Volusia County
FLORIDA

Volusia County Public Works Department

Evaluation of Maintenance and Operational Practices

Final Report
February 28, 2018

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Table of Contents

SECTION 1 EXECUTIVE SUMMARY

LA Consulting, Inc. (LAC) has reviewed the operational Divisions of Volusia County's Public Works Department (Department), based upon the scope of our consulting services. These Divisions included Coastal, Mosquito Control, Road and Bridge, Traffic Engineering, Solid Waste, and Water Resources and Utilities. This was a proactive effort initiated by the management of the Public Works Department and County leadership, for discovering the efficiencies and results from the implementations of key recommendations from two previous studies that occurred over the past ten years as well as to identify any further opportunities for future improvement.

Further, the intentions for this effort were the desire to evaluate current processes, compare Volusia County's original state with the current state by comparing the status of the 2007 and 2009 LAC Final Report recommendations, then documenting efficiency and effectiveness impacts.

The first prior assessment included Mosquito Control, Traffic Engineering, Road and Bridge, Solid Waste, and Water Resources and Utilities, which was conducted in 2007. The second assessment was for the Coastal Division and was conducted in 2009. At the time of the original evaluation, the Coastal Division was a member of the Aviation and Economic Resources Department. The Coastal Division was transferred to the Public Works Department in FY2014-15.

Over the past ten years, the Public Works Department has implemented many innovative practices, through a dedicated work force, experienced managers and directors, as well as the support of senior and executive leadership. They have clearly demonstrated the ability to change and are committed to operational improvement. Although, the County's population has increased 3.8 percent and associated assets 7.5 percent, the Department has realized significant savings through their efforts.

After the analysis of available data and comparing 2007 with 2016, the Department saw a reduction in its labor budget of 16% and reduction of overtime by over 40%, yet accomplished approximately 10% more work with adding less than 1% of total staff. This equates to a savings of 26%, or $2.9 million annually. In addition, the Department saw an original savings of $2 million during the initial two-year implementation, as well as a $1.9 million reduction in equipment costs during a ten-year period. This equals to an approximate saving of $32 million dollars during the ten-year period. In summary, the Department has accomplished more work with less equipment, dollars, and the same number of employees. Details of this improvement and savings can be found in the Appendix of this report.

In addition, the current processes, systems, and methods used by management were also evaluated. All Division Directors, the Public Works Director and several other key staff were interviewed. Many other employees and crews were also observed in the field or at their respective work locations. In general, the County Public Works operation is well-run and operates with accountability systems in place. However, there are some opportunities that can occur which could still save thousands of dollars and should be pursued.

This report outlines and provides a plan for how Public Works can continue to 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

further opportunities for improvement in various business process aspects (e.g. organizational structure, labor and equipment usage, technology needs, work management, effectiveness, and efficiency).

This report is a compilation of information collected during on-site and off-site efforts, through meetings and interviews, as well as through the review of the Departments' documents and data. The information is supplemented by input from LAC staff experienced in operations, engineering, management systems, and business process improvement. An analysis of Public Works' operational processes and maintenance practices was conducted to determine trends and current practices as 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.

The Volusia County Public Works Department is a dynamic organization and is constantly evolving. Information in this report is presented as historical and 'point-in-time' data, which may have changed since initial discovery. Most changes in policy, organization, and processes that occurred after the initial discovery are not consequently revisited as part of this effort due to significant impact on schedule and cost.

The following report is structured as follows:

Baseline Section – The Baseline Section includes an overall understanding of the operational processes and maintenance practices of the Public Works Department. This section outlines general information, including good practices and innovative ideas, general management directions, service areas, description of various assets and their characteristics, previous studies, and current systems and their support. This section outlines the resources, organization, and activities of the six Public Works operational divisions, as well as describing and outlining the operational processes found in each group.

Findings Section – The Findings Section provides support information and analysis of opportunities to improve operational processes and maintenance practices. This section also includes research and analysis which identifies findings that provided the basis for the evaluation and the development of key recommendations for improvement. The evaluation's fifty-two (52) findings are supported from observations, interviews, collected data, comparisons, prior knowledge, and analysis.

Recommendation Section – The Recommendation Section outlines and details LAC's recommendations. The forty (40) 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 each finding 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 recommendation(s) being implemented. All recommendations are listed at the end of this section and are detailed in Section 4 - Recommendations.

The recommendations are divided into categories with six (6) in the General category, thirteen (13) in Planning, fifteen (15) in Organizing, two (2) in Directing and four (4) in Controlling/Improving.

General Recommendations – The six (6) General Recommendations are overarching and should be applied to the overall organization. These recommendations address the increased

utilization of employee teams for assisting in the full implementation of continuous improvement opportunities and the full implementation of all recommendations from the 2007 and 2009 final reports. In addition, other examples include: obtaining APWA' s accreditation, the development of specific goals and objectives which link to vision and mission statements, and the reporting of performance measures in the County's budget documents and Comprehensive Annual Financial Report (CAFR).

The purpose of this category is to improve Public Works overall, making key recommendations that would not only provide positive change in systems and processes, but the entire organization.

Planning Recommendations – The thirteen (13) Planning Recommendations are concentrated on the improvement in efficiency and effectiveness of the planning processes. Some examples of recommendations in this category are to identify, optimize and centralize yard locations for most operational staff and Divisions, move management to one main location, utilize FDOT's latest reimbursement method for FDOT signal maintenance or discontinue with support of contract agencies, standardize reporting units and activity descriptions used in the Lucity database, benchmark and document the correlation between preventive maintenance and repair activities, and develop separate performance work plans and budgets in the Lucity database for work planned and performed by the Drainage Task Team (DTT) for Mosquito Control.

The purpose of the recommendations presented in this category is to improve specific annual and future work planning processes.

Organizing Recommendations – The fifteen (15) Organizing Recommendations are concentrated on the improvement of the organizational structures of the Public Works Department and its organizational groups. These recommendations focus on aligning the organization with mission and vision direction. Some examples of recommendations in this category are to study the adequacy and functionality of Coastal to be in the Public Works Department, institutionalize support for key systems and administrative processes through the staffing of key personnel, fully staff Coastal support for contract administration and provide annual training in contract management for key staff, utilize a Management team to re-organize and optimize the structure of the Road and Bridge Division, reduce the span of control of the Division Director, and document a plan to implement a complete succession plan for all levels with input from employee teams and post.

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. If implemented, these key recommendations will improve the organizational structure.

Directing / Scheduling Recommendations – The two (2) Directing/Scheduling Recommendations are concentrated on the improvement of the directing, assigning, and scheduling of work. The recommendations are to annually review and update routines in all groups, then document and automate them in Lucity. Also, all work requests received and work orders not scheduled in their respective Division's bi-weekly schedule, should be stored and backlogged in the Lucity database.

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. 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 / Improving Recommendations – The four (4) Controlling and Improving Recommendations are concentrated on the improvement, performance, and managing of work. Some of these recommendations include fully develop and document all work flows for each Division's work processes, then publish them and annually review with key staff. Then to use the work flows as tools to identify and eliminate elements of each process to increase efficiency without sacrificing quality or availability of information, standardize reporting procedures, account for one hundred percent of employee time in the Lucity database and use the data for work unit production, including all contract units, separating dollars by activity, establish a quality control process to ensure 100% data capture in Lucity, and continue to institutionalize the improvement process with current and future employees. Proactively communicate efficient and effective results to Executive Management, elected officials and the public. Annually compare key parameters for major activities to other agencies and utilize as a mechanism to improve.

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 project recommendations. The specifics for each are outlined in Section 4- Recommendations. 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 missed future improvement for the County.

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

General Recommendations

4.1.1 Increase the utilization of employee teams for assisting in the full implementation of continuous improvement opportunities such as development of guidelines, work plans and routines.

4.1.2 Fully implement all recommendations from the 2007 and 2009 final reports. If recommendations are no longer applicable, document rationale for not implementing.

4.1.3 Obtain an American Public Works Association (APWA) accreditation by utilizing all available technology and improvement tools with experienced leadership support.

4.1.4 Develop specific goals and objectives for all groups, including quantifiable efficiency and effective performance measures, which link to the vision and mission statements, using employee teams to provide input. Select, utilize and institutionalize a combination of efficiency and effectiveness measures for Budget and CAFR while utilizing for help in determining operational success.

4.1.5 Report the performance measures in the County's budget documents and the CAFR so they can be reviewed and approved by the associated Division Director and Public Works Director.

4.1.6 Fully implement and utilize functionalities of the Lucity system. Standardize usage of the web-based tool, while configuring functionality applicable to each Division.

Planning Recommendations

4.2.1 Identify, optimize and centralize yard locations for most operational staff and Division management and consider one main location. This would exclude employees for the Utilities, Transfer Station, Landfill, and Coastal Division.

4.2.2 Enhance and utilize Lucity's planning functionality for projecting resource needs within the budgeting process. Adjust annually, accounting for changes related to levels of service as well as population and asset changes.

4.2.3 Conduct an internal evaluation of Coastal Division staffing needs and retention with consideration for increased contract staffing for maintenance and operations.

4.2.4 Utilize FDOT's latest reimbursement method for FDOT signal maintenance or discontinue support of FDOT assets. Document all contract issues not directly covered, such as the repair of mast arm assets.

4.2.5 Negotiate with Cities on FDOT support for options of a fixed amount allocated annually rather than utilizing direct billing.

4.2.6 Standardize reporting units and activity descriptions used in the Lucity database. If modifications are desired, determine the impact of the change to benchmarking processes and the development of trends, then get approval from the Director. Fully justify and document all modifications or additions and then establish activities for unit changes.

4.2.7 Utilize employee teams to fully populate activity guidelines in the Lucity database with associated detail to be memorialized. Utilize "Effective" and "Supersedes" fields in guidelines. Have appropriate Division Director review and approve guidelines annually, using the "Approval" fields for Division Director's initials and date.

4.2.8 Consider changing work accomplishment reporting units for all maintenance and repair activities (Coastal, and others) from hourly to a production-based value or document rationale for not changing. For Water Resources and Utilities, develop a group of activities specific to the monitoring and maintenance of wastewater and water plants.

4.2.9 Correlate surveillance activities with mosquito mitigation to identify effectiveness of treatment activities undertaken. Document methodology and data, then report results to Senior and Executive management.

4.2.10 Benchmark production and cost per unit of "Sidewalk Repair" activity with private sector. Consider outsourcing sidewalk repair if cost and production is not met under similar conditions. Report results to Road and Bridge Director, as well as Senior Management.

4.2.11 Report status of compliance with preventive plans. Benchmark and document the correlation between preventive maintenance and repair activities. Annually report results to Division Director and Senior Management.

4.2.12 Evaluate adequacy of County crews completing and documenting routine programs including valve turning, hydrant maintenance, CCTV inspection and sewer line cleaning. Accurately report 100% of Water Resources and Utilities' resources used and the accomplishment for preventive maintenance activities in the Lucity database. Evaluate the effectiveness of completing these goals.

4.2.13 Develop a separate performance work plan and budget in the Lucity database for work planned and performed by the Drainage Task Team for Mosquito Control. Compare and report monthly achievement against the plan and discuss with Mosquito Control the status and any adjustments or modification requirements.

Organizing Recommendations

4.3.1 Revise spans of control to match industry guidelines, or document justification for those that are outside the benchmark range.

4.3.2 Study the adequacy and functionality of Coastal to be in the Public Works Department.

4.3.3 Institutionalize support for key systems and administrative processes through the staffing of key personnel. These staff should have the skills and ability, along with the authority, to provide guidance and administration to the Divisions and Senior Management.

4.3.4 Fully staff Coastal support for contract administration and provide annual training in contract management for key staff. Provide defined structure for contract administration with organizational assignments of responsibilities focused on contracts.

4.3.5 Consider re-organizing the structure of the Mosquito Control Division with the Operations/Activity Project Manager assigned as Deputy Director.

4.3.6 Fully staff a senior position in Traffic Engineering to manage operations, planning and studies. Simplify effort and use outside resources for timing support.

4.3.7 Standardize and document after-hours policies. Provide equal transparent processes to develop more employees with skills to respond to after-hours events or specialty needs. Consider combining some after-hours functions to reduce the number of on-call staff.

4.3.8 Work shifts should be established based on specific County work needs. A facilitated evaluation of the benefits of different shifts to the County should be conducted with employee team involvement, documenting the negative and positive benefits of each work shift with an optimal strategy.

4.3.9 Consider the usage of teleconferencing technology in both scheduling and production meetings to allow senior management and other staff to attend, observe and provide input without travel. This would ensure the opportunity for senior management involvement.

4.3.10 Establish benchmarks for overtime, worker compensation, and Family Medical Leave Act, monitoring monthly for all Divisions. Benchmark and evaluate impact to operations and have each Division report to the Public Works Director monthly and annually.

4.3.11 Document a plan to implement a complete succession plan for all staff levels with input from employee teams. Focus on ensuring skills, experience, education and training are all considered in this process, not length of service only.

4.3.12 Compare historical equipment utilization rates and monitor changes in cost allocations annually. Confirm accuracy of all cost when considerable changes occur.

4.3.13 Fully utilize and standardize the inventory control functionality of the Lucity system for tracking and controlling of all materials, eliminating the use of manual forms and ancillary inventory systems. Report key parameters annually for turnover and the cost to maintain inventory, as well as the cost of the inventory itself.

4.3.14 Establish and document a systematic procedure to assess future contracting candidates following the documented County maintenance and operations strategic objectives.

4.3.15 Public Works Administrative staff should meet with each Division Director and appropriate staff to review and obtain input in a transparent manner on the calculation and methodology used for determining their respective overhead rates in Lucity.

Directing / Scheduling Recommendations

4.4.1 Annually review and update routines in all groups then document and automate in Lucity.

4.4.2 All work requests received and work orders not scheduled in their respective Division's bi-weekly schedule should be stored and backlogged in the Lucity database. These should be used in future short-term schedules. Further, the Division Directors must be involved in the scheduling process and approve the biweekly plan.

Controlling / Improving Recommendations

4.5.1 Fully develop and document all work flows of each Division's work processes then publish and annually review with key staff. Use as a tool to identify and eliminate elements of each process to increase efficiency without sacrificing quality or availability of information.

4.5.2 Standardize reporting procedures, account for one hundred percent (100%) of employee time in the Lucity database used in work unit production and all contract units and dollars in separate activities.

4.5.3 Establish a quality control process to ensure completeness and accuracy of data capture in Lucity. Conduct an after-the-fact review of the data collected monthly, and report the status to the Director in addition to the monthly reports.

4.5.4 Continue to institutionalize the improvement process with current and future employees. Proactively communicate and publish efficiency and effectiveness results to Executive Management, elected officials and the public. Annually compare key

parameters for major activities to other agencies and utilize as a mechanism to improve. Educate and institutionalize new staff to this structure using best business practices.

SECTION 2 BASELINE – EXISTING OPERATIONS

This section outlines the baseline information that was used as a basis for comparing the operational Division's current state of maintenance and operations against the LAC Final Report recommendations of 2007 and 2009, as well as identify opportunities for further improvement. Information in this section was compiled from many sources including information obtained from both paper and electronic databases, during interviews, field observations, from work history, inventories, budgets, as well as considerable input from County staff. LAC assumed the information provided was accurate and complete, but also performed some minor validity checks during the process.

The information was supplemented with input from LAC staff that is 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.

2.1 Evaluation Process

LAC was contracted to assist in meeting the desired goals of the County by performing three steps. The first step was to evaluate and document current operations (***Baseline***). Secondly was to compare and outline opportunities for improvement (***Findings***). Lastly, the effort was 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 (Directors, Supervisors, and Administrative/Support).
- Observation of employees and crews performing work in the field.

Findings includes:

- 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 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 Public Works Association

Administrative Manual (American Public Works Association, 2008) along with other documented industry support processes (Michel, 2004; NACE, 1992).

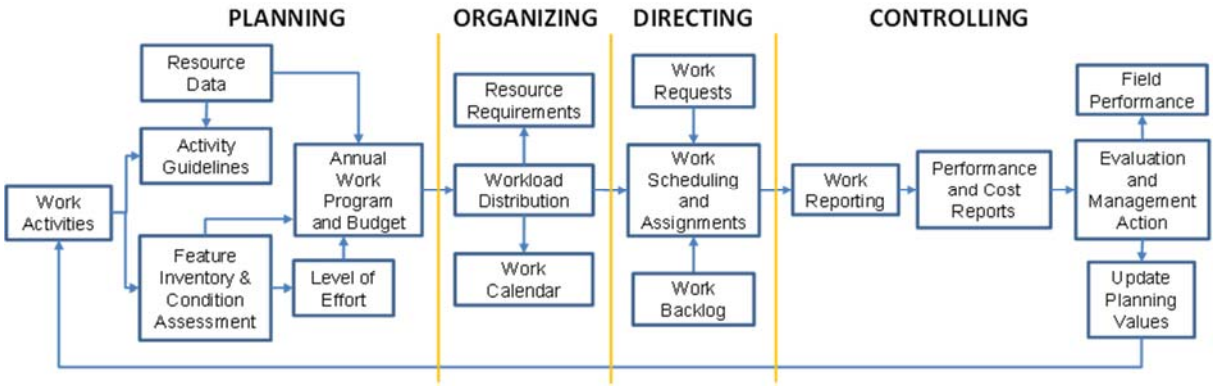
The planning effort involves determining major activities, defining guidelines, obtaining resource information, performing a condition assessment, and computing the level of effort that, in turn, allows a work program and budget to be determined. Upon completion of the process, the planning effort determines 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 as a part of the controlling phase. 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 Volusia County Public Works Department's Divisions of Coastal, Drainage Task Team, Mosquito Control, Traffic Engineering, Road and Bridge, Solid Waste, and Water Resources and Utilities. 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

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

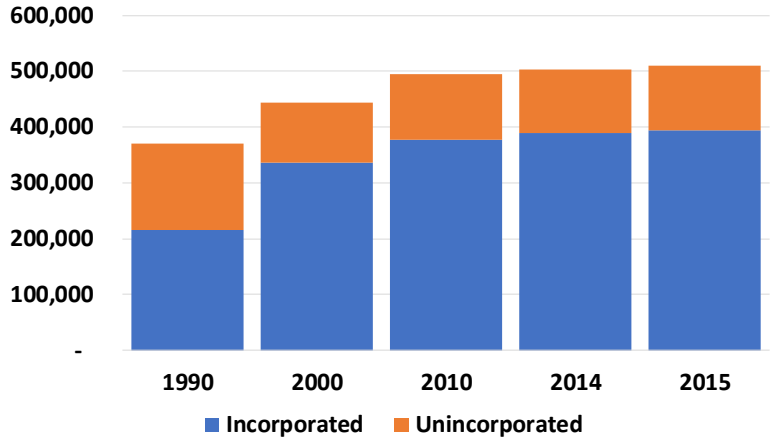
2.2 General Information

2.2.1 County General Facts

Volusia County is approximately 1,232 square miles and is located on the north-eastern coast of Florida, south of Jacksonville. In 2015 the population of the County was 510,495 with the majority concentration in two main areas, the coastal areas and the western portion of the County. Volusia County is the 11th most populous county in the state with 2.6% of the population (Florida Legislature Office of Economic and Demographic Research, 2017).

Population growth for the County from 1990-2015 along with projected population through 2020 was analyzed. From 1990 to 2015 the unincorporated population averaged approximately 122,000 and an average incorporated population of 342,600. From 2000 to 2015 the incorporated population averaged approximately 77% of the total, this is shown in Figure 2-2. Between 1990 to 2000 the population growth rate decreased by 19.6% or 1.96% annually. The national growth average of 1.3% between 1990 and 2000 and Florida's growth rate during the same period was 2.35%. From 2000 to 2015 the population growth increased 15.15% or 1% annually. The County is projected to grow an additional 5.89% between 2015 and 2020. The current growth rate in Florida is 2.6%.

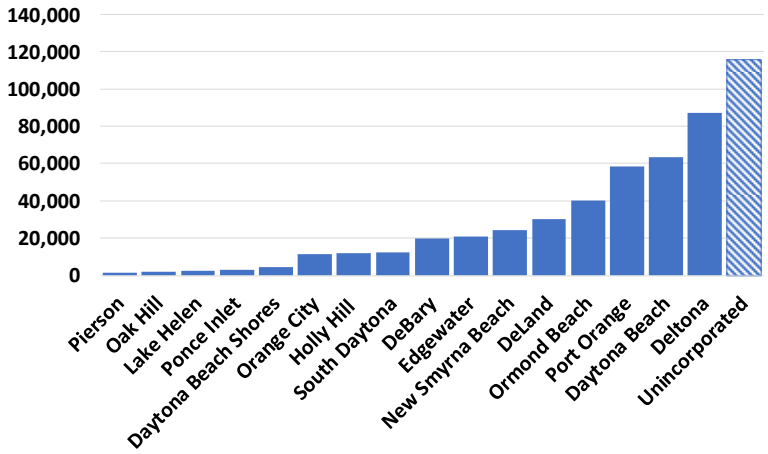
Figure 2-2
Historical Population



The east-side of the County has coastal cities such as Daytona Beach, New Smyrna Beach, Edgewater, Holly Hill and Ormond Beach. The 47 miles of coastline makes up the eastern border of the County. The west-side, which has historically been a rapid growing portion of the County, contains the largest City in the County, Deltona along with Debary and the County-seat of DeLand. The eastern and western portions of the County are divided by a lower density and largely undeveloped area, which creates a corridor that runs north to south through the middle of the County.

The largest portion of the population (394,838) reside within the sixteen incorporated Cities. The largest City within the County is the City of Deltona, which is in the south-western portion of the County with a population of 87,497 (2015). The next largest City is the City of Daytona Beach with a population of 63,534. Other Cities that are located within the County include Daytona Beach Shores, Debary, DeLand, Deltona, Edgewater, Holly Hill, Lake Helen, New Smyrna Beach, Oak Hill, Orange City, Ormond Beach, Pierson, Ponce Inlet, Port Orange, and South Daytona. Figure 2-3 outlines the general population of these Cities and unincorporated area.

Figure 2-3
Incorporated and Unincorporated Population



The County has several major tourist events throughout the year that impacts their operation requirements and generates major traffic. The impact includes both the additional population served and all maintenance work that must be performed. Some events include Speed Week, Spring Break, Bike Week, Biketoberfest and Destination Daytona. For example, a March 19, 2017 article posted to Daytona Beach News Journal Online, indicating that bike week, which occurs over a 10-day period, attracts between 250,000 to 300,000 motorcycle enthusiasts each year (Shirk & Robbins, 2017). This substantial temporary increase in population creates the need for considerable services from the County in general and specifically from Public Works, including special event planning, traffic control, debris removal, and beach patronage.

2.2.2 Public Works Department General Facts

The Public Works Department is one of four departments that reports to one of the two Deputy County Managers. The Department has seven Divisions, which include Coastal, Engineering and Construction, Mosquito Control, Road and Bridge, Solid Waste, Traffic Engineering, and Water Resources and Utilities reports to a Deputy County Manager. The Department has 451 full time equivalent (FTE) employees. The Department is responsible for 1,054 centerline miles of road, which 968 miles are paved and 86 are unpaved.

2.2.2.1 Coastal

Coastal's twenty-four (24) FTEs are responsible for the repair, maintenance and operation of 101 dune walk overs, thirty-two (32) vehicle ramps, as well as the County's ten coastal parks including the Smyrna Dunes, Lighthouse Point, and Sun Splash. Staff in this Division is also responsible for the monitoring of beach vendors along the forty-seven miles of Volusia County beaches, as well as monitoring such contracts as toll collection, landscape maintenance, ramp grading, port-o-let service, litter removal and janitorial restroom cleaning.

Coastal is staged out of several locations, including Sun Splash Park, 118 Dunlawton, Light House Point, Smyrna Dunes Park and an office adjacent to the Road and Bridge yard in New Smyrna Beach.

2.2.2.2 Mosquito Control

The twenty-nine (29) FTEs of the Mosquito Control Division are responsible for the control and reduction of mosquitoes in the County., as well as the prevention of mosquitoes on the coastline and salt marshes. The primary focus of mosquito control and reduction is upon the east side of the County with response efforts addressing other areas.

The Division is staged at the New Smyrna Beach Mosquito Control Yard, located adjacent to the New Smyrna Beach Airport. Inspectors, the lab and aerial mosquito control are staged out of this yard.

The major source of revenue for the Mosquito Control operations is a tax district from the east-side communities.

2.2.2.3 Road & Bridge and Drainage Task Team

Road and Bridge has one-hundred-fifteen full-time employees which are funded, six part-time, four leased and three intermittent. The Drainage Task Team (DTT) has fifty-five full-time employees and two leased employees. Both Divisions are led by a single Division Director. The group has two split funded position, the Division Director and an Administrative Coordinator II.

The Road & Bridge Division is responsible for maintaining 1,069 centerline miles of roadway along with associated traffic markings, roadway striping, roadway signage, ditches, shoulders, right-of-way mowing, sidewalks, culverts, drainage inlets, catch basins, retention ponds and stormwater piping. Further, this Division repairs and maintains 49 total bridges which are comprised of 46 fixed bridges, 2 bascule bridges and 1 high-rise bridge (Currently under construction). In addition, Road & Bridge Crews perform routine tree trimming and tree removal operations throughout the county as well as mowing operations in 15 cemeteries.

The Divisions are staged out of four locations, eighty-eight (88) FTEs out of the Deland Yard, ten (10) FTEs out of the Osteen Yard, twenty-five (25) FTEs out of the New Smyrna Beach Yard, and thirty-one (31) FTEs out of the Holly Hill Yard.

2.2.2.4 Solid Waste

The seventy (70) FTEs of Solid Waste are responsible for the maintenance and operations of two landfills, one active and one closed. The active landfill is located at 1990 Tomoka Farms Road, west of the City of Port Orange. The closed landfill is located at 1991 West Plymouth Ave in Deland, adjacent to one of the County's dog parks (Barkly Square Dog Park). The Tomoka landfill is approximately 3,400 acres and has Class I (household) and Class III (construction) disposal cells. The Plymouth site is approximately 129 acres and was closed February of 1996 (Florida Department of Environmental Protection, 2017). The Division also operates the County's one solid waste transfer station located at 3151 E. New York Ave., northwest of the Volusia County Fair Grounds.

2.2.2.5 Traffic Engineering

The Traffic Engineering Division has twenty-one (21) FTEs. Administration is loaded at the TCK building in downtown DeLand, and Operations is staged out of the Holly Hill Yard. Operations also has an un-staffed facility located at 300 E. New Hampshire in DeLand, which was recently damaged by Hurricane Irma and has been used for staging of equipment and materials.

The Division is responsible for all signal operations for the County and has the related engineering and planning support for traffic functions. The County maintains traffic signals for 12 cities within the County on a contract basis, as well as FDOT signals on state roadways and traffic engineering support to two other cities.

Traffic Engineering is divided into several separate functions - traffic signals, engineering, planning and administration. The County maintains and operates signals for 13 cities within the County. The City of Daytona Beach maintains their own signals. Cities maintained by County include Ormond Beach, Holly Hill, South Daytona, Daytona Beach Shores, Port Orange, Ponce Inlet, Orange City, New Smyrna Beach, Edgewater, Deltona, DeLand, Debary, and Pierson.

2.2.2.6 Water Resources & Utilities

The sixty-two FTEs of Water Resources and Utilities are responsible for the repair, maintenance and operations of 248 miles of waterline, 191 miles of sewer line, 32 miles of reclaimed waterline, 120 lift stations, nine water treatment plants, 26 water production wells, seven wastewater treatment plants, 1,501 potable water hydrants, 2,600 water valves, and 2,256 backflow devices. They are responsible for the treatment and distribution of potable water, as

well as the collection and treatment of waste water. The division also maintains ten small water treatment facilities for the Leisure Services and two leachate facilities for Solid Waste.

2.2.3 Good Practices and Innovative Ideas

The Divisions of the Public Works Department are performing many good practices and have innovative ideas already in place. While only a select group of these good practices are outlined, the Divisions have many positive effects. These have been outlined below by Division.

2.2.3.1 General

- All operational divisions use the Lucity CMMS, which is linked to GIS.
- Each operational division creates and monitors an annual performance work plan and budget.
- Accountability has been established for all groups using CMMS outputs, as well as for informational review and formalized review meetings.
- Administration has established and adheres to a continuous improvement plan with annual updates of key elements for the development of the following year's performance work plan and budget.
- The Department is recognized as a leader in the State in the use of CMMS and GIS.
- The established management and operational practices are supported by Senior and Executive Management.
- Administration annually calculates and updates avoidable overhead rates for each Division, as well as recalculates and confirms the equipment rates used in the CMMS.

2.2.3.2 Coastal

- Works closely with the Beach Safety Division, Environmental Management Division, and Facilities to maintain beach access.
- Provides oversite of all vendors along the County's beaches as well as the toll contract.
- Utilizes contracted services for restroom cleaning, beach maintenance, and the repair and maintenance of many other assets, as well as maintain public right-of-way for vehicular and pedestrian beach access.
- Internal staff handles walkovers repairs that had been responsibility of facilities.
- Utilizes alternative (leased or contracted) staff to address staffing needs.
- The use of GPS on vehicles and travel logs match Lucity data.

2.2.3.3 Mosquito Control

- They are beginning to utilize laptops in the field to record work directly into the Lucity CMMS.
- They have setup a mobile "warehouse" for truck inventory control.
- Utilizes seasonal employees and interns for work efforts.
- They have two helicopters to provide aerial surveillance and treatment.
- Helicopter pilots fly under FAA Rule 137 for Agricultural Aircraft Operations.

2.2.3.4 Road & Bridge and Drainage Task Team

- The Division utilizes routine sign inspection and plans work by geographical zone.

- They use various routines for mowing, diching cleaning for accomplishing work.
- A single Director provides leadership to both Road & Bridge and the DTT.
- They provide contract maintenance support for twelve cities through interlocal agreements.
- Provide contract support for Mosquito Control in various ditch cleaning and maintenance operations.

2.2.3.5 Solid Waste

- Scale attendants staff both the landfill and transfer station.
- Both the landfill and transfer station have designated "Mom and Pop" drop-off areas that are concrete surfaced with easy access.
- Scale system used allows optimization of loading and the ability to see what is occurring.
- The use of on-site borrowing will allow for the elimination of $1 million be set aside for purchase of dirt.
- Environment liability has been reduced by $1.6 million and satisfied Department of Environmental Protection (DEP) that were not needed.
- Has implemented working hour changes to reduce overtime.
- Increased truck loading, which increased the number of loads by truck transported to landfills from transfer stations.

2.2.3.6 Traffic Engineering

- Active preventative Maintenance programs have been established for traffic signal inspections and maintenance.
- Provides contract support for thirteen Cities related to traffic signals through interlocal agreements and two more for traffic engineering services.
- Prepares billing for contract cities to bill FDOT for signal maintenance.
- Instituted a traffic controller replacement program.
- Manages development reviews and performs traffic studies.
- Provides planning coordination with River-to-Sea Transportation Planning Organization.

2.2.3.7 Water Resources and Utilities

- Water Resources and Utilities has established and implemented a paperless work order process for field repairs and maintenance.
- The Division jointly utilizes water and sewer maintenance crews to address the repair and maintenance of assets.
- The Division utilizes a comprehensive application of supervisory control and data acquisition (SCADA) for monitoring the functions of specific assets.
- They have eliminated five package plants with the use of a force main to Ormond Beach and coordination with the City.
- They have prepared and received a $7 million grant for local advanced treatment processes, and obtained over $9 million in state and water management district grants for various alternative water supply and water quality projects.
- Decommissioned Four Towns Wastewater Treatment Plants (WWTP) in Orange City and redirected flow to the County's Southwest Regional Water Reclamation facility in Debary for advanced treatment.

2.2.4 Mission and Vision Statements

The County, Public Works Department and some of its Divisions have outlined a direction with several documented management tools. First, Volusia County has published a clear vision and mission statement. In addition, they have also developed three documented goals (Volusia County Managment and Budget Team, 2016), these include:

- Thriving Communities- Promote health and safety, provide services to meet needs of citizens, and practice stewardship of the environment.
- Economic & Financial Vitality- Achieve strong economic health tied to job growth, industry balance, and financial soundness.
- Excellence in Government- Foster partnerships to deliver exceptional services.

The County's mission and vision statement are:

> Vision statement: *To be a community rich with resources and opportunities: today and for generations to come.*
>
> Mission statement: *To provide responsive and fiscally responsible services: for the health, safety and quality of life for our citizens.*

The Public Works Department and several of its Division's mission statements are focused on both effectiveness and accomplishment. These are displayed as follows:

> Public Works Department: *"To ensure and enhance the basic quality of life, general welfare and growth of Volusia County by properly managing the county's infrastructure and related support services."*
>
> - **Coastal Division**: "Manage, maintain and improve coastal parks, beach access and coastal recreational facilities for the quality-of-life benefit of residents and visitors."
>   - **Port**: "To serve as the local sponsor for the federal channel project at Ponce de Leon Inlet and as a coastal project fund supporting public waterway and coastal facility improvements as directed by the Volusia County Council."
> - **Mosquito Control**: "To provide an Integrated Pest Management (IPM) program for mosquitoes and other arthropods of public health importance based upon a surveillance system targeting both nuisance and disease-important mosquito species. We will strive to meet the expectations of our constituents and ensure that the IPM program engenders a rigorous safety program that takes into account the needs of our personnel, our constituents and our environment. At all times, our IPM program will follow state law, regulations and standards."
> - **Road and Bridge Division**: "To maintain the county's transportation system of roads and bridges, provide a safe system, and protect the investment in that system. To develop and provide high levels of service by planning, scheduling, directing and controlling work."
> - **Solid Waste and Recycling**: "To safely dispose of all solid waste material generated in Volusia County. To develop and maintain recycling and education programs to reduce solid waste by 30 percent as mandated by the 1988 State Solid Waste Management Act."

- **Traffic Engineering**: "To enhance the quality of life for residents and visitors by providing essential services for the safe and efficient movement of both vehicle and pedestrian traffic throughout Volusia County. This is accomplished through the planning, design, implementation, operation and maintenance of traffic control devices (such as traffic signals, school zone flashers, curve warning flashers) and studies that recommend roadway signing or pavement markings in accordance with standard engineering practices. The Traffic Engineering Division assists the Florida DOT and numerous municipalities in accomplishing this same mission."
- **Water Resources and Utilities**: "…to employ best management, operations, engineering, and financial practices necessary to produce and deliver safe drinking water as well as treat and dispose wastewater within environmentally safe regulatory standards while offering competitively priced products and high-quality services for all Volusia County Water Resources and Utilities customers."

2.2.5 Prior Studies

Several studies have been conducted related to Public Works.

2.2.5.1 Public Works Operations Improvement- 2007 (Lorick Associates)

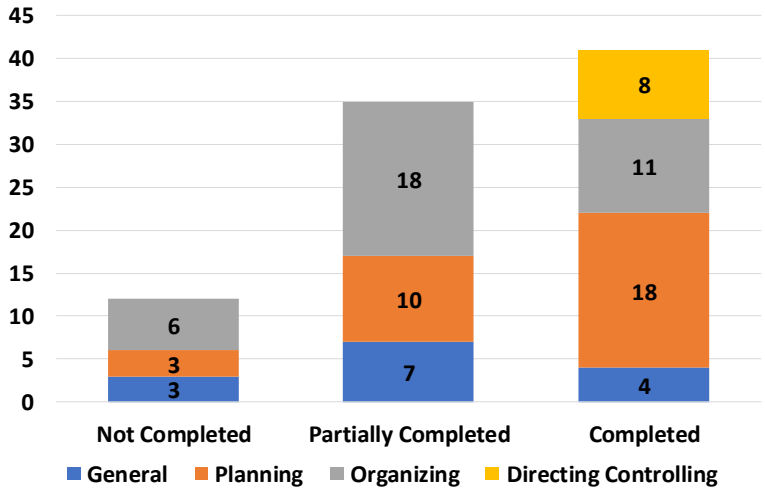
In 2007, LA Consulting, Inc. (LAC), previously known as Lorick Associates was retained by Volusia County to provide consulting services to improve operations using management and technology best practices. The original phase's final report outlined and provided an action plan of how maintenance and operations could be improved through implementing the basic management principles of planning, organizing, directing and controlling/improving. The original phase evaluated Public Works' maintenance operations investigating and documenting operations and then identified opportunities to improve in all identified aspects (e.g. organizational structure, labor and equipment usage, technology needs, asset management, work effectiveness, and work efficiency).

