer pipes missing install date.
Condition values are lacking for both asset types.

Asset data in GIS is inconsistent, incomplete and is missing key information needed for work and asset planning and management.

Recommendation 23: Determine and maintain a replacement value of all assets within the WAM database.

Update and populate all existing asset inventories within WAM and/or GIS.

Establish procedures to maintain and quality control current values and attributes.

Establish quarterly meeting with all Divisions to receive input on accuracy and quality of data.

43

Asset Condition Assessment

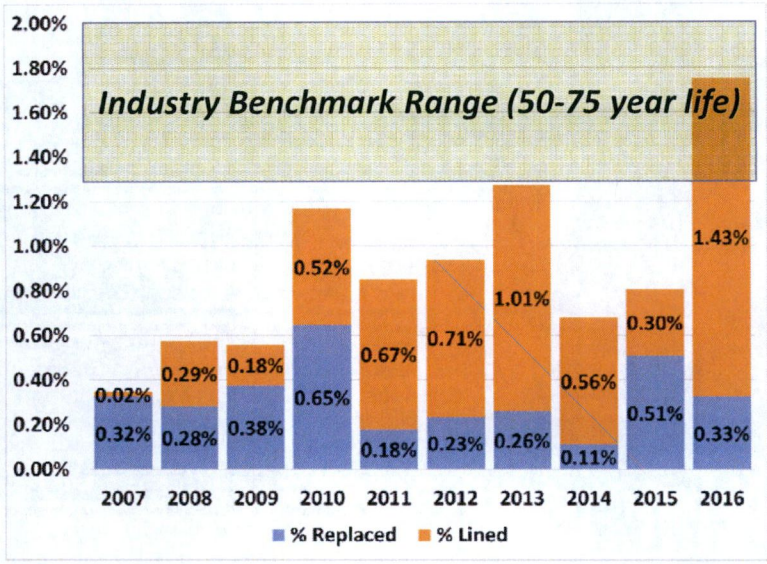
- Documented in May 2012, Florida Water Resources Journal article
- Goal: optimize planning, O&M, and financial decisions
- 18 separate condition assessment templets
- Vulnerability Assessment
  - Four level of service
  - Five criticality categories

Data and systems exist, yet lack integration with system and databases.

Recommendation 24: Populate and maintain condition assessment data within the WAM/GIS database. Use data for planning and prioritization of needs for maintenance, rehabilitation, and capital projects.

44

Wastewater Pipe Life Cycle Replacement and Lining

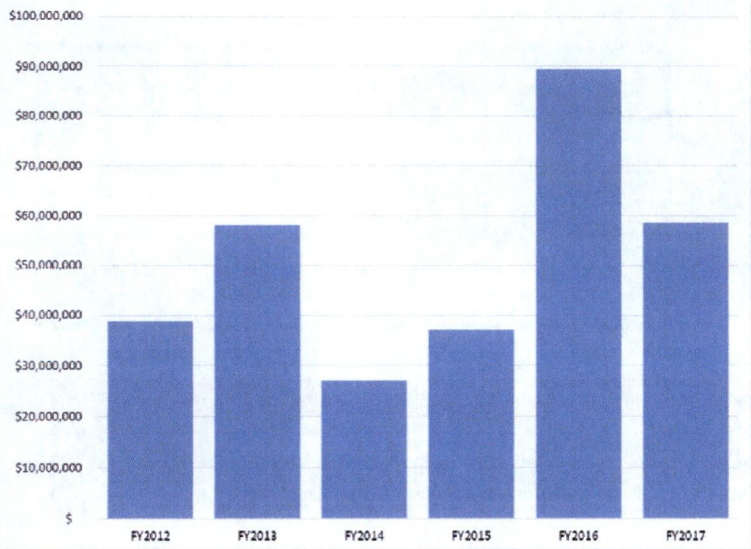


Replacement is 20% of optimal based on life cycle of the industry benchmarks.

A lining program is now underway and mandated by the CO, which helps mitigate the aging pipe infrastructure yet is short of overall industry benchmark except for 2016.

45

Historical Capital Improvement Budgets



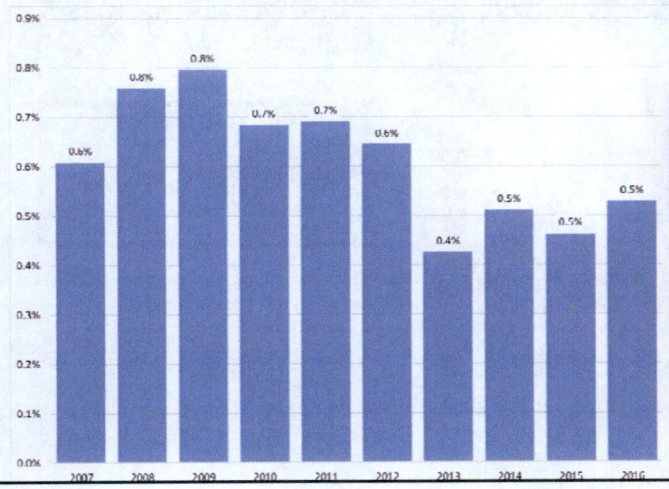
Finance estimates asset book value at $.84 billion with average $52 million expended a year.
LAC estimates between $2.5 - $3.5 Billion replacement

The capital program is about 6.1% of the book value and 2-3% of the replacement value.

46

Historical Operating Indicators- Water

Percent of Water Main Replaced of Inventory



Miles have varied from 12.58 or .8% in 2008 to 6.54 or .4% in 2013.

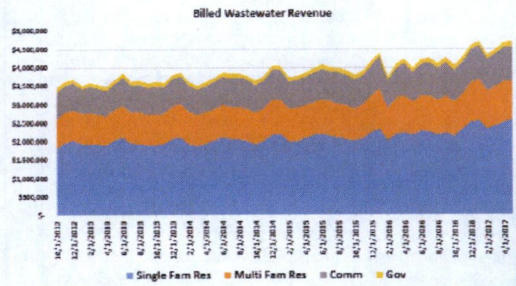
Replacement cycles for water distribution lines like wastewater pipes are on an lower life cycle, which is less than industry standards.

<u>Recommendation</u> 25: Develop long-term budgets for both proactive and lifecycle replacement for water distribution and wastewater collection systems.

Annually report to City Leadership current lifecycle status versus desired.

47

Wastewater Billing Revenue



Total billing for wastewater revenue in FY16 was $49,174,843.

Wastewater billings has increased faster than new accounts.

Total annual billing for wastewater revenue has increased 13.6% from $43.3M in FY13 to more than $49M in FY16.

<u>Recommendation</u> 26: Establish the capability for developing performance based work plans and budgets, with integration of WAM data.

Include performance measures directly linked to financial, labor and equipment resources.

Plan for each organizational unit based on the level of service, inventory and productivity, linked to a quality standard by activity.

Provide annual performance plans to Public Works Administrator and City Leadership.

48

Water Reclamation-NEWRF

1160 62nd Ave Northeast

- FDEP Operating Permit: FLA 128856 (Expires 6-12-2021)
- Permit Capacity: 16 mgd
- Average Annual Flow (2016): 8.95 mgd
- Average Sent to Distribution (2016): 4.48 mgd
- Average Sent to Wells (2016): 4.34 mgd

Reclaimed Water
- **Storage Tanks:**
  - 1 @ 8 million gallons –reject tank
  - 1 @ 10 million gallons
  - 4- High Service Pumps

Biosolids
- Dewatered Solids: 16.48%
- Dry tons per day: 4.18

The City has 3 of the 19 largest treatment plants in the state for permitted capacity and prior to its close, AWWRF was 4th in the top 27.

<u>Recommendation</u> 27: Develop a detailed performance plan for major key assets - Water Reclamation Facilities, Cosme Water Treatment Facility, pumping stations and elevated tank.

Include service levels, work needs and cost.

49

Organization

- ✓Structure and Staffing
- ✓Hours
- ✓Certifications
- ✓Equipment
- ✓Materials
- ✓Maintenance Contracts

50

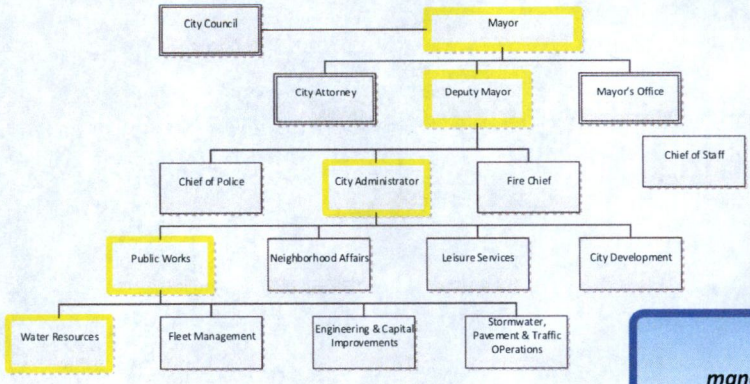
Description	Generally Disagree	Inconclusive	Generally Agree	Agree as % of Conclusive Responses	Agree as % of Total
I know about the Water Resource Department s mission statement.	29	58	129	82%	57%
(If Yes above , please answer this one) I understand how my job relates to the mission of the Department.	15	73	137	90%	61%
I know about my Division s mission statement.	44	71	111	72%	49%
I know my job requirements and what is expected of me	2	18	205	99%	91%
My Division works well together to solve problems and get the job done.	47	54	115	71%	51%
I have the right tools to do my job	30	56	178	80%	79%
I enjoy my overall working conditions.	38	38	100	72%	44%
I have a good working relationship with co-workers.	7	31	188	96%	83%
Sometimes I work with different crews and groups in the Department.	28	40	158	85%	70%
We work well with crews from other Divisions to accomplish work	26	83	116	80%	51%
The work day is too long for me to be effective at my job.	184	35	7	4%	3%
I have received the training I need to do my job efficiently and effectively.	29	47	150	84%	66%
My coworkers are capable of performing the work that we are required to accomplish.	22	45	159	88%	70%
My supervisor is available to talk about job enviornment issues.	41	57	128	76%	57%
My supervisor communicates specific goals, objectives, and expectations.	49	51	116	70%	51%
I am encouraged to develop new and more efficient ways to do work.	50	71	105	68%	46%
I have specific and documented procedures to guide my work and the work of my crew.	45	84	97	68%	43%
I understand how my job affects the customers/citizens of the Department.	3	14	209	99%	92%
My manager and supervisor sets an example of excellent customer service.	52	81	93	64%	41%
I am responsible for the safety of the work site or job where I am working.	5	29	192	97%	85%
I am satisfied that the amount of safety training and devices allows me to be safe on the job site	54	58	104	66%	46%
I am responsible for the proper use of personal protective equipment (PPE) and/or traffic control.	9	45	172	95%	76%
I have ready access to the information, tools and technology to perform my job.	41	50	135	77%	60%
I have received the training I need to do my job efficiently and effectively.	31	54	141	82%	62%
My immediate supervisor understands my work and resources needed to get my job done.	30	48	150	83%	66%

The employee survey indicates a significant majority of employees believe they know and understand their job, have the right tools, enjoy their working relationship, receive enough training, and are in a safe environment.

On-site survey prior to meeting with the available employees.
45% of survey respondents did not report the Division they worked in, 22% did not report their gender, and 22% did not report their position.
Impacts the capability to evaluate by Division.

51

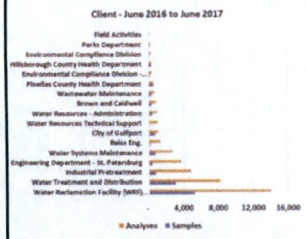
City of St. Petersburg Organizational Structure

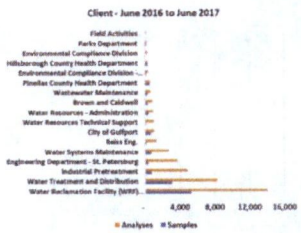


There are 4 levels of management above the Water Resources Department.

52

ECD Analysis and Samples by Client





Water Reclamation Facility (WRF) Division 40% of samples total for the year.
Water Reclamation Facility (WRF) Division 34% of analyses total for the year.

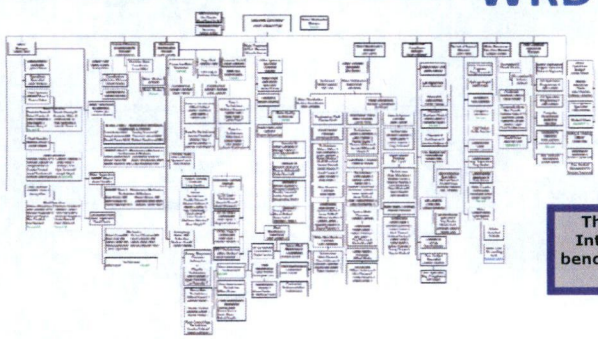
The Water Reclamation Facility (WRF) Division is the key user of laboratory support and is a generator of the major need for working seven days a week. Various plant monitoring has the largest number of projects.

Water Reclamation Facility (WRF) Division 45% of samples total for 5 years.
Water Reclamation Facility (WRF) Division 41% of analyses total for 5 years.

53

There are 79 employee classes and 324 positions.

WRD Organizational Structure



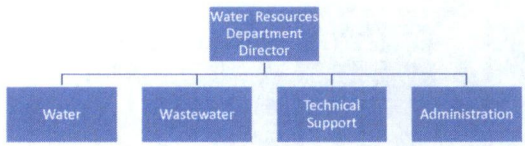
Complex organization with many layers (5-6 deep), six reporting locations and wide spans of control (1:15).

Also, the number of staff for Utilities is in the AWWA top quartile of a Combined Utility.

The Water Resources Department is currently being led by an Interim Manager with fifteen direct reports. This exceeds most benchmarks for the span of control. Spans of control are adequate for other staff positions.

<u>Recommendation</u> 28: Transition and simplify organization in the future to have three or four major functions reporting to the Director - Water, Wastewater, Technical Support and/or Administration.

Facilitate with a team to consider a simplified organizational structure. Consider combining Water Maintenance and Water Treatment and Distribution under one assistant director. Combining Waste Water Collection, Water Reclamation Facilities and ECD under another. Technical Service and ASM under another. All remaining administrative support functions under a fourth assistant director.



54

Activities Performed- Business Services and ASM Computer Resources

- Budget (capital and operations)
- Customer Relations (dispatch and incoming requests)
- Asset inventory in WAM (pumps, hydrants, most valves, meters, manholes, backflows, cleanouts)
- ASM Staff:
  - Debra – report writer from WAM/Oracle/GIS. Maintains databases
  - Kari – GIS maintenance/ update for all Water/WW. GIS reports
  - Paul – recently promoted (SCADA)

The Business Services and ASM Divisions provides major budget and technical support of systems.

<u>Recommendation</u> 29: Simplify the Technical Services Division into three groups, Engineering, Locations, and Environmental Support.

55

Lack of involvement and processes are issues identified from the employee surveys as well as observed by LAC.

Prior Studies

- **Water Systems Maintenance Climate Study Results, Angela Horvath, Ph.D. (January, 2014)**
  - 77% surveyed, with 20 staff follow-up interview
  - **Leadership**: Perceived favoritism
  - **Staffing & Training**: Absences and vacant positions, "skill silos"
  - **Equipment**: Open to new technology/equipment
- **Water Treatment & Distribution (WTD) Training Survey Results (2015)**
  - Survey of organizational membership and training needs
  - 50% were AWWA members
  - Courses desired:
    - Operators: Treatment Process (top)
    - Maintenance/Mechanics/Electricians: Pump/Motor Repair (top)

<u>Recommendation</u> 30: Public Works /Water Resources leadership should establish a systematic quarterly methodology for connecting with employees to obtain unfiltered input and real feedback.

Further, leadership should share any results and propose initial action plan with quarterly updates for addressing concerns.

Strength of the Division:
Cooperation/Teamwork 55%
Employee Knowledge/Skillset 40%
Employees- General 35%

Recommendations from Climate Study:
- *Conduct monthly division meetings*
- *Actively solicit staff input*
- *Formalize safety*
- *Review workflow procedures*
- *Empower staff*
- *Implement management performance objectives*

Challenges of the Division:
Hostile Work Environment 55%
Communication 50%
Management 40%
Micromanagement 35%
Work Planning 35%
Morale 30%
Staff Input 30%

56

Description	Generally Disagree	Inconclusive	Generally Agree	Agree as % of Conclusive Response	Agree as % of Total
Upper management (Division Manager and Public Works Administrator) are excellent leaders.	89	83	54	38%	21%
Working here provides an opportunity to advance in my career.	49	96	81	62%	36%
Senior management communicate work issues to me.	85	82	59	41%	26%
Current vacancies and absent employee are negatively impacting my work.	95	61	70	42%	31%
I believe opportunities to do more work exist during my work day.	89	82	55	38%	24%
Training and growth opportunities are provided fairly and equally.	69	76	81	54%	36%
Management respects me and cares about me.	86	76	64	43%	28%
Management has created an open and comfortable work environment.	81	77	68	46%	30%
I have confidence in management's ability to lead my Division.	75	69	82	52%	36%
My manager or supervisor provides consistent coaching, counseling, and feedback related to my job performance.	80	73	73	48%	32%
I feel like I am recognized for my customer service.	64	85	77	55%	34%

Employees survey had mixed concern about management and leadership, as well as how they were treated.

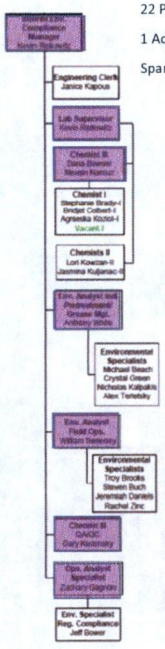
<u>Recommendation</u> 31: Utilize City standard guidelines/policy for position selection, promotion and direction.

All exceptions should be based on emergency or special needs, and documented with rational.

<u>Recommendation</u> 32: Establish technical skills training program for employees, and management skills training for supervisors.

Make some management, personnel and customer service courses mandatory, with annual updates to insure leaders have current skills to direct and guide employees and manage resources.

57



22 Positions

1 Administrative/support positions

Span of Control

- Environmental Compliance Manager- 1:6
- Lab Supervisor 1:3
- Chemist III 1:4
- Env. Analyst Ind. Pretreatment/Grease Mgt. 1:4
- Env. Field Ops. 1:4
- Ops. Analyst Specialist 1:1

Organizational Structure of Environmental Compliance

The ECD's leadership has been led by a person fulfilling two roles since the prior manager is now the acting Director.

This has compounded direction and understanding for employees of the division.

The Environmental Compliance Division has four basic groups of staff which are specialty groups that are Divisional silos.

<u>Recommendation</u> 33: ECD should cross-train staff in laboratory to minimize need for Lab Specialist. Further, all field staff should also be cross-trained in grease and pretreatment functions to optimize staffing flexibility.

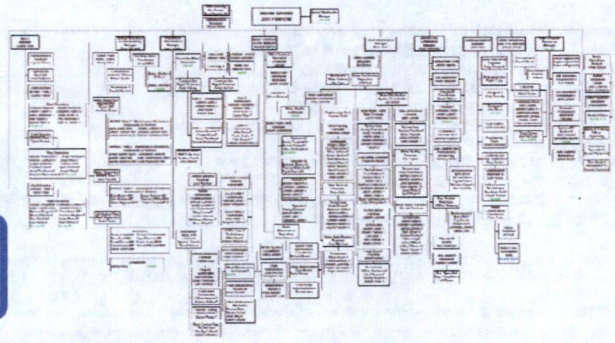
<u>Recommendation</u> 34: The ECD group should fill the Manager and Lab Supervisor positions to allow proper leadership and direction to employees.

The weekly staff meeting of key staff should occur unabated to insure staff involvement and input regardless of those absent that day.

58

Water Resources Organizational Structure

- 307 Employees
- 9 Managers
- Span of Control:
  - Department Director 1:15
  - Managers vary between 1:1 to 1:9



Five staff recently transferred to Engineering.

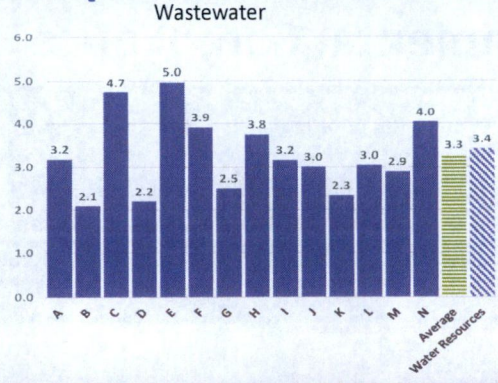
Proposing 30 new positions, primarily in Wastewater Collections.

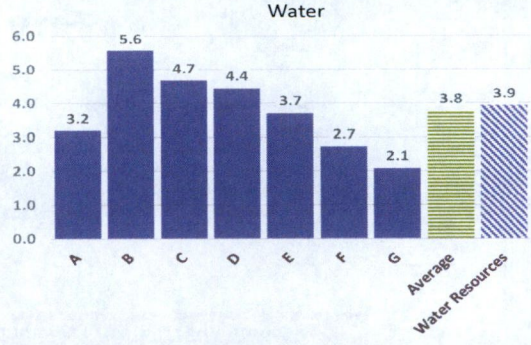
It appears that most in the Water Resources groups generally operate in silos with little cross-training or transfer between groups.

<u>Recommendation</u> 35: City should evaluate opportunities to share resources among and across Divisions and Departments, including maintenance, operations, equipment, laboratory, and instrumentation.

59

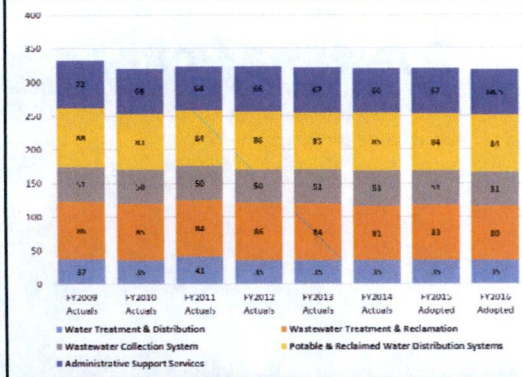
Staff per 100 Miles of Wastewater and Water Pipe





The Wastewater and Water Maintenance Division's staff per 100 miles is similar to the averages in LAC's benchmark database.

60



Historical Staffing

Water Resources has historically averaged over 324 FTEs.

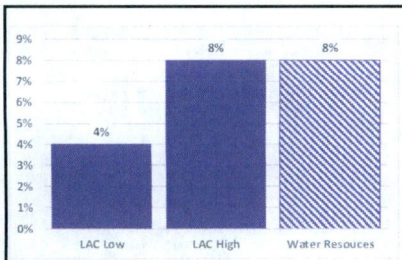
Staff is projected to increase by 30 with a net increase of 7%.

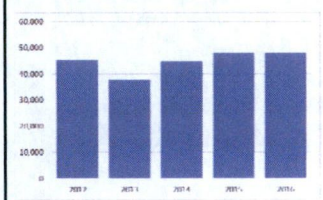
This increase was based upon key management's judgement.

<u>Recommendation</u> 36: Staffing and equipment projections should be based upon work needs and production rates using an established performance plan.

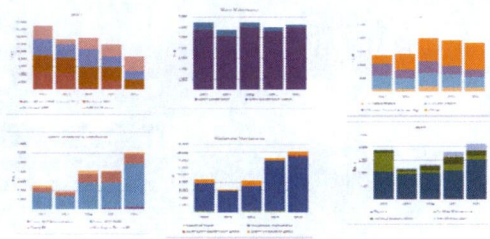
Process should be automated within WAM and reviewed annually based on need.

62





Historical Overtime Hours



Department has averaged 42,787.6 hours of overtime, or 24.3 FTEs or ~8%

Overtime is in the upper range of LAC's benchmark range of 4-8% as best management practice with some groups being higher.

Assignment of overtime varies by group with some following a defined logical approach and other based mainly on manager's judgement.

63

Resources and Overtime Policy

- All crews have radios with the on call having cell phone
- Some Water Distribution employees uses laptops or tables in the field to record work and manage WAM work orders
- Call out and stand-by:
  - Minimum of 4 hours after hours
  - OT if after regular shift
  - Some groups have standby pay
  - Water Distribution "maintenance" have two shifts covering 6:30am to 10:30 pm

The Department lacks a consistent documented after-hours policy within all Divisions as there are many coverages.

<u>Recommendation</u> 37: Standardize and document the use of overtime and provide equal transparent process for those having skill to respond to after hours or specialty needs.

Lower level staff should be trained so that they may be utilized for on-call and response, only dispatching supervisors to address more complex issue.

64

Work Shifts and Schedules

Division	Days a Week	Shift Coverage	Number of Schedules
WR Administration	5	7:00 am to 5:00 pm	4
Technical Support Admin	5	7:00 am to 4:30 pm	3
Dispatch	5	24 hours a day	6
Automated Systems Maintenance	4 and 5	7:00 am to 6:30 pm	3
Cosme WTP Administration	5	7:00 am to 5:00 pm	3
Cosme WTP O&M	2-3, 4 and 5	24 hours a day	7
Oberly PS	4 and 5	24 hours a day	5
Washington Terrace PS	5	7:00 am to 11:00 pm	2
Water Maintenance Admin	4 and 5	6:30 am to 3:30 pm	2
Water Maintenance	4 and 5	6:30 am to 10:30 pm	4
Reclaimed Water	5	7:00 am to 4:00 pm	2
Water Conservation	5	8:00 am to 5:00 pm	1
Wastewater Maintenance Admin	4 and 5	7:30 am to 7:00 pm	2
Wastewater Maintenance	4 and 5	6:30 am to 5:00 pm	4
ECD Administration	5	7:00 am to 3:30 pm	1
ECD Lab	5	7:00 am to 4:30 pm	3
ECD Indus. Pretrtmt & Grease Mg	5	6:30 am to 3:30 pm	1
ECD Field Services	5	6:30 am to 3:00 pm	1
Water Reclamation Admin	4 and 5	6:00 am to 5:00 pm	7
Northeast WRF	3,4 and 5 with swings	6:30 am to 3:00 am	8
Northwest WRF	3 and 4 with swings	6:30 am to 3:00 am	8
Southwest WRF	3 and 4 with swings	6:30 am to 3:00 am	7
WRF Lift Stations	4	6:00 am to 4:30 pm	1
Facilities Maintenance	5	6:30 am to 3:00 pm	2

Most Divisions have a wide blend of schedules for days of the week and hours in the day, which creates many employees not being directly supervised.

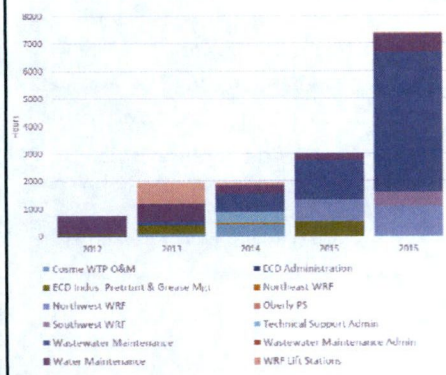
Each Division provides 24/7 coverage through various schedules, including shift work and afterhours/weekends on-call rotations.

<u>Recommendation</u> 38: Work schedule should be established based on specific work needs. The number of schedules should be standardized.

An external evaluation on the benefits to the City should be conducted with employee team involvement, documenting the negative and positive benefits of each schedule.

65

Historical Workers Compensation



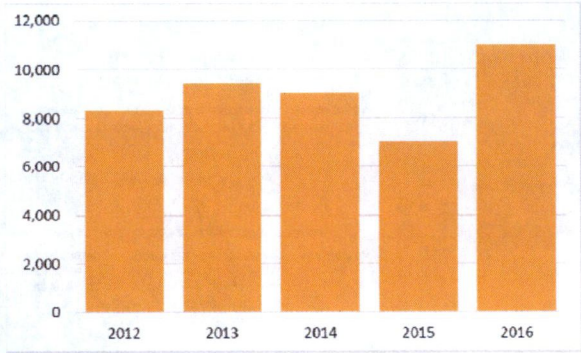
Department has averaged 3,013 hours of Workers Compensation or 1.7 FTEs (.6%).

Workers Compensation is in an acceptable range overall but has doubled in the last year.

66

Based upon 1,760 hours of productivity time

Historical FMLA Hours



FMLA is the highest it has been in five years, which has averaged 1.7% of working hours. Some groups (WREC, WM and ECD) have increased significantly.

<u>Recommendation</u> 39: Establish benchmarks for OT, WC, FMLA and monitor monthly for all Divisions, comparing to benchmarks.

Evaluate impact on operations and report to the Public Works Administrator.

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Certifications

License Type	Count
DWA = Drinking Water "A"	7
DWB = Drinking Water "B"	5
DWC = Drinking Water "C"	8
DS 1 = Distribution System Level 1	13
DS 2 = Distribution System Level 2	23
DS 3 = Distribution System Level 3	26
WWA = Wastewater "A"	16
WWB = Wastewater "B"	7
WWC = Wastewater "C"	14

The Wastewater and Water Maintenance Division is utilizing a voluntary program for employee growth and training for certification.

119 specialized licenses and training directly related to their job assignments

3 are in the DWC Process and 18 are in the apprenticeship

Programs through Pinellas Technical College (P-Tech).

The Safety & Training Officer will soon implement a department-wide online safety training program.

While benchmark (AWWA) agencies have between 20 and 40 hours annually per employee.

<u>Recommendation</u> 40: All supervisors and managers should be trained and updated annually to understand and be fully capable of using WAM and linked GIS capabilities along with management skills. This should be a requirement of promotion and part of employee's annual review.

<u>Recommendation</u> 41: Fully develop and implement publicity and public information by marketing accomplishments of the Department to others and providing information to the Mayor's office and the public.

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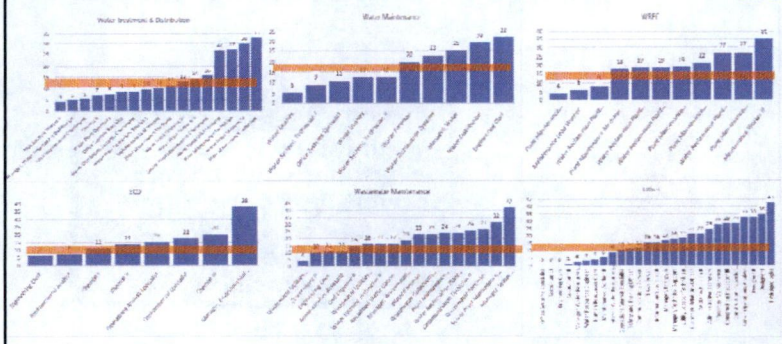
Length of Service

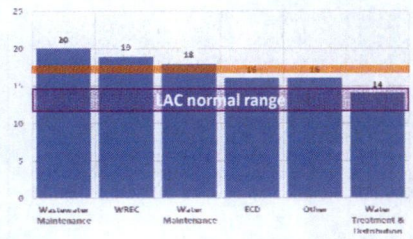


Average length of service for Water Resources is ~17 years.

12 staff are currently in the drop program and eligible separation in the next four years.

The Department's employee's length of service is above the normal benchmark range with some groups much higher.

Further, many senior managers and supervisors have lengthy tenure and could soon retire. There is a lack of a documented and implemented succession plan to meet this situation.



<u>Recommendation</u> 42: Develop, document and implement complete succession plan for all groups, with input from employee team. Focus on insuring skills, experience, education and training are all considered in this process not just time with the agency.

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- Maintenance/Replacement Projects with design costs less than $50k, consultant w/o A/E agreement
- Asset Verification -WMD - PM Work Orders for valves
- Maintenance/Replacement Projects when construction will be performed by contractors
- Funded Projects
- Easement Clearing Procedures
- Hydrant Data Base
- Intersection Drawing Creation and Updates
- Utility Locating -Daily Work Flow
- Asset Verification - Utility Locating -End of Day
- Utility Location -Vehicle and Equipment Maintenance
- Utility Locators -Documenting Mapping Errors
- Utility Locating -On Site
- Utility Locating -General Routing Goals
- Maintenance/Replacement Projects with design costs less than $100k, consultant w/ A/E agreement
- Modeling Process for System Capacity & Performance Analysis
- New Water Main Installations That Do Not Require Permitting
- As-built Drawing Process
- Public Records Request - GIS General Information
- Sewer Collection System Cip Planning Process
- Processing Potable Water Main Certificates of Construction Completion
- Maintenance/Replacement Projects when construction will be performed by WRD

Technical Support- SOPs

The Technical Support provides technical, contractual and documentation support for all groups and manages various contracts as well as five dissimilar subgroups and functions.

Locators find and mark Water Resources underground assets of water, wastewater, and reclaimed water as well as fiber.

For large projects, location marking may take the City weeks to do, and even longer for the requested party to complete related construction.

<u>Recommendation</u> 43: Track and document all remarking efforts and coordinate with contractors and other major utilities to minimize the redoing of work.

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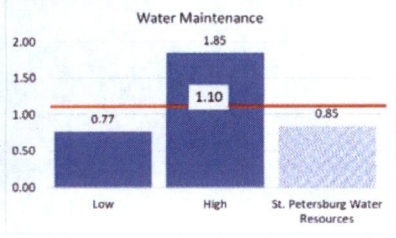
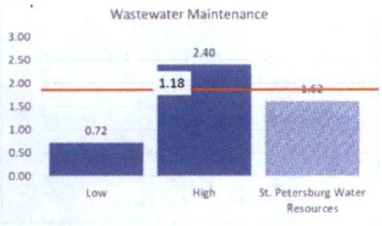
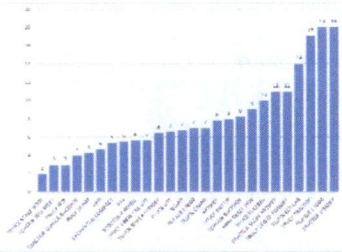




Rolling Stock per Staff

211 Pieces of rolling stock equipment with an average age of 8 years.

City fleet age and allocation to employees is well within range of desirable benchmark averages.



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Estimated Equipment Rates

METER TYPE / CLASS	AVG ANNUAL METER
AIR COMPRESSOR	485
DIRECTIONAL BORING MACHINE	507
EXCAVATOR COMPACT	520
FORKLIFT 6000	302
FORKLIFT 8000	162
GENERATOR PORTABLE	16
GENERATOR TRAILER	360
LOADER BACKHOE	3,959
MINI TRACK HOE	266
MOWER	516
PUMP	3,144
SAW CIRCULAR	13
SAW CONCRETE	6
SCOOTER 4 WHEEL	2,490
SEWER CLEANER TRAILER MTD	46
TRACTOR LOADER	65
TRACTOR LOADER BACKHOE	636
TRACTOR SLOPE MOWER	482
WELDER	19

Usage for some vehicles are low and some questionably high.

METER TYPE / CLASS	EST COST PER HOUR
MILEAGE	
SEDAN	$ 11.84
SUV	$ 17.39
TRUCK BOX	$ 124.70
TRUCK CRANE	$ 122.65
TRUCK CREW CAB UTY	$ 45.17
TRUCK DUMP	$ 76.39
TRUCK EXT CAB	$ 10.26
TRUCK FLATBED	$ 167.94
TRUCK PICKUP	$ 21.93
TRUCK SEWER FOAMER	$ 79.58
TRUCK SEWER RODDER	$ 230.42
TRUCK STAKE BODY	$ 118.39
TRUCK TRACTOR	$ 110.39
TRUCK UTY	$ 32.47
TRUCK W/JET PUMP	$ 40.46
VAN	$ 107.69

METER TYPE / CLASS	EST COST PER HOUR
HOURLY	
AIR COMPRESSOR	$ 12.10
DIRECTIONAL BORING MACHINE	$ 170.56
EXCAVATOR COMPACT	$ 28.10
FORKLIFT 6000	$ 47.29
FORKLIFT 8000	$ 10.68
GENERATOR PORTABLE	$ 30.94
GENERATOR TRAILER	$ 61.54
LOADER BACKHOE	$ 22.03
MINI TRACK HOE	$ 19.76
MOWER	$ 24.48
PUMP	$ 29.10
SAW CIRCULAR	$ 96.80
SAW CONCRETE	$ 119.97
SCOOTER 4 WHEEL	$ 12.32
SEWER CLEANER TRAILER MTD	$ 188.65
TRACTOR LOADER	$ 92.76
TRACTOR LOADER BACKHOE	$ 35.86
TRACTOR SLOPE MOWER	$ 12.73
WELDER	$ 148.91

Equipment costs are standard rates which are significantly different than calculated cost using depreciation, fuel, maintenance, usage, inflation, and salvage value.

Recommendation 44: Identify actual equipment rates for each equipment class that includes all costs of repair and maintenance, fuel and fluids, replacement, and use.

"Out of yard" hours for each piece should be tracked in WAM.

Annual review low usage and high unit cost equipment for consideration of retention with justification provided to Public Works Administrator.

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Purchasing/Materials Inventory

STOREROOM	4/1/2017
AWWRF	0.00
NEWRF	156,486.05
NWWRF	122,583.80
SWWRF	21,396.51
WRF	1,475,862.56
LS5	14,714.90
COSME	632,167.78
OBERLY	100,896.67
WASH TERRACE	56,603.83
WSM	73,723.21
WWM	128,126.46
TOTAL VALUE	2,782,561.77

- City utilizes a Consolidated Warehouse for materials
- All purchases are coordinated through the Consolidated Warehouse
- Various Storerooms exist with considerable inventory values
- Some inventories are tracking and managed using WAM

Storeroom outside of central warehouse have $2.7 million in inventory.

The Department uses the City's Centralized Warehouse for many commodities, yet the Department has $2.8 million in inventory at other satellite locations with data on usage lacking standardization.

Recommendation 45: Evaluate and stock inventory based on actual needs, optimizing inventory by using industry benchmarks.

Establish proper accountability and security functions.

Consider centralizing and reducing inventories to a controlled location that are shared with other Departments.

Directing/Scheduling

- ✓Work Identification
- ✓Routines and Scheduling
- ✓Systems
- ✓Work Flow

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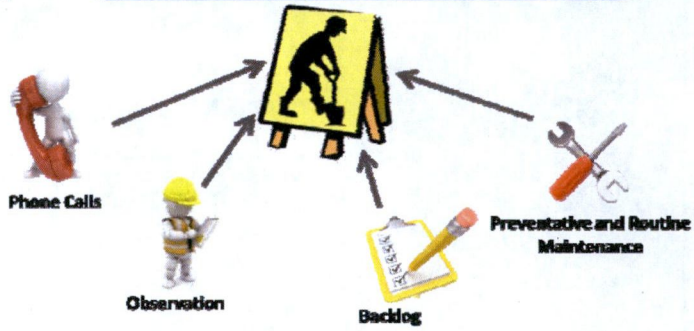
Work Identification

- **WREC**- Driven by routines and preventative maintenance cycles
- **Energy Efficiency & Sustainability**- Driven by established routes and internal customer calls
- **Wastewater Maintenance**- Driven by routines and preventative maintenance cycles
- **Water Treatment and Distribution**- Driven by routines, preventative maintenance cycles and observations
- **Water Maintenance** – Driven by established routines, maintenance cycles and observations and customer calls
- **Environmental Compliance**- Driven by established routines, maintenance cycles and observations

Combination of several methods are used.



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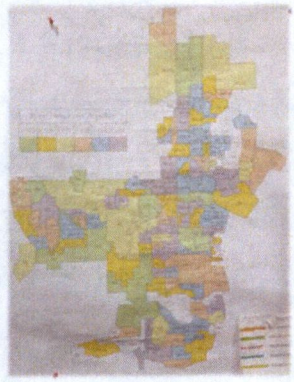
Routines and Preventative Maintenance Programs- Wastewater Collections

- Primary focus on Collection System
- System is divided into 150 basin areas
- Vactor cleaning and Inspections work together in an assigned area
- Inspection uses both a "Quick TV" (QTV) inspection method and CCTV method
  - QTV is a "pass/fail" criteria with a Fail = immediately scheduling for line cleaning and CCTV
- Each cycle of the system alternates between QTV and CCTV



Goal: to move through all 150 basins in 5-6 years or approximately 30 basins per year.

Some preventative maintenance routines and cycles are planned in the WAM system, with other opportunities existing.

Manual processes are also used such as routine preventive maintenance procedures, which have been established for wastewater collection inspections using paper maps and external spreadsheets.

<u>Recommendation</u> 46: Dedicate resources to establish and document complete preventive maintenance programs utilizing the WAM database.

Maintain programs with GIS using systematic basis to minimizing the use of paper forms.

Integrate all nonoperational routines within WAM and utilize proactively for planning, scheduling, and controlling work.

<u>Recommendation</u> 47: Establish levels of service with effort for each asset based on condition, available resources, costs, and desires of the City.

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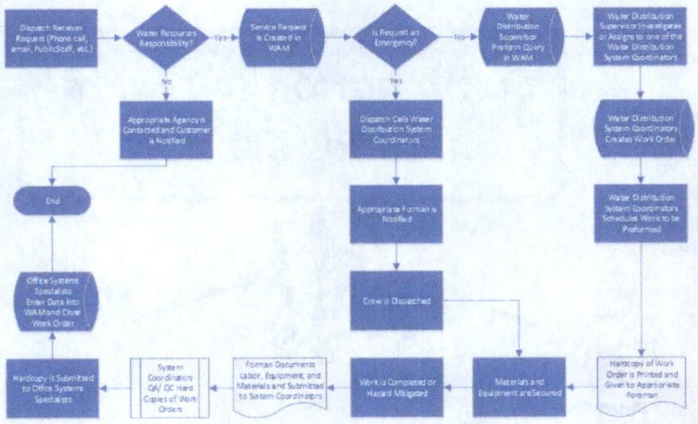
Work Flow- Water Maintenance



Some Crews are using Laptops or Tablets in the field.

Work requests and work orders are managed differently within the Department, with Water Maintenance crews utilizing laptops and tablets, where other are using manual forms.

<u>Recommendation</u> 48: Define and document priority procedure for all service requests based on need, safety, and risk to the public.

Attempt to identify all work to be performed at least two weeks in advance unless an emergency.

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Scheduling and Assigning Work

- **WREC**- Driven primarily by routines and preventative maintenance cycles. Repairs are prioritized by Chief Operators and Maintenance Supervisors.
- **Energy Efficiency & Sustainability**- Based on prioritization of incoming requests and backlog by the Manager and Maintenance Coordinator
- **Wastewater Maintenance**- Based on prioritization of incoming requests and backlog by the Maintenance Supervisor and Collections System Coordinator. Inspections proactively inspect collection system.
- **Water Treatment and Distribution**- Driven primarily by routines and preventative maintenance cycles. Repairs are prioritized by Water Plant Chief Operator, Operator IVs, and Plant Maintenance Supervisor.
- **Water Maintenance** – Driven by established routines, maintenance cycles and observations and customer calls. Prioritization of incoming requests and backlog by the Manager and Water Distribution Supervisor.

Scheduling in some groups of the Department is primarily a daily assignment process that is done independently.

Each operational group utilizes an undocumented work flow using a combination of manual processes.

Recommendation 49: Fully develop and implement a two-week scheduling procedure, related to annual work plans and routine processes.

All projects and non-operational routines should be fully scheduled based on productivity and SOP's.

Develop process to establish accountability of supervisors for adherence to schedule and accounting for items not completed.

78

Control/Improvement

- ✓Work Tracking
- ✓System Monitoring
- ✓Data compilation
- ✓Continuous Improvement Process

79

Equipment Rates used in WAM

- 504 unique Key Descriptions
- 25 charged by the mile all $.57 a mile (SUVs and Sedans)
- 470 charged by the hour – Ranging from $1.25 for an Air Compressor to $205.60 Caterpillar, Generator 500kw Trailer Mounted

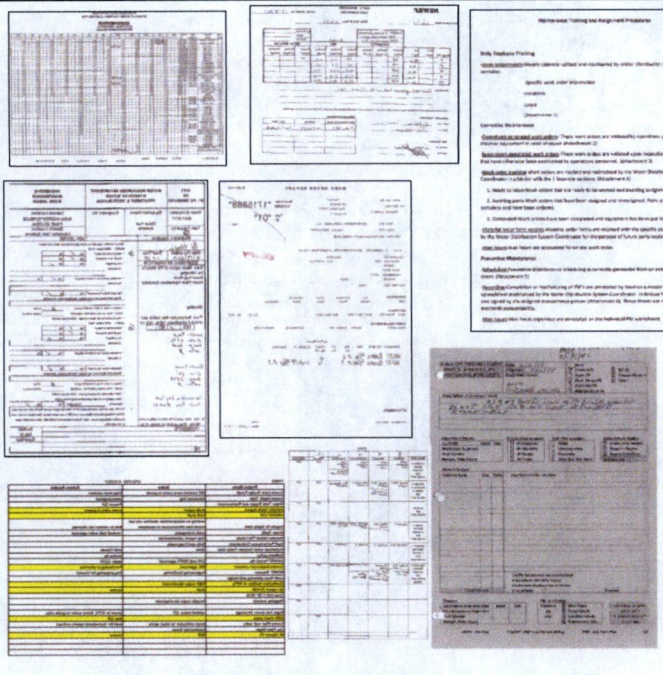
Basic information such as the cost of work and productivity is unable to be captured. Complete costing with overhead, equipment and materials is also lacking.

<u>Recommendation</u> 50: All groups should standardize tracking of labor, equipment, and materials by activity, linking to a specific asset or location.

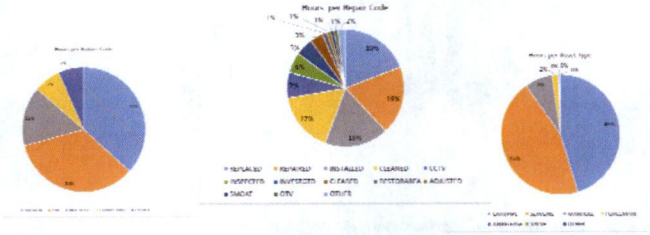
Work Tracking

Work reporting in the WAM database includes numerous combinations of repair codes and asset types that result in hundreds of potential activity descriptions.
Work reporting by general repair category and asset group provides little management information and appears to be mainly for tracking to a work order to document completion.

Work is tracked using various processes.



Wastewater Maintenance



Basic *work tracking by hour or activity is lacking, resulting in the ability to determine specific unit cost, and productivity is difficult to determine.*

Coverage for all groups is only 10%-45% of time making analyses of information very weak.

High Performance Organizations (HPO) account for all work time.

49% of work orders with time reported have an activity of "O"
50% of work orders with time reported lack an activity reported
26 FTE average annually over the time period of 55 positions

82

Some work monitoring of processes are being preformed on a case by case basis.

System Monitoring

- Rely upon a combination of manual tracking and automated systems are used
- Used for after fact research and accounting for past occurrences
- Use of manual processes to communicate work requests
- Performance measurement and costing is done on "case by case" basis
- Data and result are rarely communicated to lower levels in the organization

WAM system data is used primarily for after the fact reports and to satisfy inquiries.

Performance plans and accountability are lacking in the current system and business processes.

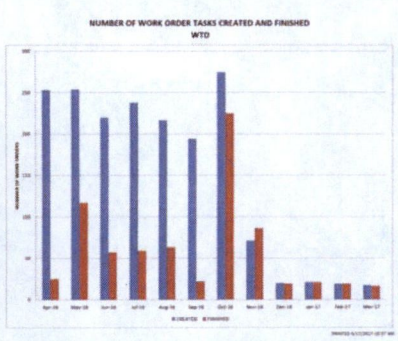
The Department lacks key performance measures to monitor both effectiveness and efficiency.
Good business practice suggests utilizing and relating measures to the work budget.

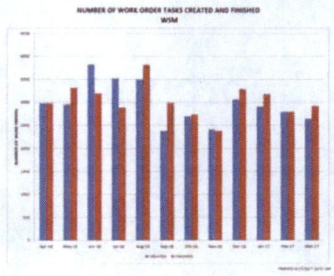
<u>Recommendation</u> 51: Standardize reporting procedures, minimizing the number of databases being used for data compilation.

Account for one hundred percent (100%) of employee time in the system.

All non-divisional work costs should be recovered, or at least identified with cost determined.

83

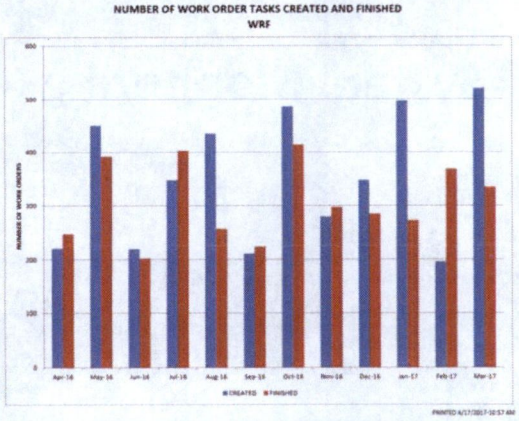


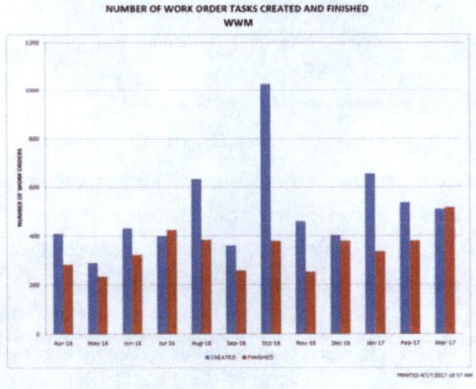


WSM closes work orders

Most groups have considerable amount of work orders open with only two groups appear to complete them in the system.

84





More work orders created than closed

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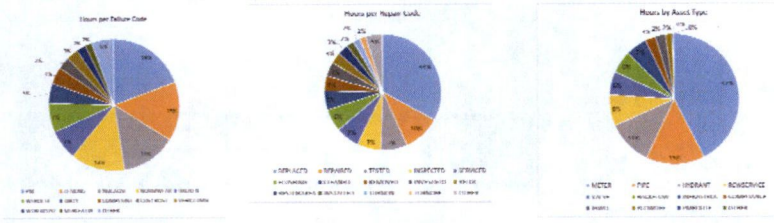
Water System Maintenance



For hours, the major failure code is PM, repair code is replaced and asset is meter.

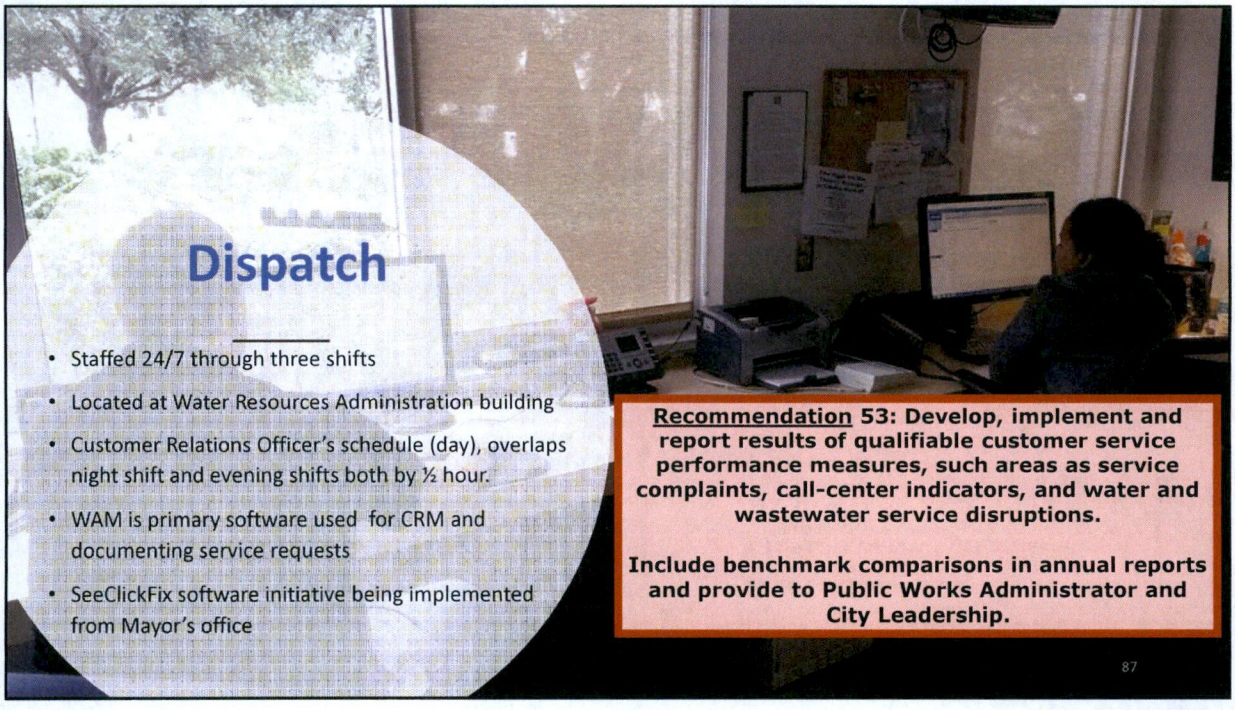
Work reporting is inconsistent and sometimes performed in multiple, redundant files without abilities to cost or determine performance. Only a portion of staff budgeted are accounted.

<u>Recommendation</u> 52: Establish a documented field work quality review process closing work orders and confirm work that is performed meets guidelines with a sampling of the work accomplished.

Include identified actions to be taken to ensure compliance with established quality guidelines. Attempt to minimize the amount of work orders by geographically grouping.

18% of work orders with time reported have an activity of "O"
76% of work orders with time reported lack an activity reported
18 FTE average annually over the time period of 85 budgeted positions

86



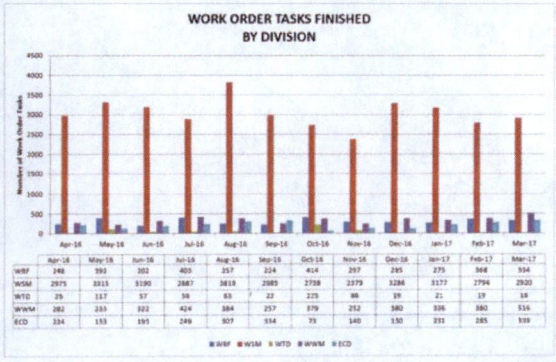
Dispatch

- Staffed 24/7 through three shifts
- Located at Water Resources Administration building
- Customer Relations Officer's schedule (day), overlaps night shift and evening shifts both by ½ hour.
- WAM is primary software used for CRM and documenting service requests
- SeeClickFix software initiative being implemented from Mayor's office

<u>Recommendation</u> 53: Develop, implement and report results of qualifiable customer service performance measures, such areas as service complaints, call-center indicators, and water and wastewater service disruptions.

Include benchmark comparisons in annual reports and provide to Public Works Administrator and City Leadership.

87



	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17
WRF	248	330	302	405	257	224	414	297	285	275	368	534
WSM	2975	3315	3190	2887	3819	2985	2738	2379	3286	3177	2794	2920
WTD	25	117	57	59	63	22	225	86	19	21	19	18
WWM	282	233	322	424	384	257	379	252	380	336	380	516
ECD	234	153	195	249	307	314	73	140	150	231	285	339

WSM has most work orders

Approximately 76% of the work orders for the Department is within the Water Maintenance Division, with over 2/3 of those from water meter reader's request.

<u>Recommendation</u> 54: All groups should produce a monthly report prepared in a similar format.

Establish a monthly meeting within each group with Department <u>Director</u> representation to review WAM data for establishing accountability with all teams.

Report results to Department Director and Public Works Administrator.

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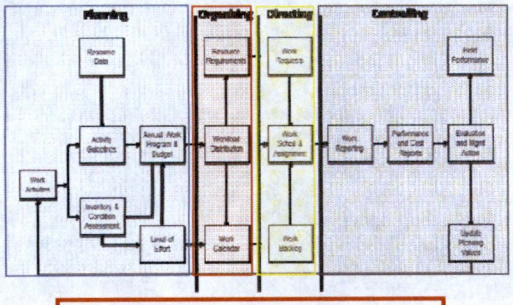
The ideal management of maintenance follows four general phases: planning, organizing, directing and controlling. This model is used as a basis for most of our observations.



Water Resources

Some desired management functions are being partially performed and those that exist lack linkage or integration. There is also a lack of uniformity and accountability of management tools in place and used.

Laboratory, a non-maintenance group, has considerable quality control and performance processes in place based on data while the other groups have minimal process for process improvement and/or operational review.

<u>Recommendation</u> 55: Establish a systematic procedure to assess future contracting candidates following documented City maintenance and operations strategic objectives.

<u>Recommendation</u> 56: Establish a continuous improvement process with a quarterly updates. Provide an annual State of Operations report to the Public Works Administrator that compares planned activities' work days, accomplishment, total costs, and unit costs, versus actual efforts for all groups.

Provide State of Operations report annually to City Leadership with non-compliance identified.

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Where do we go from here?

- Receive comments from Council and staff on Draft Report
- Finalize report with all relevant City comments

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Questions?

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City of St. Petersburg
Water Resources Department

Management Evaluation

DRAFT Final Report

November 6th, 2017

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SECTION 1 EXECUTIVE SUMMARY

LA Consulting, Inc. (LAC) has reviewed the City of Saint Petersburg's Water Resources Department, based upon the scope of our consulting services with City Council. To date, the department has implemented many innovative practices, and is managed by experienced employees. Water Resources is a dynamic organization and has historically been a leader in processing and recycling wastewater, as well as in the treatment of potable water. This combination of key staff and good business practices has produced the potential for a positive environment of work and process improvement. During the evaluation process, LAC prepared a report on the effective and efficient management practices and found some additional opportunities with recommendations for improvement.

In addition, City leadership wanted many specific questions explored in the evaluation of the Water Resources Department. Questions posed in the contract scope were specifically addressed and are shown in Section 5 – the Appendix. LAC affirmed compliance to each of these questions. Of the 65 questions, 48 were either non-complaint and/or needed specific recommendations to help resolve them. Each has a link to the specific recommendations compiled to address the issues in the Appendix.

This report outlines and provides a plan for how Water Resources can improve their existing operations through implementing specific actions using key management principles. LAC's evaluation approach was to investigate and document the current operations and identify opportunities for improvement in various business process aspects (e.g. organizational structure, labor and equipment usage, technology needs, work management, effectiveness, and efficiency). Also, some major considerations and questions arose that need further independent clarification related to the Cosme Water Treatment Facility, the capabilities and impact of new improvements to the two water reclamation plants, Work and Asset Management system (WAM), and the cost/benefit of the Bio-solids project. Finally, several recommendations are related to improving employees' communication though a transparent and fair manner as well as planning for resource needs.

This report is a compilation of information collected during on-site and off-site efforts, through meetings, interviews, two surveys and the review of Water Resources' documents. The information is supplemented by input from LAC staff experienced in operations, engineering, management systems, and business process improvement. An analysis of Water Resources' operational processes and maintenance practices was conducted to determine trends and current practices compared to ideal industry benchmarks and similar agencies' performance. The specific details are described in the body of this report in three separate sections: Baseline, Findings, and Recommendations.

Information in this draft report is presented as historical and 'point-in-time' data, as some information may have changed since its' original discovery. The baseline and findings information were provided to Water Resources employees and was confirmed and vetted by staff throughout the evaluation process. Consequently, any changes in policy, organization, and process that occurred after the initial discovery may not have been revisited as part of this effort due to the impact on schedule and cost.

The draft report is structured in addition to this executive summary as follows:

Baseline Section – The Baseline Section includes an overall understanding of the operational processes and maintenance practices of Water Resources. This section outlines general information, including good practices and innovative ideas, general information and general management directions, service areas, description of water/wastewater system assets and their characteristics, previous studies, and current systems and their support. This section outlines the resources, organization, and activities of the seven Water Resources divisions as well as describes and outlines the operational processes found in each group.

Findings Section – The Findings Section provides support information and analysis of opportunities to improve the operational processes and maintenance practices. This section also includes research and analysis with identified findings that provided the basis for the evaluations in the key recommendations for improvement. The evaluation's 79 findings are supported from observations, interviews, collected data, comparisons, prior knowledge, and analysis. Further, the findings are not presented in order of importance, but by sequence. However, many of the findings are related and should be reviewed in total, rather than each independently.

Recommendation Section – The Recommendation Section outlines and details the LAC's recommendations. The 57 key recommendations are not listed in priority, but are in a suggested implementation sequence after the general recommendations. The recommendations are not always in a "one-to-one" relationship with the findings and are often "many-to-one" or one finding may support several recommendations. Also, the recommendations are related in many cases so that a complete benefit may not occur without the prior recommendations being implemented. All recommendations are listed at the end of this section and outlined detailed in Section 4.

The recommendations are divided into categories with nine in the General category, 18 in Planning, 17 in Organizing, four in Directing and nine in Controlling/Improving.

> **General Recommendations –** The nine General Recommendations are overarching and should be applied to the overall organization. These recommendations address the decentralization of decision making with a history of significant freedom for individuals to develop their own direction and goals found in most departments. In addition, a minimal number of established accountability systems were found within the Divisions. Examples of recommendations in this category are establishing employee teams for the review of various systems improvements, obtaining APWA' s accreditation (APWA, 2011), eliminating redundant ancillary systems, and utilizing as well as enhancing the system for WAM system's capabilities and purpose in the Department's work and asset management approach.
>
> The purpose of this category of recommendations is to improve Water Resources overall, making key recommendations that would not only provide positive change in systems and improvement to individual groups, but the entire organization.

Planning Recommendations The eighteen Planning Recommendations are concentrated on the improvement in efficiency and effectiveness of the planning processes. Some examples of recommendations in this category are to update and confirm various infrastructure assets and publish inventories, establish levels of service with effort for each asset class, develop a performance based budget and integrate with WAM data (this would include performance measures directly linked to financial, labor, and equipment resources), plan for each organizational unit based on the level of service, inventory, and productivity and link to a quality standard by activity. Another example is to allow for the proper allocation of overhead and unit costing for work. Finally, major issues for the independent external evaluation include cost benefit of the Cosme Water Treatment Facility, confirming the adequacy of the wastewater reclamation plant upgrades for projected storms and a cost benefit analysis of the Bio-solid program. The purpose of the recommendations presented in this category is to improve specific annual and future work planning processes.

Organizing Recommendations – The seventeen Organizing Recommendations are concentrated on the improvement of the organizational structures of Water Resources and its organizational groups. These recommendations focus on aligning the organization with mission and vision direction. Some examples of recommendations in this category are simply organizational and provide additional accountability for leadership and employees, structured employee communication, proper technical and supervisory training, the establishment of further transparency and fairness in decision making for overtime usage, hiring and promotion as well as the production and publishing of a succession plan. This section also recommends the establishment of material controls and the projection of staffing needs using a performance plan.

The purpose of the recommendations presented in this category is to provide key recommendations to improve the existing organizational alignment with an appropriate resource mix found in the individual groups. If implemented, these key recommendations will improve the organizational structure.

Directing/Scheduling Recommendations – The four Directing/Scheduling Recommendations are concentrated on the improvement of the directing, assigning, and scheduling of work. Some examples of recommendations found in this category are: developing routine preventive maintenance (PM) programs, standardizing processes for service requests and work orders, defining priority procedure for service requests, and scheduling work two weeks in advance.

The purpose of this category of recommendations is to provide ways of improving work assignments and scheduling as well as to provide accountability for the maintenance of the Departments' assets and to provide potable water, treat and reuse wastewater. Fully implemented recommendations in this category will assist the Department in having a more optimal mix of resource assignments to achieve expectations and directives.

Controlling and Improving Recommendations – The nine Controlling and Improving Recommendations are concentrated on the improvement, performance, and

managing of work. Some examples of recommendations found in this category are to provide accountability for all employee time, standardize tracking by activity and asset, document work quality, link Customer Service with WAM, and establish a continuous improvement process which would provide further accountability for Leadership and the public.

The purpose of this category of recommendations is to provide tools to improve the control of work and accountability of staff, document actions and establish productivity monitoring, and benchmark activities for continuous improvement.

List of Recommendations: The following is a list of all the recommendations. The specifics for each are outlined in Section 4. If not implemented and adopted, the potentially enhanced and improved working environments from these recommendations will represent critically missed opportunities of cost and improvement savings as well as future improvement for the City.

The full implementation of these recommendations would result in considerable positive impact in the effectiveness of public dollars being expended, efficiency of work being performed, and create a positive attitude from the involvement of all staff and transparency in decision making allowing employees to better understand actions taken.

4.1 General Recommendations

4.1.1 Establish employee teams to review the various improvement opportunities and annual plans. Utilize the teams on an annual basis to assist in the review of work methods, quality control, annual plans, equipment needs, as well as other key processes.

4.1.2 Utilize all available technology and improvement tools with experienced leadership to obtain an American Public Works Association (APWA) accreditation.

4.1.3 Monitor continual leak detection and I/I program, report status monthly to the Department Director. Benchmark infiltration rates against those of agencies in other Florida coastal communities and determine the existence of gaps.

4.1.4 Implement a plan to provide drainage of the Southwest Water Reclamation Facility (SWWRF) to the east. Conduct an independent analysis to determine probability of future overflows and system capacity to manage stormwater events, and communicate results to all major stake holders.

4.1.5 Suggest the College implement a drainage study for determining the capability of their stormwater system for handling high storm flows. Through the study, discover opportunities to improve capacity and understand ramifications of their stormwater capacity in managing large storms.

4.1.6 Independently review the capability of WAM to provide the functions needed for water and wastewater plant operations.

4.1.7 Update and configure the Laboratory information management system (LIMS) Element module to eliminate manual processing and monitoring. Assign technical support from

Automated System Management (ASM) to directly support Element and Linko with guidance by Environmental Compliance Division (ECD) staff. Integrate scientific requirements with Information Technology (IT) functionality.

4.1.8 Discontinue ECD's utilization of the WAM system and monitor work with Element module and Linko systems

4.1.9 Establish a process for integrating water intersection drawings in Computer Aided Design and Drafting (CADD) with Geographic Information Systems (GIS). As a priority, assign additional resources to eliminate CADD backlog and expedite a systematic review by an engineer and publish monthly.

4.2 Planning Recommendations

4.2.1 Develop specific goals and objectives for all groups, including quantifiable efficiency and effective performance measures, which link to the vision and mission statements with employee teams providing input.

4.2.2 Retain engineering support for a complete independent and external cost/benefit evaluation of the Cosme Water Treatment Facility. This would include the review of various options for supplying potable water by conducting a financial analysis with benefits and cost. Benchmark against other Tampa Bay Water agencies' water treatment facilities approach and differentiate their process methods.

4.2.3 Develop a plan to provide the ability for direct flow measurement along distribution pipelines from the Cosme Water Treatment Facility to pump stations. This will allow for additional monitoring and inspection capability.

4.2.4 Develop and implement an integrated system of generators on the main campus that support each other.

4.2.5 Fund and implement physical improvements to ECD infrastructure. This would include moving the emergency support generator, insulating building, and updating the environmental control systems. Consider enhancement of facility to house all ECD employees in one location.

4.2.6 Publish evaluation impact of the Albert Whitted Water Reclamation Facility (AWWRF) closing. Perform an external capacity analysis study confirming adequacy of new improvements to meet future storm flows. Evaluate if these improvements will reduce collection system wet weather overflows.

4.2.7 Retain external support for a complete and updated cost benefit analysis of the Bio-Solid project. Document the actual cost/benefit for implementing the project at the SWWRF.

4.2.8 Establish a program to include incentives for encouraging all users to replace Orangeburg pipe laterals with approved material.

4.2.9 Define activities with accomplishment units for all work performed to allow for unit cost and productivity determination, monitor utilizing employee teams.

4.2.10 Annually establish and update work guidelines and SOP's for all major activities within all groups, except for ECD. Include anticipated production rates, crew mix, resources, methodology and quality control steps utilizing employee teams. Integrate directly within the WAM system. Monitor non-compliance with the SOPs safety shoring and develop methods to help ensure adherence.

4.2.11 Establish levels of service with effort for each asset based on condition, available resources, costs, and desires of the City.