The final report of phase one provided ninety-one specific recommendations. The recommendations were offered into four categories: General (14), Planning (31), Organizing (35), and Directing/Controlling (11). Figure 2-4 shows the percentage of each category presented.

Figure 2-4
Public Works Recommendations from 2007 LAC Study

After the submission of the phase one final report, LAC was also retained to assist in the implementation of several key recommendations. Figure 2-5 shows the status of the original recommendations, classified by category and status of completion. Currently, 14% of the recommendations have not been implemented. Several industry presentations have been made on the successful implementation of this project and how it saved millions of dollars. Also, articles were published in magazines such as Government Engineering, Florida Engineering Society and the Public Work Magazine, and State and National APWA presentations were also made related to this success.

Figure 2-5
Public Works Recommendations Status



2.2.5.2 Coastal Parks Maintenance and Operations- 2009 (Lorick Associates)

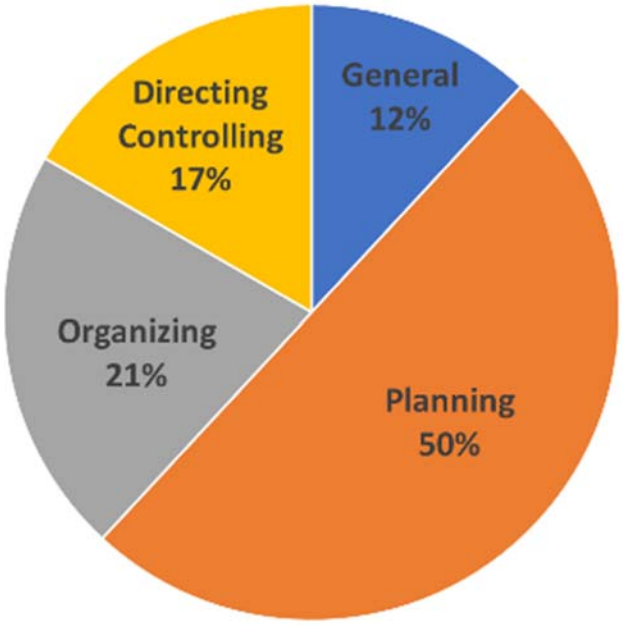
In 2009, LAC was retained by Volusia County to provide consulting services and prepare a report related to the effective and efficient management of the Coastal Division. At the time, the

Coastal Division was under the Airport & Port Services Department. The final report of the Coastal Division outlined and provided an action plan of how maintenance and operations could be improved through the implementation of the basic management principles of planning, organizing, directing and controlling/improving.

The original phase evaluated the County's Coastal Parks maintenance operations, investigated and documented operations, and identified opportunities to improve several aspects of the Division including work effectiveness and efficiency.

The final report from phase one provided forty-two specific recommendations. The recommendations were offered in four categories: General (5), Planning (21), Organizing (9), and Directing/Controlling (7). Figure 2-6 shows the percentage of each category presented.

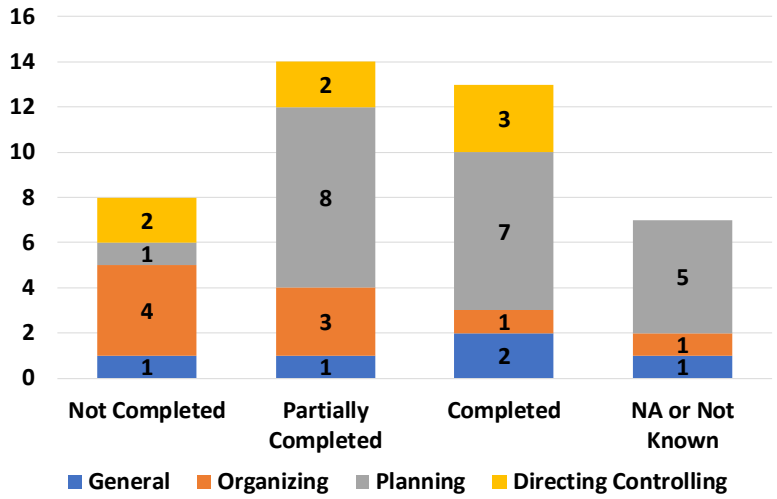
Figure 2-6
Coastal Division Recommendations



After the submission of the phase one final report, LAC was retained to assist in the implementation of several recommendations.

Figure 2-7 shows the status of the original recommendations, classified by category and status of completion. Currently, 20% of the recommendations have not been implemented. Of the original recommendations, seven are no longer applicable as the result of the reorganization of the Division.

Figure 2-7
Coastal Division Recommendations Status



2.2.6 Systems and Users

Although the Lucity CMMS is the primary system used for maintenance management, the Department and its' Divisions maintain several independent databases 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 in various Word documents and Excel spreadsheets. A list of the major databases used by the Department is below.

2.2.6.1 Department and Countywide Systems

- Lucity: Computerized Maintenance Management System (CMMS) used by all Public Works' operational Divisions for work order creation, asset management, customer service, work planning, pavement management and warehouse functions.
- CGI Advantage: Countywide system used for accounting, employee tracking, line item budgets, capital and revenue tracking.
- Kronos: Countywide timekeeping system.
- NEOGOV: Countywide system used for managing the hiring process.
- ArcGIS & ArcServer: Geographical Information System (GIS) used for mapping, establishing asset locations, mission planning, disaster recovery, and frequency analysis.

- On-Base: Countywide system used for records management and County Council Agendas.
- SharePoint: Countywide system used for CIP tracking.
- ITurn: GPS vehicle tracking system.
- AMANDA: Tracking of development permits and impact fees.

2.2.6.2 Solid Waste

- Integrity Controls: Scale house system used by Solid Waste for tracking tonnage by type and cash/credit card transactions and statements.

2.2.6.3 Mosquito Control

- Adobe Pro: Used by Mosquito Control for ultra-low volume (ULV) pesticide application planning.
- FM2: Used for ULV mission execution.
- SkyTracker: Used by Mosquito Control's aerial spray effort for larviciding and adulticiding.
- NavViewW: Used for converting contractor's aerial spray mission polygons.
- DropVision and Agdisp: Used for spray equipment calibration.
- DC-IV: Used for droplet measurements.
- MultiVapor: Used for tracking the service life of respirators.
- Thermodata: Used for the programming and reading of temperature sensors.
- Hoboware: Used for the programming and reading of weather stations.
- Serial Port Monitor: Used for troubleshooting spray equipment.
- Spidertracks: Used for helicopter tracking.

2.2.6.4 Water Resources and Utilities

- Dataflow: Supervisory control and data acquisition (SCADA) software used to monitor the performance of specific water and wastewater assets.
- VT SCADA: Software used to view the Southwest Regional Plants SCADA data.
- BillMaster: customer consumption and billing history and monthly billing system.
- Omni Touch: customer call center monitoring and quality control system.

2.2.6.5 Lucity Computerized Maintenance Management System

The Lucity Computerized Maintenance Management System (CMMS), previously known as the GBA Master Series, is the primary work management database used by the operational Divisions of the Public Works Department. The CMMS is used to track 100% of the Divisions' work efforts including labor, equipment, materials and accomplishment.

The system is also used by the County for the Daytona Beach International Airport (DBIA) maintenance, Parks and Recreation, Library Maintenance, Corrections Maintenance, and Facilities Maintenance. The system and supporting business processes were implemented internally with assistance from LA Consulting. The implementation took less than a year to complete with minimal IT support. This was indicated by IT staff as the first complete systems implementation done as scheduled.

The system was first implemented in Public Works, then later for the Coastal Division and is currently configured with seven primary Divisions: Coastal, Construction Engineering, Mosquito Control, Road Bridge and the

Drainage Task Team, Solid Waste, Traffic Engineering, and Water Resources and Utilities. Each primary Division is further divided in to sub-divisions as shown in

Figure 2-8.

Figure 2-8
Lucity Sub-Divisions

Department	Division	Sub-Division
Utilities	Public Works	Westside Wastewater
Utilities	Public Works	Utility Maintenance
Utilities	Public Works	Eastside Operations
Traffic Engineering	Public Works	Traffic Signals
Solid Waste	Public Works	Transfer Station
Solid Waste	Public Works	Tomoka Landfill
Road and Bridge	Public Works	RB Bridges and Support Services
Road and Bridge	Public Works	RB Construction
Road and Bridge	Public Works	RB Eastside NE
Road and Bridge	Public Works	RB Eastside SE
Road and Bridge	Public Works	RB Trees
Road and Bridge	Public Works	RB Traffic Signs and Markings
Road and Bridge	Public Works	RB Westside NW
Road and Bridge	Public Works	RB Westside SW
Mosquito Control	Public Works	Mosquito Control
Drainage	Public Works	Drainage
Coastal	Public Works	Coastal South Maintenance
Coastal	Public Works	Coastal Lighthouse Park
Coastal	Public Works	Coastal Smyrna Dunes Park
Coastal	Public Works	Coastal North Maintenance

Also, each primary Division also contains a category tree unique to their asset categories, as shown in Figure 2-9. For example, Coastal contains Administration, Beach Access Points, Beach Parks, and Maintenance Facilities as categories.

Figure 2-9
Lucity Category Tree

The system has a critical linkage with the County's GIS database, which allows users to view graphical representations of work order and work request statuses, perform frequency modeling and work planning. The CMMS allows managers and supervisors to plan work and estimate resource needs creating annual multi-level performance work plans and budgets based upon asset inventories, pre-established levels of service, and desires of senior leadership. Further, with these performance plans, managers and supervisors can compare planned efforts with actual cost and productivity data monthly.

The CMMS, GIS database and established work processes have played critical roles in the response to storm events through tracking, planning, and reporting work both internally and to external reporting agencies such as FEMA.

2.2.6.6 GIS and Mapping

ArcGIS and ArcServer are used by the Department to provide visual representations of information from the Lucity CMMS and related County asset locations. The database contains specific asset layers and associated features related to the infrastructure each Division is responsible for. For example, the database contains a layer of Traffic Signals with features of Signal Number, Signal Type, City, Signal Location, Billed To, Maintained By, Owner, PM Schedule, etc.

The database is heavily used by Utilities to plan and track water and sewer assets, Mosquito Control uses the database for spray mission planning, Road & Bridge and the DTT use it to track and plan routines, and Traffic Engineering uses the database for Signal PM routines.

The Public Works Department has also been recognized as leaders in the industry for their use of the Lucity CMMS and GIS databases. In 2012, the Department received ESRI's SAG Award for ArcServer Webmap and Lucity Integration. Further, several other agencies have visited the Department to explore their implementation successes and use of both databases for managing work.

2.3 Planning

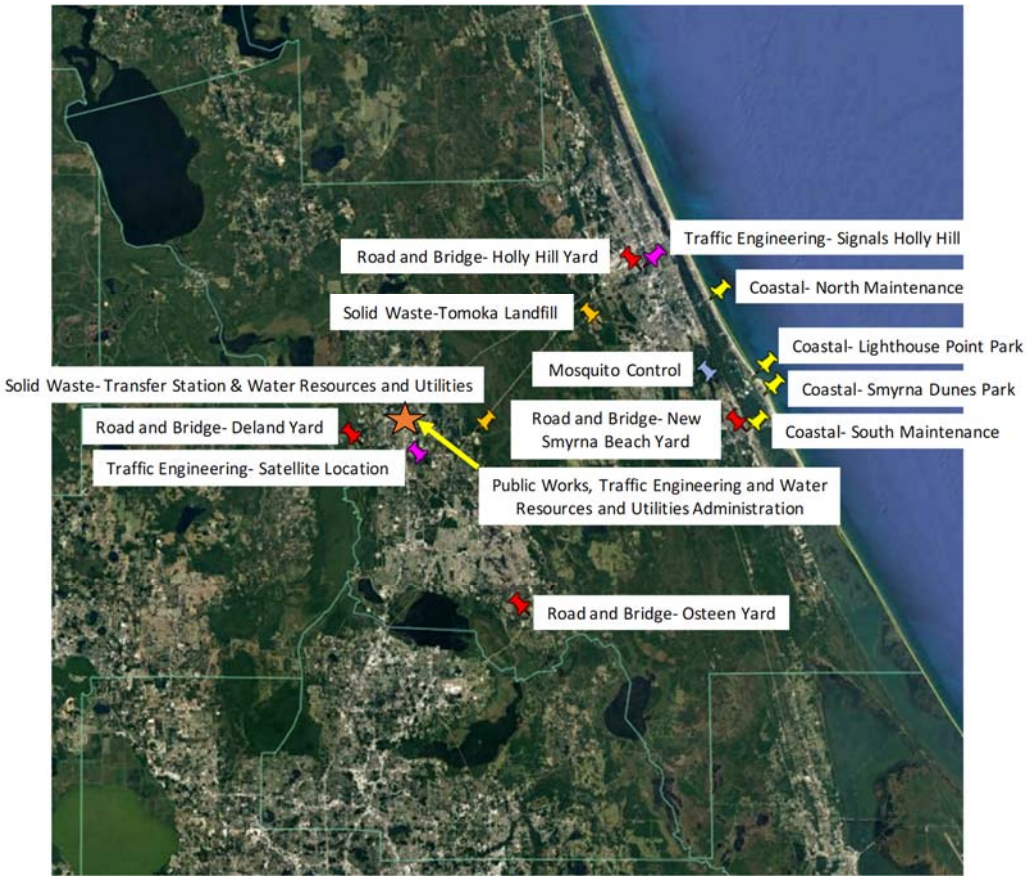
2.3.1 Work and Staging Locations

The Department maintains a copious asset infrastructure including assets related to roads, bridges, drainage, traffic signals and signs, mosquito control, coastal parks, water treatment and distribution, wastewater collection and wastewater reclamation and transmission.

The Public Works Department's Divisions have several reporting locations for staff, equipment, and materials staged throughout the County, as shown in

Figure 2-10.

Figure 2-10
Public Works Facilities



The Public Works Director and the Department's administrative group is located at the Thomas C. Kelly (TCK) County Administrative Building in DeLand noted by the orange star. Administrative staff for the Department, as well as Water Resources and Utilities are also located here. The Coastal Division has four sites including South Maintenance, located in New Smyrna Beach adjacent to the Road and Bridge New Smyrna Beach Yard, Smyrna Dunes Park, Lighthouse Point Park and North Maintenance which is located at 118 Dunlawton in Daytona Beach. The Coastal Division Director and the administrative staff stage out of the Beach Safety Building adjacent to Sun Splash Park at 515 South Atlantic Avenue in Daytona Beach. The Mosquito Control Division stages all labor, equipment and materials out of one location, adjacent to the New Smyrna Beach Airport.

Road and Bridge and the DTT are staged out of four yards including the Osteen, New Smyrna, Holly Hill, and DeLand yards. There is also a materials storage area/pit in Edgewater. The Division Director and administrative support staff stage out of the DeLand Yard. Traffic Engineering operations stage out of the maintenance yard shared with Road and Bridge's Holly Hill Yard. They also have an equipment and materials staging location located at 300 E. New Hampshire in DeLand which was recently damaged by Hurricane Irma. This location does not have employees staged out of it. Solid Waste is staged out of two sites and are their primary work locations, the County's transfer station and the Tomoka Landfill, which is located at 1990 Tomoka Farms Road west of Port Orange. The Solid Waste Division Director and administrative staff stage out of the Landfill site. The Waste Resources and Utilities Division stages out of the County's transfer station site, yet staff also report to the various waste water reclamation facilities.

2.3.2 Asset Inventories and Features

2.3.2.1 Coastal Division

The Coastal Division is responsible for the repair and maintenance of several parks and facilities unique to the County's parks system and the east central Florida area. They are also responsible for maintaining beach operations, including oversite and administration of contracts for toll collection, ramp grading, debris removal, port-o-let service and restroom cleaning. In addition, they are also involved in the oversite of capital projects such as the construction of off-beach parking lots and the reconstruction of twenty-one dune walkovers that were severely damaged during hurricane Matthew. Included is the complete rebuilding of a 5-mile elevated boardwalk with eight coastal approaches in environmentally sensitive habitat. Additionally, other projects are planned to include the construction of an additional off beach parking lot and the repair/renovation/improvement of an over fifty-year-old seawall at Bethune Beach park. At the time of this report the Division had in design plans for the repair of three existing beach vehicular approaches. Finally, they are in the design and permitting phase for an additional vehicular beach approach, amenity upgrade at two beach vehicular approaches, the conversion of a septic tank to connect with City Sewer. In-house staff are repairing/re-decking approximately fifteen walkovers. The Port District, as part of the Division, is responsible for coastal management and reefs.

Lighthouse Point Park is located north of the Ponce de Leon Inlet, and is bordered by the Atlantic Ocean on the east and the Inter-coastal waterway on the west. The Ponce Inlet Lighthouse is also adjacent to the park, yet is not within the park boundaries. The park offers such amenities as boardwalks, pavilions, restrooms and fishing. The dog-friendly park is adjacent to a major surfing area next to the jetty and is used for swimming and sun bathing. A paid admission is required to enter the park. Over the past eight years the Volusia County Beaches have seen an average of approximately 956,000 beach ramp entries with the highest total attendance in 2016 at over one million. This represents a 9.6% increase in beach patronage.

Smyrna Dunes Park, a dog-friendly park, is located on the south of the Ponce de Leon Inlet, bordered by the Atlantic Ocean on the east and the Inter-coastal waterway on the west. The park offers over five miles of boardwalks, approximately 2.5 miles of beach, swimming, fishing, pavilions, an observation platform and restrooms. The dunes are environmental homes to several endangered species including the Southeastern Beach Mouse and Gopher Tortoises, which require special protection and monitoring. The park is a jogging and walking location for many users, as well as a pet friendly park, and requires a paid admission.

The Division is also responsible for eight other coastal parks listed below:

- Frank Rendon Park
- Mary McLeod Bethune Beach Park
- Al Weeks Sr. North Shore Park
- Tom Renick Park
- Sun Splash Park
- Toronita Avenue Beach Park
- Winterhaven Park
- Van Ave. Park

The Division is also responsible for the inspection, repair and maintenance of 101 dune walk overs, thirty-two (32) vehicle ramps, three (3) beach access sidewalks, and four (4) beach access trails/paths.

2.3.2.2 Mosquito Control

The Mosquito Control Division is unique in that it lacks many of the traditional assets found in the other operational groups, while instead it is a service to control and eradicate mosquitos. The County's GIS data lists 108 larval site hand ditches, 421 larval site roadside ditches, ninety-one trap site locations, 1,658 larval polygons, 2,892 larval point sites, 24,938 catch basins, and 7,331 domestic inspection sites. These are not assets but locations and sites used to monitor, control and destroy mosquitos.

2.3.2.3 Road and Bridge, and Drainage Task Team

The Road and Bridge Division is responsible for 969 centerline miles of paved roads and an additional eighty-three 83 miles of unpaved road. Although the cemeteries are private, they provide limited maintenance to fifteen of them. They are responsible for the repair, maintenance and operations of one high-rise (under construction) and two bascule bridges crossing the intercostal waterway and 46 fixed bridges. Other assets include approximately 274 miles of sidewalks, and 5,920 inventoried signs, which include 4,483 regulatory, 310 warning, 488 school, 35 object markers, and 217 guide signs.

The DTT is responsible for the repair and maintenance of 445 miles of ditches, 305 inventoried miles of pipes, 11,816 stormwater structures, and 263 retention areas as well as supporting mosquito control for canals.

2.3.2.4 Solid Waste

Solid Waste is responsible for the maintenance and operations of two landfills, one active and one that is closed. The Tomoka landfill is approximately 3,400 acres and has Class I (household) and Class III (construction) active disposal cells. The Plymouth site is approximate 129 acres and closed February of 1996 (Florida Department of Environmental Protection, 2017). The Division also operates the County's one solid waste transfer station located at 3151 E. New York Ave. They are also responsible for the repair, maintenance and operations of eighty-nine monitoring wells and 160 gas wells.

2.3.2.5 Traffic Engineering

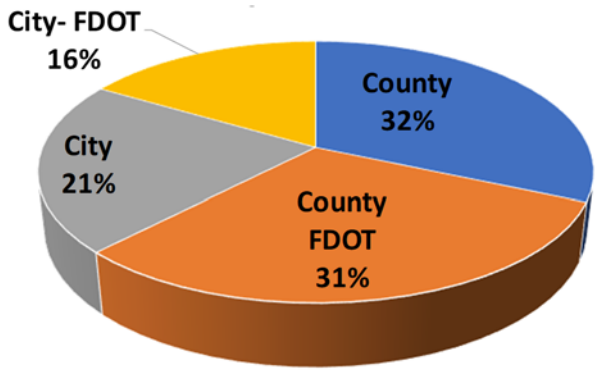
The Division is responsible for all traffic control device operations for the County and has the related engineering and planning support for traffic functions. They maintain and operate 339 signalized intersections, 297 signals with pedestrian crossing, eight emergency signals, four blinking signs, fifty flashers, seventy-three school flashers, fifty-five solar school flashers, fifty-two miles of fiber-optic line, eight wireless networks, fifty-five flashing beacons and fifty-four flashing school beacons/signs. The County maintains traffic signals for thirteen (13) of the sixteen (16) cities within the County on a contract basis as well as FDOT signals on state roadways.

The Division maintains four types of signals. First, there are County-owned signals maintained and funded using cost and material via gas tax. Second, FDOT signals are maintained and funded through an agreement rate based on the number of approaches. Third, City support for

FDOT signals are maintained and funded using the cost and material of the effort (cities are reimbursed by FDOT). Finally, City-owned signals which the County maintains and is reimbursed using cost and material.

FDOT does not perform maintenance of their traffic signals, yet instead contracts with the County, and cities to do their work. There are two methods of FDOT reimbursements. The County rates are based on the number of approaches for FDOT signals, and FDOT signals, which are in incorporated cities, and are billed based upon the rate per asset component. Figure 2-11 below shows the percentage of the four types of signalized intersections the County maintains.

Figure 2-11
Four Type of Signalized Intersections



Historically, local governments have maintained FDOT signals and have been reimbursed via agreements at a fixed rate per signal, based on approaches owned by FDOT. As the result of a recent update, rates have been increased including annual reimbursement adjustments based on the number of assets at an intersection such as signals, railroad crossings, uninterruptable power supplies, school crossings, etc.

The County has chosen to keep a prior agreement based on approaches, where the cities within the County have chosen to use the new methods of reimbursement even though the County maintains the signals. The cities bill FDOT at set rates and the County bills the cities for work performed, with the cities retaining the difference.

Figure 2-12 shows the number and category of traffic assets that are maintenance by Traffic Engineering, including County owned assets, and those which the County does the maintenance and repairs for in the eleven cities on the interlocal agreement.

Figure 2-12
Traffic Assets

Billed to	Emergency Signal	Flasher	Rapid Flash Beacon	School Flasher	School Flasher Overhead	Signal/Signal with PED
Volusia County	0	10	4	6	11	103
Ormond Beach	1	4	0	0	0	19
Pierson	0	2	0	0	0	1
New Smyrna Beach	0	0	0	0	0	10
Port Orange	0	0	0	0	0	10
South Daytona	0	0	0	0	0	3
Orange City	0	0	0	0	0	4
Holly Hill	0	0	0	0	0	8
Edgewater	0	0	0	0	0	2
Deland	0	0	0	0	0	19
Debary	0	0	0	0	0	3
Daytona Beach Shores	0	0	4	0	0	3

2.3.2.6 Water Resources & Utilities

Water Resources & Utilities is responsible for the repair, maintenance and operation of 248 miles of waterline, 191 miles of sewer line, 32 miles of reclaimed waterline, 120 lift stations, 9 water treatment plants, 26 water production wells, seven wastewater treatment plants, 1,501 potable water hydrants, 2,600 water valves, and 2,256 backflow devices. They are also responsible for the treatment and distribution of potable water, production and distribution of reclaimed water, as well as the collection and treatment of waste water.

2.3.3 Work Activities

Work activities are reported in the Lucity database for all labor hours. Some activities for indirect or overhead activities were excluded from the evaluation in this section. Non-overhead activities that were excluded include supervision, meetings, training, planning, contract coordination, administration, GBA computer work, data request, contractor management, CADD to GIS conversion, random testing, warehouse, and field supervision.

2.3.3.1 Coastal Division

The Coastal Division has an established list of activities that are tracked to work orders and entered into the Lucity system. The Lucity system keeps track of work completion, hours of labor and equipment use, as well as materials used. These are tracked to specific assets by location and activity. The time recorded is the entire time it takes to perform the activity including both preparation and travel time. The primary focus of the Division's effort is a combination of maintenance, operations, customer service and contract administration. Below is a list of activities the Division uses to track work and accomplishment:

- Contractor Management
- Invasive Plant Maintenance
- Buildings Maintenance
- Customer Service
- Landscape Maintenance
- Restroom Cleaning
- Restroom Lock/Unlock
- Wall Fixture Install/Repair
- Shower Maint/Repair
- Irrigation Maint/Repair

- Vegetation Trimming
- Sand Removal
- Painting
- Pressure Cleaning
- Park Maintenance of Traffic (MOT)
- Coastal Sign Install/Replace
- Sign Install/Replace
- Coastal Asset Inspection
- Dog Leash Compliance
- Turtle Patrol
- Wildlife Feeding Compliance
- Park Mowing
- Irrigation Inspection
- Hardscape Maintenance
- Playground Inspection
- Playground Maint/Repair
- Playground Maint/Service
- Trash Collection
- Walkover/Boardwalk Repair
- Routine Access Maintenance
- Walkover Renovation
- Gate Maint/Repair
- Toll Booth Maint/Repair
- Pavilion Rental Management

Using data provided from the Lucity database, an analysis was performed on activities performed by the Coastal Division overall and by sub-group, for hours used by activity.

There was a total of 30,103 hours reported in FY16, with 26,616 hours reported in non-overhead activities. Of the non-overhead hours activities reported for the Coastal Division, seven activities made up 79% of the total. The highest percentage of maintenance activities were Hardscape Maintenance at 8,435 hours or 32%, Routine Access Maintenance at 4,921 hours or 18%, Walkover Renovation at 2,519 hours or 9%, Restroom Cleaning at 2,147 hours or 8%, Dog Leash Compliance at 1,016 hours or 4%, Routine Boardwalk Maintenance at 998 hours or 4%, and Landscape Maintenance at 932 hours or 4%.

Figure 2-13 shows the cumulative hours per activity, the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-13
Coastal Division
Total Hours Reporting for FY16

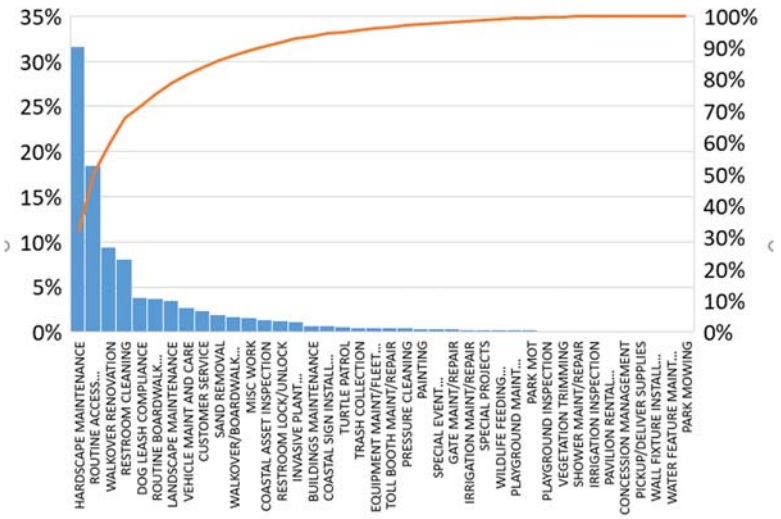
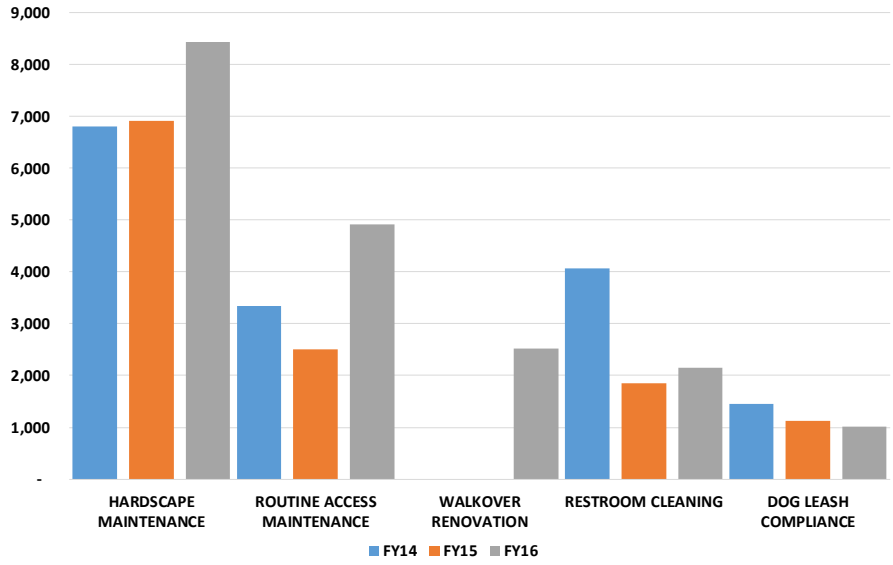


Figure 2-14 shows a three-year history of hours for the top five activities overall. Data shows that Hardscape Maintenance, Routine Access Maintenance, and Restroom Cleaning all increased, with Dog Leash Compliance remaining consistent between FY15 through FY16.

Figure 2-14
Coastal Division
Three Year Top Activities



Of the non-overhead hours activities reported for Lighthouse Point Park, five activities made up 80% of the total for this location. The highest percentage of maintenance activities were Hardscape Maintenance at 2,570 hours or 43%, Restroom Cleaning at 1,053 hours or 18%, Sand Removal at 447 or 7%, Routine Boardwalk Maintenance at 384 hours or 6%, and Dog Leash Compliance at 351 hours or 6%. Figure 2-15 shows the cumulative hours per activity for this location with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-15
Lighthouse Point Park
Total Hours Reporting for FY16

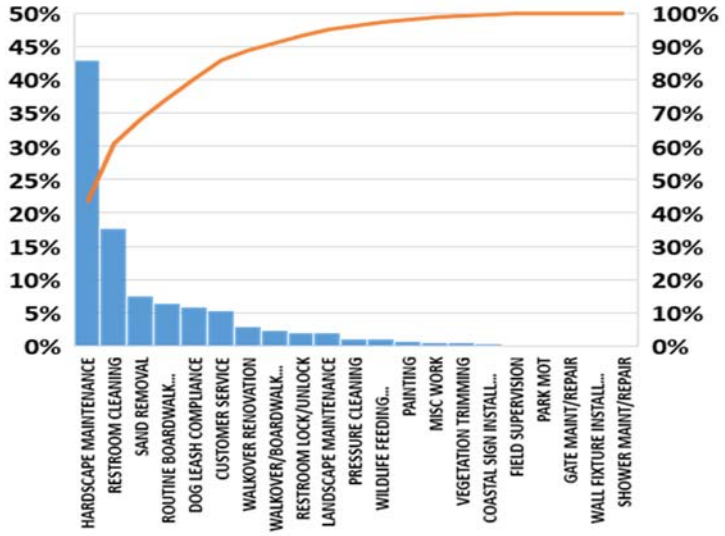
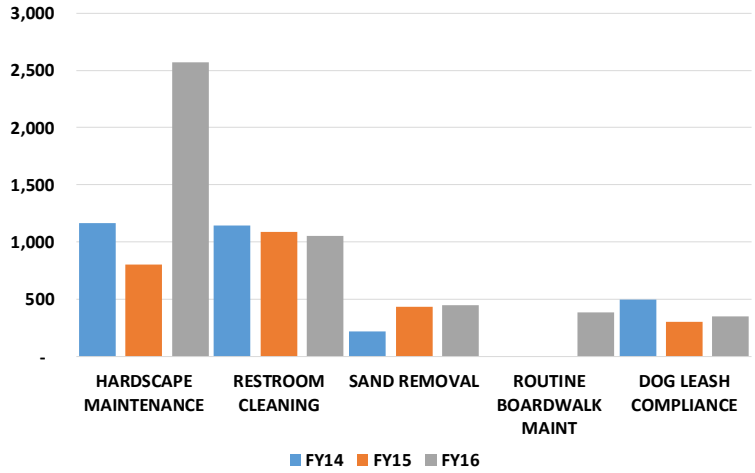


Figure 2-16 shows a three-year history of hours for the top five activities for Lighthouse Point Park. Data shows a significant increase in Hardscape Maintenance with the remaining activities remaining consistent between FY15 through FY16.

Figure 2-16
Lighthouse Park
Three Year Top Activities



Of the non-overhead hours activities reported for Coastal Maintenance, six activities made up 78% of the total. The highest percentage of maintenance activities were Hardscape Maintenance at 161 hours or 30%, Toll Booth Maintenance/Repair at 80 or 15%, Routine Access Maintenance at 67 hours or 13%, Restroom Cleaning at 48 hours or 9%, Trash Collection at 35 hours or 4%, Contractor Management at 27 hours or 5%. Figure 2-17 shows the cumulative hours per activity for this group with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-17
Coastal Maintenance
Total Hours Reporting for FY16

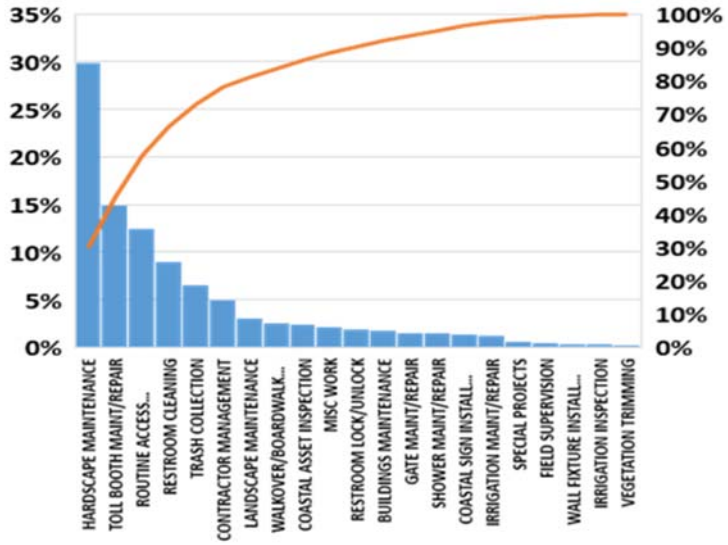


Figure 2-18 shows a three-year history of hours for Coastal Maintenance's top five activities. Data shows a significant decrease in hours reported in each of the five top activities between FY15 through FY16.

Figure 2-18
Coastal Maintenance
Three Year Top Activities

Of the non-overhead hours activities reported for Coastal North Maintenance, three activities made up 89% of the total. The highest percentage of maintenance activities were Routine Access Maintenance at 3,180 hours or 35%, Hardscape Maintenance at 2,881 hours or 32%, and Walkover Renovation at 2,002 or 22%. Figure 2-19 shows the cumulative hours per activity for this group, with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-19
Coastal North Maintenance
Total Hours Reporting for FY16

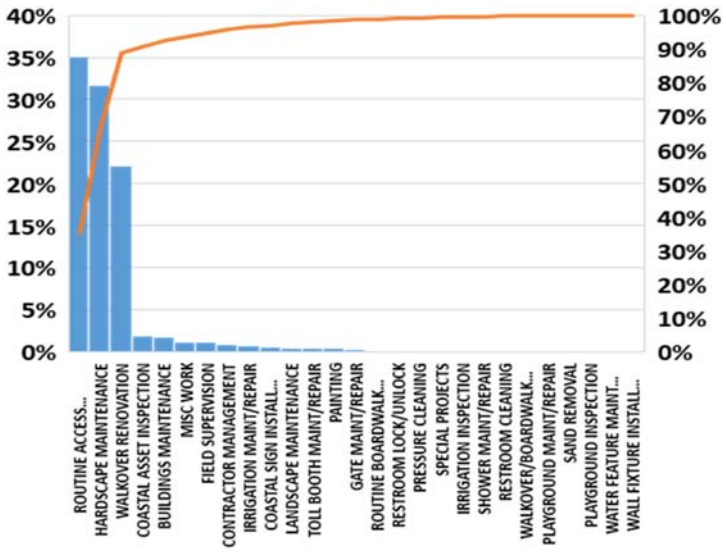
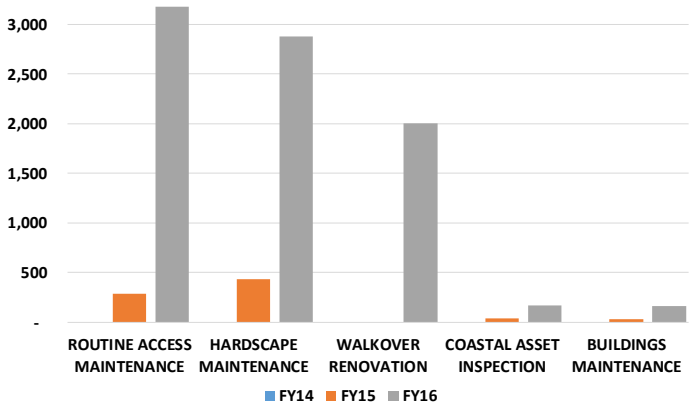


Figure 2-20 shows a three-year history of hours for Coastal North Maintenance's top five activities. Data shows a significant increase in hours reported in each of these activities between FY15 through FY16. Historical data is missing in the database before FY16, this indicates a split in work reporting for North and South Maintenance starting in FY16.

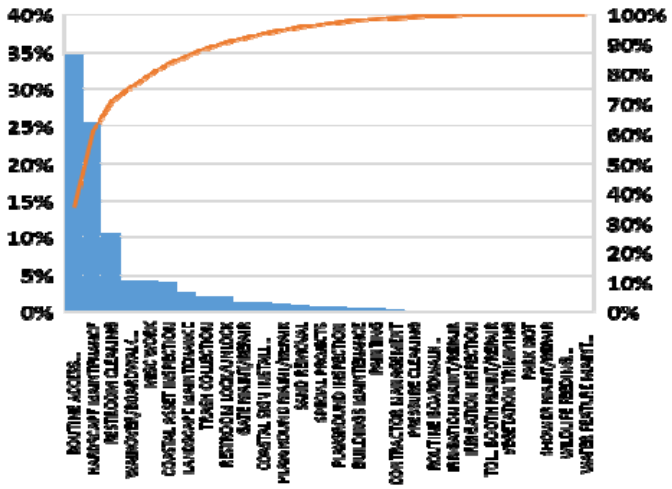
Figure 2-20
Coastal North Maintenance
Three Year Top Activities



Of the non-overhead hours activities reported for Coastal South Maintenance, five activities made up 80% of the total. The highest percentage of maintenance activities were Routine Access Maintenance at 1675 hours or 35%, Hardscape Maintenance at 1,233 hours or 26%, Restroom Cleaning at 510 hours or 11%, Walkover/Boardwalk Repair at 207 or 4%, and Miscellaneous Work at 202 or 4%. Figure 2-21 shows the cumulative hours per activity for this group, with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Historical data is missing in the database before FY16, this indicates a split in work reporting for North and South Maintenance starting in FY16.

Figure 2-21
Coastal South Maintenance
Total Hours Reporting for FY16



Of the non-overhead hours for activities reported at Smyrna Dunes Park, six activities made up 78% of the total for this location. The highest percentage of maintenance activities were Hardscape Maintenance at 1,591 hours or 29%, Dog Leash Compliance at 666 hours or 12%, Landscape Maintenance at 627 hours or 11%, Routine Boardwalk Maintenance at 583 hours or 11%, Restroom Cleaning at 527 hours or 9%, and Walkover Renovation at 338 or 6%. Figure 2-22 shows the cumulative hours per activity for this location, with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-22
Smyrna Dunes Park
Total Hours Reporting for FY16

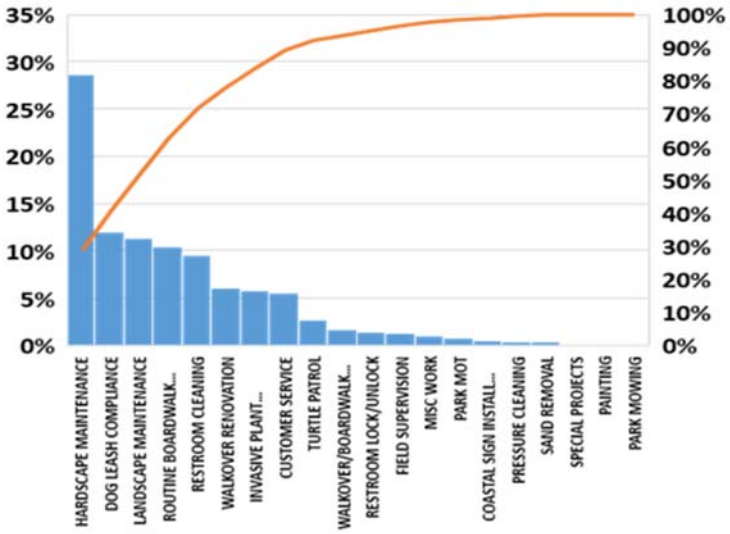
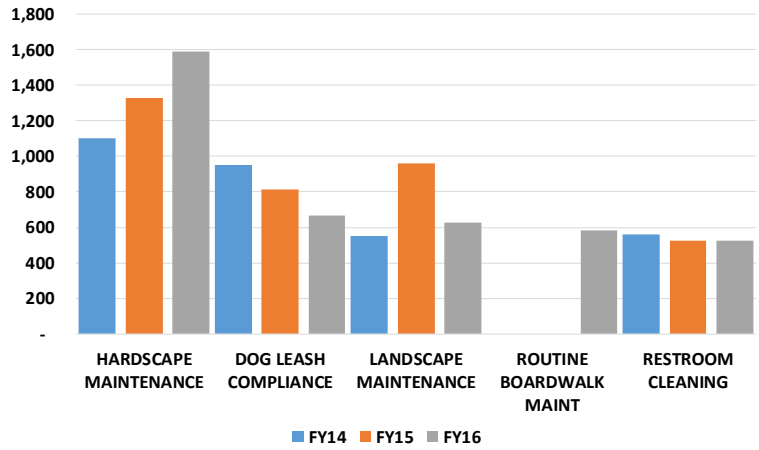


Figure 2-23 shows a three-year history of hours for the top five activities for Smyrna Dunes Park. The data shows that this activity effort varies by year.

Figure 2-23
Smyrna Dunes Park
Three Year Top Activities



2.3.3.2 Mosquito Control Division

The Mosquito Control Division also has established a list of activities that are tracked to work orders and entered into the Lucity system. The Lucity system keeps track of work completion, hours of labor and equipment, as well as materials used. These are tracked primarily to a location or zone. The time recorded is the entire time it takes to perform the activity including both preparation and travel time. The primary focus of the Division's effort is a combination of inspection, operations, data collection/analysis, customer service and contract administration. Below is an example of activities Mosquito Control uses to track work and accomplishment:

- Ground Mosquito Field Inspection
- Mosquito Trapping
- Landing Rates
- Lab Work – Mosquito/Sentinel Chicken
- Ground Larviciding
- Hand Adulticiding
- Truck Adulticiding
- Barrier Spraying
- MC Research and Development
- Marsh Boat Mosquito Inspection
- Catch Basin Larviciding
- Minnow Relocation
- MC Service Request
- Mosquito Identification/Documentation
- Tire Pickup/Disposal
- Helicopter Larviciding
- Helicopter Adulticiding
- Helicopter Support for Others
- Helicopter Mosquito Inspection
- Helicopter Maintenance
- Aerial Contract Work
- Ditch Clean – Hand
- Hand Clean Drainage Box
- Chemical Ditch Maintenance
- Mosquito Control Education and Outreach
- AC/Domestic Inspection
- Drainage Structure Inspection

Data can be analyzed based on trap count by species as well as based on who collected the samples. Figure 2-24 shows the trap counts by species, and Figure 2-25 show the samples collected by thirteen employees.

Figure 2-24
2017 Trap Counts by Species by Date

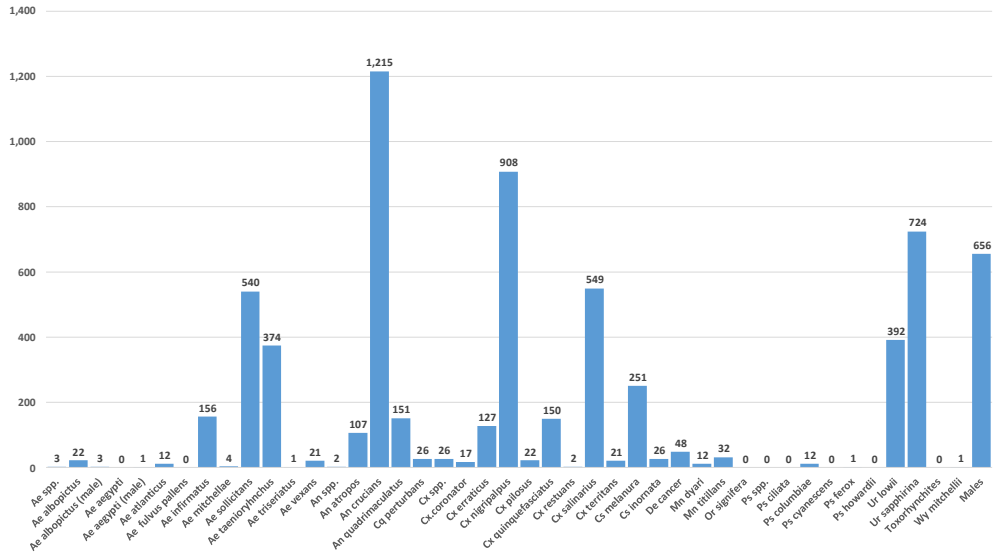
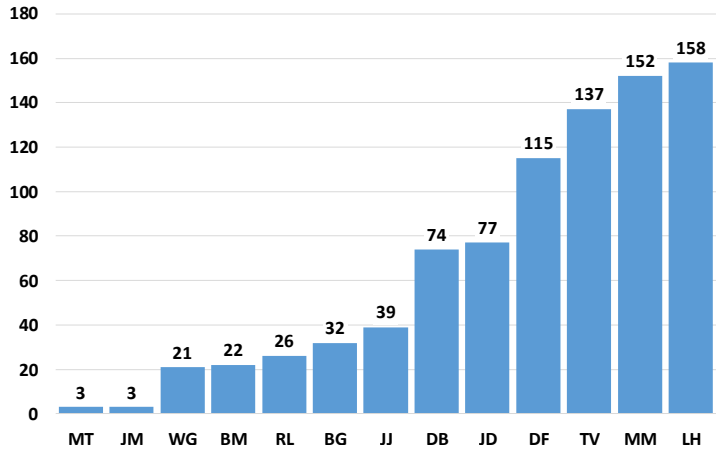


Figure 2-25
2017 Larval Collection by Staff to Date



Using data provided from the Lucity database, an analysis was performed on the activities performed by the Mosquito Control Division.

There was a total of 34,433 hours reported in FY16, with 22,846 hours reported in non-overhead activities. Of the non-overhead hours activities reported, ten activities made up 80% of the total. The highest percentage of maintenance activities were Mosquito Trapping at 4,266 hours or 19%, Ground Mosquito Field Inspection at 3,894 hours or 17%, Truck Adulticiding at 2,344 hours or 10%, AC / Domestic Inspection at 1,311 hours or 6%, MC Research and Development at 1,285 hours or 6%, Sentinel Chicken Arbovirus Surveillance at 1,266 hours or 6%, Mosquito Identification/Documentation at 1,167 hours or 5%, Helicopter Maintenance at 1,023 or 4%, MC Service Request at 988 or 4%, and Ditch Clean - Hand at 791 hours or 3%. Figure 2-26 shows the cumulative hours per activity, with the left vertical axis showing the individual percentage, and the right axis showing the cumulative total.

Figure 2-26
Mosquito Control – Total Hours Reporting for FY16

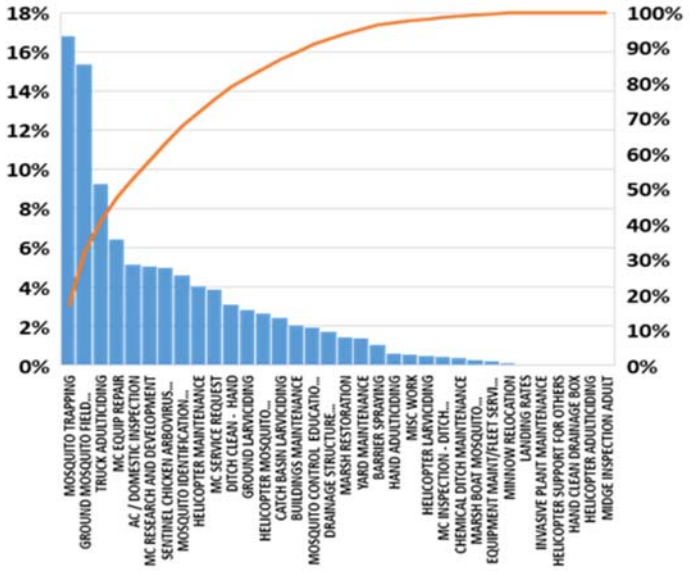
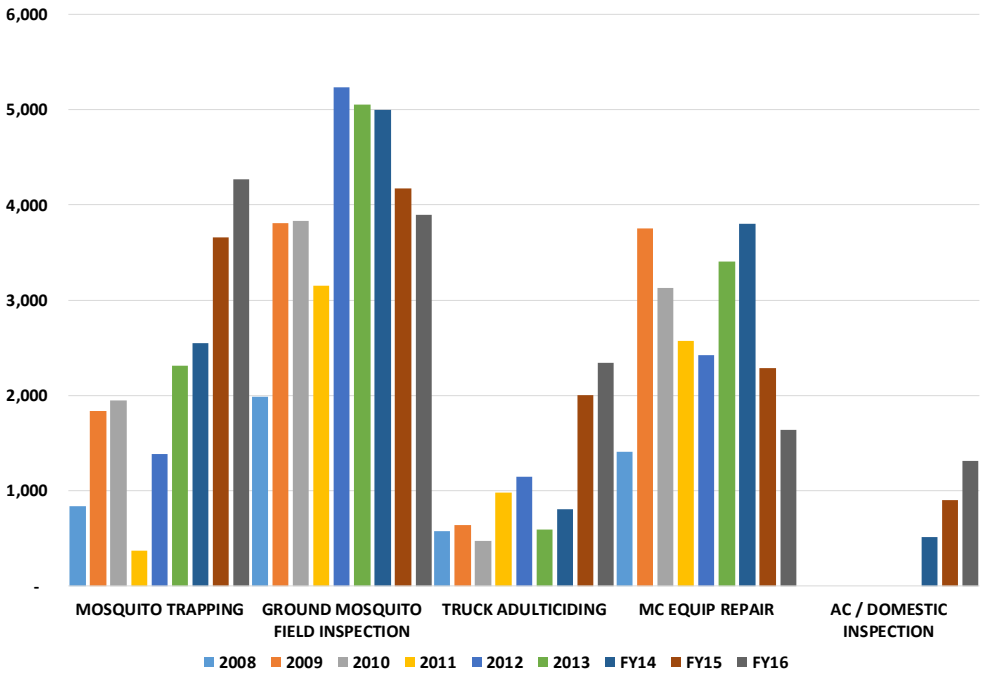


Figure 2-27 shows the nine-year history of hours for the top five activities for the Division.

Figure 2-27
Mosquito Control
Nine Year Top Activities



2.3.3.3 Road and Bridge, and Drainage Task Team (DTT)

The Road and Bridge and DTT have established lists of activities that are tracked to work orders and entered into the Lucity system. The Lucity system keeps track of work completion, hours of labor and equipment, as well as materials used. This information is tracked to specific assets by

location and activity. The time recorded is the entire time it takes to perform the activity including both preparation and travel time. Both groups' primary effort focuses on a combination of maintenance, operations and inspection. Below is an example of the activities the Division uses to track work and accomplishment:

Road and Bridge

- Retention Area Maintenance
- Road R/W Spraying
- Hand Clean Drainage Box
- Pit Operation
- Buildings Maintenance
- Asphalt Patch-mechanical
- Curb Install/Replace
- Guardrail Installation and Repair
- Pothole Cold Patch
- Sidewalk/Bikepath Maintenance
- Hauling Materials
- Dirt Rd. Rebuild/Spot Repair
- Shoulder Repair-hand
- Litter Removal
- Shoulder Repair-mech
- Shop Welding
- Road & Bridge Asset Inspection
- Flat Mowing
- Slope Mowing
- Cemetery Maintenance
- Tree Work – Remove
- Replacing Driveway Pipe
- Sidewalk Repair
- Operation of Bascule Bridges
- Bridge Repair Mechanical
- Bridge Painting
- Bridge Sweeping/Cleaning
- Bridge Repair Honeycombing
- Bridge Joints Clean/Seal
- Bridge Repair/Coat Exposed Steel
- Bridge Concrete Retaining Wall Repair
- Bridge Repair Structural
- Sign Installation/Replace
- Sign Fabrication - Special/Others
- Lane Striping
- Cold Plastic Legends
- Sign Zone Inspections
- Thermo Plastic Legends/Arrows
- Row Spraying – Structure
- Ditch Clean – Hand
- Brush Removal
- Burning Operations
- Construction-paving Dirt Roads
- Asphalt Overlay-paver
- Dirt Road Base Prep
- Handrail Installation and Repair
- Pothole Patching
- Equipment Hauling
- Clean Curb and Gutter – Hand
- Dirt Road Grading
- Swale Maintenance
- Swales Construction
- Field Welding
- Shoulder Maintenance – Mechanical
- Brush Cutting-hand
- Premowing/Trim/Litter Removal
- Zero Turn Mowing
- Tree Trim
- Stump Grinding
- Driveway Repair
- Sidewalk Grinding
- Bridge Routine Mtce PM
- Bridge Repair Electrical
- Bridge Spalling Repair
- Bridge Erosion/Undermining Repair
- Bridge Repair Cracks
- Bridge Reflectors Replace/Install
- Bridge Steel Deck/Open Grid Repair
- Bridge Fender Repair
- Bridge Fixed PM
- Sign Maintenance
- Sign Fabrications – Standard
- Cold Plastic Bars & Crosswalk
- Sign MOT
- Thermo Plastic Stop Bars/Crosswalk
- Thermo Lane Striping

- Raised Pavement Markers
- Pavement Marking Removal
- Painted Legends & Arrows
- Street Lighting Districts
- MOT Design and Review
- Small Engine Repairs
- Quick Kurb/Delineator Installation
- Painted Stop Bars, Crosswalks & Cross Hatching
- Hand Painted Lane Striping
- Street Lighting Special
- Hazard Identification/Notification

Drainage Task Team

- Ditch Inspection/Survey
- Aquatics Spraying
- Row Spraying – Structure
- Roadside Ditch Spraying
- Roadside Ditch Clean/Mechanical
- Mechanical Clean Drainage Box
- Pit Operation
- Ditch Cleaning/Mechanical – Haul
- Row Mowing Flat
- Asphalt Patch-mechanical
- Install Major Stormwater
- Hauling Materials Ton
- Install Drainage Pipe
- Swale Maintenance
- Shoulder Repair-mech
- Road & Bridge Asset Inspection
- Zero Turn Mowing
- Retention Pond Restoration
- Stormwater CCTV
- Retention Area Repair
- Retention Area Maintenance
- Row Spraying
- Retention Area Spraying
- Ditch Clean – Hand
- Retention Area Construction
- Hand Clean Drainage Box
- Ditch Clean/Mechanical No Haul
- Chemical Ditch Maintenance
- Row Mowing Slope
- Install Catch Basin / Inlet
- Equipment Hauling
- Clean Curb & Gutter Mechanical
- Repair Drainage Systems
- Swales Construction
- Mechanical Clean Drainage Pipe
- Install Exfiltration Trench
- Replacing Driveway Pipe
- Ditch Restoration/ Erosion Repair
- Drainage Structure Inspection

A total of 238,918 were hours reported in FY16, with 219,577 hours reported in non-overhead activities. Of the non-overhead hours activities reported, twenty-three activities made up 80% of the total. The top ten highest percentage of maintenance activities were Operation of Bascule Bridges at 23,562 hours or 11%, Tree Trim at 22,756 hours or 10%, PreMowing/Trim/Litter Removal at 21,000 hours or 10%, Sidewalk Repair at 14,292 hours or 7%, Tree Work - Removal at 10,321 hours or 5%, Flat Mowing at 10,074 hours or 5%, Asphalt Overlay - Paver at 8,972 hours or 4%, Sidewalk/Bikepath Maintenance at 8,338 hours or 4%, Asphalt Patch – Mechanical at 7,385 or 3%, and Shoulder Repair – Mechanical at 6,332 or 3%.

Figure 2-28 depicts the cumulative hours per activity with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-28
Road and Bridge
Total Hours Reporting for FY16

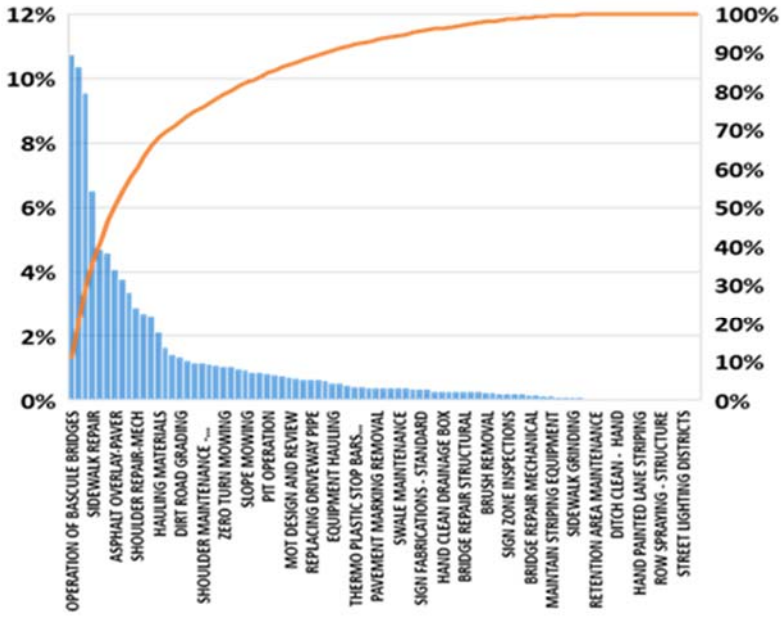
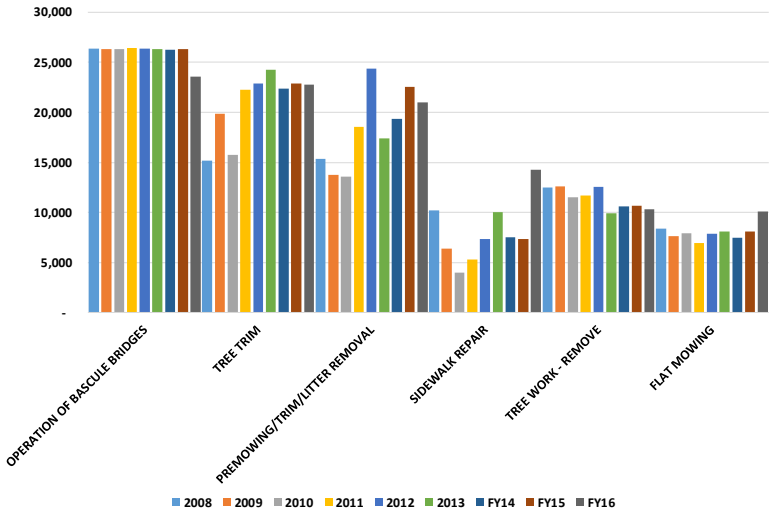


Figure 2-29 shows the nine-year history of hours for the top six activities for the Road and Bridge Division. The data shows that the hours charged to activities have remained consistent.

Figure 2-29
Road and Bridge
Nine Year Top Activities



Of the non-overhead hours for activities reported in Bridge & Support Services, four activities made up 81% of the total for this group. The highest percentage of maintenance activities were Operation of Bascule Bridges at 23,562 hours or 66%, Shop Weld at 2,479 hours or 7%, Building Maintenance at 1,447 hours or 4%, and Small Engine Repair at 1,406 hours or 4%. Figure 2-30 shows the cumulative hours per activity for this group.

Figure 2-30
Bridge & Support Services
Total Hours Reported for FY16

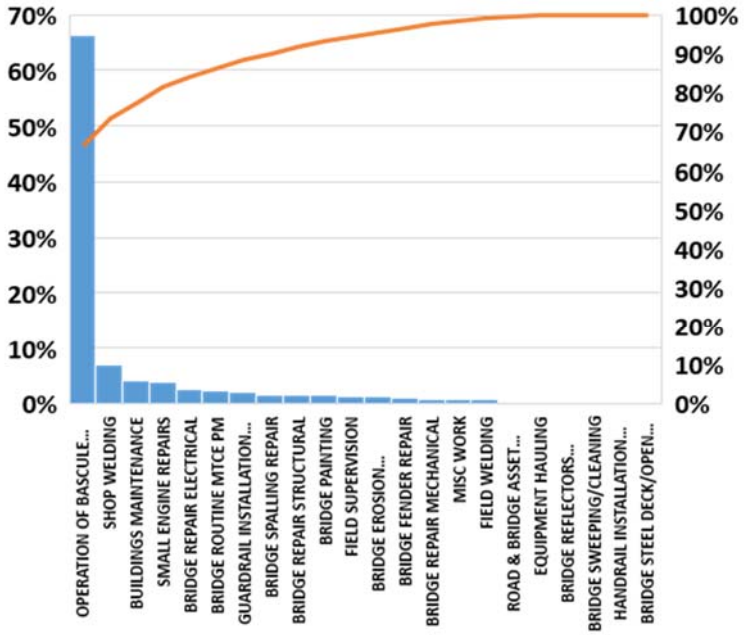
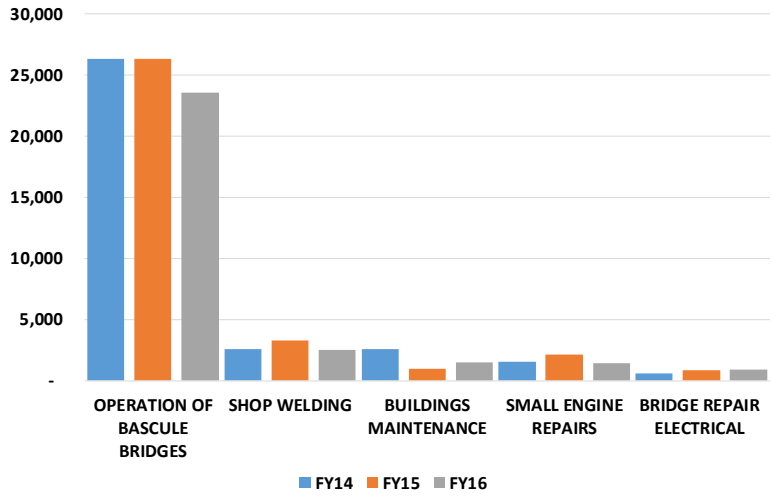


Figure 2-31 shows the three-year history of hours for the top five activities for Bridge & Support Services. The data shows that the hours charged to activities have remained consistent during the past three years.

Figure 2-31
Bridge & Support Services
Three Year Top Activities



Of the non-overhead hours for activities reported in Construction, two activities made up 74% of the total for this group. The highest percentage of maintenance activities were Asphalt Overlay-Paver at 8,972 hours or 59% and Dirt Road Base Prep at 2,404 hours or 16%. Figure 2-32 outlines the cumulative hours per activity for this group.

Figure 2-32
Construction
Total Hours Reporting for FY16

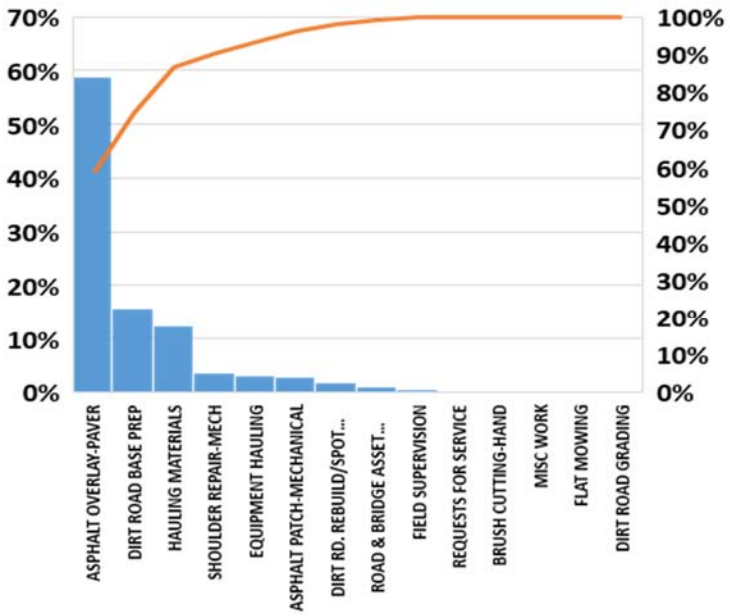
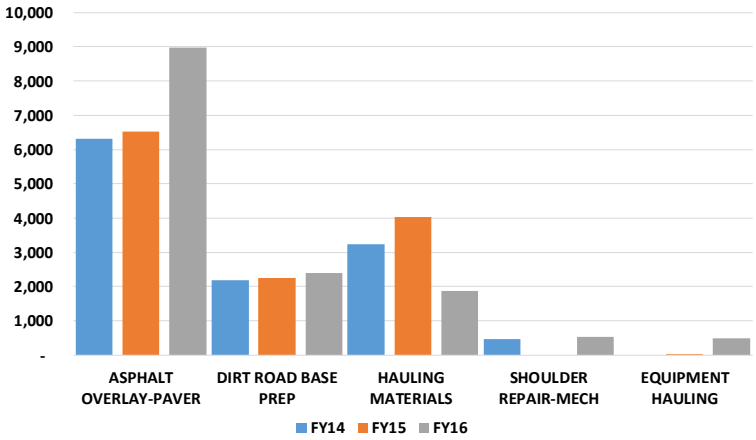


Figure 2-33 shows the three-year history of hours for the top five activities for Road and Bridge Construction. The data further shows that the activity of Overlay is the largest activity and has increased from FY15 and FY16.

Figure 2-33
Construction
Three Year Top Activities



Of the non-overhead hours for activities reported in Road and Bridge's North East (NE) group, ten activities made up 80% of the total for this group. The highest percentage of maintenance activities were Premowing/Trim/Litter Removal at 3,662 hours or 14%, Flat Mowing at 2,975 hours or 11%, Brush Cutting-Hand at 2,728 or 10%, Sidewalk/Bikepath Maintenance at 2,693 or 10%, and Shoulder Repair-Mech at 1,980 or 7%. The cumulative hours per activity for NE group are shown in Figure 2-34.

Figure 2-34
NE Group
Total Hours Reporting for FY16

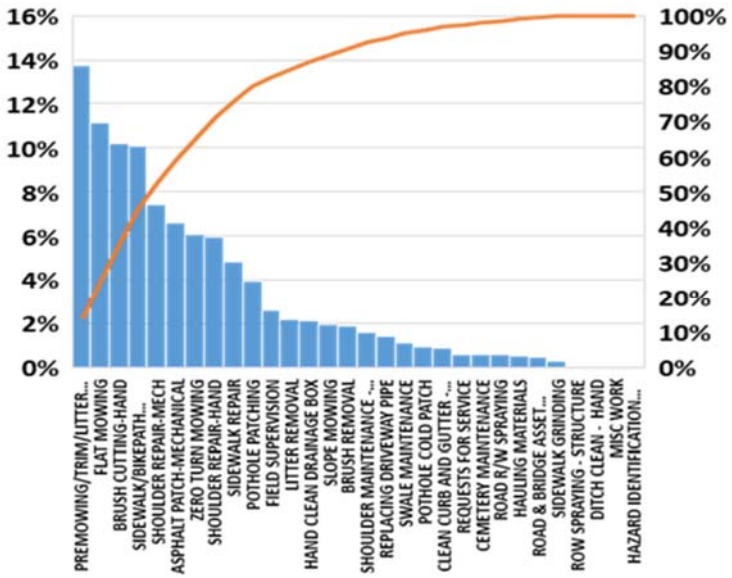
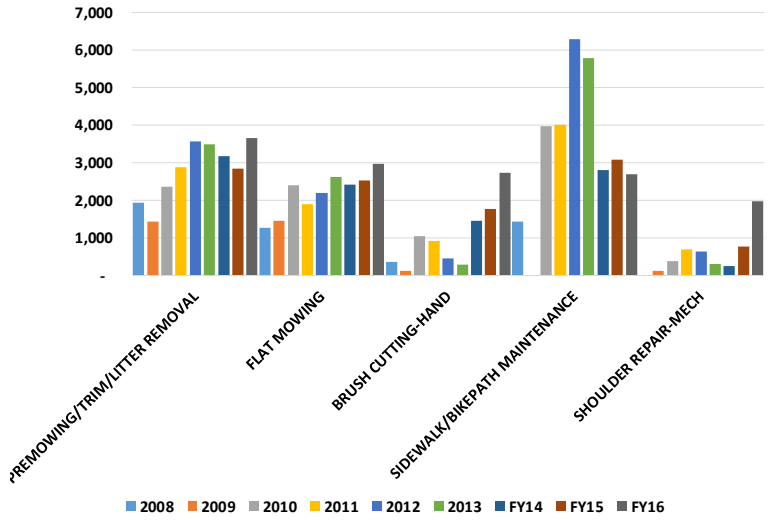


Figure 2-35 shows the nine-year history of hours for the top five activities for Road and Bridge's NE group. The data further shows that four of the five top activities have increased over the past eight years.