4.2.12 Determine and maintain a replacement value of all assets within the WAM database. Update and populate all existing asset inventories within WAM and/or GIS. Establish procedures to maintain and quality control current values and attributes. Establish quarterly meetings with all Divisions to receive input on accuracy and quality of data.

4.2.13 Populate and maintain condition assessment data within the WAM/GIS database. Use data for planning and prioritization of needs for maintenance, rehabilitation, and capital projects.

4.2.14 Develop two overhead rates that reflect the City's actual cost. Develop an avoidable overhead cost and use as a default value in WAM. A second overhead rate should be used for external billing and reimbursement. In addition, develop an annual process to update the rates and use in WAM for job costing.

4.2.15 Identify actual equipment rates for each equipment class that includes all costs of repair and maintenance, fuel and fluids, replacement, and use. "Out of yard" hours for each piece should be tracked in WAM. Annual reviews should occur on low usage and high unit cost equipment for consideration of retention with justification provided to the Public Works Administrator.

4.2.16 Develop long-term budgets for both proactive and lifecycle replacement for water distribution and wastewater collection systems. Annually report the current lifecycle status versus desired to City Leadership.

4.2.17 Establish the capability for developing performance based work plans and budgets, with integration of WAM data. This would include performance measures directly linked to financial, labor and equipment resources. Plan for each organizational unit based on the level of service, inventory and productivity, linked to a quality standard by activity. Provide annual performance plans to Public Works Administrator and City Leadership.

4.2.18 Develop a detailed performance plan for major key assets - Water Reclamation Facilities, Cosme Water Treatment Facility, pumping stations and elevated tank. Include service levels, work needs and cost.

4.3 Organizing Recommendations

4.3.1 Transition and simplify organization in the future to have three or four major functions reporting to the Director - Water, Wastewater, Technical Support and/or Administration. Facilitate with a team to consider a simplified organizational structure. Consider combining Water Maintenance and Water Treatment and Distribution under one Assistant Director.

Combine Wastewater Collection, Water Reclamation Facilities and ECD under another, as well as Technical Services and ASM under another. Combine all remaining administrative support functions under a fourth Assistant Director.

4.3.2 Simplify the Technical Services Division into three groups - Engineering, Facilities, and Environmental Support.

4.3.3 Public Works /Water Resources leadership should establish a systematic quarterly methodology for connecting with employees to obtain unfiltered input and real feedback. In addition, leadership should share any results and propose initial action plans with quarterly updates for addressing concerns.

4.3.4 Utilize City standard guidelines/policy for position selection, promotion and direction. All exceptions to the City's process should be based on emergency or special needs, and should be documented and posted with rationale.

4.3.5 Establish a technical skills training program for employees, and management skills training for supervisors. Make some management, personnel and customer service courses mandatory with annual updates to ensure leaders have the current skills to direct and guide employees and manage resources.

4.3.6 ECD should cross-train staff in the laboratory to minimize specialty focus. In addition, all field staff should also be cross-trained in grease and pretreatment functions to optimize staffing flexibility.

4.3.7 The ECD group should fill the Manager and Laboratory Supervisor positions to allow proper leadership and direction to employees. The weekly staff meeting of key staff should occur unabated to ensure staff involvement and input regardless of those absent that day.

4.3.8 The City should evaluate opportunities to share resources across all Divisions including maintenance, operations, equipment, laboratory, and instrumentation.

4.3.9 Staffing and equipment projections should be based upon work needs and production rates using an established performance plan. Process should be automated within WAM and reviewed annually based on need.

4.3.10 Establish super-users group to increase training, assist in configuration and enhance GIS and WAM skills within the Department collaborating with other City employees.

4.3.11 Standardize and document the use of overtime and provide equal transparent process for those having skills to respond to after hours or specialty needs. Lower level staff should be trained so that they may be utilized for on-call and response. Only dispatch supervisors to address more complex issues.

4.3.12 Establish benchmarks for overtime (OT), worker compensation (WC), Family Medical Leave Act (FMLA) and monitor monthly for all Divisions, comparing to other agencies. Evaluate impact on operations and report to the Public Works Administrator.

4.3.13 Develop, document and implement a complete succession plan for all groups with input from employee teams. Focus on ensuring skills, experience, education and training are all considered in this process and not only length of service.

4.3.14 All supervisors and managers should be trained on management skills to be updated annually, as well as on the methodology and capabilities of WAM and linked GIS. This should be a requirement of promotion and part of an employee's annual review.

4.3.15 Fully develop and implement public information sharing by marketing accomplishments of the Department to others and providing information to the Mayor's office and the public.

4.3.16 Evaluate and stock inventory based on actual needs, optimizing inventory by using industry benchmarks. Establish proper accountability and security functions. Consider centralizing and reducing inventories to a controlled location that is shared with other Departments.

4.3.17 Establish a systematic procedure to assess future contracting candidates following documented City maintenance and operations strategic objectives.

4.4 Directing / Scheduling Recommendations

4.4.1 Work shifts should be established based on specific work needs. The number of shifts should be standardized. An external evaluation on the benefits to the City should be conducted with employee team involvement, documenting the negative and positive benefits of each work shift.

4.4.2 The City should dedicate resources to establish and document complete preventive maintenance programs utilizing the WAM database. Integrate all nonoperational routines within WAM and utilize proactively for planning, scheduling, and controlling work.

4.4.3 Define and document priority assignment procedure for all service requests based on need, safety, and risk to the public. Attempt to identify all work to be performed at least two weeks in advance unless an emergency.

4.4.4 Fully develop and implement a two-week scheduling procedure, related to annual work plans and routine processes. All projects and non-operational routines should be fully scheduled based on productivity and SOP's. Develop a process to establish accountability of supervisors for adherence to schedule and accounting for items not completed.

4.5 Controlling / Improving Recommendations

4.5.1 All groups should standardize tracking of labor, equipment, and materials by activity, linking to a specific asset or location.

4.5.2 Standardize reporting procedures, minimizing the number of databases being used for data compilation. Account for one hundred percent (100%) of employee time in the system. All non-divisional work costs should be recovered, or at least identified with cost determined.

4.5.3 Track and document all effort to remark utility locations and coordinate with contractors and other major utilities to minimize re- work.

4.5.4 Utilize enhanced supervisory control and data acquisition (SCADA) capabilities to reduce redundancy of manual data recording for key processes in water and wastewater. Require operator involvement in all SCADA modifications with signoff by appropriate supervisor.

4.5.5 Integrate existing systems with WAM to automate work order tracking. Assign technical staff to utilize direct input from each group to configure systems for all functional users.

4.5.6 Establish a documented field work quality review process for closing work orders and confirm work performance meets guidelines with a sampling of the work accomplished. Include identified actions to be taken to ensure compliance with established quality guidelines. Attempt to minimize the amount of work orders by geographically grouping.

4.5.7 Develop, implement and report results of quantifiable customer service performance measures in such areas as service complaints, call-center indicators, and water and wastewater service disruptions. Include benchmark comparisons in annual reports and provide to Public Works Administrator and City Leadership.

4.5.8 All groups should produce a monthly report prepared in a similar format. Establish a monthly meeting within each group with the Department Manager present to review WAM data for establishing accountability with all teams. Report results to Department Director and Public Works Administrator.

4.5.9 Establish a continuous improvement process with quarterly updates. Provide an annual State of Operations report to the Public Works Administrator that compares planned activities' work days, accomplishment, total costs, and unit costs, versus actual efforts for all groups. Provide a State of Operations report annually to City Leadership with non-compliance identified.

SECTION 2 BASELINE – EXISTING OPERATIONS

LA Consulting (LAC) was retained by the City of St. Petersburg (City) to perform a management evaluation of the Water Resources Department (Department). This effort included a complete review of the basic management functions of planning, organizing, scheduling, and controlling maintenance work, as well as a review of the various systems and processes utilized by management. All Department managers and other key staff were interviewed, including approximately 45 employees. Many other employees and crews were observed in the field or their respective work locations. Additionally, interviews and follow-up reviews are still being planned to add further understanding of work and processes.

The purpose of this evaluation is to identify opportunities for improvement and develop an action plan for implementation of the best management practices. The action plan will include recommendations which, when implemented, can result in productivity improvements for the City, and savings for the citizens of St. Petersburg.

This section outlines the baseline information that was used as a basis in identifying opportunities for improvement. It was compiled from many sources including information obtained during interviews, field observations, data from both paper and electronic databases, work history, inventories, budgets, LAC's expertise, and considerable input from City staff. LAC assumed the information provided was accurate and complete, but also performed some minor validity checks during the process. A reference list of acronyms is included in Section 6 of this draft report.

The information was supplemented with input from LAC staff who are experienced in both maintenance operations and management systems. Information is presented in general terms, rather than in technical language, for all areas and is presented through the best management practices of planning, organizing, directing, and controlling/improving.

2.1 Evaluation Process

LAC was contracted to assist in meeting the desired goals of the City of St. Petersburg by doing the following; first, to evaluate and document current operations (***Baseline***), secondly to compare and outline opportunities for improvement (***Findings***) and lastly, to make recommendations for improvement (***Recommendations***).

This effort can be outlined as follows:

Baseline includes:

- Establishing a foundation for the work processes and services performed.
- Review of various products and records.
- Interviews of all appropriate maintenance and operational staff (Director, Managers, Supervisors, and Administrative/Support).
- Observe employees and crews performing work in the field.

Findings include:

- Expertise of the LAC staff in other similar projects.
- Analysis of provided records.
- Process conclusions and cost evaluations.
- Modeling of workload and maintenance budgets.

Recommendations include:

- Outline of an Action Plan for improvement and sustainability.
- Predictions of the needs to meet future workload projections.

2.1.1 Ideal Maintenance Management System

Typically, a well-structured management process involves completion of the planning, organizing, directing, and controlling/improving functions regarding maintenance and operations. A graphic of this process is depicted in Figure 2-1. This model is used as a foundational basis for many of LAC's observations and is outlined in the American Water Resources Association Administrative Manual (2008) along with other documented industry support processes (APWA, 2011; Michel, 2004; NACE, 1992).

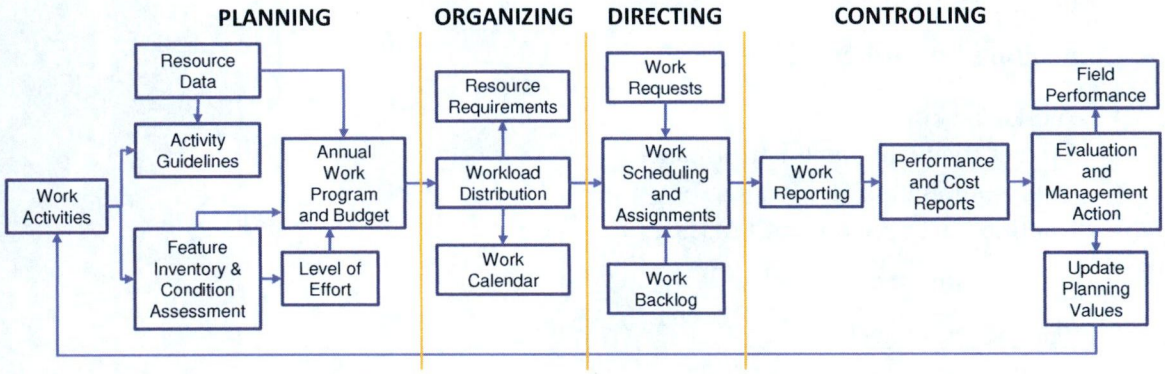
The planning effort involves determining major activities, defining guidelines, obtaining resource information, performing a condition assessment, and computing the level of effort that, in turn, allows a work program and budget to be determined. Upon completion of the process, the planning effort determines the amount of work to be performed on an annual basis for the agency.

The next phase, organization, further divides the work program into work to be performed monthly. This phase allows the work by activity and resource requirements (labor, equipment, and materials) to be determined each month.

The direction phase uses the calendar, work requests, routine maintenance programs, and work backlog to generate a short-term schedule. This schedule is then used to direct staff to perform work by location.

The completed work is recorded and tracked within an automated system. A series of outputs are then generated which gives managers the planned versus actual effort of maintenance. This information is used to evaluate the field effort and identify opportunities to improve field performance. Actual accomplishment information derived from the process is used to update planning values each year, thus facilitating the improvement process.

Figure 2-1 Ideal Maintenance Management System



2.1.2 Departmental Baseline

This section outlines the existing operations for the City of St. Petersburg Water Resources Department included the Divisions of: WREC, Wastewater Maintenance, Water Treatment & Distribution, Water Maintenance, Environmental Compliance, Technical Support, Business Services, and ASM Computer Resources. The management and work processes found within the Department and Divisions are also identified.

The following topics are discussed in this section:

General Information

- General Facts
- Good Practices and Innovative Ideas
- Prior Studies
- Systems and Technology

Planning

- Assets and Features
- Work Activities
- Budgets

Organizing

- Structure and Staffing
- Hours and Leave
- Equipment
- Materials and Contracts

Directing

- Work Identification
- System Routine Processes
- Scheduling
- Other Processes

Controlling / Improving

- Work Tracking
- System Evaluation and Performance
- Data Compilation and Evaluation
- Continuous Improvement Processes

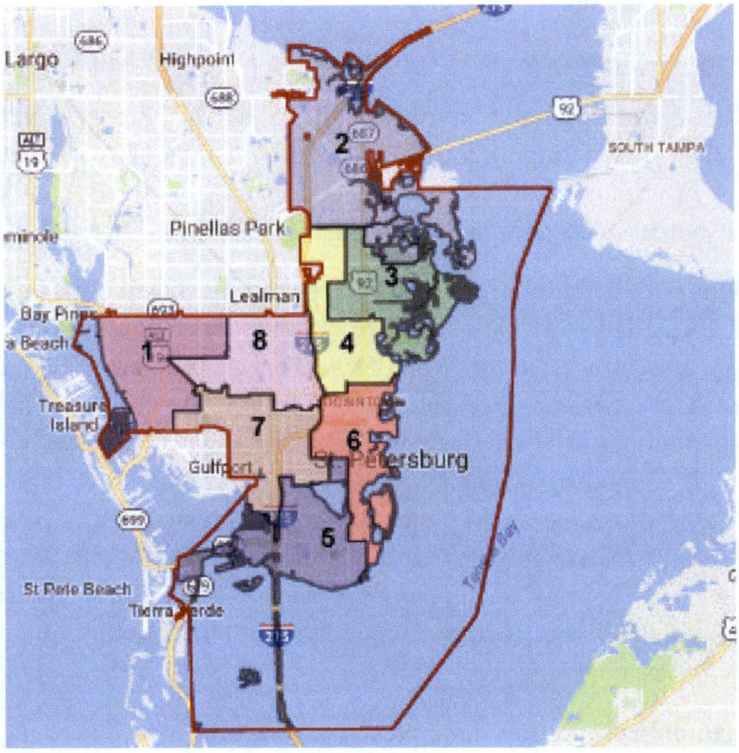
2.2 General Information

2.2.1 City General Facts

The City of St. Petersburg was incorporated on February 29, 1892. The City is 59.6 square miles and located in Pinellas County which is bordered by Tampa Bay on the east and south, Pinellas Park on the North, and several coastal communities on the West. In 2016, the estimated population was 259,906. The population density of the City is estimated at 4,255 people per square mile (Advameg, Inc., 2017). Events such as the Firestone Grand Prix of St. Petersburg and museums such as the Salvador Dali Museum, Museum of Fine Art, and The Chihuly Collection help to bring approximately 6,197,500 visitors annually to "The Sunshine City" with an average length of 5.6 days stay (City of St. Petersburg, 2017).

St. Petersburg has a strong mayor form of government, which combines a mayor with an eight-member elected council. The mayor and council members serve four-year terms. The mayor is responsible for the day-to-day affairs of the City, while the council looks after city policy, city budget, and mayoral appointments of other city officials. Currently, Mr. Rick Kriseman serves as the Mayor, Dr. Kanika Tomalin as Deputy Mayor, and Dr. Gary Cornwell as the City Administrator. The following is the City's current Council Members: Mr. Charles Gerdes, District 1, Mr. Jim Kennedy, District 2, Mr. Ed Montanari, District 3, Ms. Darden Rice, District 4, Chair Steve Kornell, District 5, Karl Nurse, District 6, Lisa Wheeler-Bowman, District 7 and Vice-Chair Amy Foster, District 8. Figure 2-2 shows the City Council Districts.

Figure 2-2 Council Districts



2.2.2 Water Resources Department General Facts

The Water Resources Department was created in 1975 when the Water and Sewer Departments merged. The Department reports to the Public Works Administrator. There are 325.40 total full time equivalents (FTE) within the Department, which is more than half of the FTEs within Water Resources as detailed in the City's 2017 adopted budget (City of St. Petersburg, Budget and Management Department, 2017). The Department is currently led by an Interim-Director with eight direct report Department Managers. These Divisions include: Water Reclamation Facilities, Wastewater Maintenance, Water Treatment & Distribution, Water Maintenance, Environmental Compliance, Technical Support, Business Services, and ASM Computer Resources.

The Department's service area is 144 square miles and includes 357,168 water service users and 331,170 wastewater service users. They maintain 93,657 water accounts, 82,538 wastewater accounts, and 11,022 reclaimed water accounts.

The City purchases all their potable water from Tampa Bay Water utility, located at 2575 Enterprise Road in Clearwater, Florida. The utility provides water to the City through a mix of three sources: seawater desalination, surface water, and a series of well-fields. The agency is a non-profit, special district of the State of Florida. They provide wholesale drinking water to the following agencies: Hillsborough County, Pasco County, Pinellas County, New Port Richey, Tampa, and the City of St. Petersburg. The District was created through an interlocal agreement among member governments. Their policies are established through a nine-member Board of Directors, consisting of two elected commissioners from each member county, and one elected

representative from each member city. Currently, St. Petersburg Council Member Karl Nurse serves on the Board of Directors.

2.2.3 Primary Work Locations

The Water Resources Administrative Complex is located at 1650 3rd Ave N, St., in St. Petersburg. This is the primary staging location for the Divisions of Wastewater Maintenance, Water Maintenance, Environmental Compliance, Technical Support, Business Services, and ASM Computer Resources. This complex also houses the interim-Director and his support staff.

The Water Treatment & Distribution Department is primarily staged out of the Cosme Water Treatment Facility, located at 16015 Racetrack Road, in Odessa, Florida. This facility is approximately thirty-one miles from the Water Resources Administrative Complex. The Division Manager and Chief Plant Operator stage out of this location. The Department is also responsible for two other key operational sites and one elevated water tower. The Oberly pumping station is located at 6198 66th Street North, in Pinellas Park, and the Washington Terrance pumping station is located at 2801 66th Avenue North, St. Petersburg. The elevated tank "Crescent Lake Water Tower" is located at 1320 5th Street North, in St. Petersburg. The Cosme Water Treatment Facility is staffed 24-hours per day, seven days per week (24/7), with the two pumping stations also having staff assigned 24/7 between the two locations. The Crescent Lake Tower location does not have any staff assigned on-site.

The Water Reclamation Facilities has three primary work locations. These include the North-East Water Reclamation Facility (NEWRF), located at 1160 62nd Ave Northeast, in St. Petersburg. The North-West Water Reclamation Facility (NWWRF) is located at 7500 26th Ave N, St., in St. Petersburg while the South-West Water Reclamation Facility (SWWRF) is located at 3800 54th Ave South, in St. Petersburg. Each Water Reclamation Facility is staffed 24/7 and is overseen by a Chief Operator.

2.2.4 Good Practices and Innovative Ideas

The Department is performing many innovative and good practices. Though only some of these are outlined below, many positive efforts have been completed or are underway.

- The Water Resources Department utilizes an intentional training program to augment the skills of their employees.
- Use of Pinellas Technical College (P-Tech) for training and staff development that allows for entry-level employees and upgrading employees with focus on basic skills and techniques needed by the Department.
- Development and current construction of capacity for wastewater by installation of new injection wells and enlarged treatment with disc filters and increased storage capacity at NW and SW facilities.
- Combination of use of closed-circuit TV by using a version of fast review of lines using QTV as well as scheduling CCTV.
- Processing of treated wastewater outflows using a combination of reclaimed water and deep wells with no planned release into adjacent water bodies.

- Work and asset management system (WAM) installed and utilized by many of the department functions.
- Centralized warehouse has been established for the department that allows for many common items to be managed and controlled.
- Use of the WAM database to create and store preventive maintenance programs in several of the groups.
- SCADA systems are in place and utilized in water and wastewater that are overlaid on actual photos of plant assets.
- Completion of evaluation study of management, operations, and maintenance programs (MOM) one of the first in Florida. The Program is to assure that a sewage system is properly managed, operated and maintained always as well as has adequate capacity to convey peak flows. Further, all feasible steps are taken to eliminate excessive infiltration and inflow from the system.
- The water reclamation facilities operate 24/7 with plans underway to pipe sludge from the NEWRF and NWWRF to the SWWRF for bio-solid regeneration project.
- Proactively addressing infiltration of stormwater into wastewater collection system by various means including using manhole inserts, gasketed manhole covers, and smoke testing.
- Receiving Wastewater Collections system of the year award in 2008.
- A functioning and certified laboratory for water and wastewater functions that has annually passed all state requirements and tests.

2.2.5 Previous Studies and Surveys

2.2.5.1 Sewer System Evaluation Survey (SSES)

The Sewer System Evaluation and Management Program Final Report was prepared for the County and submitted by Tampa Bay Engineering, Inc. on March 16, 1998 as result of Florida Department of Environmental Protection (FDEP) actions. The purpose of the report was to provide specific recommendations for capital improvements to the wastewater system to address prior sewer overflows. The report made recommendations in two phases, Phase I: Immediate Action Plan and Phase II: Long Term Program. The recommendations were in accordance to the February 2000 Consent Order.

A preliminary Phase I report was submitted January 15, 1996 and represented a three-month effort for immediate actions to reduce SSOs. These included:

- The City should focus more resources on cleaning large diameter pipes.
- Divert discharge from Lift Station 25 into the Pasadena Master Station during high flow.
- Plug the east pipe in manhole P12-65.

At the time of the Final Report, the City had completed items 2 and 3.

The Final Report primarily focused on Phase II: Long Term Program. These recommendations were divided into five categories, they include: Summary (General), Capital Improvements, Sewer System Rehabilitation Program, and Future Considerations.

Summary (General) recommendations included:

- Continuing current annual maintenance activities
- Additional continual cleaning and grease control
- Multiple techniques for concrete pipe repairs
- Flow management through pumping operations and control structures
- Enhanced wet-weather response procedures
- Capital improvements for flow re-routing and increased system capacity
- A sewer system rehabilitation program (I/I reduction)
- Designated staff for continued modeling and a maintenance management system (MMS)

Capital Improvements recommendations were listed in five groups: flow control projects, Albert Whitted area, Northeast area, Northwest area and Southwest area.

Sewer System Rehabilitation Program recommendations included the development of a long-term rehabilitation program. The program was recommended to have the following elements:

- Correction of manhole defects identified by the physical survey.
- Televising of pipe defects identified by the physical survey.
- Repair/rehabilitation of pipes based on televising results.
- Physical survey (manhole inspections and smoke testing) of remaining portions of the sewer system not surveyed as part of the project.
- Televising, repair and rehabilitation based on the additional physical survey.

In future considerations, Tampa Bay Engineering made three specific recommendations. They included:

- The City should consider re-evaluating the collection system through a formal study every ten years.
- The City should continue the sewer system physical inspection of the remaining 60 percent of the system. The City should consider an ongoing physical inspection as a continuous process.
- The City should monitor the flow in rehabilitation projects to determine the effectiveness of the actions.

Updates were conducted annually through 2008 to list capital improvements to Water Reclamation Facilities, pumping stations, and collection systems as well as automated system improvements and maintenance approaches.

2.2.5.2 *Management, Operations and Maintenance (MOM)/Capacity Assurance, Management, Operation and Maintenance (CMOM) Program*

In November of 1998, the City was invited by the United States Environmental Protection Agency (USEPA), Region 4 to participate in a self-audit of their wastewater system. This effort included an evaluation of management, operations, and maintenance programs (MOM) associated with the City's wastewater collection facilities. The original performance audit was conducted by CH2MHILL, with a submitted report in September of 1999.

The Management Programs evaluated included:

- Training
- Safety
- Information Management
- Engineering
- SSO Reporting and Notification
- Financing and Cost Analysis
- Equipment and Tools Repair Management
- Customer Service
- Legal
- Surface Water Quality Monitoring

The Operation Programs evaluated included:

- Pump Station Operation
- Pretreatment
- Corrosion Control
- Grease Trap Inspection and Enforcement
- Tap-in (New Connection) Management
- Flow Monitoring
- Service Laterals
- Septic Tank Haulers
- No Dig

The Maintenance Programs evaluated included:

- Lift Station Preventative Maintenance
- Sewer Cleaning Preventative Maintenance
- Emergency Maintenance
- Maintenance of Rights-of-Way and Easements

Recommendations related to the Management Programs included areas of training programs, safety programs, an information management system, engineering programs, sanitary sewer overflow reporting and notification programs, financing and cost analysis, equipment and tools management programs, customer service programs, and legal programs.

Recommendations related to the Operation Programs included areas of corrosion control programs, flow monitoring programs, and service laterals program as well as no dig programs.

Recommendations related to the Maintenance Programs included areas of lift station preventive maintenance program, and the maintenance of way and easements

After the original audit, and as directed by the USEPA in 2001, Capacity Assurance was included as an element of further reporting. The name of the following reports after 2001 are Wastewater Collection System Capacity Assurance, Management, Operations and Maintenance (CMOM) Reports.

2.2.5.3 *Albert Whitted Water Reclamation Facility (AWWRF) Operation Alternative Report*

The Albert Whitted Water Reclamation Facility (AWWRF) Operation Alternative Report was prepared and submitted by Camp Dresser and McKee, Inc. in October of 2010. The report indicated the main driver for the evaluation was in response to the Florida Department of Environmental Protection (FDEP) request for managing the City's reject water via a water storage facility (and subsequent re-treatment) rather than direct disposal via the existing injection wells.

Three alternatives were compared related to the status of the AWWRF, they included:

1. Keeping the AWWRF Operational
2. Divert flow to the SWWRF (and AWWRF out-of-service/demolished)
3. Split flow and divert to both SWWRF and NWWRF (and take AWWRF out-of-service/demolished)

The report recommended that the City proceed with the conceptual design of flow diversion using SWWRF as the receiving facility (Camp Dresser and McKee, Inc., 2010).

2.2.5.4 *Southwest Water Reclamation Facility Wet Weather and Liquid Process Capability Assessment*

The Southwest Water Reclamation Facility Wet Weather and Liquid Process Capability Assessment was performed by Brown and Caldwell, of Tampa, Florida. Their report was submitted in July of 2014 to determine capability and risk of actions related to the AWWRF facility options.

The scope of the assessment was to establish the maximum treatment capacity for the SWWRF to meet the existing effluent requirements including the flows and pollutant loadings from the AWWRF.

The report detailed three options for increasing wet weather capacity, they included: equalization of flows with existing secondary clarifiers, equalization of flows with improved secondary clarifier mechanism, or an addition of a new secondary clarifier (Brown and Caldwell, 2014). The report also provided planning level recommendations to eliminate hydraulic and treatment process bottlenecks at the SWWRF to handle the projected peak wet weather influent flow of 69 MGD.

The report detailed potential failures for options: One (Equalization of Flows with Existing Process Units) and Two (Equalization of Flows with Improved Secondary Clarifier Mechanism and Other Hydraulic Improvements). For Option 1, Brown and Caldwell made the conclusion, "…an equalization tank with a volume of approximately 10 MG would be required to be able to reduce the wet weather flows from 69 MGD to 40.5 MGD entering the plant. This assumes that the influent flow at the SWWRF, after the storm event, returns to a rate less than 40.5 MGD and that there is not an extended duration of the associated storm event" (Brown and Caldwell, 2014). The report goes on to note the detail of the potential failures for Option 2, "…equalization of the flows beyond 50 MGD for a day is required. In this option, an equalization volume of

approximately 4.5 MG is required. The same assumptions are made as in Option 1 with regards to the influent flow conditions after the storm event and the storm event duration" (Brown and Caldwell, 2014).

2.2.5.5 *Clam Bayou Central Stormwater Pond Assessment*

The Clam Bayou Central Stormwater Pond Assessment- Assessment of Short and Long-Term Effects of Event Driven Fecal Coliform Loading was performed by Environmental Consulting & Technology, Inc. of Gainesville, Florida. Their report was submitted in December of 2015.

The final report highlighted a significant extended rainfall event, which occurred in late July through early August 2015 that overburdened the City's SWWRF stormwater and sanitary wastewater drainage systems. The event contributed to an August 3, 2015 raw wastewater discharge to drainage ditches hydraulically connected to the Clam Bayou Central Stormwater Pond (Environmental Consulting & Technology, Inc., 2015).

The assessment's goals were to:

- Evaluate the potential for residual impacts from the 2015 discharge of raw sewage into the stormwater treatment pond that discharges into Clam Bayou.
- Quantify sources (specifically that of human origin) and transport processes of bacterial contamination within central pond.

The report concluded that by early October 2015, fecal coliform counts in the water column of the pond were significantly reduced and were not found to be of human origin. Further, the report went on to conclude that the fecal coliform identified in all the samples collected in early October 2015 are from other sources of microbial pollutant loading most likely from freshwater/stormwater basin inflows and/or re-suspended sediments from up gradient urban sources (Environmental Consulting & Technology, Inc., 2015).

2.2.5.6 *4/10's Survey*

The Department also performed a survey among staff to solicit feedback related to alternative work schedules. Two specific questions were asked of staff. "How satisfied are you with the 4/10 schedule?" and "Would you prefer a 5/8 schedule?" Forty-four employees responded to the survey.

The results of the employees surveyed that 88.7% were *very* or *somewhat* satisfied with 4/10 schedules, 6.8% were *neutral*, and 6.8% replied *not at all*. For question two, 81.8% surveyed did not prefer a 5/8 schedule, where 9.1% responded *yes*.

2.2.5.7 *Succession Plan Management Survey Report*

In December of 2012, an internal Succession Plan Management Survey was conducted within the Water Resources Department. This was an anonymous survey administered to seven Water Resources Department Managers. The purpose of the survey was to solicit feedback on the Director's Management Team meeting and Succession Plan. The Managers were asked a set of thirteen questions, related to succession planning and employee meetings.

Examples of feedback related to the "pros" of succession planning included: "*Shows concern of its originators for the overall wellbeing of the WR employees. It exemplifies "we care about you; Prepare[s] individuals for future promotion and be ready to fill vacancies as people retire or leave City employment, and Stressing the benefits to employees of planning for a job that will enable them to continue to be successful regardless of their age, physical limitations, or unplanned circumstances in life.*"

Examples of feedback related to the "cons" of succession planning included: *"There is no written plan, goals, targets, or guidelines." "For WRD there is a lack of funding for some of the initiatives* and *No support from the unions to forgo compensation in areas that could limit the Plan's success (i.e. the desire to be paid OT for cross-training)."*

Several succession plan changes were identified. Several feedback items were related to documenting, setting objectives, goals, metrics, and accomplishments of a succession plan.

2.2.5.8 Employee Wellness Survey Report

In December of 2012, an internal Employee Wellness Survey was conducted within the Water Resources Department. Employees were surveyed to collect feedback on such topics as health care, exercise, nutrition, tobacco use and the Department's Succession Plan. The report indicated that just under half (48%) of staff responded.

Most (73%) of the respondents rated their overall health as "excellent" or "very good. Of the four Succession Planning topics, Development & Training received the highest percent (52%) of "strong interest."

2.2.5.9 Water Systems Maintenance Climate Study

A Water System Maintenance Climate Study was performed internal by Angela Horvath, Ph.D., former Management Methods Analyst within the Water Resources Department. Her report was submitted in January of 2014. This was a follow up to an anonymous survey administered to Water Systems Maintenance (WSM) employees in 2013. Interviews were also conducted, representing administrative support staff, coordinators, foreman, and technicians. 77% of the WSM staff responded to the original survey. In September of 2014, a modified follow-up survey was administered, resulting in a 68% response rate.

Conclusions drawn from the surveys include the following:

Strength of the Division:

- Cooperation/Teamwork 55%
- Employee Knowledge/Skillset 40%
- Employees- General 35%

Challenges of the Division:

- Hostile Work Environment 55%
- Communication 50%
- Management 40%

- Micromanagement 35%
- Work Planning 35%
- Morale 30%
- Staff Input 30%

The report recommendations were categorized into three areas: Leadership, Staffing & Training, and Equipment. The following are recommendations from the Water Systems Maintenance Climate study.

- Conduct monthly Department meetings
- Actively solicit staff input
- Formalize safety
- Review workflow procedures
- Empower staff
- Implement management performance objectives

2.2.6 Mission and Vision Statements

The City has established a clear mission statement that focuses upon the effectiveness of providing public services as well as protecting and enhancing the sustainability of the environment and quality of life in their City. The City's mission statement is: *"...to provide efficient and effective public services that protect and enhance sustainability of our environment and the quality of life in St. Petersburg."*

Water Resources has also established both vision and mission statements. The Water Resources' Vision Statement is: "We will achieve our mission by driving collaboration between employees and citizens with a spirit of partnership and pragmatism. Understanding what matters, bringing new ideas, and creating a positive impact!" In support of their Vision Statement, their Mission Statement is: "The Mission of the Water Resources Administration is to Keep the Public in Water Resources."

The Water Resources Department has also established a clear mission statement, which focuses upon both effectiveness and efficiency elements, being clearly focused on service delivery and the efficiency of costs with an emphasis on public health and adhering to environmental regulations. Water Resources' Mission Statement is: "Our City's Water Resources Department will effectively and efficiently manage the water resources for the benefit of the public pursuant to applicable public health and environmental regulations."

In support of the Departments' Mission statement, the Water Maintenance and Wastewater Maintenance Division have also developed Mission Statements. Water Systems Maintenance's Mission Statement is: "To promote the health, safety and welfare of the public served by the City Public Drinking Water System and the City's Reclaimed Water System, and to effectively maintain the integrity of the Potable and Reclaimed Water Distribution System through effective utilization of employees, equipment and materials." Wastewater Collection's Mission Statement is: "To provide the citizens of the City of St. Petersburg with reliable sanitary sewer service through safe, efficient wastewater collection system maintenance."

2.2.7 Codes, Mandates, and Permits

The City of St. Petersburg and its Water Resources Department is required to adhere to numerous codes, mandates, and permits in service to the community. These requirements are for other agencies yet are exacerbated by fact of their geographical location in a peninsula adjacent to Tampa Bay and Gulf of Mexico.

2.2.7.1 Consent Orders

The City, because of sewer overflows, agreed to a consent decree as an agreement to resolves a DEP dispute without admission of guilt or liability on two separate occasions. This allows the court to maintain supervision over the implementation of the decree and interactions. The City has had two of these- one in 2000 and another in 2016.

2.2.7.1.1 Consent Order #1

In 2000, because of unpermitted discharges that impacted waters of the state in 1995, 1997 and 1998, the City and DEP mutually resolved a disagreement with several conditions. First, civil penalties/fines were assessed. An agreement for documented needs was implemented as outlined in a two-phase Sanitary Sewer Study by Tampa Bay Engineering. This included capacity upgrades, system improvements, maintenance planning and organizational adjustments. Further, the City had to produce annual reports covering progress until all were completed. This Consent Order was successfully completed in February of 2010.

2.2.7.1.2 Consent Order #2

In 2016, another consent order was proposed, and agreed to, by DEP because of unpermitted discharges in waters of the state in FY 2015/16. The agreement included civil penalties along with required capacity improvements. The identified and required capacity upgrades included:

Feb 2018 – SW headworks bypass and disc filters with injection well(s),
Feb 2018 – NW effluent filter and an injection well,
Jun 2018 – Update Water Master Plan, and
Sep 2019 – SW expand headworks, add clarifier & filters.

Other documented plans for action were required in the agreement including Albert Whitted Facility justification and plan, flow mitigation report, hydraulic model update, bi-annual implementation report. This resulted in Inflow /Infiltration being funding $14 million annually for 5 years. Also required was a private lateral replacement ordinance and requirement to update and document the CMOM process.

2.2.7.2 Permits

The work of the Department must follow a series of permits with state, regional and local agencies. Among those permits include:

- SWFWMD- Reward Well Project FDEP- Domestic Wastewater Facility Permits
- FDEP- Stormwater Discharge Permits

- FDEP- Class I Injection Well System, NWWRF Construction and Testing Permit, IW-3, IW-4
- FDEP- Southwest Water Reclamation Facility Biosolids to-Energy Project
- Administrative Correction to FDEP Permit 034515-006-007-UO/1M to Operate a Class I Injection Well System, St. Petersburg Albert Whitted WRF
- State monthly requirement to report the number of fecal coliform samples greater than 25 CFU/100 ml (Specific Condition III.B.1.) in the injected wastewater

Further, all Water Reclamation Facilities (WRF) have current operating permits with the State.

2.2.8 Systems

The Water Resources Department maintains several independent manual and automated databases for managing and accounting for maintenance and operations. The databases are maintained in a variety of different systems and applications. Further, there are additional inventories and files, which are tracked manually, or are in various Word documents and Excel spreadsheets. A list of the major databases and spreadsheets observed by LAC and their functions are provided below.

2.2.8.1 Work Order Database (WAM)

The WAM (Work and Asset Management) system is the primary Computerized Maintenance Management System (CMMS) used by each Division in the Department. All operational groups use WAM except laboratory and plant operators for tracking work. However, water and wastewater operators do utilize the WAM database for creating work requests for repairs yet do not use to track plant inspections. The WAM was implemented in 2007, going live in 2008.

2.2.8.2 Supervisory Control and Data Acquisition (SCADA)

The Department uses Wonderware (HMI) SCADA. This system is used throughout Water Reclamation and Water Treatment and Distribution with workstations available to all assigned operators with user login and authorized security permissions. Adjustments were made by engineering to allow for easier data retrieval by operators. Several modules are used for monitoring most site equipment components with automated control capabilities on most equipment.

2.2.8.3 ERSI-GIS

A geographic information system (GIS) software from Environmental Systems Research Institute (ESRI) integrates hardware and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information for water and other assets. GIS allows the Department to view, understand, and interpret data in many ways to help visualize relationships, patterns, and trends using maps, reports, and charts.

2.2.8.4 Other Automated Systems

- BOSCH Access Easy Master- Facility security software
- Chromeleon- Instrument Controller (IC)
- Geonexus- Mapping software linking WAM with GIS

- ICP-OES, Expert- Instrument Controller (ICP-OES)
- Intranet – Underground Utility locating
- Kronos – timekeeping system for payroll
- NaviLine – meter reading software
- Omnion- Instrument Controller (FIA)
- Oracle E-Business- Financial and budgeting
- Promium Element DataSystem- Laboratory Information Management System (LIMS)
- Promium Data Tool- Instrument link to LIMS
- PublicStuff
- SeeClickFix
- TOC Control L, ver. 1.04- Instrument Controller (TOC)
- Varian MS workstation v6.5- Instrument Controller (GC/MS)
- WinCan- CCTV documenting software
- WinControlXL- HVAC monitoring and controls

2.2.8.5 Other Ancillary Documents, Spreadsheets, and Databases

Numerous unlinked files in various formats are utilized by various personnel for managing information. This includes spreadsheets, word documents, and independent databases to inventory usage and work order logs.

The WAM (Work and Asset Management) system is the primary Computerized Maintenance Management System (CMMS) used by each Department in the Department. WAM was implemented in 2007, going live in 2008.

Some activity tracking is performed by the Divisions of the Department including the Administration (ADM), Environmental Compliance (ECD), Water Reclamation Facilities (WRF), Water System Maintenance (WSM), Water Treatment and Distribution (WTD), and Wastewater Collection Maintenance (WWM). These Divisions use the CMMS for service requests and work orders. In FY2016, 116,682 tasks were recorded at a cost of $13,455,006. There is some integration with other systems, including the City's NaviLine system used by meter readers. Yet, most system linkages are performed through manual processes.

Recently, the Department published an internal Computerized Maintenance Management System Project Charter and Standards. The Document included the following Mission Statement: "*To modernize the Water Resources Department's maintenance and operational processes through business process reengineering (BPR) in conjunction with the implementation of an integrated asset-based Maintenance Management software to provide a system that will enable the WRD to establish best business practices, increase efficiency, improve customer service, comply with environmental regulations, manage rates, and ensure public health.*"

The document also outlined eleven goals and critical success factors, they include:

Project Goals:

- Allows core business functions to be fully integrated with a proven, public-sector CMMS software that utilizes current, mainstream technology;
- Streamlines the core maintenance and asset management processes through business process reengineering (BPR) in conjunction with the implementation of the CMMS;
- Meets current and anticipated business requirements for 5 to 7 years in a reliable and cost-effective manner;
- Provides the technology, tools, and training to enable all levels of staff to extract data they require to meet their business needs;
- Provides desktop access to data and information (Windows-based);
- Eliminates administrative activities that add no value;
- Provides a secure system ensuring data integrity, reliability, and availability;
- Improves the ability to budget/measure program efficiencies based on performance metrics;
- Facilitates compliance with Capacity Management, Operation and Maintenance program (CMOM);
- Facilitates compliance with the Governmental Accounting Standards Board's (GASB's) new financial reporting requirements for state and local governments; and,
- Limits customizations to the software to hold down costs, to support standardization of business practices, and to preserve the ability to upgrade to new versions as released.

Critical Success Factors:

- Committed and involved Executive Sponsorship;
- Communication of common and realistic expectations;
- Ability to embrace the magnitude of the change;
- Ability to invest sufficient funds necessary to ensure the success of the project;
- A timely communication and issue resolution process;
- Strong project ownership by the respective business areas involved;
- The sustained involvement of motivated and skilled team members;
- Timely and informed decision making;
- Access to quality data, effective conversion and appropriate interfaces to other systems;
- A carefully articulated and documented structure to: define, monitor, and measure the status of each project milestone;
- An understanding of the project scope;
- Restricting system modifications and instead reengineering the business processes;
- Minimizing negative organizational impact through early workflow analysis, skills assessment, training and proactive communication; and,
- Focus on the users and collaboration with divisions to ensure implementation requirements align with their business goals.

The project is planned to be approached in three phases: Phase I—Needs Analysis and Software Selection, Phase II—Pre-Implementation Planning and Phase III—Systems Implementation. The start of the project is yet to be determined.

The Department also utilizes, ESRI's ArcView as their spatial database. The software is distributed by ESRI and is a platform often integrated with maintenance management systems, linking maintenance and repair activities to spatial maps. Some employees print out maps and attach them to work orders. Interactive mapping tools are also available to customers online. The GIS database includes the following asset layers:

Sewer / Stormwater

- *Pressurized Main*
- *Gravity Main*
- *Manhole*
- *Clean Out*
- *City Lateral Line*
- *Network Structure*
- *Fitting*

Water Distribution

- *Main*
- *Hydrant*
- *Fire Service*
- *System Valve*
- *Control Valve*
- *Fitting*
- *Network Structure*

There are 96,310 GIS water segments with only 307 segments (<0.5%) reporting length, as an attribute reported in the database. In addition, 10,479 of these segments (10.9%) are also missing installation date/age. There are 23,983 GIS sewer segments with 122 segments missing length value. Of these segments, only 1,001 (>4%) report installation dates. Condition values are also lacking for both asset types.

2.3 Planning

2.3.1 Assets and Characteristics

The Department maintains an abundant asset infrastructure including assets related to water treatment and distribution, wastewater collection and wastewater reclamation and transmission. The Water Resources Department complex is located at 1650 3rd Ave N, in St. Petersburg.

The Divisions of Wastewater Maintenance, Water Maintenance, Environmental Compliance, Business Services, ASM Computer Resources, and Administration are staged out of this complex. This site is also shared by other City groups including Central Records, Parks & Recreation, and Stormwater. Stormwater shares a portion of the Department's Operations building. The City's consolidated warehouse is also located at this site. Bulk materials and most small and large equipment used by WRD are staged out of this facility. Figure 2-3 shows the general layout of the complex, identifying major areas specific to the functions and operations of the Department. The complex has several generators located throughout the complex providing back up emergency power in various buildings that are independent systems.

Figure 2-3 Water Resources Administrative Complex

2.3.1.1 *Water Treatment & Distribution, and Water Maintenance*

Water Treatment & Distribution and Water Maintenance are responsible for 1,543 miles of water main, 6,481 fire hydrants, 32,060 valves, two repumping stations (Oberly Pump Station and Washington Terrace Pumping Station), one elevated water tower, and two booster stations, five remote pressure monitoring sites and six remote water quality monitoring sites with associated site assets.

Figure 2-4 shows the locations of the primary facilities of Water Treatment & Distribution, in relationship to the Department Administration complex. The Cosme Water Treatment Facility in Hillsborough County is approximately 25 miles, or 41 minutes, from the Oberly pumping station and approximately 31 miles, or 40 minutes, from the Water Resources Administration.

Figure 2-4 Primary Facilities of Water Treatment & Distribution

2.3.1.1.1 *Cosme Water Treatment Facility*

The Cosme Water Treatment Facility is located at 16015 Racetrack Road, in Odessa, which is in Hillsborough County. The facility was constructed in 1930 with softening and filtration capabilities added in 1942. Expansion occurred in both 1955 and 1961.

The facility capacity is 68 million gallons per day (MGD) and the average daily production of water was 28.5 MGD in FY2016. It has an aeration capacity of 82 MGD, lime-softening capacity of 41 MGD, and filtration capacity of 68 MGD. The facility utilizes Chloramines as a disinfectant and has a finished water storage capacity of 3.9 million gallons (MG). The finished water quality goals are: an alkalinity of between 120 and 140, total hardness of between 130 and 220, a pH of between 8.1 and 8.3 and a chlorine residual of between 5 and 7 ppm total chlorine.

Other assets found at the facility include nine transmission pumps, a 10,000-gallon Fluorosilic Acid storage tank, a sixteen-ton gaseous chlorine cylinder and four chlorinators.

The finished water is carried to the two pumping stations via two water transmission lines. A 36-inch reinforced concrete pipe, with a length of just under 24 miles, delivers finished water to the Washington Terrace Pump Station. The capacity of this line is 23 MGD. The second transmission line is a 48-inch prestressed concrete cylinder pipe (PCCP) and ductile iron pipe with a length of just over 25 miles, which delivers finished water to the Oberly Pumping Station. The capacity of this line is 45 MGD.

Sustaining power at the facility is critical to maintain pressure in the delivery system. As the result of some failing systems, electrical upgrades are currently underway using generator support to allow for these upgrades.

2.3.1.1.2 Oberly Pumping Station

The Oberly Pumping Station is located at 6198 66th Street North, in Pinellas Park. The station's pumping capacity is 13 MGD with a total storage capacity of 24 MGD. The distribution pumping capacity of the station is a total of 80 MGD with a firm of 64 MGD. The site also has one 1,825 KW generator and two 5,000-gallon diesel tanks.

2.3.1.1.3 Washington Terrace Pumping Station

The Washington Terrace Pumping Station is located at 2801 66th Avenue North, in unincorporated Pinellas County. The station's total storage capacity is 15.25 MG with the distribution pumping capacity of 45 MGD with a firm pressure of 30 MGD. The site also has one 1,825 KW generator and two 5,000-gallon diesel tanks.

2.3.1.1.4 Elevated Storage Tank No. 2 (Crescent Lake Water Tower)

Water Resources also has an elevated storage tank located at 1320 5th Street North, in Petersburg. This is adjacent to a City park site and Crescent Lake. The riveted steel tank was constructed in 1926 and stands 140 feet tall. The tank's capacity is 500,000 gallons. The primary function is to assist in maintaining water pressure in the event of power loss and reduction of pressure from Oberly and/or Washington Terrace Pumping Stations, as well as for fire flow during emergencies.

2.3.1.2 Sanitary Sewer and Reclaimed Water

Wastewater Collections Maintenance is responsible for 888 miles of sanitary sewer gravity mains, 49.41 miles of sanitary force mains, 97,941 laterals, 19,379 public manholes and 461

private manholes, 4,376 valves, 312 hydrants, and 81 City-owned lift stations. The City also owns four wastewater reclamation facilities with one now being inactive.

2.3.1.2.1 Northeast Water Reclamation Facility (NEWRF)

The City's Northeast Water Reclamation Facility (NEWRF) is located at 1160 62nd Ave Northeast, in St. Petersburg. The facility operates under the FDEP permit number FLA 128856. This permit expires June 12, 2021. The permit capacity of the NEWRF is 16 MGD with an average annual flow of 8.95 MGD in FY2016. Further, in 2016 the average sent to the injection wells was 4.34 MGD and 4.48 to distribution.

The site has two reclaimed water storage tanks, one 8-million-gallon reject tank and one 10-million-gallon tank. The system also has four high-service pumps, which are used in the process.

The facility also produces an average 4.18 dry tons of biosolids a day with a dewatering percentage of 16.48%. Currently, the City is in the process of implementing the piping of biosolids to the SWWRF as part of the City's future waste-to-energy project.

2.3.1.2.2 Northwest Water Reclamation Facility (NWWRF)

The City's Northwest Water Reclamation Facility (NWWRF) is located at 7500 26th Ave N, in St. Petersburg. The facility operates under the FDEP permit number FLA 128821. This permit expires September 20, 2020. The permit capacity of the NWWRF is 20 MGD with a 2016 average annual flow of 11.09 MGD. Also, in 2016 the average sent to the injection wells was 2.99 MGD and 7.27 to distribution.

The site has two 5-millon-gallon reclaimed water storage tanks and is serviced by four high-service pumps, which are used in the process.

The facility also produces an average 4.02 dry tons of biosolids a day with a dewatering percentage of 13.6%. Currently, as with the NEWRF, the City is in the process of planning and implementing the piping of biosolids to the SWWRF as part of the City's future waste to energy project.

Enhancements to the facility's infrastructure are also underway. A new disk filter and injection well is currently being constructed.

This facility also receives wastewater from other agencies, such as Treasure Island, St. Pete Beach and South Pasadena.

2.3.1.2.3 Southwest Water Reclamation Facility (SWWRF)

The City's Southwest Water Reclamation Facility (SWWRF) is located at 3800 54th Ave South, in St. Petersburg. The facility operates under the FDEP permit number FLA 128848. This permit expired June 28, 2017. The permit capacity of the SWWRF was 20 MGD with an average annual flow of 18.17 MGD. Also, the average sent to the injection wells was 10.71 MGD and 9.75 to distribution.

The site has two reclaimed water storage tanks - one 5-million-gallon rejection tank, one 15-million-gallon rejection tank, and another 10-million-gallon rejection tank. The process is serviced by four high-service pumps, which are used in the process.

The facility also produces 28.2 dry tons of biosolids a day with a dewatering percentage of 24.4%.

Major capacity and processing enhancements to the facility's infrastructure is currently underway with the installation of new disc filters, a 15-million-gallon storage, primary clarifier, chlorine contact basin, and injection well as well as the waste to energy project.

2.3.1.2.4 Albert Whitted Water Reclamation Facility (AWWRF)

The Albert Whitted Water Reclamation Facility (AWWRF) is located at 601 8th Avenue Southeast, St. Petersburg, adjacent to the Albert Whitted Airport. The facility operated under FDEP permit number FLA 128830, which expired June 3, 2017 yet have recently updated the permit to 2022. The facility was designed for a 12.4 MGD flow with a high weather design of 24.8 MGD. The facility was closed in April 2015, where all sanitary flow was transferred to the SWWRF via Lift Station 85.

2.3.1.2.5 Water Reclamation Cumulative MGD Flow at All Plants

Figure 2-5 shows the historical flows of the Water Reclamation Facilities from April 1, 2012 through April 1, 2017. Prior to March of 2015, four plants operated. After the closing of the Albert Whitted Water Reclamation Facility (AWWRF) in March of 2015, the flows are shown for the remaining three functioning facilities.

Figure 2-5 Cumulative Flow at All Plants

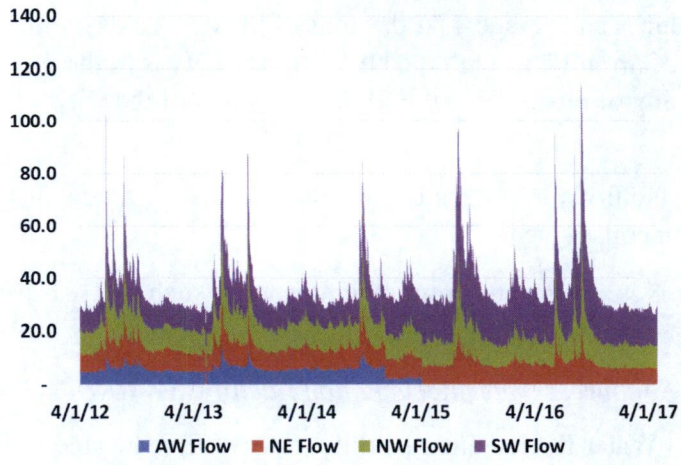


Figure 2-6 shows the five-year average daily flow by year for all facilities. The highest average total by year came in CY2016 at 45 MGD followed by CY2015 at 37.9 MGD.

Figure 2-6 Average Daily Flow – By Year

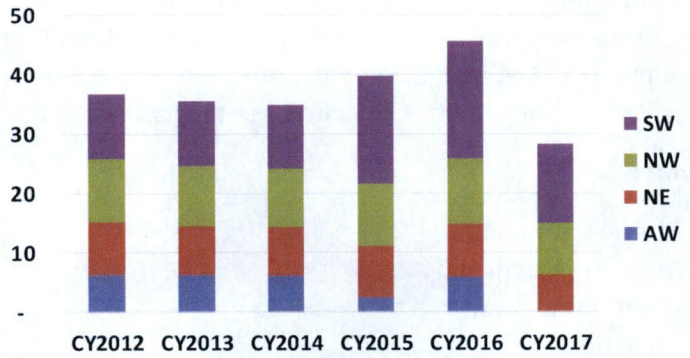
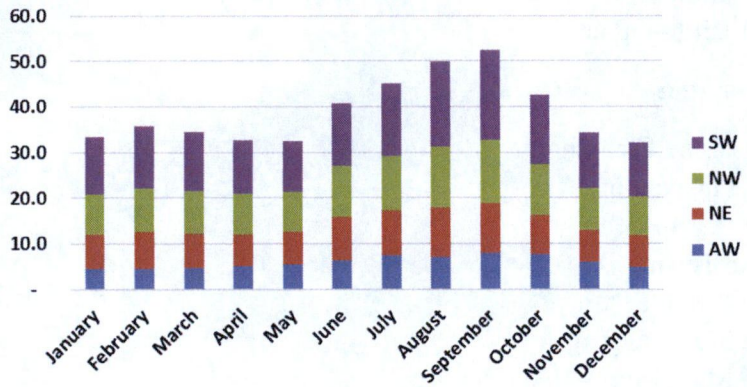


Figure 2-7 shows the five-year average daily flow by month. The highest average total by month was September at 52 MGD followed by August at 50 MGD with the lowest in volumes reported in May and December.

Figure 2-7 Average Daily Flow – By Month



2.3.2 Activities Performed

Each Division within the Water Resources Department has a list of established activities that are found in various databases, including the WAM system.

2.3.2.1 Wastewater Collection Maintenance

Water Resources' Wastewater Maintenance Division has a list of established activities and standard operating procedures (SOP). This list of activities can be found in various databases, including the WAM system.

Maintenance and repair work performed on wastewater assets have labor, equipment and material resources associated with them, which are tracked to work orders and reported in the WAM database. Work done on routines such as Vactor Line Cleaning, CCTV and Quick TV Inspection, as well as Force Main Line Valve Exercising are systematically recorded to specific assets.

The labor effort hours are also tracked and input to the Kronos system for payroll. Kronos is used to track the pay types of regular, overtime and leave. Labor hours recorded in the Kronos system encompass the entire time to perform work, including both preparation, travel and cleanup time. Labor hours that are input to WAM include only the time worked on a specific work order. Some of the activities performed by Wastewater Collection Maintenance include:

Corrective Maintenance

- Gravity Main Spot Repairs
- Gravity Main Replacements
- Gravity Main Install New
- Manhole Repairs
- Manhole Ring & Cover Replacements
- Force Main Replacements
- Service Laterals- Install New
- Service Laterals- Replace
- Service Laterals- Install Cleanout
- Restoration- Sod
- Restoration- Other

Preventive Maintenance

- Vactor Line Cleaning
- CCTV Inspection
- Quick TV Inspection
- Smoke Testing
- Dyed Water Testing
- Force Main Pigging
- Force Main Line Valve Exercise
- Force Main Air Release Cleaning/Replacement
- Manhole Inspection
- Root Control Chemical Foaming
- Root Control- Cutting & Removal
- Manhole Inflow Shield Installation

Wastewater Collection has a published Standard Operating Procedures & Foreman's Manual. This manual includes several components including the Division's mission and vision statements, standard operating procedures (SOP) for notifications and emergency response, after-hours staffing policy, and several other key functions of the Division. Each of the SOPs includes activity name, purpose, procedure, measurement, personnel & equipment to be used. This manual was revised in June of 2017.

2.3.2.1.1 Historical Operating Indicators

2.3.2.1.1.1 Sanitary Sewer

Water Resources tracks and reports operating indicators for several accomplishments within the Department.

Figure 2-8 shows the historical miles of sanitary sewer pipe rehabilitation through cured-in-place pipe (CIPP) lining. The average length per year over the past five years has been 7.5 miles.

Figure 2-8 Miles of Sanitary Pipe Rehabilitation

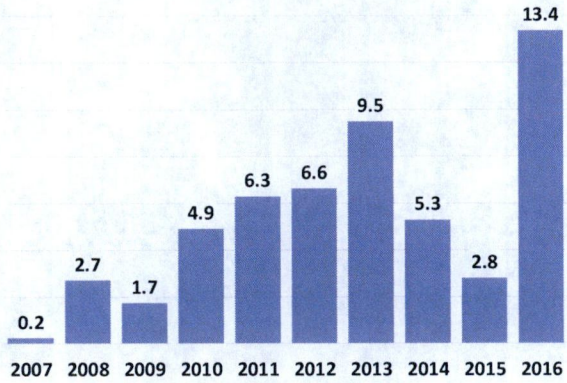
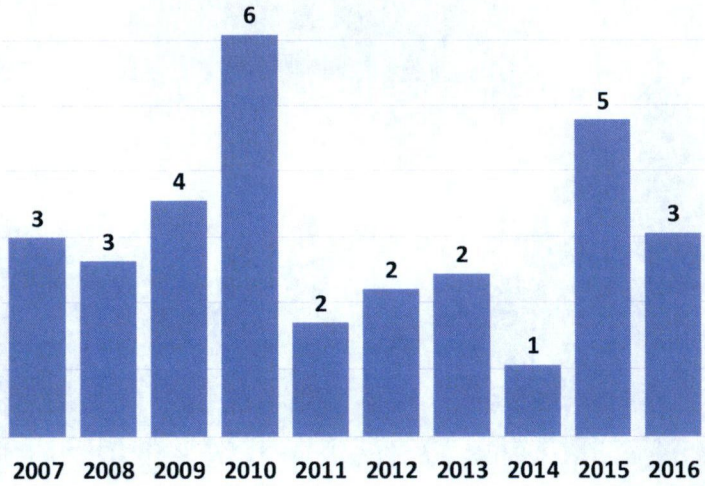


Figure 2-9 shows the miles of sanitary sewer collection main replaced. The average amount replaced from 2007 to 2016 has been 3 miles per year, or an average of 0.33% of the system inventory. The miles replaced have varied from 6 miles or 0.65% of the system inventory in 2010 to 1 mile or 0.11% in 2013.

Figure 2-9 Miles of Sanitary Sewer Collection Main Replaced



2.3.2.1.1.2 Reclaimed Water Distribution

Operating indicators for reclaimed water distribution are also tracked and reported.

Figure 2-10 shows the number of reclaimed water customers from 2007 to 2016. The amount reported was 11,153 accounts in 2009 and 11,022 accounts in 2016.

Figure 2-10 Reclaimed Water Customers

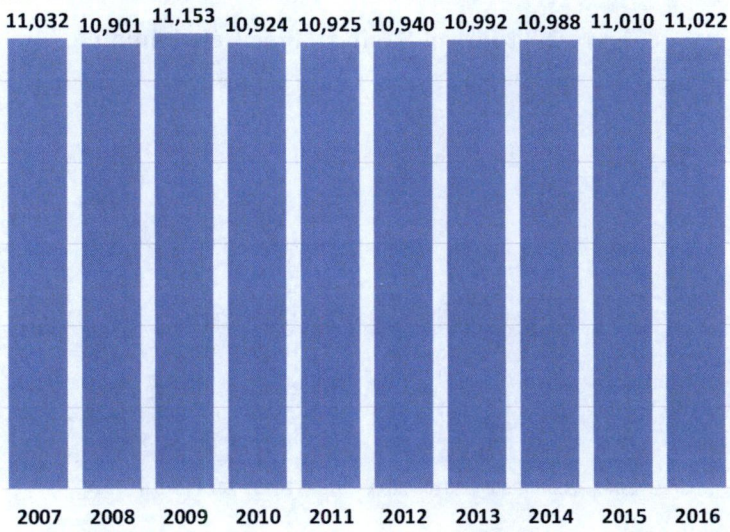
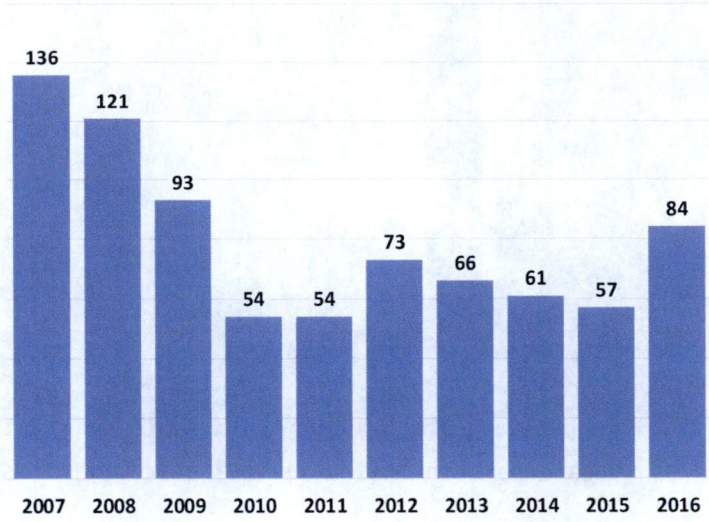


Figure 2-11 shows the number of new installs of reclaimed water from FY2007 through FY2016. The average annual new installs during this period was 80 customers. New installs have increased between 2010 and 2016 but are lower than FY 2007-2009, which were relatively dry rainfall years.

Figure 2-11 Reclaimed Water New Installs



2.3.2.2 *Water Maintenance*

Water Resources' Water Maintenance Department has a list of established activities and standard operating procedures (SOP). This list of activities can be found in various databases, including the WAM system.

Maintenance and repair work performed on water distribution assets have labor, equipment and materials associated with them, which are tracked to work orders and reported in the WAM database. Work done on routes such as meter/service maintenance, valve inspection/maintenance, as well as large meter field-testing are systematically recorded to specific assets.

The labor effort hours are also tracked and input to the Kronos system for payroll. Kronos is used to track the pay types of regular, overtime, and leave. Labor hours recorded in the Kronos system encompass the entire time to perform work, including both preparation, travel, and cleanup time. Labor hours that are input to WAM include only the time worked on a specific work order. Some of the activities performed by Water Maintenance include:

- Water System Pipeline Installation
- Vertical Adjustment of Water Main
- Main Repair
- Tap and meter Installation for Residential, Commercial and Fire Services ¾-Inch to 2-Inch
- Large Meter Installation
- Fire Hydrant Installation
- Fire Service Installation for Four to Ten-Inch Services
- Meter/Service Maintenance
- Fire Hydrant Inspection/Maintenance
- Valve Inspection/Maintenance (Smaller than 16-Inch)
- Trunk Main Valve Inspection/Maintenance (16-Inch and Larger)
- Large Meter Field Testing
- Backflow Preventer Testing and Repair
- Flushing and Disinfection of New Potable Water Fire Services or Water Meter Services
- Flushing and Disinfection of New Potable Water Mains
- Flushing of Dead-end Blowoffs and Dead-end Fire Hydrants
- Disinfection of Repaired Depressurized Mains
- Directional Drilling
- Shutting Down or Turning Off Water Mains 16" and Larger
- Turning on or Restoring Water Mains 16" or Larger to Service

Water Maintenance has also published a Water Distribution Operations and Maintenance Manual. Some major sections include: Organization, Standard Operating Procedures (SOPs), Water Quality, Safe Drinking Water Act (SDWA) Compliance, Emergency Planning, and Water

Systems and Maintenance Personnel Training. Each of the SOPs include activity name, procedure, and personnel & equipment to be used. This manual was revised in April of 2014.

In addition, Water Maintenance has a Repair and Maintenance Manual related to the 36" and 48" water transmission mains, which transport finished water from the Cosme Water Treatment facility to the pumping stations of Oberly and Washington Terrace. This manual was prepared and submitted by Greeley and Hansen LLC of Tampa, Florida in January of 2011. The manual's major sections include: General Information, Emergency Repair, and Maintenance. The maintenance section provides maintenance procedures, details of corrosion monitoring systems as well as details of both mains. The manual provides minimum requirements for the protection of the transmission mains at temporary construction traffic crossings.

2.3.2.2.1 Historical Operating Indicators

Water Resources track and report operating indicators for several accomplishments within the Department. Using this data, Figure 2-12 shows the historical percent of miles of water main replaced compared to the total inventory. The average percent of the inventory annually over the past ten years has been 0.61%, or 9.6 miles. Pipe replacement amounts have varied from 12.58 miles, or 0.8% in 2008, to 6.54 miles or 0.4% in 2013.

Figure 2-12 Percent of Water Main Replaced of Inventory

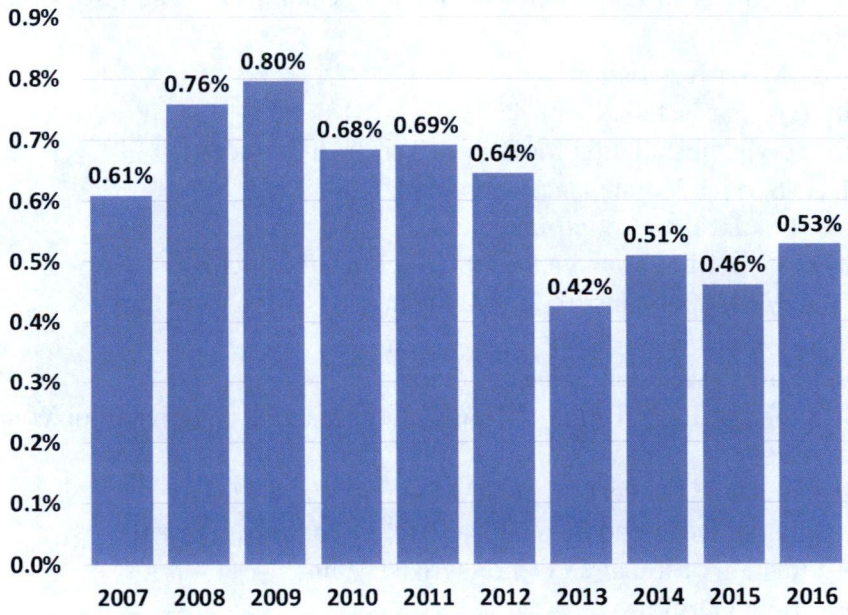
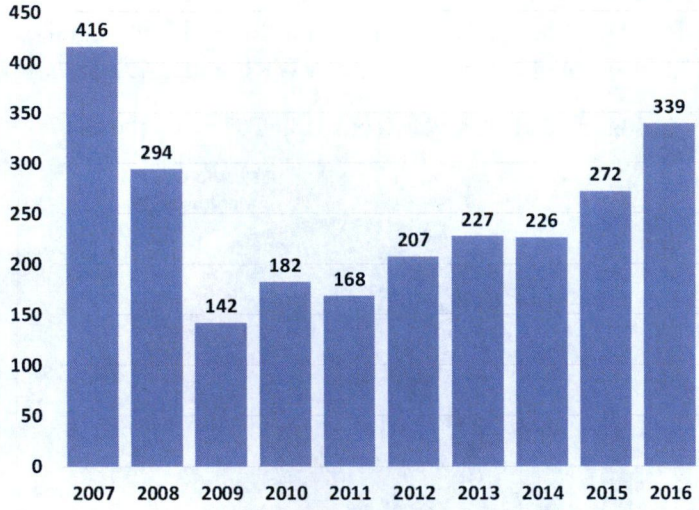


Figure 2-13 shows the number of new installs over the past ten years. Data indicates, new installs have more than doubled in the last six years, yet has not reached the 2007 level of 416 installs.