Figure 2-35
NE Group – Nine Year Top Activities



Of the non-overhead hours for activities reported in Road and Bridge's South East (SE) group, twelve activities made up 80% of the total for this group. The highest percentage of maintenance activities were Premowing/Trim/Litter Removal at 3,083 hours or 13%, Shoulder Repair – Hand at 2,717 hours or 12%, Asphalt Patch – Mechanical at 2,223 hours or 10%, Brush Cutting-Hand at 2,061 hours or 9%, and Flat Mowing at 1,768 hours or 8%. The cumulative hours per activity for NE group are shown in Figure 2-36.

Figure 2-36
SE Group
Total Hours Reporting for FY16

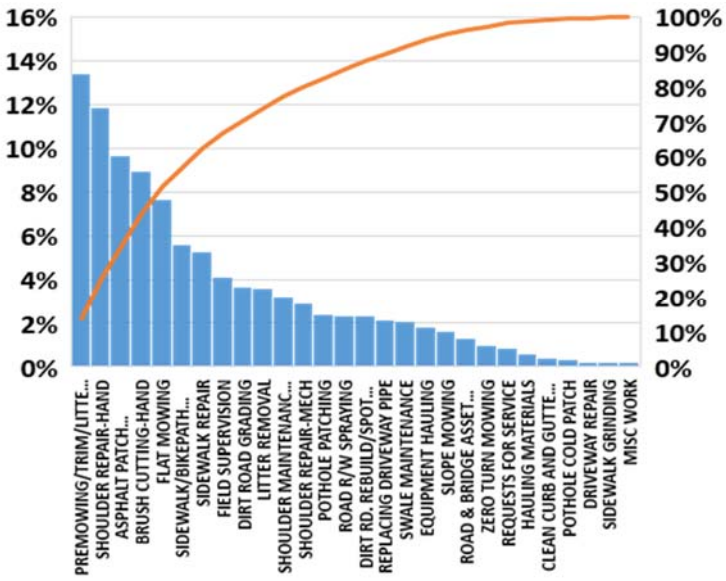
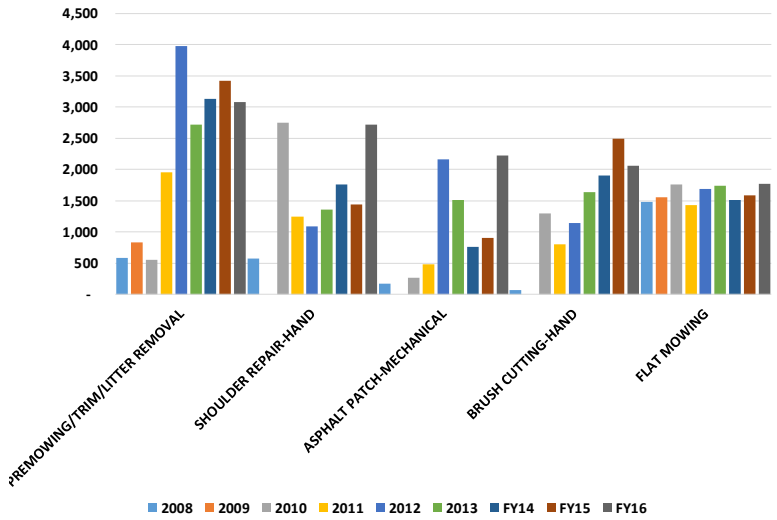


Figure 2-37 shows the nine-year history of hours for the top five activities for Road and Bridge's SE group. The data further shows that activity effort has varied by year with Flat Mowing remaining consistent over the past nine years.

Figure 2-37
SE Group
Nine Year Top Activities



Of the non-overhead hours for activities reported in Road and Bridge's Tree group, only four activities made up the total production hours for this group. These included Tree Trimming at 22,643 hours or 65%, Tree Work - Remove at 10,304 hours or 30%, Request for Service at 967 hours or 3%, and Stump Grinding at 245 hours or 2%. The cumulative hours per activity for tree group are depicted in Figure 2-38.

Figure 2-38
Trees Total Hours Reporting for FY16

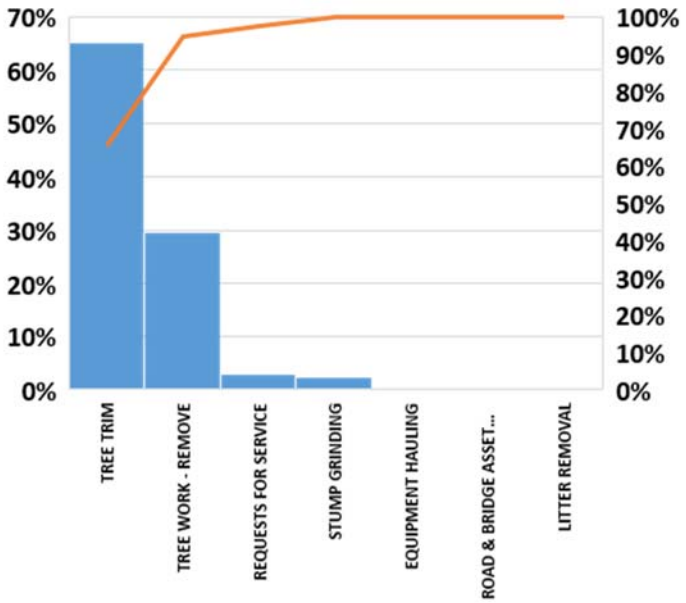
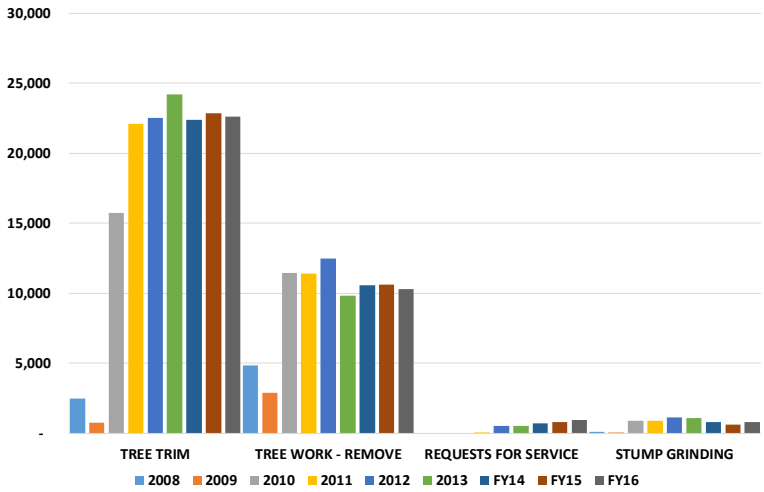


Figure 2-39 shows the nine-year history of hours for the top five activities for Road and Bridge's Tree group. The data further shows that activity effort for each of the four activities have remained consistent over the past nine years.

Figure 2-39
Trees Nine Year Top Activities



Of the non-overhead hours for activities reported in Road and Bridge's Signs & Markings NW group, eight activities made up 80% of total production hours for this group. The highest percentage of maintenance activities were Sign Maintenance at 3,574 hours or 23%, Lane Striping at 2,580 hours or 16%, Sign Installation/Replace at 1,891 hours or 12%, Sign MOT at 832 or 9% and Thermo Plastic Stop Bars/Crosswalk at 726 hours or 6%. The cumulative hours per activity for Signs and markings group are shown in Figure 2-40.

Figure 2-40
Signs & Markings NW
Total Hours Reporting for FY16

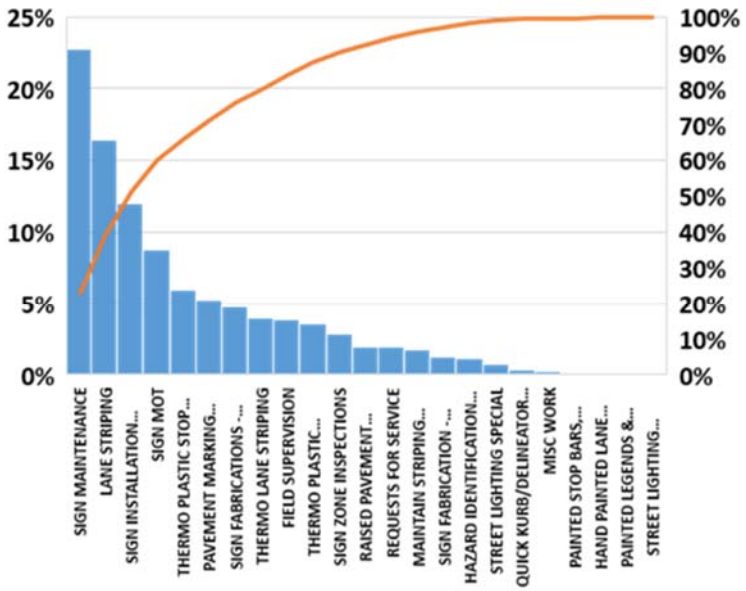
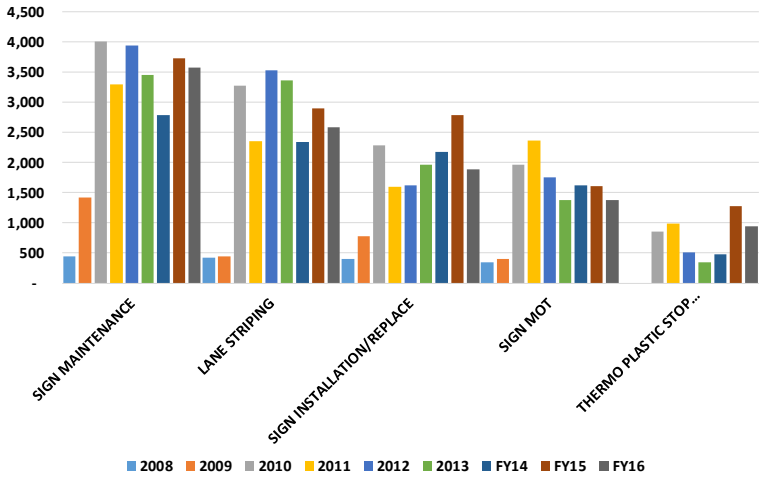


Figure 2-41 shows the nine-year history of hours for the top five activities for Road and Bridge's Signs & Markings NW group. The data shows that activity effort for the top five activities varied year to year over the past nine years.

Figure 2-41
Signs & Markings NW
Nine Year Top Activities



Of the non-overhead hours activities reported for Road and Bridge's Westside NW group, ten activities made up 79% of the total for this group. The highest percentage of maintenance activities were Sidewalk Repair at 9,121 hours or 23%, Premowing/Trim/Litter Removal at 7,448 hours or 19%, Flat Mowing at 2,796 hours or 7%, Hauling Materials at 2,420 or 6%, and Dirt Road Grading at 2,057 hours or 5%. Figure 2-42 shows the cumulative hours per activity for this group, with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-42
Westside NW
Total Hours Reporting for FY16

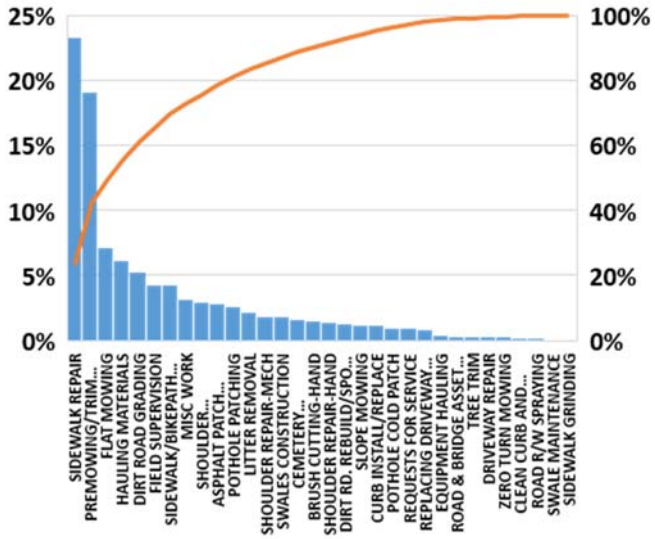
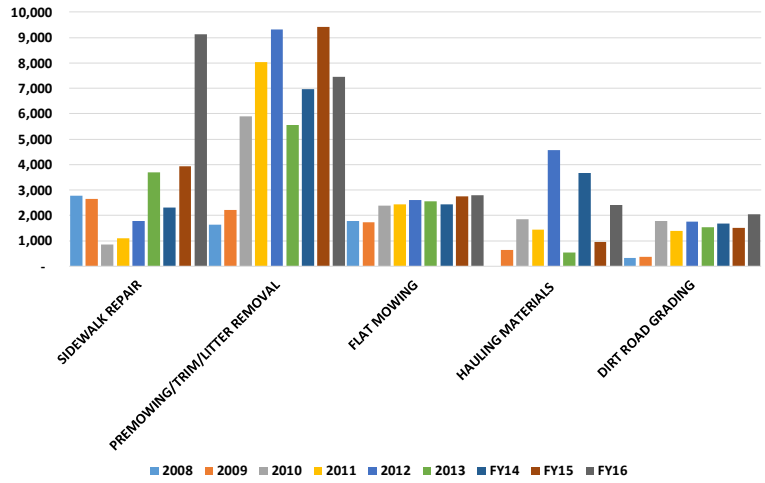


Figure 2-43 shows the nine-year history of hours for the top five activities for Road and Bridge's Westside NW group. The data also shows that the activity of Sidewalk Repair has increased by over double in FY16 as compared to FY15.

Figure 2-43
Westside NW
Nine Year Top Activities



Of the non-overhead hours activities reported for Road and Bridge's Westside SW group, seven activities made up 78% of the total for this group. The highest percentage of maintenance activities were Premowing/Trim/Litter Removal at 6,806 hours or 26%, Sidewalk/Bike Path Maintenance at 2,694 or 10%, Sidewalk Repair at 2,666 hours or 10%, Flat Mowing at 2,632 hours or 9%, and Shoulder Repair - Mech at 2,413 hours or 9%. Figure 2-44 shows the cumulative hours per activity for this group with the left vertical axis showing the individual percentage, and the right axis showing the cumulative total.

Figure 2-44
Westside SW
Total Hours Reporting for FY16

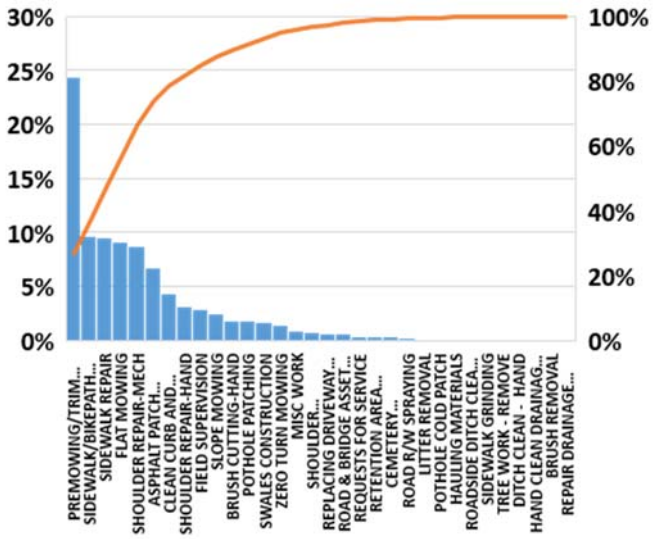
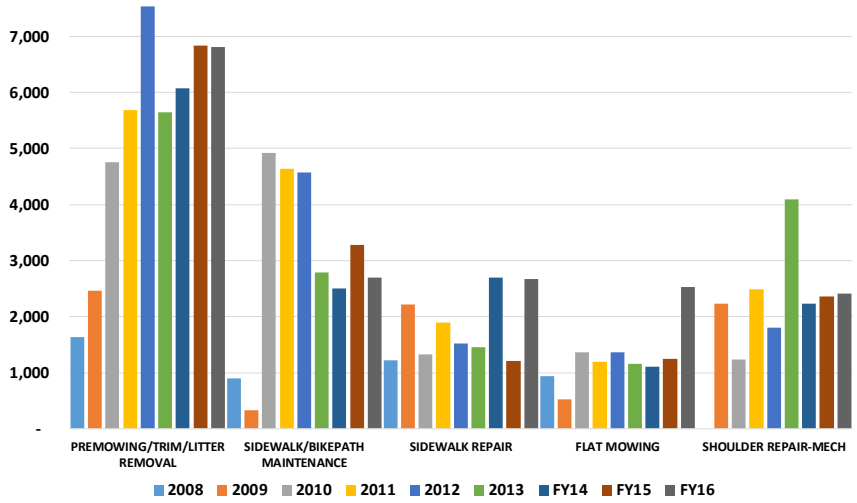


Figure 2-45 shows the nine-year history of hours for the top five activities for Road and Bridge's Westside SW group. The data shows that the activity of Sidewalk Repair and Flat Mowing has also increased in FY16 as compared to FY15.

Figure 2-45
Westside SW – Nine Year Top Activities



The Drainage Task Team reported a total of 76,214 hours in FY16 including 72,728 hours reported in non-overhead activities. Of the non-overhead hours activities reported, fifteen activities made up 80% of the total. The top highest percentage of maintenance activities were Install Drainage Pipe at 12,228 hours or 17%, Roadside Ditch Clean/Mechanical at 7,146 hours or 10%, Retention Area Maintenance at 5,844 hours or 8%, Ditch Cleaning/Mechanical - Haul at 5,385 hours or 7%, and Mechanical Clean Drainage Pipe at 5,208 hours or 7%.

Figure 2-46 shows the cumulative hours per activity with the left vertical axis showing the individual percentage, and the right axis showing the cumulative total.

Figure 2-46
Drainage Task Team – Total Hours Reporting for FY16

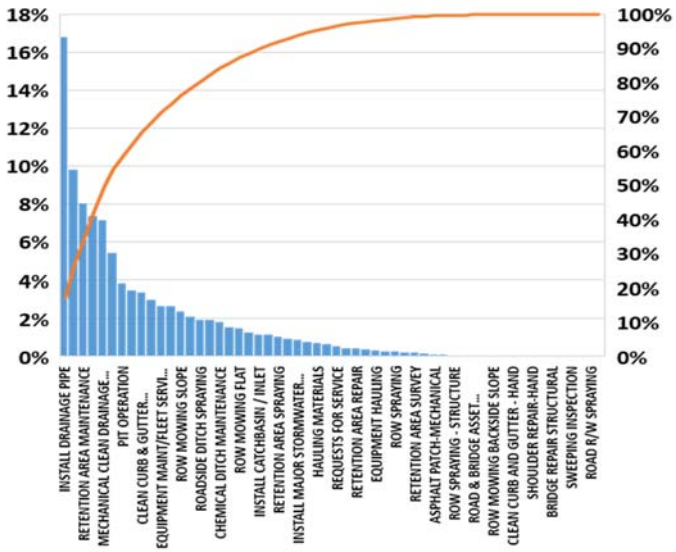
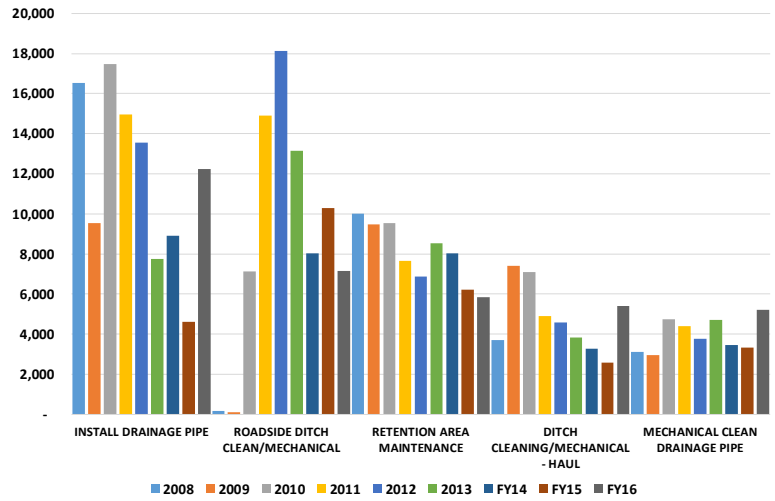


Figure 2-47 shows the nine-year history of hours for the top five activities for the DTT. In addition, the data shows that the activity effort varied by year over the period.

Figure 2-47
Drainage Task Team – Nine Year Top Activities



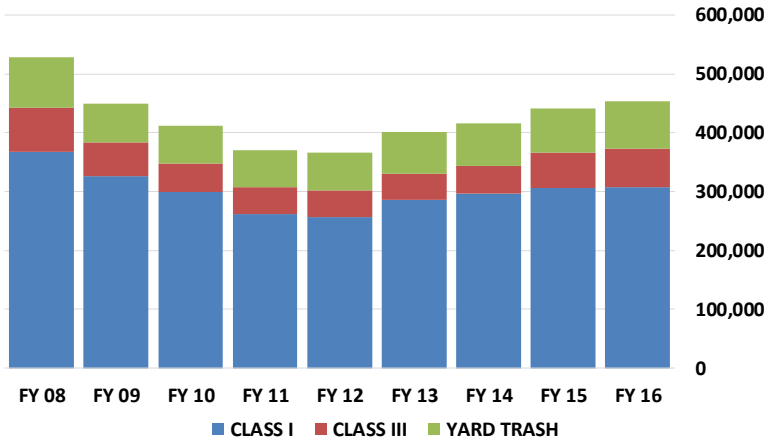
2.3.3.4 Solid Waste

The Solid Waste Division also has established a list of activities that are tracked to work orders and entered into the Lucity system. The Lucity system keeps track of work completion, hours of labor and equipment, as well as materials used. These are tracked primarily to either the transfer station or landfill. The primary focus of the Division's effort is a combination of maintenance, operations, customer service and contract administration. Below is the list of activities Solid Waste uses to track work and accomplishment:

- Compaction of Waste-class I
- Customer Convenience Center Operations
- Litter Control
- Monitoring Well Maintenance
- Drainage Maintenance
- Borrow Pit
- Roadway Construction
- Landfill Finish Surface/Maintenance
- Capital Projects - Solid Waste
- Closed Cell Maintenance
- Complaint Inspections
- Light Carpentry/Construction
- Flare Station Operation
- Hazardous Waste Collection and Sorting
- Paint Processing
- Freon Recovery & Goods Processing
- Home Fuel Oil Recovery
- Monthly Inspection SW
- Transfer Station Lawn Maintenance
- Stormwater Pump Installation
- Hauling Cover (Dirt)
- Spreading Cover
- Hauling Materials
- Compaction of Waste-class III
- Refuse Hauling
- Access Road Maintenance
- Recycling & SW Education
- Dust Control
- Fire Control
- Solid Waste & Litter Enforcement
- Yard Waste Operations
- Leachate Control
- Scale House Operation
- Stockpile Maintenance
- Landfill Gas Well Inspection
- Gas Well Monitoring/Analysis
- Used Oil Collection Maintenance
- Waste Tire Removal
- Process Electronics
- Hauling Recycling Materials
- Transfer Station Floor Operations
- Landfill Mowing
- Landfill Gas Well Maintenance
- Hauling Cover (Mulch)
- Yard Maintenance

Figure 2-48 the historical tonnage of solid waste processes by class. Class I has averaged 300,817 tons from FY08 through FY16, Class III has averaged 54,284 tons, and Yard Trash has averaged 71,175 tons. Between FY15 and FY16 Class I increased by approximately 1%, Class III by 11%, and Yard Waste by 6%.

Figure 2-48
Solid Waste Tonnage by Class



Using the data provided from the Lucity database, an analysis was performed on activities performed by the Solid Waste Division and its sub-groups for hours used by activity.

There was a total of 128,278 hours reported in FY16 with 107,870 hours reported in non-overhead activities. Of the non-overhead hours activities reported, twelve activities made up 79% of the total. The top highest percentage of maintenance activities were Refuse Hauling at 15,910 hours or 15%, Compaction of Waste – Class I at 12,123 hours or 11%, Transfer Station Floor Operations at 10,128 hours or 9%, Compaction of Waste – Class III at 9,661 hours or 9%, and Yard Waste Operations at 8,573 hours or 8%. Figure 2-49 shows the cumulative hours per activity with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-49

Solid Waste – Total Hours Reporting for FY16

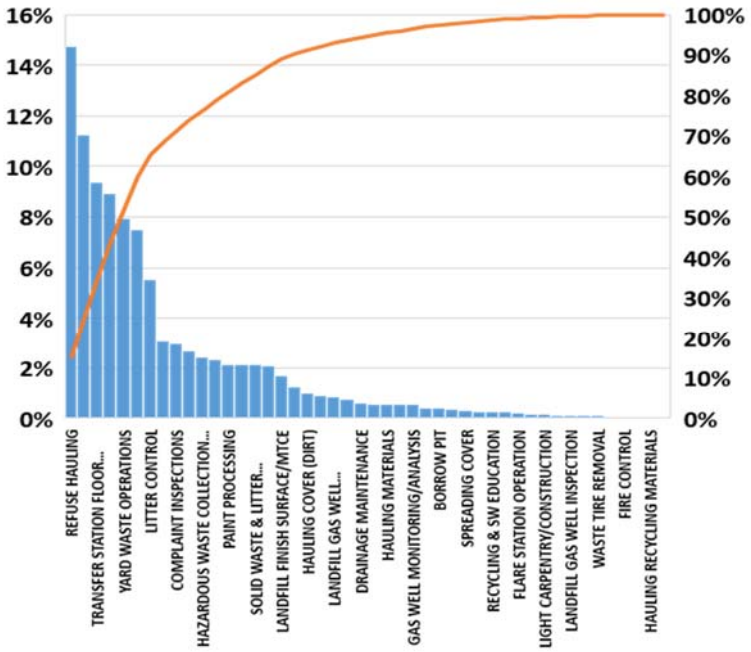
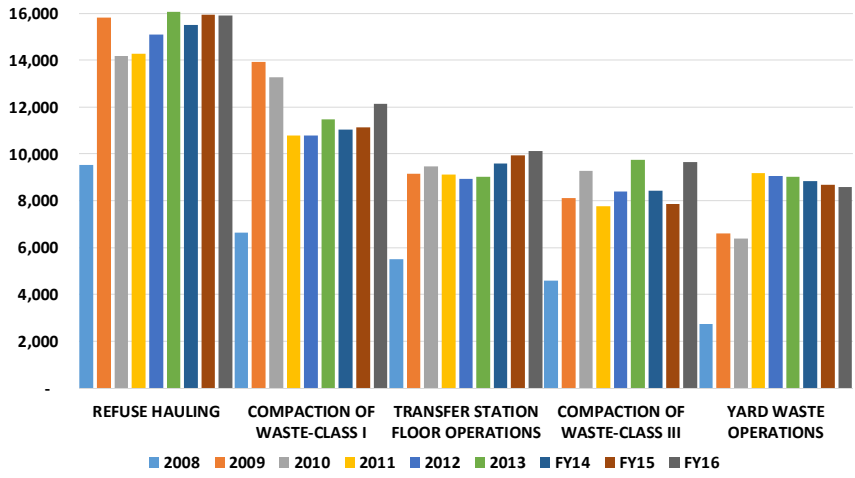


Figure 2-50 shows the nine-year history of hours for the top five activities for the Solid Waste Division. The data further shows that activity efforts have remained consistent over the period.

Figure 2-50
Solid Waste Division
Nine Year Top Activities



Of the non-overhead hours for activities reported in the Solid Waste's Transfer Station, four activities made up 78% of the total for this group. The highest percentage of maintenance activities were Refuse Hauling at 15,910 hours or 38%, Transfer Floor Operations at 10,128 hours or 24%, Scale House Operations at 3,234 hours or 8%, and Yard Waste Operations at 3,014 hours or 7%. Figure 2-51 shows the cumulative hours per activity for this group, with the left vertical axis showing the individual percentage, and the right axis showing the cumulative total.

Figure 2-51
Transfer Station – Total Hours Reporting for FY16

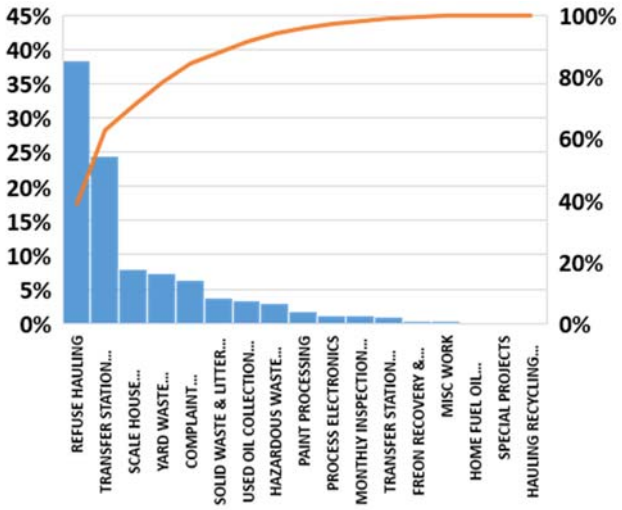
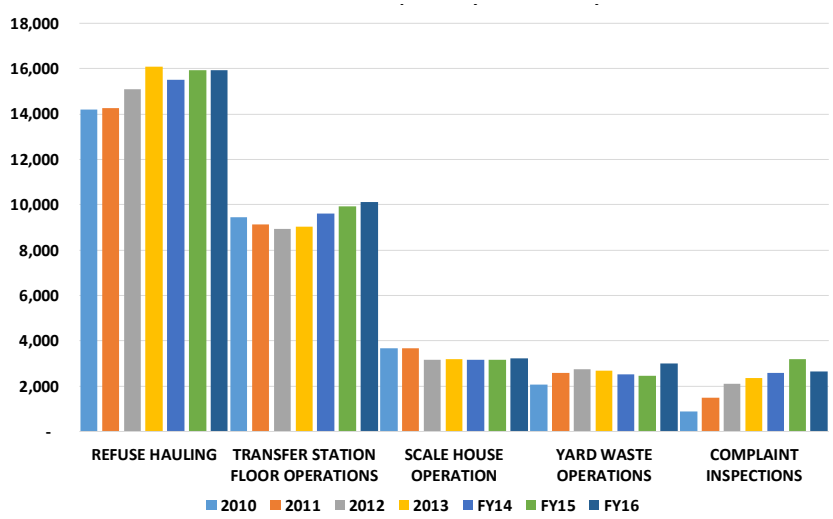


Figure 2-52 shows the seven-year history of hours for the top five activities for the Solid Waste's Transfer Station. The data shows that activity efforts have remained consistent over the period.

Figure 2-52
Transfer Station Seven Year Top Activities



Of the non-overhead hours activities reported for Solid Waste's Tomoka Landfill, ten activities made up 79% of the total for this group. The highest percentage of maintenance activities were Compaction of Waste – Class I at 12,123 hours or 19%, Compaction of Waste – Class III at 9,661 hours or 15%, Litter Control at 5,991 hours or 9%, Yard Waste Operations at 5,599 hours or 9%, and Scale House Operation at 4,855. The cumulative hours per activity for NE group are shown in Figure 2-53.

Figure 2-53
Tomoka Landfill

Total Hours Reporting for FY16

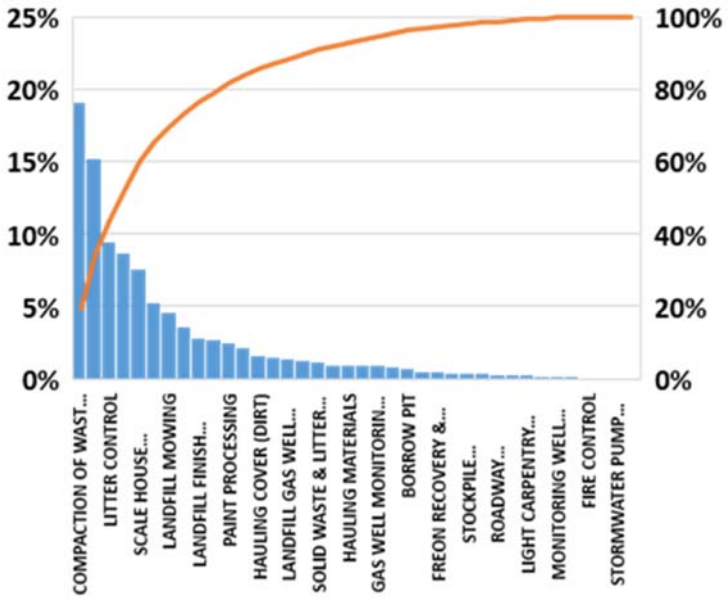
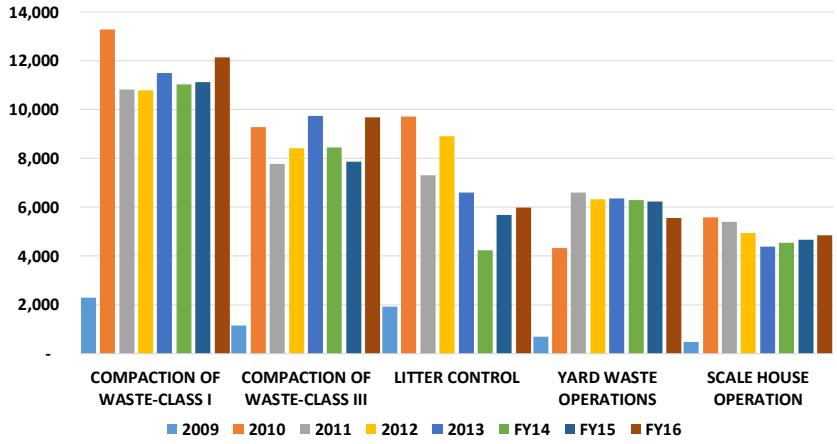


Figure 2-54 shows the seven-year history of hours for the top five activities for the Solid Waste's Tomoka Landfill. The data also shows that activity efforts have remained consistent over the period with under reporting in all activities in FY2009.

Figure 2-54
Tomoka Landfill
Eight Year Top Activities



2.3.3.5 Traffic Engineering

The Traffic Engineering Division also has established a list of activities that are tracked to work orders and entered into the Lucity system. The Lucity system keeps track of work completion, hours of labor and equipment, as well as materials used. These are tracked to specific assets by location and activity. The accuracy of work planning and tracking is critical to this Division for the proper billing to the cities they service. The time recorded is the entire time it takes to perform the activity including both preparation and travel time. Below is an example of the activities the Division uses to track work and accomplishment:

- Signal Contractor/Loops
- Signal Modification/Cabinet
- Signal Repair
- TE Inspection
- Signal Timing
- Street Lighting
- School Flasher Installation/Repair
- Sign Repair Overhead
- Remote Traffic Control/Monitoring
- Special Events PMs
- Field Traffic Control
- Signal Installation
- Signal PM
- Bench Work/Assembly/Setup
- Communication-Signals
- Locates
- Trouble Call
- School Flasher PM
- Signal Rebuild
- Contractor Assistance
- Flasher/Flashing Signal Maintenance
- Conflict Monitor Testing/Replacement

Using data provided from the Lucity database, an analysis was performed on activities performed by the Traffic Engineering Division for hours used by activity.

There was a total of 11,518 hours reported in FY16 with 9,246 hours reported in non-overhead activities. Of the non-overhead hours activities reported, eight activities made up 79% of the total. The top highest percentage of maintenance activities were Signal Repair at 2,423 hours or 31%, Trouble Call at 1,469 hours or 18%, Signal PM at 1,271 hours or 16%, School Flasher Installation/Repair at 443 hours or 5%, and Bench Work/Assembly/Setup at 407 hours or 5%. Figure 2-55 shows the cumulative hours per activity with the left vertical axis showing the individual percentage, and the right axis showing the cumulative total.

Figure 2-55
Traffic Engineering – Total Hours Reporting for FY16

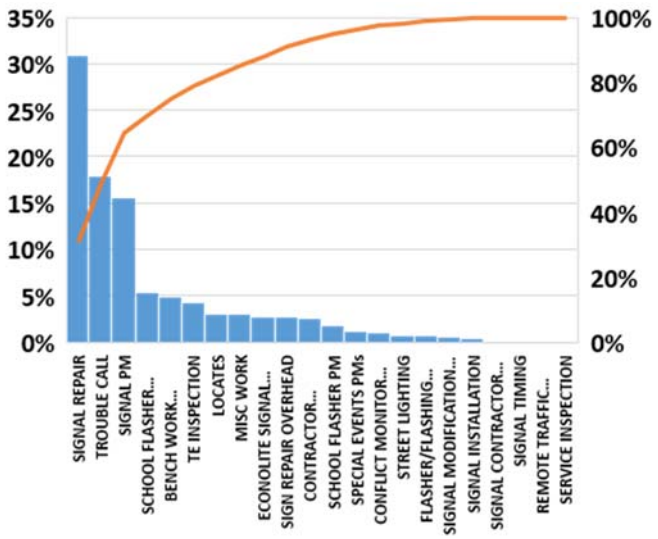
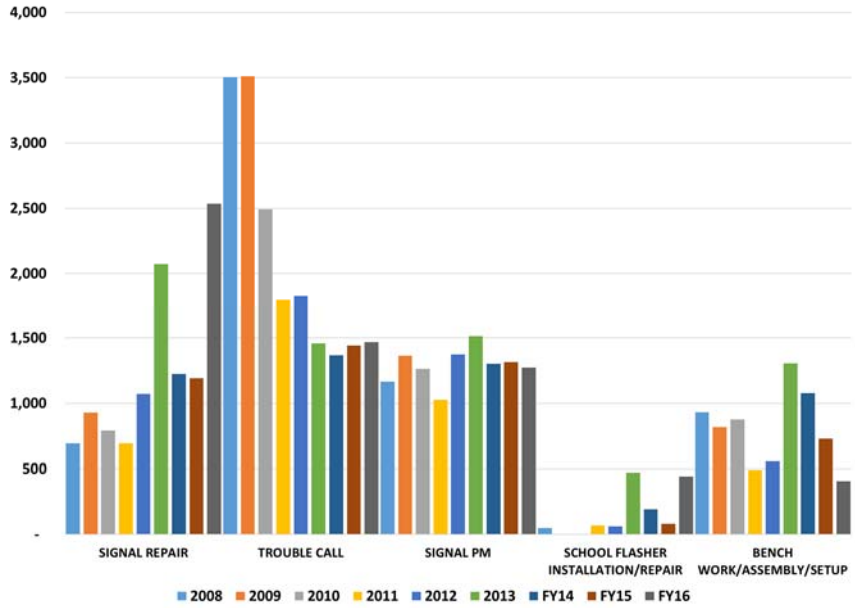


Figure 2-56 shows the seven-year history of hours for the top five activities for the Traffic Engineering Division. The data shows that the activity of Trouble Call has remained consistent over the past four years, effort for this activity has been significantly reduced as compared to the first five years.

Figure 2-56

Traffic Engineering – Nine Year Top Activities



2.3.3.6 Water Resources & Utilities

The Water Resources and Utilities Division also has established a list of activities that are tracked to work orders and entered into the Lucity system. The Lucity system keeps track of work completion, hours of labor and equipment, as well as materials used. These are tracked to specific assets by location and activity. The time recorded is the entire time it takes to perform the activity including both preparation and travel time. The primary focus of the Division's effort is a combination of water and wastewater maintenance and operations for collections, distribution and treatment. Below is an example of the activities the Division uses to track work and accomplishment:

- Flat Mowing
- Sewer Blockage
- Lift Station Pm/Maintenance
- Sewer Line Cleaning
- Treatment Plant Repair
- Sewer Line Repairs
- Valve Exercising
- Utility Locate
- Verify for New Hookup
- Cross Connection Inspection
- Zero Read Investigation
- Test Backflow
- Install/Replace Dual Check
- Meter Maintenance/Repair
- Replace Potable Meter
- Replace Reclaim Meter
- Water Audit / Customer Education
- Scada System Repairs/Maintenance
- Water Line Repairs
- Lift Station Repair
- Lift Station Site Work
- Treatment Plant PM/Maintenance
- Valve Maintenance
- Reclaim Line Repair
- Turn On/Off
- GPS/Locate Assets
- Install/Remove Temp Meter
- Repair/Replace Backflow
- Backflow New Install
- Read Meter
- Install Potable Meter
- Install Reclaim Meter and Dual Check
- Re-read/Verify Meter
- Customer Service

- Install/Replace Radio
- Manhole Maintenance
- Hydrant Maintenance
- Major Water Plant Ops
- Flushing
- Consecutive System Ops
- Major WW Plant Operations
- WW Package Plant Operations
- Remove Meter
- Hydrant Repairs
- Lock Offs/Disconnects/Reconnects
- Water Sampling
- Water Package Plant Operations
- Monitoring Well Levels
- WW Sampling
- Construction Inspection - Utilities

Using data provided from the Lucity database, an analysis was done on activities performed by the Water Resources and Utilities Division and its sub-groups for hours used by activity.

There was a total of 51,823 hours reported in FY16 with 50,054 hours reported in non-overhead activities. Of the non-overhead hours activities reported, nine activities made up 79% of the total. The top highest percentage of maintenance activities were Major WW Plant Operations at 14,943 hours or 30%, Major Water Plant Ops at 11,833 hours or 24%, WW Package Plant Operations at 2,536 hours or 5%, Lift Station PM-MTC at 2,336 hours or 5%, and Turn On/Off at 1,674 hours or 3%. Figure 2-57 shows the cumulative hours per activity with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-57
Water Resources and Utilities – Total Hours Reporting for FY16

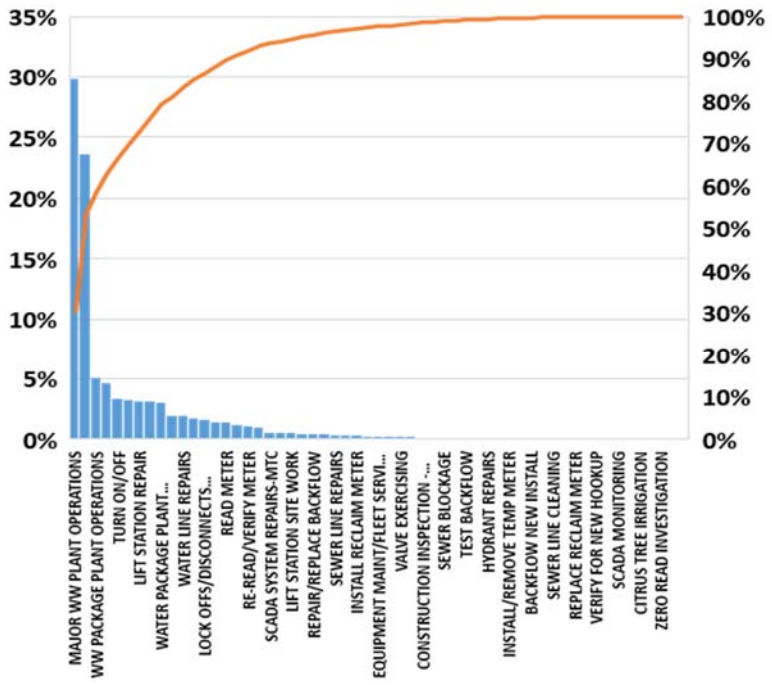
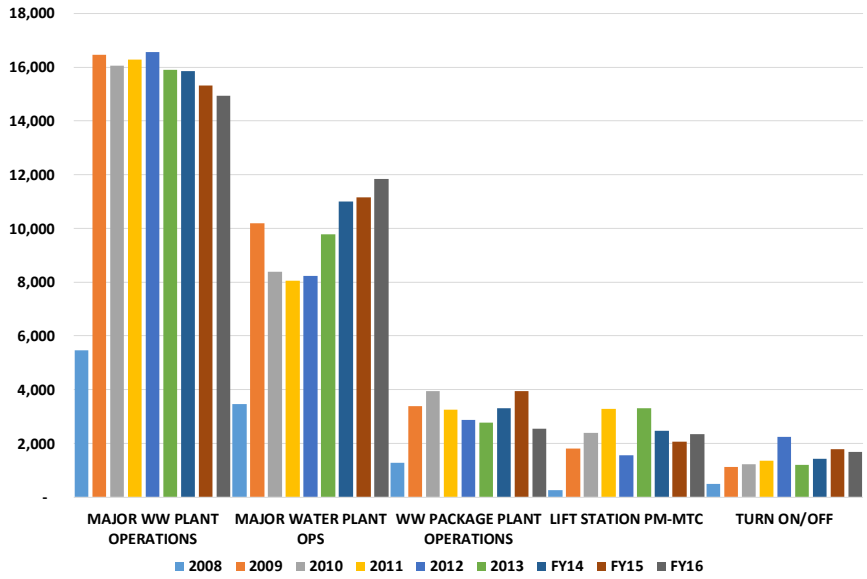


Figure 2-58 shows the nine-year history of hours for the top five activities for the Water Resources and Utilities Division. The data additionally shows that all activities have remained consistent over the period.

Figure 2-58
Water Resources and Utilities – Nine Year Top Activities



Of the non-overhead hours activities reported for Water Resources and Utilities' WW Collection & Water Distribution, ten activities made up 79% of the total for this group. The highest percentage of maintenance activities were Turn On/Off at 1,674 hours or 18%, Water Line Repairs at 970 hours or 10%, Customer Service at 888 hours or 10%, Lock Offs/Disconnects/Reconnects at 836 hours or 9%, and Meter Maintenance/Repair at 741 or 8%. Figure 2-59 has the cumulative hours per activity for this group outlining the cumulative total.

Figure 2-59
WW Collection & Water Distribution – Total Hours Reporting for FY16

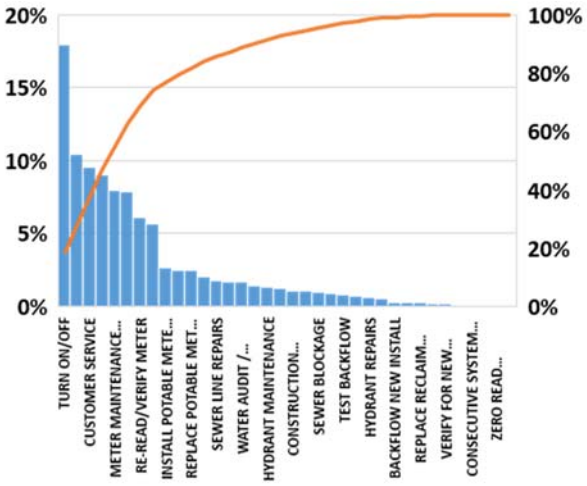
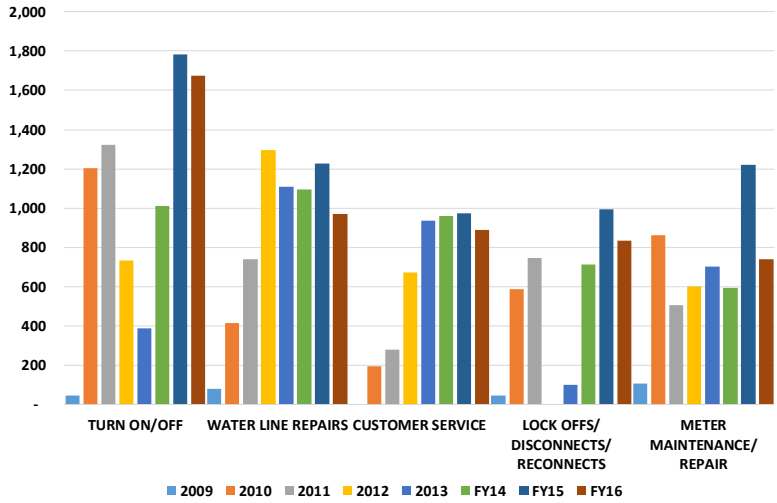


Figure 2-60 shows the eight-year history of hours for the top five activities for the Water Resources and Utilities Division's WW Collection & Water Distribution. The data shows that Turn On/Off significantly increased over the past two years, yet all activities have had reduced efforts. Staff reported the activity of Turn On/Off was shifted to water distribution staff in the past two and a half years. Prior to this change, customer service staff performed this task and the tracking of work accomplished and reported hours is questionable.

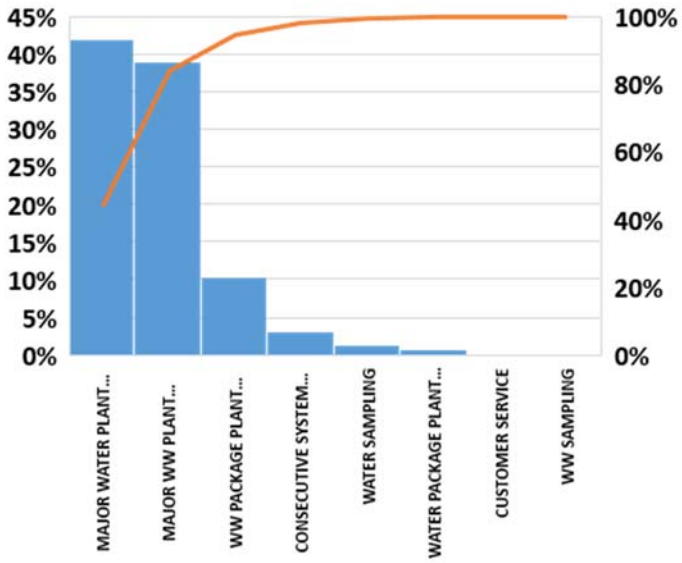
Figure 2-60

WW Collection & Water Distribution – Eight Year Top Activities



The highest percentage of non-overhead maintenance activities in Water Resources and Utilities' Eastside Operations were Major Water Plant Ops at 5,747 hours or 44%, Major WW Plant Operations at 5,335 hours or 40%, and WW Package Plant Operations at 1,417 hours or 11%. Figure 2-61 shows the cumulative hours per activity for this group, with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

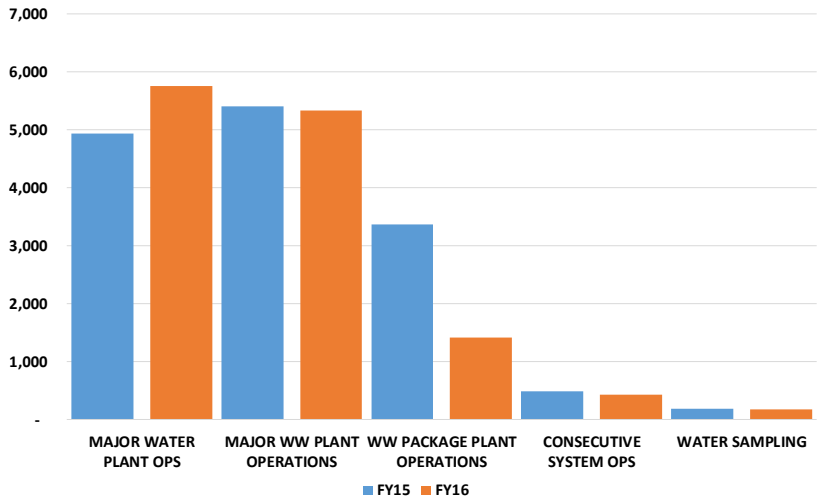
Figure 2-61
Eastside Operations
Total Hours Reporting for FY16



Using available Lucity data, Figure 2-62 shows a two-year history of hours for the top five activities for the Water Resources and Utilities Division's Eastside Operations. The data also shows that Major Water Plant Ops and Major WW Plant Operations have remained consistent from FY15 through FY16 with WW Package Plant Operations reducing by more than half.

Figure 2-62
Eastside Operations

Two Year Top Activities



The highest percentage of maintenance activities of the non-overhead hour activities reported for Water Resources and Utilities' Utilities Maintenance were Lift Station PM-MTC at 2,334 hours or 39%, Lift Station Repair at 1,591hours or 27%, and Treatment Plant Repair at 1,322 hours or 22%. Figure 2-63 shows the cumulative hours per activity for this group with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-63
Utilities Maintenance
Total Hours Reporting for FY16

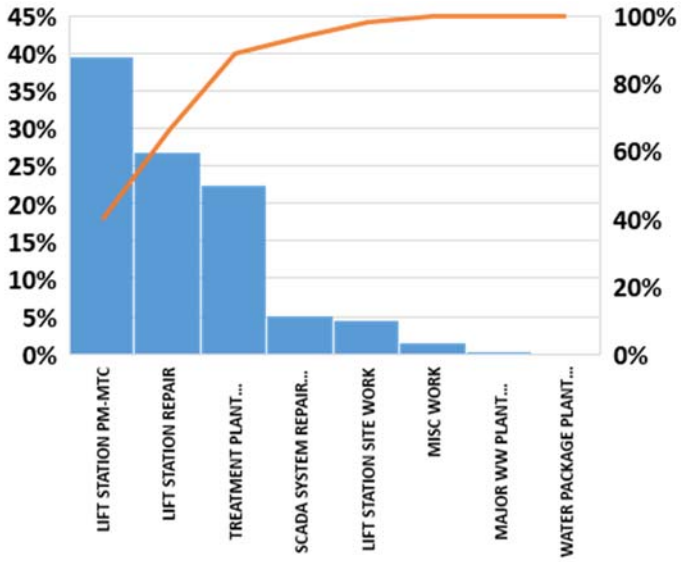
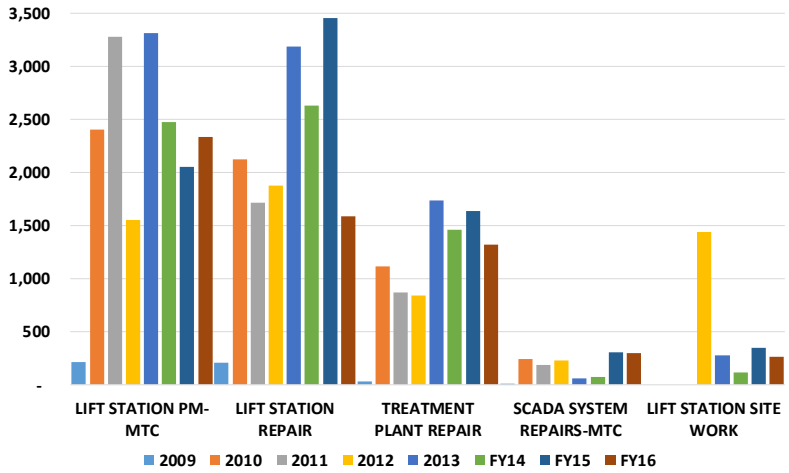


Figure 2-64 shows an eight-year history of hours for the top five activities for the Water Resources and Utilities Division's Utilities Maintenance. The data further shows that all activity efforts have reduced from FY15 to FY16 except for Lift Station PM-MTC.

Figure 2-64
Utilities Maintenance – Eight Year Top Activities



In Water Resources and Utilities Westside Water, the highest percentage maintenance activity of the non-overhead hours for activities reported was Major Water Plant Ops at 6,071 hours or 79% of the total production effort. Figure 2-65 shows the cumulative hours per activity for this group, with the left vertical axis showing the individual percentage and the right axis showing the cumulative total.

Figure 2-65
Westside Water – Total Hours Reporting for FY16

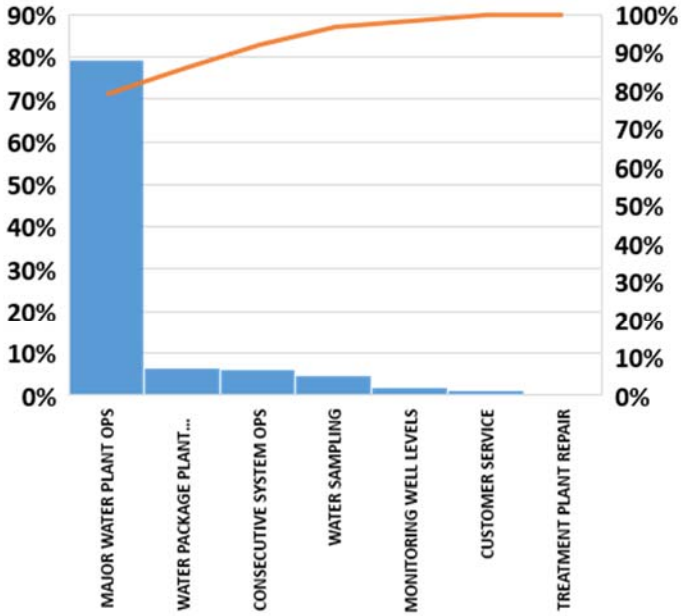
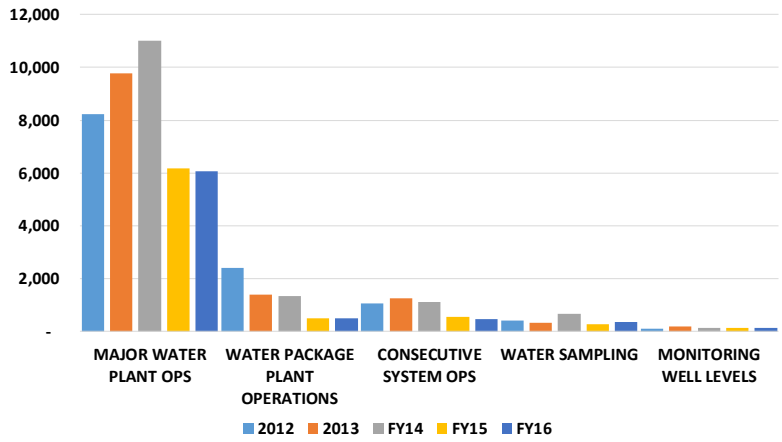


Figure 2-66 shows a five-year history of hours for the top five activities for the Water Resources and Utilities Division's Westside Water. The data further shows that Major Water Plant Ops reduced from FY14 to FY15, yet has remained consistent from FY15 through FY16.

Figure 2-66
Westside Water
Five Year Top Activities



For Water Resources and Utilities' Westside Wastewater, the highest percentage non-overhead hours maintenance activity was Major WW Plant Operations at 9,594 hours or 81% of the total production effort. Figure 2-67 shows the cumulative hours per activity for this group, with the left vertical axis showing the individual percentage, and the right axis showing the cumulative total.

Figure 2-67
Westside Wastewater
Total Hours Reporting for FY16

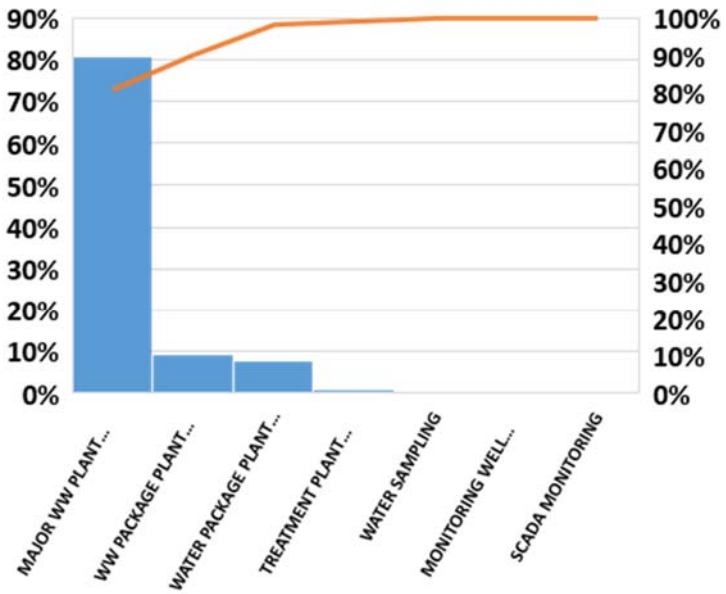
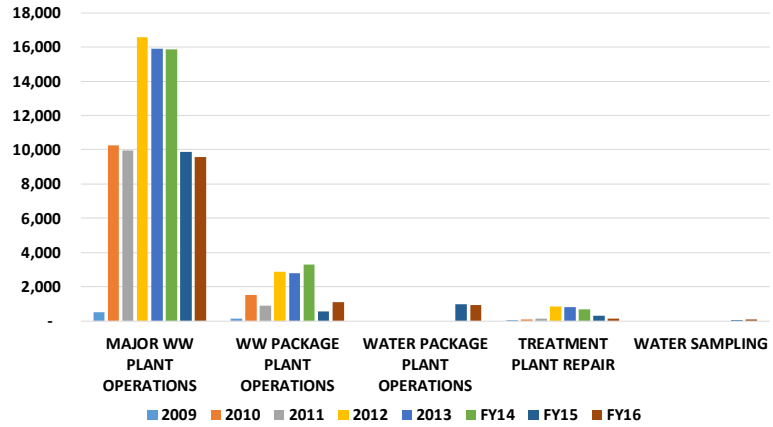


Figure 2-68 shows an eight-year history of hours for the top five activities for the Water Resources and Utilities Division's Westside Wastewater. The data further shows that Major WW Plant Operations reduced from FY14 to FY15, yet has remained consistent from FY15 through FY16.

Figure 2-68
Westside Wastewater
Eight Year Top Activities



2.3.4 Interlocal Agreements

The Department has entered into several interlocal agreements for maintenance with several incorporated communities. Most of the services provided are at an "as needed" annual costs and are not planned or scheduled, except for Traffic Engineering. Traffic signal support is a full service for fifteen agencies including the FDOT with an addition of two city engineering contracts. Figure 2-69 shows the service categories provided and the agencies which the County has agreements. The Water Resources and Utilities Division also has several interlocal agreements for whole and retail water, as well as sewer service.

Figure 2-69
Interlocal Agreements

Agency	Mosquito Control	Road and Bridge	Traffic Engineering	Water Utilities- SWPS Monitoring	Water Utilities- Bill Keller Park Plant Maintenance
City of DeBary	X	X	X	X	X
City of Deland	X	X	X		
City of Deltona	X	X	X		
City of Edgewater		X	X		
City of Holly Hill		X	X		
City of Lake Helen	X	X			
City of New Smyrna Beach		X	X		
City of Ormond Beach		X	X		
City of Port Orange		X	X		
City of South Daytona		X	X		
Town of Pierson	X	X	X		
Town of Ponce Inlet		X	X		
Orange City	X	X	X		
City of Daytona Beach Shores		X	X		
Plantation Bay (Flagler County)	X				
Eagle Rock (Flagler County)	X				

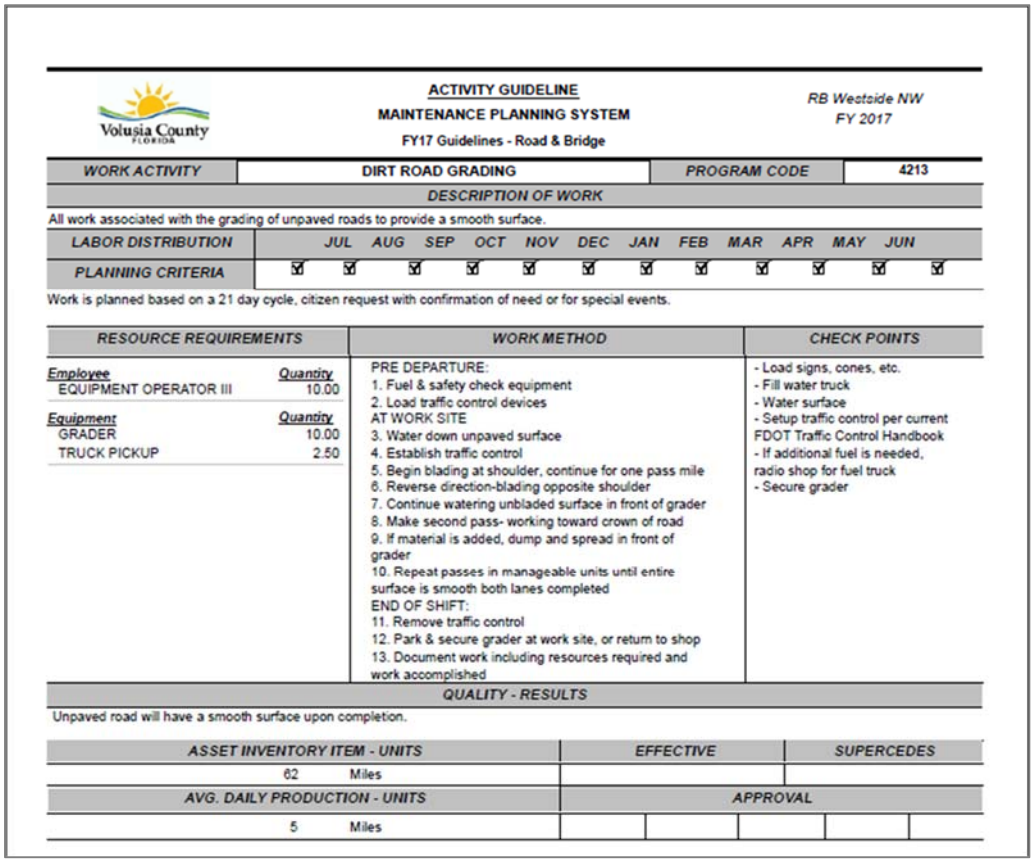
2.3.5 Activity Guidelines

Each of the operational Divisions have unique guidelines to contribute and outline the accomplishment of their work by activity. These guidelines assist employees in work execution and managers and supervisors in managing work efforts as well as defining all tasks associated with an activity.

Each guideline is named and includes an activity code, description of the activity, planning criteria, resource needs (labor, equipment and materials), work methods and check points, expected quality/results, specific inventory, and expected average daily production. Some guidelines have specific detail with others being more general. Each activity guideline is also stored in the Lucity CMMS for reference by County staff.

Figure 2-70 is an example of an activity guideline. Each Division reviews this guideline and attempt to update them annually using actual data, work changes and their desires. They have added, deleted and modified in this annual review of the employee teams. The guidelines are the key building block for both annual planning and performance budget.

Figure 2-70
Activity Guideline Example



Volusia County
FLORIDA

ACTIVITY GUIDELINE
MAINTENANCE PLANNING SYSTEM
FY17 Guidelines - Road & Bridge

RB Westside NW
FY 2017

WORK ACTIVITY	DIRT ROAD GRADING	PROGRAM CODE	4213

DESCRIPTION OF WORK

All work associated with the grading of unpaved roads to provide a smooth surface.

LABOR DISTRIBUTION	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
PLANNING CRITERIA	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

Work is planned based on a 21 day cycle, citizen request with confirmation of need or for special events.

RESOURCE REQUIREMENTS		WORK METHOD	CHECK POINTS
Employee	*Quantity*	PRE DEPARTURE:	- Load signs, cones, etc.
EQUIPMENT OPERATOR III	10.00	1. Fuel & safety check equipment	- Fill water truck
Equipment	*Quantity*	2. Load traffic control devices	- Water surface
GRADER	10.00	AT WORK SITE	- Setup traffic control per current FDOT Traffic Control Handbook
TRUCK PICKUP	2.50	3. Water down unpaved surface	- If additional fuel is needed, radio shop for fuel truck
		4. Establish traffic control	- Secure grader
		5. Begin blading at shoulder, continue for one pass mile	
		6. Reverse direction-blading opposite shoulder	
		7. Continue watering unbladed surface in front of grader	
		8. Make second pass- working toward crown of road	
		9. If material is added, dump and spread in front of grader	
		10. Repeat passes in manageable units until entire surface is smooth both lanes completed	
		END OF SHIFT:	
		11. Remove traffic control	
		12. Park & secure grader at work site, or return to shop	
		13. Document work including resources required and work accomplished	

QUALITY - RESULTS

Unpaved road will have a smooth surface upon completion.

ASSET INVENTORY ITEM - UNITS		EFFECTIVE	SUPERCEDES
62	Miles		
AVG. DAILY PRODUCTION - UNITS		**APPROVAL**	
5	Miles		

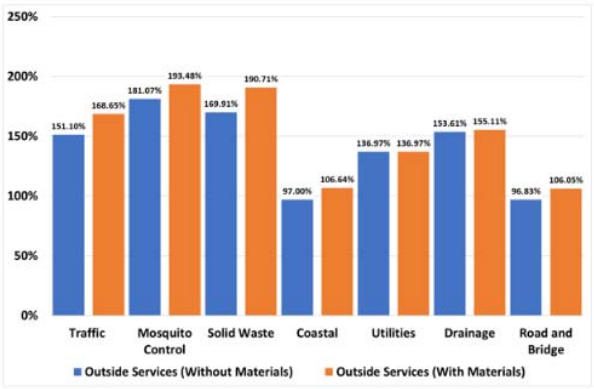
2.3.6 Overhead

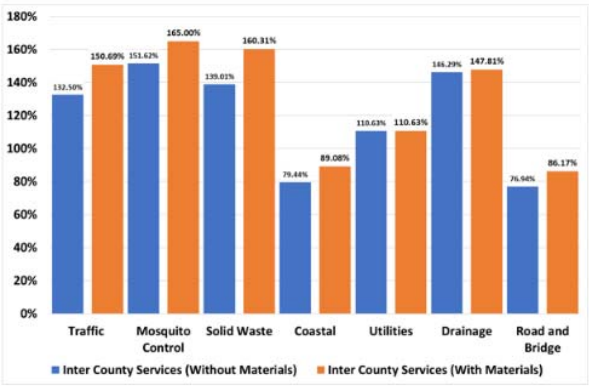
The Public Works Administrative section is responsible for creating and monitoring the budget, and calculate each Division's annual overhead rate. The separate rates are calculated for internal

charges within the County, as well as charges external to the County. The average internal Public Works overhead is 136.77% with materials, and the average external overhead rate is 146.8% with materials. Two additional rates for work performed without materials are also calculated for internal and external charges.

The average internal Public Works overhead is 126.17% without materials and the average external overhead rate is 136.36% without materials. Figure 2-71 shows the internal and external overhead rates with and without materials for each of the Divisions.

Figure 2-71
Outside and Inside Overhead Rates





2.3.7 Budgets

The Public Works Department and its Divisions utilize a line item budget based on historical expenditures and anticipated needs. Each Division submits their own budget, which are all combined to create the Public Works Department Budget. Key Funding Sources by Division have been summarized below.

Coastal Division

- Assessment Districts
- Beach Tolls (percentage funds Beach Capital)
- General Fund

Drainage Task Team

- Stormwater Utility
- Mosquito Control Budget

Mosquito Control Division

- Contract Work for Cities
- Intergovernmental Revenues
- Assessment

Road and Bridge Division

- Contract work for Cities
- Intergovernmental Revenues
- Gas tax

Solid Waste Division

- Tipping Fees and Annual Collection Fees
- Recycling Sales
- License and Permit Fees
- Intergovernmental Revenues

Traffic Engineering Division

- Contract Work for Cities and FDOT
- Gas tax
- Occasional grant and federal funds

Water Resources and Utilities Division

- Utility Billing Fees
- Intergovernmental Revenues

2.3.8 Performance Measures

Each Division compiles line item budgets, and include a list of performance measures that they expect to accomplish. The performance measures are included in the County's final budget document, yet lack linkage to the cost of the performance measures and the actual budgets. Figure 2-72 through Figure 2-84 shows the performance measures of the Divisions as they are documented in the Adopted Budget Fiscal Year 2016-2017. Most measures in the budget focus upon an accomplishment type of measure (number of crosswalks resigned, number of catch basins inspected, tons of A/C repairs, etc.) or input (number of plants owned).