Figure 2-13 New Installs



2.3.2.3 *Environmental Compliance*

Water Resources' Environmental Compliance Division (ECD) is a laboratory environment that provides sampling and analysis for various groups within the City. From June 2016 to June of 2017, they accomplished one hundred and seventy-six projects. These activities include the sampling and analyses for WetChem (chemistry performed on samples in the liquid phase), Micro (microbiology), Nutrients (water nutrient levels), and Volatile Organics (human-made and naturally occurring chemical compounds that have high vapor pressure at ordinary room temperature).

During this same period, the ECD performed 13,224 samples and 41,353 analyses. Over the past five years, the ECD has averaged 21,125 samples and 44,387 analyses annually. Figure 2-14 shows the Department's historical samples and analyses. Majority of samples (34%) were Micro and the second most was WetChem at 24%.

Figure 2-14 Departmental Samples and Analyses

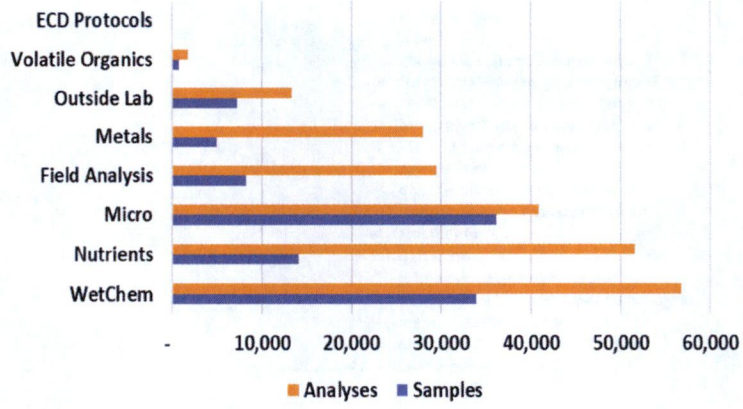
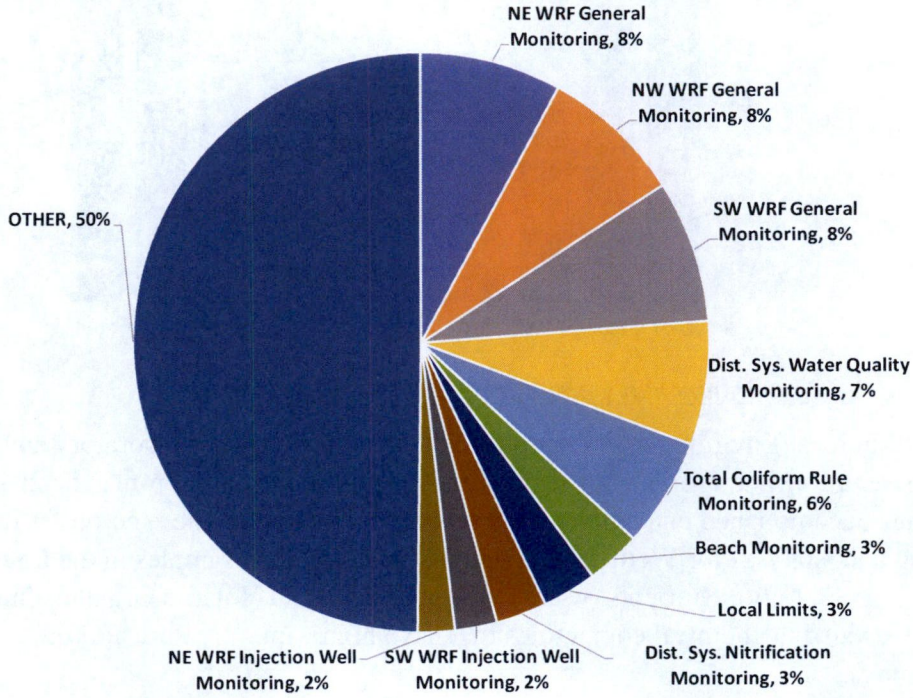


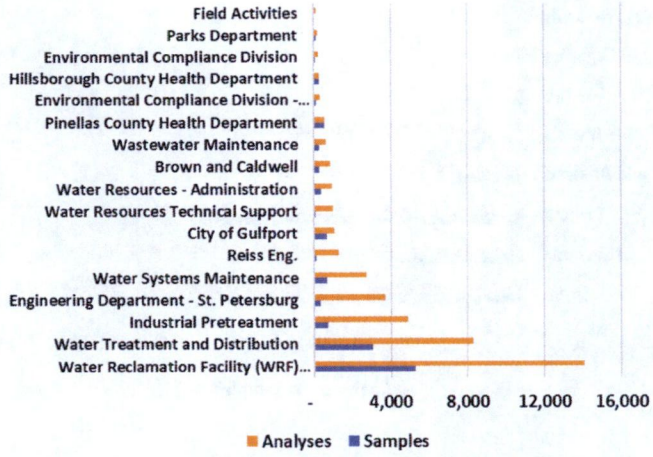
Figure 2-15 shows the percentage of projects by group from June 2016 through June 2017. The highest percentage of projects were performed for the water reclamation facilities - NEWRF, NWWRF, and SWWRF. The NEWRF had 1,478 samples and 2,616 analyses. The NWWRF had 1,480 samples and 2,614 analyses while the SWWRF had 1,473 samples and 2,606 analyses.

Figure 2-15 Projects from June 2016 to June 2017



ECD also performs sampling and analysis for internal groups and agencies outside of the City. Figure 2-16 shows the activities performed by each client. Some clients are external to the City including Reiss Engineering, the City of Gulf Port, Brown and Caldwell, Pinellas County Health Department, and Hillsborough County Health Department.

Figure 2-16 Clients from June 2016 to June 2017



Work performed by Environmental Specialists within the ECD have labor, equipment and some materials associated with them which some are input to the WAM database. Routes such as WRF general monitoring, water quality monitoring, and lift station monitoring are recorded to specific assets systematically, after the work is completed.

The ECD labor effort hours are also reported in the Kronos system for payroll. Kronos is used to track the pay types of regular, overtime, and leave. Time recorded in the Kronos system includes the entire time to perform work, including both preparation and travel time. Labor time that is entered in WAM is only the time worked on a specific work order. Some of the activities performed by the Environmental Compliance Division include:

- WRF General Monitoring
- Water Quality Monitoring
- Total Coliform Rule Monitoring
- Beach Monitoring
- Dist. Sys. Nitrification Monitoring
- WRF Injection Well Monitoring
- Lift Station Monitoring
- Healthy Beaches
- Surface Water Monitoring
- Reuse Ground Water Monitoring
- WRF Biosolids Monitoring
- Protozoa Monitoring
- Storage Tank Monitoring

2.3.2.4 Technical Support

The Technical Support Division provides a variety of support functions for the Water Resources Department. This includes technical data compilation, permitting, hydrological analysis, contract management and inspection, water conservation coordination, and utility locates. The following are examples of some, but not all, of the activities performed within this Division.

- Maintenance/Replacement Projects with design costs less than $50k, consultant without A/E agreement
- Asset Verification - preventive maintenance work orders for valves
- Maintenance/Replacement Projects when construction will be performed by contractors
- Funded Projects
- Easement Clearing Procedures
- Hydrant Database
- Intersection Drawing Creation and Updates
- Utility Locating -Daily Work Flow
- Asset Verification - Utility Locating -End of Day
- Utility Location -Vehicle and Equipment Maintenance
- Utility Locators -Documenting Mapping Errors
- Utility Locating -On Site

- Utility Locating -General Routing Goals
- Maintenance/Replacement Projects with design costs less than $100k, consultant with A/E agreement
- Modeling Process for System Capacity & Performance Analysis
- New Water Main Installations That Do Not Require Permitting
- As-built Drawing Process
- Public Records Request - GIS General Information
- Processing Potable Water Main Certificates of Construction Completion
- Maintenance/Replacement Projects when construction will be performed by WRD

2.3.2.5 Business Services

The Business Services Division also provides a variety of support functions for the Water Resources Department including budget oversight of capital outlays, operational spending, human resources, and customer relations. The Departments Customer Service Coordinators are found within this Division. This group is often the first point of contact a customer will have with the Department. They receive customer calls and coordinate the dispatch of resources.

2.3.2.6 ASM Computer Resources

ASM Computer Resources also provides a variety of support functions for the Water Resources Department. They supply support for writing reports to query information from WAM/Oracle/GIS and the maintenance of these databases, GIS database maintenance of water and wastewater assets, including but not limited to pumps, hydrants, most valves, meters, manholes, backflows, and cleanouts, and oversight and maintenance of the Department's SCADA systems.

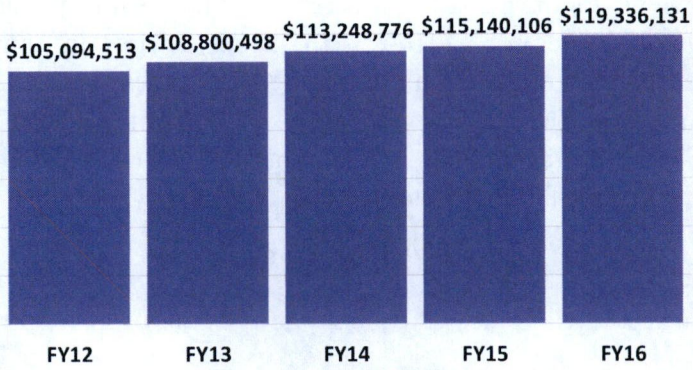
2.3.3 Budget

The Water Resources Department within the City of St. Petersburg operates as an enterprise fund. The revenues are collected related to the production and distribution of water, wastewater collection and treatment and reclaimed water utility fees.

Enterprise funds are used to account for operations that are financed and operated in a manner like private sector enterprise and it is the intent of the City that the costs (including depreciation) of providing goods or services to the public be financed or recovered primarily through user charges.

The FY2016 Department budget was $119,336,131, which was an increase of $4,196,025 or 3.64% over the FY2015 budget. The budget has averaged $112.3 million over the past five years. Figure 2-17 shows the historical budget over the past five years.

Figure 2-17 Water Resources' Historical Budget



2.3.3.1 Salaries and Wages, and Benefits

For salaries and wages, the FY2016 budget was $16,075,399, which was an increase of $1,192,474 or 8.01% over the FY2015 budget. Salaries and wages have averaged $15.7 million over the past five years.

Figure 2-18 shows the historical budget for salaries and wages with FY 2016 levels reaching FY2013.

Figure 2-18 Salaries and Wages' Historical Budget

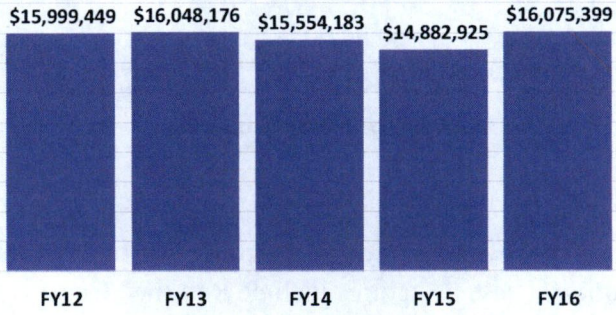
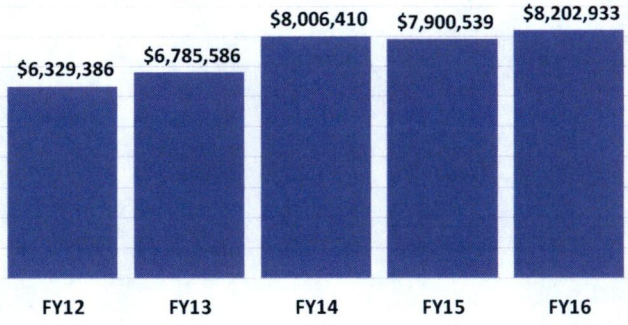


Figure 2-19 shows the historical budget for benefits over the past five years. Budgeted benefits also increased slightly, $302,394 or 3.83% last year and have had a 29% change since FY12.

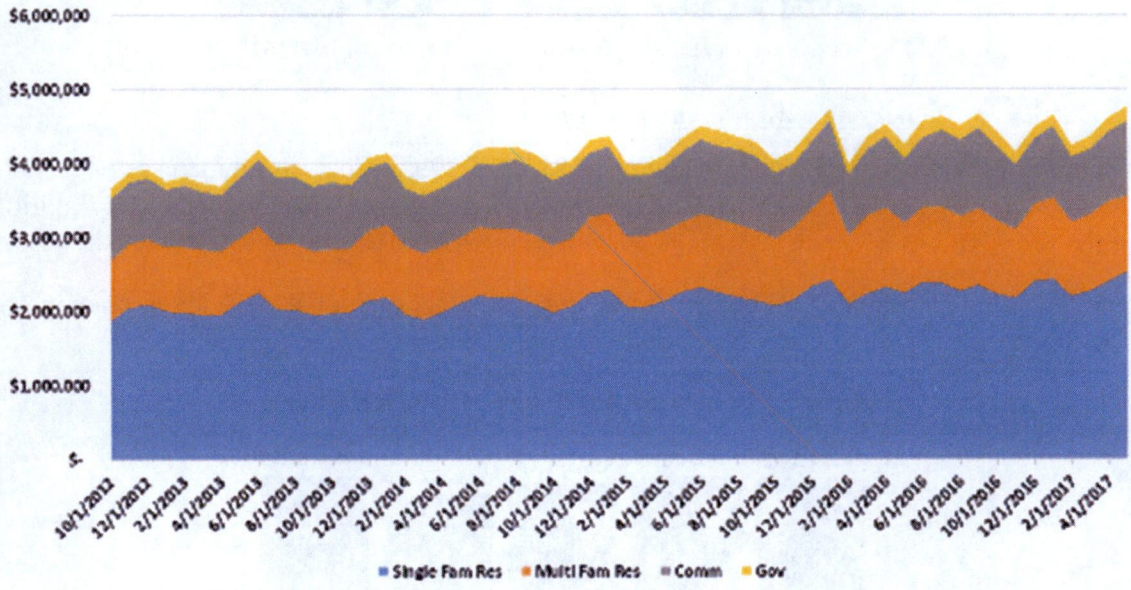
Figure 2-19 Benefits' Historical Budget



2.3.3.2 *Water Billing Revenue*

A major source of revenue for the Department is related to the treatment and distribution of water. The total billing for water in FY2016 was $52,982,240. The total annual billing for water revenue has increased 14.1% from $46.4 million in FY2013 to nearly $53 million in FY2016. In FY2016, Single Family Residents made up the largest portion of revenue at 51%. This is followed by Multi-Family Residence at 23.1%, Commercial at 21.3% and Governmental at 4%. Figure 2-20 shows the historical billed water revenue by category.

Figure 2-20 Billed Water Revenue

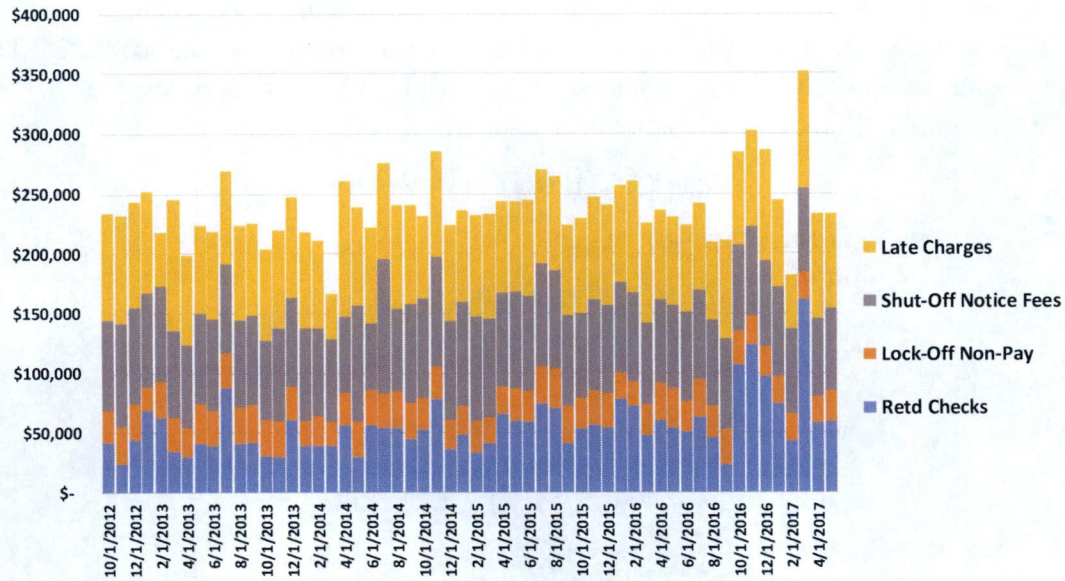


2.3.3.2.1 *Miscellaneous Amounts Billed*

The Department also receives revenues through the collection of other miscellaneous charges related to water distribution. These categories include Returned Checks, Lock-Off Non-Pay, Shut-Off Notice Fees and Late Charges. The total miscellaneous billed in FY2016 was $2,811,882. The highest percentage was for Late Charges at 33.6%, Shut-Off Notice Fees at 31.3%, Returned Checks at 23.5%, and Lock-Off Non-Pay at 11.6%.

Figure 2-21 shows the historical billed miscellaneous revenue by category with range of 175,000 to 350,000 monthly with average around $250,000. In March 2017, a large amount of returned checks impacted and increased the amount to $350,000.

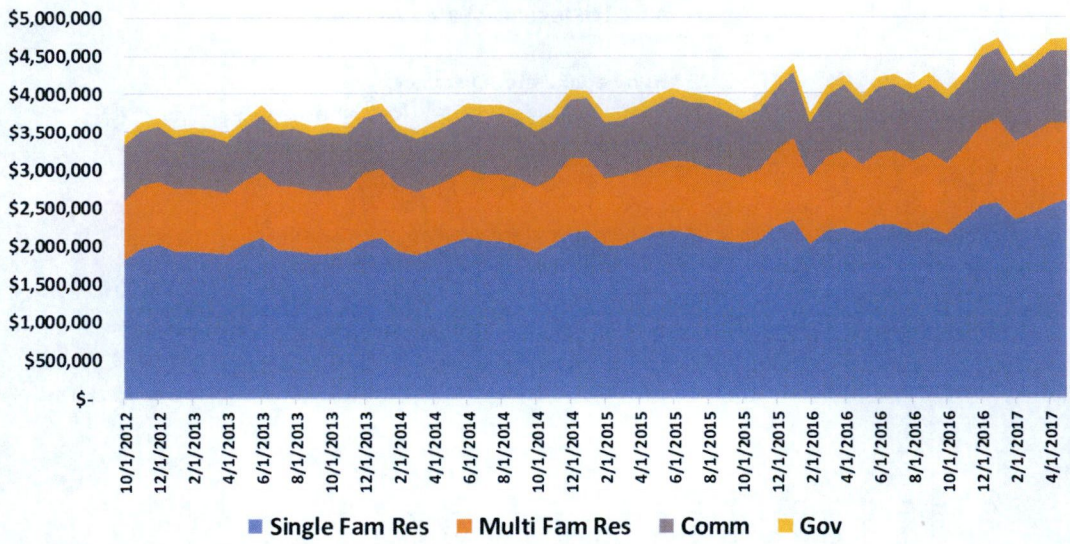
Figure 2-21 Miscellaneous Revenue



2.3.3.2.2 Wastewater Billing Revenue

Another major source of revenue for the Department is related to collection of wastewater assessments. The total billing in FY2016 was $49,174,843. The total annual billing revenue has increased 13.6.1% from $43.3 million in FY2013 to more than $49 million in FY2016. In FY2016, Single Family Residents made up the largest portion at 53.3% which is followed by Multi-Family Residence at 23.3%. Commercial comes in at 20.5% and Governmental at 2.9%. Figure 2-22 shows the historical billed revenue by category.

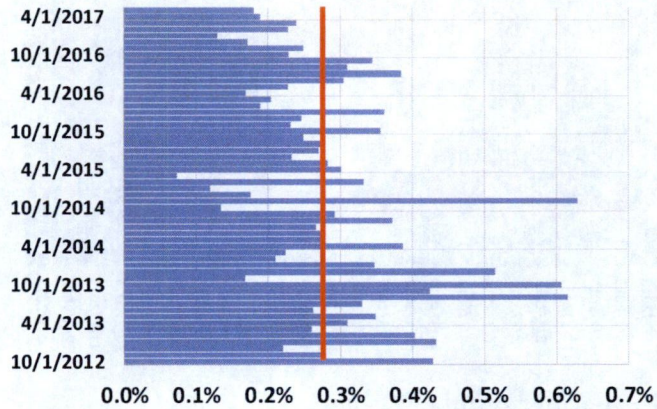
Figure 2-22 Billed Wastewater Revenue



2.3.3.2.3 Write-Off Percent of Billed Revenue

In some circumstances accounts or billed revenue will be written off, as they cannot be collected. Over the past five years, write-offs have averaged less than 1% of the revenues collected. The average monthly write-offs have been $40,667 with considerable variance of less than 0.1 % to over 0.6%. Figure 2-23 shows the historical write-offs.

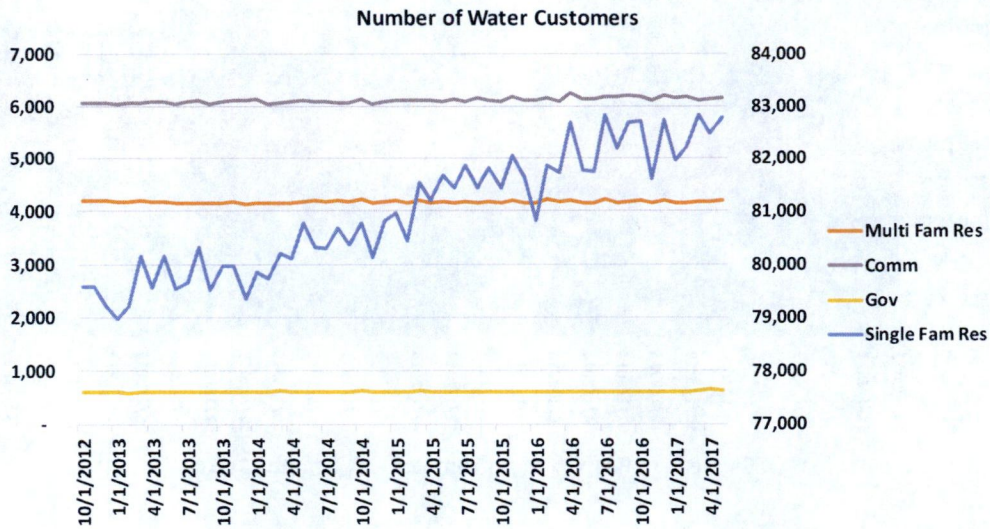
Figure 2-23 Historical Write-Offs



2.3.3.3 Water Accounts

The City has over 93,000 active water service accounts with most the accounts for Single Family Residential customers at 82,731 or 88% of the total. The account categories are shown in Figure 2-24 with two scales with the right unit's scale being residential and left are the other three groups. Commercial accounts for 6.6%, Multi-Family Residential 4.4%, and Governmental 0.7%. Overall water customer accounts increased 3.6% from 90,461 in October of 2012 to 93,657 in June of 2017.

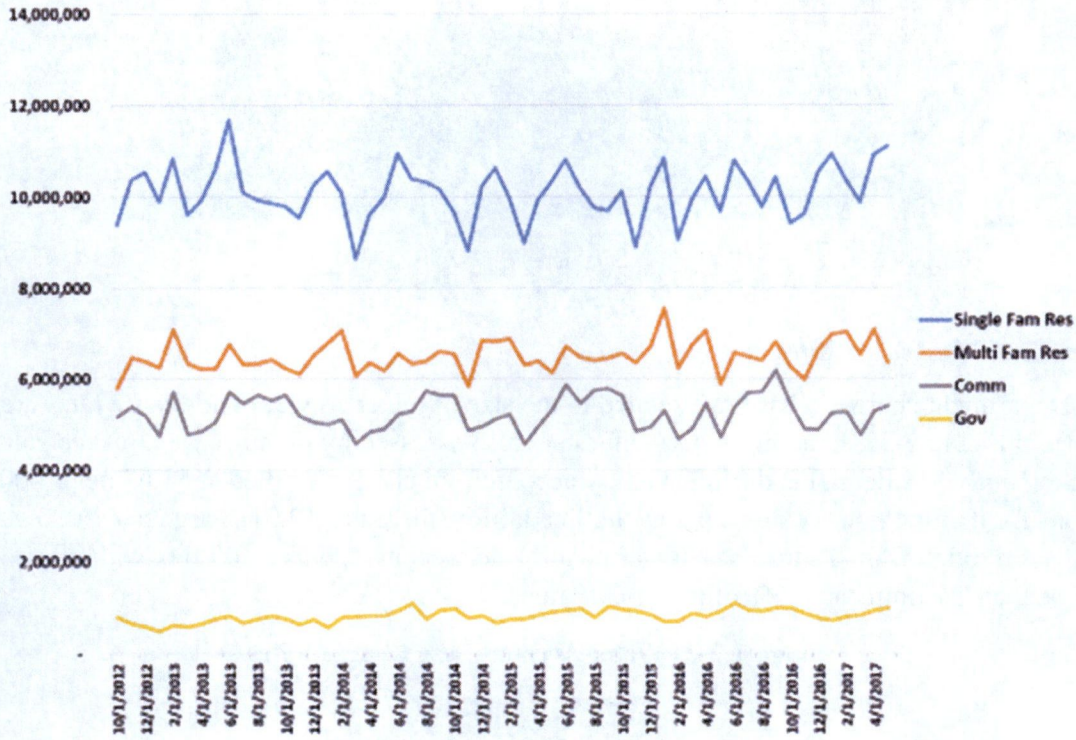
Figure 2-24 Historical Water Accounts



2.3.3.3.1 Average Daily Water Consumption (Gallons)

Average daily water consumption between October 1, 2012 and April 1, 2017 was 22,661,903 gallons. Single Family's averaged just under 10 million gallons of the total or 45%, Multi-Family's averaged 6.5 million or 29%, Commercial consumption was at 5.2 million or 23%, and Government was at 0.81 million or 4%. Figure 2-25 shows the historical average daily water consumption by category, which shows relatively consistent usage.

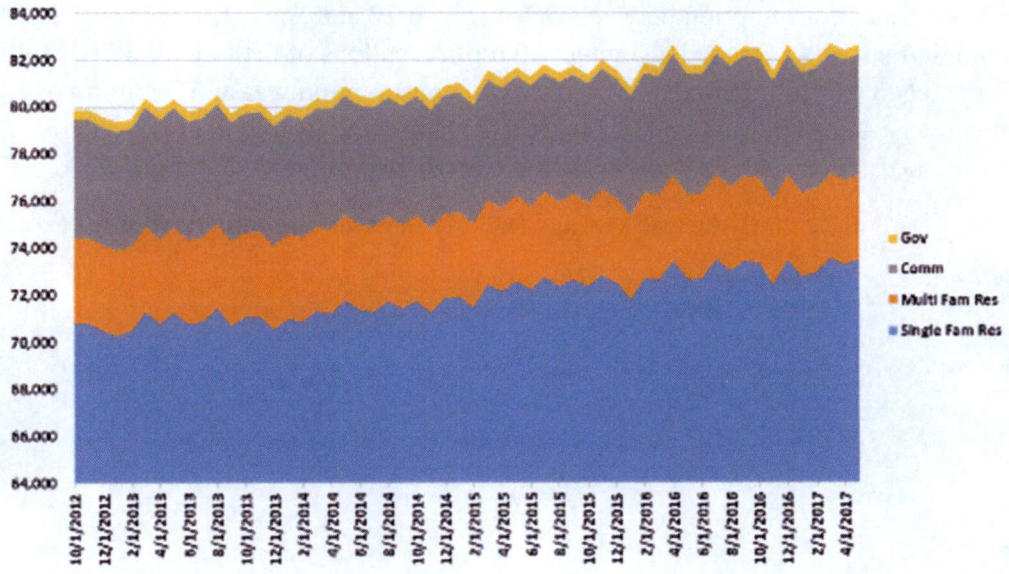
Figure 2-25 Historical Average Daily Water Consumption (Gallons)



2.3.3.4 Wastewater Accounts

The City has over 82,500 active wastewater accounts with the largest being for Single Family Residential at 73,445 or 89% of the total. The account categories are shown in Figure 2-26 with Commercial accounting for 6.2%, Multi-Family Residential 4.3%, and Governmental 0.5%. Wastewater customer accounts increased 3.4% from 79,876 in October of 2012 to 82,538 in June of 2017.

Figure 2-26 Historical Wastewater Accounts



2.3.3.5 *Water Rates*

The Department charges a base rate related to the size of meter service. These base rates are shown in Figure 2-27. In addition, usage fees are also assessed by monthly water usage values. Single Family Residential and Multi-Family accounts are currently billed at $1.67 per 1,000 gallons for the first 5,600 gallons per cycle. In addition, there is a $2.31 charge per 1,000 gallons that pass through from Tampa Bay Water on all water accounts, plus a 10% tax with rates outside the City limits at 125% of the in-City rate.

Figure 2-27 Water Account Base Charge Rates

Meter Size	Base Charge
5/8" x 3/4"	$ 11.01
1"	$ 27.52
1.5"	$ 55.04
2"	$ 88.06
3"	$ 176.13
4"	$ 275.20
6"	$ 550.39
8"	$ 880.63
10"	$ 1,265.91
12"	$ 2,366.69

The usage rates are shown in Figure 2-28. All other accounts are billed at $2.91 per billing unit for all water consumed. The graphic shows rates are adjusted based on usage.

Figure 2-28 Residential and Multi-Family Usage Rates

Single family dwelling:	Per 1,000 gallons	Multi- family dwelling:	Per 1,000 gallons
First 5,600 gallons	$1.67	First 5,600 gallons	$1.67
Next 2,400 gallons	$2.69	Next 2,400 gallons	$2.69
Next 7,000 gallons	$4.48	Next 7,000 gallons	$4.48
Next 5,000 gallons	$6.66	Over 15,000 gallons	$6.66
Over 20,000 gallons	$15.64		

Commercial accounts are assessed at $1.67 per 1,000 gallons up to the account's average. The usage rates for Commercial accounts are shown in Figure 2-29 where rates increase based on average usage amounts. For new commercial customers without previous consumption history, the lowest block rate will be utilized until a 12-month period between October and September is completed. A commercial customer experiencing changed business conditions that would necessitate a revised calculation of the monthly average may request a water audit by the City. The City may calculate a new average based on that audit.

Figure 2-29 Commercial Usage Rates

Commercial *	Per 1,000 gallons
Up to average	$1.67
Average - 1.4 x average	$3.13
1.4 to 1.8 x average	$4.48
Over 1.8 x average	$5.69

2.3.3.6 Wastewater Rates

The Department charges a base rate related to the size of the meter for wastewater. These base rates are shown in Figure 2-30. In addition, usage fees are also assessed by monthly volume. The City assesses $5.24 for each 1,000 gallons registered on the meter along with a 10% tax with rates outside the City limits of 125% of the in-City rate shown in Figure 2-30.

Figure 2-30 Wastewater Account Base Charge Rates

Meter Size	Base Charge
5/8" x 3/4"	$13.66
1"	$34.16
1.5"	$68.32
2"	$109.31
3"	$218.62
4"	$341.60
6"	$683.19
8"	$1,093.11
10"	$1,571.35
12"	$2,937.73

2.3.3.7 *Reclaimed Water & Irrigation Rates*

The Department also has available reclaimed water for residential and commercial use. There is both metered and unmetered service. Metered service is $0.60 per 1,000 gallons and a minimum charge of $21.29 for the billing cycle plus a 10% tax with rates outside the city limits of 125% of the in-City rate. For unmetered service, the rate is $21.29 for one acre or less and $12.20 for each additional acre, plus a 10% tax with rates outside the city limits of 125% of the in-City rate. Reclaimed water service is not available in all areas. Figure 2-31 shows the irrigation only service rates.

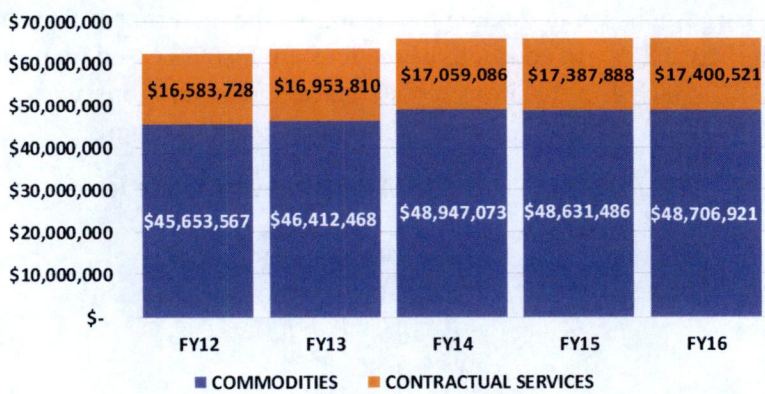
Figure 2-31 Irrigation Water Rates

New Irrigation Only Service	
Meter Size (inches)	**Connection Charges**
5/8" or 3/4"	$ 756.00
1"	$ 870.00
1 1/2"	$ 2,515.00

2.3.4 Contracted Services and Commodities

Water Resources also uses contracted services to provide goods and services for the repair and maintenance of the City's assets. Contracts are used to supplement maintenance work and to provide needed materials for internal repairs. Contracted services have averaged $17 million and commodities have averaged $47.6 million over the past five years. As shown in Figure 2-32 each have remained relatively consistent with a value of $63.2 million in FY2012 to $66.1 million in FY2016.

Figure 2-32 Historical Contracted Services and Commodities

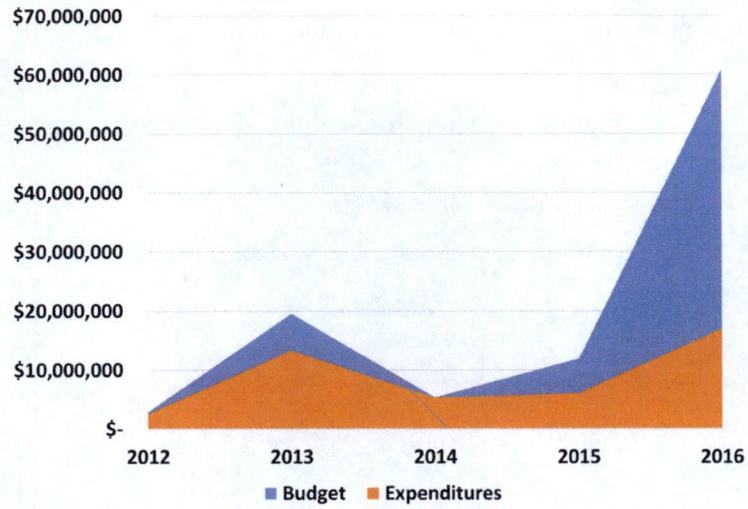


2.3.5 Capital Improvement

A Capital Improvement Plan (CIP) is a plan to provide for the rehabilitation or replacement of existing public facilities and assets, and for the construction or acquisition of new ones. The CIP for the Department is adopted each year and is used as a guide for the following five (5) years. The fund is financed from user fees and other enterprise revenues. Figure 2-33 shows the overall

Department's CIP budget historically (blue) with the CIP expenditure in orange. The CIP budget has averaged approximately $20 million and the Department EIP expenditures has averaged $8.8 million. Further, the Department has expended an average of 66% of the CIP budget over the past five years. In 2016, the Department expended 28% of the CIP budget allocated.

Figure 2-33 Historical CIP Budget



2.3.6 Objective Measures and Indicators

Performance measures are often used to measure the progress of a defined budget and an organization's operational goals. This may be measured in terms of work accomplished, such as number of meters read, or in terms of productivity, such as 10 feet of water line installed per labor hour. Utilizing performance measures provides an organization with measurable goals that relate directly to funding and budget programs.

The Water Resources Department appears to lack use of short-term performance measures for reporting and monitoring on a systematic weekly or monthly basis, yet key accomplishments are reported in their annual budget documents. Figure 2-34 shows the performance measures reported in the annual budget documents.

Figure 2-34 Performance Measures

Performance Measure	2013 Actuals	2014 Actuals	2015 Actuals	2016 Estimates	2017 Forecast Target
Customer Feedback *% of Customers*					
Reclaimed Water Pressure	.21%	.27%	.32%	.82%	0
Water Quality	.06%	.06%	.14%	.14%	0
Sanitary Sewer Overflows	6	11	18	12	0
Potable Water Consumption *(mgd)*	80	80	82	79	79
Reclaimed Water Usage *(mgd)*	16.34	16	16	18	16
Residential Customer in Lowest Tier *Gallon/Day %*	82%	82%	81	81	81

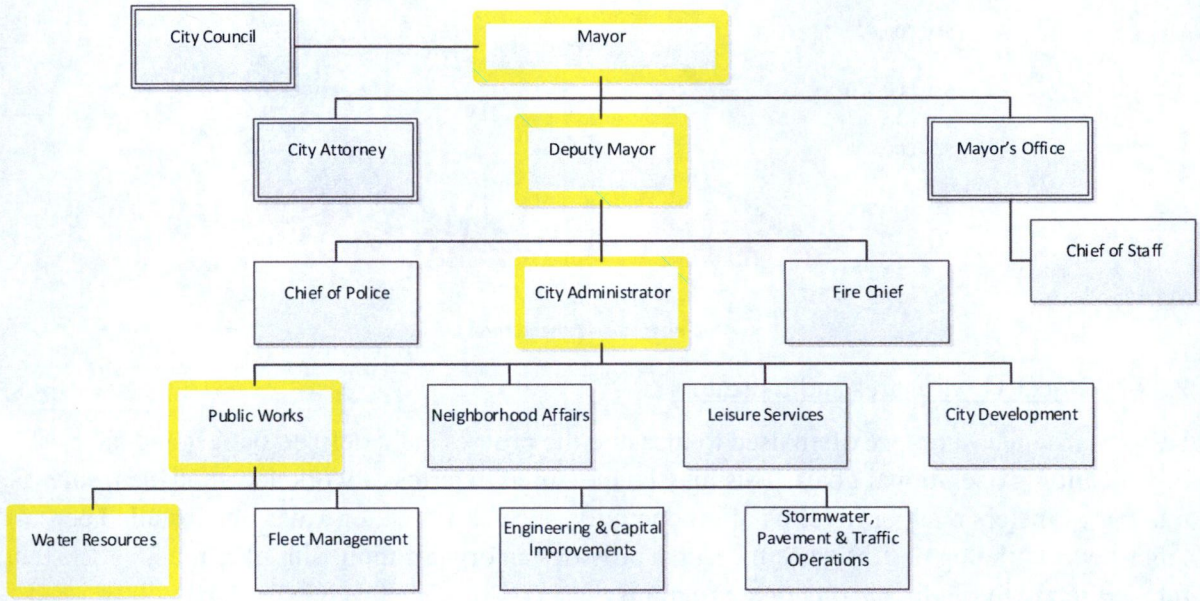
2.4 Organizing

2.4.1 Organization Structure

2.4.1.1 City of St. Petersburg

The Water Resource Department has four levels of management above the Department's Interim-Director, including the Water Resources Administrator, City Administrator, Deputy Mayor, and Mayor. This organizational structure is shown in Figure 2-35 with yellow boxes showing those levels.

Figure 2-35 City Organizational Structure



2.4.1.2 Water Resources Department

The Department is led by an Interim-Director with fifteen (15) direct reports. These include: eight Division Managers, a WAM Senior Operations Analyst (*new for 2018*), a Senior Wastewater Manager (*currently vacant*), an Administrative Secretary, a Senior Operations Analyst, the Safety & Training Officer, an Information Specialist II, and an Operations Analyst (*part-time*) with a span of control of 1:15. The Interim-Director reports to the Water Resources Administrator. The span of control for the Senior Operations Analyst is 1:3. Five staff have been recently transferred to Engineering with thirty new positions proposed for the new budget year. The Division Manager's span of control ranges from 1:2 to 1:9. The organizational chart in Section 5 – the Appendix shows the organizational structure of the Department at the time of the initial evaluation of which the highlights indicate Division Managers.

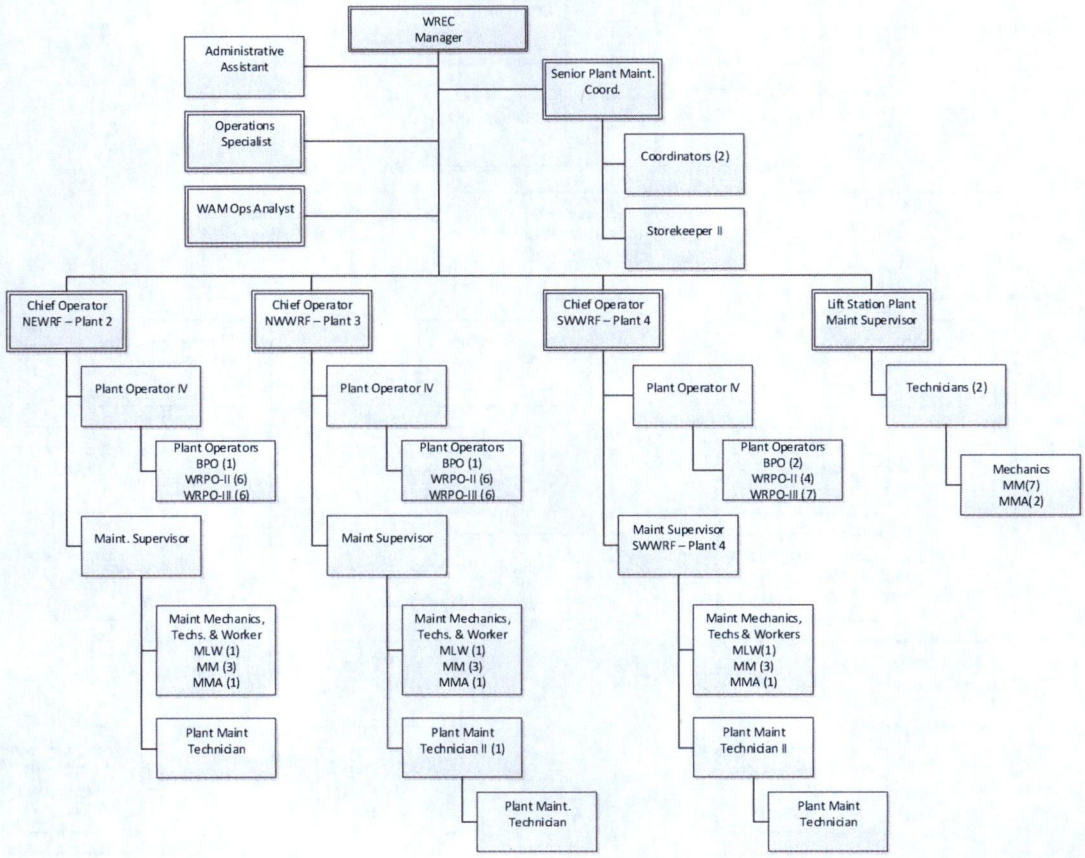
2.4.1.3 Water Reclamation Facilities Division

The Water Reclamation Facilities Division is responsible for the City's four wastewater reclamation facilities, including the Northeast Water Reclamation Facility (NEWRF), Northwest Water Reclamation Facility (NWWRF), and Southwest Water Reclamation Facility (SWWRF).

The Albert Whitted Water Reclamation Facility (AWWRF) is inactive but is monitored. The Department is also responsible for the City's eighty-one (81) lift stations.

The Division has eighty-five (85) budgeted positions and is led by the WREC Manager, with a span of control of 1:9. His direct reports include three Chief Operators with spans of control in the range of 1:11 to 1:14. The two Maintenance Supervisors have spans ranging from 1:6 to 1:12, a Lift Station Plant Maintenance Supervisor a span of control of 1:10 and a Senior Plant Maintenance Coordinator with a span of control of 1:2 along with an Administrative Assistant and Operations Specialist. The organizational structure of the Division is shown in Figure 2-36.

Figure 2-36 Water Reclamation Division Organizational Structure



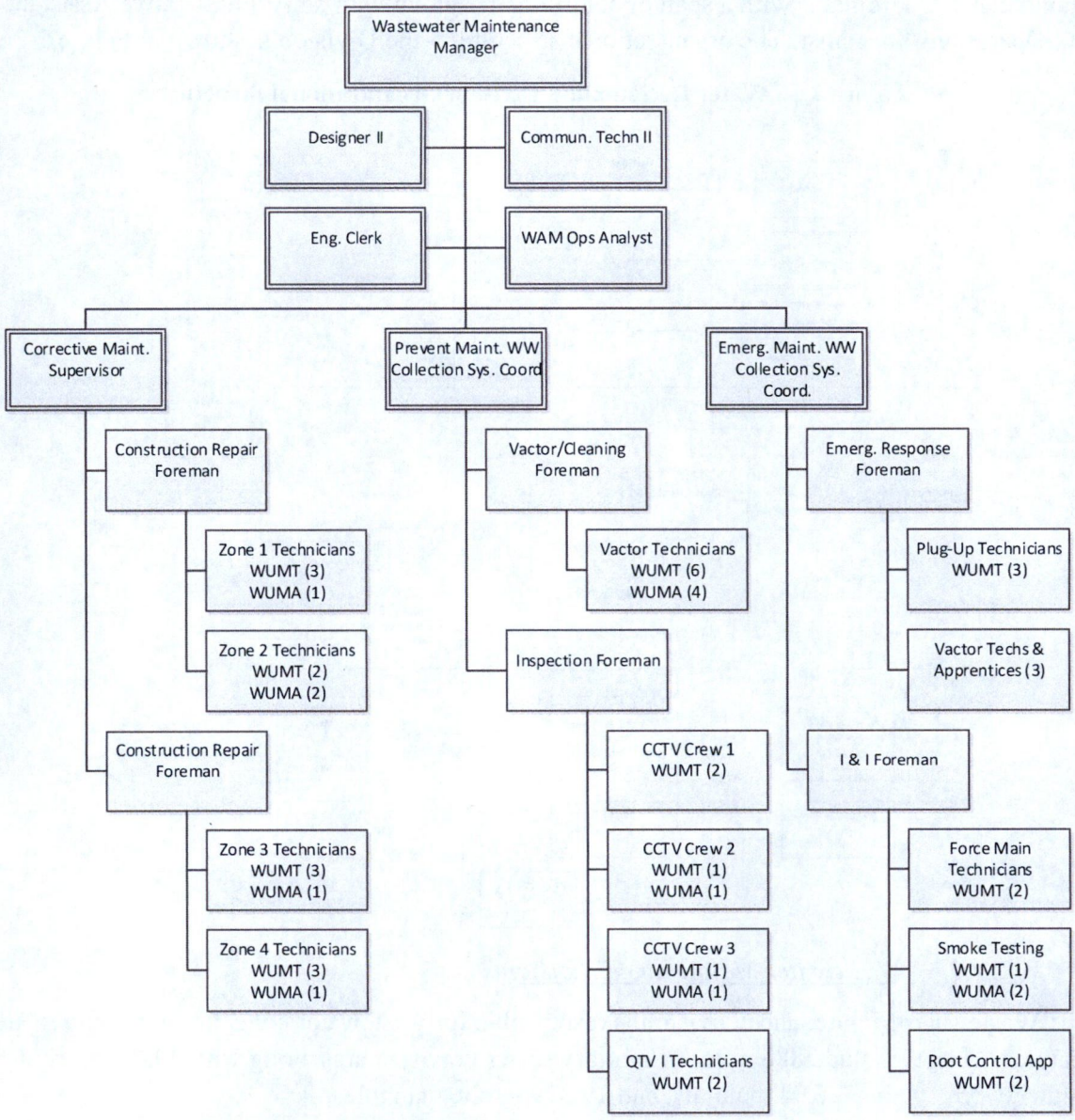
2.4.1.4 Wastewater Maintenance Division

The Wastewater Maintenance Division is responsible for wastewater collection lines and related features. Assets include 888 miles of sanitary sewer gravity mains along with 49.41 miles of sanitary force mains, 97,941 laterals, and 19,379 public manholes.

The Division has sixty (60) budgeted positions. The Division is led by the Wastewater Maintenance Manager, with a span of control of 1:7. His direct reports include a Corrective Maintenance Supervisor with a span of control of 1:2, a Preventive Maintenance Wastewater Collections System Coordinator with a span of control of 1:2, an Emergency Maintenance Wastewater Collection System Coordinator with a span of control of 1:4, and, an Engineering

Clerk, Communications Technician II and WAM Operations Analyst Specialist. Each of the Construction Repair Foreman's have spans of control of 1:8. The Vactor/Cleaning Foreman has a span of control of 1:8. The Emergency Response Foreman has a span of control of 1:3. The organizational structure of the Wastewater Maintenance Division is shown in Figure 2-37 with vacant positions in green.

Figure 2-37 Wastewater Maintenance Division Organizational Structure



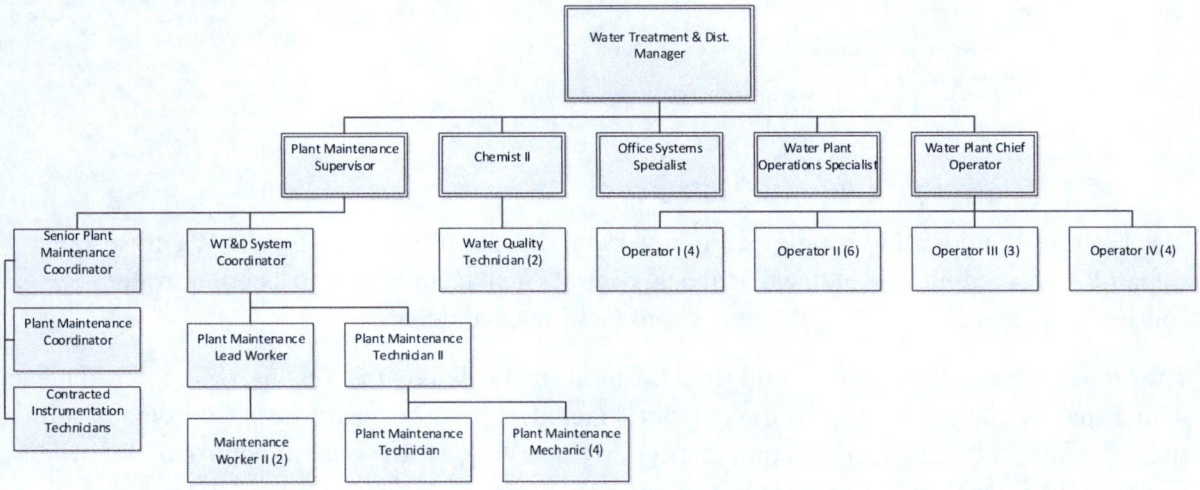
2.4.1.5 Water Treatment and Distribution Division

The Water Treatment & Distribution Division is responsible for the Cosme Water Treatment Facility and Oberly Pump and Washington Terrace Pumping Stations. In addition, assets include

one elevated water tank, five remote pressure-monitoring sites, six remote water quality-monitoring sites and all associated site assets.

The Division has thirty-six (36) budgeted positions. It is led by the Water Treatment & Distribution Manager, with a span of control of 1:5. Her direct reports include: The Water Plant Chief Operator with a span of control of 1:4, a Plant Maintenance Supervisor with a span of control of 1:2, a Chemist II with a span of control of 1:1, a Water Plant Operations Specialist, and an Office Systems Specialist. The Water Treatment & Distribution Coordinator's span of control is 1:2, the Senior Plant Maintenance Coordinator's span of control is 1:2, the Plant Maintenance Lead Worker's span of control is 1:2, and the Plant Maintenance Technicians II's span of control is 1:5. The organizational structure of the Water Treatment & Distribution Division is shown in Figure 2-38.

Figure 2-38 Water Treatment & Distribution Organizational Structure

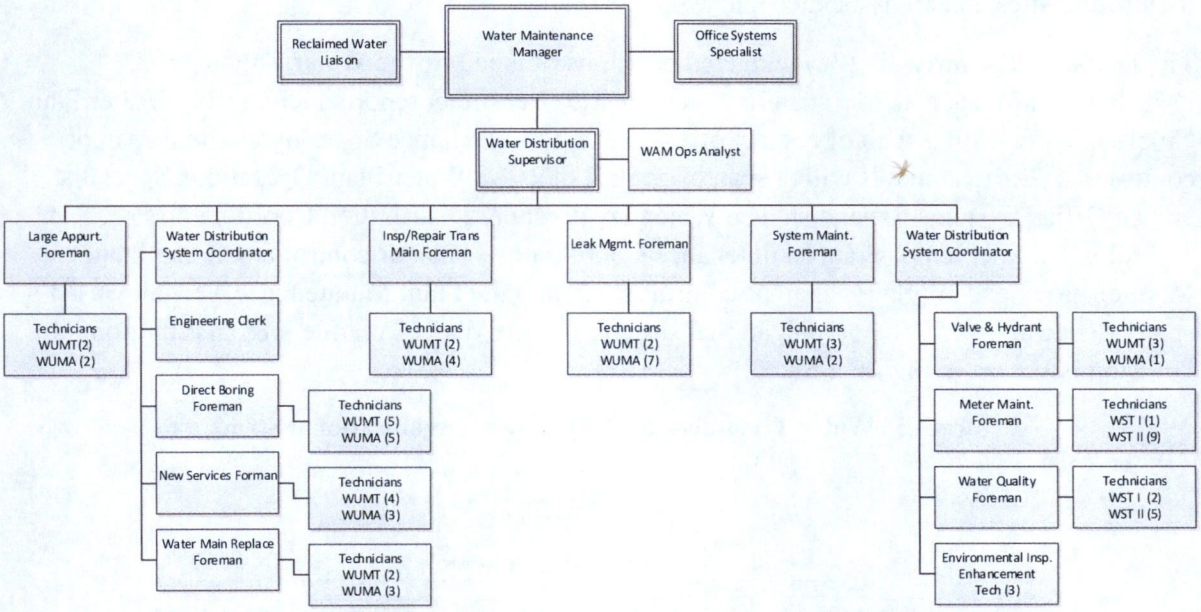


2.4.1.6 Water Maintenance Division

The Water Maintenance Division is responsible for the water distribution system consisting of 1,543 miles of water main, 6,481 fire hydrants, 32,060 valves and other related assets including the 287-mile reclaimed water distribution system with 4,376 valves and 312 hydrants.

The Division has eighty-two (82) budgeted positions. It is led by the Water Maintenance Manager with a span of control of 1:2. His direct reports include a Water Distribution Supervisor with a span of control of 1:2 and an Office Systems Specialist. There are two Water Distribution System Coordinators with spans of control of 1:3 and 1:4. The Direct Boring Foreman's span of control is 1:10. The New Services Foreman's span of control is 1:7. The Water Main Replace Foreman's span of control is 1:4. The Insp/Repair Trans Main Foreman's span of control is 1:6. The Leak Management Foreman's span of control is 1:9. The System Maintenance Foreman's span of control is 1:5. The Large Apertures Foreman and Valve & Hydrant Foreman's spans of control are 1:4. The Water Quality Foreman's span of control is 1:7. The Meter Maintenance Foreman's span of control is 1:10. The organizational structure of the Water Maintenance Division is shown in Figure 2-39.

Figure 2-39 Water Maintenance Division Organizational Structure

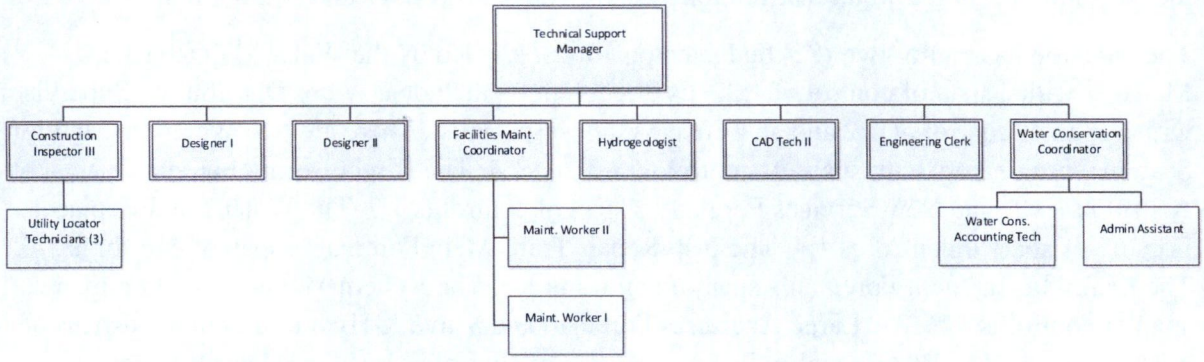


2.4.1.7 *Technical Support Division*

The Technical Support Division provides a variety of support functions for the Water Resources Department including hydrological analysis, contract management and inspection, water conservation coordination, utility locates, and facilities maintenance.

The Division has seventeen (17) budgeted positions and is led by the Technical Support Manager with a span of control of 1:8. His direct reports include a Water Conservation Coordinator with a span of control of 1:2, a Construction Inspection Supervisor with a span of control of 1:5, a Facilities Maintenance Coordinator with a span of control of 1:2, as well as a Water Resources Engineer, Hydrologist, Designer II, CAD Tech II, and an Engineering Clerk. The organizational structure of the Technical Support Division is shown in Figure 2-40.

Figure 2-40 Technical Support Division Organizational Structure

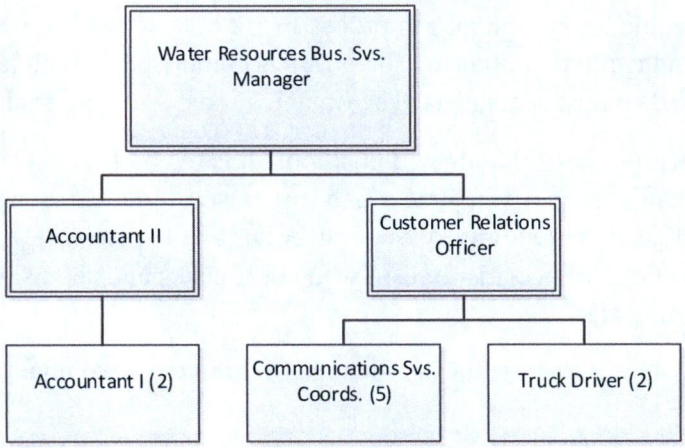


2.4.1.8 Business Services Division

The Business Services Division also provides a variety of support functions for the Water Resources Department including budget oversight of capital outlays, operational spending, and customer relations. The Departments Customer Service Coordinators are found within this Division. This group is often the first point of contact for a customer with the Department. They receive customer calls and coordinate the dispatch of resources.

The Division has eleven (11) budgeted positions, with two being part-time. It is led by the Water Resources Business Services Manager with a span of control of 1:2. Her direct reports include an Accountant II with a span of control of 1:1 and a Customer Relations Officer with a span of control of 1:8. The organizational structure of the Business Services Division is shown in Figure 2-41.

Figure 2-41 Business Services Division Organizational Structure

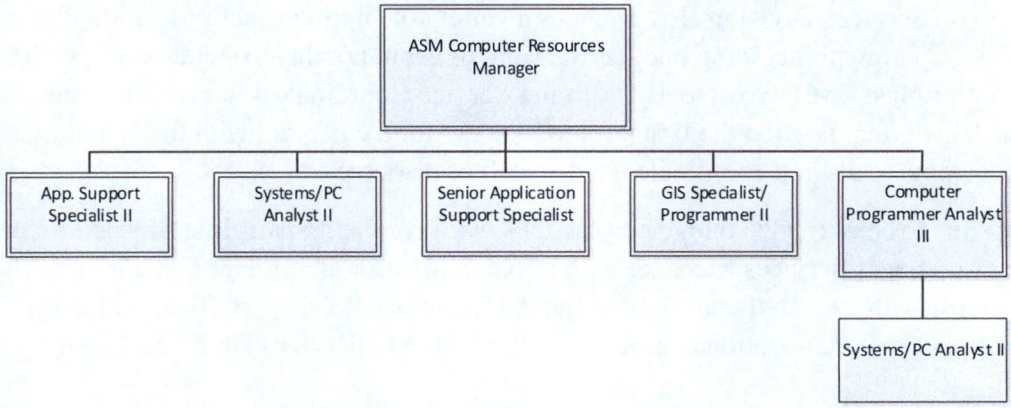


2.4.1.9 ASM Computer Resources Division

The ASM Computer Resources Division also provides a variety of support functions for the Water Resources Department. They supply support for writing reports to query information from WAM/Oracle/GIS and the maintenance of these databases, GIS database maintenance of water and wastewater assets, including but not limited to pumps, hydrants, most valves, meters, manholes, backflows, and cleanouts, and oversight and maintenance of the Department's SCADA systems.

The Division has eight (8) budgeted positions. It is led by the ASM Computer Resources Business Services Manager, with a span of control of 1:8. Her direct reports include a Senior Application Specialist, GIS Specialist/Programmer I, Computer Programmer III, Systems/PC Analyst II, and an Application Support Specialist II. The organizational structure of the ASM Computer Resources Division is shown in Figure 2-42.

Figure 2-42 ASM Computer Resources Division Organizational Structure

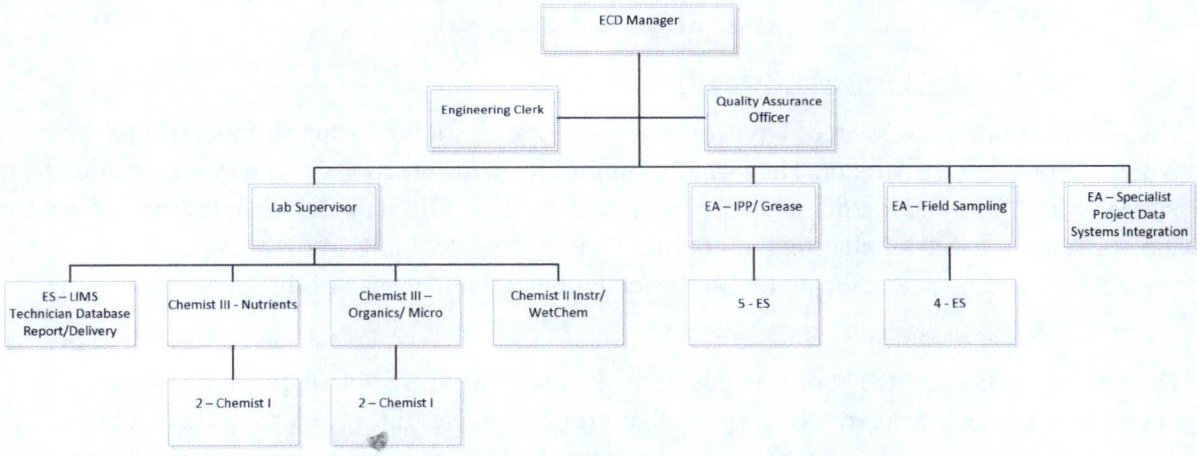


2.4.1.10 Environmental Compliance Division

This group is responsible for compliance in processes for both water and wastewater facilities as well as monitoring industrial compliance. The group is comprised of both laboratory professionals and field analyst/specialists. The organizational structure is shown in Figure 2-43.

The Division has twenty-five (25) budgeted positions. It is led by the ECD Manager, with a span of control of 1:6. His direct reports include a Lab supervisor, three EAs, engineer clerk and a quality assurance officer. The Laboratory Supervisor has a 1:4 span while Chemist -III have 1:2. The EAs have 1:4 while EA Specialist liaison who coordinates and setups projects along with the website has no reporting staff.

Figure 2-43 Environmental Compliance Division Organizational Structure



2.4.2 Resources

The resources used by the Water Resources Department are separated amongst several locations, including the Administrative Complex located at 3rd Ave N, St., in St. Petersburg, the Cosme Water Treatment Facility located at located at 16015 Racetrack Road, in Odessa, the two Pumping Stations of Oberly and Washington Terrace, located at 66th Street North, in St.

Petersburg and 2801 66th Avenue North, St. Petersburg respectively, and the three Water Reclamation Facilities.

The labor, equipment and material resources were summarized in the following section for the Divisions of WREC, Wastewater Maintenance, Water Treatment & Distribution, Water Maintenance, Environmental Compliance, Technical Support, Business Services, and ASM Computer Resources.

2.4.2.1 Labor

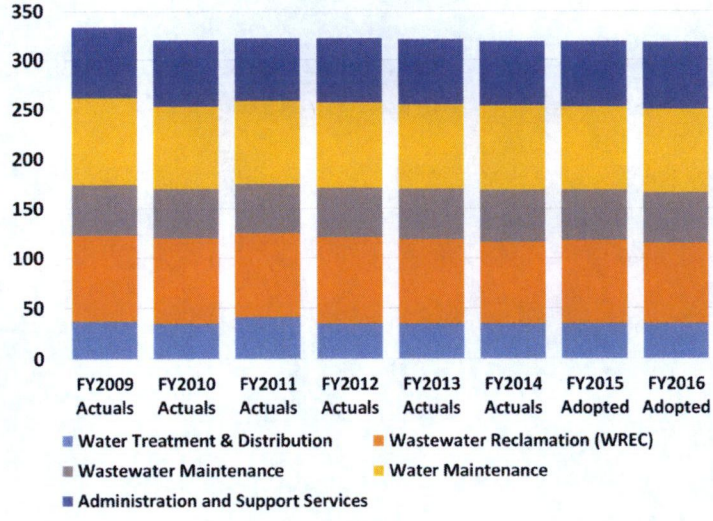
The Water Resources Department of the City of St. Petersburg currently has just over 320 budgeted full-time positions. This includes thirty-nine (39) in Water Treatment & Distribution, eighty-six (86) in Water Reclamation (WREC), sixty-one (61) in Wastewater Maintenance, ninety-three (93) in Water Maintenance, eleven (11) in Business Services, eight (8) in ASM Computer Resources, twenty-five (25) in Environmental Compliance, seventeen (17) in Technical Support, and eleven (11) in Administration.

2.4.2.1.1 Historical Staffing

Water Resources has historically averaged over 324 FTEs including part-time staff, and currently has 324.9 FTEs.

Figure 2-44 shows the historical staffing for FTEs of the Water Resources Department by group with overall amounts being relatively constant since 2010. In FY 2009, the Department had 337 FTEs, in FY 2010 there were 323 FTEs and now in FY 2016 it budgeted 321. During that timeframe, Water Treatment & Distribution averaged thirty-six (36), Water Reclamation (WREC) averaged approximately eight-four (84), Wastewater Maintenance averaged fifty-one, Water Maintenance averaged eighty-five, and Administration and Support Services averaged just over sixty-seven. The Department has also utilized part-time staff equivalent to an average of just under two FTEs annually.

Figure 2-44 Historical Staffing Levels



2.4.2.1.2 Employee Classifications

There are currently three hundred twenty-four (324) employees in seventy-nine (79) classifications within the Water Resources Department. Water Treatment & Distribution has thirty-nine (39) employees in twenty-one (21) classifications. This is shown in Figure 2-45.