Figure 2-72
Coastal Division (Coastal Access and Inlet Parks)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of walkovers redesigned	1	2	5
2. Number of walkovers reconstructed	5	11	10

Figure 2-73
Drainage (Drainage Task Team)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of catch basins inspected	7,600	8,000	8,500
2. Feet of roadside ditch systems cleaned	268,251	300,000	300,000
3. Acres of retention areas maintained	1,689	1,700	1,800
4. Feet of deteriorated pipe replaced	7,871	9,000	10,000

Figure 2-74
Mosquito Control Division
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Percentage of operations showing adult mosquito reduction of 75% or greater following adulticiding	33	90	90
2. Percentage of days one helicopter is available for work	100	90	100
3. Number of immature mosquito sites with newly stocked minnows	35	100	100

Figure 2-75
Road and Bridge Division
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Miles of right-of-way trees trimmed	107	110	112
2. Tons of asphalt repairs	864	1,100	1,200

Figure 2-76
Solid Waste Division (Administration)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Tons of solid waste processed per year	482,989	492,699	502,500
2. Tons of transported waste per year	145,633	150,002	154,502
3. Percent recycled materials per year	57	50	52
4. Years of available permitted capacity	10	9	8

Figure 2-77
Solid Waste Division (Collections)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of unincorporated residential units per year	45,259	45,382	45,457
2. Tons of residential waste collected for recycling	4,590	4,620	4,700
3. Percent of complaints resolved in 24 hours	99	99	99
4. Number of residential education contacts	38,002	39,500	40,000

Figure 2-78
Traffic Engineering Division
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of twice per year traffic signal preventative maintenance	684	674	684
2. Number of annual school zone/flasher preventative maintenance	233	233	233
3. Response time to afterhours emergency traffic signal trouble calls (hrs)	2	2	2
4. Miles of signal communications network maintained & operated	52	52	52

Figure 2-79
Water Resources and Utilities Division
(Administration)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of utility connections	15,062	15,200	15,350
2. Number of work orders	7,557	7,700	8,000
3. Number of inserts mailed annually	45,200	60,500	62,000

Figure 2-80
Water Resources and Utilities Division
(Collection and Distribution Maintenance)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of meter conversions	98	99	100
2. Number of utility locates performed	2,718	2,900	2,900
3. Number of valves turned and hydrants tested	2,656	2,670	2,695
4. Number of linear feet of sewer main cleaned	16,547	16,700	16,750

Figure 2-81
Water Resources and Utilities Division
(Customer Service)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of bills mailed to active water and sewer accounts per month	15,053	15,200	15,300
2. Number of ACH and online payments	3,367	3,500	3,700
3. Number of new service accounts	2,504	2,550	2,575

Figure 2-82
Water Resources and Utilities Division
(Operations-Potable Water)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Amount of potable water processed (million gallons per year)	4	4	4
2. Number of plants owned	9	9	9

Figure 2-83
Water Resources and Utilities Division
(Utility Engineering)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Number of capital projects	6	7	6
2. Number of GPS for all water and sewer assets	325	300	420
3. Number of permits maintained	15	11	12

Figure 2-84
Water Resources and Utilities Division
(Water Utilities Wastewater)
Performance Measures

Performance Measures	FY 2014-15 Actual	FY 2015-16 Estimated	FY 2016-17 Budget
1. Wastewater processed (in millions of gallons)	2	2	2
2. Percent of plants with FDEP permit effluent compliance > 99%	100	100	100
3. Reclaimed water pumped (millions of gallons per year)	1	1	1

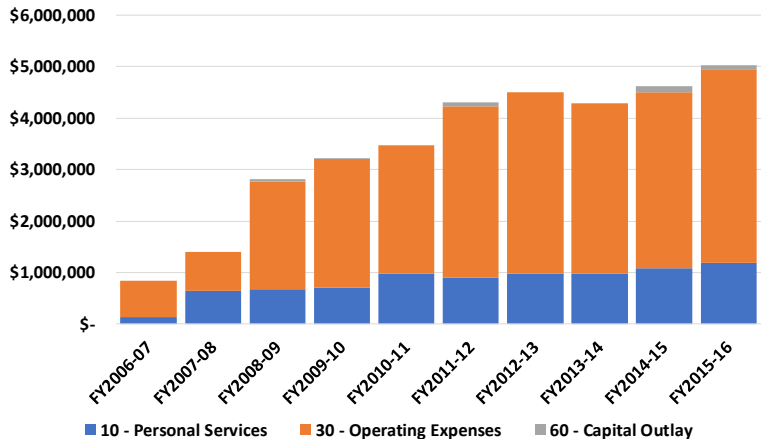
2.3.9 Historical Expenditures

The historical budget expenditures were analyzed with actual expenditures using a combination of published budget documents and data provided from the Public Works Administration group. The following analysis focuses upon the categories of: 30- Operating Expenses, 10- Personal Services, 60- Capital Outlay, and 61- Capital Improvements.

2.3.9.1 Coastal Division (Coastal Parks and General Government)

Figure 2-85 shows the combined expenditures for Coastal Parks and General Government, utilized for the Coastal Division. The average combined expenditures have been approximately $3 million annually with growth dramatically in the last ten years from less than $1M to $5M. From FY2014-15 to FY2015-16, Personal Services have increased by $97,784 or 9%. In the same time frame, Operating Expenses have increased $342,607 or just over 10% and, Capital Outlay decreased by $26,926 or almost 23%.

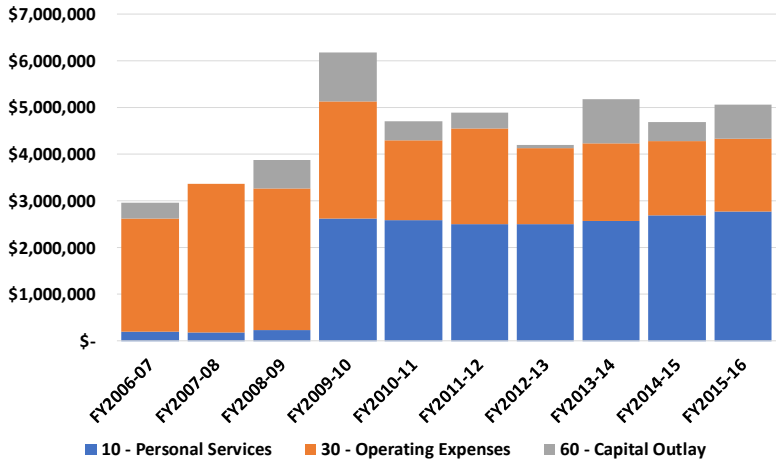
Figure 2-85
Coastal Division Historical Expenditures



2.3.9.2 Drainage Task Team (Stormwater)

Figure 2-86 depicts the Drainage Task Team's historical expenditures. The average combined expenditures have been approximately $4 million annually with a range of $3M to $6M. From FY2014-15 to FY2015-16, Personal Services increased by $82,133 or just over 3%. Operating Expenses decreased $16,314 or just over 1% and Capital Outlay increased by $303,023 or almost 72%.

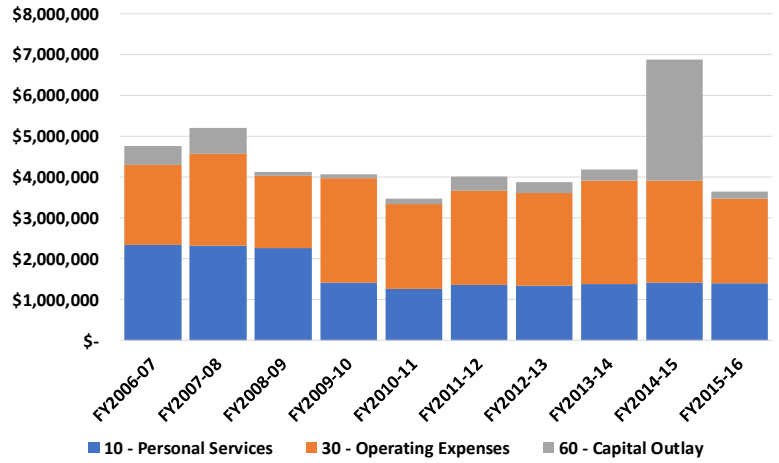
Figure 2-86
Drainage Task Team Historical Expenditures



2.3.9.3 Mosquito Control Division

Figure 2-87 displays the Mosquito Control Division's historical expenditures. The average combined expenditures have been approximately $4.4 million annually ranging from $3.5 M to nearly $7M. From FY2014-15 to FY2015-16, Personal Services decreased by $18,210 just over 1%. In the same time frame, Operating Expenses have decreased $428,743 or just over 17% and Capital Outlay decreased by $2.78 million. For the FY2014-15, Capital Outlay was over five times the average for the category but dropped back in the next year.

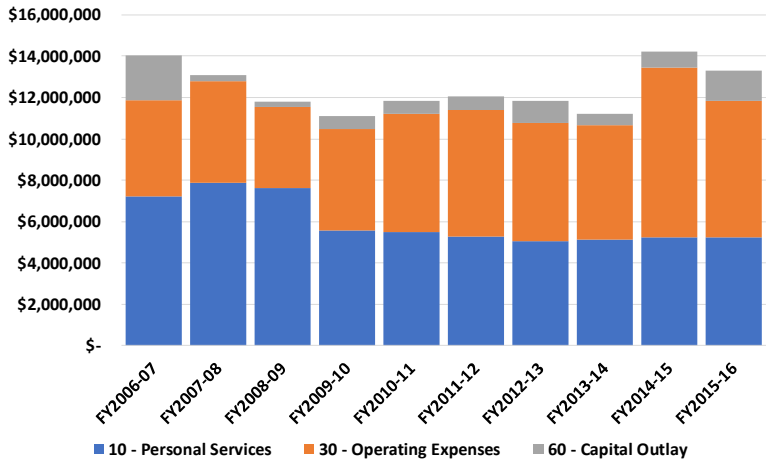
Figure 2-87
Mosquito Control Division Historical Expenditures



2.3.9.4 Road and Bridge Division

The Road and Bridge Division's historical ten-year expenditures is in Figure 2-88. The average combined expenditures have been approximately $12.45 million annually ranging from $11M to $14M. From FY2014-15 to FY2015-16 Personal Services decreased by $18,672 or under 1% while Operating Expenses decreased $1,613,474 or just over 19.7%. Capital Outlay increase by $723,128, almost doubling. The expenditures are now less than they were ten years ago.

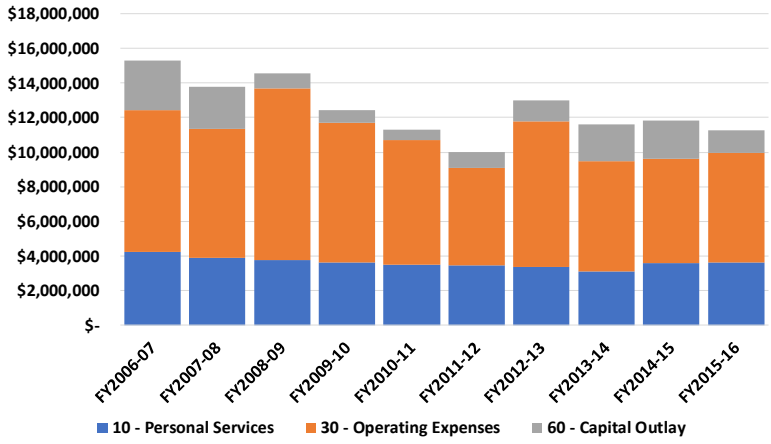
Figure 2-88
Road and Bridge Division Historical Expenditures



2.3.9.5 Solid Waste Division

The Solid Waste Division's historical expenditures are presented in Figure 2-89. The average combined expenditures have been approximately $12.5 million annually ranging from $10M - $15M. From FY2006-07 to FY2015-16, Personal Services decreased by $606,445 just over 14% while Operating Expenses have decreased $1,852,180 or 22.6% and Capital Outlay decreased by $1,534,4431 or almost 54%.

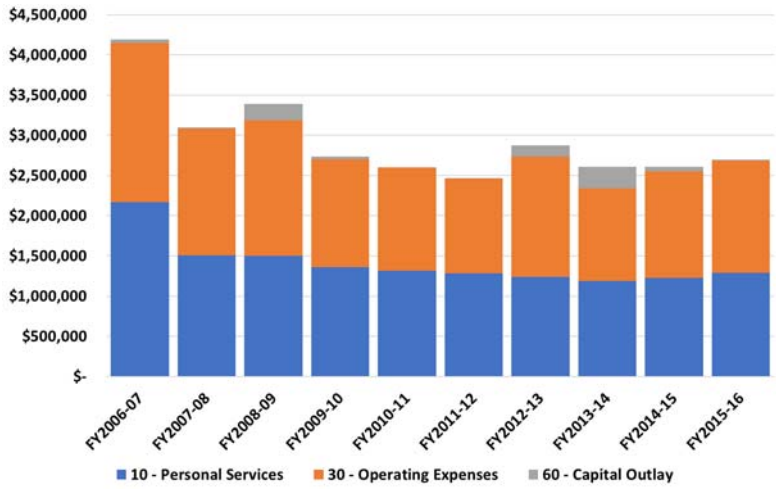
Figure 2-89
Solid Waste Division Historical Expenditures



2.3.9.6 Traffic Engineering Division

Figure 2-90 illustrates the Traffic Engineering Division's historical expenditures for traffic signal maintenance and repair. The average combined expenditures have been approximately $3.1 million annually with a range of $2.5 M in FY2011-12 to $4M in 2006-7. From FY2006-07 to FY2015-16, Personal Services decreased by $875,758 or 40.4% and Operating Expenses decreased $584,149 or 29.5% while Capital Outlay has averaged $76,163 over ten years to near zero in FY2015-2016.

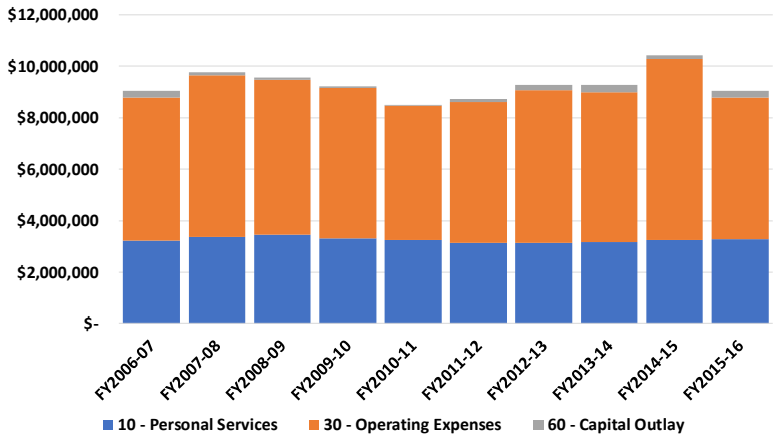
Figure 2-90
Traffic Engineering Division Historical Expenditures



2.3.9.7 Water Resources & Utilities

Figure 2-91 illustrates the Water Resources and Utilities Division's historical operating expenditures. The average combined expenditures have been approximately $9 million annually with a range of $8M to $10M. From FY2014-15 to FY2015-16, Personal Services increased by $47,039 or 1.45%, while Operating Expenses decreased $1,559,363 or just over 22%. Capital Outlay increased by $127,992 which is almost double from FY2014-15 to FY2015-16.

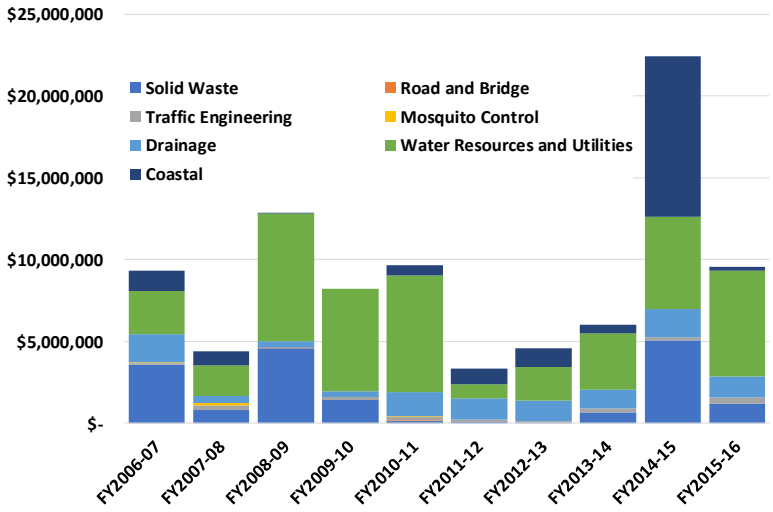
Figure 2-91
Water Resources and Utilities Division Historical Expenditures



2.3.10 Capital Improvement

The historical Capital Improvement Plan (CIP) expenditures were analyzed using a combination of published budget documents and data provided from the Public Works Administration group, and actual expenditures were used in the analysis. From FY2006-07 through FY2015-16, CIP expenditures averaged $9.04 million. The high was in FY2014-15 at $22.45 million and the low came in FY2011-12 at $3.36 million. Figure 2-92 shows the historical CIP expenditures Division.

Figure 2-92
Historical CIP Expenditures



2.4 Organizing

2.4.1 Organizational Structure

The Public Works Department is a multiple layered organization with several Divisions reporting to the Public Works Director. Figure 2-93 shows the Volusia County's management and leadership organizational structure. There are four levels of management above the Divisions, including the County Council, the County Manager, and the Deputy County Manager and Public Works Director.

Figure 2-93
County Management and Leadership Structure

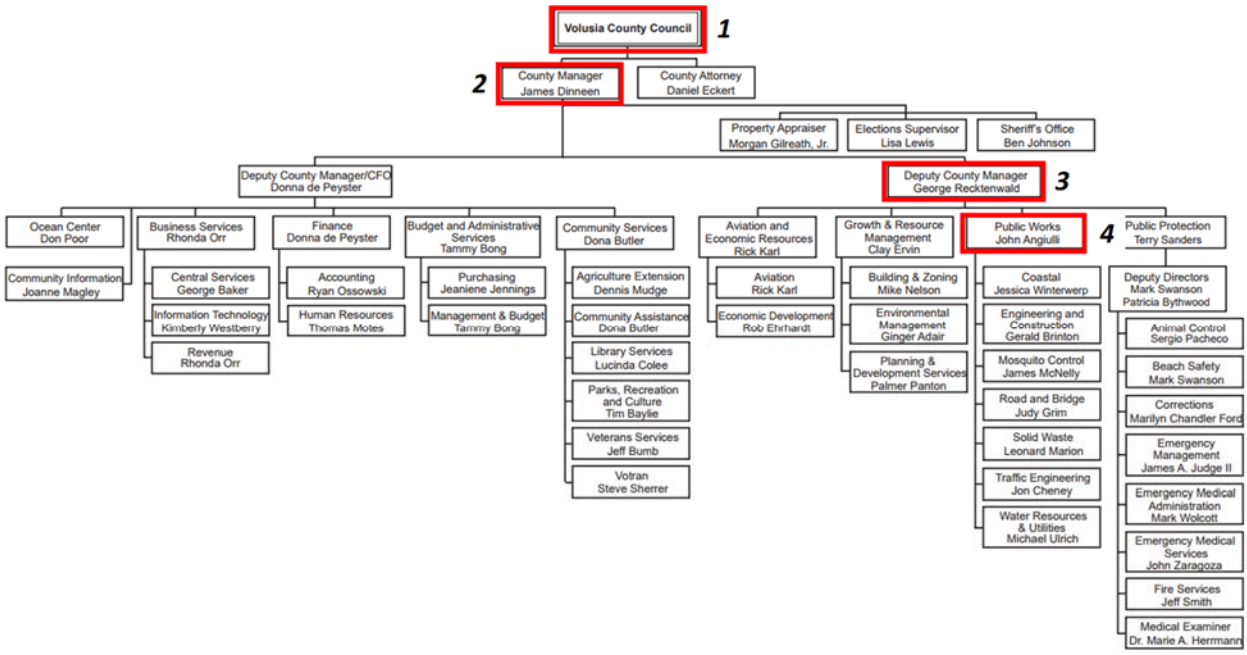
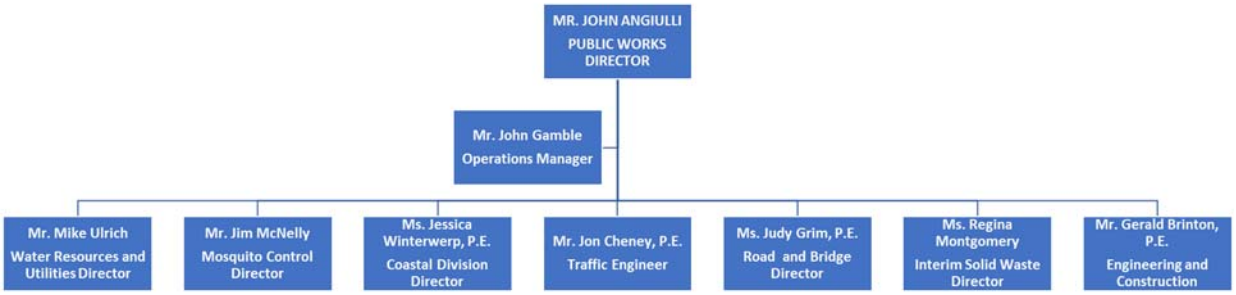


Figure 2-94 shows the management and leadership organizational structure of the Department, with the eight operational Divisions including Administration. The operational Divisions include Coastal, Mosquito Control, Road and Bridge, Traffic Engineering, Solid Waste, and Water

Resources and Utilities. There is also a support Division of Engineering and Construction who directly reports to the Public Works Director.

Figure 2-94
Public Works Management and Leadership Structure



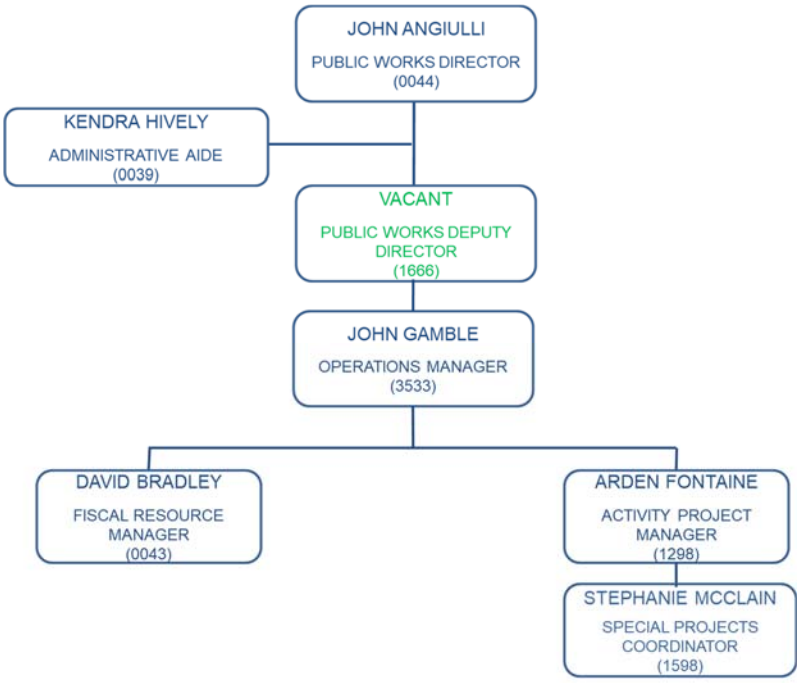
All resource information is from the point in time at which the original organization charts were received. Any changes that were made to the organization during the review are not reflected in this information. The Department of Public Works is managed by the Director of Public Works and is divided into seven Divisions, and nine functions. The operational Divisions of the Department are:

2.4.1.1 Public Works Administration

The administrative unit includes the Public Works Director, Operations Manager, Fiscal Resource Manager, Activity Project Manager, Special Project Coordinator and Administrative Aide. This groups general responsibilities include providing management and support to the Department's Divisions. In addition, this group compiles and monitors the Public Works budget and calculates overhead, oversees contracts and special projects, assists with GIS needs, as well as provides administration and work planning for the Lucity database. The group has five full-time employees and is shown in Figure 2-95.

The span of control of the Public Works Director is 1:9. The span of control for the vacant Public Works Deputy Director is 1:1. The span of control for the Operations Manager is 1:2. The span of control for the Activity Project Manager is 1:1.

Figure 2-95
Public Works Administration
Organizational Structure

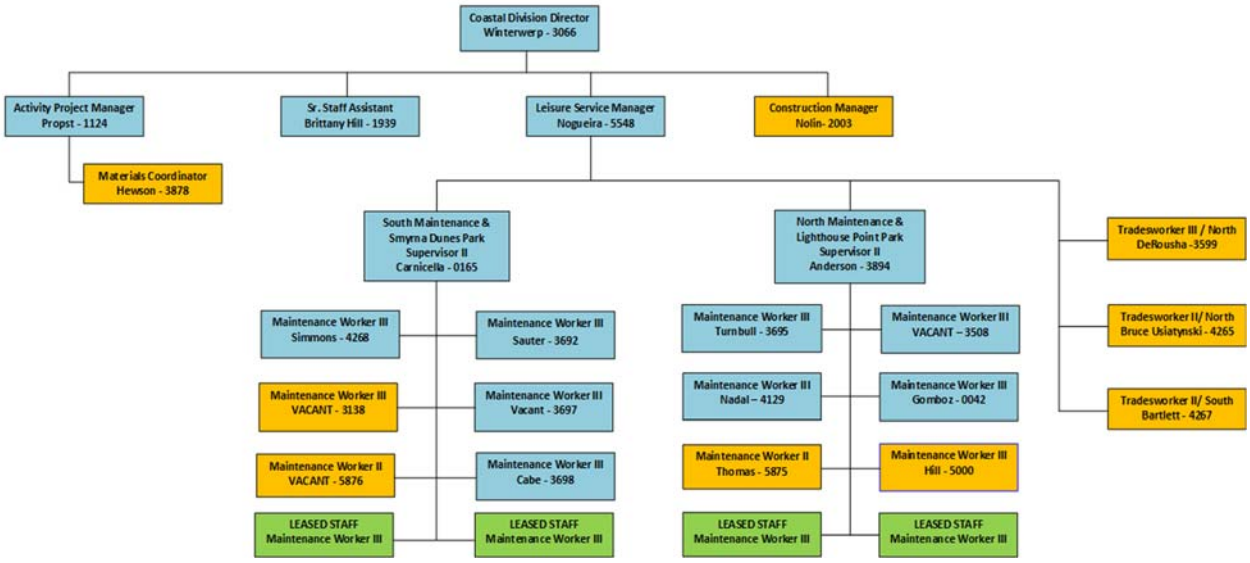


2.4.1.2 Coastal

Coastal is responsible for the repair, maintenance and operation of the County's beach access points, including dune walk overs, vehicle ramps, sidewalks and paths. They are also responsible for the County's ten coastal parks including Smyrna Dunes, Lighthouse Point, and Sun Splash. Staff in the Division is also responsible for the monitoring of beach vendors along the forty-seven miles of Volusia County beaches. Coastal has 24 employees and four leased staff. This Division is shown in Figure 2-96 from information provided from the County when the project started in 2017.

The Division is led by the Coastal Division Director and has a span of control of 1:4. The span of control for the Activity Project Manager is 1:1. The span of control for the Leisure Service Manager is 1:5. Both North and South Maintenance Supervisor II's span of control is 1:8. The colored boxes depict the two funding sources with blue being Port Fund (114) and yellow being General Fund with green for contract or leased employees.

Figure 2-96
Coastal Division
Organizational Structure

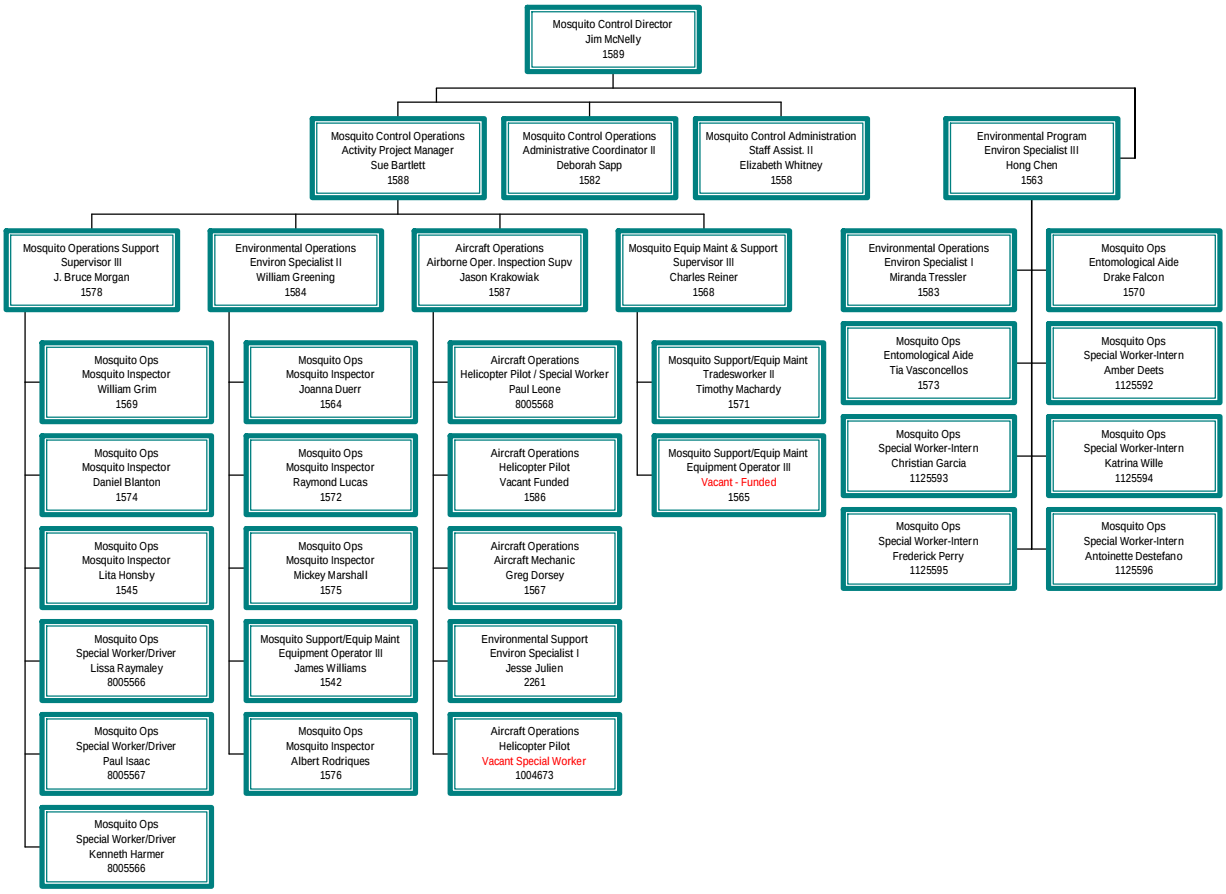


2.4.1.3 Mosquito Control

Mosquito Control is responsible for the abatement of mosquitoes through inspection and surveillance, chemical application for mosquito control (truck and helicopter), setting and monitoring traps and testing sentinel chickens. They are also responsible for biological control, mosquito education, as well as monitoring mosquito population trends and virus presence. Mosquito Control has twenty-nine full-time employees and eleven half-time employees. This Division is shown in Figure 2-97 with red text indicating unfilled positions.

The Division is led by the Mosquito Control Division Director and has a span of control of 1:4. The Activity Project Manager has a span of control of 1:4 and the Environmental Specialist III is 1:8. The span of control for the classification of Supervisor III ranges for 1:2 to 1:6. The Environmental Specialist II's span of control is 1:5, and the Airborne Operations Inspection Supervisor's span of control is 1:5.

Figure 2-97
Mosquito Control Division
Organizational Structure



2.4.1.4 Road & Bridge and Drainage Task Team

Road and Bridge is responsible for maintaining the County's roadways, mowing, cemeteries, signs, markings and bridges. The Drainage Task Team (DTT) is responsible for the repair, maintenance and operation of the County's stormwater assets. Road and Bridge has 108 full-time employees, six part-time, and three intermittent positions. The DTT has fifty-two full-time positions. The Road and Bridge Division is shown in Figure 2-98, and the Drainage Task Team is shown in

Figure 2-99. The colored boxes in both figures indicate schedules, unfilled positions, split funding, bridge tenders and supervisor categories.

Road and Bridge and DTT are both led by a single Division Director. Their individual span of direct control is 1:3 and they have a shared span of control of 1:6. The Director and Engineering Section Manager share leadership of six staff (three in Roads and Bridge and three in Drainage) with an Engineering Section Manager who has a direct span of control of 1:1 and a shared span of control of 1:6.

The Road and Bridge Division's Administrative Coordinator II's span of control is 1:2 with a shared span of control of 1:6 with the Special Project's Coordinator. For the DTT, these two positions have a shared span of control of 1:3. Road and Bridge's Public Works Services Supervisor in DeLand has a span of control of 1:3 and the Public Works Services Supervisor in Holly Hill has a span of control of 1:4. The Trades Supervisor has a span of control of 1:15 with

six full-time and four part-time Bridge Tenders. The Supervisor III's span of control varies between 1:4 and 1:11. The Trades Works III's span of control varies between 1:2 and 1:4.

The DTT's Public Works Services Supervisor's span of control in both DeLand and Holly Hill is 1:3. The span of control for the Civil Engineer III is 1:1. The span of control for the Supervisor III varies between 1:4 and 1:10.