Figure 2-45 Water Treatment & Distribution Employee Classifications

Chemist II	1
Plant Maintenance Lead Worker	1
Maintenance Worker II	2
Manager, Water Treatment & Distribution	1
Office Systems Specialist	1
Plant Maintenance Coordinator	1
Plant Maintenance Mechanic	4
Plant Maintenance Supervisor	1
Plant Maintenance Technician	1
Senior Plant Maintenance Coordinator	1
Water Distribution Systems Coordinator	1
Water Plant Chief Operator	1
Water Plant Operations Specialist	1
Water Plant Operator I	4
Water Plant Operator II	6
Water Plant Operator III	3
Water Plant Operator IV	4
WAM Operations Analyst	1
Water Quality Technician	2
Plant Maintenance Technician II	1
Contracted Instrumentation Technician	1

The Water Maintenance Division has ninety-three (93) employees and twenty-three (23) classifications. This is shown in Figure 2-46 with four categories having 90% of the employees.

Figure 2-46 Water Maintenance Employee Classifications

Engineering Clerk	1
Manager, Water Maintenance	1
Office Systems Specialist	1
Reclaimed Water Liaison I	1
Water Distribution Supervisor	1
Water Distribution Systems Coordinator	2
Insp/Repair Trans Foreman	1
Valve & Hydrant Foreman	1
Direct Boring Foreman	1
Water Quality Foreman	1
Meter Maintenance Foreman	1
System Maintenance Foreman	1
Large Apparatus Foreman	1
Leak Management Foreman	1
Water Main Replacement Foreman	1
New Services Foreman	1
Trans. Main Maintenance & Leak Detect Foreman	1
Water Systems Technician I	3
Water Systems Technician II	14
Water Utilities Maintenance Apprentice	29
Water Utilities Maintenance Technician	23
Environmental Insp. Enhancement Tech	3
WAM Operations Analyst	1

Water Reclamation Facilities has eighty-five (85) employees and nineteen (19) classifications. This is shown in Figure 2-47 with most being either plant operators or mechanics.

Figure 2-47 WREC Employee Classifications

WREC Manager	1
Administrative Assistant	1
Operations Specialist	1
Plant Maintenance Mechanic	14
WAM Operations Analyst	1
Senior Plant Maintenance Coordinator	1
Coordinator	2
Storekeeper II	1
Chief Operator	3
Water Reclamation Plant Operator IV	3
Water Reclamation Plant Operator III	19
Water Reclamation Plant Operator II	16
Plant Maintenance Mechanic Apprentice	5
Maintenance Technician	5
Maintenance Supervisor	3
Water Reclamation Plant Operator I	3
Maintenance Lead Worker	3
Maintenance Worker II	1
Water Reclamation Plant Belt Press Operator	3

Wastewater Maintenance has sixty-one (61) employees and ten (10) classifications. This is shown in Figure 2-48 with half being wastewater utility maintenance workers.

Figure 2-48 Wastewater Maintenance Employee Classifications

Designer II	1
Communication Technician II	1
Engineering Clerk	1
Manager, Wastewater Maintenance	1
WAM Operations Analyst	1
Corrective Maintenance Supervisor	1
WW Collection Systems Coordinator	2
Foreman	6
Wastewater Utilities Maintenance Apprentice	15
Wastewater Utilities Maintenance Technician	31

As shown in Figure 2-49, Environmental Compliance has twenty-five (25) employees and ten (10) classifications. This group has laboratory staff who analyze the various samples using different processes to determine compliance and ten (10) environmental specialists who monitor, collect samples and deliver data to laboratory staff.

Figure 2-49 Environmental Compliance Employee Classifications

Chemist I	4
Chemist II	2
Chemist III	3
Engineering Clerk	1
Environmental Analyst	2
Environmental Specialist	10
Manager, Environmental Compliance (Acting)	1
Operations Analyst Specialist	1
Lab Supervisor	1
Pretreatment Coordinator	1

The other groups of Technical Support, Business Services, Administration and ASM Computer Resources are combined shown in Figure 2-50. As depicted there are thirty-eight (38) categories with twenty-three (23) having only one in the classification.

Figure 2-50 Other Employee Classifications

Accountant I	1
Accountant II	1
Administrative Secretary	1
CADD Technician II	1
Communications Service Coordinator	5
Construction Inspector III	1
Customer Relations Officer	1
Designer I	1
Designer II	2
Engineering Clerk	1
Facilities Maintenance Coordinator	1
Human Resources Clerk	3
Hydrogeologist	1
Information Specialist II	1
Interim Water Resources Director	1
Maintenance Worker II	1
Maintenance Worker I	1
Manager, Environmental Compliance	1
Manager, Technical Support	1
Manager, Water Resources Business Services	1
Manager, ASM Computer Resources	1
Office Systems Specialist	1
Operations Analyst (part-time)	1
Safety and Training Officer	1
Senior Operations Analyst	1
Truck Driver	2
Utility Locator Technician	3
Water Conservation Coordinator	1
Administrative Assistant	1
Administrative Secretary	1
Senior Wastewater Manager	1
WAM Senior Analyst	1
Water Conservation Accounting Technician	1
Senior Application Support Specialist	1
GIS Specialist/Programmer II	1
Computer Programmer Analyst III	1
System/PC Analyst II	3
Application Support Specialist	1

2.4.2.1.3 Length of Service

The staff has varying amounts of time working for the City. Figure 2-51 shows the average length of service by Division. The average length of service is approximately fifteen years, as shown by the red line.

Figure 2-51 Average Length of Service by Group

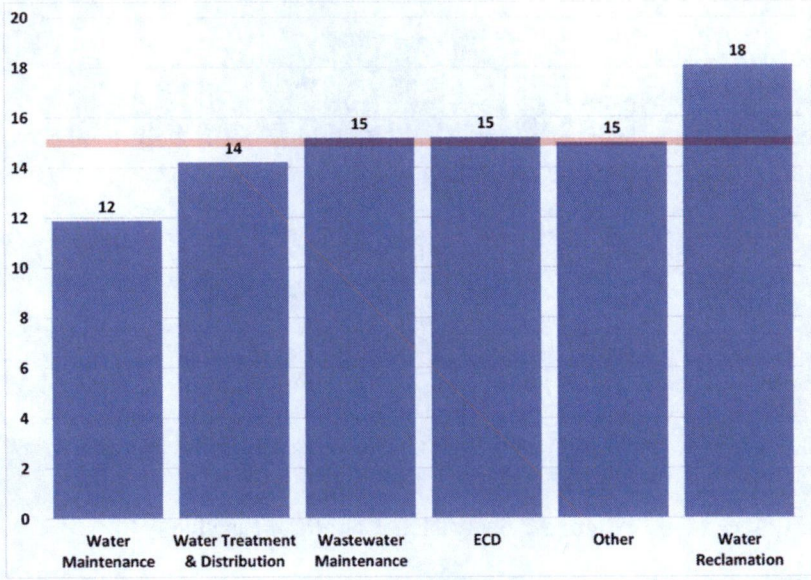


Figure 2-52 through Figure 2-57 show the length of service by employee classification for each of the Divisions. Water Treatment and Distribution's average is just over fourteen (14) years, Water Maintenance is under twelve (12), Water Reclamation (WREC) has the highest average at eighteen (18), Wastewater Maintenance's average is fifteen (15), and Environmental Compliance's average is just over fifteen (15). The remaining groups have approximately fifteen (15) years of service.

Figure 2-52 Water Treatment & Distribution Length of Service

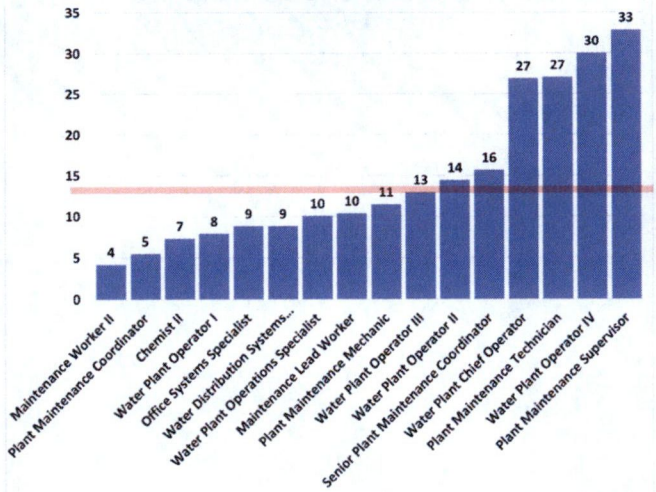


Figure 2-53 Water Maintenance Length of Service

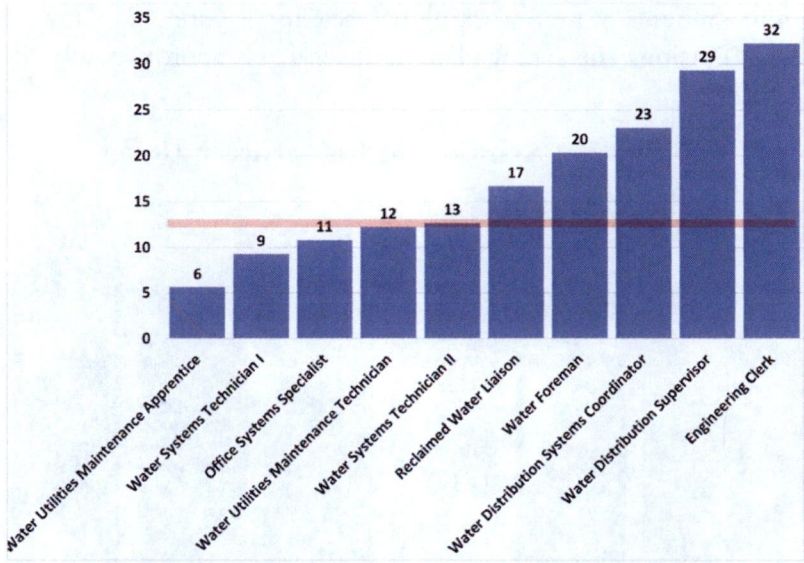


Figure 2-54 WREC Length of Service

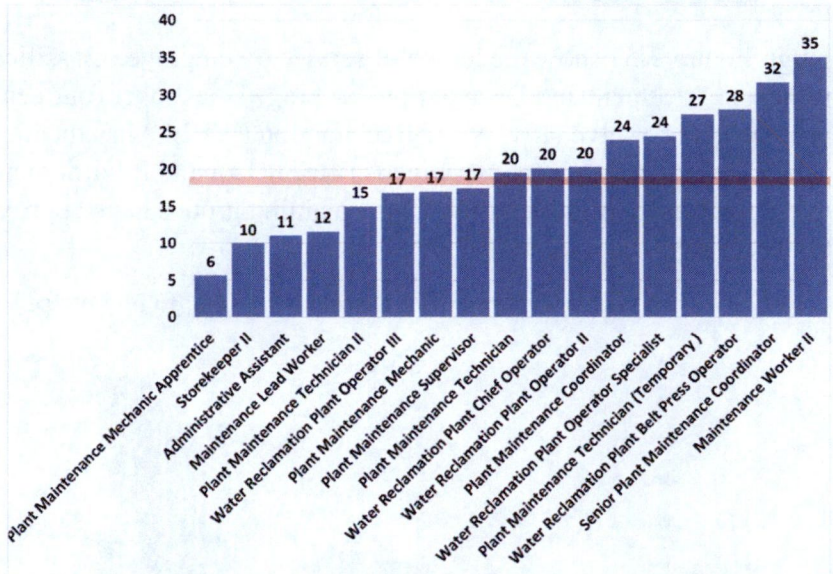


Figure 2-55 Wastewater Maintenance Length of Service

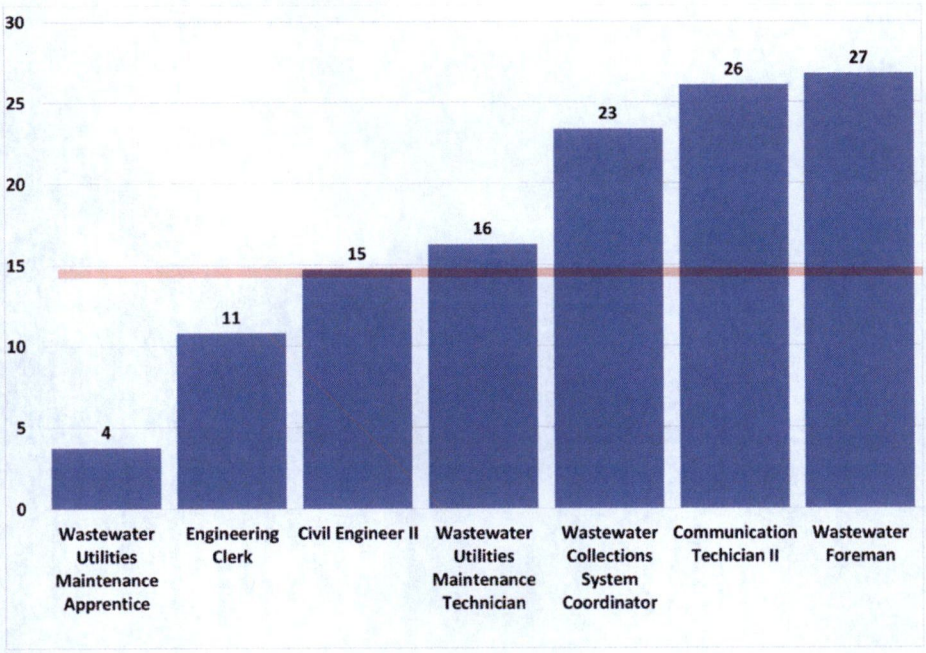


Figure 2-56 Environmental Compliance Length of Service

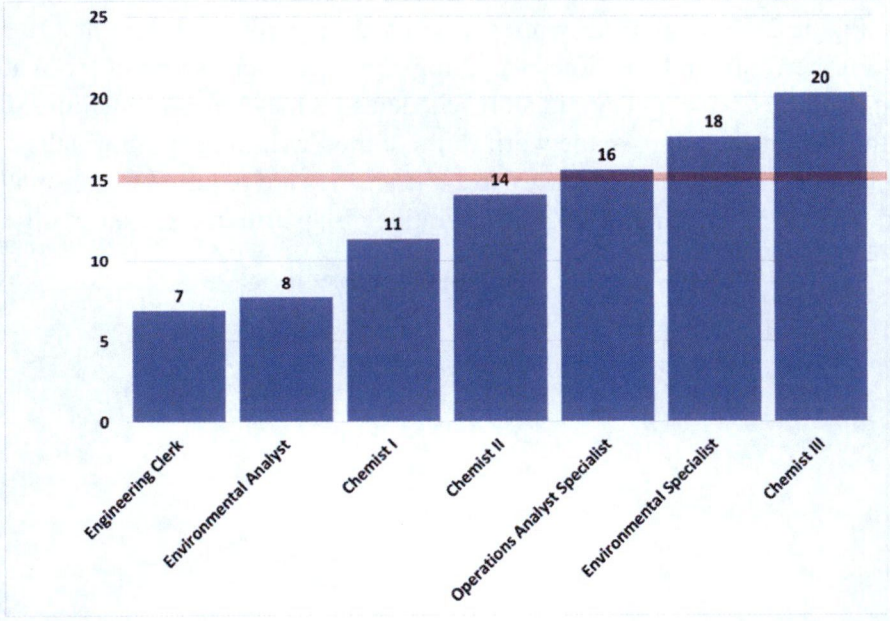
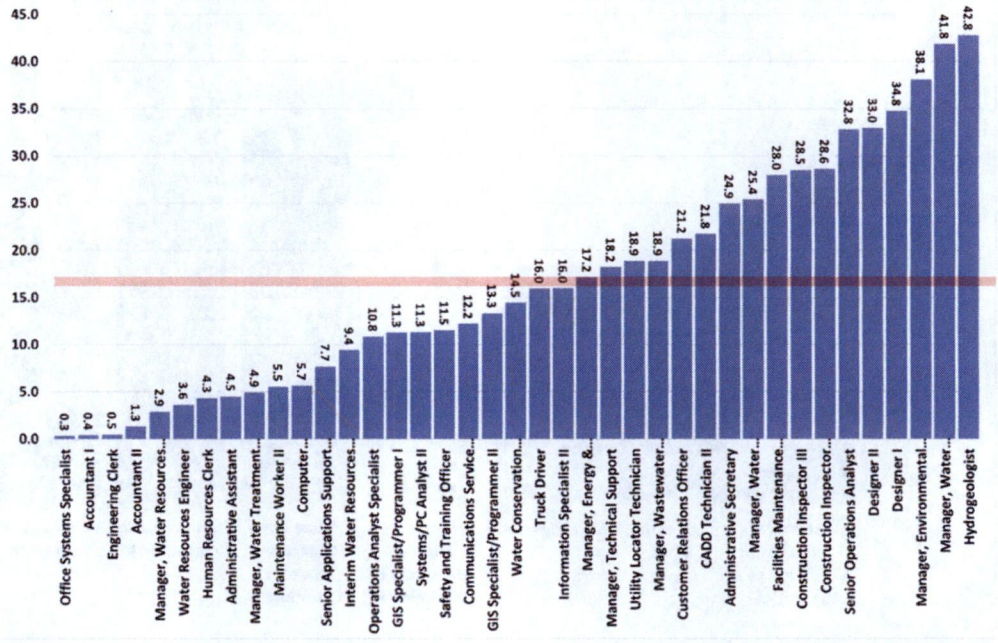


Figure 2-57 Other Employee Classifications Length of Service



There are currently twelve (12) staff in the Deferred Retirement Option Program (DROP) and eligible for separation in the next four years. It should be noted that not all employees participate in DROP.

2.4.2.1.4 Work Shifts

As shown in Figure 2-58, employees work many schedules with three, four and five days' workweeks. Further, start and end times vary. Some groups, such as two of the Water Reclamation Facilities, have up to eight shift schedules, as they are 24/7 facilities. It was also discovered through interviews that the work shifts of the Environmental Specialists in the Environmental Compliance Division are also 24/7. As they are required to constantly take samples and provide monitoring. One administrative group also utilizes seven different schedules.

Figure 2-58 Work Shifts

Division	Days a Week	Shift Coverage	Number of Schedules
WR Administration	5	7:00 am to 5:00 pm	4
Technical Support Admin	5	7:00 am to 4:30 pm	3
Dispatch	5	24 hours a day	6
Automated Systems Maintenance	4 and 5	7:00 am to 6:30 pm	3
Cosme WTP Administration	5	7:00 am to 5:00 pm	3
Cosme WTP O&M	2-3, 4 and 5	24 hours a day	7
Oberly PS	4 and 5	24 hours a day	5
Washington Terrace PS	5	7:00 am to 11:00 pm	2
Water Maintenance Admin	4 and 5	6:30 am to 3:30 pm	2
Water Maintenance	4 and 5	6:30 am to 10:30 pm	4
Reclaimed Water	5	7:00 am to 4:00 pm	2
Water Conservation	5	8:00 am to 5:00 pm	1
Wastewater Maintenance Admin	4 and 5	7:30 am to 7:00 pm	2
Wastewater Maintenance	4 and 5	6:30 am to 5:00 pm	4
ECD Administration	5	7:00 am to 3:30 pm	1
ECD Lab	5	7:00 am to 4:30 pm	3
ECD Indus. Pretrtmt & Grease Mg	5	6:30 am to 3:30 pm	1
ECD Field Services	5	6:30 am to 3:00 pm	1
Water Reclamation Admin	4 and 5	6:00 am to 5:00 pm	7
Northeast WRF	3,4 and 5 with swings	6:30 am to 3:00 am	8
Northwest WRF	3 and 4 with swings	6:30 am to 3:00 am	8
Southwest WRF	3 and 4 with swings	6:30 am to 3:00 am	7
WRF Lift Stations	4	6:00 am to 4:30 pm	1
Facilities Maintenance	5	6:30 am to 3:00 pm	2

Several groups including environmental compliance, wastewater treatment plants and The Cosme Water Treatment Facility and Oberly Pumping Station are on 24/7 shifts every day. The Laboratory, though not listed above, does have staff working every day. This creates the need for various rotating shifts.

For example, in water treatment and distribution in Cosme and Oberly facilities have seven and five schedules respectively. The other water facility Washington Terrace Pumping Station is monitored remotely via SCADA from the other two Water locations when not staffed. An example of Water Treatment & Distribution's staffing schedule is shown in Figure 2-59.

Figure 2-59 Water Treatment & Distribution Schedule

WATER TREATMENT & DISTRIBUTION OPERATIONS - WORK SCHEDULE — JUNE 2017

EMPLOYEE		MON 15	TUE 16	WED 17	THU 18	FRI 19	SAT 20	SUN 21	MON 22	TUE 23	WED 24	THU 25	FRI 26	SAT 27	SUN 28	MON 29	TUE 30	WED 31	THU 1	FRI 2	SAT 3	SUN 4	MON 5	TUE 6	WED 7	THU 8	FRI 9	SAT 10	SUN 11
Barnes	R	3C 020	3C 020	3C	3C	3C	X	X	X	1OB tr	1C	1C	X	1C	1C	1C	1OB tr	1C	1C	1C	X	X	X	1OB/ TR	1C	1C	X	1C	1C
BRACKEN		1OB	1C	X	X	X	5C	5C	1C	1OB	X	X	X/ 3WT	5OB	5OB	1OB	1OB	X	X	X/ 1OB	5C	5C	1C	1OB	X	X	X	5OB	5OB
BRUSCA		2C	2C	2C	2C	2C	X	X	2C	2S	2C	2WT MAN	2C	X	X	2P	2P	2P	2S	2P	X	X	2S	2S	2S	2S	2OB	X	X
BUTLER	R	2OB	2OB	2OB	2OB	2OB	X	X	1P/ 2OB	1C/ 2C	1OB	1OB/ 3WT	1OB	X	X	X	1C	1OB	1OB	X	1OB	1OB	1OB	1C	1OB	1OB	1OB	X	X
CAMPBELL		X/ 0700-1900	X/ 0700-1900	X	2/ 1hr 020	2/ 3hr 020	4	4	2/ 3	2	X	X	X/ 1900-2300	5	5	1	1	1	1	1	X	X	X	X	X	2	2	4	4
CHURCH		1C	x	X	X	1C	5OB	5OB	1OB	X	X	X	1C	5C/P	5C/P	3 tr	3 tr	3 tr	3 tr	3 tr	X	X	3TR	3TR	3TR	3TR	3TR	X	X
COSTELLO		X	X	3P 070	3P 020	X	4OB	4OB	X	X	3C 070	3C 020	X	4C	4C	X	X	3WT	3WT	X	4P	4P	X	X	3C	3C	X	4OB	4OB
EADS	R	X	X	1OB	1OB	1OB	1P 2hrs 020	1P 020	X	X/ 2OB	2OB/ 3WT	2C	2P	2P	2P	2OB	2OB	2OB	2OB	2OB	X	X	X	X	2OB	2OB	2P	2C	2C
FALSEY		2 020	2 020	X/ 0700-1900	X/ 3	X/ 3	5	5	1	1	1/ 1900-2300	1/ 1900-2300	1	X	X	X/ 3	X/ 3	X	2	2	4	4	3	3	3	3	3	X	X
FENNEL	R	2TR	2TR	2TR	2TR	2TR	X	X	2tr OR	2tr OR	2C/ TR	2TR	2TR	X	X	3C	3C	3C	3C	3C	X	X	2C	2C	2C	X	X	3C	3C
JARMON		3C	3C	X	X	X	4P	4P	3C	3C	X	X	X	4OB	4OB	3WT	3WT	X	X	X	4C	4C	3C	3C	X	X	X	4P	4P
JOYCE		2S	2S	2S	X	X	3C/P	3C/P	3WT	3WT	3WT/ 020	3WT/ 020	3WT/ 020	X	X	2C	2C	2C	X	X	3OB	3OB	3P	3P	3P	3P	3C	X	X
MALIACKAL		3WT	3WT	3WT	3WT	3WT	X	X	3P	3P	3C	3C	3C	X	X	3P	3P	3P	3P	3WT	X	X	3WT	3WT	3WT	3WT	3WT	X	X
VACANT III		1	1	1	1	1	X	X	1	1	1	1	1	X	X	1	1	1	1	1	X	X	1	1	1	1	1	X	X
SCHOENFELD		2	2	2	2	2	X	X	2	2 int	2	2 flush	2 flush	X	X	2	2	2 Dr.	2	2	X	X	2	2	2	2	2	X	X
SHEPPARD		X	X	2S	2S	2S	2C	2C	2S	2S	2S	2OB man.	2OB	X	X	X	X	2	2	2C	2C	2OB	2OB	2OB	2S	2C	2C	X	X
WERT		1P	1OB	1C	1C	1C	X	X	2 tr	2 int	2 tr	2 tr	2 tr	X	X	2/ H	2	2 021	2 020	2 020	X	X	2L	2L	2L	2L	2L	X	X
ZDRODOWSKI		1/ 1900-2300	1/ 1900-2300	1/ 1900-2300	1	1/ 0700-1000	X	X	X	X/ 3	X/ 0700-1900	2/ 1500-1900	2/ 1500-2300	4	4	2	2	2/ 3	3	3 020	X/ 5	X/ 5	1	1	X	X	X	5	5
OVERTIME		2 3	2 3	2/ 3	3	3			2OB 3	2OB 3	2/ 3	3	3			3	3	2		3 1OB	5	5	2	2	1/ 2	1	1C/ 1		
					$$$														$$$				tentative						
MASTOS		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	X	X

Dispatch found within the Business Services Division is also staffed 24/7. An example of their schedule is shown in Figure 2-60. All shifts are staffed with a single employee, with one exception when two employees are staffed during one shift.

Figure 2-60 Dispatch Shifts and Schedules

Staff Various Hours		
8am/4pm	3 shift days	Sunday - Tuesday
4pm/12pm	2 shifts nights	Wednesday - Thursday 2nd shift
Days Off		Friday and Saturday
Staff / Midnight Shift		
12am/8am	5 shifts	Monday - Friday
Days Off		Saturday and Sunday
Staff Days		
8am-4pm	5 shifts	Tuesday - Saturday
Days Off		Sunday and Monday
Staff / Evening		
4pm/12am	5 shifts	Friday - Tuesday
Days Off		Wednesday and Thursday
Staff / PT Weekends		
12am/8am	2 shifts	Saturday and Sunday

2.4.2.1.5 Standby and On-Call

After hours and standby procedures vary between Divisions. Water Maintenance lacks a documented call out procedure, yet addresses after hours' emergencies from 2:30 pm to 10:30 pm using a rotating evening shift that includes one Foreman and two support personnel. The Foreman is placed on standby pay status for the week, and the support personnel is provided first call for any overtime that may arise during the week. Foreman, support personnel and a Water Supervisor or Coordinator are placed on standby status for the weekend.

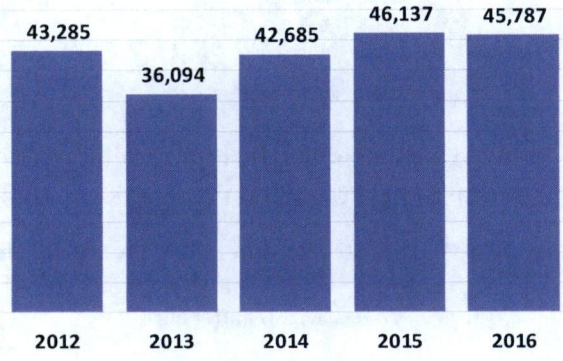
As documented in the Wastewater Collection Division's *Standard Operating Procedures & Foreman Manual,* on-call supervisors are available during after hours, weekends, and holidays. They respond to calls from the stand-by Wastewater Foreman or Water Systems Maintenance stand-by Foreman as needed (City of St. Petersburg Water Resouces Department Wastewater Collection Division, 2017). Division personnel will call in employees if needed.

Water Treatment & Distribution and WREC provide 24/7 coverage of their facilities, not requiring standby or on call status to addresses after hours' emergencies. Although the respective Divisions will call in personnel if needed.

2.4.2.1.6 Historical Overtime – Water Resources

Water Resources has averaged 42,787.6 hours of overtime annually or 24.3 FTEs, approximately 8% of the total reported hours for the past five years. As shown in Figure 2-61, there was a slight decrease in reported overtime from 2015 to 2016, of less than one percent.

Figure 2-61 Annual Overtime Hours Reported by Water Resources



The highest user of overtime in 2016 was Wastewater Maintenance at 14,607 hours or 32%, followed by Water Maintenance using 5,976 hours or just over 13%, and Cosme O&M using 4,600 hours or 10% and the SWWRF using 4,587 also 10% of the total overtime hours reported.

Figure 2-62 shows the historical overtime hours by group within Water Treatment & Distribution. The amount of overtime has increase by 240% in FY 2016 versus FY 2012.

Figure 2-62 Water Treatment & Distribution Overtime History

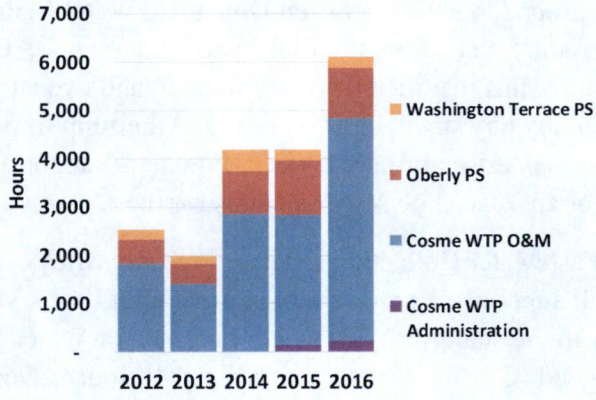


Figure 2-63 shows the historical overtime hours by group within Water Maintenance that has been consistent over last five years at approximately 6,000 hours annually.

Figure 2-63 Water Maintenance Overtime History

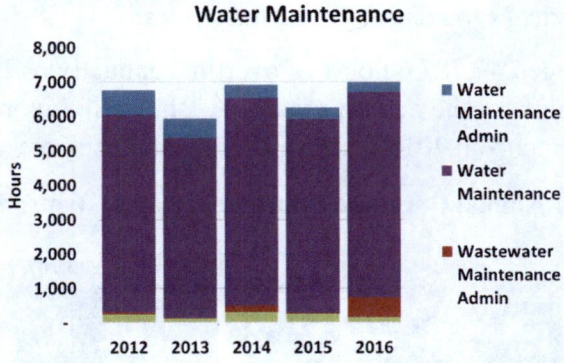


Figure 2-64 shows the historical overtime hours, by group, within Wastewater Maintenance. Overtime has nearly doubled from 8,600 hours in FY2012 to over 16,000 hours in FY2016.

Figure 2-64 Wastewater Maintenance Overtime History

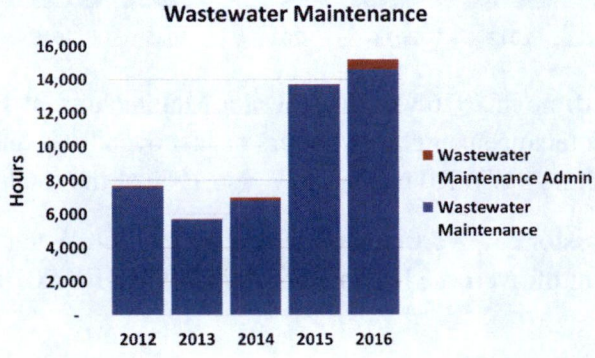


Figure 2-65 shows the historical overtime hours, by group within WREC. Overtime has decreased by 50% from nearly 17,000 hours in FY 2012 to 8,500 hours in 2016.

Figure 2-65 WREC Overtime History

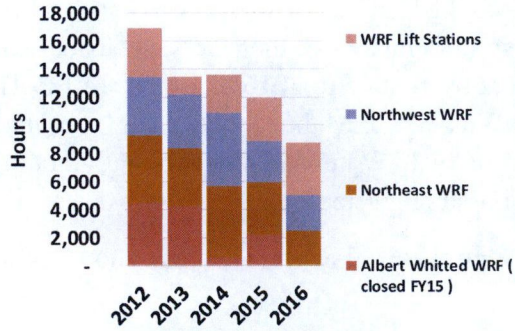


Figure 2-66 shows the historical overtime hours, by group within Environmental Compliance. Overtime has increased by 28% from FY2012 to FY 2016.

Figure 2-66 Environmental Compliance Overtime History

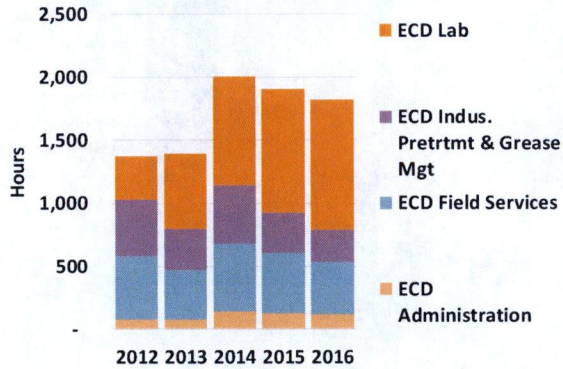
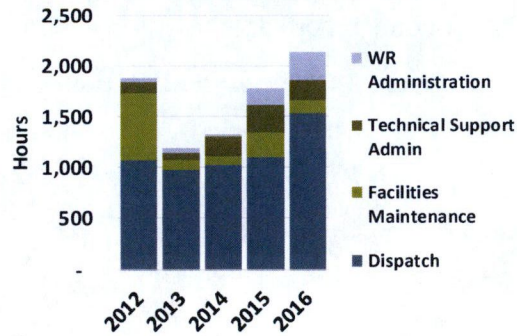


Figure 2-67 shows historical overtime hours for various other Departmental groups with a significant decrease after FY2012 and a steady increase since 2013 to 2,100 hours, which exceeds the FY2012 value.

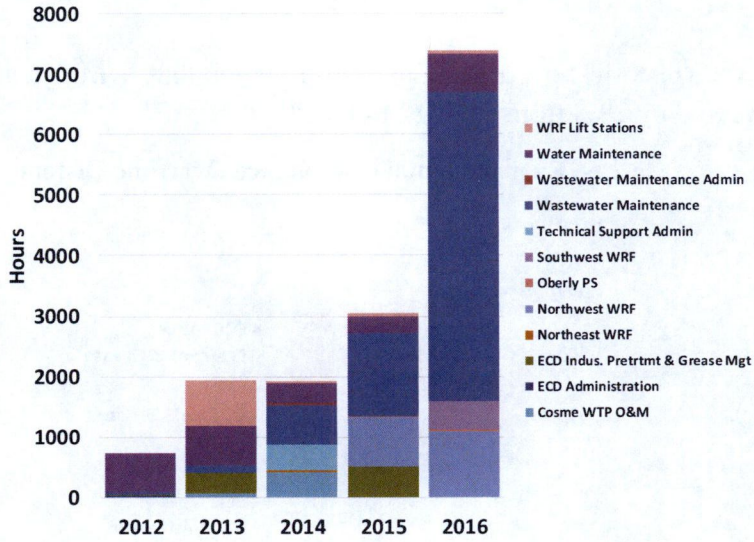
Figure 2-67 Others Overtime History



2.4.2.1.7 Workers Compensation

Water Resources has averaged 3,013 hours of workers' compensation annually or 1.7 FTEs, for the past five years. As shown in Figure 2-68, there was a considerable increase in reported Workers Compensation hours from 2015 to 2016 of almost 140%. The highest user of Workers Compensation in 2016 was Wastewater Maintenance at 5,110 hours or 69%, followed by NWWRF using 1,070 hours or 14%, Water Maintenance at 640 hours or 9%, and the SWWRF using 472 or 6% of the total hours reported.

Figure 2-68 Workers Compensation History



2.4.2.1.8 Family Medical Leave Act

Water Resources has averaged 8,977 hours of Family Medical Leave Act (FMLA) hours annually or 5.1 FTEs, approximately 1.7% of total reported hours for the past five years. As shown in Figure 2-69, there was a considerable increase in reported FMLA from 2015 to 2016, of than 55.5 percent. The highest user of FMLA in 2016 was Water Maintenance using 3,160 hours or just over 29%, the NWWRF using 1,256 or 11% and Wastewater Maintenance using 1,064 or 10% of the total FMLA hours reported.

Figure 2-69 History FMLA Hours

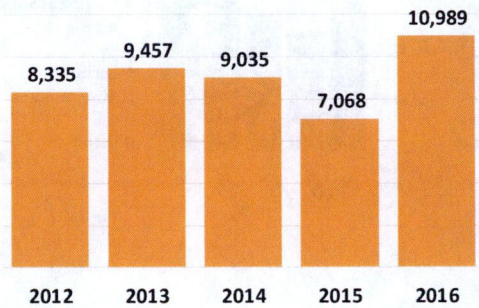


Figure 2-70 shows the historical FMLA hours by group within Water Treatment & Distribution, which outlines a 50% reduction since FY 2012 for FY2016.

Figure 2-70 Water Treatment & Distribution FMLA Hours

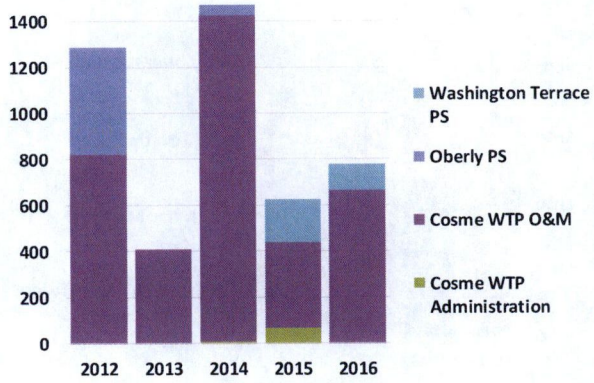


Figure 2-71 shows the historical FMLA hours by group within Water Maintenance with values doubling from FY2012 to FY2016.

Figure 2-71 Water Maintenance FMLA Hours

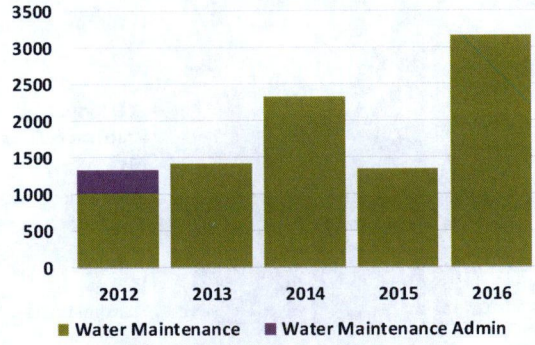


Figure 2-72 shows the historical FMLA hours by group within Wastewater Maintenance, which has increased from 1,000 hours to more than 1,400 hours.

Figure 2-72 Wastewater Maintenance FMLA Hours

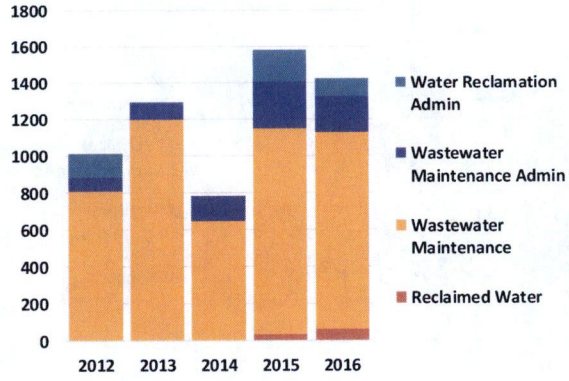


Figure 2-73 shows the historical FMLA hours by group within WREC have varied over the five-year period with an ~1,000 hour increase from FY2012 to FY2016.

Figure 2-73 WREC FMLA Hours

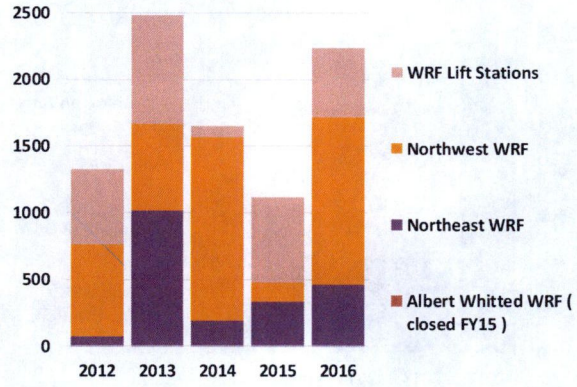


Figure 2-74 shows the historical FMLA hours by group within Environmental Compliance that has varied from 750 hours in FY 2014 to 2,100 hours in FY 2013.

Figure 2-74 Environmental Compliance FMLA Hours

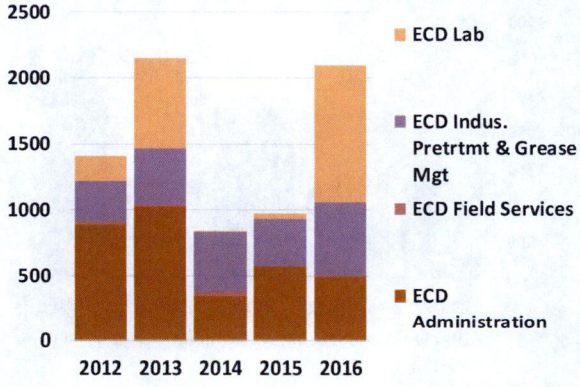
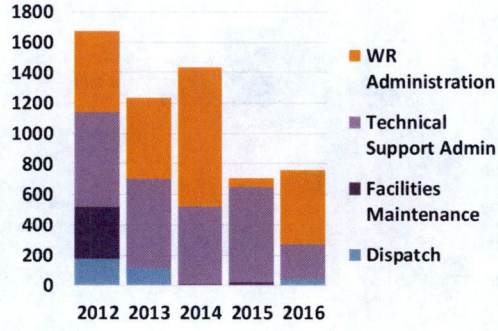


Figure 2-75 also shows historical overtime hours for various other Departmental groups which as decreased from 1,600 hours in FY2012 to slightly more than 600 in FY2016.

Figure 2-75 Other Group's FMLA Hours



2.4.2.1.9 Employee Certifications and Licenses

In addition to employment classes and training provided by the City, employee certifications and licenses exist for several different job functions within the Department. There are one hundred and nineteen (119) licenses directly related to employee job function and duties. Three (3) employees are in the Drinking Water "C" (DWC) process and eighteen (18) are currently in the apprenticeship program.

Figure 2-76 shows the current licenses found within the Department. Several employees take advantage of Pinellas Technical College's (P-Tech) Water Resources courses. P-Tech offers several courses including Water Resources Cadet I - Course ETC0003, which includes training in the theory and operation of wastewater systems, plant operations, and water distribution systems.

Figure 2-76 Department Licenses

License Type	Count
DWA = Drinking Water "A"	7
DWB = Drinking Water "B"	5
DWC = Drinking Water "C"	8
DS 1 = Distribution System Level 1	13
DS 2 = Distribution System Level 2	23
DS 3 = Distribution System Level 3	26
WWA = Wastewater "A"	16
WWB = Wastewater "B"	7
WWC = Wastewater "C"	14

2.4.2.2 Equipment

The Water Resources Department has 211 pieces of rolling stock, which can be seen in Figure 2-77, by classification and count. Utility and Pickup are the two classifications with the most units, fifty-one (51) and thirty (30) respectively. The average age of the rolling stock is eight (8) years.

Figure 2-77 Count of Rolling Stock

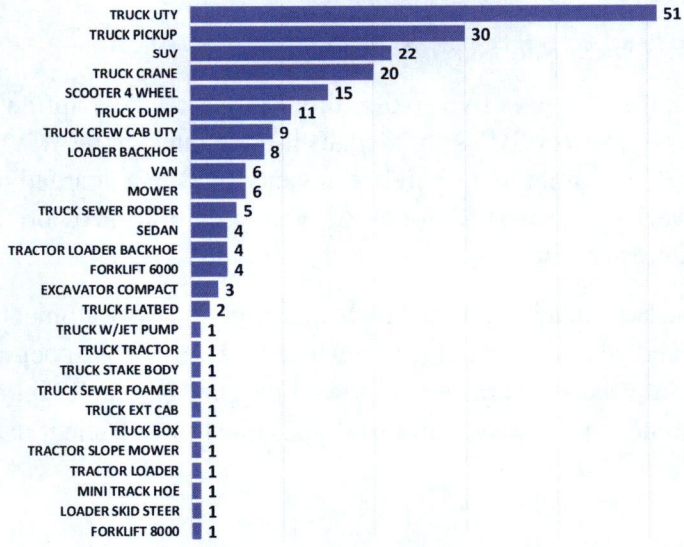
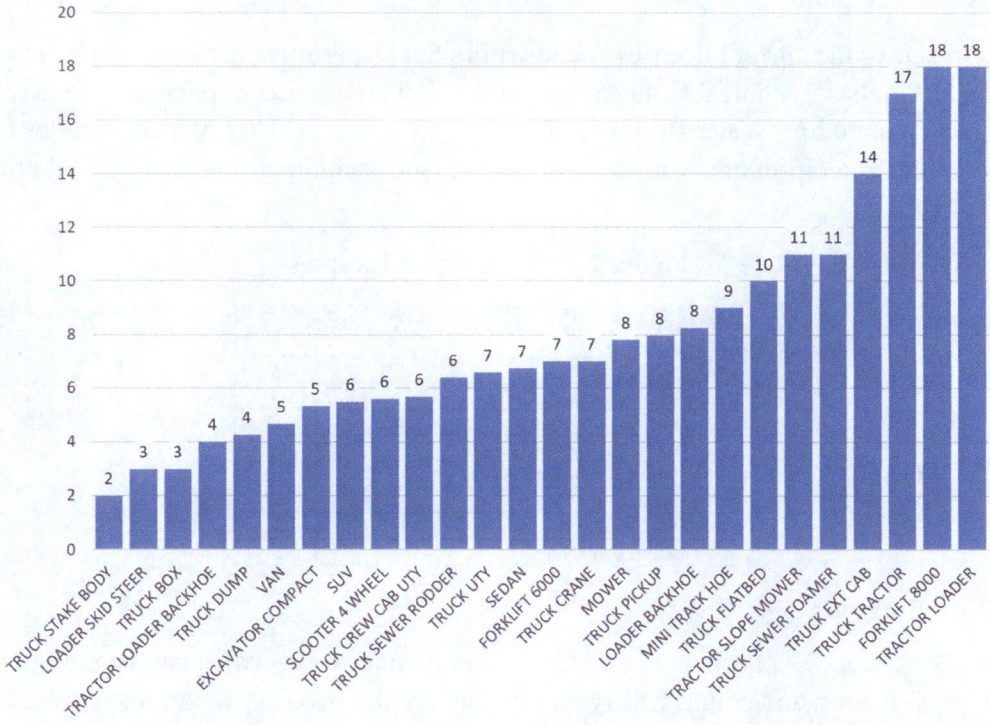


Figure 2-78 shows the average age of rolling stock by classification. The oldest classification averages are *Tractor Loader* and *Forklift 8000* at 18 years. Equipment is staged at several of the Department facilities, with most being staged at the Water Resources Administrative Complex in St. Petersburg.

Figure 2-78 Age of Rolling Stock



The Department also has numerous non-rolling stock equipment, including trailers, pumps, and other support apparatus they use for performing maintenance and repair on the City's water and wastewater infrastructure. This includes fifty-three (53) trailers, forty-three (43) concrete saws, and sixty-six (66) pumps.

2.4.2.2.1 Equipment Rates Used In WAM

In the list of equipment, the City uses five hundred four (504) key description codes. Twenty-five (25) key description codes for SUVs and Sedans use the rates in the WAM system and are charged by the mile at $0.57 a mile. Four hundred seventy (470) are charged by the hour. These hourly reporting rates vary between $1.25 for an Air Compressor to $205.60 for a Caterpillar, Generator 500kw Trailer Mounted.

LAC calculated the hourly utilization rate for each classification of equipment using the provided data of purchase price and year, repair and maintenance costs, fuel costs, depreciation, and usage McCorkhill. (2008). These estimated rates are shown in Figure 2-79 and Figure 2-80. LAC did not estimate rates for some vehicle and equipment types due to insufficient data provided.

Figure 2-79 Equipment Hourly Rate for Meter Type of Mileage

METER TYPE / CLASS	EST COST PER HOUR
MILEAGE	
SEDAN	$ 11.84
SUV	$ 17.39
TRUCK BOX	$ 124.70
TRUCK CRANE	$ 122.65
TRUCK CREW CAB UTY	$ 45.17
TRUCK DUMP	$ 76.39
TRUCK EXT CAB	$ 10.26
TRUCK FLATBED	$ 167.94
TRUCK PICKUP	$ 21.93
TRUCK SEWER FOAMER	$ 79.58
TRUCK SEWER RODDER	$ 230.42
TRUCK STAKE BODY	$ 118.39
TRUCK TRACTOR	$ 110.39
TRUCK UTY	$ 32.47
TRUCK W/JET PUMP	$ 40.46
VAN	$ 107.69

Figure 2-80 Estimated Rate for Meter Type of Hourly

METER TYPE / CLASS	EST COST PER HOUR
HOURLY	
AIR COMPRESSOR	$ 12.10
DIRECTIONAL BORING MACHINE	$ 170.56
EXCAVATOR COMPACT	$ 28.10
FORKLIFT 6000	$ 47.29
FORKLIFT 8000	$ 10.68
GENERATOR PORTABLE	$ 30.94
GENERATOR TRAILER	$ 61.54
LOADER BACKHOE	$ 22.03
MINI TRACK HOE	$ 19.76
MOWER	$ 24.48
PUMP	$ 29.10
SAW CIRCULAR	$ 96.80
SAW CONCRETE	$ 119.97
SCOOTER 4 WHEEL	$ 12.32
SEWER CLEANER TRAILER MTD	$ 188.65
TRACTOR LOADER	$ 92.76
TRACTOR LOADER BACKHOE	$ 35.86
TRACTOR SLOPE MOWER	$ 12.73
WELDER	$ 148.91

2.4.2.2.2 Small Equipment and Hand Tools

Small equipment is issued to each crew daily through a shared warehouse process. Each crew has specific equipment assigned to them, yet all the equipment is stored in a shared warehouse location. When a crew needs a specific piece of equipment, their foreman will notify the shop lead. When the crew arrives, the equipment will be fueled, tested and ready for pickup. At the end of use, the crew will return the equipment to the warehouse and turn in the equipment for fueling, any needed repairs or preventive maintenance. Hand tools are issued to specific crews and independent workers who are responsible for their care and security.

2.4.2.3 Purchasing and Materials

The Department utilizes the City's Consolidated Warehouse for many bulk items such as manhole covers, concrete pipes, and PVC pipes. These items are secured and accounted for through the City's procurement group located at the Warehouse. Department-specific items, such as water valves, breakers, and pump items are inventoried, stored and controlled through storerooms at the various Department locations.

The estimated inventory value of materials outside of the Consolidated Warehouse in other storerooms is $2.7 million. Figure 2-81 shows the estimated values of the inventories outside of the Consolidated Warehouse. All purchases regardless of location are coordinated to the staff at the Consolidated Warehouse Some inventories are tracked and managed using WAM, and some manual databases are also used.

Figure 2-81 Estimated Inventory Values

STOREROOM	4/1/2017
AWWRF	0.00
NEWRF	156,486.05
NWWRF	122,583.80
SWWRF	21,396.51
WRF	1,475,862.56
LS5	14,714.90
COSME	632,167.78
OBERLY	100,896.67
WASH TERRACE	56,603.83
WSM	73,723.21
WWM	128,126.46
TOTAL VALUE	2,782,561.77

2.4.2.4 Annual Maintenance Contracts

The Department also uses contracted services to provide goods and services for the repair and maintenance of the City's assets. Contracts are used to supplement maintenance work and to provide the needed materials for internal repairs. The following is a list of current contracts noting the year, project type, contractor and amount budgeted.

2012
- Pipe Painting, Viktor - $98,000
- Pipe Painting, Enviro - $295,000

2013
- Water Tank Painting, Tank Rehab.com - $404,000

2014
- NEWRF Clarifier 3 Rehabilitation, Wharton-Smith Inc. - $394,000
- NEWRF Diffused Air, Odyssey - $263,000

2015
- GST Water Tank cover repairs, FL Environmental Construction - $399,000

2016
- NEWRF Perimeter Fence, USA Fence - $302,000
- NEWRF Clarifier 4 Rehabilitation, SGS Contracting Services - $494,000
- NWWRF Clarifier 2 Rehabilitation, L& Construction - $494,000

2017
- SWWRF Headworks Liner Repair, KAT - $182,000
- Pipe Crossover Painting, Jam 520 - $82,000
- Water Tank Painting, Viktor - $360,000

The Department also uses contracted services to augment the repair and maintenance of their building and facilities. Figure 2-82 shows a sample of the annual contracts used for facility maintenance showing the name of the contractor, type of work and the annual budgeted amount.

Figure 2-82 Sample List of Facility Maintenance Contracts

Name	Type of Work	Annual Expense
Fencing	Security	10,000.00
Air Mech HVAC	Maintenance	82,800.00
United Fire	Maintenance Supplies (Fire)	1,200.00
Tampa Bay Fire	Maintenance Fire Sprinklers	800.00
Flagship Fire	Maintenance Server	800.00
SAS Lock & Key	Locks & Keys	3,000.00
ABC Controls	HVAC Controls	8,000.00
All Phase Security	Security	9,000.00
Brennic Bros	Boiler Maintenance	4,000.00
Apollo Const	Plumbing	8,000.00
Falcon Electric	Electric	19,400.00
Lindsey Refrig	Ice Machines	4,200.00
Nite Owl	Irrigation	2,600.00
Envirolight Disposal	Lamps & Batteries	1,100.00
CFCS	Floor care	2,500.00

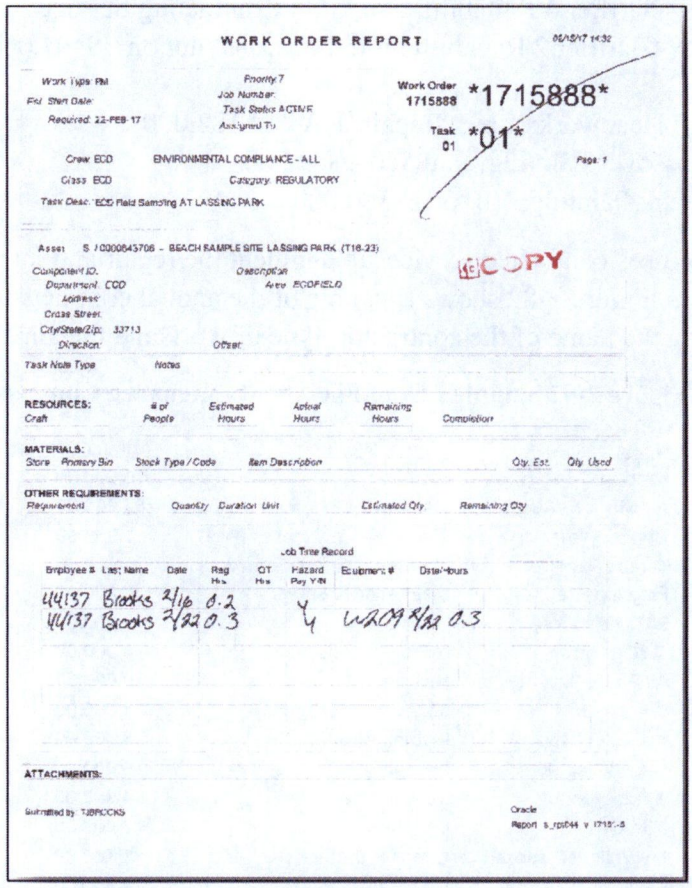
2.5 Directing / Scheduling

2.5.1 Work Identification

Work is identified through several methods within each group. In general, there are four main areas that function to assist in work identification. These include response work, inspection, documented and undocumented routines, and identification by staff in the field or at work sites.

Response work is work that is identified by customers through citizen requests, complaints or emergency events, which require action by the Department. The City uses the WAM system to document this response work. Figure 2-83 shows an example of a WAM work order used by the Department for work assignment and tracking.

Figure 2-83 WAM Work Order



WORK ORDER REPORT

Work Type: PM
Priority:7
Job Number:
Task Status:ACTIVE
Assigned To:
Work Order 1715888 *1715888*
Task 01 *01*
Req'd Start Date:
Required: 22-FEB-17
Crew: ECD ENVIRONMENTAL COMPLIANCE - ALL
Class: ECD Category: REGULATORY
Task Desc: ECD Field Sampling AT LASSING PARK
Asset S / 0000643706 - BEACH SAMPLE SITE LASSING PARK (T16-23)
Component ID: Description
Department: CCD Area: ECDFIELD
Address:
Cross Street:
City/State/Zip: 33713
Direction: Offset:
Task Note Type Notes
COPY

RESOURCES: Craft | # of People | Estimated Hours | Actual Hours | Remaining Hours | Completion

MATERIALS: Store | Primary Bin | Stock Type / Code | Item Description | Qty. Est. | Qty. Used

OTHER REQUIREMENTS: Requirement | Quantity | Duration | Unit | Estimated Qty. | Remaining Qty.

Job Time Record

Employee # | Last Name | Date | Reg Hrs | OT Hrs | Hazard Pay Y/N | Equipment # | Date/Hours

44137 Brooks 2/16 0.2
44137 Brooks 2/22 0.3 Y W209 2/22 0.3

ATTACHMENTS:

Submitted by: TJBROOKS

Oracle Report s_rpt644 v 1715[illegible]-5

Inspection work is work that is identified by Department personnel who are sent out specifically to identify if work needs to be performed, or to validate that work has been performed properly. An example would be the proactive inspection of sewer pump stations and water quality inspections.

Preventive maintenance is general maintenance that is usually performed to prevent larger more costly and serious maintenance issues from occurring in the future. Routine maintenance is work

that is performed on a specific cycle or schedule. Preventive maintenance may often be performed on a routine. An example of this is sewer line cleaning which is done on a geographical zone-based proactive cycle.

The WREC Division is also driven by routines and preventative maintenance cycles. The Wastewater Collections Maintenance Division's work is driven by routines, preventative maintenance cycles and customer complaints. Water Treatment & Distribution focuses upon routines, preventative maintenance cycles and work identified through observations. The Water Maintenance Division's work is determined through established routines, maintenance cycles, as well as observations and customer calls. The Environmental Compliance Division's work is focused upon established routines, maintenance cycles for maintaining environmental compliance with various laws and mandates.

The Dispatch group within the Business Services Division plays a crucial role in being the first contact customers have with the Department. Dispatch is staffed 24/7 and located in the Water Resources Administration Building. The supervisor of this group is the Customer Relations Officer, which is scheduled during day shifts, yet overlaps the night and evening shifts both by half an hour. The WAM system is the primary software used for customer relationship management (CRM) and documenting service requests. Recently the Mayor's Office has initiated and implemented the SeeClickFix software to be used for all City Departments which allows for specific locations with photos of the issue to be compiled and can be generated by anyone, including citizens.

2.5.2 Scheduling and Assignments

For most groups, scheduling and assignment are primarily a combination of response and routines. Water Treatment & Distribution, WREC, and Environmental Compliance is almost entirely routine based with actions added based on inspection, or supplementing by identification of needs resulting from routine inspections. Routines are based upon pre-established areas and frequencies, that are adjusted based on the supervisor's direction and some customer response. At the beginning of their respective shifts, supervisors will meet with their direct reports to provide assignments or updates for previously directed work. Most supervisors use a standardized daily task list for the direction of their staff. Work order processes vary between groups including foreman, coordinators and administrative staff who enter data into the WAM system.

Figure 2-84 shows the general flow of work found within the Wastewater Maintenance Division. Initially a request is received via phone call, email, or PublicStuff. If it is determined the request is not the Department's responsibility, the appropriate agency is contacted and the customer is notified. If the call is identified as an emergency, the appropriate supervisor is notified and resources are dispatched to the location to make the repair or mitigate the condition. If the request is determined to be the responsibility of Water Resources, information is input to the WAM system by Communications Services Coordinator. If the request is not an emergency, the System Coordinators will query the WAM system for assigned work requests. The System Coordinators will investigate to determine the scope of the project and validity of the request. If the work order is valid and work is to be performed, the System Coordinators will prioritize the

new work order with their existing orders, and schedule the work to be performed. The System Coordinators will print hardcopies of the work orders to be given to the appropriate Foreman. The Foreman will gather the needed materials and secure equipment. After the work is performed, the Foreman will make notes and document on the hardcopy work order, labor, materials and equipment used. The Foreman will then submit the hardcopy work order to their respective System Coordinator for QA/QC and then enter the related data into the WAM system and the work order is closed.

Figure 2-84 General Work Flow of Wastewater Maintenance

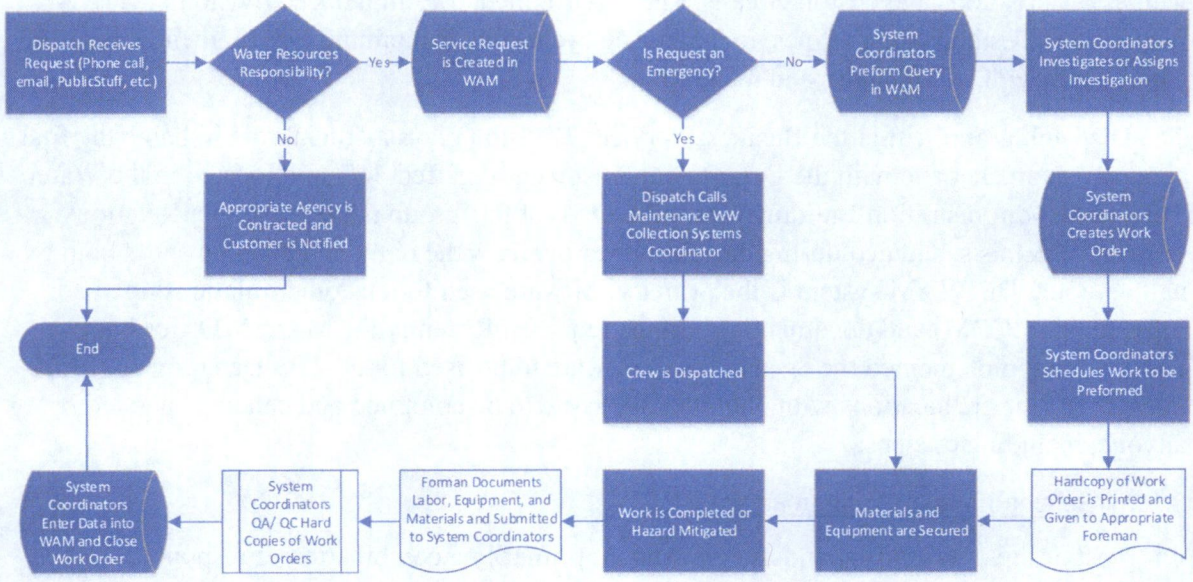
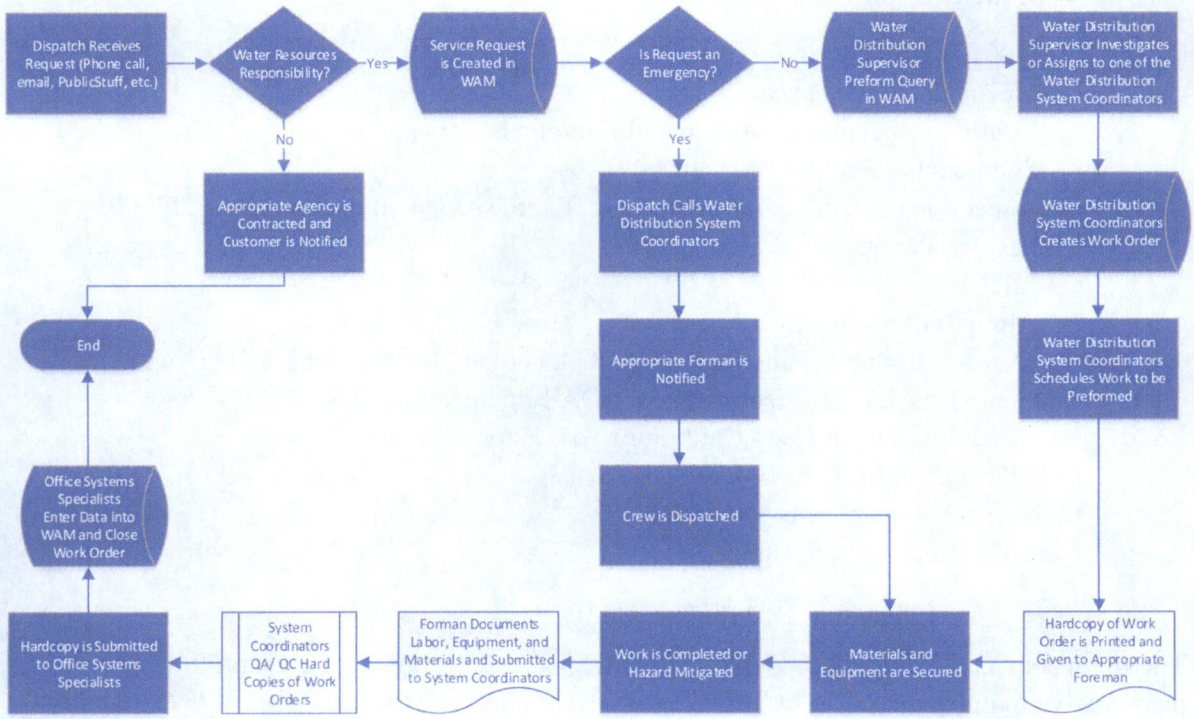


Figure 2-85 shows the general flow of work found within the Water Maintenance Division. Similar to the Wastewater work flow, initial requests are received via phone call, email, or PublicStuff. If it is determined the request is not the Department's responsibility, the appropriate agency is contacted and the customer is notified. If the call is identified as an emergency, the appropriate supervisor is notified and resources are dispatched to the location to make the repair or mitigate the condition. If the request is determined to be the responsibility of Water Resources and is not an emergency, then the Communications Services Coordinator enters the information in the WAM system. The Water Distribution Supervisor will query the WAM system for assigned work requests. The Water Distribution Supervisor will investigate to determine the scope of the project and validity of the request or assign the task to one of his Water Distribution System Coordinators. If the work order is valid and work is to be performed, the Water Distribution System Coordinators will create a work order and prioritize with their existing orders, and schedule the work to be performed. The Water Distribution System Coordinators will print hardcopies of the work orders to be given to the appropriate Foreman. The Foreman will gather the needed materials and secure equipment. After the work is performed, the Foreman will make notes and document on the hardcopy work order, labor, materials and equipment used. The Foreman will then submit the hardcopy work order to their respective Water Distribution System Coordinator for QA/QC. After QA/QC the work orders are submitted to the Division's Office

System Specialist for data into the WAM system and work order closing. Recently, the Water Maintenance Division has begun to utilize laptops and tablets in the field with some crews.

Figure 2-85 General Work Flow of Water Maintenance



2.5.3 Routines and Preventive Maintenance Programs

Routines exist for many operational, maintenance and environmental activities. These proactive efforts are performed to protect the City's assets and ensure proper operation, as well as optimize asset life cycles. Many of the routines can be found within the WAM system. Those identified and confirmed by the City are listed below and on the following page.

2.5.3.1 Wastewater Collections

The Wastewater Maintenance Division's preventive maintenance focus is primarily upon the wastewater collection system. They have divided the City into one hundred and fifty (150) basin areas, which are used to systematically plan the inspection of the system. The Vactor crew, in coordination with the Close Circuit Television (CCTV) crew, performs inspections. The Division's goal is to make a complete cycle of all basins every 5-6 years or to inspect approximately 30 basins per year.

The method of inspection includes both a "*Quick TV*" (QTV) method and CCTV. Each cycle of the system alternates between QTV and CCTV. The result of the QTV method is a "pass/fail," with a "fail" resulting in an immediate scheduling for line cleaning and CCTV inspection to investigate the condition.