Figure 2-98
Road and Bridge Division
Organizational Structure

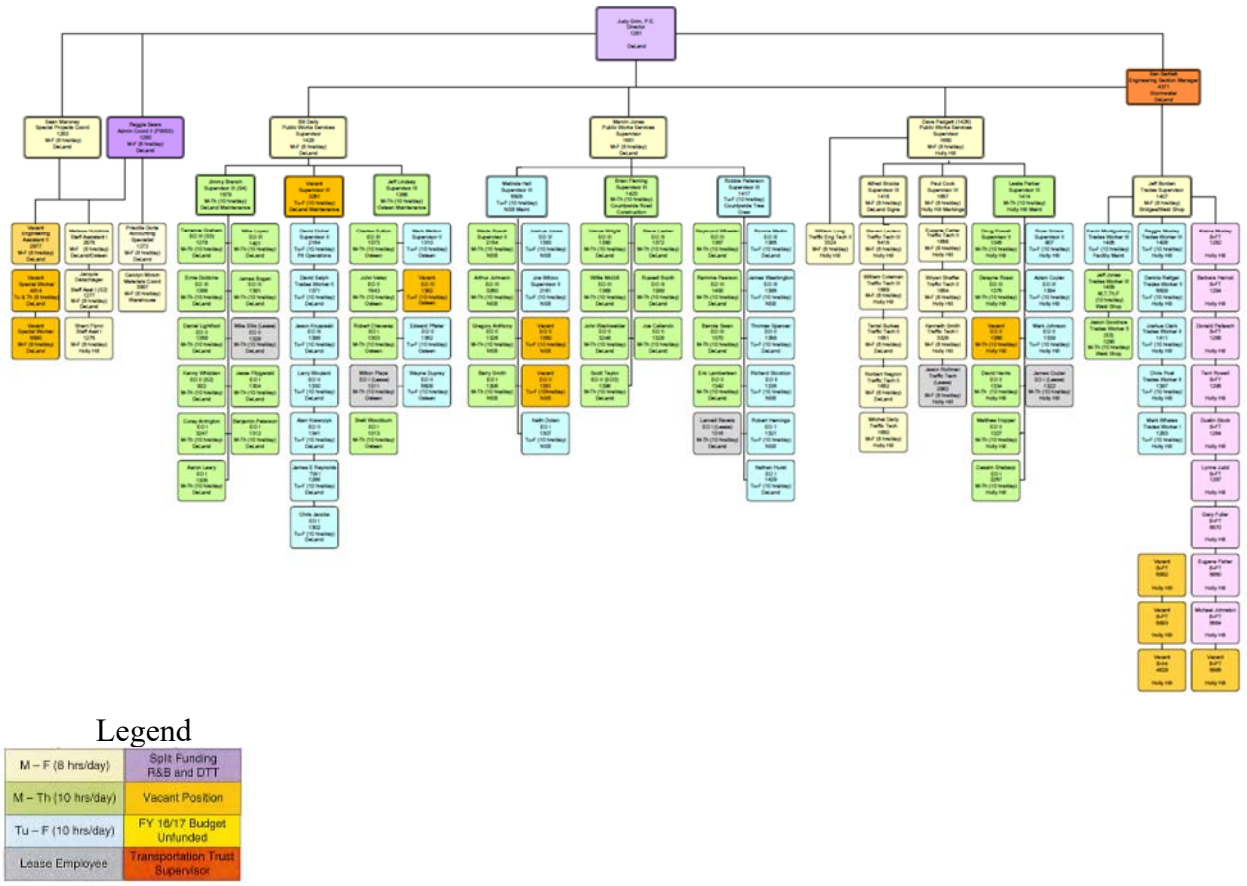
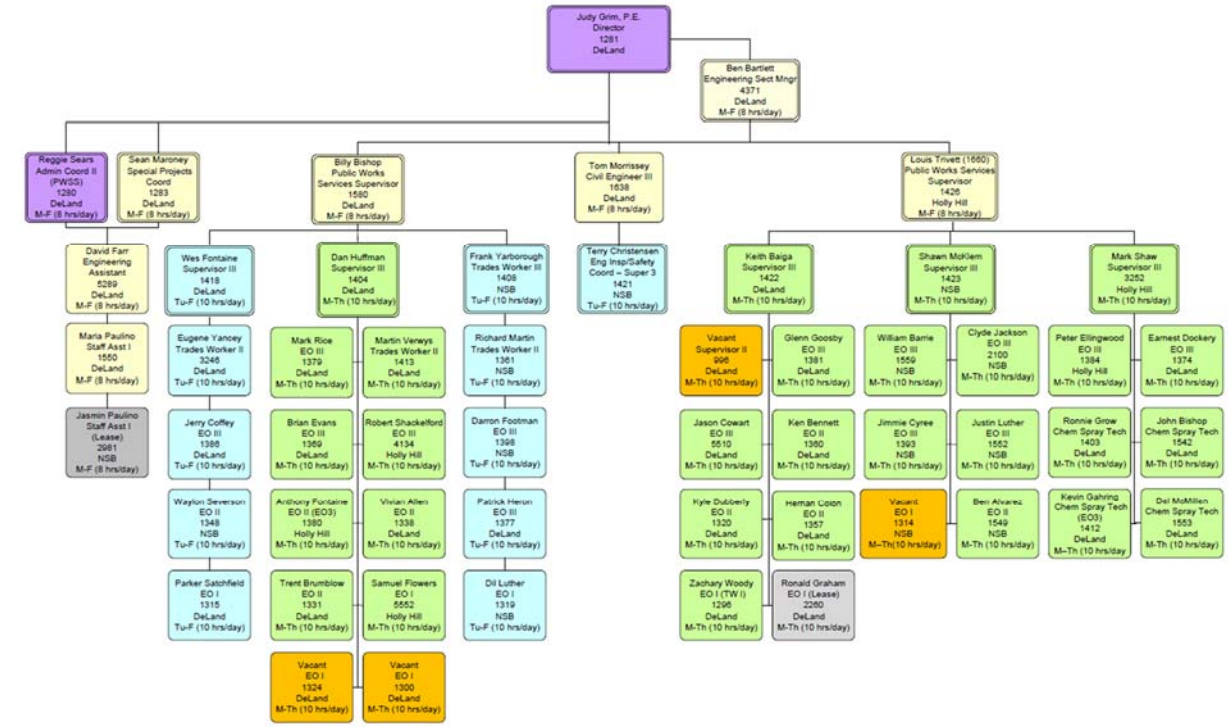


Figure 2-99

Drainage Task Team
Organizational Structure



Legend

M – F (8 hrs/day)	Split Funding R&B and DTT
M – Th (10 hrs/day)	Vacant Position
Tu – F (10 hrs/day)	FY 16/17 Budget Unfunded
Lease Employee	Transportation Trust Supervisor

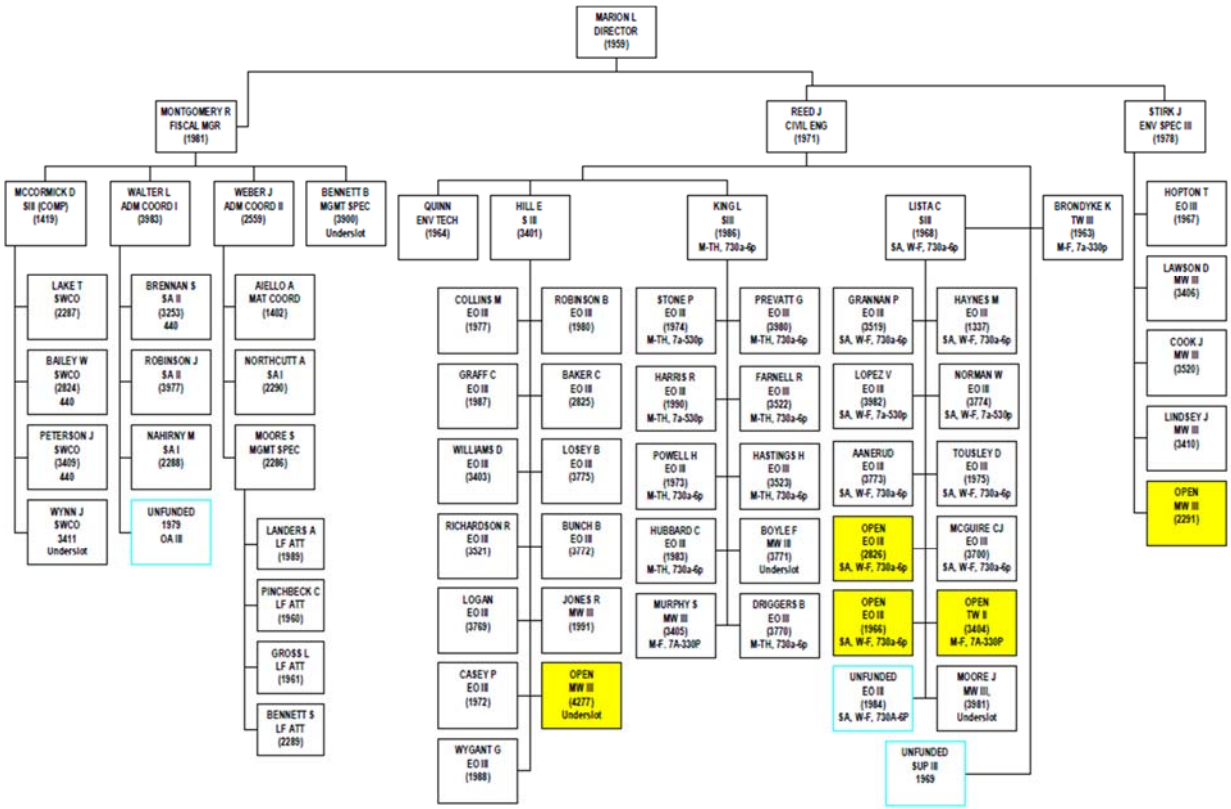
2.4.1.5 Solid Waste

Solid Waste is responsible for the operation of Tomoka Landfill and Transfer station, as well as consumer waste collection recycling and educational programs. Solid Waste has seventy (70) full-time positions. This Division is shown in Figure 2-100 with unfilled positions in the yellow boxes, and the blue boxes showing unfunded positions.

This Division is led by the Solid Waste Division Director who has a span of control of 1:3. The Fiscal Manager's span of control is 1:4. The span of control for the Civil Engineer is 1:5. The span of control for the Environmental Specialist III is also 1:5. The Administrative Coordinator I's span of control is 1:4. The Administrative Coordinator II's spans of control 1:3. The Management Specialists span of control is 1:4. The span of control for the Supervisor IIIs vary between 1:10 to 1:12.

Figure 2-100

Solid Waste Division
Organizational Structure



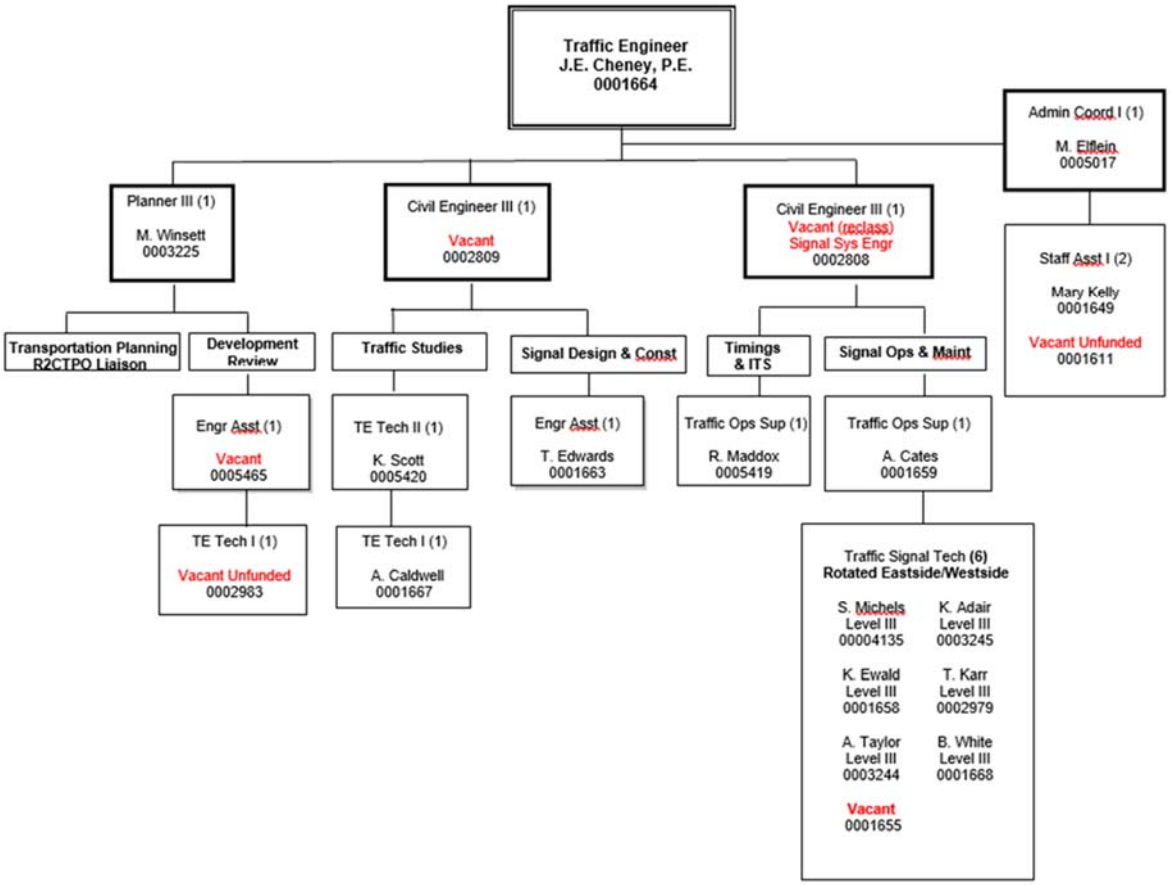
2.4.1.6 Traffic Engineering

Traffic Engineering is responsible for the repair, maintenance, inspection and operations of traffic signals. In addition, Traffic Engineering performs or monitors traffic studies and control signal timing. Traffic Engineering has twenty-one full-time positions. This Division is shown in Figure 2-101 with red text depicting vacant positions.

The Division is led by the County's Traffic Engineer who has a span of control of 1:4. The Planner III and Administrative Coordinator I both have spans of control of 1:2. The Civil Engineer III has a span of control of 1:3 and the span of control for the Traffic Operations Supervisor is 1:7.

Figure 2-101

Traffic Engineering Division
Organizational Structure



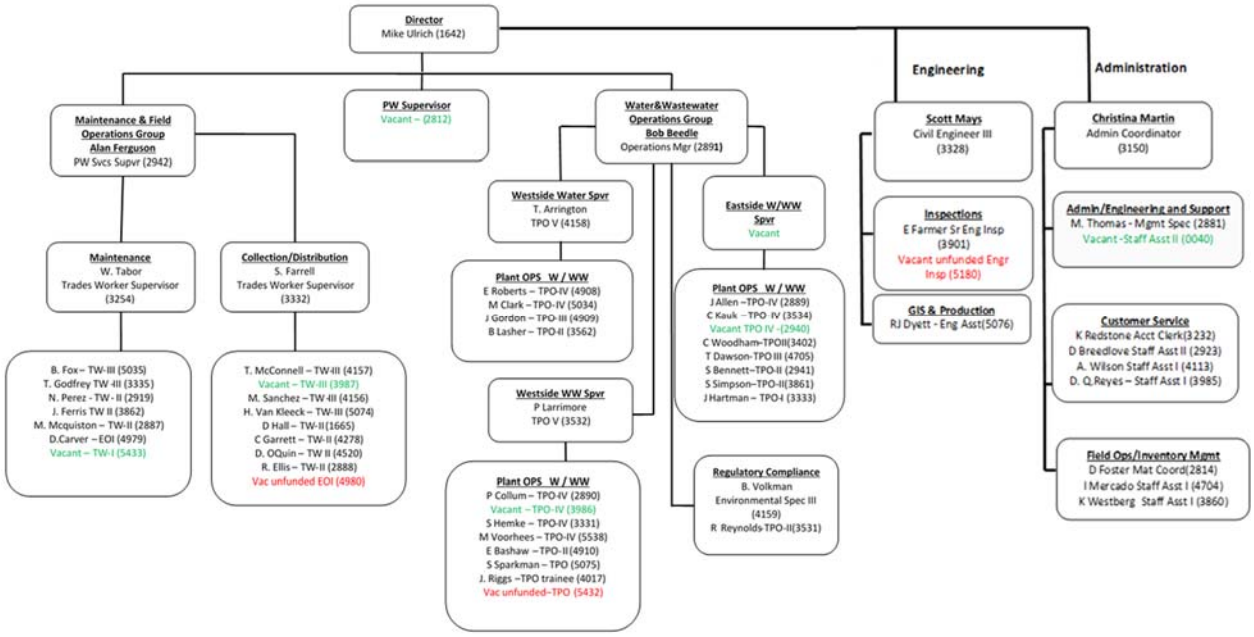
2.4.1.7 Water Resources & Utilities

Water Resources and Utilities is responsible for the repair, maintenance and operation of water and sewer treatment plants, as well as water quality, utility billing, water distribution lines, sewer collections lines and adjoining assets such as manholes and meters. Water Resources and Utilities have sixty-two (62) full-time positions and two special workers, of which one is full-time and the other is part-time. This Division is shown in Figure 2-102 with ten being unfilled and green vacant.

The Division is led by the Water Resources and Utilities Director who has a span of control of 1:4. The Public Works Services Supervisor has a span of control of 1:2. The Civil Engineer has a span of control of 1:3. The Operations Manager and Waste Supervisor both have spans of control of 1:4. The Wastewater Supervisor has a span of control of 1:8. The span of control for the Administrative Coordinator is 1:9.

Figure 2-102

Water Resources and Utilities Division
Organizational Structure



2.4.2 Historical Staffing

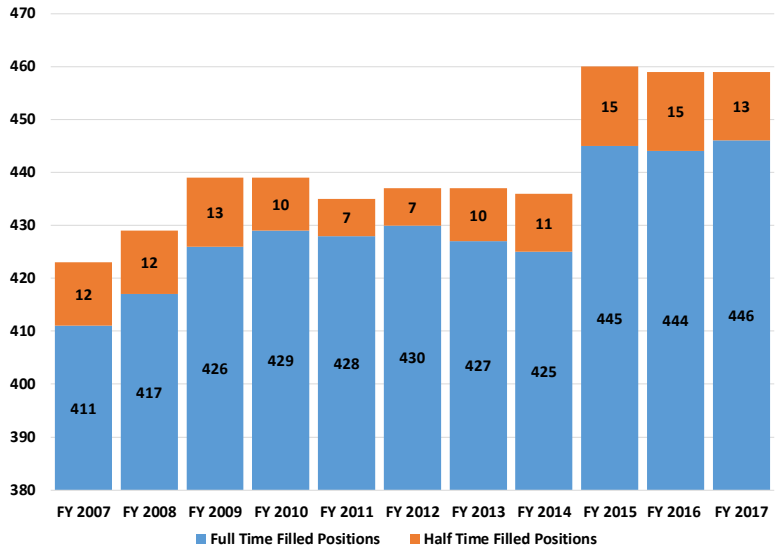
The Public Works Department has historically averaged over 430 FTEs, 11.36 part-time employees over the past ten years and currently has 446 full-time and 13 part-time employees.

Figure 2-103 shows the historical staffing for full-time and part-time employees for the Department. The Coastal Division was added in FY2015, which added twenty-one full-time and two part-time employees to the Department's total accounting for all the increase in full time staff for the Department.

During that timeframe, the Public Works Administration group averaged six (6) full-time employees, Engineering & Construction averaged fifty-two (52) full-time employees, Mosquito Control averaged over thirty-two (32) full-time employees and almost three half-time employees, Traffic Engineering averaged over twenty-four (24) full-time employees, Road and Bridge has averaged over 136 full-time employees and over six half-time employees, Solid Waste has averaged over seventy-one (71.55) full-time employees and more than one half-time employee, Water Resources and Utilities has averaged over sixty-five (65) full-time employees and less that ¼ of a half-time employee, and Drainage (Stormwater Utilities) has averaged over fifty-six (56) full-time employees and one (1) half-time employees.

Figure 2-103

11-year Historical Staffing Levels



2.4.3 Employee Classifications

There are currently 446 full time and 13 half-time employees. Further, in the Divisions of Coastal, DTT, Mosquito Control, Road and Bridge, Traffic Engineering, Solid Waste and Water Resources and Utilities, there are 387 full time and 13 half-time employees. Within these Divisions there are 53 job classifications. These classifications and the number of employees in each class by Division are shown in Figure 2-104.

Coastal has ten classes, DTT twelve classes, Mosquito Control twelve classes, Road and Bridge have nineteen classes, Solid Waste has seventeen classes, Traffic Engineering has nine classes, and Water Resources and Utilities have eighteen classes.

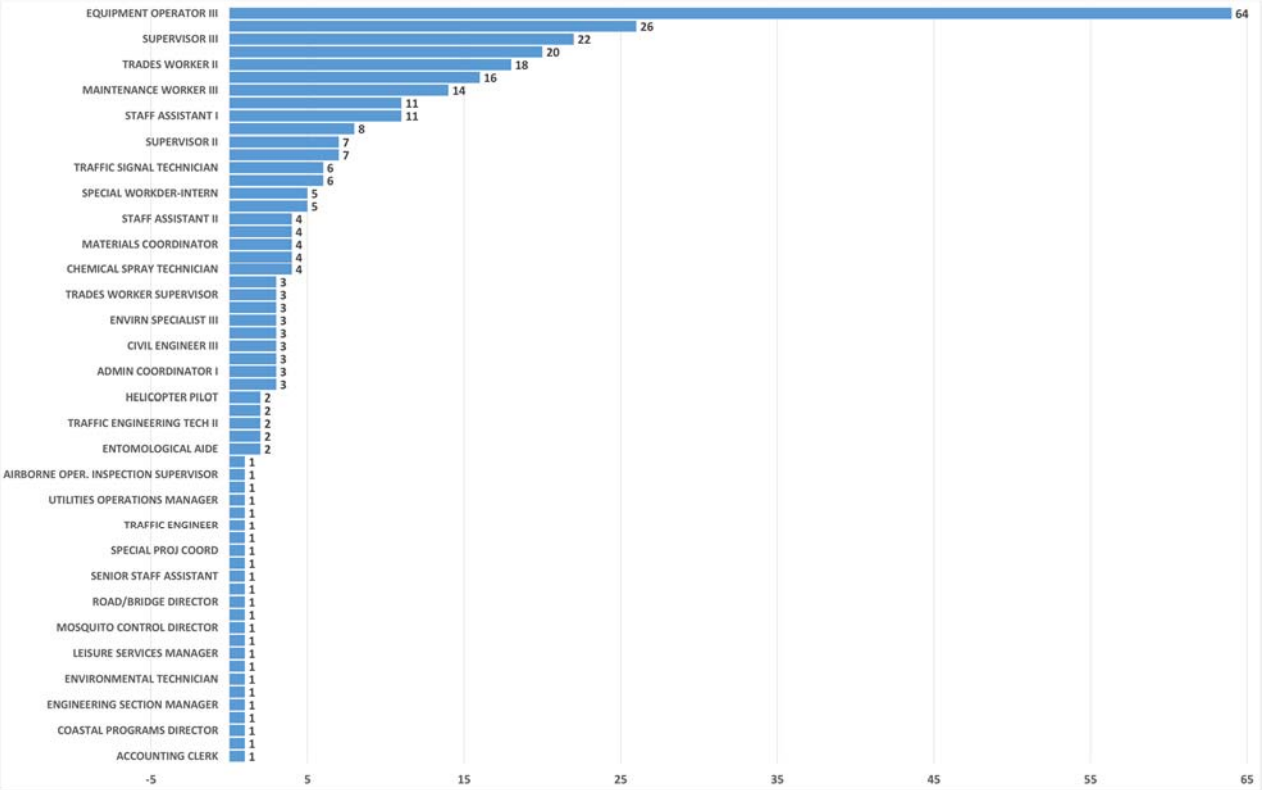
Figure 2-104

Division Employee Classes

	Divisions							
Employee Class	**Coastal**	**Mosquito Control**	**Road And Bridge**	**Solid Waste**	**Drainage**	**Traffic Engineering**	**Water Resources & Utilities**	**Totals**
ACCOUNTING CLERK							1	1
ACCOUNTING SPECIALIST			1					1
COASTAL PROGRAMS DIRECTOR	1							1
DIR OF WATER RES. & UTILITIES							1	1
ENGINEERING SECTION MANAGER					1			1
ENVIRN SPECIALIST II		1						1
ENVIRONMENTAL TECHNICIAN				1				1
FISCAL RESOURCE MANAGER				1				1
LEISURE SERVICES MANAGER	1							1
MAINTENANCE WORKER II	1							1
MOSQUITO CONTROL DIRECTOR		1						1
PLANNER III						1		1
ROAD/BRIDGE DIRECTOR			1					1
SENIOR ENGINEERING INSPECTOR							1	1
SENIOR STAFF ASSISTANT	1							1
SOLID WASTE DIRECTOR				1				1
SPECIAL PROJ COORD			1					1
TRADES WORKER I			1					1
TRAFFIC ENGINEER						1		1
TRAFFIC ENGINEERING TECH I						1		1
UTILITIES OPERATIONS MANAGER							1	1
HELICOPTER PILOT/SPECIAL WORKER		1						1
AIRBORNE OPER. INSPECTION SUPERVISOR		1						1
AIRCRAFT MECHANIC		1						1
ENTOMOLOGICAL AIDE		2						2
ENVIRN SPECIALIST I		2						2
TRAFFIC ENGINEERING TECH II			1			1		2
TRAFFIC OPERATIONS SUPERVISOR						2		2
HELICOPTER PILOT		2						2
ACTIVITY PROJECT MANAGER	2	1						3
ADMIN COORDINATOR I				1		1	1	3
ADMIN COORDINATOR II		1	1	1				3
CIVIL ENGINEER III				1	1		1	3
ENGINEERING ASSISTANT					1	1	1	3
ENVIRN SPECIALIST III		1		1			1	3
MANAGEMENT SPECIALIST				2			1	3
TRADES WORKER SUPERVISOR			1				2	3
SPECIAL WORKER/DRIVER		3						3
CHEMICAL SPRAY TECHNICIAN					4			4
LANDFILL ATTENDANT				4				4
MATERIALS COORDINATOR	1		1	1			1	4
SOLID WSTE MGMT COMPLIANCE OFF				4				4
STAFF ASSISTANT II		1		2			1	4
PUBLIC WORKS SERVICES SUPV			2		2		1	5
SPECIAL WORKDER-INTERN		5						5
BRIDGETENDER			6					6
TRAFFIC SIGNAL TECHNICIAN						6		6
MOSQUITO CONTROL INSPECTOR		7						7
SUPERVISOR II	2		5					7
TRAFFIC MAINTENANCE TECHNICIAN			8					8
STAFF ASSISTANT I			3	2	1	1	4	11
TRADES WORKER III	1		3	1	1		5	11
MAINTENANCE WORKER III	7			7				14
EQUIPMENT OPERATOR I			8		7		1	16
TRADES WORKER II	2	1	5		3		7	18
TREATMENT PLANT OPERATOR							20	20
SUPERVISOR III		2	10	4	6			22
EQUIPMENT OPERATOR II			19		7			26
EQUIPMENT OPERATOR III		2	19	29	14			64
Totals	**19**	**35**	**96**	**63**	**48**	**15**	**51**	**327**

The amount of positions per category can be seen in Figure 2-105. The equipment operator has the most positions by category with 21 categories only having one position filled.

Figure 2-105
Division Employee Classes Breakdown

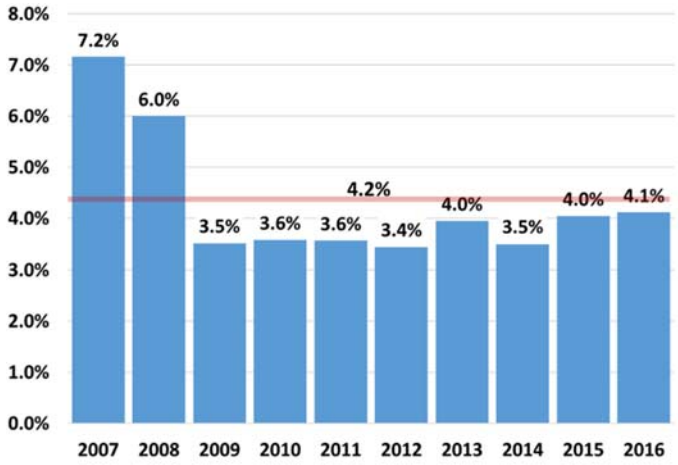


2.4.4 Overtime

For the past ten years, the operational Divisions have averaged 28,883 hours of overtime annually, which represent an average of 4.2% of all reported hours being overtime. Overall, the Divisions have significantly reduced overtime when comparing 2007 with 2016.

Figure 2-106 shows the average percentage of overtime from 2007 through 2016. This is a reduction of just under 3% between the two periods or just over 3% when comparing 2007 with 2016.

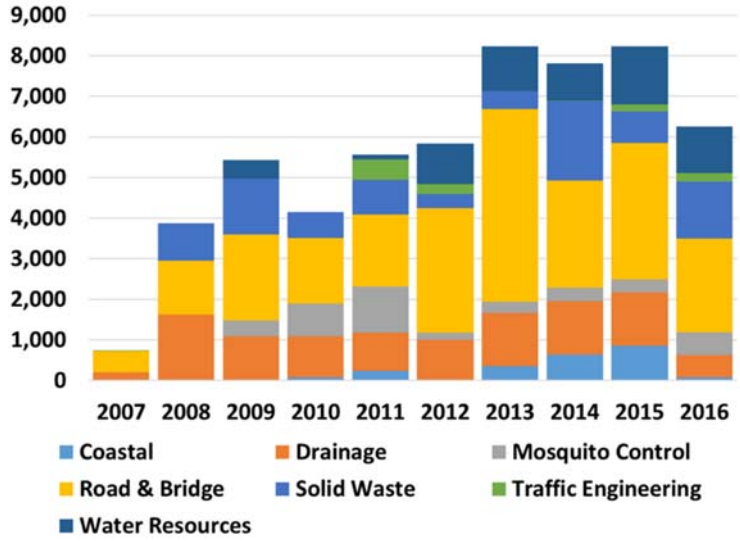
Figure 2-106
Historical Overtime



2.4.5 Family Medical Leave Act (FMLA)

Benchmark indicators are used to measure the impact of leave, including the recorded Family Medical Leave Act (FMLA) time. From 2007 through 2016 reported FMLA has averaged 5,612 hours annually. In addition, the use of this class of leave has increased considerably. The use of historical FMLA hours are shown in Figure 2-107.

Figure 2-107
Historical FMLA



2.4.6 Resources

The resources used by the Public Works Department are located throughout the 14 different staging sites. The County resources of labor, equipment and materials were reviewed. County Public Works staff work varied schedules depending on the Division and crew.

Generally, most Road and Bridge, Drainage, and Solid Waste crews work four days over a one-week period for 40 hours throughout the year with alternating Mondays and Fridays off (split 4 days at 10 hours). This allows for 5-day coverage of all maintenance activities. Traffic Engineering and Mosquito Control work 5 days at 8 hours. The Utilities Division provides seven-days-a-week coverage for water and waste water treatment plants from 7:30am to 11:30pm. In general employees for Utilities work 5 days at 8 hours with a few employees working 4 hours at 10 hours. Solid Waste generally works 4 days at 10 hours. Due to the hours of operation of the Tomoka Landfill and Transfer station, some employees work 3 days at 11-hours with 1 day at 7-hour schedules to provide coverage on the weekend.

A detailed listing of labor and equipment, including the number of units is outlined below.

2.4.6.1 Labor

The Public Works Department has a total of 446 full-time positions with 387 in the operational Divisions. In addition to the 387 positions, the County also utilizes thirteen temporary staff. The Public Works Department is made up of seven separate Divisions, which include Coastal, Road and Bridge and Drainage (Drainage Task Team), Mosquito Control, Water Resources and Utilities (Water Utilities), Solid Waste, Engineering & Construction and Traffic Engineering. The information LAC analyzed is based upon the point in time it was received, which was September 25, 2017. New organizational structures and vacant positions may not be reflected after that point.

Figure 2-108 indicates the number of employees by operational Division.

Figure 2-109 indicates the percentage of employees by Division. Road and Bridge have the most employees of all the Divisions equaling 34% or 134.5 employees. Solid Waste employees make

up the next highest total number of employees at 18% or 70 employees. Water Resources and Utilities have 61 employees or 16%, Drainage has 55.5 employees or 14%, Mosquito Control has 35 employees or 7%, Coastal has 23 employees or 6% and the smallest group is Traffic Engineering with 21 employees or 5% of the total employees in the operational Divisions.

Figure 2-108
Number of Employees Per Division

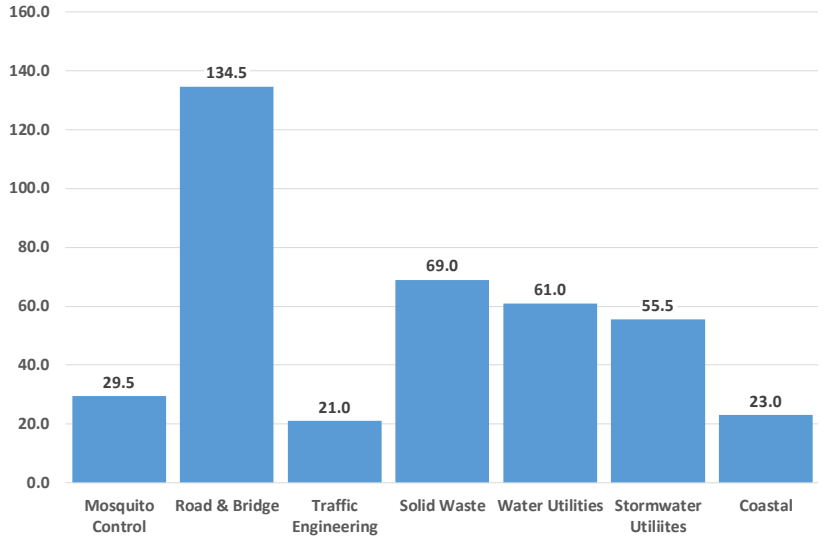
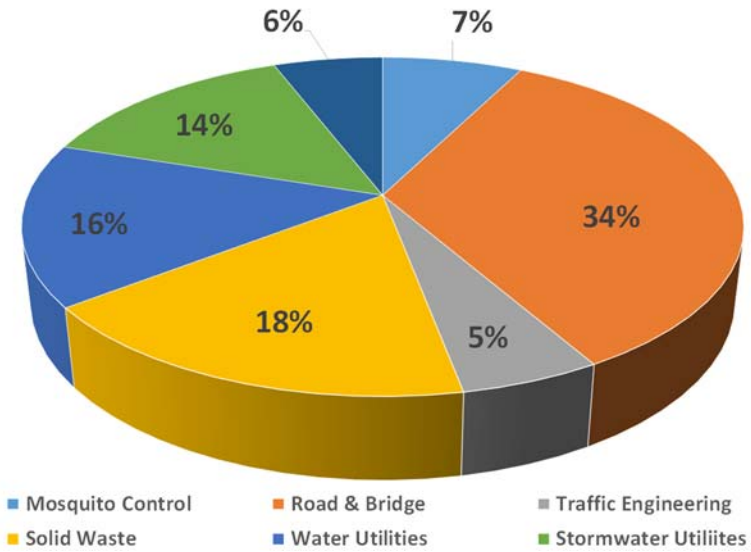


Figure 2-109
Percentage of Operational Employees



All Divisions provide 24/7 coverage through various schedules and methods. For after hours and weekend work, Traffic Signals utilize a six week on-call rotation using tree statuses, Primary, Secondary, and Off Call. The Primary is the first to respond to a call out, drives a vehicle home and receives a minimum of two hours of pay for a call out. The Secondary is the Primary's first

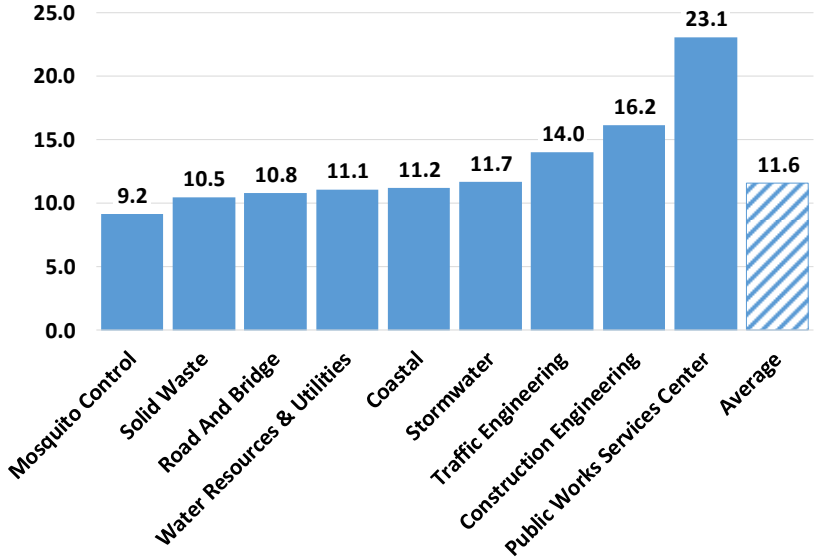
support if needed. Water Resources and Utilities have four on-call staff, one east-side, one west-side, one water and one supervisor. Their on-call rotations are ten days on and four days off. Road and Bridge and Drainage have six employees on-call. They include one east-side traffic signs and one west-side. They also have Tree and Bridge on-call employees with take home vehicles. Solid Waste does not have a formalized after-hours call out schedule, yet they do have an emergency contact list they utilize if needed. Similarly, Mosquito Control does not utilize an on-call employee, yet if needed, a supervisor will be called out. They also receive overtime pay for call outs. Coastal utilizes an unwritten policy for on-call rotation where one person is the on-call employee every two weeks.