2.5.3.2 *Wastewater Reclamation Facilities*

The three Wastewater Reclamation Facilities also perform routines and preventative maintenance cycles. The WAM routines include three (3) daily or five hundred and forty-one (541) monthly. The following are examples of these PMs:

- PM, Electrical, Group
- Mechanical PM, Group
- Routine Inspection of Station and Equipment
- Submersible Pumps
- Inspection of Station and Equipment, Exercise Generators and Check Fluids
- Sewage Pumps
- Lift Stations
- Alum Stations, Routine Inspection
- Exercise Portable Generator, check Oil, coolant, battery, fuel Levels, run Hours
- Clean Dust and Dirt from The SCADA File Servers
- FDEP Instrument Loop Calibration for Loops
- Clarifiers & CCB Backwash
- Valve PM, Aerator & Clarifier
- Valve PP, Digester Tanks

2.5.3.3 *Environmental Compliance Division*

The Environmental Compliance Department(ECD) also performs numerous routines and preventative maintenance. The ECD performs seven hundred and thirty-seven (737) monthly maintenance PMs and thirty-four (34) weekly PMs. The following are examples of these PMs found within the WAM system:

- Biosolids Ecoli Monitoring
- Injection Well Monitoring
- Reuse Ground Water Monitoring
- Biosolids Monitoring
- Dedicated Auto Composite Sample
- IPP Compliance Monitoring
- Biosolids Monitoring - Class A Monthly

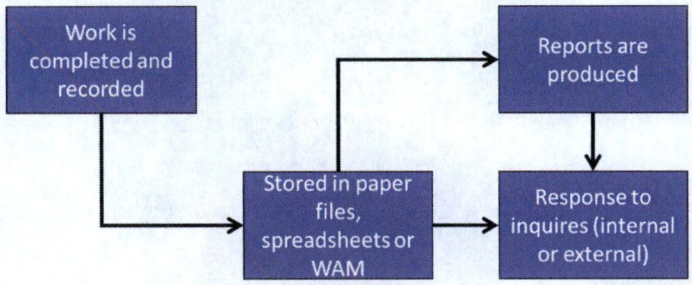
2.6 Controlling / Improving

2.6.1 Work Tracking

Each group uses a variety of systems, databases, spreadsheets, word documents, and manual forms for research and tracking some aspects of their work. Daily timesheets are used to account for labor and equipment hours, materials used, and work accomplished. The employees write on the timesheets the date, accomplishment, equipment and labor hours, materials used, and any comments associated with a specific work order. After being quality checked by their supervisor, the work orders or daily log sheets are input to the WAM system.

Information is often compiled through manual processes, accounting for past occurrences and the analysis of specific activities. Figure 2-86 shows the general process used for inquires. Work is completed and recorded in various manual and electronic databases and reports are produced, or direct response is provided to the requestor.

Figure 2-86 General Process for Inquiries



2.6.2 Work Reporting

2.6.2.1 WAM Systems Use and Monitoring

The Department relies upon a combination of manual tracking and automated systems for tracking and monitoring work, which is mainly used for after-the-fact research and accounting for past occurrences. Multiple work logs exist with varying forms used by each group. Water Maintenance field employees have started to use laptops and tablets in the field to record and document completion of daily routines such as valve exercising, fire hydrant flushing, fire flow, and blow-off, and hydrant maintenance. A daily logbook is also used in Wastewater Maintenance for manual recording of daily activity and to document any issues or concerns that occur.

WAM work order reporting includes labor, equipment, and material resource utilization and is often linked to a specific asset in the database. The Department's field maintenance employees do not record work preparation in the yard or travel time, just the time spent at individual work locations. Performance measures and costing are done on a case-by-case basis.

Figure 2-87 shows the historical amount of repair code reported for the entire WAM database for FY2016. The codes of *Repaired* or *Replaced* totaled 59% of reported codes last year.

Figure 2-87 Repair per Code Reported

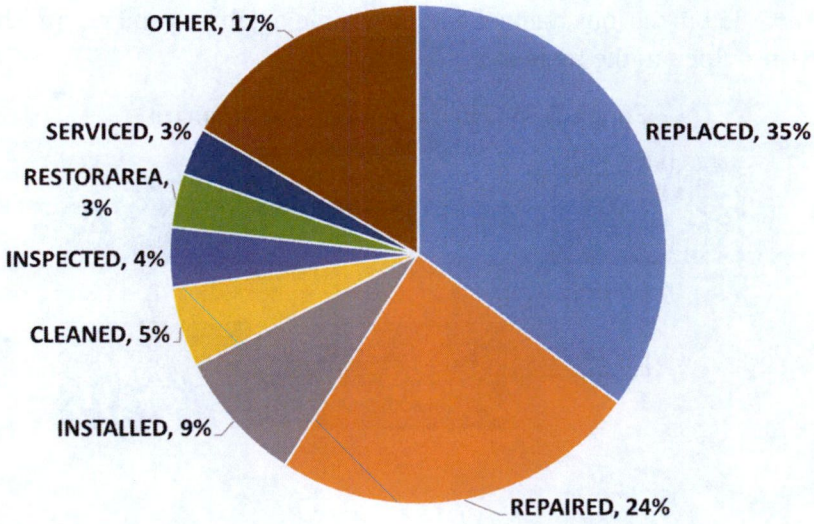


Figure 2-88 shows the historical amount of failure codes reported by the Division in the WAM database for FY2016. The failure code of *Broken* was the highest code reported at 33% last year.

Figure 2-88 Failure Codes Reported

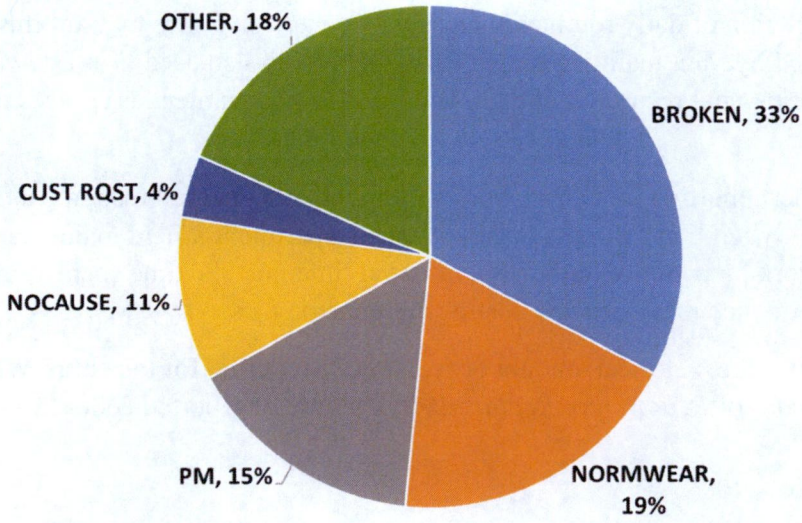
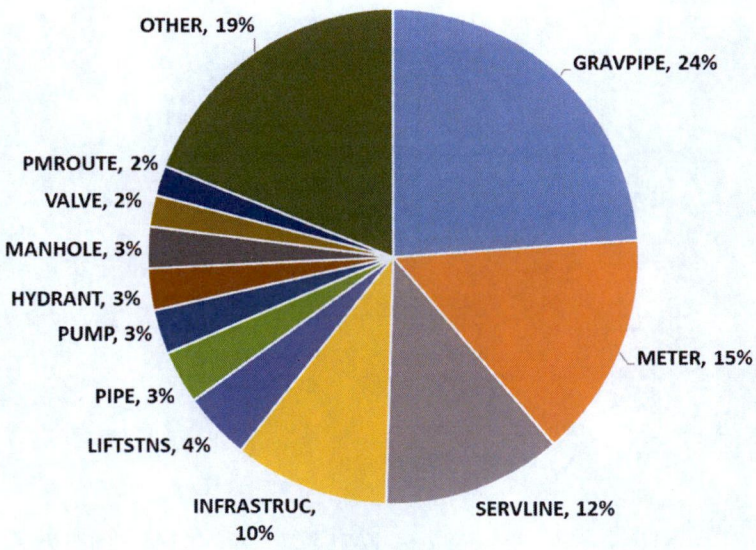


Figure 2-89 shows the historical amount of asset types reported by the Division in the WAM database for FY2016. The asset types of *Gravity Pipe* and *Meter* were the highest reported codes at a combined 39% last year.

Figure 2-89 Asset Type Task Amount Reported



2.6.2.2 *Water Maintenance Division*

Figure 2-90 shows the historical percent of hours per repair code for the Water Maintenance Division reported in the WAM database for FY2016. The code of *Replaced* totaled 33% last year.

Figure 2-90 Repair Code Reported (Water Maintenance)

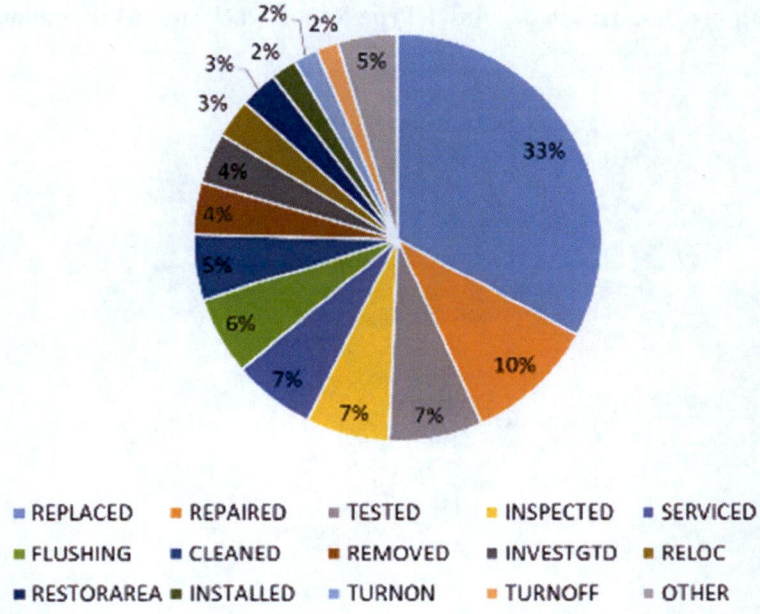


Figure 2-91 shows the historical percent of hours per failure code for the Water Maintenance Division reported in the WAM database for FY2016. The codes of *PM, Leaking, and No Cause* totaled 48% of hours reported last year.

Figure 2-91 Hours per Failure Code Reported (Water Maintenance)

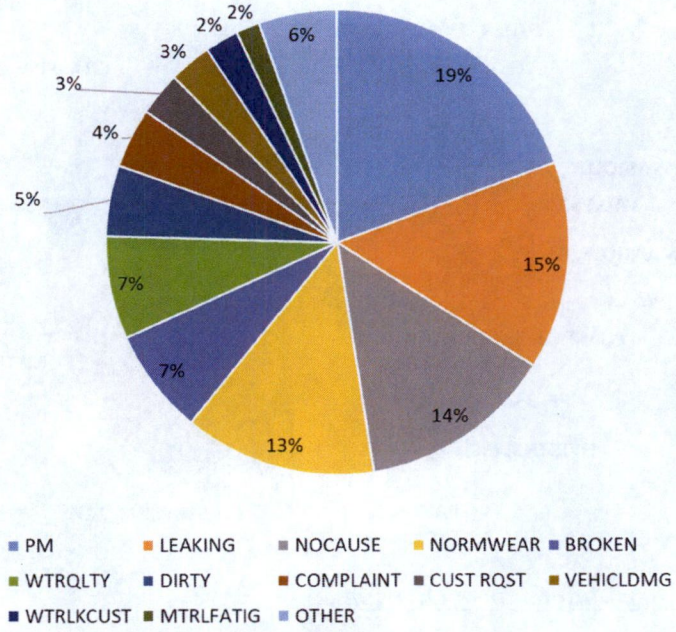
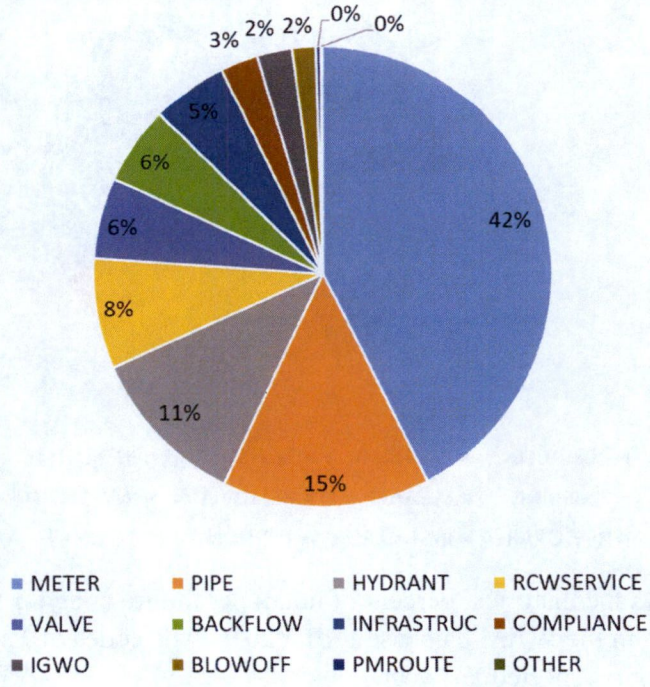


Figure 2-92 shows the historical percent of hours per asset type for the Water Maintenance Division reported in the WAM database for FY2016. The codes of *Meter and Pipes* totaled 57% of hour reported last year. The total hours reported for Water Maintenance Division in FY2016 calculated to be 18 FTEs.

Figure 2-92 Hours per Asset Type Reported (Water Maintenance)



2.6.2.3 *Wastewater Maintenance Division*

Using the same historical data provided from the WAM system detailed above, LAC calculated the following statistics for the Wastewater Maintenance Division. Figure 2-93 shows the historical percent of hours per repair code for the Division reported in the WAM database for FY2016. The codes of *Repaired, Replaced* and *Installed* totaled 56% last year.

Figure 2-93 Hours per Repair Code Reported (Wastewater Maintenance)

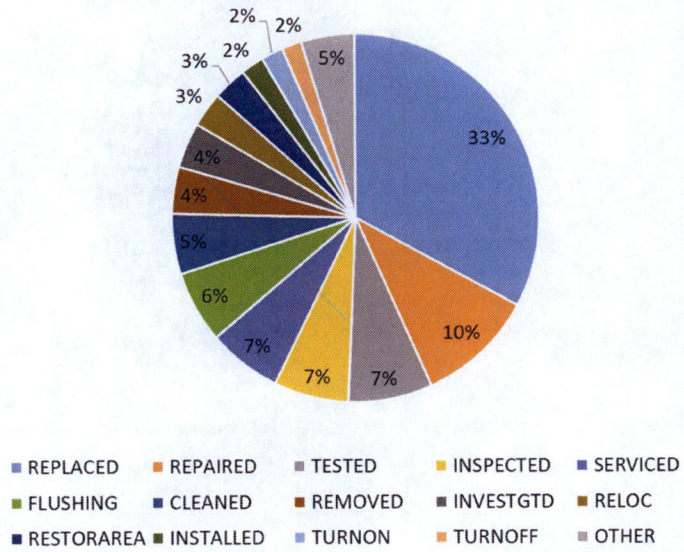


Figure 2-94 shows the historical percent of hours per failure code for the Wastewater Maintenance Division reported in the WAM database for FY2016. The codes of *Broken* and *PM* totaled 71% hours reported last year.

Figure 2-94 Hours per Failure Code Reported (Wastewater Maintenance)

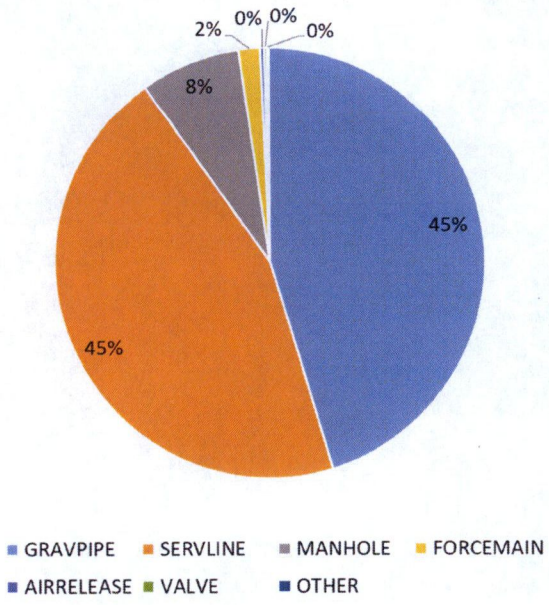
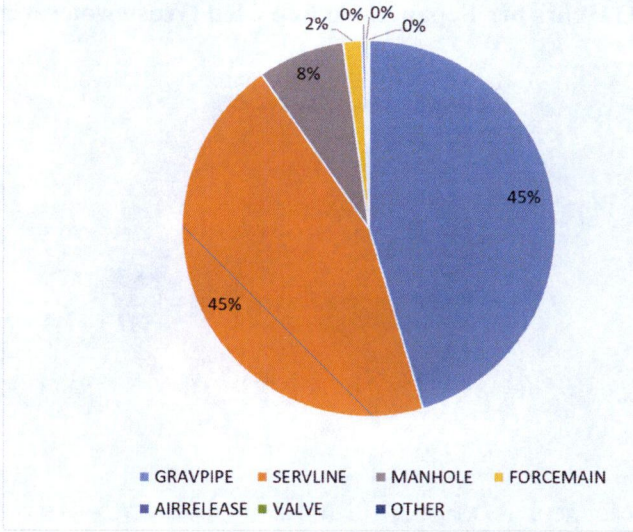


Figure 2-95 shows the historical percent of hours per asset type for the Wastewater Maintenance Division reported in the WAM database for FY2016. The codes of *Gravity Pipe* and *Service Line* totaled 90% of hours reported last year. The total hours reported for Wastewater Maintenance Division in FY2016 calculated to be 25.65 FTEs.

Figure 2-95 Hours per Asset Type Reported (Wastewater Maintenance)



2.6.2.4 *WRF*

Using the same historical data provided from the WAM system detailed above for Water and Wastewater, LAC calculated the following statistics for the WREC Division. Figure 2-96 shows the historical percent of hours per repair code for the Division reported in the WAM database for FY2016. The codes of *Replaced, Serviced* and *Cleaned* totaled 55% of hour reported last year.

Figure 2-96 Hours Per Repair Code Reported (WRF)

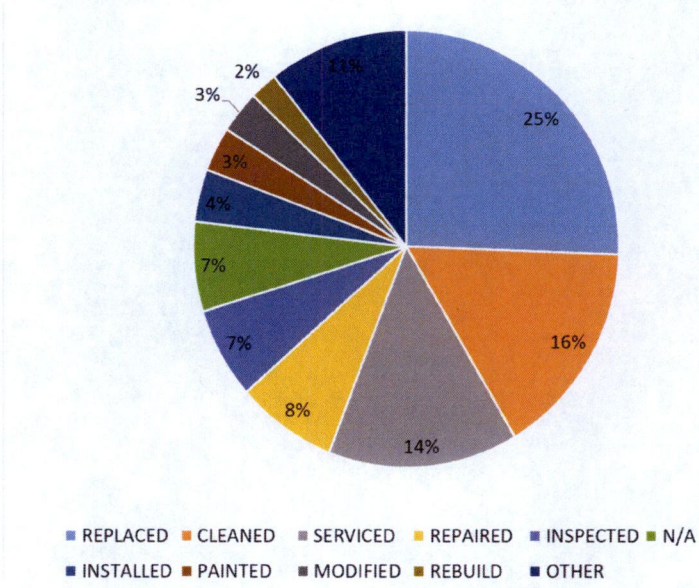


Figure 2-97 shows the historical percent of hours per failure code for the Division reported in the WAM database for FY2016. The codes of *PM, No Cause,* and *Other* totaled 58% of hour reported last year.

Figure 2-97 Hours per Failure Code Reported (WRF)

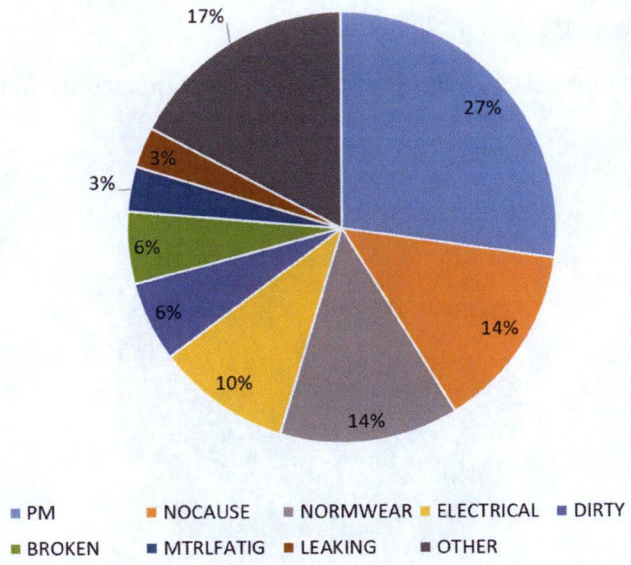
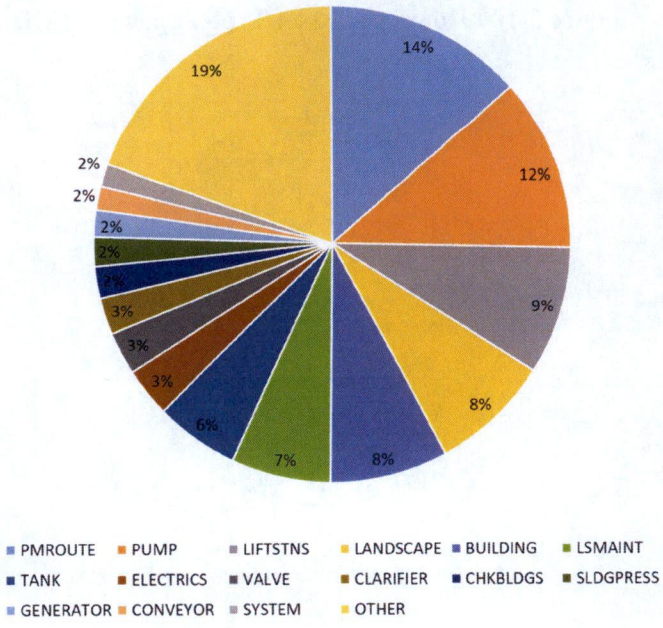


Figure 2-98 shows the historical percent of hours per asset type for the Division reported in the WAM database for FY2016. The codes of *PM Routine*, *Other* and *Pump* totaled 45% of hour reported last year. The total hours reported for the Division in FY2016 calculated to be 13.9 FTEs.

Figure 2-98 Hours per Asset Type Reported (WRF)



2.6.2.5 *Environmental Compliance Division*

Using the same historical data provided from the WAM system detailed for the Divisions above, LAC calculated the following statistics for the Environmental Compliance Division.

Figure 2-99 shows the historical percent of hours per repair code for the Division reported in the WAM database for FY2016. The code of *Sampled* totaled 96% of hours reported last year as laboratory data is not being tracked in the system.

Figure 2-99 Hours per Repair Code Reported (ECD)

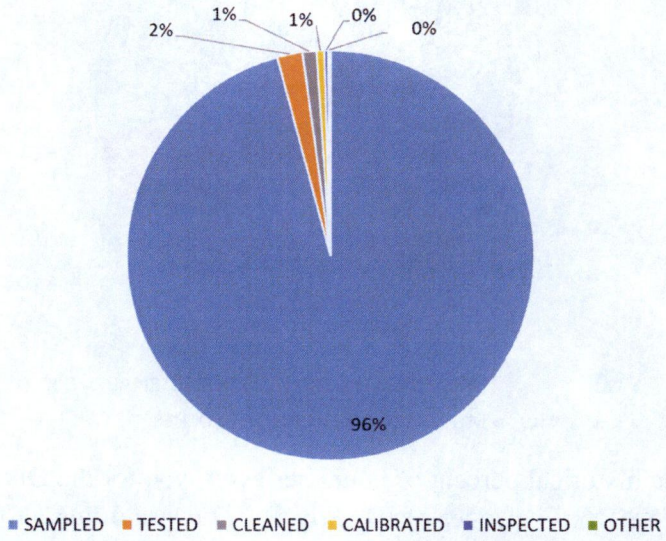
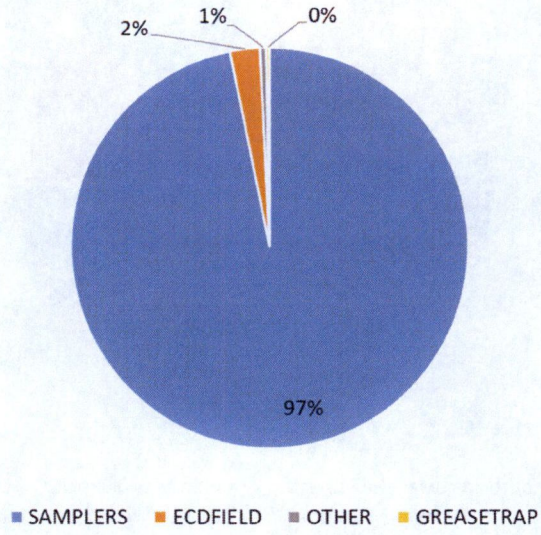


Figure 2-100 shows the historical percent of hours per asset type for the Division reported in the WAM database for FY2016. The code of *Samplers* totaled 97% of hours reported. The total hours reported for Division in FY2016 calculated to be 2.27 FTEs.

Figure 2-100 Hours per Asset Type Reported (ECD)



2.6.2.6 *Administration*

Using the same historical data provided from the WAM system detailed for the Divisions above, LAC calculated the following statistics for Administration, which is only for staff performing facilities maintenance. Figure 2-101 shows the historical percent of hours per repair code, reported in the WAM database for FY2016. The codes of *Repaired* and *Cleaned* totaled 71% last year.

Figure 2-101 Hours per Repair Code Reported (Administration)

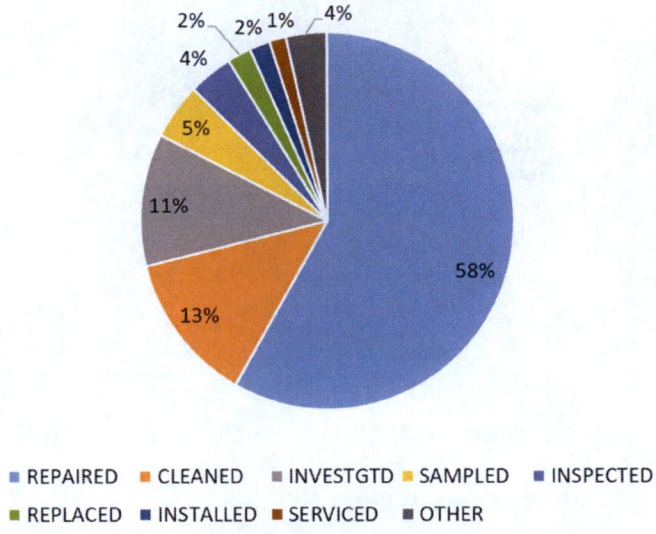


Figure 2-102 shows the historical percent of hours per failure code reported in the WAM database for FY2016. The codes of *Broken* and *PM* totaled 71% of hours reported.

Figure 2-102 Hours per Failure Code Reported (Administration)

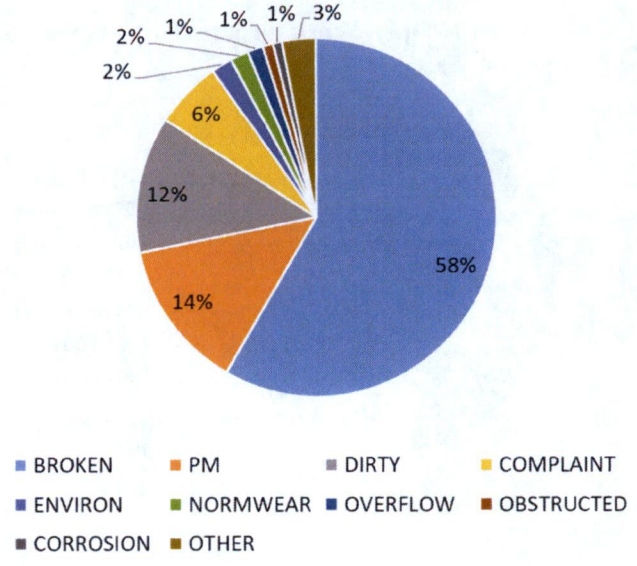
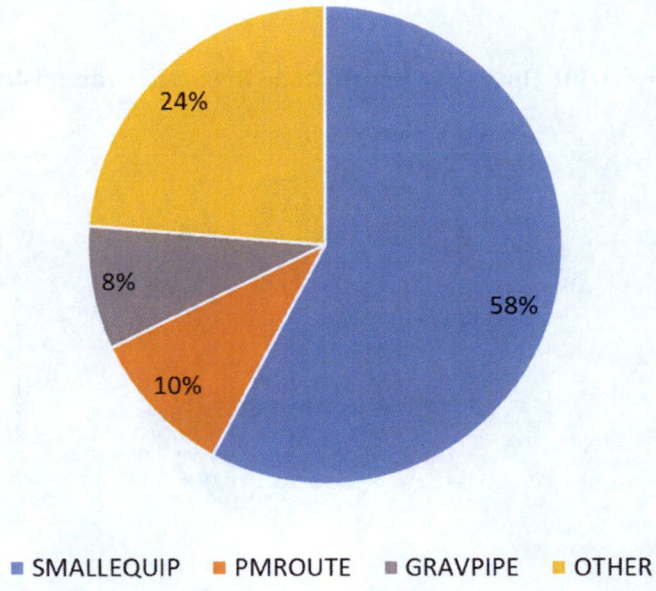


Figure 2-103 shows the historical percent of hours per asset type reported in the WAM database for FY2016. The codes of *Small Equipment* and *PM Routine* totaled 86% of hours reported. The total hours reported in FY2016 calculated to be 1.68 FTEs.

Figure 2-103 Hours per Asset Type Reported (Administration)



2.6.2.7 *Internal Data Analysis Reports*

The Department produces some analysis of WAM data via other means. The following are snapshots from PDFs provided during the discovery baseline phase of the project.

Figure 2-104 shows the total open work orders for the Department on April 17, 2017, totaling 6,015 with 44% exceed being open more than 60 days.

Figure 2-104 Open Work Orders (City provided)

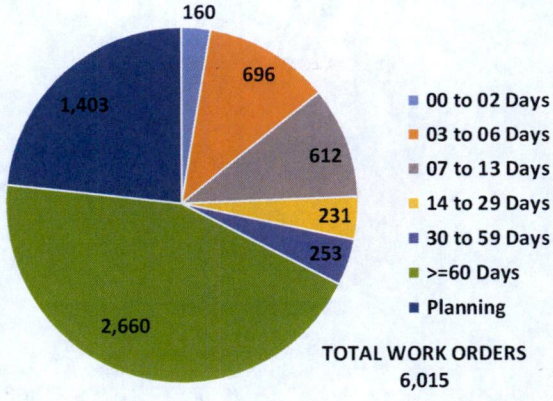


Figure 2-105 shows the number of work order tasks created and finished from April of 2016 to April of 2017, for the Department. It appears that more work orders were created than closed.

Figure 2-105 Open Work Order Tasks vs. Finished (City provided graphic)

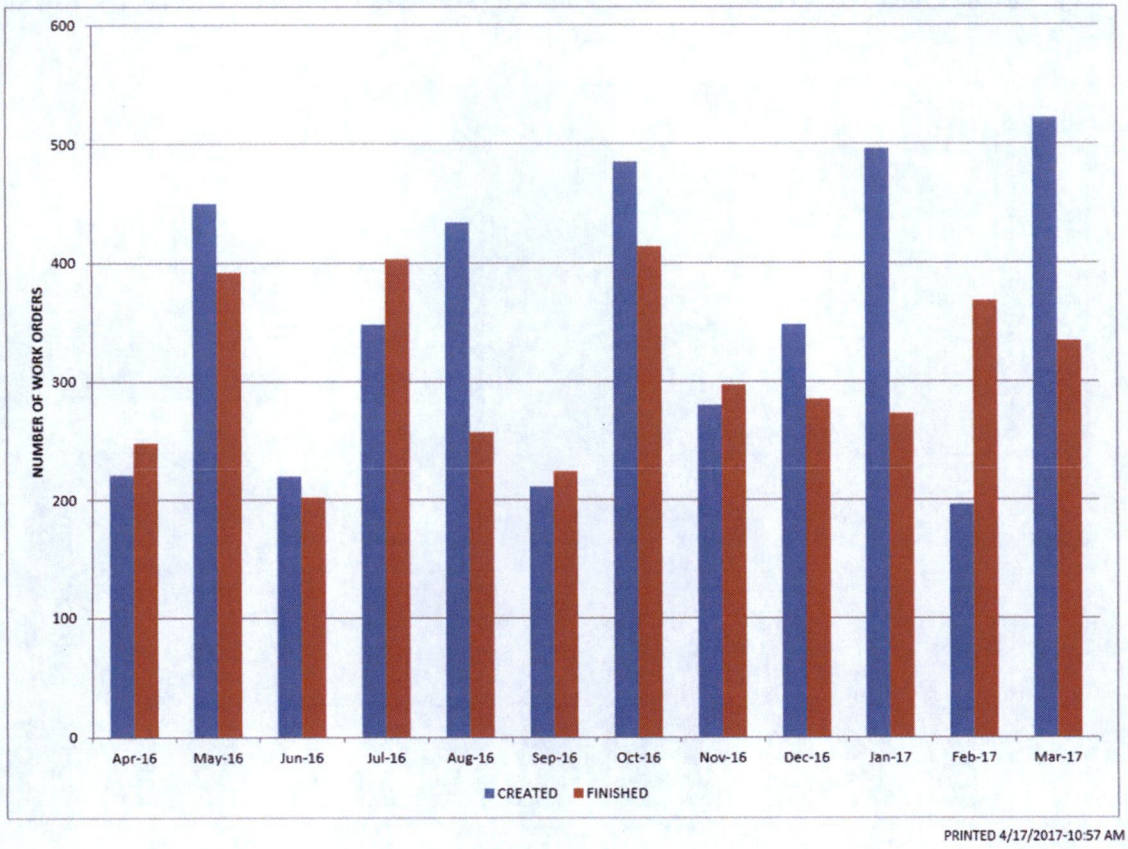


Figure 2-106 shows the number of work order tasks created and finished from April of 2016 to April of 2017, for the Wastewater Maintenance Division. Like the Department, the Wastewater Maintenance Division also appears to have had more work orders created than finished.

Figure 2-106 Open Work Order Tasks vs. Finished (Wastewater Maintenance) (City provided graphic)

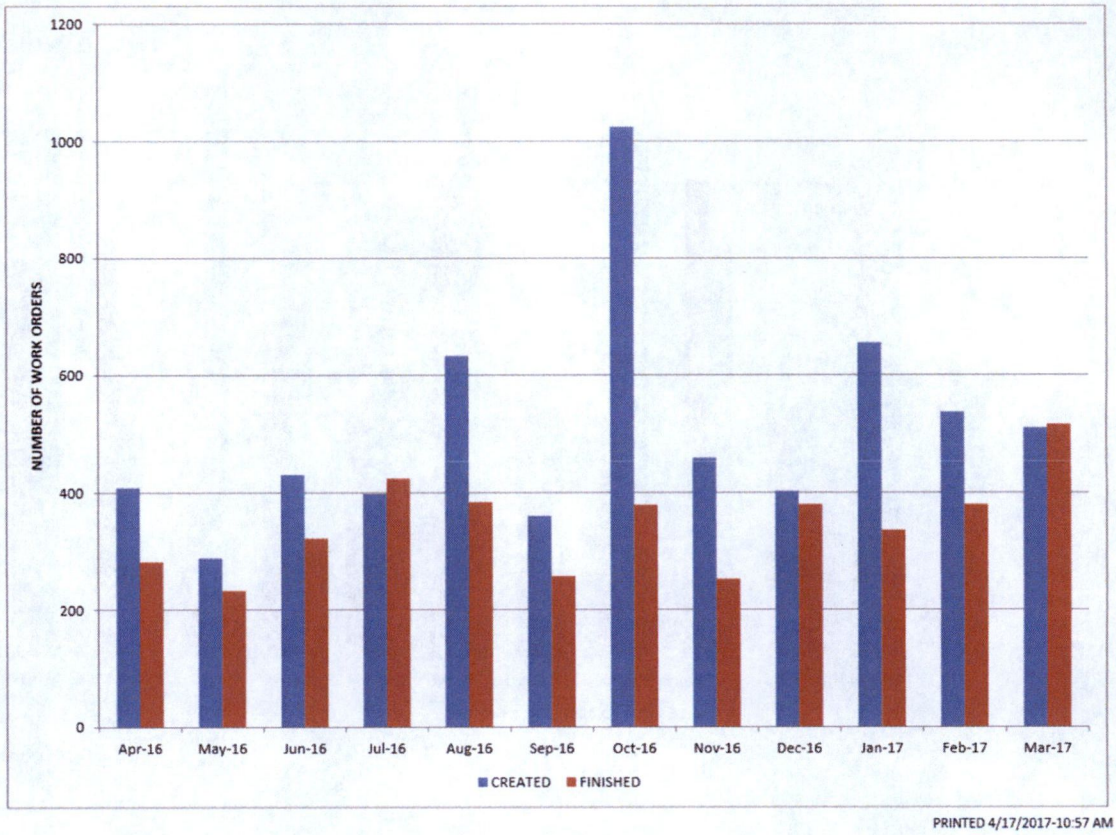


Figure 2-107 shows the number of work order tasks created and finished from April 2016 to April 2017, for the Water Treatment & Distribution Division. A large number (~250) appear to be created in the first half of the year with most having not been completed with exceptions in October and November 2016. The second half of the year shows that only a few created (~20 a month), but those were completed.

Figure 2-107 Open Work Order Tasks vs. Finished (Water Treatment & Distribution) (City provided graphic)

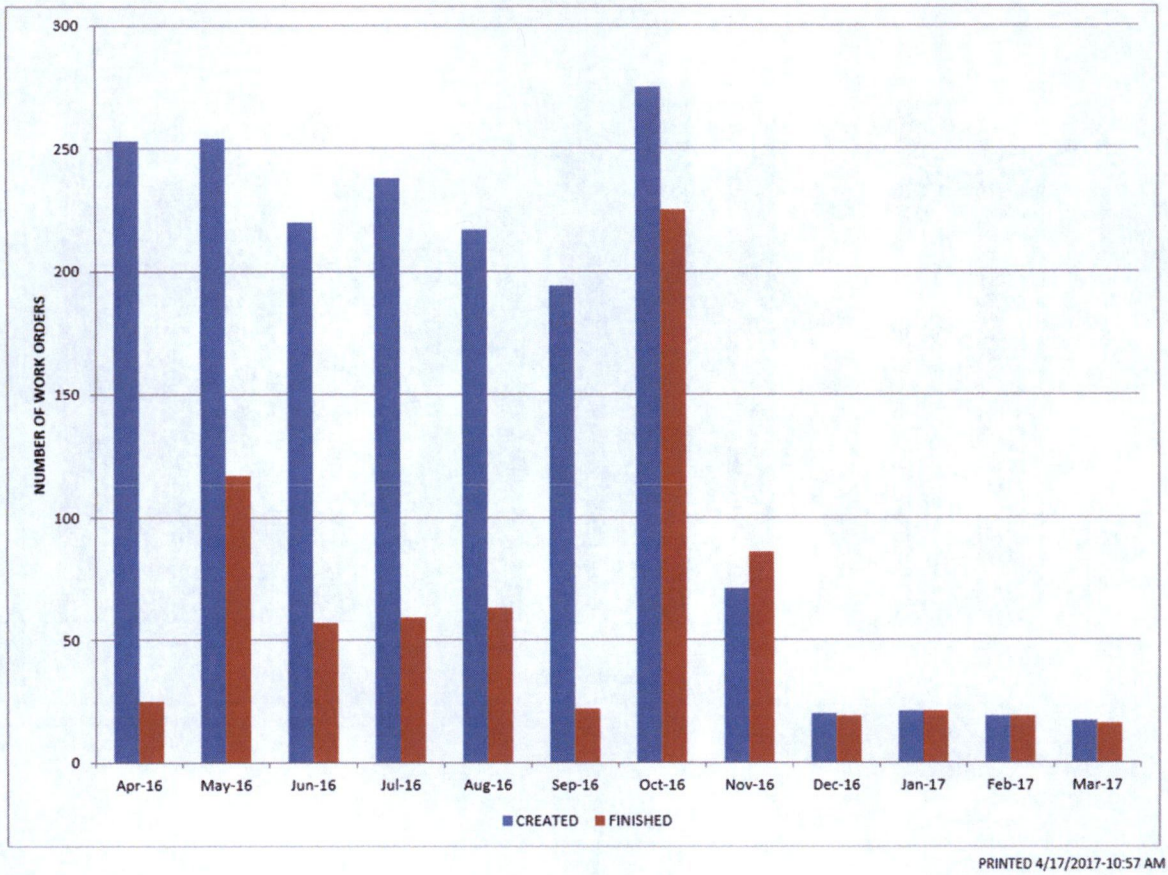


Figure 2-108 shows the number of work order tasks created and finished from April 2016 to April 2017 for the Water Maintenance Division. It appears that the Division routinely completes and closes open work orders month to month.

Figure 2-108 Open Work Order Tasks vs. Finished (Water Maintenance) (City provided graphic)

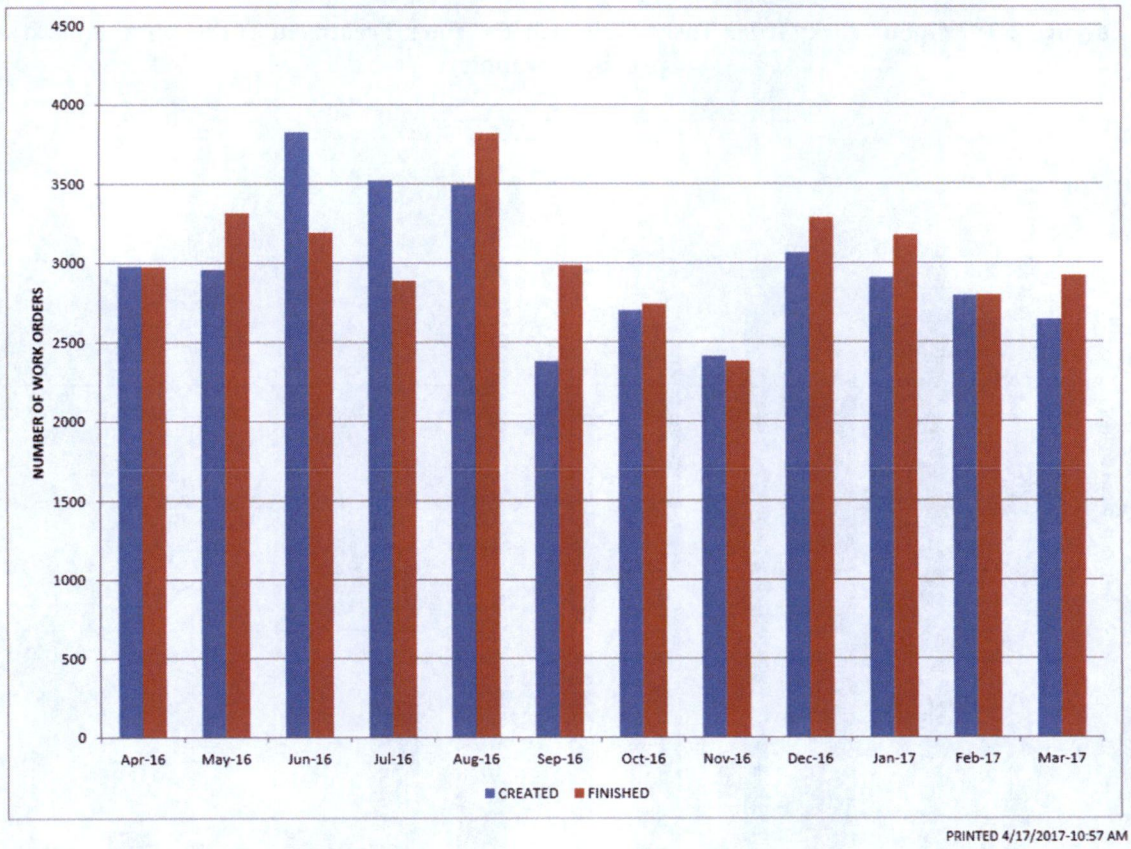


Figure 2-109 shows the number of work order tasks created and finished from April 2016 to April 2017 for the Environmental Compliance Division. It appears that the Division completes and closes most work orders month to month. They primarily track and close work orders for sampling by the Environmental Specialists.

Figure 2-109 Open Work Order Tasks vs. Finished (Environmental Compliance) (City provided graphic)

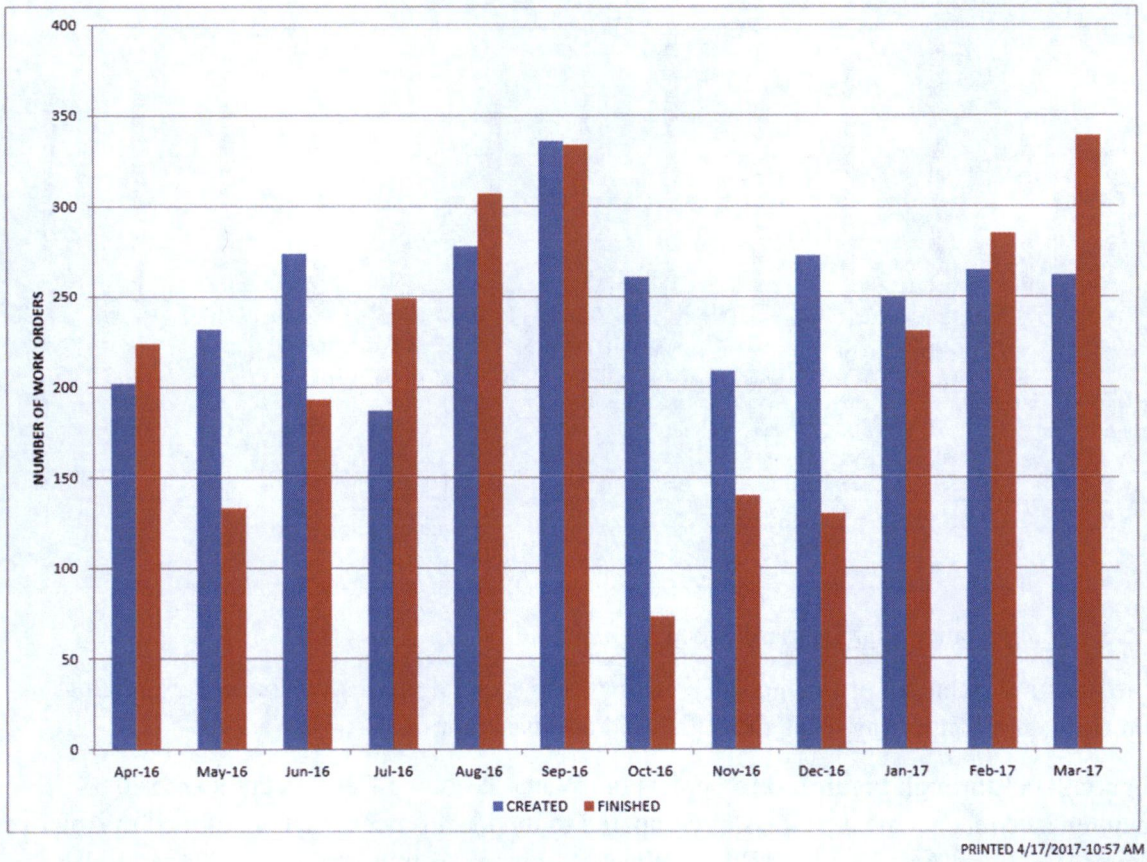
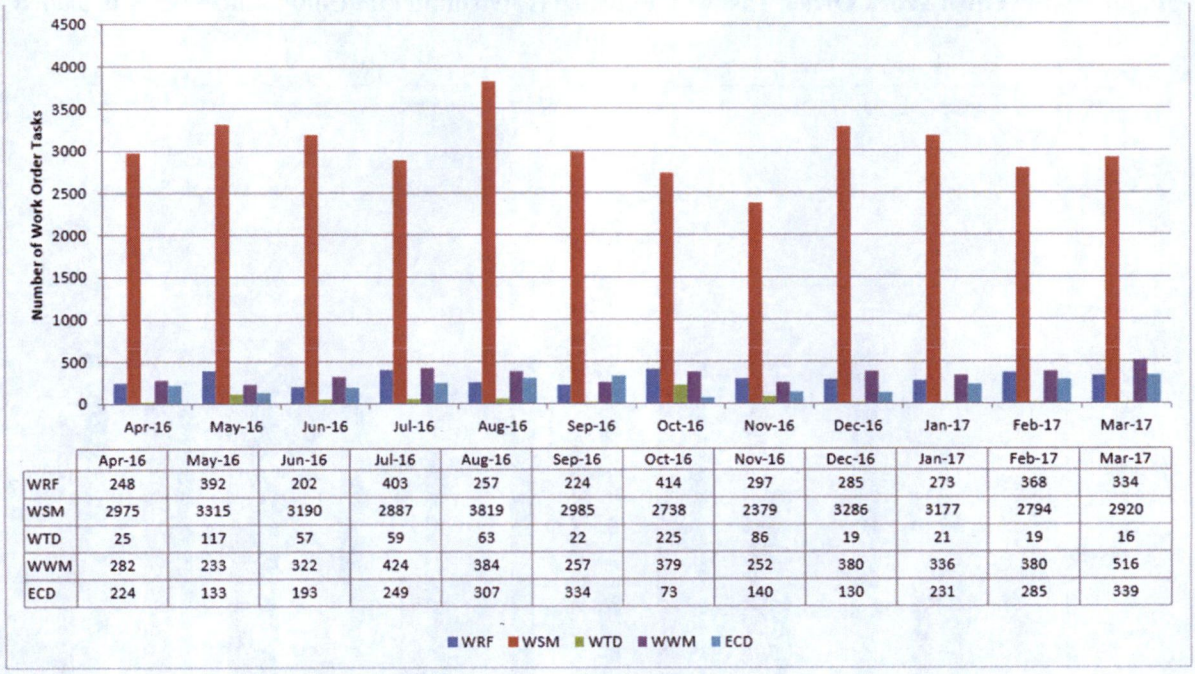


Figure 2-110 shows the number of finished work orders by Division from April 2016 to April 2017. It appears that the Wastewater Maintenance Division consistently has and finishes the most (~80%) work orders among the Divisions.

Figure 2-110 Finished Work Orders per Division (City provided graphic)



	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17
WRF	248	392	202	403	257	224	414	297	285	273	368	334
WSM	2975	3315	3190	2887	3819	2985	2738	2379	3286	3177	2794	2920
WTD	25	117	57	59	63	22	225	86	19	21	19	16
WWM	282	233	322	424	384	257	379	252	380	336	380	516
ECD	224	133	193	249	307	334	73	140	130	231	285	339

2.6.3 Maintenance Management Process

The ideal management of maintenance follows four general phases: planning, organizing, directing, and controlling. This model is used as a basis for many observations.

Figure 2-111 through Figure 2-115 depicts the Water Resource Department's Division's maintenance management process as compared to the ideal process that is outlined in American Water Resources Association (APWA) Water Resources Administration (2007, page 110). Check marks "✓" are used in Figures to identify existing processes, while a "P" is used if a portion or partial process is being undertaken. The Department has several of these processes in place, yet linkage between them is difficult to obtain due to the use of a combination of management tools to guide staff.

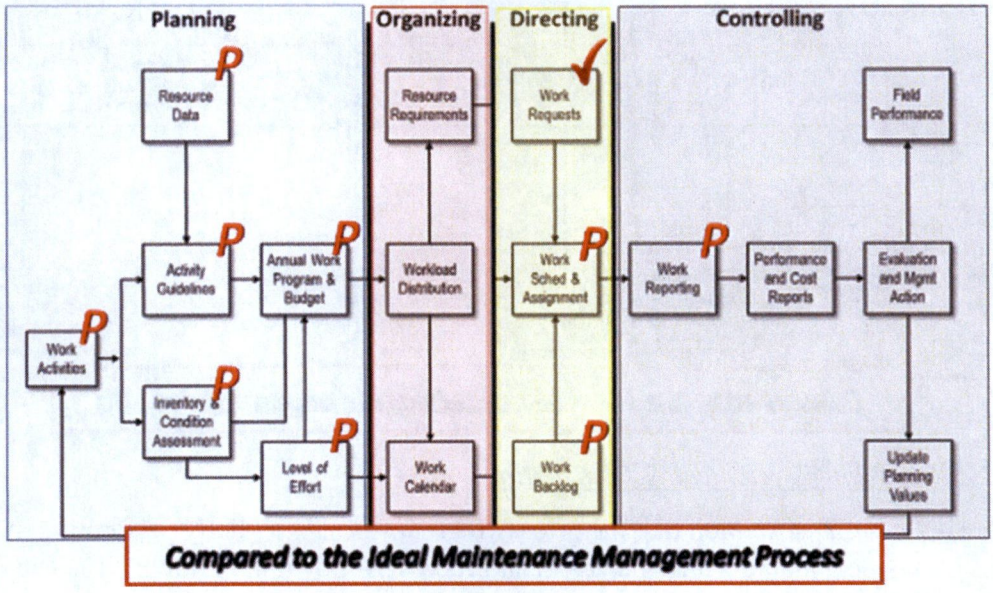
2.6.3.1 Water Maintenance Division

The Water Maintenance Division is partially performing many functions of the ideal maintenance management process (Figure 2-111). A basic activity list exists in the WAM system and other documents, yet not all employee time is reported to an activity on a work order. Asset lists exist in various formats and files for key assets such as water pipes, valves, meters, and fire hydrants. Resource data exists, but is outdated or does not reflect the actual costs.

Service levels have been established for some routine activities, yet an annual work program and budget is lacking and is not part of the Division's work processes. Some short-term scheduling

occurs using a combination of tools, and to a certain extent, is integrated with work backlog. A systematic approach to scheduling incoming, ongoing, and backlogged work is absent. Work requests are utilized and linked in the WAM system to work orders. Some labor, equipment, and material reporting occur on work orders, yet work preparation and travel time is not reported to a specific work order. Activity reporting lacks full cost to allow management's evaluation of performance and costs. Most budget and inventory reports are generated ad-hoc, created based on inquiries by management, executive management and elected officials. Some work monitoring of processes is being performed.

Figure 2-111 Maintenance Management Process (Water Maintenance)



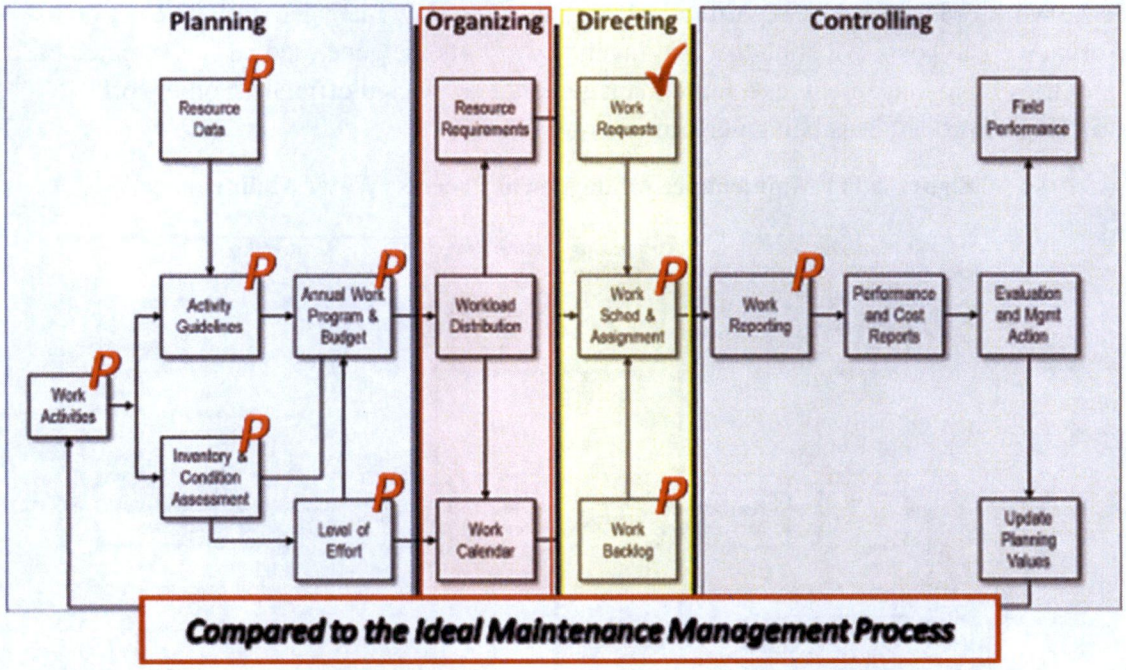
2.6.3.2 *Wastewater Maintenance*

The Wastewater Maintenance Division, similar to Water Maintenance, is also partially performing many functions of the ideal maintenance management process as shown in Figure 2-112. They too have a list of basic activities in the WAM system and other documents, yet again not all employee time is reported to an activity on work orders. Asset lists exist in various formats and files for key assets of the collection system.

Service levels have been established for some routine activities, such as the systematic inspection of the collection system via QTV and CCTV, yet an annual work program and budget is lacking for all activities and is not part of the Division's work processes. Some short-term scheduling occurs using a combination of tools, and to some degree integrated with work backlog, yet a systematic approach to scheduling all incoming, ongoing, and backlogged work is lacking. Work requests are utilized and linked in the WAM system to work orders. Some labor, equipment, and material reporting occur on work orders, yet work preparation and travel time is not reported to a specific work order. Activity reporting lacks full cost to allow management's evaluation of performance and costs. Most budget and inventory reports are generated ad-hoc, created based on inquiries by management, executive management and elected officials. Some work

monitoring of processes and budget is reviewed with Department Finance without direct linkage to the work being performed.

Figure 2-112 Maintenance Management Process (Wastewater Maintenance)



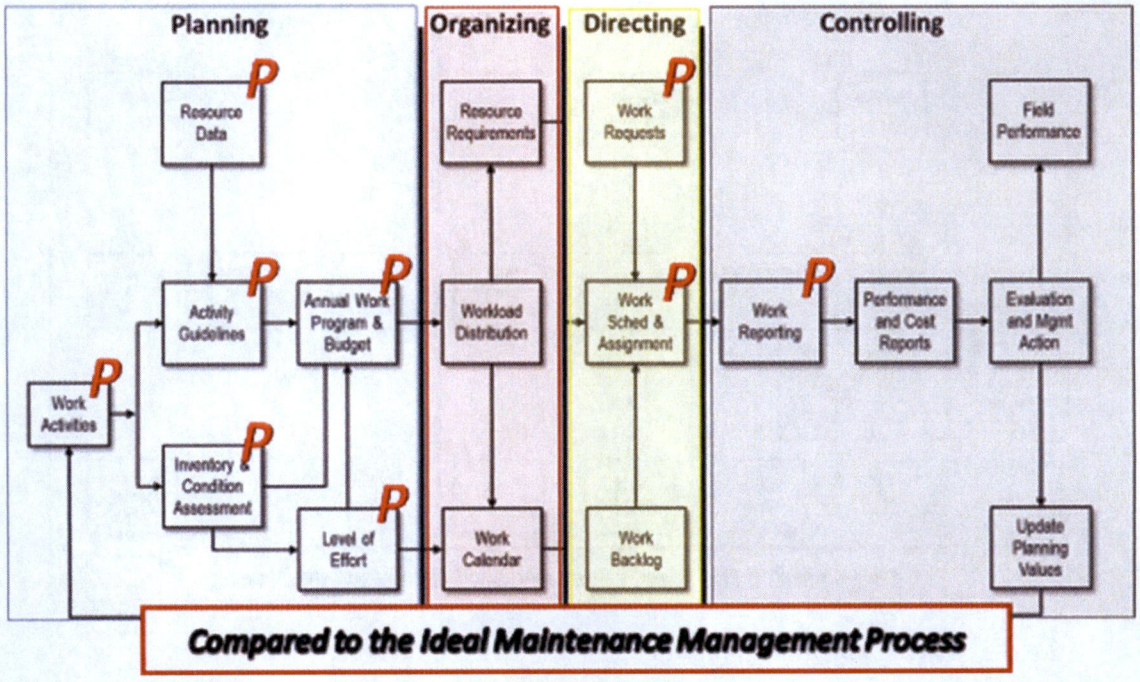
2.6.3.3 Water Treatment & Distribution

Water Treatment & Distribution like the prior two groups is also partially performing many functions of the ideal maintenance management process as shown in Figure 2-113. They too have a list of basic activities in the WAM system and other documents and lists of assets exist in various formats and files for the water treatment and distribution infrastructure.

Service levels have been established for some routine activities, such as the systematic inspection and monitoring of key operational functions of the Cosme Water Treatment Facility, pumping stations and other water distribution related assets.

Some short-term scheduling occurs using a combination of tools is integrated with work backlog for Plant Maintenance, yet a systematic approach to scheduling incoming, and backlogged work is limited. Work orders are utilized and linked in the WAM system using manual processes. Some labor, equipment, and material reporting occur on work orders. Activity reporting lacks full cost to allow management's evaluation of performance and costs. The budget and inventory reports are generated ad-hoc, created based on inquiries by management, executive management and elected officials. Some work monitoring of processes is being performed without direct linkage to work being performed.

Figure 2-113 Maintenance Management Process (Water Treatment & Distribution)



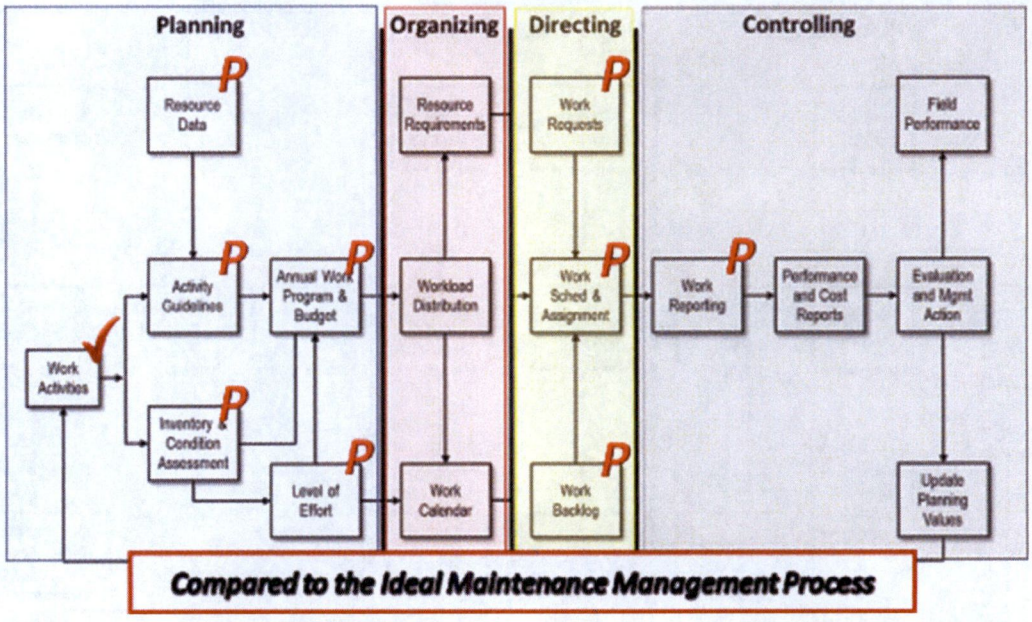
2.6.3.4 WREC

The WREC Division is also partially performing many functions of the ideal maintenance management process as shown in Figure 2-114. They too have a list of basic activities in the WAM system and other documents and lists of assets exist in various formats and files for the City's water reclamation infrastructure.

Service levels have been established for some routine activities, such as the systematic inspection and monitoring of key operational functions of the three water reclamation facilities, related infrastructure, and wastewater lift stations. Some short-term scheduling occurs using a combination of tools, which is partially integrated with work backlog for Plant Maintenance.

Systematic approach to scheduling incoming, and backlogged work is limited with exception of standardized plant functions, which are clearly documented. Work orders are utilized and linked in the WAM system using manual processes. Some labor, equipment, and material reporting occurs on work orders. Activity reporting lacks full cost to allow management's evaluation of performance and costs. Most budget and inventory reports are generated ad-hoc that are created mainly based on inquiries by management, executive management and elected officials with limited proactive utilization for process improvement. Some work monitoring of processes is being performed.

Figure 2-114 Maintenance Management Process (WREC)



2.6.3.5 *Environmental Compliance*

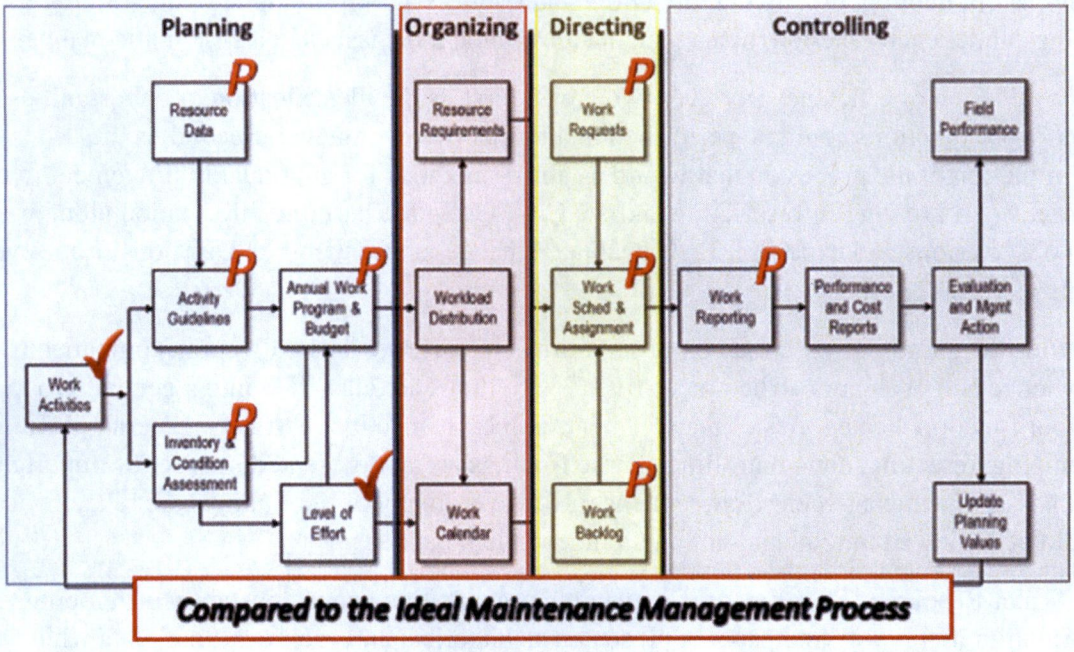
Environmental Compliance by monitoring and sampling by the environmental specialist is outlined in Figure 2-115. It should be noted that the laboratory work and support is not maintenance and operations function and does not follow the mentioned ideal maintenance process and has a separate complete process in place. It is documented in their Laboratory Quality Manual, which reflects an accurate outline of the laboratory procedures and staff and a Field Quality Manual reflects most procedures for field activities as well as processes required to annually confirm their work quality in a documented Management Review of what occurred in the laboratory and their work quality. Further independent confirmation of their work is tested and done annually by outside laboratories

The Environmental Specialists effort like the other operational groups is also partially performing many functions of the ideal maintenance management process. They too have a list of basic activities in the WAM system and other documents, yet not all employee time is reported to an activity on work orders. Asset lists exist in various formats and files for key assets of the collection system.

Service levels have been established for some monitoring routine activities, such as Biosolids Ecoli monitoring and Injection Well monitoring, yet an annual work program and budget is lacking for all activities and is not part of the Division's work processes. Some short-term scheduling occurs using routines and responses from issues raised by the Laboratory staff and others. Work orders are linked to the WAM after-the-fact. The primary purpose of reporting is to document the sampling and testing. Labor reporting occurs on work orders, yet work preparation and travel time is not reported to a specific work order. This minimal activity reporting lacks information to fully document cost to allow management's evaluation of performance. No budget and inventory reports are normally generated by WAM and if information is needed a

combination of logs are compiled creating needed information from inquiries by management and executive management. Some work monitoring of processes is also being performed using logs.

Figure 2-115 Maintenance Management Process (Environmental Compliance – Environmental Specialist Only)



SECTION 3 FINDINGS / OPPORTUNITIES

This working paper provides information to support the analysis of opportunities to improve the existing maintenance and operations of St. Petersburg's Water Resources Department. This paper also uses LAC's research and analysis to identify findings that will provide a basis for specific recommendations. The paper is structured to follow the fundamental management functions of planning, organizing, directing, and controlling/improving. By categorizing the findings under each function, management can approach the issues in a systematic manner.

This evaluation of efficiency involves two areas. First, is the identification of opportunities in which work functions could be performed in a more efficient manner. Second, is the determination of the processes that would establish methods for continual improvement to meet the needs of a growing infrastructure and the City. Using the baseline information along with field observations and expertise, LAC evaluated the Department and its Divisions from several points of view.

The following findings are based on observations, interviews, data collection, comparisons, prior knowledge and evaluation. The ninety-five (95) findings are classified into a general group and the four functional categories of management, in their respective sections – general, planning, organizing, directing, and controlling. These findings are not presented in order of importance, but instead in a management flow sequence. However, many of the findings are related and should be reviewed in total and not on an independent basis.

The Water Resources Department is a dynamic organization and is constantly developing. Information in this working paper is presented as historical and 'point-in-time' data which may have changed since discovery. Most changes in policy, organization, and process that occurred after the initial discovery are not consequently revisited as part of this effort due to significant impact on schedule and cost.

3.1 General

3.1.1 The Department is already performing many good and innovative practices, which demonstrates a philosophy of change and capability for continuous improvement.

The Water Resources Department is performing various efforts which demonstrates their innovation and earnest desire to improve. Some examples of these practices include:

- The Water Resources Department utilizes an intentional training program to augment the skills of their employees.
- Use of Pinellas Technical College (P-Tech) for training and staff development that allows for entry-level employees and upgrading employees with focus on basic skills and techniques needed by the Department.
- Development and current construction of capacity for wastewater by installation of new injection wells and enlarged treatment, with disc filters and increased storage capacity at NW and SW facilities.
- Combination of use of closed-circuit TV by using a version of fast review of lines using QTV as well as scheduling CCTV.
- Processing of treated wastewater outflows using a combination of reclaimed water and deep wells with no planned release into adjacent water bodies.
- Work and asset management system (WAM) installed and utilized by many of the department functions.
- Centralized warehouse has been established for the Department that allows for many common items to be managed and controlled.
- Use of the WAM database to create and store preventive maintenance programs in several of the groups.
- SCADA systems are in place and utilized in water and wastewater that are overlaid on actual photos of plant assets.
- Completion of an evaluation study of management, operations, and maintenance programs (MOM) one of the first in Florida. The Program is to assure that a sewage system is properly managed, operated and maintained always, as well as has adequate capacity to convey peak flows. Further, all feasible steps are taken to eliminate excessive infiltration and inflow from the system.
- The water reclamation facilities operate 24/7 with plans underway to pipe sludge from the NEWRF and NWWRF to the SWWRF for bio-solid regeneration project.
- Proactively addressing infiltration of stormwater into the wastewater collection system by various means including using manhole inserts, gasketed manhole covers, and smoke testing.
- Receiving Wastewater Collections system of the year award in 2008.
- A functioning and certified laboratory for water and wastewater functions that has annually passed all state requirements and tests.

These are just a few examples of the positive efforts, skills and practices displayed by the Department's employees indicating their capabilities, successes and desire to improve.

3.1.2 The Water Resources Department's mission statement supports both Water Resources and the City as it focuses upon effective and efficient management of water resources for the benefit of the public. Effectiveness and efficiency are often joint goals for High Performance Organizations.

The Water Resources Department's staff focuses on the maintenance and operations of the City's water processing and distribution, wastewater collection and reclamation resource infrastructure. This is accomplished through the effective and efficient management of water resources for the benefit of the public stewardship for public health and compliance to various environmental regulations. This focus is not only stated in their mission statement, but was observed during the direction and execution of their work.

However, the Water Resources' Administrative mission statement emphasizes the effectiveness elements, through the collaboration of employees and citizens. For example, Water Resources' mission statement emphasizes the pragmatic understanding of what matters, the bringing of new ideas and the creation of a positive impact. The direction set forth in their vision statement is focused upon keeping the public in Water Resources. High Performance Organizations (De Waal, 2016) utilize both efficiency and effectiveness metrics to manage their operations.

Several other divisional mission statements also focus upon effective and efficient operations. The Water Resources Department is further separated into seven (7) functional Divisions and several have also developed mission statements. For example, Water Systems Maintenance focuses on the welfare of the public through the effective maintenance of potable and reclaimed water distribution systems owned by the City. This is accomplished through the effective use of their employees, equipment, and acquired material resources. This focus is not only stated in their mission statement, but was observed during the direction and execution of work.

Another example, Wastewater Collection Systems Maintenance has also developed a mission statement that is utilized as a guiding principle in their division. The emphasis of their mission statement is on the provision of reliable sanitary sewer services through safe and efficient wastewater collection system maintenance.

3.1.3 The Consent Order of 2000 required penalties as well as capacity improvements and studies to be performed. The Capacity, Management, Operations and Maintenance (CMOM) documentation is now mandated by the Florida Department of Environmental Protection (FDEP).

The Consent Order (CO) in 2000 required the City to complete several actions to help minimize any potential sanitary sewer overflows. The City has now substantially completed those requirements from this Consent Order. The action had also required the City to pay penalties to the State of Florida.

This CO resulted in incorporating the Sewer System Evaluation Survey of 1998, which outlined the capacity requirements that needed to be addressed. A mandate was made for this document to be updated with the capacity improvements completely outlined. A report was completed documenting the City's compliance with the updates conducted annually through 2008. The

report and related updates monitored the capital improvements to the Water Reclamation Facilities, pumping stations, and collection systems as well as all the automated system improvements and maintenance approaches.

The City, though not required by the federal government, did establish a Capacity, Management, Operations and Maintenance (CMOM) program of a suggested federal outlined program. The City was one of the first in the State to complete the plan. A CMOM Program is to assure that a wastewater collection system is properly managed, operated and maintained always, has adequate capacity to convey peak flows, and all feasible steps are taken to eliminate excessive infiltration and inflow from the system. A CMOM Program should help mitigate the impact of overflows on waters of the state, the environment and public health. Public notification is required for each Sanitary Sewer Overflow (SSO). Participation was voluntary and the City was one of the first Florida cities to complete the program.

The purpose outlined in the CMOM is to enable the City to:

- Better manage, operate, and maintain collection systems.
- Investigate capacity constrained areas of the collection system.
- Proactively prevent SSOs.
- Respond to SSO events.

An effective CMOM program can help utilities optimize their use of all resources by becoming proactive on maintenance activities. This is thought to produce savings through avoided costs as well as help improve communication relations with the public, other municipal works and regional planning organizations and regulators. The CMOM program requires considerable work in monitoring and diligence to ensure compliance.

3.1.4 Three of the Water Reclamation Facilities experienced significant unpermitted discharges/Sanitary Sewer Overflows (SSO) that resulted in the issuance of the new 2017 Consent Order with specific requirements.

The City had overflows from their three water reclamation facilities into State of Florida Waters at several times in years 2015-2016. These overflows included:

- August 2nd -10th, 2015 = 31.5 million gallons at Southwest Water Reclamation Facility;
- June 6th - 9th, 2016 = 9.8 million gallons at Southwest Water Reclamation Facility, and
- August 31st - September 13th, 2016 = 78-93 million gallons at Albert Whitted Water Reclamation Facility and 58 million gallons at Northwest Water Reclamation Facility.

Further, other issues occurred when partially treated water was disposed in the injection wells, which did not follow the state operating permit criteria because of capacity issues within the plants. This included the 220+ million gallons injected in the Northwest Water Reclamation Facility's wells and the 561+ million gallons injected into the Southwest Water Reclamation Facility's wells. No overflows were reported at the fourth plant, the Northeast Water Reclamation Facility.

These unauthorized discharges and related conflicts along with discussion with the FDEP resulted in a consent order being negotiated. The 2017 Consent Order requires additional penalties, capacity improvements, follow-up studies and accountability reports to be performed, as well as the prior CMOM study to be updated.

3.1.5 Stormwater infiltration is considerable during significant storm events with as much as 2/3 of the water in the wastewater systems coming from stormwater. A consultant outlined historical flows and provided the City with analysis.

City staff, through confirmation of the CH2M Hill study, has estimated that as much as 2/3 of the water within the collection system delivered to the plants is stormwater. This results in much higher capacity needs in both the collection and treatment process and related equipment. The impact of such higher wet weather flows was outlined in a consultant's evaluation and report (CH2MHill, 2015).

In fact, the consultant suggested design parameters for the SWWRF plant and estimated higher than some utilized standards that are used by the State (Ten States, 2017). Key design parameters suggested by CH2MHill's report for factors of maximum day flow (MDF)/Annual average daily flow (AADF) of 2.63 and peak hourly flow (PHF)/AADF of 3.41, both of which are higher than the 10 States Criteria that is often used. However, these suggested factors are similar but lower than FDEP's default factors for PHF/AADF of 4.5, yet are higher for MDF/AADF at 2.25. The high-water table and the occurrence of large rain events is considered to impact peak flows in many areas within the state of Florida as implied by state regulators as suggested by these design factors.

This translates to the fact that both the State and CH2MHill indicated that anticipated peaks will occur because of storm water infiltration during large storm events, and must be designed for in wastewater collection and treatment facilities. However, as directed in the Consent Order, the City is attempting to reduce the amount of inflows by several different efforts.

3.1.6 The Florida Department of Environmental protection (FDEP) indicated that during storm events in 2015/2016, all Pinellas County Facilities had overflows and AWWRF closing was a contributing factor but not completely the sole reason for the City's overflows.

An evaluation of overflows in the City in the years 2015/2016 was undertaken by the FDEP. The document reported on the impact closing the AWWRF plant had on the sewer overflows. The report was produced by FDEP's SW District Secretary (Yeargan, 2017) which indicated that all Pinellas County wastewater facilities were flooded in the large rain events because of a high-water table, heavy rains, high tides and a storm surge.

It was cited by Yeargan (2017) that the NWWRF did have overflows yet was not connected to the AWWRF. The report used that fact and others to conclude that "operation of the AWWRF would not have prevented SSOs in St Petersburg during 2015-2016, but would have resulted in lower volumes of SSOs."

3.1.7 The storm events of 2015/2016 also impacted Eckerd College and neighboring communities. In the College, some flooding occurred on streets (Avenue of States) and athletic fields, with partially treated effluent mixed with stormwater. A local developed community has expressed concerns over the 2015/2016 unpermitted effluent releases to Boca Ciega Bay.

The overflows from SWWRF in 2015/2016 were reported by both the City and College to have flowed onto and through the Eckerd College campus. The College indicated mixed storm and sewer effluent flooded portions of major roadways in the college and flowed across their athletic fields. The natural drainage as shown in the College's own storm drain plan shows a portion of the plant area naturally flowing through the college.

The college has expressed concern of untreated sewer flow through their campus creeks, as well as their open and closed drainage systems. They indicated concern for future overflows and construction improvements that are underway. In addition, the sewer overflow entered portions of Boca Ciega Bay, a bayside community west of the college, and their residents expressed concern over the City's management of such past overflows.

3.1.8 Natural drainage from some of the SWWRF area flows though the College campus. The drainage system that is in place at the College with various inlets, stormwater structures, and watercourses may restrict some flows and could be enhanced.

A portion of the area that SWWRF resides in drains in a southwestern direction toward the College. A pond exists on the southwestern portion of the plant site to collect stormwater. The pond can, and has, overflowed onto the college, then flowed through the College's conveyance system into Boca Ciega Bay. Further, the interim storage tanks in the middle of the WRF facility were reported by both the College and SWWRF employees to have overflowed and drained toward the campus and its athletic fields. This negative overflow situation is most concerning to College leadership.

The current stormwater system in the College that drains onto a portion of Avenue of States and adjacent property, has a combination of stream flow and piping systems that meander on the College campus reaching Boca Ciega Bay. Some of the watercourses, inlet and pipes appear to be restricted and could impact drainage runoff as the flowing water appears to be used as an aesthetic feature.

3.1.9 The construction plan of draining the SWWRF away from the central part of the campus, along with new storage facilities under construction and some detention may reduce risk, yet still may need enhancements for emergency situations.

The current drainage plan for the SWWRF plant rehabilitation has changed some of the current natural drainage flow. The plan is to convey the stormwater from the SWWRF site on the plant's southern border with the College to flow to the east. The plan would have stormwater flow into a regraded and improved ditch system and then picked up in an inlet and conveyed into the piping system under Avenue of States. This would then flow into the water course east of the college

maintenance yard. This watercourse eventually flows south into to the Frenchman Creek, then to Boca Ciega Bay.

This will result in runoff and any future overflows from initially going on the campus, minimizing some risk for flow onto the college. However, a major overflow could potentially exceed the SWWRF enhanced ditch system capacity that has been designed and planned.

3.1.10 Lack of involvement and processes are issues identified from the employee surveys as well as observed by LAC.

During 2013-14, a Water Systems Maintenance Climate Study was performed internally by Angela Horvath, Ph.D., former Management Methods Analyst with the Department. Through collected survey data and interviews with some administrative support staff, coordinators, foreman, and technicians, the report drew several conclusions. This effort was solely focused and conducted with employees of the Water Systems Maintenance Division.

The final report concluded that the 55% of the employees who responded to the survey believed that cooperation and teamwork were one of their strengths. They also faced several other challenges in the execution of their efforts. They felt they were in a hostile work environment, there was poor communication, they were micromanaged, poor work planning existed, there was low morale, and they had little input on decisions.

As this survey and related effort was performed approximately four years ago, some areas have shown improvement, yet others still need improvement. For example, staff involvement in decision making and the development and implementation of work processes is still an issue.

Several similar agencies involve employees at all levels in the organization in the development of work processes, the identification of resource needs, and the establishment of productivity benchmarks by activity.

3.1.11 Water Resources have numerous state, local, regional, federal mandates and permits they must comply with as well as a recent consent order.

The City offers several significant environmental and recreational resources, including St. Petersburg Municipal Beach, Maximo Beach & Park, Spa Beach, and North Shore Beaches. In addition, via the nature of the Department's purpose of maintaining and operating essential utilities, the Department's mission statement focuses upon public health and environmental regulatory compliance.

The Department is required to comply with numerous state, local, regional, and federal mandates and permits. For example, each of the City's three (3) wastewater reclamation facilities are permitted by the Florida Department of Environmental Protection (FDEP). FDEP permits are associated with the use and sampling of injection well systems, numerous Florida State Statutes, Southwest Florida Water Management District (SWFWMD) Rules, City and County Administrative Codes, as well as the Federal Clean Air and Clean Water Acts.

Each of these governing agencies and associated documents have a significant impact on the maintenance and operations of the City's water and wastewater assets.

3.1.12 SCADA systems provide some tools for monitoring and controlling processes, yet lack data integrity as much of the reporting still requires manual confirmation efforts at the water treatment facility and pumping stations. In addition, the accuracy, timing and presentation of wastewater lift station SCADA information is also questioned by staff.

The City utilizes SCADA for both water and wastewater assets. SCADA is configured at all WRFs and lift stations and allows for monitoring critical treatment processes with some remote-control capabilities. It is also established for the water treatment plant. Configuration is done with a combination of in-house and consultants. Some configuration is performed internally by City employees, though installation and major configuration is done via contract support. Some changes and configuration have been made without full involvement of the operations staff creating some lack of desired functionality and acceptance.

Staff have expressed concern over the accuracy of the SCADA and perform manual checks daily to confirm proper information for decision making. In the wastewater lift station, the operational staff are impacted because of changes by others in the system configuration in the way information is displayed and presented, thus making it more difficult to utilize the system.

3.1.13 The WAM database was initially configured with full contribution of Water Maintenance and limited participation from others, yet is now somewhat utilized by the other operational Divisions.

The WAM system was implemented in 2007 and has been utilized for approximately ten years as the primary Computerized Maintenance Management System (CMMS) used by each Division in the Department with the exceptions of the Environmental Compliance Division's laboratory and Water Reclamation's and Water Treatment plant operators.

A working group was formed for the implementation of the system with representatives from each of the Department's Divisions. Representatives were supplied to provide feedback and input related to the needs of their specific Divisions. Further, the Department has also developed a user's support group for providing feedback and communicating the specific system needs of their Division to the ASM Computer Resources Division.

The current Water Maintenance Manager was the previous Computer Resources Manager, and so further configuration and implementation were encouraged in his Division. This includes the use of tablets and laptops in the field by crews. Alternatively, the remainder of the Divisions appear to lack making the effort for the full implementation of the system and related processes to benefit their operations and work flow. Their support of the system was and is not as complete as Water Maintenance.

3.1.14 The GIS system exists yet is fully utilized by only a few groups in the Division.

The City's Geographical Information System (GIS) is utilized within the department with some internal staff support from the Computer Systems Division, as well as Citywide IT. The GIS mapping capability exists in the WRD and is utilized by some employee positions in assigning and reporting work.

The GIS asset data has been integrated with the WAM database to link reported work to some map features in both Water and Wastewater. GIS can be used to generate maps and displays that may be printed and used for presentation, planning, or reporting of work done. However, many employees in the WRD do not have access to electronic maps in daily operations, or lack skills to use the system.

GIS, especially for linear assets (collections and distribution), is a common tool used in water and wastewater agencies. Several benchmark agencies also developed and maintain a comprehensive inventory of all assets they are responsible for, storing these inventories and their related attributes such as condition, location, and installation dates in their GIS system. These agencies also automate the linkage between their MMS and inventory data for easy access by employees at all levels of the organization.

3.2 Planning

3.2.1 Water Resources Administrative Complex has multiple backup generators that operate independently with some different one's powering portions of the same building. One generator is located adjacent to the lab and creates fumes which impact work done on samples.

The Water Resources Administrative Complex is the primary staging location for most of the employees and equipment of the Department. This Complex is equipped with several emergency generators for utilization if normal electrical transmission is interrupted. There are generators spaced throughout the complex serving various buildings and power needs. In addition, each of the water reclamation facilities, pumping stations, and the Cosme Water Treatment Facility also utilize this form of emergency backup power.

The emergency power generators at the Administrative Complex for various buildings are autonomous systems that provide backup support. These generators work independently, and if one goes down it must be supported by a portable generator that must be moved to the site. Each generator operates separately and there is no integration of the systems.

In a unique case, a generator located adjacent to the laboratory creates exhaust fumes when used and is close to an air vent. The employee survey indicated many employees expressed experiencing headaches during the work day and find the work environment less than desirable.

3.2.2 Environmental Specialists of the Environmental Department are assigned in a different location than where they do most of their work.

The Environmental Compliance Department (ECD) is currently led by a Manager with an office located in the main administrative building of the Water Resources Department. The Department has twenty-five (25) staff including the Interim Manager. The Division has eight (8) Environmental Specialists, four (4) Environmental Analysts who specialize in Industrial Pretreatment and Grease Management, and four (4) Environmental Analysts who specialize in Field Operations.

The reporting location for the Environmental Specialists is in the main administrative building, where they check their computers for the day's work, then walk to the laboratory building across the street. This is shown in Figure 3-1. When arriving at the lab building, they prepare their equipment for the day's field sampling. At the end of the day after working in the field, they return to the lab building unloading samples and documenting their samples for analysis. Afterwards, they walk back to the main building to record their day and review emails. This joint location of assignment is for all non-laboratory staff – environmental specialists, environmental analysts, operations analysts, and the engineering clerk.

Figure 3-1 Environmental Specialist Reporting Locations

3.2.3 The City purchases water from Tampa Bay Water, which is provided from different sources, providing inconsistency in the water quality blend which is often treated differently at Cosme Plant.

The City of St. Petersburg purchases water from Tampa Bay Water (TBW) at $2.56 per 1,000 gallons. Tampa Bay Water provides blended water from three sources: ground water, surface water and seawater desalination. From October 2016 to August 2017, the blend has been 62.7% Ground Water, 32.8% Surface Water, and 4.5% Desalinated Seawater (Tampa Bay Water, 2017). Tampa Bay Water manages the blend of water they deliver to their six (6) member governments including the City of St Petersburg.

Tampa Bay Water provides various levels of treatment from different source waters to maintain an acceptable degree of hardness prior to distribution to its customers. This includes disinfecting and stabilizing, filtration (or desalination with reverse osmosis) and disinfecting with chloramines. The processes used are unique to each of the three sources of water provided by TBW.

Tampa Bay Water determines the blend of water they will transmit to St. Petersburg Cosme Water Treatment Faculty daily, so the water quality blend is inconsistent from day to day. Cosme staff consistently perform water quality monitoring to determine the level of treatment they will require to meet desired water standards of the City.

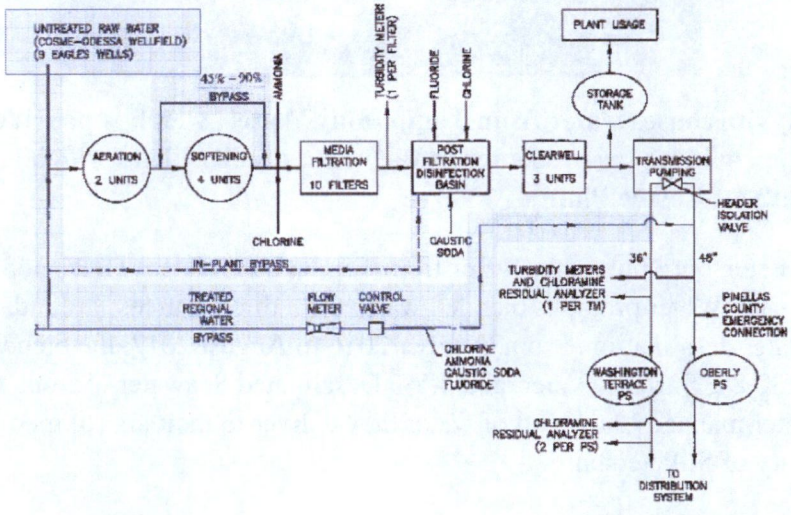
3.2.4 Purchased TBW water has occasionally by-passed around the Cosme plant and been conveyed directly to St. Petersburg pumping stations.

The Cosme Water Treatment Facility is in Hillsborough County and receives Tampa Bay Water. Under normal operations, 45%-90% of water by-passes the water softening, and often a portion of water by-passes aeration and media filtration processes before entering the post filtration disinfection basin. On occasion, the water has by-passed various treatments processes at the Cosme plant before being sent directly to the two water pumping stations at Oberly and Washington Terrace in unincorporated Pinellas County.

There have been times where all the treated regional water has by-passed the plant treatment processes and was delivered directly to the City's pumping stations at Oberly and Washington Terrace. The transfer of water travels occurs through the two independent water lines – one 36-inch and one 48-inch. These lines travel over 25 miles through various terrain, under water courses and attached to bridges.

These various by-pass alternatives of the treatment process discussed are shown in Figure 3-2 in the blue colored lines. This same process has been in place even before the City was utilizing TBW water.

Figure 3-2 Various Cosme Plant Water By-Passes



There have been times where the plant was down or on trial basis where water was directly supplied to pump stations, bypassing the treatment facility. The other five utility providers who receive Tampa Bay Water do not soften or further treat the water. The standards being utilized by the City for softening appears to exceed those of the other utility providers.

The Cosme Water Treatment Plant's processes include aeration, softening and filtration along with fluoridation, all which vary with the blended water quality from TBW sources.

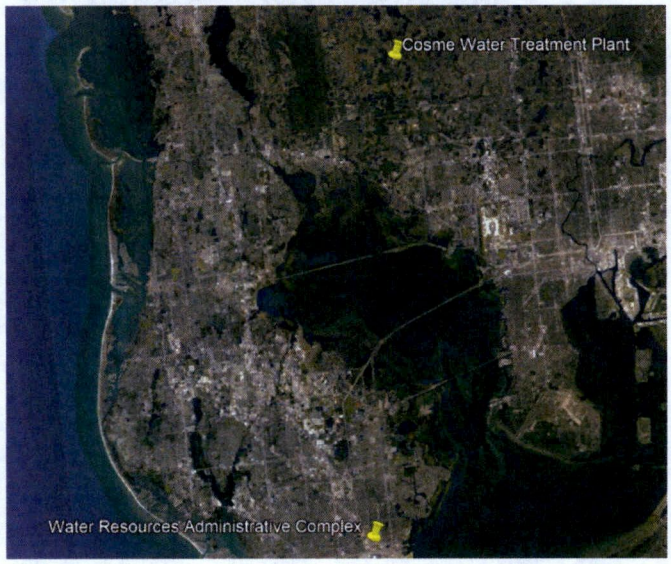
Cosme staff consistently perform water testing to determine the treatment they will require the supplied water to meet the water standards of the City. The City's standards include: an alkalinity range between 120 and 140, a total hardness between 130 and 220, a pH between 8.1 and 8.3, and chlorine residual between .5 and .7 parts-per-million (ppm) total chlorine. Dependent upon the test results, the City will apply various treatments to meet or exceed these standards.

3.2.5 The Cosme Water Treatment Facility is in Hillsborough County and is a considerable distance (31 miles) from the Water Resources Administrative Complex.

The staff of the Water Treatment & Distribution Division are primarily staged out of the Cosme Water Treatment Facility, located at 16015 Racetrack Road, in Hillsborough County. The Division Manager and the plant's Chief Plant Operator stage out of this location. The Water Resources Administrative Complex is located at 1650 3rd Ave N, St., in St. Petersburg.

The Cosme Water Treatment Facility is approximately thirty-one (31) miles, or more than an hour drive from the Water Resources Administrative Complex during high traffic. Figure 3-3 shows the location of the Cosme Water Treatment Facility in relationship to the Department's Administration Complex.

Figure 3-3 Location of Cosme Water Treatment Facility



The travel time for a meeting, coordination, training and guidance that an employee receives at the Administrative Complex or City Hall is considerable and can take up to an hour one-way travel time during heavy traffic.

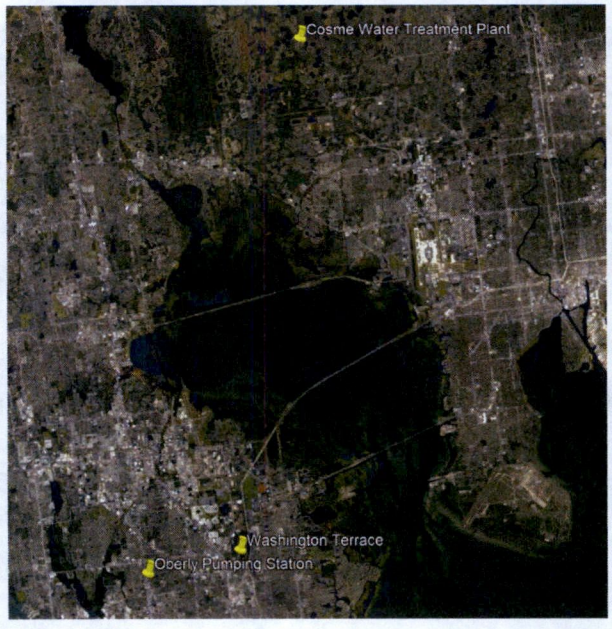
3.2.6 Water considerable time from the Cosme Facility and travels a considerable distance (25+ miles) through two independent piping systems requiring pumping stations to maintain both pressure and water quality for the City's customers.

The water received from Tampa Bay Water undergoes various treatment processes at the Cosme Water Treatment Facility before being pumped to the City's two pumping stations, Oberly, which is located at 66th Street North in Pinellas Park and Washington Terrace, which is located at 66th Avenue North in unincorporated Pinellas County.

The transmission line to the Oberly Pumping Station is a 48-inch line constructed of prestressed concrete cylinder pipe (PCCP) and ductile iron pipe with a length of approximately 25 miles. The line has a transmission capacity of 45 million gallons per day (MGD). The transmission line to the Washington Terrace Pumping Station is a 36-inch line constructed of reinforced concrete with a length of approximately 24 miles. The line has a transmission capacity of 23 million gallons per day (MGD). Figure 3-4 shows the location of the Cosme Water Treatment Facility relative to the two pumping stations. These lines are over 50-years-old and generate a potential risk of failure and are difficult to access and maintain as well as monitor their condition and status.

Although there is adequate pressure to convey water from the Cosme Facility, the pumping stations are required to maintain water pressure in the water distribution system and prevent pressure variations, surges or water hammers. Water quality is also monitored at the pumping stations prior to final distribution to the City's customers.

Figure 3-4 Location of Water Pumping Stations



3.2.7 The primary purpose of the elevated storage tank is to recirculate water for quality, and serve as a safe guard for maintaining steady water system pressure and fire protection integrity. This is different than some other agencies use of elevated tanks.

The City's 500,000-gallon elevated water tank is located at 5th Street North in St. Petersburg and is adjacent to Crescent Lake Park. The tank is 140 feet tall and is constructed of riveted steel. The primary purpose of the tower is to maintain water pressure in a power loss, reducing the potential water hammer effect from the pumping stations being interrupted or losing power as well as helping to ensure fire flow pressure is maintained.

This is different than some other agencies. In addition to these functions, other agencies utilize their storage tanks in more of energy cost saving role. These agencies will fill their tank(s) when the cost of energy is low, typically at night and use the water in the distribution system when energy is more expensive and water is in a higher demand. However, the Crescent Lake Tank does not have the volume to provide this opportunity.

3.2.8 The City has 3 of the 19 largest treatment plants in the state for permitted capacity. Also, AWWRF was 4th in the top 27 prior to closing. The smallest plant, the NEWRF, had no significant overflows during the large storms in 2015/2016.

The City has large municipal wastewater treatment plants relative to the other 243 in the state. In fact, the City has three of the largest 19 largest municipal plants (FDEP, 2017). Prior to AWWRF closing, they had four of the top 27 in size. These facilities' large sizes require a considerable number of staff and requires the employees to have the proper experience, certifications and training.

During the storms in 2015/2016, the NEWRF plant was the only one of these facilities that had no significant overflows. The other three had overflows, which created major concerns within the area with citizens, the media, regulators and various environmental groups.

3.2.9 Closure of the AWWRF resulted in a reduced overall treatment capacity.

Four water reclamation facilities were utilized until April 2015 when the AWWRF plant was closed and ceased operation, resulting in three remaining treatment facilities managing and processing the wastewater flows. The anticipated cost requirements needed to upgrade and upkeep the AWWRF along with other factors appear to be the cause the City to close that facility. In the 2017 Consent Order, a re-evaluation of the capability of this facility is scheduled to be underway to determine opportunity to utilize this facility as well as impact of its closing on past sewer overflows.

Combined permitted capacity at the four plants equaled 68.5 MGD with an average daily flow in 2016 of 39.74 MGD. Closure of the AWWRF reduced the system-wide treatment capacity to 56 MGD which is only 29% above the average daily value in 2016. It was anticipated and mandated in a recent 2017 CO that improvements would occur at other facilities to increase their capacity.

3.2.10 Two of the plants (SWWRF and NWWRF) have major improvements underway mandated by the CO. These plants had significant overflows during the large storms in 2015/2016.

The City under the 2017 CO, has mandated major capacity and efficiency improvements, which are underway at two of the WRFs. These improvements are now under construction following explicit timelines mandated by the CO. At the NWWRF, the enhancements include a new disc filter, upgraded pumping systems, another injection well, as well as a plan to pump slurry through a new connection to the available collections system travelling to SWWRF.

The SWWRF also has considerable construction and major capacity enhancements underway. This includes a splitter box, headworks improvements, adding a 4th secondary clarifier, several disc filters, increasing the storage tank (15M gallons), adding a 3rd chlorine contact basin and three new injection wells, as well as any necessary pumps and piping for increased flow capability. Further, there is also a waste-to-energy project underway which will process sludge from all three operational WRFs.

Because of the requirements of the CO, the NWWRF and SWWRF processes are now being modified for the renovation of projects, while the NEWRF has remained generally the same.

Further, there are mandated collection system improvements with $14 million to be used for pipe lining, replacement and rehabilitation along with an ordinance addressing private lateral improvements and standards by 2012. These being done to help reduce the infiltration of stormwater into the system.

3.2.11 The City is constructing a bio-solid to energy regeneration facility at the SWWRF, and will receive piped sludge from the NWWRF and NEWRF. These plants currently produce and haul sludge twenty-four hours a day.

The City is also constructing an energy regeneration system using bio-solids from all three operating plants utilizing financial resources of a grant from the Environmental Protection Agency. This project is not mandated by a CO, but is planned for the efficient use of byproducts. All three plants are planned to utilize slurry to the SWWRF. The construction has started at SWWRF and the pumping stations at the NWWRF to pump to locations in the collection system that can be further piped to SWWRF. The NEWRF has yet to start construction on similar improvements to transfer the sludge. This will require the pumping facility to pump slurry at a point where gravity flow can be utilized to flow the sludge to SWWRF.

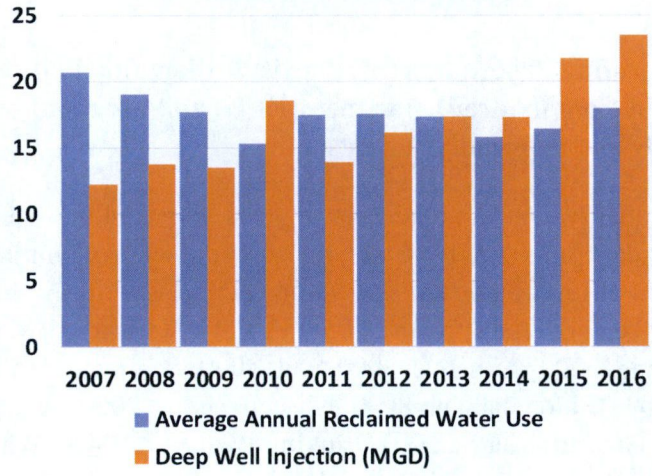
This process of the pumping and related reuse of slurry for energy could eliminate the need to process and dewater sludge, which now occurs throughout the day in all three plants. The cost and effort of people and equipment will be eliminated for these loading, hauling and unloading operations at two plants. In addition, the SWWRF facility will use the waste material for energy conversion that can be used for fuel in City vehicles and/or sold.

3.2.12 All reclaimed wastewater is either sent to reclaimed distribution or to injection wells, with no outflow to other watercourses. Over the last three years, injection wells have received slightly more than the reclaimed water distribution system.

The City outfall of treated wastewater is either used as reclaimed water for uses such as irrigation or injected into deep wells. Over the past ten years, the average reclaimed water use has been 17.5 million gallons a day (MGD). The City has also averaged 16.8 MGD for deep well injection. These are the two methods of addressing reclaimed water as a byproduct of the water reclamation process method with no outflows to other watercourses. This is unique to the City of St. Petersburg does not release treated water to natural watercourses.

As Figure 3-5 shows, reclaimed water usage has been reduced and deep well injection has historically increased. Further, over the past three years, the injection wells have received slightly more volume than reclaimed water distribution. Over the past three years reclaimed water distribution received 16.71 MGD where the wells have averaged 20.81 MGD, or nearly 25% more than reclaimed.

Figure 3-5 Distribution Compared to Deep Well Injection

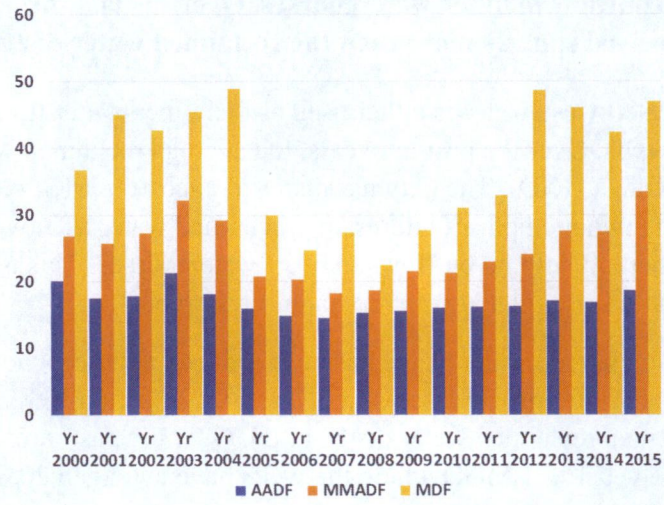


3.2.13 Combined flow and rates of the SWWRF and AWWRF varied, with 2000-2004 values being somewhat similar to 2011-2015 flow and rates.

When the historical flow and rates of the Southwest Wastewater Reclamation Facility and the Albert Witted Wastewater Reclamation Facility were combined, the rates of AADF, MMADF and MDF were found to be very similar by year as seen in Figure 3-6. The volume changes with peaks and valleys over time and yet looks consistent over the depicted timeframe with low and high periods.

For example, in high flows, the AADF for 2000-2004 was 18.972 million gallons (MG), where 2011-2015 was 17.03 MG or a difference of 10.8%. The MMADF for 2000-2004 was 28.234 MG, where 2011-2015 was 27.086, a difference of 4.2%. The MDF for 2000-2004 was 43.756 MG, where 2011-2015 was 43.402 MG a difference of less than 1%.

Figure 3-6 Historical Flow and Rates of SWWRF and AWWRF



The values of flows appear to indicate that future flow rates can be determined based on historical flows which have not varied that much over the years by considering normal wet and dry periods.

3.2.14 Standard Operating Procedures (SOP) exist for key functions within the Environmental Compliance Department(ECD) and are monitored and documented both internally and externally.

The ECD has several quality control procedures in place. Pursuant of the Quality Assurance Rule -Chapter 62-160, Florida Administrative Code, the Environmental Compliance Division utilizes the Florida Department of Environmental Protection (FDEP) Quality Assurance Requirements for Sampling & Field Testing. The structure of the FDEP's SOPs for field sampling include: 1000- General Sampling, 2000- Aqueous, 3000-Soil, 4000- Sediment, 5000- Waste, 6000-Biological Tissue, 7000- Biological, and 8000- Miscellaneous. 2000- Aqueous includes: 2100-Surface Water, 2200- Ground Water, 2300- Drinking Water, and 2400-Wastewater. Each SOP includes the sections of Scope and Application, Equipment and Supplies, Reagents and Standards, Quality Control, Documentation, and References.

The laboratory is subject to periodic external audits related to sampling performance and data usability. The audits criteria include the use of FDEP SOPs, the use of any approved alternative procedures, and project data quality objectives. This information is directly monitoring by the assigned Operations Analyst. The City has successfully met the past audits over the last five years.

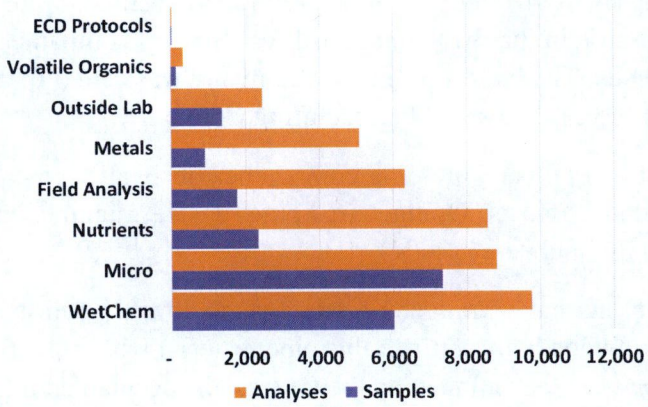
3.2.15 Micro has the most samples and WetChem has the most analyses for the Environmental Compliance Department(ECD).

The Environmental Compliance Division's primary focus is the collection and analysis of various samples to qualify and monitor both wastewater and potable water for the safety of the public and assurance of compliance to the local, state and federal regulations. The Division

monitors and tracks eight (8) different sampling categories, each having specific associated analyses.

Over the past five years, the highest percentage of samples were conducted in the category of Microbiology or Micro, with 34%. In the category of wet chemistry or WetChem, the highest percentage of analysis was at 26% of the total. Also, the category of Metals had the highest ratio of samples to analyses at 1:5.62. The comparison of sampling categories tracked by the ECD is shown in Figure 3-7. As a comparison, WetChem has a ratio of 1:1.67 and Micro had a ratio of 1:1.3.

Figure 3-7 Number of Samples and Analyses Reported by ECD



3.2.16 The Water Reclamation Facility (WRF) Division is the key user of laboratory support and is a generator of the major need for working seven days a week. Various plant monitoring has the largest number of projects.

The Department's Environmental Compliance Department(ECD) functions in a laboratory environment that provides sampling and analysis for various groups, primarily within the City but does assist other agencies. These activities include the sampling and analyses for WetChem (chemistry performed on samples in the liquid phase), Micro (microbiology), Nutrients (water nutrient levels), and Volatile Organics (human-made and naturally occurring chemical compounds that have high vapor pressure at ordinary room temperature).

The Water Reclamation Facility (WRF) Division is the major user of the laboratory's support. In fact, the Division support results in 45% of samples total, as well as 41% of analyses total for the past 5 years. In addition, because of the public health need to monitor key flow processes at each of these three major wastewater reclamation facilities, there must be daily support for sampling and testing. The plants are sampled daily on-site, picked up and evaluated at a laboratory every day of the year.

Also, various plant monitoring for water and wastewater has the largest number of projects. Of the sampling and related analysis, the highest percentage of projects are performed for the Water Resources Department's water reclamation facilities - NEWRF, NWWRF, and SWWRF. From June 2016 to June 2017, the three facilities had the largest percentage of monitoring/sampling at

24% combined or 4,431. This major requirement to monitor the wastewater plants drives much of the workload and schedule. Many agencies have combined organizationally the laboratory and WRF plant capabilities because of the work synergy where the City separates them.

3.2.17 Orangeburg pipes have a considerably shorter life cycle than other pipe types and have been used for residential laterals. They are near the end of life cycle creating potential failure issues. The new Consent Order is requiring a lateral responsibility study.

The City has certain private sewer lateral pipe types which have historically caused considerable infiltration issues. This type is Fiber Conduit now commonly referred to as Orangeburg pipe, made of ground cellulose (wood) fibers, sealed with liquefied coal tar pitch. These were first used for water transmission in the Boston area in 1865. Several companies produced the fiber conduit in the early 1900s. The largest producing company was called Fiber Conduit, who later changed their name to the Orangeburg Manufacturing Company.

In response to the post-war housing building boom, a heavier-walled round version of the fiber conduit was developed and sold as "Orangeburg" pipe (in sizes ranging from 2" to 18") for sewer and drain applications (Schladweiler, 2004).

Although, the City does not have Orangeburg pipe installed for the transmission of sanitary sewer, many privately-owned homes utilize this pipe material within their sewer laterals. In 1970, Orangeburg pipe was discontinued by the City as an acceptable building material. As this pipe material has a considerably lower life cycle than modern pipe materials resulting in numerous failures occurring within lateral pipes, which are part of the sanitary sewer collection system. It has also been estimated that 2/3 of the inflow to the water reclamation facilities are from stormwater intrusion, which the City is taking steps to combat stormwater intrusion within the City right-of-way. Some of this intrusion may be attributed to Orangeburg pipe failures due to exceeding their useful lives. Other cities, across the nation such as San Bruno and San Carlos in California have experienced this same issue.

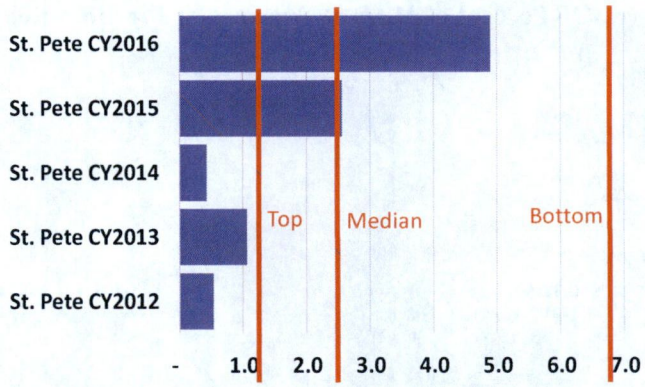
The 2017 Consent Order entered between the FDEP and the City, requires the Water Resources to perform a lateral responsibility study. Further, the Consent Order also requires by 2022 for the City to pass an ordinance regarding the replacement of private laterals that contribute to I/I and to the City's Systems.

3.2.18 Collection Sanitary System Overflows (SSO) have been increasing and in 2016 exceed median AWWA benchmarks.

A key performance indicator for wastewater operations published by the AWWA is the number of sanitary system overflows (SSO) per 100 miles of sanitary collection system piping. The aggregate data for the sewer overflow indicator for combined operations include the Top Quartile of 1.2, Median of 2.5, and Bottom Quartile of 6.9 (American Water Works Association, 2015).

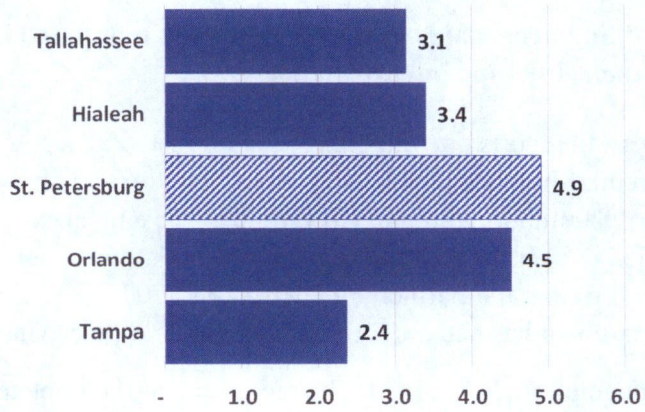
Figure 3-8 shows the historical SSOs for the City from FY 2012 through FY 2016, in comparison to AWWA's performance indicators. The Figure shows that in the three years preceding FY 2015, the City was found to be within the Top Quartile. In FY 2015 the City was just above the Median, and in FY 2016 exceeded the Median and was approaching the Bottom Quartile at 4.9. These increased overflows in last serval years appear to match and are directly impacted by the recent issues in the treatment plants due to capacity issues. Prior to CY2015, the benchmark values were relatively low.

Figure 3-8 Historical SSOs per 100 Miles



In comparison, Figure 3-9 shows other comparative Florida Cities using the same indicator. The figure shows St. Petersburg exceeding the other four Florida benchmark cities last year.

Figure 3-9 Other Florida Cities as Compared to St. Petersburg



These SSO values are a combination of all overflows including those during both dry and wet weather events.

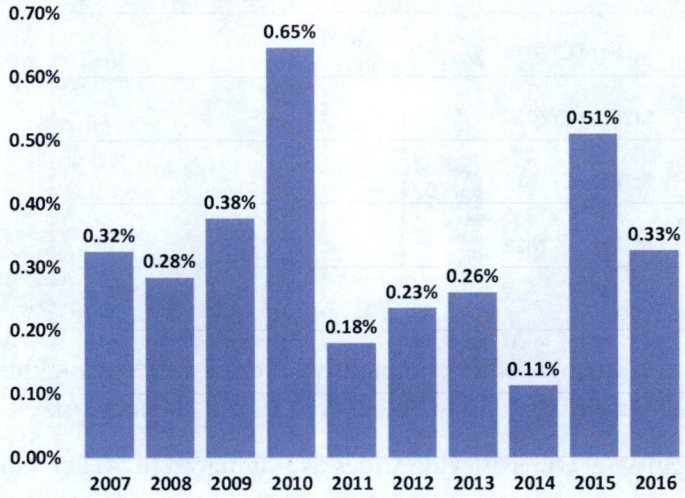
3.2.19 City sewer replacement is 20% of optimal based on life cycle of the industry benchmarks.

Water Resources track and report operating indicators for several accomplishments within the Department including wastewater main pipe replacement. Figure 3-10 shows the historical percent of miles of wastewater pipelines replaced compared to the total inventory. The average

percent of the inventory annually over the past ten years has been 0.33%, or just over 3 miles annually. Pipe replacement amounts have varied from 6.08 miles, or 0.65% of inventory in 2010, to 1.05 miles or 0.11% in 2014. This calculates to an average replacement life-cycle of 300+ years.

A performance indicator for wastewater operations is the percent of inventory replaced as a portion of the total inventory. As compared to benchmark performance indicators, the City's wastewater replacement lifecycle is 20% of the optimal base. The optimal base range is between a fifty and seventy-five-years life.

Figure 3-10 Percent of Miles of Wastewater Pipelines Replaced

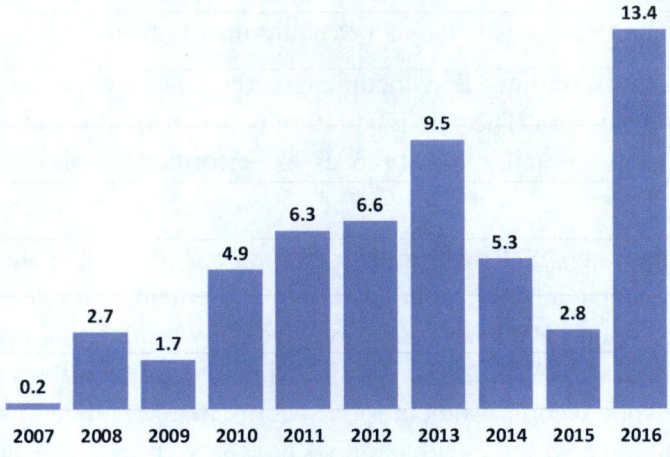


3.2.20 An increased lining program is now underway and mandated by the CO, which may help mitigate the aging pipe infrastructure.

Water Resources tracks and reports operating indicators for several accomplishments within the Department including cured-in-place pipe (CIPP) lining. Figure 3-11 shows the historical miles of sanitary sewer pipe rehabilitation through CIPP lining. The annual average length of pipe this process has been applied to over the past ten years has been 5.3 miles, and an average of 7.5 annual miles for the past five years. Further, FY 2016 reported the greatest length of CIPP lining at 13.4 miles. The Department has had a CIPP lining contract in place since 2000.

Although, this is not a complete alternative to the replacement of complete sanitary sewer lines, CIPP lining is a method of mitigating an aging sanitary sewer line infrastructure and extended life and helping reduce I/I issues. The 2017 Consent Order entered between the FDEP and the City required the Water Resources to renew the existing manhole rehabilitation contract and finish year 2 of the existing cured-in-place pipe (CIPP) mainline sewer lining contract in 2017. Further, the Consent Order required the award of a second CIPP mainline sewer and public laterals lining contract no later than June 2017.

Figure 3-11 Miles of Sanitary Sewer CIPP Lining – 2007 to 2016



3.2.21 Some Standard Operating Procedures (SOP) exist for many key functions, yet lack consistency in format with other groups and integration with WAM. These SOPs also include documentation of the use of work zone safety methods, yet it has been observed that it is inconsistently utilize by field crews.

Each Division has their own unique set of Standard Operating Procedures (SOP) focused upon accomplishing their mission within the Water Resources Department. For example, the Wastewater Collection Division has documented and published a Standard Operating Procedures & Foreman's Manual, which includes each of the SOPs. Each SOP includes an activity name, associated purpose, procedure, measurement, personnel & equipment to be used. The Water Resources' Water Maintenance Division also has a list of established activities and standard operating procedures (SOP) for their functions.

As detailed in Wastewater Collection's SOP for *Lateral – Repair & Replace,* several references to safety and traffic control procedures are documented within the SOP's *Procedure* section. For example: "*Set up traffic control work zone safety as needed*" then "*Wear personal protective equipment as required*" then "*Excavate trench or hole as required adhering to excavation safety procedures*" and "*Install trenching and shoring equipment if required.*"

During several site visits, the use of such protective measures (i.e. shoring) was found to be utilized inconsistently although they are detailed within several of the Department's SOPs. The lack of the proper use of safety methods could potentially place Department employees and the public at risk.

3.2.22 Well outlined Standard Operating Procedures (SOP) exist for many key functions, yet lack integration with WAM.

Each Division has their own unique set of Standard Operating Procedures (SOP) focused upon accomplishing their mission within the Water Resources Department. Each SOP details the purpose, procedure, measurements, personnel & equipment to be used in each activity.

Although, each SOP is well outlined and documented, there lacks an automated integration with the Department's WAM system. The sole integration between what is to be performed and what was accomplished is made through manual processes performed by Division Managers or their direct reports.

Some like agencies store their SOPs within their Computerized Maintenance Management Systems (CMMS), linking available resources (labor, equipment, and materials) to planned work accomplishment based upon asset inventories, average daily production, levels of service and the desires of senior managers (APWA, 2008). Further, this integration allows supervisors and managers to monitor work accomplishment for a specific period and compare against an annual performance plan, making operational adjustments to achieve pre-established performance goals.

3.2.23 Wastewater collection and reclaimed water rates increased for FY2018, yet water did not.

Revenue is created through the collection of charges for providing such services as potable water, wastewater collection and reclaimed water. In FY 2017, the City increased its Stormwater, Wastewater and Reclaimed Water rates, while the Water did not.

Each year, the City performs a review of utility rates for water, wastewater, reclaimed and stormwater service. In a presentation made to the Budget Finance & Taxation Committee, rates for Water, Reclaimed Water, Wastewater, and Stormwater were discussed. Potable Water is projected to increase 4%, Wastewater 17%, and Reclaimed Water 11%. If adopted, rates will be effective January 1, 2018.

For Water customers, Single Family Residents generate 53% of the revenue and account for 88% of the accounts. Multi-Family Residents generate 22%, Commercial 21%, and Government 4%. Of the total potable water accounts, Single Family Resident account for 88% of the total accounts, Commercial 7%, Multi-Family 4%, and Government 1%.

3.2.24 Wastewater billings has increased faster than new accounts.

Wastewater billing has increased faster than new wastewater accounts. Between October 31, 2012 and September 30, 2016, Wastewater customers have increased 3.4%. During the same period, billing for Single Family Residents increased 3.7%, Commercial 1.7%, and Government remained the same. Multi-Family Residents billing total fell 1%. This is shown in Figure 3-12. As a comparison, wastewater billing revenue increased 13.6% with Single Family Residents increasing 12.3%, Multi-family Residents 15.7%, Commercial 15.9% and Government 5.7%. This is shown in Figure 3-13.

Figure 3-12 Number of Wastewater Customers

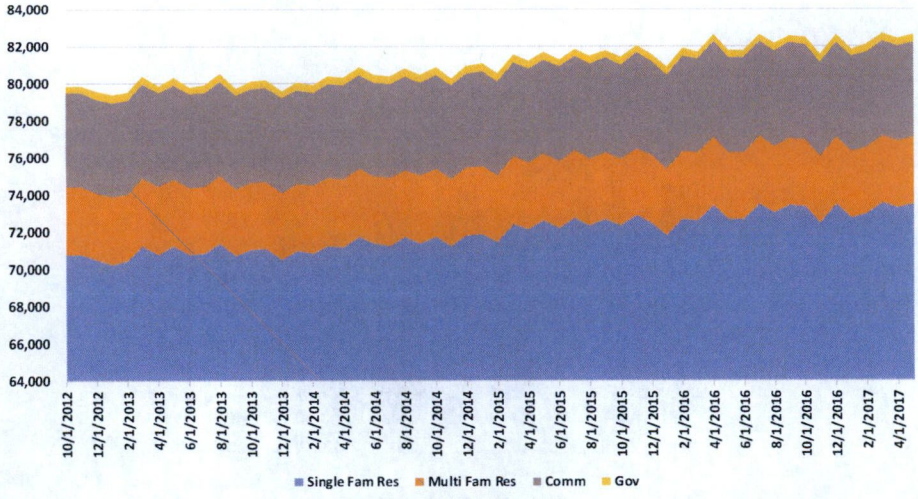
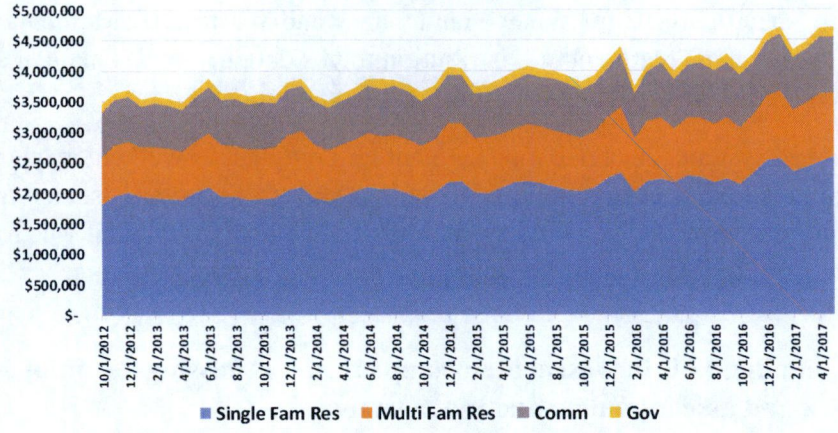


Figure 3-13 Billed Wastewater Revenue

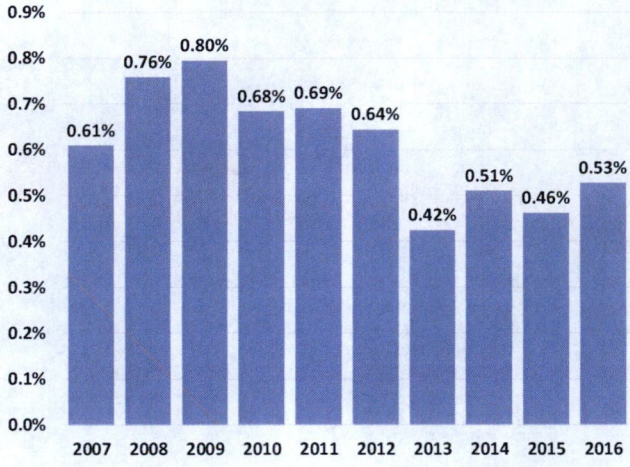


3.2.25 Replacement cycles for water distribution lines like wastewater pipes are on an excessive life cycle, which exceeds industry standards.

Water Resources track and report operating indicators for several accomplishments within the Department including replacement of water main lines. Figure 3-14 shows the historical percent of miles of water line replaced compared to the total inventory. The average percent of the inventory annually over the past ten years has been 0.61%, or just over 9.6 miles. Pipe replacement amounts have varied from 12.58 miles, or 0.76% in 2008, to 6.54 miles or 0.42% in 2013. This calculates to an average replacement life-cycle of 171 years.

A key performance indicator for water operations is the percent of inventory replaced as a portion of the total inventory. The City's water line replacement lifecycle is over 100% more than the optimal performance indicators of a 50-75-year cycle.

Figure 3-14 Percent of Miles of Water Line Replaced



3.2.26 Data and systems exist, yet lack integration with system and databases.

Some data in various systems exists yet lacks integration. The data collected is primarily used for tracking work to specific assets for Water Maintenance and Wastewater Maintenance, in which WAM is used, yet Water Treatment & Distribution tracks data in various manual and automated databases which are not integrated except through manual processes.

Users of the WAM system can create management tool outputs, as well enter specific parameters to pull the desired data. For custom reports, most WAM users require assistance from ASM Computer Support to write code against the WAM data tables. In review, it was found most groups outside of Water Maintenance produce and review minimal outputs from the WAM system.

3.2.27 Asset data in GIS is inconsistent, incomplete and is missing key information needed for work and asset planning and management.

The City has asset data in GIS yet is not complete. Asset data for water and wastewater pipe features stored in the WAM database includes 96,310 pipe segments for water distribution and 23,983 pipe segments for wastewater collections. Attributes in the database include asset type, installation date, pipe material, diameter, age, and length. Only 307 segments (< 0.5%) of water pipe segments indicated a length and 10,479 segments were lacking installation date or age.

For Wastewater, pipe segments included length on all but 122 segments with only 1,001 pipe segments (< 5%) reporting an installation date. Condition values are lacking in the database for both water and wastewater pipe segments. Complete and accurate asset inventory data is useful for estimating workload as well as for planning rehabilitation and replacement based on condition or age. Incomplete data may cast doubt on system integrity and inhibit the ability to quickly and accurately compile asset inventory data.

3.2.28 The Business Services and ASM Divisions provides major budget and technical support of systems.

The Business Services Department is led by the Water Resources Business Service Manager. This manager and staff provide a variety of vital support functions for the Department including budget oversight of capital outlays, operational spending, and customer relations. The Departments Customer Service Coordinators are found within this Division. This group is often the first point of contact a customer will have with the Department.

The ASM Computer Resources Department is led by the Computer Systems Manager. This manager and staff also provide a variety of support functions for the Department. For example, they provide support for the writing of custom reports to query information from WAM/Oracle/GIS. They are also the database managers and provide maintenance of these databases. In addition, they are responsible for the oversight and maintenance of the Department's SCADA systems.

3.2.29 The Technical Support Department provides technical, contractual and documentation support for all groups and manages various contracts.

The Technical Support Department provides a wide variety of vital support functions for the Department. This includes technical data compilation, permitting, hydrological analysis, contract management and inspection, water conservation coordination, and utility locates. An example of the contractual support they supply is the oversight of the maintenance of the elevated water tank painting.

The groups act as maintenance and operations engineering and technical arm. However key shifting of some technical staff to Citywide engineering at City Hall has occurred that could reduce their resources capability as well as focused support effort of the Department.

3.2.30 Water Revenue has exceeded account growth. Miscellaneous exceeds 5% of total billing.

Potable water billing revenue has exceeded growth from FY2013 to FY2016. Total annual billing in FY 2013 was $46.4 million and in FY 2016 $53 million. This represents an increase of approximately $6.6 million annually or an increase of just over 14%. In FY 2016, miscellaneous was 5% or approximately $2.9 million.

Miscellaneous includes late charges, shut-off notice fees, lock-off non-pay fees, and returned check fees. Late charges made up 33.6% of the miscellaneous fees, shut-off notice fees 31.3%, returned check fees 23.5%, and lock-off non-pay fees 11.6%.

Revenue growth has exceeded the growth of the asset system and staffing thus providing resources for capital and rehabilitation.

3.2.31 The overhead rate that is provided by Finance is 63% plus equipment and materials. Overhead amounts are considerable less than LAC's computed avoidable overhead rate.

The effective rate being used by the City for overhead charges is 63% which only covers employee's direct benefits. The rate includes direct cost such as, benefits, material and equipment which could be eliminated or go away if work planned was not done in-house. The City uses an overhead rate that appears to not include some items such as leave, uniforms, training, and small equipment and hand tools, etc.

LACs overhead rate estimate for the city is 175% as outlined by Martin (2003) and which is much higher than the City estimate though many components are not being considered in the City's rate. The difference in overhead estimates is substantial and would have a 20-30% overall impact on total costing of most work being done.

3.2.32 Performance measures used by the City are all effective based, yet mission statements indicate efficiency as part of Department's direction.

Performance measures for the Department have been established and are reported in the City's budget and Comprehensive Annual Financial Report (CAFR) documents. Although performance measures have been established, they primarily focus upon the measure of effectiveness, yet lack efficiency components as implied in the Department's and some of the Division's mission statements.

In general, performance measures should describe the work and resources needed to perform specific activities, assuring both work efficiency and effectiveness (Michel, 2004). The performance measures and feedback in the City on productivity is rarely communicated to field staff and to crews on comparing accomplishment to any measurement or standard. In addition, most employees are unaware of their existence and the use of performance measures are not a part of their day to day operational experience. Seldom are these performance measures referenced when planning, scheduling, or controlling work and resources.

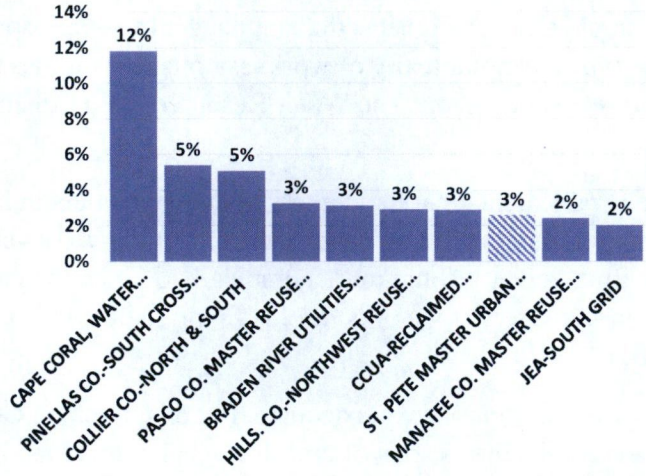
The use of both effectiveness and efficiency is a good business practices that helps assure that the appropriate work is being done and done well. High Performance Organizations use of both effectiveness and efficiency in monitoring work (De Waal, 2016). The City missions' statement mentions efficiency yet all measures are of accomplishment or effectiveness.

3.2.33 St. Petersburg ranks in the top ten reclaimed water distribution systems in the state based upon residential customers and has of 3% of all residential customers in the state of Florida.

The City of St. Petersburg ranks in the top ten of reclaimed water distribution systems in the state of Florida based upon residential customers, this is shown in Figure 3-15 (Florida Department of Environmental Protection, 2017). Florida also ranks as number one in the United States in reuse flow per capita.

Of the total reuse customers in the State, St. Petersburg services 3% with only seven systems ranking higher. A unique use of reclaimed water in the City is for the Tropicana Field's A/C and Commercial Properties. Other systems utilize their reuse water for decorative fountains, A/C chillers at hospitals, and at bio-solid facilities. This good business practice does come at a cost for water reuse.

Figure 3-15 Florida Reclaimed Water Systems



3.2.34 The capital program is about 6.1% of the book value and 2-3% of the replacement value.

The current worth of the City's assets is estimated in the City's Financial Statement at $0.84 Billion. This is the book value of the amount of the assets, or the amount they are now worth using a deprecation methodology. LAC used the City's facility estimates on distribution and collection systems and found that the actual replacement value is between $3 - $4 Billion.

The City has historically expended about $52 million annually, which is about 6.1 % of book values and 1.3% to 1.7 % of replacement value. This puts the assets on a 60-80-year replacement cycle. For assets having a 50-75-year life, this is a little low indicating the potential lack of resource allocation for life cycle rehabilitation.

3.3 Organizing

3.3.1 Complex organization with many layers (5-6 deep), six reporting locations and wide spans of control (1:15). Also, the number of staff for Utilities is in the AWWA top quartile of a Combined Utility.

A complex organization is one that could have many layers, wide spans of control and several reporting locations (Tolbert, 2009). The City's Water Resources Department has six vertical layers going from Manager to the lowest level of employees. Also, there is spatial complexity too with six different reporting locations that are separated in travel time by a ½ to one hour. Horizontally, there are fifteen groups that report to the Interim Director.

This organizational complexity makes communication, control and coordination difficult to obtain. The 2014 Climate Survey indicated and confirmed that communication and involvement are the main issues of the City employees within the organizations.

3.3.2 The Water Resources Department is currently being led by an Interim Manager with fifteen direct reports. This exceeds most benchmarks for the span of control. Spans of control are adequate for other staff positions.

Span of control is the number of subordinates that a manager or supervisor directly controls. This number varies with the type and complexity of work, established routines performed, or their subordinates need for direct supervision. The Water Resources Department's Interim Managers' span of control is 1:15.

A range of 1:4-8 is a desirable benchmark and good business practice, unless direct reports need increased supervision or consistent direction and communication or conversely, they need less direction as work is routine, repetitive and more completely defined then a higher span is appropriate. The Interim Managers' span of control is found to be above the ideal benchmark of 4-8 for this level position.

For the other positions span of control seem adequate. For example, the Chief Plant Operator for the Cosme Water Treatment Facility's span of control appeared high and is documented to be 1:16, yet he delegates the day-to-day operations to his Operator IVs, who then manage day-to-day functions at 1:4/5. This functional span of control is then within an acceptable range.

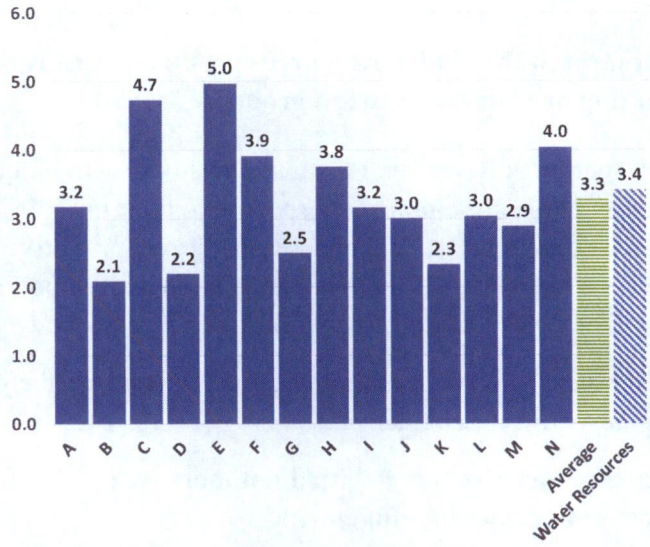
The Technical Support Manager's span of control is documented to be 1:8. This is found to be at the higher end of the benchmark range. This rationale may vary depending upon the type and complexity of work, established routines performed, or their subordinates need for direct supervision (Lorick, 2011).

3.3.3 The Wastewater Maintenance Division's staff per 100 miles is similar to the average in LAC's benchmark database.

Using LAC's benchmark agencies, it appears that the Wastewater Maintenance Division's staff per 100 miles of wastewater pipe is similar to other agencies. The benchmark agency high is 5 staff per 100 miles, the low is 2.1, and the average is 3.3 as shown in green in Figure 3-16. Wastewater Maintenance's staff per 100 miles is 3.4 shown in shaded blue, which is slightly higher than the benchmark average.

This high-level metric by itself does not lead to a conclusion but does show staffing by the City for wastewater collections is in the general range of other agencies based just on raw asset inventory values and staffing.

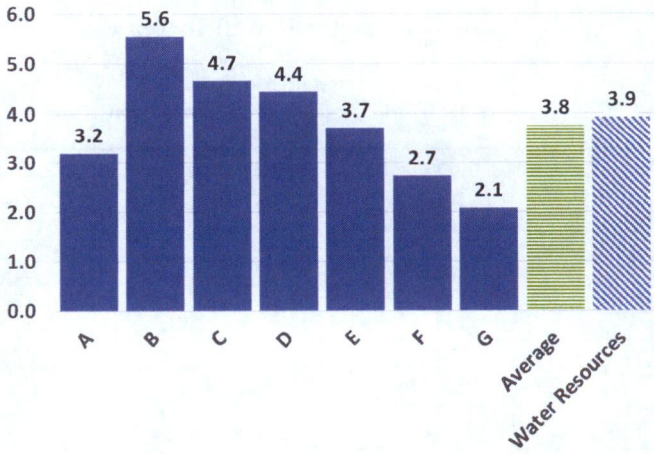
Figure 3-16 Staff per 100 Miles of Wastewater Pipe



3.3.4 The Water Maintenance Division's staff per 100 miles is similar to LAC's benchmark database. This includes 287 miles of reclaimed water main in the infrastructure inventory.

LAC, using benchmark agencies, compiled distribution staff per 100 miles of water pipe as shown in Figure 3-17. The information shows that the Water Maintenance Division is like other agencies. The benchmark agency's high is 5.6 staff per 100 miles, the low 2.1 and the average is 3.8 in green. Water Maintenance is 3.9 staff per 100 miles in shaded blue, which is slightly higher than the benchmark average.

Figure 3-17 Staff per 100 Miles of Water Pipe



It should also be noted that the Division focuses considerable internal efforts and resources on the rehabilitation and replacement of water distribution pipes at 5-10 miles per year. This high-level metric by itself does not lead to a conclusion but does show staffing by the City for water

distribution is in the general range of other agencies based on raw pipe asset inventory and staffing.

3.3.5 It appears that most in the Water Resources groups generally operate in silos with little cross-training or transfer between groups.

The Water Resources Department has several distinct Divisions, with unique functions. Some require licenses and certifications for employees' specific to their missions. Each group is led by a Manager and associated direct reports. Each operational group primarily operates independent of one another, with some support from the Divisions of Technical Support, Business Services, and Computer Systems. There is very little cross-training or transfer between groups.

There sometimes are emergency support and training functions where the groups do work together, but normally they work in separate silos.

3.3.6 Staff is projected to increase by 30 with a net increase of 7%. This increase was based upon key management's judgement.

The Water Resources Department has 329.9 FTEs at the time of initial discovery for this review. Seventy-nine (79) in WREC, fifty-four (54) in Wastewater Maintenance, thirty-six (36) in Water Treatment and Distribution, eighty-three (83) in Water Maintenance, twenty-four (24) in Environmental Compliance, fifteen (15) Technical Support, nine point nine (9.9) in Business Services, and nine in Computer Systems. There are ten (10) in the Interim Director's group.

In mid-2016-17, five (5) positions were transferred to the City's Engineering Department. Proposed in the FY2017-18 budget is an increase of thirty (30) staff, twenty-nine within the Department, and one WAM Senior Operations Analyst Specialist at the Water Resources Administrator's level. This is the largest increase since 2009. Figure 3-18 shows the percent increase of proposed staff by group within the Department.

Figure 3-18 Proposed Staff Increase

Groups	October 1, 2016	Transferred to Engineering (2017)	New Position	October 1, 2017	Percent Increase
WREC	79	0	9	88	10%
Energy Efficiency and Sustainability	4	1	0	0	Removed
Wastewater Maintenance	54	1	6	59	8%
Water Treatment & Distribution	36	0	2	38	5%
Water Maintenance	83	0	9	92	10%
Environmental Compliance	24	0	1	25	4%
Technical Support	15	2	0	16	6%
Business Services	9.9	0	0	9.9	0%
Computer Systems	9	1	1	9	0%
Interim Director's group	10	0	1	11	9%
All Groups	323.9	5	29	347.9	7%

This increase in staffing was based on the experience of key management with input from the Division Managers. Some best managed agencies utilize performance plans and work plan projects from their work and asset systems to project needed resources based upon asset

inventories, levels of service, and productivity. For example, Hillsborough County uses a performance based budget from their CMMS in Water Resources to estimate staffing levels.

3.3.7 Staffing has decreased by 9% in ten years yet assets have increased and mandates. Inconsistency exists between the CAFR and provided budget data making analysis of staffing difficult.

Data from the City's CAFR report from FY 2006 through FY 2015 shows that staffing has decreased almost 9% (8.8%), yet the number of assets and mandates the Department is responsible for has increased.

Further, comparing information found in the City's CAFR report and data from the City's Adopted Fiscal Plans, there appears to be an inconsistency between the two sources in staffing levels. Figure 3-19 uses CAFR information to show a continual reduction of labor from FY 2006 to FY 2015 with FY 2013 reporting 296 Full Time employees and two Part-Time employees. The adopted fiscal budgets show a much lower number of staff reduction from FY 2009 to FY 2015 with the FY 2013 Adopted Budget reporting 322 Full Time employees and 1.4 Part Time as shown in Figure 3-20. This is a difference of 25.4 FTEs between the two sources. Interviews and other sources seem to indicate the CAFR is more relevant to actual staffing.

Figure 3-19 Labor Resourced as Reported in CAFR

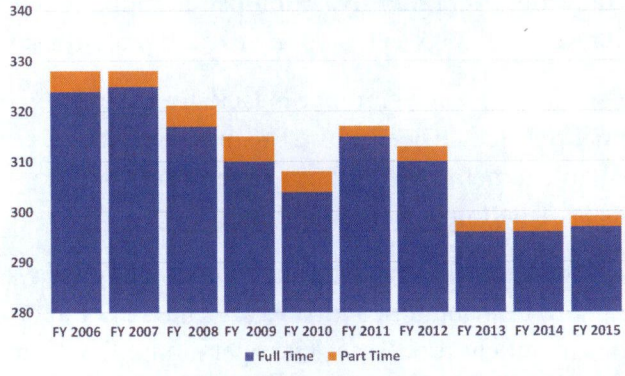
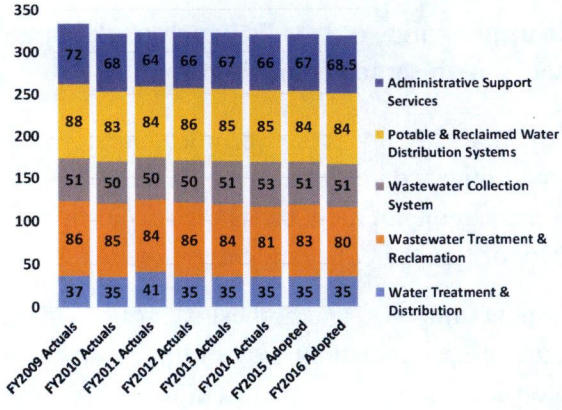


Figure 3-20 Labor Resources as Reported in Adopted Fiscal Plans



3.3.8 The Department lacks a consistent documented after-hours policy within all Division as there are many coverages.

After hours and standby procedures vary from Division to Division. For example, Water Maintenance lacks a documented call out procedure, yet addresses after hours' emergencies from 2:30 pm to 10:30 pm using a rotating evening shift. However, Wastewater Maintenance has a documented policy for on-call supervisors who are available during after hours, weekends, and holidays.

Other groups such as Water Treatment & Distribution and WREC provide 24/7 coverage of their facilities, therefore after-hours is not needed nor established. The Environment Services group has set hours with a 7-day week coverage without the need for a specific after hours' policy.

3.3.9 Most Divisions have a wide blend of schedules for days of the week and hours in the day, which creates many employees not being directly supervised. Each Division provides 24/7 coverage through various schedules, including shift work and afterhours/weekends on-call rotations.

The Departments employees work many varied schedules with some working three, four and five-day work-weeks. Further adjustment recently made within each group allows for varying start and end times. Some groups, such as two of the Water Reclamation Facilities have up to eight shift schedules as they are a 24/7 facility. Administration for Water Reclamation provides coverage four and five days a week between 6:00 am to 5:00 pm with seven different schedules.

With this wide blend of schedules, some employees lack direct supervision for their entire shift. For example, the Customer Service Officer of the Business Services Division that supervises Dispatch, is directly available to her night shift employees for a half hour in the evening and her morning shift employees for a half hour in the morning.

Several Divisions within the Department are staffed 24 hour a day 7 days a week, including: Dispatch, Water Treatment & Distribution, and WREC. The ECD Laboratory staff cover 7 days a week to monitor various treatment processes. The operational Divisions of Wastewater Maintenance and Water Maintenance also provide 24 hour a day 7 days a week coverage through shift work and afterhours/weekend on-call rotations.

3.3.10 Overtime is in the upper range of LAC's benchmark range of 4-8% as best management practice with some groups higher.

Water Resources has averaged 42,787 hours of overtime annually or 24.3 FTEs, which is approximately 8% of the total reported hours for the past five years. This is at the upper range of LAC's benchmark as best management practices. There was a slight decrease in reported overtime from 2015 to 2016, of less than one percent.

Some groups are at even higher amounts. The highest user of overtime in 2016 was Wastewater Maintenance at 14,607 hours or approximately 13% of total hours followed by, the SWWRF using 4,587 or approximately 10% hours, Cosme O&M using 4,600 hours or approximately 9%,

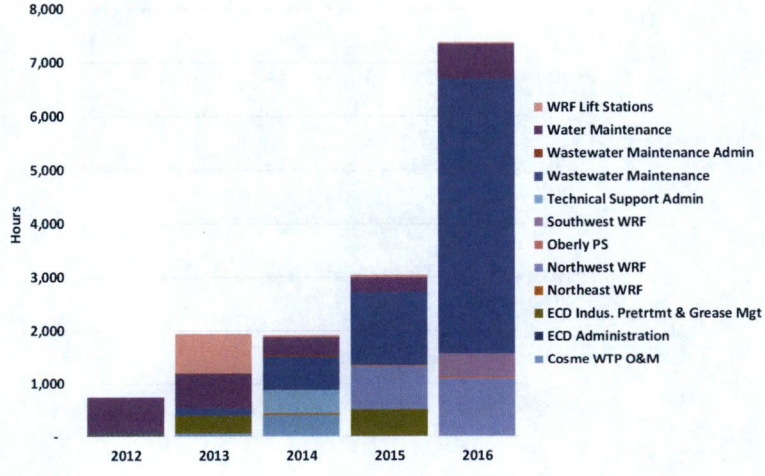
and the Water Maintenance at 5,976 hours or approximately 4%. The amount of overtime has increase by 240% in FY 2016 versus FY 2012.

3.3.11 Workers Compensation is in an acceptable range overall but has doubled in the last year.

The City's workman's compensation utilization was compared to LAC benchmarks. This utilization measurement shows impact of leave in reduction of productive time of a work force and their ability to provide maintenance and repair to the activities. When compared to like agencies, the Department's overall rate was found to be similar to LAC benchmarks. However, there was a considerable increase in reported Workers Compensation hours from 2015 to 2016 of almost 140%.

In 2016, the highest user of Workers Compensation was Wastewater Maintenance at 5,110 hours or 69% of the total, followed by the NWWRF using 1,070 hours or 14%. In this same year, Workers Compensation hours equaled approximately 5% of reported hours for Wastewater Maintenance and NWWRF. WRF Lift Stations equaled approximately 4%. Figure 3-21 shows the historical accumulated Workers Compensation hours for the Department with FY 2016 having a major increase. This increase has meant less available work time for production and has added pressure on those who can work.

Figure 3-21 Historical Worker Compensation



3.3.12 FMLA is the highest it has been in five years, which has averaged 1.7% of working hours. Some groups (WREC, WM and ECD) have increased significantly.

Benchmark indicators are used to measure the impact of leave including Family Medical Leave Act (FMLA) time. Reported FMLA has found to be the highest it has been in the past five years, with some groups having significant increases of more than 55%.

Figure 3-22 shows the WREC's historical FMLA hours, they had a 100% increase or 1,118 hours from FY 2015 to FY 2016. Water Maintenance increased 1,815 hours or 135% as shown in

Figure 3-23. Figure 3-24 shows ECD's increase at 1,121 hours or 115% from FY 2015 and FY 2016.

This increase has meant less available work time exist for production and has added pressure on those who can work.

Figure 3-22 Historical FMLA (WREC)

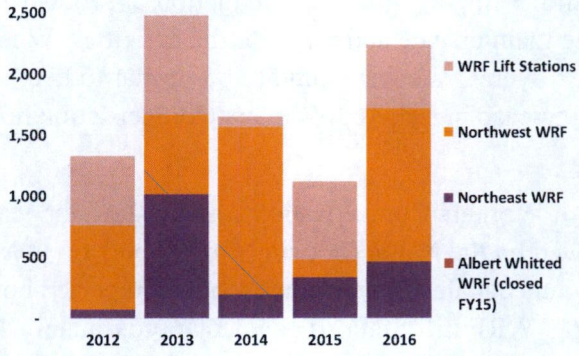


Figure 3-23 Historical FMLA (Water Maintenance)

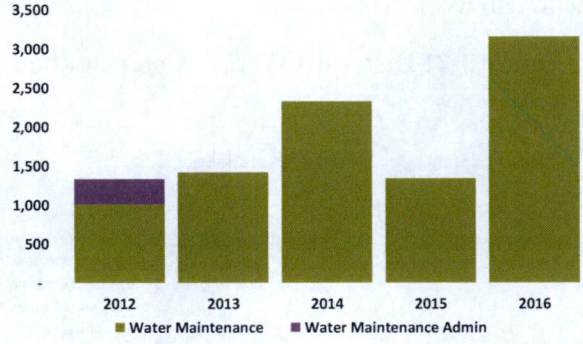
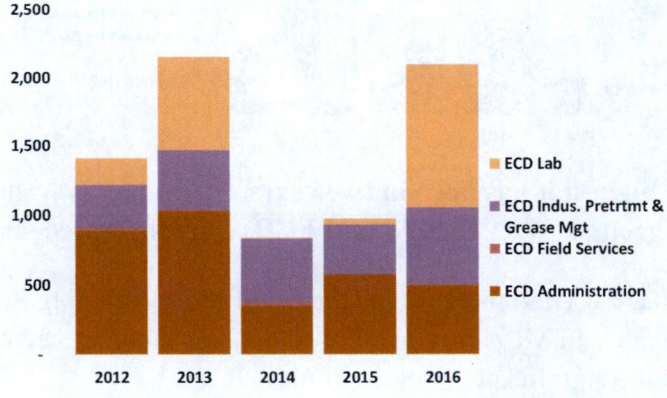


Figure 3-24 Historical FMLA (ECD)



3.3.13 Both Wastewater and Water Maintenance Divisions are utilizing a program for employee growth and training for certification. While others are utilizing a more informal methodology.

There are one hundred and nineteen (119) licenses within the Department, which are directly related to the job function and duties of its employee. Several employees take advantage of Pinellas Technical College's (PTech) Water Resources courses. PTech offers several courses including Water Resources Cadet I - Course ETC0003, which includes training in the theory and operation of wastewater systems and plant operations, and water distribution systems.

The Wastewater and Water Maintenance Divisions have established a program for employee growth and training for certification related to the job functions within their Division. Other Divisions within the Department utilize a more informal methodology of training, including some cross-training within their respective Divisions.

3.3.14 The Safety & Training Officer will soon implement a department-wide online safety training program. While benchmark (AWWA) agencies have between 20 and 40 hours annually per employee.

In a memorandum dated October 10, 2016, Bryan King, the Department's Safety and Training Officer proposed the purchase of an online training program for the Department. At the time of proposal, five vendors were researched with the cost of purchase between $16,000 and $75,000 annually. A customizable option for individual employees and the maintenance of tracking and accountability were offered as support for this method of training.

Recently, the Department purchased and have implemented online training solutions from Underwriters Laboratory. There are thirty-five (35) topics/courses in the program. Some examples include: *Chemical Facility Security Awareness Training, Lab Safety, Trenching and Excavation mini, and Work Zone Safety mini.*

At the time of original discovery, the documented annual effort for training by employee was not provided. Benchmark agencies of the AWWA allow for and document between 20 and 40 hours annually per employee (American Water Works Association, 2015). The training planned should be a wide range of training applied equally including technical, supervisory, human resources and administration.

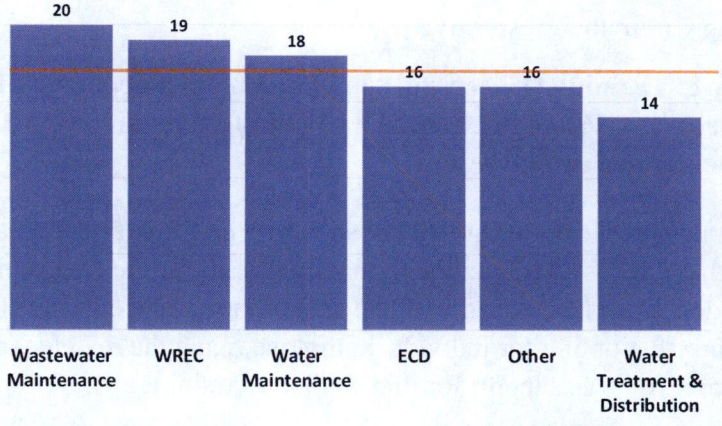
3.3.15 The Department's employee's length of service is above the normal benchmark range with some groups much higher. Further many senior managers and supervisors have lengthy tenure and could soon retire. There is a lack of a documented and implemented succession plan to meet this situation.

The average employee length in years of service for the Department is approximately seventeen years, with some employees making employment with the Department a second career. Figure 3-25 shows the average years of service by Division. Wastewater Maintenance, WREC, and Water Maintenance has the highest average at twenty, nineteen, and eighteen respectively. The LAC benchmark range is between twelve and fourteen years for most agencies. Several of the

senior employees in these Divisions have the potential to retire or leave employment in the next five years.

Currently, the Department lacks a documented succession plan to address this circumstance. Any succession planning that is done is performed at the discretion of individual Department Managers. The Department is at risk of losing vital institutional knowledge. Several benchmark agencies have established mentoring, data and system processes to capture this knowledge and transfer it back to the agencies' employees. Also, a plan for coverage of the most likely departures of key staff is missing.

Figure 3-25 Average Years of Service



3.3.16 City fleet age and allocation to employees is well within range of desirable benchmark averages.

The average age of all rolling stock for the Department is approximately eight years, with little variance among units. This average is less than other agencies in LAC's benchmark database as well as those of NAFA and APWA benchmarks. A fleet of this age generally indicates that there should be an anticipated lower operational cost and less maintenance that needs to be performed on the fleet allowing for higher operational hours and less down time.

The rolling stock per employee for both the Water Maintenance and Wastewater Maintenance Division were compared to other like agencies. Both Water and Wastewater employees per rolling stock are within expected range as shown in the LAC benchmark database. These comparisons can be seen in Figure 3-26 and Figure 3-27 respectively.

Figure 3-26 Rolling Stock per Employee (Water Maintenance)

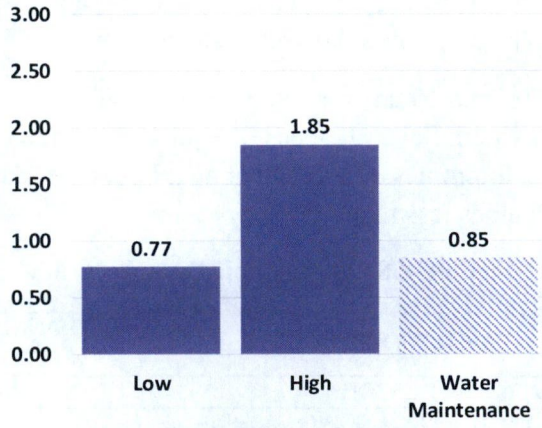
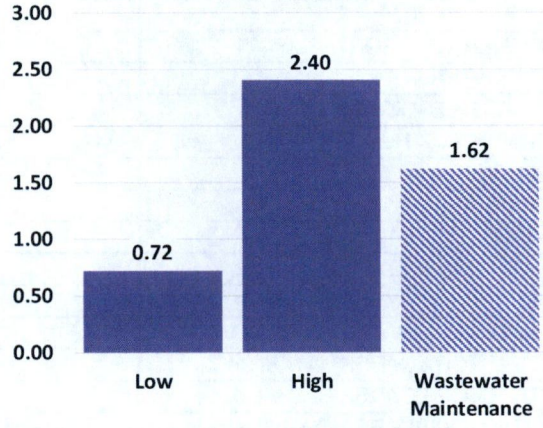


Figure 3-27 Rolling Stock per Employee (Wastewater Maintenance)



3.3.17 Equipment costs are standard rates, which are significantly different than calculated cost using depreciation, fuel, maintenance, usage, inflation, and salvage value.

The City equipment charge rates are based on industry standard rates not actual values. The City uses five hundred four (504) unique key description codes for its equipment, which are also used in the WAM system for costing work. Twenty-five (25) key description codes for SUVs and Sedans use the rates in the WAM system and are charged by the mile at $0.57 a mile. Four hundred seventy (470) vehicles are charged by the hour. These hourly reporting rates vary between $1.25 for an Air Compressor to $205.60 for a Caterpillar, Generator 500kw Trailer Mounted.

LAC calculated the hourly utilization rate for each classification of equipment using the provided data of purchase price and year, repair and maintenance costs, fuel costs, depreciation, and usage (McCorkhill, 2008).

Several rates used by the Department were found to be significantly different than using costing data of depreciation, fuel usage, maintenance and repair costs, inflation, and salvage value. For

example, the cost per hour used in the WAM system for Directional Boring Machine is $31.00 where LAC calculated these units at $170.56 per hour. A Compact Excavator in WAM is $20.00 or $43.00 an hour, where LAC calculated the unit cost per hour to be $28.10.

In addition, LAC could not estimate rates for some vehicle and equipment types due to the insufficiency of the data provided. Several pieces of equipment lacked usage data or data was questionable and inaccurate. Examples of average annual hours per class is shown in Figure 3-28 depicting several very low values less than 100 hours a year.

Figure 3-28 Questionable Data Accuracy

METER TYPE / CLASS	AVG ANNUAL METER
AIR COMPRESSOR	485
DIRECTIONAL BORING MACHINE	507
EXCAVATOR COMPACT	520
FORKLIFT 6000	302
FORKLIFT 8000	162
GENERATOR PORTABLE	16
GENERATOR TRAILER	360
LOADER BACKHOE	3,959
MINI TRACK HOE	266
MOWER	516
PUMP	3,144
SAW CIRCULAR	13
SAW CONCRETE	6
SCOOTER 4 WHEEL	2,490
SEWER CLEANER TRAILER MTD	46
TRACTOR LOADER	65
TRACTOR LOADER BACKHOE	636
TRACTOR SLOPE MOWER	482
WELDER	19

3.3.18 Basic information such as the cost of work and productivity is unable to be captured. Complete costing with overhead, equipment and materials is also lacking.

Each group uses a variety of systems, databases, spreadsheets, word documents, and manual forms for research and tracking some aspects of their work. Daily timesheets are used to account for labor and equipment hours, materials used, and work accomplished. The employees write the date on the timesheets, accomplishment, equipment and labor hours, materials used, and any comments associated with a specific work order. After being quality checked by their supervisor, the work orders or daily log sheets are put into the WAM system. WAM work order reporting includes labor, equipment, and material resource utilization, and is often linked to a specific asset in the database.

Although, some work data is collected, basic information such as the completed cost of work and productivity is unable to be captured. Complete costing with overhead, equipment and materials is also lacking. For example, the Department does not record support work preparation in the

yard or travel time, just the time spent at the individual work locations. This lack of complete costing makes analytical comparison to alternative service providers very difficult.

3.3.19 The Department uses the City's Centralized Warehouse for many commodities, yet the Department has $2.8 million in inventory at other satellite locations with data on usage lacking standardization.

The Department utilizes the City's Consolidated Warehouse for many bulk item commodities such as manhole covers, concrete pipes, and PVC pipe, yet the Department has a considerable inventory at other satellite locations. As the Consolidated Warehouse is secured and inventory is accounted for through the City's procurement group, the satellite location's inventory data lacks standardization. Some inventories are tracked and managed using WAM, and some utilize manual databases.

Lack of standardization make cost analysis difficult to determine. High performance agencies also utilize satellite and mobile warehouses, yet standardize their inventory processes using maintenance, and work and/or asset systems for securing and accounting for inventory. The advantage of providing an automated linkage for material control is the ability to track inventory values by yard or in total, as well as provide transparency for project planning, and the ability to use concepts such as "just-in-time" material ordering where the suppliers deliver what material is needed. Finally, it allows for full costing of work being accomplished.

3.4 Directing / Scheduling

3.4.1 Some preventative maintenance routines and cycles are planned in the WAM system, with other opportunities existing. Manual processes are also used such as routine preventive maintenance procedures, which have been established for wastewater collection inspections using paper maps and external spreadsheets.

Routines exist for many operational, maintenance and environmental activities. These proactive efforts are performed to protect the City's assets and ensure proper operation, as well as optimize asset life cycles, with many of these routines found within the WAM system.

Further, manual processes are also used such as paper maps and external spreadsheets, for routine preventive maintenance procedures which have been established for wastewater collection inspections. Wastewater Maintenance's preventative maintenance focus is primarily upon the wastewater collection system. They have divided the City into one hundred and fifty (150) basin areas, which are used to systematically plan the inspection of the system. They utilize paper maps and external spreadsheets to document and track the completion of specific basin areas.

Several like agencies utilize their maintenance, work and/or asset system to automate the process of preventative maintenance and inspection routines. The agencies automate the linkage between these systems and GIS database to plan, schedule and monitor these routines. Annual performance plans are also used to plan and project work based on asset inventories, available

resources, and desired levels of service. Volusia County uses just this concept in its directing of staff in their water and wastewater functions.

3.4.2 Scheduling in some groups of the Department is primarily a daily assignment process that is done independently. Each operational group utilizes an undocumented work flow using a combination of manual processes.

Although, some work is proactively scheduled and some routines exist, work is prioritized, scheduled, and assigned through manual processes in some groups. These processes are based upon available staffing and equipment as well as the judgement of the group's respective supervisor. Although functional, the process lacks an automated linkage to the current CMMS system.

Many like agencies develop a systematic work flow of planning, organizing, scheduling and controlling work. This process is documented and followed by every member of the organization to provide consistence and reduce redundancies. The work flow identifies the responsible staff for each of its elements. The work flow is evaluated annually as part of the planning process, reflecting any changes identified by agency leadership in making service delivery increasingly more effective and efficient.

3.4.3 Work requests and work orders are managed differently within the Department, with Water Maintenance crews utilizing laptops and tablets, where other are using manual forms.

Work requests and work orders are managed differently within the Department. Some groups manually link WAM requests to work orders, where other Divisions utilize automated linkages, laptops and tablets in the field. The status of work request closures lacks consistency with some blanket closures made at periodic intervals. The WAM system is used inconsistently between groups for information reporting and accounting for work, cost and accomplishment.

Some agencies, including many in Florida, utilize a fully linked automated CMMS and/or asset system to plan, organize, schedule, and control resources to both meet annual performance plan goals and address new service requests from the public. These systems also allow for multiple service requests to be linked to a single work order, tracking the status of multiple work requests, cost and productivity monitoring of a single or multiple work orders, and the communication of priorities based upon pre-established criteria.

The Water Resources groups managing this approach differently makes utilization of the WAM data to make high level decisions very difficult.

3.5 Controlling / Improving

3.5.1 Work reporting in the WAM database includes numerous combinations of repair codes and asset types that result in hundreds of potential activity descriptions. Work reporting by general repair category and asset group provides little management information and appears to be mainly for tracking to a work order to document completion.

All Divisions that report work in the WAM database may include values for asset type, repair code, and component. For example, a repair code of "CLEANED" may be reported with the asset type "GRAVPIPE" to indicate vactor line cleaning by the wastewater collections crew. These asset/repair combinations are undefined and appear to be used in an inconsistent manner. Water Reclamation Facilities reported to over 600 asset/repair combinations in FY16 and Water System Maintenance reported to more than 460 combinations.

This high number of activity types (1000+) makes it most difficult for managers to summarize and communicate work efforts to leadership, as well as increases difficulty in evaluating productivity or cost. Benchmark productivity because of this fineness of data is most difficult. Many agencies utilize a more succinct tracking of work by a specific activity using only a 10% less of code combinations to describe a specific activity the City uses.

3.5.2 WAM system data is used primarily for after the fact reports and to satisfy inquiries.

The Department relies upon a combination of manual tracking and automated systems for tracking and monitoring work, which is primarily used for after-the-fact research and accounting for past occurrences as well work assignment. Multiple work logs exist with varying forms used by each group. Performance measures and costing are done on a case-by-case basis.

Water Maintenance field employees have started to use laptops and tablets in the field to record and document completion of daily routines such as valve exercising, fire hydrant flushing, fire flow, and blow-off, and hydrant maintenance. A daily logbook is also used in Wastewater maintenance for manual recording of daily activities and to document any issues or concerns that occur.

The data is collected and issued for accounting and after the fact justification, and the information compiled lacks utilization to make management decisions to improve quality or productivity of work or service. This tool lacks a continuous improvement process as suggested by APWA (2008).

3.5.3 Performance plans and accountability are lacking in the current system and business processes. The Department lacks key performance measures to monitor both effectiveness and efficiency. Good business practice suggests utilizing and relating measures to the work budget.

Minimal tools and data parameters are in place for staff to measure performance and maintenance costs or evaluate field performance which would allow them to take proactive

management actions based on the identified inefficiencies. The tools and processes that are now in place are manual-tracking processes that research after-the-fact accounting for past occurrences. Thus, performance planning and associated accountability is lacking. Further, the Department also lacks specific key performance measures used to monitor effective and efficient operations.

High Performance Organizations utilize systems and establish documented processes to measure job performance and cost-effectiveness for all activities they perform (APWA, 2008; De Waal, 2016). These established processes assist managers in measuring the productivity and cost of performing work. They can then utilize this information to act and monitor work, comparing to others and then striving for improvement.

3.5.4 Work reporting is inconsistent and sometimes performed in multiple, redundant files without abilities to cost or determine performance. Only a portion of staff budgeted are accounted.

The Department and its Divisions relies upon a combination of manual processes and automated systems for reporting and tracking work. Multiple work logs exist with varying forms used by each group. For example, Water Maintenance's field employees have started to use laptops and tablets in the field to record and document the completion of daily routines where a daily logbook is used in Wastewater maintenance for manual recording of daily activity and to document any issues or concerns that occur. The risk of using multiple processes and systems is the potential for the inconsistent reporting of information. It has been estimated that approximately 22% of the budgeted staff's time is accounted for in the WAM system.

Basic work tracking by hour or activity is lacking, resulting in the ability to determine specific unit cost, and productivity is difficult to determine. Coverage for all groups is only 10%-45% of time making analyses information very weak. High performance organizations account for all work time (De Waal, 2016).

3.5.5 Most groups have considerable amount of work orders open with only two groups appear to complete them in the system.

Most operational Divisions have a considerable number of work orders open with only Water Maintenance and the ECD consistently completing and closing them in the WAM system. Figure 3-29 and Figure 3-30 compare the Water Treatment & Distribution Division, which has very few work orders from December 2016 to March of 2017, with that of the Water Maintenance Division. From April of 2016 through March of 2017 the Division had just three months in which they had more work orders created than finished and closed.

Figure 3-29 Created and Finished Work Orders (Water Treatment & Distribution)

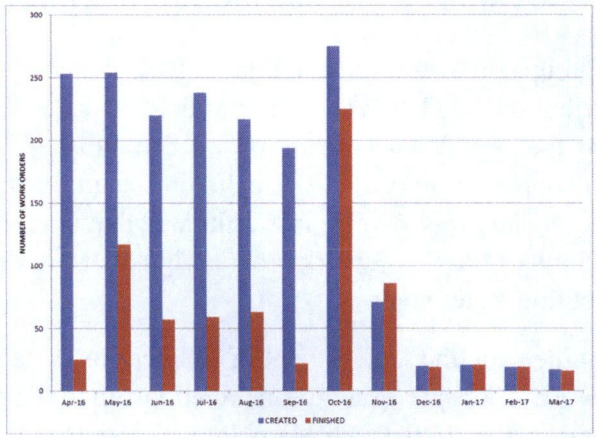
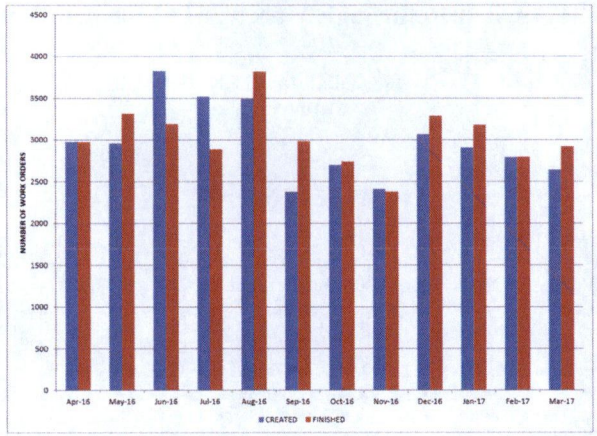


Figure 3-30 Created and Finished Work Orders (Water Maintenance)



This lack of due diligence and follow-up puts data system accuracy in question and reduces potential benefit for decision making.

3.5.6 Environmental Compliance Department(ECD) data collected in the WAM is minimal and review of information for any decision making it nonexistent.

ECD is a support group for operations and maintenance. Some employees of the ECD (environment specialist managing samples) use the WAM system and track both time and effort. Only a small portion of the time (8%) of the 24 assigned FTE is collected.

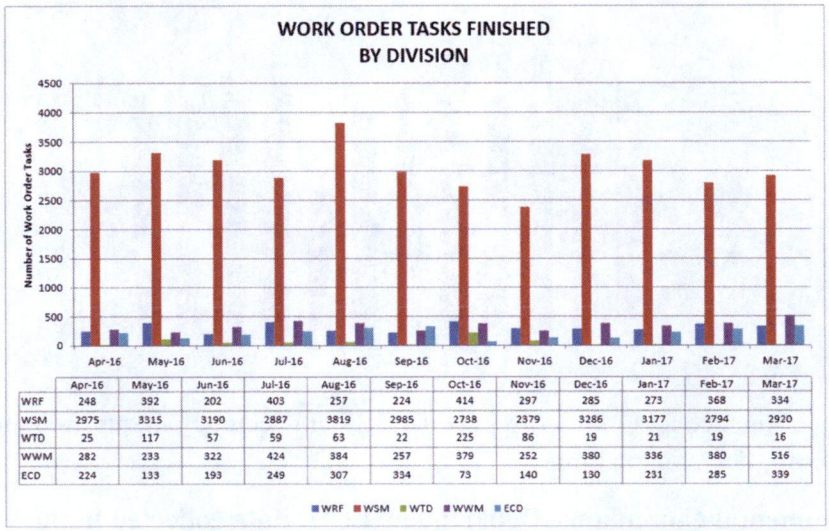
The information collected is not maintenance or asset related, but applies to samples picked up and delivered for the laboratory. The WAM system is designed for maintenance and operations on assets. The data collected in the system is not being reviewed by the Environmental Compliance manager, or any other known supervisors. There appears to be minimal to no use of WAM outputs for decisions being made by ECD because of the data that is being collected.

3.5.7 Approximately 76% of the work orders for the Department is within the Water Maintenance Division, with over 2/3 of those from water meter reader's request.

For the five operational groups of Water Reclamation (WRF), Water Maintenance (WSM), Water Treatment & Distribution (WTD), Wastewater Maintenance (WWM), and Environmental Compliance (EDC), using the provided data from work orders finished between April 2016 and March of 2017, WSM had approximately 76% or 36,465 of the total work orders finished. The second most work orders finished was WWM. It is estimated that over 2/3 or an average of approximately 2,280 a month of the WSM work orders originate from the City's Meter Readers, while performing their routine meter reads.

Examples of these work orders are the replacement of a meter box, a damaged meter, or "foggy" sight glass. Each of the work orders are a one-to-one relationship to the meter. Figure 3-31 shows work orders finished from April 2016 through March of 2017 for the Department's five operational groups.

Figure 3-31 April 2016 through March 2017 Finished Work Orders



	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17
WRF	248	392	202	403	257	224	414	297	285	273	368	334
WSM	2975	3315	3190	2887	3819	2985	2738	2379	3286	3177	2794	2920
WTD	25	117	57	59	63	22	225	86	19	21	19	16
WWM	282	233	322	424	384	257	379	252	380	336	380	516
ECD	224	133	193	249	307	334	73	140	130	231	285	339

3.5.8 Some desired management functions are being partially performed and those that exist lack linkage or integration. There is also a lack of uniformity and accountability of management tools in place and used.

The Water Maintenance Division is partially performing many functions of the ideal maintenance management process. A basic activity list exists in the WAM system and uses three different fields as well as other documents, yet not all employee time is reported. Asset lists exist in various formats and files for key assets such as water pipes, valves, meters, and fire hydrants. Resource data exists, but is outdated or does not reflect the actual costs.

Service levels have been established for some routine activities, yet an annual work program and budget is lacking and is not part of the Division's work processes. Some short-term scheduling occurs using a combination of tools, and to a certain extent, is integrated with work backlog. A

systematic approach to scheduling incoming, ongoing, and backlogged work is absent. Work requests are utilized and linked in the WAM system to work orders. Some labor, equipment, and material reporting occurs on the work orders, yet work preparation and travel time is not reported to a specific work order. Activity reporting lacks full cost to allow management's evaluation of performance and costs. Most budget and inventory reports are generated ad-hoc, created based on inquiries by management, executive management and elected officials. Some work monitoring of processes is being performed.

The Wastewater Maintenance Division is performing some functions of the ideal maintenance management process. They too have a list of basic activities in the WAM system and other documents, yet again not all employee time is reported to an activity on work orders. Asset lists exist in various formats and files for key assets of the collection system.

Service levels have been established for some routine activities, such as the systematic inspection of the collection system via QTV and CCTV, yet an annual work program and budget is lacking for all activities and is not part of the Division's work processes. Some short-term scheduling occurs using a combination of tools, and to some degree, is integrated with work backlog, yet a systematic approach to scheduling all incoming, on-going, and backlogged work is lacking. Work requests are utilized and linked in the WAM system to work orders. Some labor, equipment, and material reporting occurs on work orders, yet work preparation and travel time is not reported to a specific work order. Activity reporting lacks full cost to allow management's evaluation of performance and costs. Most budget and inventory reports are generated ad-hoc, created based on inquiries by management, executive management and elected officials. Some work monitoring of processes is being performed without direct linkage to work being performed.

Water Treatment & Distribution like the prior two groups is also partially performing some functions of the ideal maintenance management process. They too have a list of basic activities in the WAM system and other documents and lists of assets exist in various formats and files for the water treatment and distribution infrastructure. Although, the use of the WAM system is very limited.

Service levels exist for Cosme Water Treatment Facility and Pumping Stations, such as the systematic inspection and monitoring of key operational functions using manual documented processes. Some short-term scheduling occurs using a combination of tools, integrated with work backlog for Plant Maintenance, yet a systematic approach to scheduling incoming, and backlogged work is limited. WAM work orders are minimally utilized and some are linked using manual processes. Some labor, equipment, and material reporting occurs on work orders. Activity reporting lacks full cost and does not allow management to evaluate performance and costs. Budget and inventory reports are generated ad-hoc, created based on inquiries by management, executive management and elected officials. Some work monitoring of processes is being performed without direct linkage to work being performed.

The Water Reclamation Facilities Division is also partially performing many functions of the ideal maintenance management process. They too have a list of basic activities in the WAM

system and other documents and lists of assets exist in various formats and files for the City's water reclamation infrastructure.

Service levels have been established for some routine activities, such as the systematic inspection and monitoring of the key operational functions of the three water reclamation facilities and related infrastructure, including lift stations. Some short-term scheduling occurs using a combination of tools, which is partially integrated with work backlog for Plant Maintenance. Systematic approach to scheduling incoming and backlogged work is limited except for standardized plant functions, which are clearly documented. Some labor, equipment, and material reporting occurs on work orders, though not all employee time is reported to specific activities on work orders. Activity reporting lacks full cost to allow management's evaluation of performance and costs. Most budget and inventory reports are generated ad-hoc and are created mainly based on inquiries by management, executive management and elected officials with limited proactive utilization for process improvement. Some work monitoring of processes is being performed.

3.5.9 Laboratory, a non-maintenance group, has considerable quality control and performance processes in place based on data while the other groups have minimal process for process improvement and/or operational review.

The Environmental Compliance Division performs laboratory work and support, but does not perform maintenance and operations functions nor follows the mentioned ideal maintenance process. There is a separate process in place, which is detailed and documented in their Laboratory Quality Manual, and reflects an accurate outline of the laboratory procedures and staff. Further, a Field Quality Manual reflects most procedures for field activities, as well as the processes required to annually confirm work quality in a documented Management Review. In addition, independent confirmation of their work is tested and performed annually by outside laboratories.

SECTION 4 RECOMMENDATIONS

This section outlines the details of the recommendations for the Water Resources Department. The fifty-eight (58) recommendations are not in priority order, but are in a suggested implementation sequence. Further, the recommendations are related in many cases so that complete benefits indicated may not occur without the prior recommendations being implemented. The following recommendations are structured in five sections to further assist with improving existing operations.

4.1 General / Systems

4.1.1 Establish employee teams to review the various improvement opportunities and annual plans. Utilize the teams on an annual basis to assist in the review of work methods, quality control, annual plans, equipment needs, as well as other key processes.

City employees have shown an earnest desire to implement good business practices. Staff are seasoned with considerable experience. Employee involvement is a key component in the implementation of effective improvement processes. LAC surveyed employees who expressed concern about open communications, involvement and awareness of system changes.

Employee support and acceptance can be further enhanced by establishing capable employee teams. This employee involvement will provide a conduit for ideas and the flow of information during the implementation. Key involvement includes the development of work methods, annual work plans and equipment needs. Supervisors and senior workers would then be consulted on the work methods and activity guidelines to ensure valuable input is obtained from those employees closest to the work.

The involvement of employee teams is crucial to a successful implementation and development of methods for continuous improvement. The teams would be used on an annual basis to update work methods and guidelines as well as to review the annual work plans.

4.1.2 Utilize all available technology and improvement tools with experienced leadership to obtain an American Public Works Association (APWA) accreditation.

The City employees are performing many positive and innovative processes. The employees and management both expressed concerns over credibility with customers and elected leaders. The American Public Works Association (APWA, 2016) has established a program where an agency can go through a process, meeting specific standards established by APWA to become accredited. This demonstrates that the agency has established methods, processes and policies to guide them in the effective use of the resources provided to them.

In 1996, APWA began to grant accreditation to agencies that submitted to the evaluation, completed a verification, and agreed to comply with a series of recommended management practices. The purpose of the accreditation program is to provide a means of recognizing public works agencies for adherence with these practices. The first phase of the process is to conduct a self-assessment using the Public Works Management Practices Manual. This tool and phase is used by agencies to determine how their policies, procedures, and practices compare to

recommended practices. After the Self-Assessment Phase is completed, a team of evaluators review and verify the Self-Assessment documentation for compliance on-site. If the agency is found to follow each of the recommended practices, they will be granted accreditation. The initial accreditation is for a period of four years with a semi-annual update required to demonstrate continued compliance (APWA, 2011).

The cost for this effort is less than $10,000 paid to APWA for processing and professionals who must certify this effort. The City should apply for APWA accreditation through the program. This would encourage the City to establish and document industry standards and processes, and have tools for employees to effectively manage their work. This would provide credibility for the agency and allow the City residents affirmation that they have industry processes is in place for employees to manage water resources and assets. In addition to the leadership's forward and proactive direction, many processes, technologies and improvement tools are already in place. This accreditation would provide acknowledgement to the public and elected leaders that the agency has the processes in place to optimize the provided financial resources.

4.1.3 Monitor continual leak detection and I/I program, report status monthly to the Department Director. Benchmark infiltration rates against those of agencies in other Florida coastal communities and determine the existence of gaps.

The City is now expending effort and resources to determine infiltration and inflow. Infiltration is the excess water that sometimes seeps, trickles, or flows into old or damaged collection systems from the surrounding soil. High groundwater, or water remaining in the soil after rain, can often infiltrate mainline pipes, joints, service laterals, connections, and other parts of a collection system that have deteriorated, cracked, sagged, or collapsed. Inflow is the unwanted water that can also enter collection systems from above ground sources. During storms, for example, large volumes of water may flow into wastewater collection systems through leaky manhole covers or combined stormwater/wastewater connections. In addition, private residences may have roof, cellar, yard areas, or foundation drains inappropriately connected to wastewater collection systems. Any extra water flowing into wastewater collection systems from above ground sources, either intentionally or unintentionally can cause an issue.

It has been estimated by the City that 2/3 of their sewer water that flows during peak times is a result of stormwater. This was also mentioned in the Consent Decree, and actions are underway to address this in several areas including pipe replacement, plan for lateral controls, as well as a monitoring system.

The two thirds of stormwater being in the City's sewer lines appears to be high and exceeds values of most agencies in the U.S. However, other Florida communities do experience higher flows, especially in areas with high water tables and those with tidal influence. In fact, the City's own consultants in their plant design utilizing a factor for peak design of 3.5 or 71% of sewer flow is storm water related (CH2M HILL, 2015). Further, the FDEP has as a default factor in approved infiltration design for plants of 4.5 (FDEP, 2014). Both factors appear to indicate and account for similar amounts of I/I that the City is now experiencing, which is being designated and planned for in Florida.

The current I/I reduction program and effort should be compared to actual results with impacts of the efforts documented and reported systematically. Also, to obtain a full understanding of potential success of the program, benchmarks should be done against other Florida communities that have high water tables and tidal influence to determine what is a realistic value for I/I reduction efforts.

4.1.4 Implement a plan to provide drainage of the Southwest Water Reclamation Facility (SWWRF) to the east. Conduct an independent analysis to determine probability of future overflows and system capacity to manage stormwater events, and communicate results to all major stake holders.

The current water reclamation facility in the southwest is under construction. Many new and enhanced assets are underway to increase capacity. In recent years, several overflows at the facility have occurred and the 2017 Consent Order with the State of Florida has required improvement. The site has a drainage plan to collect stormwater and convey it along the south border of the facility via a ditch and piping system, which will flow under the eastern leg of Avenue of the States Drive to a small water pond, which eventually will drain into Frenchman's Creek. The natural drainage of the site now goes in several directions. Some to the Southwest portion of the Resource Recovery site, some through the center of the College, and other portions East in the same direction as the proposed piping system. Some portions of the site drain to the North and then along the West boundary to Frenchman's Creek.

The current plan is designed to minimize flow from the site to the main college campus' drainage system. The plan appears to be adequate to handle some storm flows. However, as a result of the grade of the conveyance system and lack of elevation for outfall to the southwest portion of the site, there may be at potential risk of an overflow. Water Resources should have an independent review performed by a firm that has no affiliation with any design or construction project of Water Resources to evaluate and document any overflow risk. This should be documented and reported to the Public Works Administrator and provided to all stakeholders to fully understand the risk.

4.1.5 Suggest the College implement a drainage study for determining the capability of their stormwater system for handling high storm flows. Through the study, discover opportunities to improve capacity and understand ramifications of their stormwater capacity in managing large storms.

The recent overflows from the SWWRF through the campus along with general flooding has been brought to the attention of the City, College and other stakeholders. In a primary review of the area that had apparently flooded during the mentioned overflows, several items were noted. The drainage system in the College, which consists of inlets, pipes, ditches and other watercourses appears constricted. The drainage appears to have the potential difficulty of conveying stormwater through the campus system to the Maximo Channel, and eventually to the Boca Ciega Bay.

These restrictions along with the limited elevational difference of a few feet between the central section of Avenue of States Drive, just west of the College Administration Building to the final outfall into the Maximo Channel increases the possibility of flooding from stormwater events independent of any run-off from the SWWRF. The City should recommend to the College that they analyze this drainage infrastructure and seek to enhance stormwater flow to help minimize or eliminate their own internal stormwater issues. Any overflow from the SWWRF could be further compounded by potential College drainage issues.

4.1.6 Independently review the capability of WAM to provide the functions needed for water and wastewater plant operations.

The WAM system is an asset and work management system and appears to work well for plant maintenance, distribution, collections and some other functions. However, for plant operations the system is not being utilized and does not appear to provide much current or future benefit. Some work performed by plant operators is asset based yet a considerable amount of their effort is monitoring and adjusting plant processes. Many efforts are mandated by state and federal requirements outlined in their plant permits.

The plant mechanics capabilities in WAM appears to be adequate and helpful, yet operator benefits are dubious. The City should select an independent consultant, who has no past or current ties to any City systems or vendors, to determine if there are any benefits for operators utilizing the system and if it should be discontinued or another system utilized. Preliminary indication in this assessment is that little benefit would be added by the operator's utilization of WAM.

4.1.7 Update and configure the Laboratory information management system (LIMS) Element module to eliminate manual processing and monitoring. Assign technical support from Automated System Management (ASM) to directly support Element and Linko with guidance by Environmental Compliance Division (ECD) staff. Integrate scientific requirements with Information Technology (IT) functionality.

Element LIMS (Promium) is a configurable off-the-shelf laboratory information management system (LIMS) designed specifically for labs that test water and wastewater. Element LIMS allows data control over operations and can ensure confidence in analytical results. The Element database used to manage laboratory functions is managed by a combination of IT and EC staff.

Many of the potential functions are now being managed by an environmental specialist who does scheduling processes and compilation that could be automated. If the system was properly configured, some manual and time-consuming processes may not be necessary.

Another system is also used by the Environmental Compliance Department. The Linko system is used for pretreatment and Fats, Oil and Grease (FOG) coordination to ensure local, state and federal requirements are met and reduce the risk for compliance technicians and managers. As a Commercial Off-The-Shelf (COTS) application, IT is relieved of time consuming maintenance requirements and costs.

Both COTS systems are science related yet still require some IT support. ASM should assign staff to assist in configuring both systems, working with knowledgeable operational staff, as well as assisting in output generation. Time and redundant efforts are now expended by ECD as IT support is needed to optimize the use of these systems.

4.1.8 Discontinue ECD's utilization of the WAM system and monitor work with Element module and Linko systems.

The ECD does track some data into the WAM system mainly related to sample collection and monitoring. The total amount of time is about 10% of all time worked by ECD employees. The data collected is not being utilized by any supervisory or management staff.

WAM is an asset and work management system. The ECD functions are all laboratory related and they have two systems in place that are used daily and monitored that match their explicit needs for laboratory and sampling functions. To configure WAM to perform functions that it is not designed for would be costly and timely.

ECD should discontinue the utilization and recording of data in WAM and use other existing systems to manage their laboratory, sampling and permit efforts.

4.1.9 Establish a process for integrating water intersection drawings in Computer Aided Design and Drafting (CADD) with Geographic Information Systems (GIS). As a priority, assign additional resources to eliminate CADD backlog and expedite a systematic review by an engineer and publish monthly.

The locations of water and sewer facilities are documented using a combination of GIS and CADD intersection drawings that are used by various employees in the field. The intersection drawings are used by all groups, yet the heaviest use is by those working and locating underground water assets. The CADD and GIS work are performed independently and outputs do not match. The CADD drawings are updated by a single CADD technician. The work done by the technician must be checked and released by an engineer. Currently, there is a considerable backlog as changes with prior accumulation exceed a single staff members capacity. This is further exacerbated by recent changes in the organization that have resulted in the lack of an available engineer to review and finalize CADD documents. Hence, the updating of the water locations in the CADD drawings are not current and have a growing backlog. This has resulted in field staff expending additional effort to affirm underground locations of assets before starting work, or locating them for others.

The City should provide resources to eliminate the backlog and establish a process with available engineering support for a more responsible review and release of these documents. Also, CADD and GIS should coordinate to ensure the systems are comparable and consistent.

4.2 Planning

4.2.1 Develop specific goals and objectives for all groups, including quantifiable efficiency and effective performance measures, which link to the vision and mission statements with employee teams providing input.

The Division has developed some explicit goals in the past that were included in the City's budget documents and were accomplishment, inventory and effectiveness based. Both the City and the Divisions have mission statements. The mission statements provide clear purpose with rationale for existence. The mission statements can help guide the Division's actions, provide a path, and guide decision-making (APWA, 2008; 2011; Bain, 2013).

The Division should utilize a facilitated management team to establish specific goals, which identify specific efficiency and effectiveness measures. The goals, along with mission and vision statements, should be included in budget documents.

The goals should be linked to specific quantifiable performance measures. These performance measures would have performance indicators (e.g. number of valves turned, number of pumps serviced, linear feet of sewer line cleaned, etc.) to allow for periodic progress evaluations. Items such as unit cost, productivity (work units/hour), and total cost should be in the goals.

These measures should be integrated with the WAM database. Recording the work accomplishment, these systems should directly facilitate automated status reports that can be standardized and utilized by all groups. This would allow for the performance measures to be readily computed, as well as monitored on a continuous basis. This increases transparency and accountability to better manage performance and take short-term action to meet the planned goals. This would provide a key element of establishing accountability, while ensuring operations have benchmark data to compare to other agencies and industry norms.

4.2.2 Retain engineering support for a complete independent and external cost/benefit evaluation of the Cosme Water Treatment Facility. This would include the review of various options for supplying potable water by conducting a financial analysis with benefits and cost. Benchmark against other Tampa Bay Water agencies' water treatment facilities approach and differentiate their process methods.

The City purchases water from Tampa Bay Water (TBW), which is produced from various sources including desalinated seawater, surface water (Hillsborough River, Tampa Bypass Canal and Alafia River) and wellfields. The various dispersed sources of groundwater throughout the region provides water of various water hardness. The "blended" source of ground and surface water from TBW produces a high quality finished potable water that has an acceptable hardness (a goal of 160mg/l) and adjusted alkalinity that is provided to prevent pipe corrosion. The blended water source is managed by TBW and is distributed to member agencies using chloramination to control acceptable levels of trihalomethanes and disinfectant-by-products (DBPs) formed when chlorine is used to disinfect water. The surplus of water from the available surface sources is pumped to the remote 15-billion-gallon Bill Young reservoir to offset water shortages.

The Cosme Water Treatment Plant provides an additional level of water treatment to further blend TBW supply (and a portion from the Cosme-Odessa wellfield) to maintain a reduced level of water hardness that is delivered to the City's customers. The Cosme Water Treatment Plant relies on a lime softening processes that requires staff operations and facility costs, and produces waste sludge that requires management by the City.

The other five members (Hillsborough County, Pasco County, Pinellas County, New Port Richey and Tampa) receive water from Tampa Bay Water, yet have acceptance of the water provided by TBW.

The City expends $3.1 million annually to treat and process water supplied to the booster pumping stations. Other agencies appear to spend less on this process and directly accept water from TBW. The City should retain an unbiased independent water quality Consultant who does not work, or will not work, for the City to evaluate the benefit/cost. An effective evaluation and presentation may provide the City options for senior leadership to provide water of the City. Also, the evaluation should benchmark against other Tampa Bay Water utility providers approach and differentiate their process methods. This should guide the City to determine if the millions of dollars are being expended in a wise and efficient manner.

4.2.3 Develop a plan to provide the ability for direct flow measurement along distribution pipelines from the Cosme Water Treatment Facility to pump stations. This will allow for additional monitoring and inspection capability.

The Cosme Water Treatment is approximately 25-30 miles from the two booster pumping stations. There are two pipelines connecting Cosme to each facility, which travel under roadways, structures, watercourses and open space. These lines have limited ability to monitor the flows within them. The potential risk for a leak or break of an aging transmission system exists that would be difficult to identify without the ability to determine flow change.

Water Resources should consider installing an accurate flow measure device at both pumping stations and at intermediate locations, and use it to compare with treatment plant flow sources. This could help directly determine if any water loss has occurred. The current time-consuming method is now estimated based on computed data from indirect measurements and assumptions.

4.2.4 Develop and implement an integrated system of generators on the main campus that support each other.

Water Resources Administrative Complex has multiple backup generators that operate independently. These generators provide support for power loss from storms, construction mishaps, projects or other disruptions. In addition, there are two different generators powering portions of the same building.

If any of these generators go down, power must then be provided from other sources, such as portable generators. This requires time and may involve working without power and putting those that need the support power at risk. The campus staff are major first emergency responders for the City who have imperative power needs, especially during a major storm event. These

generators should be interconnected so that if one fails, the power would be provided by an integrated system of generators.

4.2.5 Fund and implement physical improvements to ECD infrastructure. This would include moving the emergency support generator, insulating building, and updating the environmental control systems. Consider enhancement of facility to house all ECD employees in one location.

The ECD staff are in two places within the main campus with laboratory employees being housed in a standalone facility, and the environmental specialists who perform sample collections, pretreatment inspection and fat/oil/grease inspections are in the main administration complex building.

The laboratory has a power generator on the north side of the building against the outside wall. The generator's exhaust is located very close to one of the vents within the Lab and the generator when it is operating causes fumes to enter the laboratory. Also, the laboratory building has insulation problems that result in condensation buildup in the building because of the temperature differential from outside the laboratory. Further, the air conditioning system has been unable to maintain the proper temperature and humidity controls in the building.

The testing being conducted must follow strict environmental tolerances and the current laboratory controls are inadequate to provide those needed criteria throughout the year. The City needs to enhance the building insulation and environmental controls to ensure the operating environment meets the mandated requirements for testing to be properly done in a controlled environment. This proper environment allows the laboratory to provide necessary guidance on water and wastewater treatment processes to operations staff as well as provide supporting documentation to the State on public safety. In addition, building enhancement and improvement should be considered to house all ECD staff in one facility.

4.2.6 Publish evaluation impact of the Albert Whitted Water Reclamation Facility (AWWRF) closing. Perform an external capacity analysis study confirming adequacy of new improvements to meet future storm flows. Evaluate if these improvements will reduce collection system wet weather overflows.

The City is under a 2017 Consent Order because of past significant overflows that occurred into state waters. The City is required to take many actions including making major improvements, which are underway as mandated in two of the wastewater treatment plants (SWWRF and NWWRF). These two plants had significant overflows during the large storms in 2015/2016.

In review of the City's 15-year history on combined peak flow rates of the SWWRF and AWWRF, LAC found the data varied. Peak rates are shown in the Findings Section on Figure 3-6. This Figure plotted the data from CH2M Hill report (CH2MHILL, 2014) for three key parameters. First is the annual average daily flow (AADF) which is the total system wastewater flow for the year, divided by 365 days. Next is the maximum monthly design flow (MMDF) or the largest monthly wastewater flow in the year of interest, divided by the number of days in that

month. Third is the maximum daily flow as the largest wastewater flow during a single 24-hour day in the year of interest (MDF).

These three system-wide wastewater flow characteristics are important for assessing the capability of wastewater treatment, pumping and transmission facilities to service customers. The peak period flows shown in Figure 3-6 in 2000-2004 was much like the 2011-2015 time period, while the period of 2005-2010 had lower flows as storm water events appeared to be lower in magnitude. The AWWRF plant closed following several years (2005-2010) of flows that were lower than the prior 2000-2004 time period.

The Florida Department of Environmental protection (FDEP) indicated that during storm events in 2015/2016, all Pinellas County Facilities had overflows, and AWWRF closing was a contributing factor though not completely the sole reason for the City's overflows.

An independent evaluation by an unbiased environmental engineering firm who does not currently work for, or has not worked in the past for the City should occur. This effort would be in affirming that the current plant improvements will actually meet the City's needs based on historical storm events during wet years and outline the potential for future overflows.

4.2.7 Retain external support for a complete and updated cost benefit analysis of the Bio-Solid project. Document the actual cost/benefit for implementing the project at the SWWRF.

The City is currently involved in an innovative Bio-solid project at the SWWRF facility that will receive sludge for the SWWRF and two other plants, then convert the sludge into usable energy. The project is to use available technologies and processes to dispose of biosolids and yard wastes and produce renewable thermal, electrical, or combustible gas energy to be utilized to offset energy requirements used in the water reclamation operations, and significantly reduce biomass trucking and disposal costs. Additional objectives are to reduce the City's carbon footprint, develop renewable energy credits, and greenhouse gas emission reduction credits. The City received support from the Department of Energy (DOE) project Research and Development (R&D) for an 80% cost grant with a 20% minimum local cost share in which Phase 2 design and Phase 3 construction are eligible for a 50% grant with a 50% local cost share with DOE allocating $2,500,000, which was an approved grant in 2011 (City of St. Petersburg, 2017). A construction manager at risk (CMAR) project has started where the consultant not only designs but helps build the facility at a set price.

A Florida Department Environmental Protection (FDEP) $40 million loan was provided to help fund the infrastructure to consolidate and treat biosolids from SWWRF and two nearby water reclamation facilities, creating an innovative alternative to traditional disposal and land application. Once consolidated and treated, these biosolids are planned to be transformed into higher fertilizer-grade biosolids suitable for sale in gardening centers. Biogas from the biosolids treatment process is planned to be captured, cleansed and compressed for use as vehicle fuel (FDEP, 2016).

An initial analysis of this facility was not provided for LAC to review. Water Resources should perform an updated cost benefit and risk of completing and implementing the project now that more information is known. Some of the advantages or benefits cited may not actually occur, such as reduction of the disposal cost and trucking. Further, additional costs and potential ramifications may not have been accounted for (odor in transmission lines, loss of energy transferring biomass from NWWRF and NWWRF, staff capability to maintain and operate the plant and risk of facility adjacent to Eckerd College). The evaluation should be done by an independent firm not involved or who has no potential for conflict of interest in construction, design or evaluation work in the past or future for the City. This would allow for the cost and risk to be provided in relation to benefits of the Bio-solids facility.

4.2.8 Establish a program to include incentives for encouraging all users to replace Orangeburg pipe laterals with approved material.

The City has certain sewer lateral pipe types, which are the resident's responsibility and have historically caused infiltration issues. These fiber conduit pipes, now commonly referred to as Orangeburg pipe, are made of ground cellulose (wood) fibers, and are sealed with liquefied coal tar pitch. These were believed to have been installed in the years between the 1950s-1970s. The pipes' life span is thought to be around 50 years yet no studies have been done to confirm this. What is known is that they have been failing in the City.

These pipes create a risk for failure that could ultimately result in increased infiltration into the City's wastewater collection system. The City should survey and identify these installations and then encourage and promote the replacement of these facilities by their residents. This includes providing some incentives for replacement.

4.2.9 Define activities with accomplishment units for all work performed to allow for unit cost and productivity determination, monitor utilizing employee teams.

Each operational group should develop a list of specific, well-defined activities for maintenance operations that is understood and communicated to all employees. Employee teams with supervisor facilitation support should be used annually to identify the initial key activities and associated work units for their respective groups.

A combination of historical data and institutional knowledge of staff along with industry benchmarks should be utilized to accomplish this effort. This concept should be applied by employee teams working independently in the following years to annually configure, refine, and update to match the current working environment and mandated required work and related processes.

4.2.10 Annually establish and update work guidelines and SOP's for all major activities within all groups, except for ECD. Include anticipated production rates, crew mix, resources, methodology and quality control steps utilizing employee teams. Integrate directly within the WAM system. Monitor non-compliance with the SOPs safety shoring and develop methods to help ensure adherence.

Employee teams with supervisor facilitated support should establish performance measures for all groups that include both efficiency and effectiveness components. The established performance measures should be stored in the WAM, then linked and integrated within the Department's budget. The performance measure component will allow planned dollars to be directly linked to the quantity and quality of work that is planned. Each outcome should not only concentrate on accomplishment but should be linked to a quality standard for outcomes.

Guideline and performance standards should be developed and documented for each activity. Each activity guideline should include:

- An activity definition;
- Criteria to use for work identification;
- The mix of resources required;
- The method to conduct work;
- An expected daily productivity (ADP);
- Work quality expectation; and,
- Anticipated service levels.

This information should serve as a benchmark of identified resource needs for work planning, as well as provide the additional benefit of common terminology, a device for training, and most importantly, a tool for continuous improvement. The establishment of an annual update process for new methods, technology, and existing processes will be considered as part of the guideline improvement process for each year.

The guidelines would also serve as a basis for comparison and benchmarking to determine how various decisions are impacting efficiency, and allow for staff input in the work process. Once documented, the guidelines should be stored or linked electronically to WAM, and then be made available and retrievable for all maintenance staff.

These guidelines would not only establish accountability for maintenance and operations, but it is a good business practice because it ensures that work is planned based on a desired, measured outcome. Standardization of costs and units of measure would allow for benchmarking and comparison between agencies of like services.

4.2.11 Establish levels of service with effort for each asset based on condition, available resources, costs, and desires of the City.

The actual levels of effort (i.e. whether quantitative or qualitative) are not known for some activities performed by the Department. Due to the lack of established levels of service, work is performed without knowing whether specific overall goals of service are being achieved.

A good business practice as outlined by APWA (2008) is to define levels of service by the individual maintenance activity the District desires or is required to achieve, and then allocate the corresponding resources.

The work effort in production units for the year can be determined by knowing the amount of assets to maintain and the frequency of each activity to maintain each asset. These units are the basis of information needed to estimate the resources required to perform the work and to prepare a performance budget by activity.

The maintenance effort level should be established by activity and policy for all infrastructure assets. This would allow each Division to develop work plans and give direction to supervisors in their use of resources.

The ability to establish specific maintenance and performance goals allows for the development of service levels, which helps to determine the funding and yearly service projections. The effort levels and performance goals can be adjusted to reflect population growth, need mandates and rising customer expectations. Optimal routine maintenance cycles improve the quality of assets, reduce the need to perform response work, and help minimize life cycle costs.

There is a cost-benefit trade off that must be determined of the cost versus the service being provided. Benchmarking to others can assist to determine this value, but it should be a combination function of the community's desires and the effort to optimize asset life.

The Department should establish specific levels of effort for each activity and then through the budget and resource process, determine specific cycles that would be achieved. A process should be established to monitor status to assure compliance and understanding of shortfalls for actions planned.

4.2.12 Determine and maintain a replacement value of all assets within the WAM database. Update and populate all existing asset inventories within WAM and/or GIS. Establish procedures to maintain and quality control current values and attributes. Establish quarterly meetings with all Divisions to receive input on accuracy and quality of data.

The Department should determine and maintain a replacement value for all assets linked to the WAM and GIS. These values and data should then be used for short-term maintenance planning, and to provide input and support in developing replacement and rehabilitation actions for both above and below ground assets. These assets and related attributes should be placed in, or linked to the WAM database.

The Department should develop, implement, and document condition assessment processes for both above and below ground assets. The processes should include the physical inspections of each asset class, comparing the discovered condition data to an established rating scheme developed through technical guidance and industry standards.

The results of the implementation of these condition assessment processes would create a more accurate evaluation process of existing assets compared against a documented set of condition standards. In addition, the data collected and analysis made will further assist in the development

of CIP candidates and assist in directing the maintenance efforts to maximize the life cycle of the Department's assets. Finally, the Department should establish procedures to maintain and quality control current values and attributes. In relation to this involvement of data, the establishment of quarterly meetings with all Divisions should occur for discussing the available data and gathering the input on accuracy and quality of data.

4.2.13 Populate and maintain condition assessment data within the WAM/GIS database. Use data for planning and prioritization of needs for maintenance, rehabilitation, and capital projects.

Some condition data and systems exist and have been documented in various reports and files for water and sewer assets. The data, however, is not being stored and compiled in the WAM system. This lack of integration with the system and databases reduces planning capabilities and prevents access by employees who are performing or scheduling the work. Water Resources should store all condition data whether plant assets, or distribution and collection systems, directly in the WAM system.

The WAM system needs to be configured to store this data, create outputs and be designed to allow easy retrieval of information. Information compiled using condition data along with work history can be used to plan maintenance and capital projects, as well as project future needs or actions.

4.2.14 Develop two overhead rates that reflect the City's actual cost. Develop an avoidable overhead cost and use as a default value in WAM. A second overhead rate should be used for external billing and reimbursement. In addition, develop an annual process to update the rates and use in WAM for job costing.

Water Resources should establish an avoidable overhead rate for internal cost comparisons and use it for outsourcing determination (Martin, 1993). Applying this rate allows analysis, benchmarking, and other comparative studies in relation to direct maintenance costs. This rate should also be used as the default value in the WAM system.

A second rate should be determined for a full overhead allocation to consider the costs related to all aspects of the Department that includes various fees, administrative salaries, insurance, professional services, and rents/leases. This rate should be applied to work conducted for other agencies or citizens to recoup the Department's full costs.

Also, the City should develop a third rate based on two fringe benefit rates; one for regular time and another for overtime and apply them to the hourly labor cost for all FEMA related work. These rates should be reviewed and updated on an annual basis.

4.2.15 Identify actual equipment rates for each equipment class that includes all costs of repair and maintenance, fuel and fluids, replacement, and use. "Out of yard" hours for each piece should be tracked in WAM. Annual reviews should occur on low usage and high unit cost equipment for consideration of retention with justification provided to the Public Works Administrator.

Equipment rate determination methods should be developed and documented for consistency, using all costs such as repair, maintenance, fuel and lubrication, and replacement. This is significant when determining the total cost of performing an activity (resource costs of labor, equipment, and materials). The true cost of the operation could be distorted by using national FEMA rates that are not representative.

Water Resources should adopt the methods outlined in APWA publications (McCorkhill, 2008). Utilizing this method is useful in many ways:

- **Communication with customers** – being able to break down the equipment rate allows users to understand what the rate includes.
- **Comparison with others** – having rate components available can facilitate an "apples-to-apples" comparison with other agencies and service providers.
- **Financial management** – allows an agency to periodically track rental revenues by component and match these against actual expenditures.

In addition, the rates should be based on the number of hours that the vehicle or equipment leaves the yard for, and is staged and/or committed for a particular activity, as well as how long it is unavailable for other employees to use (out of yard hours). This measurement would be in addition to the operating hours of the equipment, and the running time of the hour meter or mile meter. The CMMS should be utilized to track the "out of yard" hours for each piece of equipment.

Further, the Federal Emergency Management Agency (FEMA) has specific rental rates established for various equipment classes. When the City requests reimbursement for national declared disaster areas, such as floods or fires, a specific process must be followed, including the use of the specific equipment rates scheme. Special FEMA codes should be developed for equipment to apply these rates for FEMA reimbursable events. These codes will provide the ability to track equipment at specified rates, track operational hours for rolling and non-rolling stock, as well as associated equipment operators.

4.2.16 Develop long-term budgets for both proactive and lifecycle replacement for water distribution and wastewater collection systems. Annually report the current lifecycle status versus desired to City Leadership.

The capital program average expenditure over the last ten years is about 6.1% of the book value of all assets and 2-3% of the replacement value, which equates to a 33 to 50-year cycle. This range for the overall assets is in the acceptable life cycle range. However, the City's water distribution and waste water line collection are being replaced and repaired at a lower frequency and longer life cycle than a desired life cycle of 50-75 years. The water distribution exceeds a planned life of 125 years and waste water, even accounting for lining activity, is over 110 years.

The specific amount of needed replacements and rehabilitations for any given year is dependent on the life cycle of each asset and is impacted as new and rehabilitated assets are installed or replaced. The Department should develop and implement a methodology for estimating life cycle costs. The methodology should account for the impact of the new and replaced assets on the overall Capital Replacement Program. The method should be used to estimate the resources based on the optimal annual asset rehabilitation and replacement cycle.

The Department should establish an annual prioritized Capital Improvement Plan that lists all approved and funded projects. The Department should also utilize collected condition data, repair, and maintenance history from the WAM, and technical recommendations from various sources to create the prioritized list. The priority should be dependent upon projects that can be funded and provide the highest benefit to the overall asset network. The result of this process will ensure that the projects that are most cost effective are planned, which optimizes the life cycle costs of the total assets.

4.2.17 Establish the capability for developing performance based work plans and budgets, with integration of WAM data. This would include performance measures directly linked to financial, labor and equipment resources. Plan for each organizational unit based on the level of service, inventory and productivity, linked to a quality standard by activity. Provide annual performance plans to Public Works Administrator and City Leadership.

Water Resources should establish a process to allow each group to produce a performance plan and budget that is based on an annual work program and for the work performance that is anticipated. A performance plan and budget allows planned dollars to be directly linked to the quantity and quality of work budgeted.

The work program should be established for each organizational unit by activity and include inventory, level of service, productivity, and required resources. Also, each outcome (valves exercised, sewer lines cleaned, samples analyzed and meters read) should be linked to a quality standard. For example, develop a goal that includes the number of pump preventive maintenance efforts and establish a budget based upon actual maintenance performance. The performance budget would establish accountability and is a good business practice because it ensures that work is planned based on a desired measured outcome.

Seasonal variations may occur for some activities, which are a function of weather or community schedules. The performance plan should be adjusted to account for these seasonal variations in workload and resources, which should be planned accordingly. An opportunity may exist for the utilization of temporary or contract support during peak workloads.

This effort will also produce a work calendar, which quantifies the amount of work units planned each month. Major activities with frequent, routine work can be broken down into manageable amounts for both scheduling and coordination purposes.

Once the performance plan is complete, it should be provided to senior leadership and elected officials, to identify the plan to utilize available resources for the year. This establishes accountability, as well as educates leadership on how resources are being used.

4.2.18 Develop a detailed performance plan for major key assets - Water Reclamation Facilities, Cosme Water Treatment Facility, pumping stations and elevated tank. Include service levels, work needs and cost.

The City has 3 of the 19 largest treatment plants in the state for permitted capacity. Also, AWWRF was 4th of the top 27 in capacity prior to its closure. The Cosme Water Treatment Facility is rated at the largest size criteria as a class A facility, and services nearly a ¼ of a million customers. The City also has the two large pump stations at Oberly (24 MG storage capacity) and Washington Terrace (15 MG storage capacity).

These large and multimillion dollar assets should have their own separate performance plans. The plans would include, by activity, all asset sizes, level of service, desired accomplishment, maintenance effort, cost of labor, equipment and materials needed. This would allow for annual planning to be done with consideration for the resources needed, based on the actual planned work and projects.

4.3 Organizing

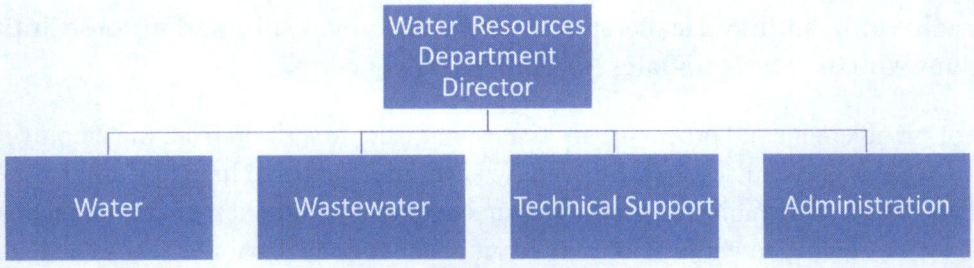
4.3.1 Transition and simplify organization in the future to have three or four major functions reporting to the Director - Water, Wastewater, Technical Support and/or Administration. Facilitate with a team to consider a simplified organizational structure. Consider combining Water Maintenance and Water Treatment and Distribution under one Assistant Director. Combine Wastewater Collection, Water Reclamation Facilities and ECD under another, as well as Technical Services and ASM under another. Combine all remaining administrative support functions under a fourth Assistant Director.

The Water Resources Department is a large and complex organization (Tolbert &Hall, 2009). It has many layers with 5 to 6 employee levels starting at the lowest level position, to the Water Resources Director. There are six different reporting locations for the employees and wide spans of control (1:14) for the Director. The span exceeds what is normally expected (Lorick, 2011). There are 79 employee classes and 324 positions. Also, the number of staff for Utilities is in the AWWA top quartile of a Combined Utility (Lafferty & Lauer, 2006). This is a large organization managing large assets for a ¼ of a million people.

The interviews and survey both indicated a lack of time for the Director to communicate and guide employees and managers. A lack of understanding on the direction of the Department was drawn from the survey. The employees' survey had mixed concern about management and leadership, as well as a lack of openness and senior management communication.

The span of control needs to be reduced and the groups consolidated. A span of 3-4 reporting to the Director as shown in Figure 4-1 is suggested.

Figure 4-1 Proposed High-Level Organization



This span of control adjustment would require restructuring to help make communication to key staff easier, more transparent and allow leadership direction to be more readily transmitted. The details of this should be compiled and prepared in an open and transparent facilitated manner with a team of employees getting input from various stakeholders.

The team should consider combining Water Maintenance and Water Treatment and Distribution under one Assistant Director, resulting in a focus on drinking water. Also, combining Wastewater Collection, Water Reclamation Facilities and the ECD under another should be reviewed. The idea is that the ECD is a major supporter of the WRF Division who is the key user of laboratory support, and is a generator of the major need for working seven days a week. Further, the largest number of projects involve various plant monitoring.

Technical Services and ASM should be combined together under another Assistant Director, as both provide technical and professional support. Finally, all remaining administrative support functions should be combined under a fourth Assistant Director to focus on budgeting, personnel, record keeping and data compilation. It may be possible to combine Technical Services, ASM and Administration. The adding of three or four new positions should not be necessary if the existing positions are consolidated first, before adding any new Assistant Director positions.

4.3.2 Simplify the Technical Services Division into three groups - Engineering, Facilities, and Environmental Support.

The Technical Services group manager has eight direct reports. The staff do not perform uniform functions and require considerable understanding of the issues. The staff now operate more autonomously than desired without getting time with their supervisor. Many design functions should be combined and otherwise grouped. A suggested organization would have only three direct reports, Engineering, Environment, and Facilities. This would simplify the structure, establishing accountability to staff, as they would have a supervisor who is available to monitor their work.

4.3.3 Public Works /Water Resources leadership should establish a systematic quarterly methodology for connecting with employees to obtain unfiltered input and real feedback. In addition, leadership should share any results and propose initial action plans with quarterly updates for addressing concerns.

The lack of involvement and processes are issues that were identified from the employee surveys, as well as issues that were observed by LAC and identified in the prior internal climate survey. The LAC survey indicated that senior management have a lack of communicating issues (74%), as well as management has not created an open work environment (30%) and staff lacks confidence in management's ability to lead the Division (36%).

The senior management needs to reach out to all employees on a routine basis. Establish a quarterly meeting where senior management (Director and the Public Works Administrator) can receive unfiltered direct input from employees, and then in a transparent way, discuss identified common issues. Once the issues have been presented, then management should outline actions to address the issues or explain their understanding and concern, and educate staff on the misunderstandings. These match the recommendations of the Climate study on actively soliciting input and empowering staff.

4.3.4 Utilize City standard guidelines/policy for position selection, promotion and direction. All exceptions to the City's process should be based on emergency or special needs, and should be documented and posted with rationale.

Interviews, surveys and LAC observations indicated that several issues exist regarding how employees are selected, promoted and who they direct. The survey indicates employee concerns on the fairness of training and growth. Several written comments were received on hiring and promotion, and which processes were followed. Also, concerns were expressed over supervisors managing related staff with the potential for nepotism.

Water Resources should adhere strictly to all City hiring policies and promotions. Also, they should follow guidance on supervising related employees. Any exceptions to this as result of special circumstances or emergencies, should be approved by the Director and posted in a transparent manner.

4.3.5 Establish a technical skills training program for employees, and management skills training for supervisors. Make some management, personnel and customer service courses mandatory with annual updates to ensure leaders have the current skills to direct and guide employees and manage resources.

Most employees indicated that they believe they are properly trained (66%), they understand what is expected of them (91%), and how their work affects customers (92%). Though most employees think that they have enough training (62%), there were some who thought their safety training (23%) was not adequate. Interviews of staff indicated they believe the mid-level manager may need training on the latest management and personnel supervisor capabilities. LAC's observation is that more open communications is needed and can be an opportunity.

Water Resources should establish a technical and safety skills training program for employees, and management skills training for supervisors. These should all be documented and be part of annual employee reviews and guidance. Also, some management, personnel and customer service courses should be mandatory for supervisors and managers with annual updates to ensure leaders have the current skills to successfully direct, guide and grow their employees as well as manage financial, contractual and equipment resources.

4.3.6 ECD should cross-train staff in the laboratory to minimize specialty focus. In addition, all field staff should also be cross-trained in grease and pretreatment functions to optimize staffing flexibility.

The Environmental Compliance Division has four basic groups of staff, which are specialty groups that are in divisional silos. Although all chemists are somewhat crossed trained in the laboratory, they tend to specialize and mainly focus on their specialties. In the industrial pretreatment and sampling groups, the employees are specialized.

The laboratory staff should use the strengths of their employees and fully cross train in various aspects of their testing, from sampling and analyses for WetChem, Micro, Nutrients, and Volatile Organics, as well as the use of instrumentation.

The field sampling and the pretreatment/grease groups both work independently under an Environmental Analyst. The field staff positions in each group are all Environmental Specialists. ECD should cross train all staff to incur flexibility and growth. The laboratory staff should be cross-trained in laboratory functions and instrumentation, and all field staff cross-trained in both field sampling and pretreatment/grease.

4.3.7 The ECD group should fill the Manager and Laboratory Supervisor positions to allow proper leadership and direction to employees. The weekly staff meeting of key staff should occur unabated to ensure staff involvement and input regardless of those absent that day.

The ECD manager is currently acting as the Manager of Water Resources and the Laboratory Supervisor has stepped up to now act as the ECD manager. The Laboratory Supervisor was not backfilled. Also, ECD staff previously had a weekly meeting where key work elements, projects and issues were discussed. However, in the last several months, meetings have often been cancelled, which results in a lack of communication for key staff.

In interviews and discussions, laboratory staff appears to perceive that they lack direction and yet are technically capable and skilled. They believe this is the result of the split responsibilities of the ECD Manager. Laboratory employees are unable to get specific direction and guidance with no assignments for anyone in the interim to lead the effort. Personnel and work coordination efforts have become difficult, causing conflicts and has impacted morale.

The ECD Manager and Laboratory supervisor positions need to be filled with staff familiar with the Department who have worked both in the laboratory and the field. The senior staff meeting is one of the key ways of communication for Water Resources direction and guidance. The meeting

should be restarted and held regardless of the availability of any employees with backup people assigned and a meeting leader identified. If someone is unavailable to attend because of leave, sickness or reassignment, the meeting should still occur with information from management provided to the meeting leader.

4.3.8 The City should evaluate opportunities to share resources across all Divisions including maintenance, operations, equipment, laboratory, and instrumentation.

The Water Resources Department has several divisions that operate independently with little involvement between them. Their work functions are unique with little overlap. The movement of employees between Divisions does occur somewhat with promotions, yet most employees stay and move within their own Division.

A process needs to be established to allow for sharing resources among groups such as equipment and basic labor support. Specialty groups such as the ECD and plant operators may be difficult to include, yet the field staff in plant mechanics, lift stations, water maintenance and wastewater maintenance may be possible. These groups should support each other with cross training to allow for increased resource capabilities, as well as open opportunities for employees. In the LAC survey, 1/3 of the employees indicated they saw Water Resources as an opportunity to advance.

4.3.9 Staffing and equipment projections should be based upon work needs and production rates using an established performance plan. Process should be automated within WAM and reviewed annually based on need.

Currently, full-time staffing is determined by the Water Resources supervisors by estimating the future year's needs along with the existing resources that are available. This year 30 additional staff were requested in the budget without complete clarity on the actual work values they would add to accomplish. Full-time staffing requests should be based upon work needs and production rates using an established performance plan and budget. The plan should include asset inventories and service levels. Any temporary seasonal increases in work demands should be met with a combination of contracts, part-time, and appropriate overtime.

Staffing can utilize the performance plan methodology to meet the annual projections for work accomplishment, the expectations of senior and elected leaders as well as City customers, and to match the repair and maintenance needs of the Division's asset inventory.

4.3.10 Establish super-users group to increase training, assist in configuration and enhance GIS and WAM skills within the Department collaborating with other City employees.

The capability of the users of WAM varies with some groups integrating the system with their daily processes and others just using the system to track a portion of work being done. WAM is supported by ASM staff who are knowledgeable of the automated system and have experience in retrieving data out of the system, as well as formatting it for Water Resource staff use. Further, the GIS system exists yet is fully utilized by only a few groups in the Department.

Many of the functions being performed by Water Resources have specific technical nuances and require some background of water and wastewater maintenance and operations. The interaction with daily users of the system is paramount for system success. The Water Resources Department should be establishing key knowledgeable staff like other organizations that use both IT staff, such as ASM, along with super users or working staff embedded within the group they support. Water Resources should be training established super users in the Administration, Water Maintenance, Water Reclamation Facilities, Wastewater Maintenance, and Water Treatment and Distribution.

4.3.11 Standardize and document the use of overtime and provide equal transparent process for those having skills to respond to after hours or specialty needs. Lower level staff should be trained so that they may be utilized for on-call and response. Only dispatch supervisors to address more complex issues.

Overtime (OT) and after hours for all groups have similarities in that crews often have radios, and the on-call employee has a cell phone. Also, the call-out and stand-by employees receive a minimum of 4 hours if work is after-hours, as well as OT if work is after their regular shift.

However, there are differences in how the after-hours and overtime is being administered by each Division. In addition, some groups have standby pay, while others do not. Some groups have shifts and have been able to reduce unnecessary overtime. For example, Water Distribution "maintenance" has two shifts covering from 6:30am to 10:30pm.

The key issue is regarding the way after-hours and overtime vary with some groups assigning a specific trained employee in an OT schedule rotation, while others keep lists and employees volunteer to be assigned as needed. The Department lacks a consistent documented after-hours policy within all Divisions as there are many coverages. The LAC survey indicated some employees perceived some unfairness as result of this process. In interviews, others indicated that only senior employees got this opportunity, and newer employees lacked an opportunity for this additional pay/work.

Water Resources should standardize the methodology used, as well as the skills and knowledge required to work overtime and publish the information to make it transparent to all staff. The Water Resources Director should review and approve the processes established. Employees who have the desire but lack experience to be able to meet the needs of the after-hours shifts, should be given opportunities to develop those skills, so they may eventually participate in OT work.

4.3.12 Establish benchmarks for overtime (OT), worker compensation (WC), Family Medical Leave Act (FMLA) and monitor monthly for all Divisions, comparing to other agencies. Evaluate impact on operations and report to the Public Works Administrator.

A key to accomplishing work is employee availability. Workman compensation (WC) and the Family Medical Leave Act (FMLA) provide employees with benefits for leave from work that can affect work planning and production. Over the last five years, the Department has averaged 3,013 hours of Workers Compensation or 1.7 FTEs (0.6% of total working hours). FMLA is the

highest it has been in five years, which has averaged 1.7% of working all hours. Some groups (Water Maintenance, Water Reclamation Facilities and ECD) have increased significantly.

Another factor in resources availability is overtime. This is the time were employees are paid for work beyond their normal working hours. In Water Resource operations, overtime is a fact of life and will occur as infrastructure is used and operates 24 hours, 365 days a year. Water Resources percent of overtime was reported at 8% and is in the upper range of LAC's benchmark of 4-8% best management practice of total working hours.

These three measures impact work: accomplishment, budgets and staffing. The Water Resources should establish benchmarks by Division, and monitor monthly with accountability to the managers assigned. The impact of these values and adherence to goals should be evaluated and reported to the Public Works Administrator monthly.

4.3.13 Develop, document and implement a complete succession plan for all groups with input from employee teams. Focus on ensuring skills, experience, education and training are all considered in this process and not only length of service.

The Department employee's average length of service is over 17 years and is above the normal benchmark range with some groups being even much higher at 20 years of service. Also, several key staff are now in the Deferred Retirement Option Program (DROP) which provides an alternative method for retirement benefits to employees who will be departing the agency soon. In addition, many senior managers and supervisors have a lengthy tenure of 30 plus years and could soon retire. The loss of these key staff will take some institutional knowledge of operations with them.

The loss of key staff is being addressed by Water Resources one position at a time. There is a lack of a documented and implemented succession plan to meet this situation. Water Resources should develop a complete plan of how key positions will be replaced. The replacement concept should not be solely based on length of service but should include skills, training, and education that will best allow the agency to address the many challenges in maintaining a department of a large water and wastewater utility for ¼ million people. Criteria for replacing these positions should be outlined with the combination of experience, skills, education and training that will be needed to optimally provide service by key positions.

4.3.14 All supervisors and managers should be trained on management skills to be updated annually, as well as on the methodology and capabilities of WAM and linked GIS. This should be a requirement of promotion and part of an employee's annual review.

The internal manager surveys indicated that 50% of managers were familiar with WAM and utilized it. The WAM system has been selected by the City to manage operations and yet less than 40% of all labor is now being captured, and little system outputs are being utilized by supervisors and management for decision making. GIS, while being generally understood, is not being applied by supervisors and managers throughout Water Resources.

The WAM system is also utilized to help manage the Water Resources vast asset infrastructure. Supervisors and managers should have the basic understanding of the WAM system and application of GIS. This understanding and utilization should be a requirement for promotion to supervisor or manager positions. Also, utilization of WAM/GIS for decision making should be an element of an employee's annual review.

Additionally, only 32% of employees in the employee survey indicated they had confidence that management had the ability to lead their Division. Management and supervisors should be assigned required management skill training annually. This should also be an element of an employee's annual review and/or promotion for supervisors and managers.

4.3.15 Fully develop and implement public information sharing by marketing accomplishments of the Department to others and providing information to the Mayor's office and the public.

In the last several years, Water Resources has received negative press coverage of the wastewater overflows. Many areas that Water Resources is embarking in are very positive including unidirectional flushing, proactive wastewater cleaning, use of CCTV, having a fully functional laboratory, use of reclaimed water, acknowledgment/awards from peers and the use of P-Tech to develop and grow employees.

The Water Resources Department should actively provide information that can be used by leadership to display all actions including all those positive actions that are occurring. A monthly summary of accomplishments and positive stories of accomplishments should be promoted by various communication techniques to inform the citizens and elected leaders of the Department's successes and innovative approaches. The negative issues that occur should not be hidden from anyone, yet neither should all the successes that are occurring.

4.3.16 Evaluate and stock inventory based on actual needs, optimizing inventory by using industry benchmarks. Establish proper accountability and security functions. Consider centralizing and reducing inventories to a controlled location that is shared with other Departments.

The Department uses the City's Centralized Warehouse at the Water Resources complex for many commodities, yet the Department has $2.8 million in inventory at six other satellite locations. In all cases, inventory is being accounted for differently and lacks usage data or a standard method of tracking. The WAM system utilization for inventory management varies in these locations.

After further evaluation of material inventory control practices, Water Resources should affirm the need for these remote locations and consolidate wherever beneficial. All inventory utilization should be documented in a standardized methodology and data placed in WAM. WAM should be configured to provide proper inventory controls for all groups.

4.3.17 Establish a systematic procedure to assess future contracting candidates following documented City maintenance and operations strategic objectives.

A documented process to determine if work should be contracted or performed in-house is now lacking. A process should be established that would enable the Department to produce the information necessary to conduct this analysis.

One tool used to accomplish this is the performance budget as outlined in Recommendation 4.2.17. An overall unit cost by activity can be determined that would incorporate actual labor, equipment, and material costs including an applied avoidable overhead rate. This will allow the Department to compare the true cost of conducting operations and compare the cost with other agencies for benchmarking and goal setting purposes. In addition, the Department will be able to evaluate the efficiency of each group by analyzing productivity levels and can correct any deviation to allow for continuous improvement.

The Department should have the capability to develop a work plan for contracted work with a defined work quantity and projected cost. This can allow for proper contract management and monitoring progress based upon accomplishment and cost. Also, contracted work should have a defined quality measure for the finished product to compare the expected results to the end-product's actual delivery. The defined quality standard should be clearly outlined and communicated with both the contractor and staff that are used to monitor.

This effort would allow the Department to annually evaluate all activities and determine whether any activities appear to be warranted for consideration for outsourcing (Martin, 1993). The Department would then act to improve that activity or function, or consider it as a candidate to outsource in a competitive effort. The purpose of this process would ensure an internal focus to always compete without being required and look for continuous improvement via external benchmarks. This process should be annually conducted by Water Resources staff and reported to the Public Works Administrator.

4.4 Directing / Scheduling

4.4.1 Work shifts should be established based on specific work needs. The number of shifts should be standardized. An external evaluation on the benefits to the City should be conducted with employee team involvement, documenting the negative and positive benefits of each work shift.

The Divisions have a blend of work shifts (4 days@10 hours, 5 days @8 hours, 3 days @11 hours) and various starting hours in the day, which creates situations with many employees not being directly supervised. The utilization of hours for 24/7 coverage of both water and wastewater plants requires a schedule to ensure staffing is compliant and meets permit mandates. Due to the need for sampling support for wastewater plants, the Laboratory must staff during the weekend to monitor plant performance. The staff in other groups are assigned based on many factors such as employee desires, supervisor preference and historical precedence. Each Division also provides 24/7 coverage as necessary through various schedules, including shift work and after-hours/weekend on-call rotations.

The working hours should be based on what is best for the City with some employee considerations that allow for retention and recruitment. Working in the Florida environment involves high temperatures and humidity in the summer, and short days in the winter. This results in crews working at twilight, as well as during peak traffic time periods, which further impacts work due to traffic. Crews that work longer hours can negatively impact productivity (Lorick, 2012). The Water Resources Department should perform an external documented review and determine what is the best working hours for the Divisions. It is possible that daily and weekly schedules could vary for some groups depending on what their job entails.

4.4.2 The City should dedicate resources to establish and document complete preventive maintenance programs utilizing the WAM database. Integrate all nonoperational routines within WAM and utilize proactively for planning, scheduling, and controlling work.

Many activities with related assets can be predetermined, grouped, and scheduled. Water Resources have many routine PMs already in the WAM database. Managers and Supervisors should focus on these activities and others by structuring as many activities as possible into defined routines. These routines should be documented with established levels of effort.

Water Resources should develop a documented routine program for cyclical work in support of maintenance efforts and water infrastructure. Existing routine lists and manual records for repetitive work on pumps, valves, sewer lines etc. should be transferred into the WAM system for use in PM modules.

These routines should be used within WAM as a basis for the annual plan and distribution of resources as well as generation of proactive work orders from the system. The development and subsequent use of routines will aid managers and supervisors to better plan, organize, and schedule their resources. By grouping and scheduling work, travel time and setup can also be optimized.

4.4.3 Define and document priority assignment procedure for all service requests based on need, safety, and risk to the public. Attempt to identify all work to be performed at least two weeks in advance unless an emergency.

Work requests and work orders are managed and processed differently within the Department including assignment, monitoring, closure and recording. Some groups use technology such as the Water Maintenance crews who utilize laptops and tablets, where others are using manual forms. The priority assignment for work requests and work orders are not defined and consequently handled differently by Division.

Water Resources should standardize priorities based on specific needs, safety related issues and any risk to the public and infrastructure. The call takers should be trained, along with the Division, to manage requests consistently. Assign items that do not pose immediate safety, liability or public risk to a priority category to future efforts. Then integrate them with scheduling and group work by geographical area to allow for more efficient assignment.

4.4.4 Fully develop and implement a two-week scheduling procedure, related to annual work plans and routine processes. All projects and non-operational routines should be fully scheduled based on productivity and SOP's. Develop a process to establish accountability of supervisors for adherence to schedule and accounting for items not completed.

The development of a systematic two-week scheduling process should occur with all employees trained to utilize and enhance the current daily work assignment process. This process of scheduling needs to include all work by activity to be accomplished in a specific time based on a developed annual work plan, and outstanding service requests. A systematic involvement of managers and supervisors should occur to assist with the coordination of equipment, labor and material needs, methodology, and any special circumstances. A two-week scheduling meeting should involve managers and supervisors to discuss the adherence to and future efforts of these schedules. Various points related to this process should include:

- Allowance for maximum use and sharing of limited resources
- Minimize work insertions and "fire-fighting"
- Communicate among all employees about the work plan and available resources
- Provide for employee involvement and feedback in planning work
- Reduce resource conflicts

The schedule should be prepared and released for all maintenance employees to be aware of the planned work. Further, supervisors should be required to discuss their new schedules, and compare them with the prior two-weeks, to determine the adherence to the previous schedule.

Supervisors should be held accountable for their schedule completion. Several tools such as a PM program, routines, performance plans, cross-training, and an adequately configured WAM system must be operational prior to establishing an effective scheduling system.

Work assignments should be directed by supervisors for their respective sections with support provided by field lead workers. Schedules should be derived primarily from the annual work plan and work calendar, which is broken down into manageable 'projects' on a two-week basis. Supervisors should use the two-week schedules for guiding daily assignments with adjustments made for defined emergencies or urgent requests only.

Supervisors should focus on adherence to the two-week schedule with field support by informed field employees. This will assist in completion of the annual plan and established performance measures. Such a two-week scheduling process is now being done in other similar Florida agencies such as Hillsborough and Volusia Counties. In addition, consideration should be made to utilize video conferencing for scheduling and regular meeting. Travel time to the plants from headquarters and City Hall with all the multiple schedules make it difficult and costly to achieve.

4.5 Controlling / Improving

4.5.1 All groups should standardize tracking of labor, equipment, and materials by activity, linking to a specific asset or location.

Key data should be collected to allow for performance measurement of cost, productivity, unit cost and accomplishment (APWA, 2008; State of Washington, 2009). All resources used should

be tracked for each activity performed. Work should be tracked in a standardized method that is done consistently by all groups, including preparatory and travel time to the job site. When possible, work should also be tracked to specific assets and/or locations to allow for the lifecycle costing of infrastructure assets and maintenance history reporting. The data on accomplishment would also be included in work reporting.

All work data collected would then be stored in the WAM database and used for process improvement and continuous monitoring. The collected data should allow management to compile comprehensive summaries of accomplished work and productivity metrics (unit cost, units per hour) in a consistent format for work management purposes. Further, the system data should involve management staff in using the information to improve operations.

4.5.2 Standardize reporting procedures, minimizing the number of databases being used for data compilation. Account for one hundred percent (100%) of employee time in the system. All non-divisional work costs should be recovered, or at least identified with cost determined.

Water Resources currently accounts for all the external cost of project work in various spreadsheets and databases, as well as in the accounting system. Water resources should establish a mechanism for 100% tracking of internal time to activities, assets and locations. Currently, less than ½ of time is accounted for in the WAM system.

This 100% tracking will provide input on the evaluation of how work is being completed and give data to assist and improve ways to manage work. The City should utilize the same concept on their internal work and projects as is required of contractors and outsourced support.

Water Resources currently limits work tracking using a combination of work reporting processes in manual databases and unlinked systems. The work being reported varies for each group, as outlined in Section 2, Baseline with incomplete and inconsistent work information being documented. All resources used (labor, equipment, materials, and contractors) should be tracked for each activity performed.

The data on accomplishment (i.e. number of valves repaired, meters replaced, linear footage of pipe repairs) would be included in work reporting. All work activities would then be stored in the WAM database. In addition, locations such as zone or area would be systematically reported and stored by activity. This will assist with future reporting and compilation of data. Reports will be able to be run by one location, one activity, or an entire section to determine where work efforts are concentrated.

4.5.3 Track and document all effort to remark utility locations and coordinate with contractors and other major utilities to minimize re- work.

Water Resources is required by Florida Statute 556 to physically identify and mark all City owned water sewer and cable utility infrastructure following specific criteria and methodology once notified. This is done to aid the public by preventing injury to persons or property, and to prevent the interruption of services resulting from damage to an underground facility caused by excavation or demolition operations.

Three Water Resources employees with part-time support identify and mark locations of Water Resources underground assets so that others doing work will not impact them and plan accordingly. Large projects are often planned where the Water Resources staff will mark a large area for all Water Resources underground assets. Then, because construction projects are so large, they are called out again to remark the same areas multiple times as delays and size prevent the contractors or other entities from getting promptly to the areas marked and the markings fade, disappear or become too difficult to identify.

The City should keep track of these occurrences, then discuss with the specific contractors on what is occurring, and require they consider limiting their requests to those that can be done in a relatively short time frame to prevent continually remarking. Though the contractor is not required to do this, they may consider these marking requests when construction is not planned to occur or impact the area in question for weeks or months in the future.

4.5.4 Utilize enhanced supervisory control and data acquisition (SCADA) capabilities to reduce redundancy of manual data recording for key processes in water and wastewater. Require operator involvement in all SCADA modifications with signoff by appropriate supervisor.

The City staff in both water and wastewater utilize the SCADA system to monitor plants, pump stations, lift stations, and other features. The utilization of SCADA is extensive yet there are considerable redundant processes that are still in place. The City enhances and updates the system with a combination of in-house and external resources.

The operational staff uses the SCADA daily yet changes and updates may occur without their direct input. These changes require adjustments and changes in their actual work processes. The tool is key for operations staff who utilize it to affirm with physical observations and recording of meters, flows, temperatures, etc.

SCADA improvement should be done with direct operations employee input and agreements of the rationale for change and how the information is to be displayed. The immediate operations supervisor should sign off on all changes, assuring the modification is a collaborative effort that the change and rationale is understood.

4.5.5 Integrate existing systems with WAM to automate work order tracking. Assign technical staff to utilize direct input from each group to configure systems for all functional users.

The Work and Asset Management (WAM) system in 2007 replaced the prior Cartegraph system. The WAM system has an asset inventory hierarchy, as well as service requests and work order capabilities. It has been setup for seven (7) Divisions (ADMIN, ECD, WRD, WRF, WSM, WTD, and WWM).

The WAM database was initially configured with representative employee teams from all Divisions. However, the involvement and acceptance varied with full contribution of Water

Maintenance employees and limited participation from others. Hence, the system is now being utilized by all operational Divisions without complete integration with their work processes.

In addition, capabilities to access and retrieve data for utilizing the WAM system has not been fruitful for the plant mechanics. In the Cosme Water Treatment Facility plant, the WAM system appears to not have been used for several months due to a lack of access to the system.

The WAM system should be configured for all groups to ensure full utilization with necessary access and rights. For example, if a plant mechanic repairs a pump or another asset, the mechanic should be able to retrieve the data to enhance his decision making. ASM Division should be assigned to assist all groups to fully integrate the system to ensure operations processes are implemented in the WAM, and staff is provided access to the data needed for their work.

4.5.6 Establish a documented field work quality review process for closing work orders and confirm work performance meets guidelines with a sampling of the work accomplished. Include identified actions to be taken to ensure compliance with established quality guidelines. Attempt to minimize the amount of work orders by geographically grouping.

A system should be established and documented to review the quality of work produced on a short-term basis using system tools such as activity guidelines and various system outputs from the WAM. This will help determine how well each group is completing work and servicing customers as well as how much is accomplished and at what cost. The guidelines and performance standards discussed earlier should have a defined quality for each activity.

An independent review by a supervisor should occur to ensure the desired results and performance expectations are achieved. The work being done should be treated in a similar fashion as contractor work with quality controls being performed by supervisors. Feedback should be provided for staff to ensure compliance to the desired quality standards. Specific guidance and/or training should be given to individuals and groups as necessary to meet these guidelines.

4.5.7 Develop, implement and report results of quantifiable customer service performance measures in such areas as service complaints, call-center indicators, and water and wastewater service disruptions. Include benchmark comparisons in annual reports and provide to Public Works Administrator and City Leadership.

Metrics for customer service are minimal and lack reporting of specific values. Benchmarks exist by industry sources that should be used as a guide for Water Resources (AWWA, 2005; Lafferty & Lauer, 2006; Patrick & Kozlosky, 2006). Metrics such as complaints per account, disruptions per account, percent water loss, percent work orders closed, work order duration, work orders opened, first call resolution, number of water line and sewer breaks per 100 miles of pipe, number of overflows per 100 miles of sewer pipe, planned plant maintenance versus all work, and operations plus maintenance cost per millions of gallons treated are all available.

Water Resources should develop metrics mirroring industry standards and monitor monthly. These metrics should be used for accountability and should be reported monthly to both the Water Resources Manager and the Public Work Administrator. The agency should consider an APWA review or The Partnership for Safe Water review (AWWA, 2017).

All metrics should be reported monthly and linked to budget documents, then be provided to the City leadership, indicating customer service accountability.

4.5.8 All groups should produce a monthly report prepared in a similar format. Establish a monthly meeting within each group with the Department Manager present to review WAM data for establishing accountability with all teams. Report results to Department Director and Public Works Administrator.

The WAM system is used by all groups at varying degrees to collect and store data. However, little utilization is made of data collected to adjust or enhance operations. Some outputs are generated on work order numbers yet are not widely utilized. Various groups create reports for their specific uses. Seventy-six percent (76%) of the work orders are in one Division. The amount of labor recorded is less than 40% of working hours.

The data is being collected but lacks any focused utilization to improve the organization. Outputs and reports are mainly created on a request basis, or by administrative staff. Any accountability in the system use and data compiled are minimal or nonexistent.

Water Resources should establish a report or outputs that can be reviewed for accountability. The output should be show for each Division the labor hours by activity, work accomplishment in units, productivity and cost of actual effort versus a desired plan (Michel, 2004). The outputs should be reviewed by management, and the necessary actions taken to quality control data to use for improving operations. These outputs, after being reviewed by supervisors, should be released to both the Water Resources Director and the Public Work Administrator.

4.5.9 Establish a continuous improvement process with quarterly updates. Provide an annual State of Operations report to the Public Works Administrator that compares planned activities' work days, accomplishment, total costs, and unit costs, versus actual efforts for all groups. Provide a State of Operations report annually to City Leadership with non-compliance identified.

The Department has many good work processes in place, yet they are not linked and integrated as discussed in prior recommendations. System feedback is not used to update any planning or scheduling data from one year to the next. Short-term scheduling is done, yet it is independent of other processes. Work is tracked, yet there is a lack of linkage to a performance work plan and budget. Many tools are in place, but they lack system integration and understanding by employees on how they should work together.

A systematic method for evaluating effectiveness and efficiency of the operation is not currently available. The Department's mechanism for tracking, planning and scheduling is recorded in

various databases and spreadsheets, which does not allow for evaluation of cost effectiveness and/or measurement of efficiency.

The current WAM system should be fully utilized as a planning tool to establish a baseline consisting of frequency of service, the desired quality and quantity of work, and unit cost for all activities that can be extracted on a routine basis by any specific time frame and/or location. By developing these capabilities, training the managers and supervisors and then re-engineering processes, methods could be established to have an integrated business-like operation.

Each group should have tools to review all alternatives for providing cost-effective, quality service, and select the best options (internal, contract, or combination) to best meet these criteria. These tools, if implemented, could provide a process and mechanism to maximize the best use of the public's dollars and increase stewardship of Department assets.

A complete continuous improvement process as outlined in APWA' s Public Works Administrative Manual (2008, p. 110), NACE (1992) and discussed in AWWA (2005) should be implemented with facilitation, and these independent systems linked and optimized. Training should be done to guide managers and supervisors on how to fully utilize system concepts to plan, organize, schedule and improve their work. This system would then provide both data and feedback methods to all levels to work toward continuous improvement. The Department has many of the processes, but they are not tied together with employees lacking the background on how to implement this concept. A quarterly meeting should occur where summary information on costing, productivity and accomplishment is presented to all employees. Actions planned because of this information should be documented and used as targets for improvement. Various activities' performance in cost and productivity should be available and posted for all employees to observe results.

Also, information should be compiled into a short report on an annual basis and be provided to the Public Works Administrator, outlining the results of work effort and compliance to the annual performance work plan. Information on response to customers, performance measures, unit cost, accomplishment, and productivity should be provided. Proposed actions to ensure compliance and acknowledgment of success should also be provided. Once information is confirmed and reviewed, the "State of the Maintenance and Operations" should be presented to the City Administrator and elected officials.

SECTION 5 APPENDIX

The following sections includes the list of specific questions presented by leadership, along with LAC's response with related recommendations. An organizational chart is also included that shows the Water Resources Department at the time of this evaluation.

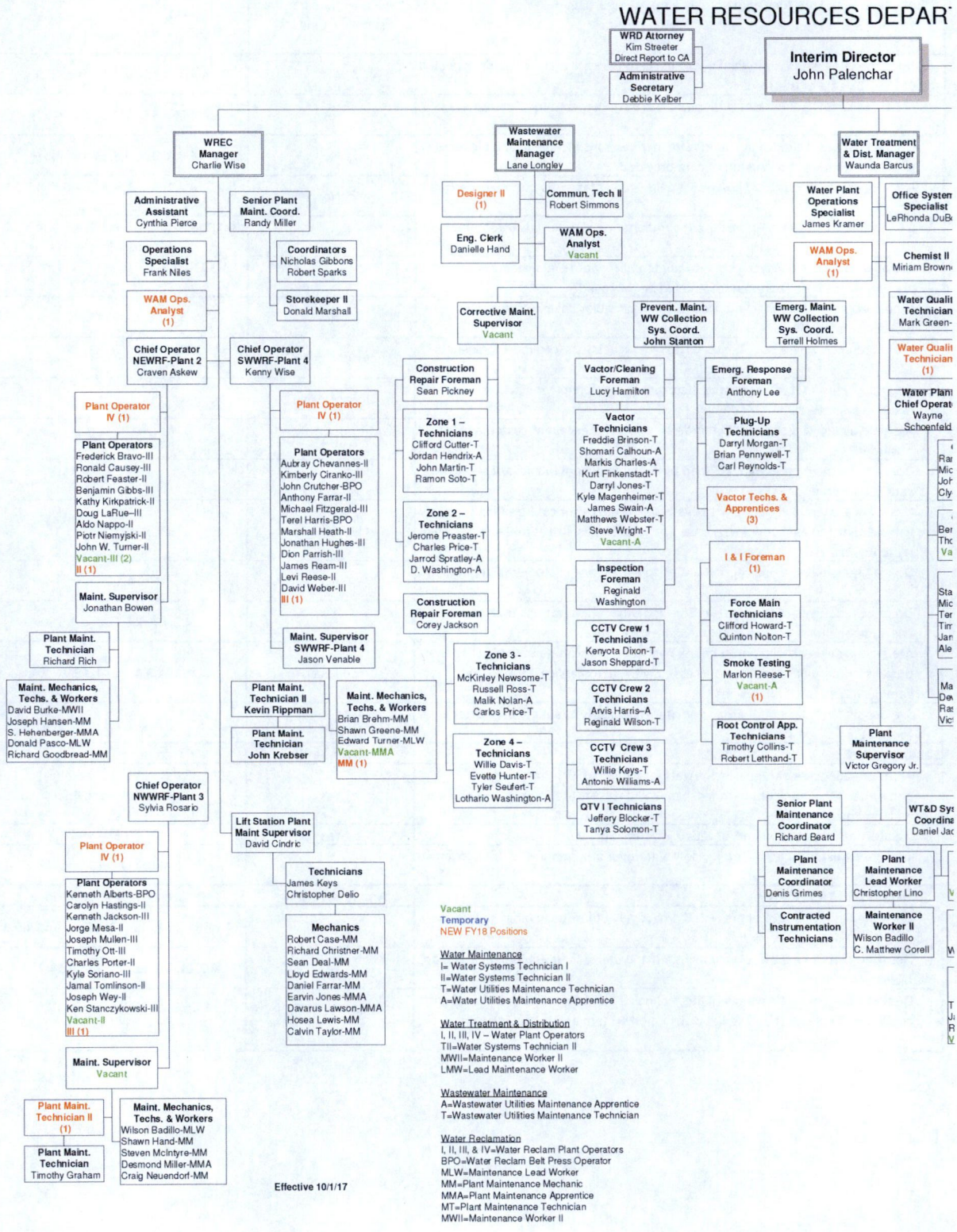
Mission and Goals	Answers/Findings	Related Recommendations
Has the department adopted a departmental mission (or vision) statement?	Yes	4.2.1
Is the department's mission compatible with the mission of the city?	Yes	4.2.1
Is the department's mission (or vision) stated clearly, concisely and in easily understandable terms and are employees aware of its mission?	Yes	4.2.1
Has management set operational goals for the department?	No	4.2.1 and 4.5.9
Are these goals congruent with each other?	No	4.2.1 and 4.2.10
Do these goals directly support the mission?	No	4.2.1 and 4.2.10
Are these goals stated in measurable terms (benchmarks)?	No	4.2.1, 4.2.10, 4.5.1, and 4.5.9
Is there methodology used to help employees understand how their daily work contributes to the goals of their units and the overall mission of the department and the City?	No	4.1.1, 4.2.10, and 4.5.8
Organization Structure	**Answers/Findings**	**Related Recommendations**
Is the organizational structure currently in place adequate to accomplish the department's mission and/or goals?	No	4.3.1, 4.3.2, and 4.3.8
Is the staff organized in such a way that missions and accountability are clearly defined without duplication and overlap of responsibility?	No	4.2.9 and 4.2.10
Is the department organized to optimize integration, cooperation, and communication within the department as well as with other departments, other outside agencies, the Mayor and Council, and the citizens?	No	4.1.1, 4.3.3, 4.3.8 and 4.3.15
How does the organizational structure compare to other governmental units of similar size?	Yes	4.3.1, 4.3.2, 4.3.8 and 4.3.9
Staffing Levels	**Answers/Findings**	**Related Recommendations**
Is the staffing level adequate to maintain the service levels expected by our citizens and anticipated in the approved budget document?	Yes	4.3.9, 4.3.17, 4.4.1 and 4.5.9
Are staffing levels adequate within each classification (i.e. apprentices, laborers, technicians, professional, supervisory, management, etc.)?	Yes	4.3.9, 4.3.10 and 4.3.11
Is the current staff turnover levels appropriate for the department and how do these compare with other governmental units of similar size?	Inconclusive	Information not provided on hire dates and retirement/separation dates of all employees
Staff Qualifications	**Answers/Findings**	**Related Recommendations**
Are the staff members, including management, supervisory, office staff and operations staff qualified to carry out their duties as well as the City's policies and procedures?	Yes	4.3.5 and 4.3.14
Do managers, supervisors and operations staff have the necessary education, licenses, and professional certifications to perform their duties?	Yes	4.3.5 and 4.3.10
Do managers, supervisors and operations staff have the necessary experience and knowledge to perform their duties? Is the overall experience level of staff adequate?	Yes	4.3.5 and 4.3.14
Do the skill sets and expertise levels of staff match up with the job skills required to perform their duties?	Yes	4.3.5 and 4.3.14
Do managers and supervisors possess the soft skills required to be effective leaders?	No	4.3.5
Are there adequate growth opportunities in place for all staff including promotions and management opportunities and are these available to all staff on an equal basis?	No	4.3.11 and 4.3.13
Is training of staff (both short term and long term) adequate for the required duties and is the opportunity for training available to all staff on an equal basis?	Yes	4.3.10, 4.3.13 and 4.3.14

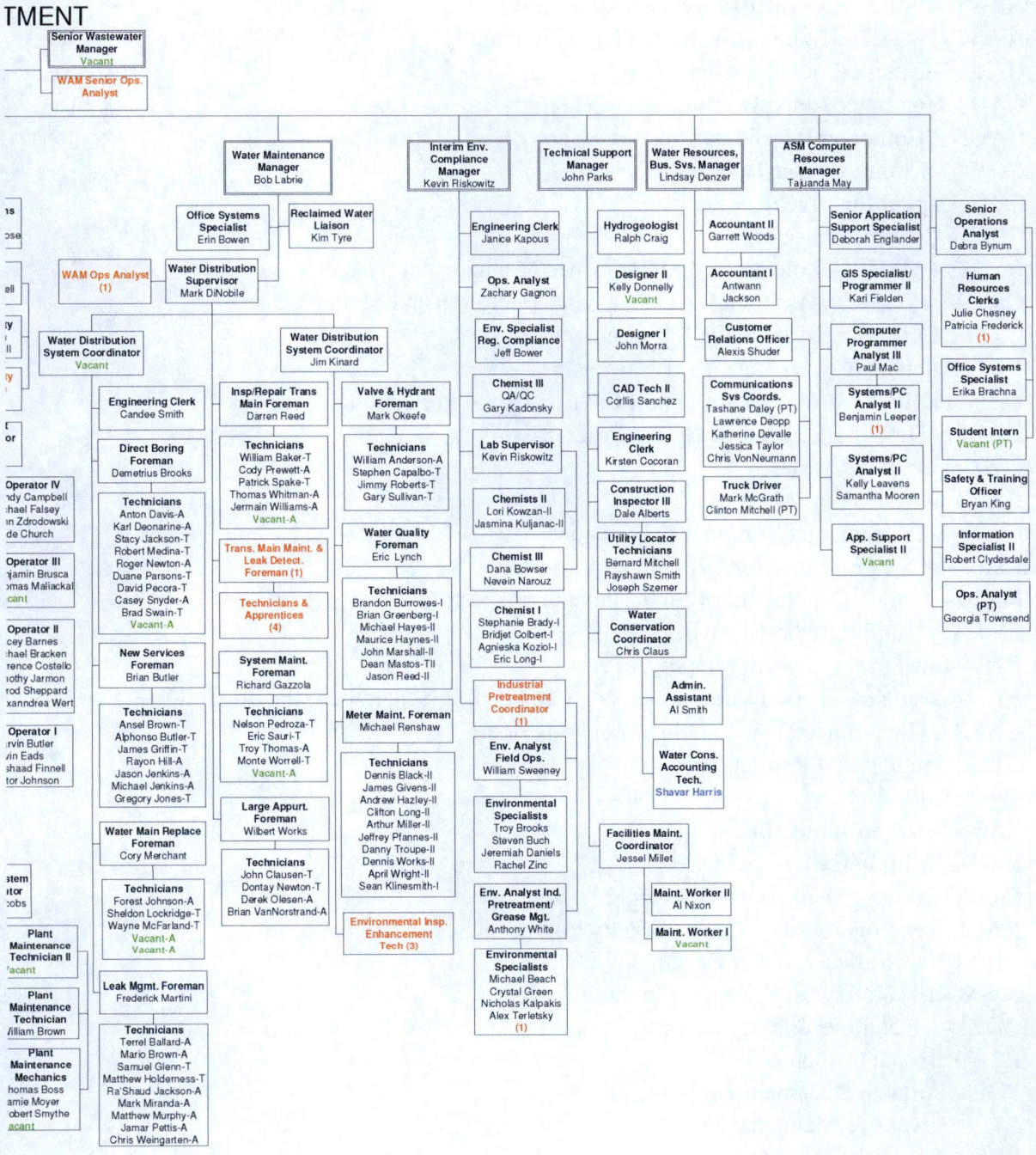
Management of Staff	Answers/Findings	Related Recommendations
Do managers and supervisors demonstrate strong leadership?	No	4.3.3, 4.3.5 and 4.5.9
Do they have credibility and the confidence of subordinates?	No	4.3.3, 4.5.8 and 4.5.9
Do managers and supervisors clearly communicate the City's and department's goals and objectives?	Yes	4.5.9
Are these goals and objectives incorporated into daily tasks and action plans?	No	4.2.9, 4.4.4, 4.5.6 and 4.5.9
Do managers and supervisors hold their subordinates accountable for meeting established goals, objectives, and expectations?	No	4.2.9, 4.4.4, 4.5.6 and 4.5.10
Do managers and supervisors hold themselves accountable for meeting the needs of their staff?	No	4.3.3, 4.4.4 and 4.5.9
Do managers and supervisors lead by example?	No	4.3.3 and 4.4.4
Do managers and supervisors empower their staff to make decisions, be creative, make mistakes, learn from those mistakes and take reasonable risks in order to improve efficiencies and service to our customers?	Yes	4.1.1, 4.2.10, 4.3.3, 4.3.5 and 4.3.14
Do managers and supervisors encourage staff to work as a team where every member is valued and invited to fully participate?	Inconclusive	4.1.1, 4.2.10, 4.3.3, 4.3.5 and 4.3.15
Do managers and supervisors encourage change management throughout the department?	No	4.1.1, 4.3.3 and 4.5.9
Do managers and supervisors consistently apply rules, regulations, and policies?	Inconclusive	4.3.11, 4.3.12, 4.3.17 and 4.4.3
Do they provide consistent coaching, counseling, and feedback to subordinates?	Inconclusive	4.5.8
Do they provide fair and equal access to training and growth opportunities?	Inconclusive	4.3.4
Is staff operating in accordance with existing rules, regulations and policies?	Yes	4.3.4
Are work schedules established to accomplish the goals and objectives of the department in the most efficient and effective manner?	No	4.4.1, 4.4.2, 4.4.3 and 4.4.4
Are staff responsibilities determined in such a way as to reduce duplication of effort, both within the department and with other City departments?	Yes	4.3.8, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.5.1, 4.5.6, 4.5.7, 4.5.8 and 4.5.9
Is the distribution of assignments the most equitable and efficient?	Inconclusive	4.4.1, 4.4.2, 4.4.3 and 4.4.4
Does the department have a succession plan in place for management, supervisory and operational staff and does this plan include empowerment and/or training of current staff for these future roles?	No	4.3.13, 4.3.14 and 4.5.9
Is there a plan to develop staff expertise to allow for reduction of consultant needs within the department?	No	4.2.17, 4.3.8 and 4.3.17

Policies and Procedures	Answers/Findings	Related Recommendations
Are the City's (including departmental) policies and procedures as applied by the department adequate to provide for efficient and effective operations of the department including purchasing materials for maintenance and repair, management of treatment facilities, management of the lab facilities, complaint routing and follow-up, water service line & meter connections and project management/oversight (i.e. in-house vs. contracted projects)? Are industry best practices being utilized by the department?	No	4.2.1, 4.2.17, 4.3.4, 4.5.6 and 4.5.9
Are the City's (including departmental) policies and procedures as applied by the department adequate to provide for efficient and effective operations of the department including purchasing materials for maintenance and repair, management of treatment facilities, management of the lab facilities, complaint routing and follow-up, water service line & meter connections and project management/oversight (i.e. in-house vs. contracted projects)? Are industry best practices being utilized by the department?	Yes	4.3.5, 4.3.9, 4.3.16, 4.5.6 and 4.5.9
Is the department's use of consultants including the number of consultants, consultant projects and management of consultant projects consistent with industry best practices and how do these compare with other governmental units of similar size?	Inconclusive	4.3.17 and 4.5.6
Does the department utilize a team project approach in addressing issues with consultants, contractors and staff to determine the best solutions and if not should this type of process be implemented?	Inconclusive	4.1.1, 4.3.17 and 4.5.7
Is this team approach concept industry best practice?	Inconclusive	4.3.17 and 4.5.8
Is the department's operating and/or CIP budget adequate for it to accomplish its mission?	No	4.2.5, 4.2.7, 4.2.12, 4.2.13, 4.2.16 and 4.2.18
Does the department have adequate procedures in place to provide security of the water supply and distribution system?	Yes	No related recommendation
Are the current departmental procedures adequate and industry best practices followed related to water quality and testing?	Yes	4.1.7, 4.1.8, 4.2.10 and 4.5.9

Customer Service	Answers/Findings	Related Recommendations
Has the department clarified all the standards that are expected from our employees and are they agreed to as a management team?	Employee indicate they have adequate training (survey responses)	4.1.1, 4.2.1 and 4.4.3
Does the department train employees in customer care and standards expected of them as part of their induction?	Yes	4.4.3, 4.3.5, 4.3.14 and 4.5.7
Are there refresher sessions periodically on customer care for all employees?	Yes	4.4.3, 4.3.5, 4.3.14 and 4.5.8
Do the customer care training and refresher sessions include *all* employees who have an impact on customer care provided?	No	4.4.3, 4.3.5, 4.3.14 and 4.5.9
Is the department doing all it can to provide good standards of *employee care* ?	No	4.1.1, 4.2.1, 4.3.3, 4.4.3, 4.3.5, 4.3.14 and 4.5.10
Do employees currently appreciate the importance of *'internal customer care'* ?	No	4.1.1, 4.2.1, 4.3.3, 4.4.3, 4.3.5, 4.3.14 and 4.5.11
Are *all* employees given the opportunity to put forward practical suggestions about how they feel customer care could be improved?	No	4.1.1, 4.2.1, 4.4.3, 4.3.5, 4.3.14 and 4.5.10
Is customer satisfaction levels measured on a regular basis with feedback from typical customers?	No	4.5.7 and 4.5.9
Is action taken where possible on customer suggestions/common complaints?	Inconclusive	4.5.7
Are employees kept informed about customer satisfaction and action being taken to improve it?	Inconclusive	
Are employees who provide *'that little bit extra'* for excellent customer care rewarded?	No	4.5.7 and 4.5.8
Does the management team all 'lead by example' where exemplary customer care is concerned?	Yes	4.5.9
Has management planned how to evaluate the customer care training? (e.g. will we speak to each employee on a *'one to one'* basis to agree what they will try to improve?)	Inconclusive	Not witnessed
Do managers have regular opportunities to experience customer facing roles?	No	4.5.7
Do representatives of the organization visit other organizations on a regular basis to gain ideas on how to improve customer care?	No	4.2.10, 4.2.17 and 4.5.9
Are employees recruited partly on the basis of their attitude towards customers or skills in customer care? Are successes with customers celebrated and communicated to all employees?	Inconclusive	4.3.4 and 4.3.9
Are our system/ideas built around what is most likely to satisfy the customer, (or what is easiest for us?)	No	4.2.10, 4.3.5, 4.3.15, 4.5.7 and 4.5.9
Safety of Staff	**Answers/Findings**	**Related Recommendations**
Are there adequate safeguards for staff on the job in all areas of the department, including laboratories, water and wastewater plants, and pipeline maintenance?	Yes	4.2.10, 4.3.3 and 4.5.6
Is safety at construction and/or repair job sites adequate?	Yes	4.2.10, 4.3.3 and 4.5.7
Is there an established on the job safety training program and is this program effective?	Yes	4.2.10, 4.3.3, 4.3.16 and 4.5.8
Equipment and Technology	**Answers/Findings**	**Related Recommendations**
Does the department effectively and proactively utilize technology to improve services and control costs?	No	4.1.6, 4.2.12, 4.2.13, 4.2.17 and 4.5.8
Does the department effectively maintain and utilize their equipment and plant facilities?	Yes	4.2.11, 4.2.12, 4.2.13 and 4.2.18
Does the department have adequate technology and experience to assess the condition of the water and sewer distribution system and the wastewater collection system?	No	4.2.13 and 4.2.18

The following two pages show the organizational chart at the time of this evaluation.




TMENT
Senior Wastewater Manager
Vacant
WAM Senior Ops. Analyst
Water Maintenance Manager
Bob Labrie
Interim Env. Compliance Manager
Kevin Riskowitz
Technical Support Manager
John Parks
Water Resources, Bus. Svs. Manager
Lindsay Denzer
ASM Computer Resources Manager
Tajuanda May
Office Systems Specialist
Erin Bowen
Reclaimed Water Liaison
Kim Tyre
WAM Ops Analyst (1)
Water Distribution Supervisor
Mark DiNobile
Water Distribution System Coordinator
Vacant
Water Distribution System Coordinator
Jim Kinard
Engineering Clerk
Candee Smith
Direct Boring Foreman
Demetrius Brooks
Technicians
Anton Davis-A
Karl Deonarine-A
Stacy Jackson-T
Robert Medina-T
Roger Newton-A
Duane Parsons-T
David Pecora-T
Casey Snyder-A
Brad Swain-T
Vacant-A
New Services Foreman
Brian Butler
Technicians
Ansel Brown-T
Alphonso Butler-T
James Griffin-T
Rayon Hill-A
Jason Jenkins-A
Michael Jenkins-A
Gregory Jones-T
Water Main Replace Foreman
Cory Merchant
Technicians
Forest Johnson-A
Sheldon Lockridge-T
Wayne McFarland-T
Vacant-A
Vacant-A
Leak Mgmt. Foreman
Frederick Martini
Technicians
Terrel Ballard-A
Mario Brown-A
Samuel Glenn-T
Matthew Holderness-T
Ra'Shaud Jackson-A
Mark Miranda-A
Matthew Murphy-A
Jamar Pettis-A
Chris Weingarten-A
Plant Maintenance Technician II
Plant Maintenance Technician
Plant Maintenance Mechanics
Insp/Repair Trans Main Foreman
Darren Reed
Technicians
William Baker-T
Cody Prewett-A
Patrick Spake-T
Thomas Whitman-A
Jermain Williams-A
Vacant-A
Trans. Main Maint. & Leak Detect. Foreman (1)
Technicians & Apprentices (4)
System Maint. Foreman
Richard Gazzola
Technicians
Nelson Pedroza-T
Eric Sauri-T
Troy Thomas-A
Monte Worrell-T
Vacant-A
Large Appurt. Foreman
Wilbert Works
Technicians
John Clausen-T
Dontay Newton-T
Derek Olesen-A
Brian VanNorstrand-A
Valve & Hydrant Foreman
Mark Okeefe
Technicians
William Anderson-A
Stephen Capalbo-T
Jimmy Roberts-T
Gary Sullivan-T
Water Quality Foreman
Eric Lynch
Technicians
Brandon Burrowes-I
Brian Greenberg-I
Michael Hayes-II
Maurice Haynes-II
John Marshall-II
Dean Mastos-TII
Jason Reed-II
Meter Maint. Foreman
Michael Renshaw
Technicians
Dennis Black-II
James Givens-II
Andrew Hazley-II
Clifton Long-II
Arthur Miller-II
Jeffrey Pfannes-II
Danny Troupe-II
Dennis Works-II
April Wright-II
Sean Klinesmith-I
Environmental Insp. Enhancement Tech (3)
Engineering Clerk
Janice Kapous
Ops. Analyst
Zachary Gagnon
Env. Specialist Reg. Compliance
Jeff Bower
Chemist III
QA/QC
Gary Kadonsky
Lab Supervisor
Kevin Riskowitz
Chemists II
Lori Kowzan-II
Jasmina Kuljanac-II
Chemist III
Dana Bowser
Nevein Narouz
Chemist I
Stephanie Brady-I
Bridjet Colbert-I
Agnieska Koziol-I
Eric Long-I
Industrial Pretreatment Coordinator (1)
Env. Analyst Field Ops.
William Sweeney
Environmental Specialists
Troy Brooks
Steven Buch
Jeremiah Daniels
Rachel Zinc
Env. Analyst Ind. Pretreatment/ Grease Mgt.
Anthony White
Environmental Specialists
Michael Beach
Crystal Green
Nicholas Kalpakis
Alex Terletsky
(1)
Hydrogeologist
Ralph Craig
Designer II
Kelly Donnelly
Vacant
Designer I
John Morra
CAD Tech II
Corllis Sanchez
Engineering Clerk
Kirsten Cocoran
Construction Inspector III
Dale Alberts
Utility Locator Technicians
Bernard Mitchell
Rayshawn Smith
Joseph Szemer
Water Conservation Coordinator
Chris Claus
Admin. Assistant
Al Smith
Water Cons. Accounting Tech.
Shavar Harris
Facilities Maint. Coordinator
Jessel Millet
Maint. Worker II
Al Nixon
Maint. Worker I
Vacant
Accountant II
Garrett Woods
Accountant I
Antwann Jackson
Customer Relations Officer
Alexis Shuder
Communications Svs Coords.
Tashane Daley (PT)
Lawrence Deopp
Katherine Devalle
Jessica Taylor
Chris VonNeumann
Truck Driver
Mark McGrath
Clinton Mitchell (PT)
Senior Application Support Specialist
Deborah Englander
GIS Specialist/ Programmer II
Kari Fielden
Computer Programmer Analyst III
Paul Mac
Systems/PC Analyst II
Benjamin Leeper
(1)
Systems/PC Analyst II
Kelly Leavens
Samantha Mooren
App. Support Specialist II
Vacant
Senior Operations Analyst
Debra Bynum
Human Resources Clerks
Julie Chesney
Patricia Frederick
(1)
Office Systems Specialist
Erika Brachna
Student Intern
Vacant (PT)
Safety & Training Officer
Bryan King
Information Specialist II
Robert Clydesdale
Ops. Analyst (PT)
Georgia Townsend

SECTION 6 ACRONYMS

APWA – American Water Resources Association
AWWRF – Albert Whitted Water Reclamation Facility
BPR – Business Process Reengineering
CAD – Computer Aided Drafting
CADD – Computer Aided Drafting & Design
CCTV – Closed-Circuit Television
CIP – Capital Improvement Plan
CIPP – Cured-In-Place Pipe
CMMS / MMS – Computerized Maintenance Management System
CMOM – Capacity Assurance, Management, Operation and Maintenance
CRM – Customer Relationship Management
CY – Calendar Year / Cubic Yard
DEP / FDEP – Florida Department of Environmental Protection
DROP – Deferred Retirement Option Program
DWC – Drinking Water "C"
EA – Environmental Analyst
ECD – Environmental Compliance Division
ESRI – software vendor for Geographic Information System
FDEP – Florida Department of Environmental Protection
FMLA – Family Medical Leave Act
FTE – full-time equivalent (employee)
FY – Fiscal Year (period starting October 1 and ending September 30 in the following year)
GASB – Governmental Accounting Standards Board
GIS – Geographic Information System
KW – Kilowatt
LAC – LA Consulting, Inc.
MGD – Million Gallons per Day
MOM – Management, Operations and Maintenance
NACE – National Association of County Engineers
NEWRF – Northeast Water Reclamation Facility
NWWRF – Northwest Water Reclamation Facility
O&M – Operations & Maintenance
PC – Personal Computer
PDF – Portable Document Format
PM – Preventive Maintenance
PVC – Polyvinyl chloride (pipe material)
QA/QC – Quality Assurance / Quality Control
QTV – Quick TV
SCADA – Supervisory Control and Data Acquisition
SDWA – Safe Drinking Water Act
SOP – Standard Operating Procedure
SSES – Sewer System Evaluation Survey

SSO – Sanitary Sewer Overflow
SUV – Sport Utility Vehicle
SWFWMD – Southwest Florida Water Management District
SWWRF – Southwest Water Reclamation Facility
USEPA – United States Environmental Protection Agency
WAM/WAMS – Work and Asset Management System
WRD – Water Resources Department
WREC – Water Resources Environmental Compliance
WRF – Water Reclamation Facility
WSM – Water System Maintenance
WTD – Water Treatment & Distribution
WWM – Wastewater Maintenance

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