2.4.6.2 Length of Service

The hire date of employees was used to generate

Figure 2-110, which shows the average time with the County based upon Division. On average employees have over eleven years of service with the County. There are several classifications that have over 25 years of experience including the Operations Manager who has over 36. The Leisure Services Manager, Traffic Operations Supervisor, and Environmental Technician all have over 28 years of experience, while the Director of Water Resources and Utilities, the Right of Way Specialist and the Public Works Services Supervisor all have over 26 years of service.

Figure 2-110
Years of Service by Division



2.4.6.3 Equipment

Using data from the Lucity database and data provided by Fleet Management, there are 684 pieces of rolling stock and equipment assigned to the Public Works Department's operational Divisions, including specialty equipment such as the two (2) helicopters and boats that are utilized for mosquito control efforts.

Figure 2-111 shows the total number of pieces of equipment by Division from Fleet, excluding the helicopters and non-rolling stock. Coastal has eighteen (18) rolling stock, Drainage has sixty-four (64), Mosquito Control has seventy-five (75), and Road and Bridge have the most rolling stock at 305 followed by Solid Waste with 119. Traffic Engineering has 22 rolling stock, and Water Resources and Utilities have 86.

Figure 2-111

Rolling Stock by Divisions

	Divisions							Totals
Rolling Stock Class	Coastal	Drainage	Mosquito Control	Road and Bridge	Solid Waste	Traffic Engineering	Water Resources and Utilities	
BACKHOE		1		6	1		1	9
BULLDOZER CAT5		1						1
BULLDOZER CAT6				1				1
BULLDOZER CAT6 SW					10			6
BULLDOZER CAT7 SW					1			1
BULLDOZER CAT8 SW					1			1
CAMERA VAN		1		1				2
CHIPPER TRUCK				3				3
CURBING MACHINE				2				2
EXCAVATOR LARGE				1	3			4
EXCAVATOR LONG REACH					1			1
EXCAVATOR MEDIUM		4						4
EXCAVATOR SMALL		1					1	2
FORKLIFT			1	6	2			11
GRADALL		3		8				12
GRADALL TRACK					1			1
GRADER				12	2			14
GRADER MINI				1				1
LOADER, FRONT END LARGE				1	10			11
LOADER, FRONT END MEDIUM		1		9				10
LOWBOY TRUCK				3				3
LOWBOY TRUCK		1						1
PAINT STRIPER				2				2
PAVING MACHINE				2				2
SEDAN						2		2
SKID STEER		1		6	4			11
SLOPE MOWER				5	1			6
SPYDER		1		1	1			3
STREET SWEEPER		3		2				5
SUV			1	4	7	1	3	15
SWEEPER SW					2			2
TANDEM WHEEL VIBRATORY ROLLER				6				6
TRACTOR	1	1	3	31	3		7	45
TRACTOR BROOM/SWEEPER				3	1			4
TRUCK BUCKET				6		7		13
TRUCK CLAM				3				3
TRUCK DISTRIBUTOR				2				2
TRUCK DUMP OFFRD					12			12
TRUCK FLATBED		10		41	4	1	2	58
TRUCK NURSE			0					1
TRUCK OIL					1			1
TRUCK PICKUP	17	13	28	53	26	1	60	230
TRUCK PICKUP HD		5	2	33			10	50
TRUCK PLATFORM						5		5
TRUCK POTHOLE PATCH				4				4
TRUCK PRISON				7				7
TRUCK ROLLOFF SW					4			4
TRUCK SCRAPER				1				1
TRUCK SPRAY		7	1					8
TRUCK SPRAY LARGE		1						1
TRUCK SPREADER				2				2
TRUCK TANDEM		8		31				40
TRUCK TRACTOR SW					18			18
TRUCK VACUUM		1		2				3
TRUCK WATER				3				3
TRUCK WATER SW					2			2
VAC TRAILER					1			1
VAN				1		2	1	4
VAN BUCKET						3		3
YARD DOG TRUCK							1	1
Totals	**18**	**64**	**36**	**305**	**119**	**22**	**86**	**681**

The equipment information, usage and cost were determined utilizing the provided data from the Lucity database. Also, this data was taken as a point in time record of the County's vehicles at the time of the initial review and will not reflect new purchases or vehicles that have been salvaged. In addition, there may be some difference between the County's Fleet System and the Lucity database.

2.4.6.4 Average Annual Hours of Vehicles and Equipment

Figure 2-112 through Figure 2-118 show the average annual reported hours by vehicle and equipment class for each Division. Each Figure shows a nine-year history, except for the Coastal Division. The Coastal Division began to record data in the Public Works' Lucity database in the FY2014.

Figure 2-112 shows the three-year average for Coastal's six classes. They reported an average of 3,594 equipment hours annually with Litter Cart making up 46% and Pick up 38%.

Figure 2-112
Vehicles and Equipment Average Annual Hours – Coastal

Coastal Avg Hours by Type	CY14	CY15	CY16
ATV	351		23
LITTER CART	2,169	1,692	1,112
MOWER WALK BEHIND	63	50	28
RIDING MOWER	54	50	93
TRAILER			1,008
TRUCK PICKUP	1,514	1,259	1,317

Figure 2-113 shows the nine-year average for the Drainage Task Team. They have averaged a total of 14,514 reported equipment hours annually with Truck Pickup HD making up 10% and Truck Vacuum, Truck Tandem both making up 9%, and Riding Mower, Camera Van and Street Sweeper making up 8% individually.

Figure 2-113
Vehicles and Equipment Average Annual Hours – Drainage

Drainage Avg Hours by Type	CY08	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16
5.5 HP 200 GALLON SKID SPRAYER		30	742	897	89	1,116	1,155	1,112	703
BACKHOE					491	364	222	525	441
BOAT		4							
BULLDOZER CAT5	1,012	268	304	357	255	204	240	80	56
CAMERA VAN							945	1,321	1,366
CONCRETE SAW SP						5	9	83	
EXCAVATOR MEDIUM	949	1,022	695	1,006	1,012	952	728	645	627
EXCAVATOR SMALL				369	1,161	1,137	1,081	1,071	975
GRADALL	506	675	1,068	1,061	1,089	760	623	611	704
HYDROSEEDER	26	66	77	76	34	17	42	5	1
LITTER CART		122	346	503	397	289	316	189	248
LOADER, FRONT END MEDIUM									124
LOWBOY TRUCK	254	477	437	722	515	200	387	325	225
MIXER							132	340	351
NOT DEFINED		510							
PUMP 2"	160	244	237	1					
PUMP 3"		80			15				
RIDING MOWER						843	1,265	1,412	960
SKID STEER		340	1,160	1,194	1,212	826	755	823	433
SPYDER							76	643	1,029
STREET SWEEPER		755	1,598	1,501	1,036	1,120	1,155	1,283	1,311
TRACTOR							594	1,352	918
TRAILER	296	166	315	279	722	667	1,035	808	753
TRUCK FLATBED	143	590	958	1,016	1,495	1,230	1,312	1,414	1,083
TRUCK PICKUP	534	972	785	838	513	622	874	1,071	683
TRUCK PICKUP HD	1,310	1,038	1,706	1,775	779	1,429	1,675	1,459	1,292
TRUCK SPRAY	832	1,074	1,279	1,356	1,144	858	1,197	1,091	885
TRUCK SPRAY LARGE		830	1,186	1,047	1,229	310	204	130	120
TRUCK TANDEM	592	1,324	1,497	1,368	1,424	1,389	1,157	1,172	1,287
TRUCK VACUUM					32	1,800	1,702	1,324	1,367

Figure 2-114 shows the nine-year average for Mosquito Control. They have averaged a total 3,300 reported equipment hours annually with the Amphibious Excavator making up 27%, Truck Pick up 25%, and Airboat make up 20% of the total average hours.

Figure 2-114
Vehicles and Equipment Average Annual Hours – Mosquito Control

Mosquito Control Avg Hours by Type	CY08	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16
AIRBOAT	593	1,242	770	674	695	979	403	437	141
AMPHIBIOUS EXCAVATOR	551	494	1,108	1,401	1,522	1,189	271	516	
ATV	408	11	12	4		28	86	126	50
BOAT	200	404	582	239	199	154	140	64	52
BUFFALO TURBINE							20	33	42
FORKLIFT		5	12	45	37	6	18	6	30
GRADALL	29								
HELICOPTER	135	69	54	132	165	205	176	94	95
LITTER CART			329	23	196	70	19	17	70
LOWBOY TRAILER	11	8					4		
RIDING MOWER						9	65	50	105
SLIDE IN ULV	31	54	46	87	94	56	68	162	172
SPRAY RIG		-	4						
SUV				23					
TRACTOR	123	2	26		21	26	17	9	4
TRAILER	147	15	301	610	770	679	57	59	78
TRUCK NURSE	6		17	41	6				
TRUCK PICKUP	298	1,042	1,469	1,165	1,156	587	556	566	549
TRUCK PICKUP HD	1,444	385	32	19	223		25	218	73
TRUCK SPRAY					12	43	51	59	136
TRUCK TANDEM	570	179							

Figure 2-115 shows the nine-year average for Road and Bridge. They have averaged a total 24,044 reported equipment hours annually with Truck Pickup at 7%, Truck Pickup HD at 6, and Camera Van, Chipper Truck, Truck Vacuum, Truck Bucket, and Backhoe all averaging 5% individually.

Figure 2-115
Vehicles and Equipment Average Annual Hours – Road & Bridge

Road & Bridge Avg Hours by Type	CY08	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16
AIR COMPRESSOR	8	54	276	250	177	242	327	454	242
ARROW BOARD		33	309	469	396	148	59	161	98
BACKHOE	1,225	919	1,686	1,595	1,295	1,093	1,067	572	883
BITUMINOUS APPLICATOR						151	50	41	37
BLOWER EDGER									132
BOAT	208	150	49	28	70	192	169	65	128
BULLDOZER CAT6	459	527	669	520	474	235	439	334	57
CAMERA VAN	596	1,211	1,204	1,220	1,466	1,500	452		
CHAINSAW		1,020	1,882	20					
CHIPPER - TREE	594	1,037	579	893	716	742	911	941	910
CHIPPER TRUCK	799	998	775	1,200	1,210	1,243	1,191	1,818	1,726
CONCRETE GRINDER	11	15	11	76	42	40	50	48	16
CONCRETE SAW	29	38	27	75	13	11		5	
CURBING MACHINE		10	24	21	16	47	30	11	19
EXCAVATOR LARGE	1,006	520	723	586	494	385	124	93	147
FORKLIFT	325	142	239	147	33	123	253	154	80
GENERATOR PORTABLE	28	1		5			-	10	
GRADALL	831	913	1,205	813	832	776	728	646	719
GRADER	694	669	640	836	734	685	594	505	687
GRADER MINI	523	269	80						
LITTER CART	342	827	929	1,201	797	709	880	1,109	762
LOADER, FRONT END LARGE	659	82							
LOADER, FRONT END MEDIUM	511	539	1,242	923	504	636	542	475	370
LOWBOY TRAILER		6			3				
LOWBOY TRUCK	1,287	1,311	1,310	1,295	1,358	1,058	888	929	870
MESSAGE BOARD	107	153	741	737	752	491	466	597	953
MIXER	65	102	213	53	70	33	27	22	27
MOWER WALK BEHIND	1,208	1,556	1,575	664	432	532	85	6	34
NOT DEFINED			1,178						
PAINT STRIPER	1,142	915	862	656	954	472	806	829	768
PARKING LOT STRIPER				44	44	107	316	68	29
PAVEMENT LINE ERASER				8		86	203	183	209
PAVING MACHINE	125	170	275	119	130	133	332	371	427
POLE TRIM CHAIN SAW									
POWER SCREEN	456	772	834	250	519	251	640	598	324
PUMP 6"	140	170	10			7		5	
RIDING MOWER	579	530	544	490	804	689	843	967	766
SKID STEER	742	545	899	627	733	721	783	618	712
SLOPE MOWER	620	472	771	925	533	559	362	286	367
SPYDER	375	244	725	394	435	406	602		
STREET SWEEPER	461	331							
STUMP GRINDER	117	162	157	183	207	207	162	137	155
SUV	60			4	39	5		27	2
TAMPER	101	124	439	271	188	108	134	157	257
TAMPERSR	203	226	384	162	633	514	297	252	209
TANDEM WHEEL VIBRATORY ROLLE	189	87	165	358	359	403	345	358	320
THERMO TRAILER				292	196	210	185	381	440
TILLER		6	60	244	21		43	55	30
TRACTOR	890	995	996	1,111	1,236	1,195	896	903	796
TRACTOR BROOM/SWEEPER	545	600	857	419	207	631	547	370	274
TRAILER	430	680	653	636	708	663	701	822	749
TRENCH BURNER	75	362	770	410	357	771	1,146	1,052	898
TRUCK BUCKET	1,141	1,242	1,044	1,376	1,107	1,381	1,424	1,430	1,144
TRUCK CLAM	876	683	972	1,123	1,108	986	1,010	1,016	1,029
TRUCK DISTRIBUTOR	193	179	336	178	315	567	491	501	529
TRUCK FLATBED	929	911	1,004	981	1,055	936	1,107	1,015	864
TRUCK PICKUP	1,799	1,786	1,994	2,466	1,562	1,106	1,190	1,127	1,126
TRUCK PICKUP HD	1,384	1,427	1,328	1,671	1,489	1,254	1,559	1,516	1,179
TRUCK POTHOLE PATCH	959	781	1,005	1,025	1,170	660	722	551	643
TRUCK PRISON	1,575	1,011	971	693	1,136	1,024	684	325	102
TRUCK SCRAPER	138	186	59	115	88	2			
TRUCK SPREADER	228	220	142	291	318	380	268	133	234
TRUCK TANDEM	1,005	908	1,072	995	848	916	957	934	669
TRUCK VACUUM	1,157	1,242	1,463	1,348	1,241	574	695	799	1,563
TRUCK WATER	272	309	233	996	777	482	282	329	480
VAN	147	363	90	360	558	705	657	528	563

Figure 2-116 shows the nine-year average for Solid Waste. They have averaged a total 20,588 reported equipment hours annually, with Truck Pickup at 11%, Compactor at 9%, and Bulldozer Cat 6 SW, Loader, and Front-End Large all averaging 8% individually.

Figure 2-116
Vehicles and Equipment Average Annual Hours – Solid Waste

Solid Waste Avg Hours by Type	CY08	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16
ATV	94	1,091	685	91	17				
BACKHOE	9	787	707	706	386	232	43	286	324
BULLDOZER CAT6 SW					536	874	1,293	1,260	1,742
BULLDOZER CAT6SW	770	1,512	1,700	1,277	1,386	1,007	1,180	507	-
BULLDOZER CAT7SW	752	1,182	962	1,682	1,374	1,055	763	677	-
BULLDOZER CAT8 SW	1,152	2,001	1,669	911	662	1,474	1,217	1,087	547
COMPACTOR	656	1,260	1,800	1,921	1,935	2,290	1,845	2,169	2,194
EXCAVATOR LARGE	170	685	481	414	674	923	596	295	508
EXCAVATOR LONG REACH	48	453	416	333	239				
FORKLIFT	127	564	769	733	544	446	473	599	362
FUSION UNIT	4	98	365	368	196			13	
GENERATOR	18	1	-						
GRADALL TRACK	361	369	421	167	92	154			
GRADER	253	755	1,098	903	1,065	583	187	347	396
LITTER CART	47	1,029	651	381	424	489	504	828	711
LOADER, FRONT END LARGE	946	1,846	1,780	1,604	1,776	1,780	1,478	1,839	1,509
PUMP 4"	21	411	16	27	28				
PUMP 6"	336	213	29	53	31	34	67	50	184
PUMP 8"	771	534	12	1	36				
RIDING MOWER	194	184	289	270	320	388	313	180	388
ROTATORJET TRAILER	86	294	141	91	64	176	33	76	37
SKID STEER	147	350	426	348	307	285	128	214	328
SLOPE MOWER							20	58	362
SPYDER	186	231	421	177	-				
SUV	94	23	80	402	971	798	4	8	
SWEEPER SW	7	42	37	94	173	86	100	116	211
TRACTOR	195	241	423	637	957	597	339	317	733
TRACTOR BROOM/SWEEPER	107	65							
TRAILER	355	847	722	711	784	948	1,227	1,229	1,265
TRUCK DUMP OFFRD	770	1,409	1,041	1,353	1,204	1,197	867	630	743
TRUCK FLATBED	600	1,359	1,108	1,187	1,368	748	731	692	913
TRUCK OIL			807	1,647	1,467	1,385	1,348	1,348	1,379
TRUCK PICKUP	1,383	3,055	2,604	2,264	2,381	3,302	2,201	2,133	1,327
TRUCK ROLLOFF SW	151	335	128	285	310	351	266	234	775
TRUCK TRACTOR SW	747	1,527	1,372	1,371	1,480	1,288	1,246	1,281	1,326
TRUCK WATER SW	494	1,038	1,380	1,475	1,622	472	732	933	1,485
VAC TRAILER	4	592	128	125	129	151	58	1	

Figure 2-117 shows the nine-year average for Traffic Engineering. They have averaged a total 3,218 reported equipment hours annually, with Truck Platform at 32%, Truck Bucket at 28%, Van Bucket at 24% and Truck Pickup at 18% of the total average.

Figure 2-117
Vehicles and Equipment Average Annual Hours – Traffic Engineering

Traffic Eng Avg Hours by Type	CY08	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16
CONCRETE SAW SP			7						
SEDAN	5	10	15	20	28				
SUV				305	710	116	67		
TRAILER				82	30				
TRUCK BUCKET	882	1,437	1,032	607	728	869	801	946	769
TRUCK FLATBED	47	105		8					
TRUCK PICKUP	26	651	833	871	487				
TRUCK PLATFORM	1,370	902	853	803	1,336	615	870	1,118	1,416
VAN	7	18	211	203	155	32			
VAN BUCKET	986	871	492	1,086	860	1,105	462	699	279

Figure 2-118 shows the nine-year average for Water Resources and Utilities. They have averaged a total 6,093 reported equipment hours annually with Truck Flatbed at 29%, Truck Pickup HD at 22%, Truck Pickup at 21% and SUV at 12% of the total average.

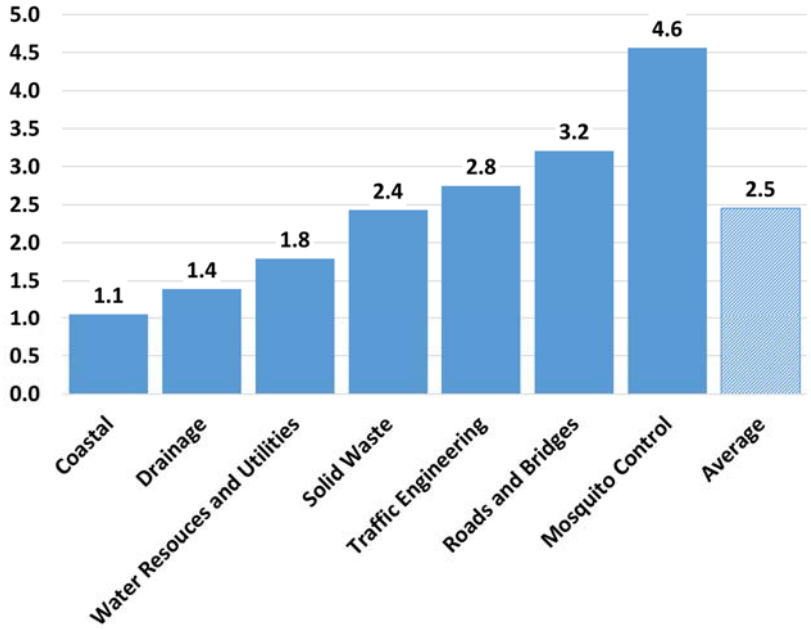
Figure 2-118
Vehicles and Equipment Average Annual Hours – Water Resources & Utilities

Water Res & Util Avg Hours by Type	CY08	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16
BACKHOE	20	295	302	298	314	306	343	284	90
EXCAVATOR SMALL	147	254	203	123	120	312	282	440	304
GENERATOR PORTABLE	4	17	8	21	3	12	-		56
GROVE SPRAYER TRAILER				97	139				
HITCH SPRAYER				134	585		43		
HOSE		8							
LITTER CART				324	528				
NOT DEFINED				1	162				15
PUMP			248						
PUMP 3"	127	4	6	3	6	14		2	
PUMP 6"		40	84	17	6	23			8
RIDING MOWER				287	527				22
ROTATORJET TRAILER									16
SUV	248	603	1,418	823	1,478	726	1,053		
TRACTOR	40	98	97	227	323	108	76	98	39
TRACTOR	22	112	95	103	117	108	110	97	41
TRUCK FLATBED	1,047	2,057	1,966	1,854	1,949	1,891	2,019	2,018	1,058
TRUCK PICKUP	653	1,767	1,429	1,365	1,476	1,380	1,141	1,294	975
TRUCK PICKUP HD	255	1,818	1,695	1,801	1,618	1,287	1,065	1,529	1,268
VAC TRAILER	8	132	79	19	5	43	43	21	25
VAN	237	1,780	1,373	96	90				

2.4.6.5 Rolling Stock per Field Employees

Figure 2-119 shows the rolling stock per field employees. The number of rolling stock in each Division was divided by the number of field staff, Administrative and office staff were excluded from the analysis. The Figure shows the average for all seven Divisions at 2.5 pieces of rolling stock per field employee, with the low of 1.1 for Coastal and 4.6 for Mosquito Control.

Figure 2-119
Rolling Stock Vehicles and Equipment
per Field Employees



2.4.6.6 Equipment Rates Used in Lucity

The Administrative group of the Department systematically calculates vehicle and equipment rates annually to be used within the Lucity database. The data used in the calculations include fuel costs and usage, repair and maintenance costs, and appreciation or depreciation costs, as well as hours used from the previous year within the Lucity database. There are currently seventy-seven equipment codes in the Lucity database that can be selected and charged against work orders. All calculations utilize Lucity hours except for rental equipment. Over half, or forty-one of the rates have reduced from FY15/16 to 16/17. This is shown in Figure 2-120 depicting two fiscal years and difference in rates between years in red. The calculated rates are all "out of yard" hours including preparatory and travel time. The greatest decrease in hourly cost is for the Hydro Seeder of $1,326.44 and the largest increase was for the Bulldozer Cat6 at $160.89 an hour.

Figure 2-120
Lucity Vehicles and Equipment Rates

Description	CostPerHour 15/16	CostPerHour 16/17	Difference from Previous Year
AIRBOAT	$ 10.56	$ 27.93	$17.37
AMPHIBIOUS EXCAVATOR	$ 146.30		($146.30)
ARROW BOARD	$ 2.50	$ 2.50	$0.00
ATV	$ 13.09	$ 14.79	$1.70
BACKHOE	$ 25.74	$ 27.47	$1.74
BITUMINOUS APPLICATOR	$ 12.34	$ 26.42	$14.07
BOAT	$ 4.97	$ 22.46	$17.50
BULLDOZER CAT5	$ 60.99	$ 59.71	($1.29)
BULLDOZER CAT6	$ 91.37	$ 252.15	$160.79
BULLDOZER CAT6 SW	$ 45.02	$ 27.24	($17.78)
BULLDOZER CAT7 SW	$ 134.84		($134.84)
BULLDOZER CAT8 SW	$ 142.67	$ 129.17	($13.50)
CAMERA VAN	$ 17.86	$ 23.38	$5.52
CONCRETE GRINDER	$ 8.66	$ 12.95	$4.29
CHIPPER - TREE	$ 17.99	$ 10.77	($7.22)
CHIPPER TRUCK	$ 11.72	$ 11.51	($0.21)
COMPACTOR	$ 94.99	$ 63.61	($31.38)
CURBING MACHINE	$ 31.24	$ 28.50	($2.74)
EXCAVATOR LARGE	$ 94.01	$ 190.48	$96.47
EXCAVATOR MEDIUM	$ 40.86	$ 41.55	$0.69
EXCAVATOR SMALL	$ 11.17	$ 7.65	($3.52)
FORKLIFT	$ 11.00	$ 11.00	$0.00
GRADALL	$ 69.40	$ 54.07	($15.33)
GRADER	$ 36.39	$ 41.95	$5.56
HYDROSEEDER	$ 1,759.08	$ 432.64	($1,326.44)
LITTER CART	$ 2.98	$ 4.45	$1.47
LOADER, FRONT END LARGE	$ 52.30	$ 50.13	($2.17)
LOADER, FRONT END MEDIUM	$ 33.02	$ 39.85	$6.84
LOWBOY TRUCK	$ 54.13	$ 64.46	$10.33
MIXER	$ 8.75	$ 8.75	$0.00
MOWER WALK BEHIND	$ 1.00	$ 1.00	$0.00
MESSAGE BOARD	$ 1.93	$ 1.67	($0.26)
PAVING MACHINE	$ 134.86	$ 58.39	($76.47)
POWER SCREEN	$ 29.45	$ 50.97	$21.52
PAINT STRIPER	$ 48.83	$ 50.42	$1.59
PUMP 4"	$ 1.20	$ 1.20	$0.00
PUMP 6"	$ 2.03	$ 2.03	$0.00
RIDING MOWER	$ 2.88	$ 2.45	($0.44)
ROTATORJET TRAILER	$ 71.24	$ 22.91	($48.33)

Description	CostPerHour 15/16	CostPerHour 16/17	Difference from Previous Year
STUMP GRINDER	$ 22.22	$ 33.19	$10.98
SKID STEER	$ 20.85	$ 16.40	($4.46)
SLOPE MOWER	$ 150.13	$ 59.29	($90.83)
SPYDER	$ 132.12	$ 46.33	($85.79)
SWEEPER SW	$ 78.09	$ 53.20	($24.88)
STREET SWEEPER	$ 37.62	$ 48.40	$10.78
TAMPER	$ 2.35	$ 7.99	$5.64
TAMPERSR	$ 5.38	$ 6.07	$0.70
TILLER	$ 105.00	$ 105.00	$0.00
THERMO TRAILER	$ 28.67	$ 22.52	($6.15)
TRACTOR	$ 27.49	$ 23.90	($3.60)
TRACTOR BROOM/SWEEPER	$ 32.19	$ 14.49	($17.70)
TRAILER	$ 1.30	$ 1.86	$0.56
TRENCH BURNER	$ 23.69	$ 30.37	$6.68
TRUCK SPRAY	$ 8.51	$ 7.38	($1.13)
TRUCK SPRAY LARGE	$ 86.07	$ 57.49	($28.58)
TRUCK BUCKET	$ 20.90	$ 20.62	($0.28)
TRUCK CLAM	$ 42.98	$ 39.89	($3.09)
TRUCK DISTRIBUTOR	$ 53.64	$ 40.44	($13.20)
TRUCK DUMP OFFRD	$ 55.61	$ 77.68	$22.06
TRUCK FLATBED	$ 8.90	$ 9.78	$0.89
TRUCK OIL	$ 18.71	$ 21.35	$2.64
TRUCK PICKUP	$ 4.83	$ 4.97	$0.14
TRUCK PICKUP HD	$ 6.38	$ 6.28	($0.10)
TRUCK POTHOLE PATCH	$ 38.86	$ 38.73	($0.13)
TRUCK PLATFORM	$ 16.21	$ 15.34	($0.87)
TRUCK PRISON	$ 15.68	$ 23.85	$8.17
TRUCK ROLLOFF SW	$ 85.49	$ 65.05	($20.44)
TRUCK SPREADER	$ 30.08	$ 21.37	($8.71)
TRUCK TANDEM	$ 35.44	$ 27.55	($7.89)
TRUCK TRACTOR SW	$ 49.90	$ 44.91	($4.99)
TRUCK VACUUM	$ 79.89	$ 50.57	($29.32)
TRUCK WATER	$ 37.49	$ 24.18	($13.31)
TRUCK WATER SW	$ 78.21	$ 44.81	($33.40)
SLIDE IN ULV	$ 8.80	$ 8.38	($0.42)
VAC TRAILER	$ 161.87	$ 94.31	($67.56)
VAN	$ 8.31	$ 4.33	($3.98)
VAN BUCKET	$ 20.39	$ 50.99	$30.60
TANDEM WHEEL VIBRATORY ROLLER	$ 33.36	$ 22.24	($11.11)
BUFFALO TURBINE	$ 6.29	$ 47.42	$41.13

2.4.6.7 Fleet Division and Maintenance

The Fleet Maintenance Division is responsible for maintenance and repair of vehicles for the Public Works Department. Fleet replacement and ownership is determined by each Department and is managed through a separate fleet budget within the Department. Leased equipment is managed through the Fleet Division, and is replaced on a 6-year cycle. The Fleet Division has established specific equipment Performance Measures by type and interval for the equipment. The equipment PMs are as follows:

Heavy/Diesel Equipment

- A – 200 Hours
- B – 1,000 Hours

Light Equipment

- A – 5,000 Miles
- B – 15,000 Miles
- C – 30,000 Miles

Generator Pumps

- Inspected twice per year
- PM every 150 Hours

2.4.6.8 Materials

Materials are controlled primarily using the Department's Lucity database, yet some manual systems are utilized for the temporary recording of material inventory. The control and issuance of materials are addressed differently from Division to Division. For example, Mosquito Control and Water Resources and Utilities have primary warehouses, yet also utilize "truck warehouses" for issuing parts and materials to specific crews and employees for easy access in the field, preventing them from having to travel to their respective yards and reducing their need for warehouse visits. Truck inventory is "issued" from the truck warehouse when it is used for treatment and added to the work order in the field. Figure 2-121 shows an example of a manual form used to control chemical inventories with specific employees and vehicles. This form is used to compare the monthly physical count with the system output. In contrast, the Roads and Bridge Division has a dedicated warehouse person to receive and issue parts and materials.

Figure 2-121
Truck Warehouse Inventory

Joanna Dillon 10-15		Veh.#178502		
Chemical	**Last Inv**	**This Inv**	**Rec'd**	**Used**
Altosid Briquets				0
Altosid Pellets				0
Altosid ALL 5%	102.1	102.1		0
Golden Bear	19.1	19.1		0
Abate 5%b Tire				0
Masterline 7.9%			0.47	0.47
Altosid XR Briquets				0
5% Skeeter Abate				0
Natular T30				0
Natular G30 Gran's	61.3	60.5		0.8
Altosid XRG Sand Gran's	31	22.3		8.7
Vectolex FG	36.9	36.9		0
Agnique Liq.		0		0
MMF Granuler				0
Vectomax WSP	34	30		4
Vectobac 12AS				0
Natular XR-T Tabs	31	30		1
Aquabac 400G				0
Natular 2EC	16	16		0
Habitat	15	15		0
Kenitic	126	126		0
Vectolex WDG	0.9	0.9		0
Cross Ckeck	0.99	0.99		0

2.4.6.9 Contracts

Water Resources and Utilities and the Coastal Division augment in-house maintenance and repair efforts using various contractual services. Water Resources and Utilities has contracts for

sewer main jet and vacuum function, sewer line video inspection services and fire hydrant maintenance and flow testing. The Coastal Division utilized two contracts as well, one for restroom cleaning and the other for what is referred to as "Beach Maintenance." The Beach Maintenance contract includes several services including ramp grading and sweeping, garbage pickup and disposal, toll booth transportation and minor repair, beach maintenance worker/porter, beach conservation post replacement/removal, and beach fire ring transport/placement. Most of this contract concentrates on the forty-seven miles of County beaches. Coastal also has a dedicated employee who manages this contract.

The contracts in place include for Utilities 17-B-73VB - Sewer Main Cleaning and Sewer Line Video Services of $75,000 and ITB-15-B-78AK Fire Hydrant Service and Repairs of $57,000 while Coastal has 14-B-112AK Beach Maintenance of $1,900,000, Concessions of $425,000, tolls of $2,372,063.21 and Parks Operations and Maintenance of $12,740.

2.5 Directing / Scheduling

2.5.1 Work Identification

Work is identified through several methods in each Division. These include response work, inspection, preventative maintenance, routines and observation by staff in the field.

Response work is work that is identified by customers or citizens who call in or emergency events that occur where the County must respond. This can be either during normal business hours, on weekends or evenings. The County has a service request process in place for each Division and documents all response work.

Inspection work is work that is identified by County personnel who are dispatched specifically for the identification of work that needs to be performed, or to validate that work has been completed properly. For example, Road and Bridge performs site inspections, Mosquito Control inspects areas for larvae or complaints or to determine if a site needs treatment, Coastal performs walkover inspections for needed repairs at a minimum every two weeks, Water Resources and Utilities utilize closed circuit television (CCTV) technology in sewer lines and Solid Waste has spotters to inspect trucks for material types that are being carried in hauler's loads.

Routine maintenance is work that is performed on a specific cycle or schedule. Preventative maintenance often uses this method. Routine activities include dirt road grading, which is performed every two weeks, right-of-way mowing and hand cleaning of ditches. Treatment plant operators within Water Resources and Utilities also perform routine plant maintenance and testing. Other routine or preventative tasks include signal PMs, which are performed every 6 months, striping every 2 years, and a tree trimming cycle every 4 years. Mosquito Control has developed and follows documented routines within their lab, including general lab operations by day of the week. In addition, surveillance also uses a general trapping schedule by the day of the week, for setting and collecting mosquito traps.

Work that is identified by field staff is work that is observed while they are working in the field as needed to be performed, and then is documented so crews can return and perform repairs later. It is common for work to be identified in the field and then a service request be developed. If the work is an emergency it will be addressed immediately.

2.5.2 Routines and Preventive Maintenance Programs

Routines exist for many operational, maintenance and environmental activities. These proactive efforts are performed to protect the County's assets and ensure proper operation, as well as optimize asset life cycles.

Water Resources and Utilities inspect, maintain and perform repairs on one-hundred-twenty lift stations, with one-hundred-eight having telemetry. Of these stations, they visit seventy-six monthly, nine weekly, and twenty-two bi-weekly. All visits are planned and scheduled on routines. In addition, they turn all key water valves along major distribution mains on an annual basis and valves on smaller mains on a 3-year cycle, and exercise all hydrants annually through contracted services. The treatment plants and their respective components are also inspected monthly.

Traffic Engineering perform the inspection and maintain and perform repairs on numerous traffic related assets. Many routines have been developed and implemented internally, yet some such as traffic signal preventative maintenance routines are established through interlocal and FDOT agreements of frequency with County performing PMs on all twice a year.

Road and Bridge also utilizes routines and maintenance cycles to the assets and their features. These routines include dirt road grading, mowing by functional class, tree trimming, pavement markings, and right-of-way herbicide spraying.

2.5.3 Scheduling and Assigning Work

Once work is identified, it is then planned and scheduled. Work scheduling varies for each Division, yet most utilize a documented short-term or bi-weekly scheduling process with key staff to meet with schedules discussed and finalized. Some schedules are just compiled without any meetings and given to the supervisor. Because of the routine nature of their work, Solid Waste does not utilize a two-week schedule process, but instead has a daily assignment of employees used normally consistent from day to day with only changes based on actual employees working that days. These prepared schedules include routines, backlog work, new work orders, and work planned from the Division's annual performance plans.

Coastal utilizes established routines, backlog work, their annual performance plans and new work orders to develop their bi-weekly schedule of work, although they do utilize some ancillary systems to store backlog work. Some work may be inserted into their schedules related to high priorities, response or direction from senior leadership. In these cases, the supervisor will communicate directly with the impacted crew or employee for reassignment. Most of this Division's backlog work is stored in ancillary manual systems, then entered into the Lucity database when scheduled.

Drainage utilizes established routines, backlog work, their annual performance and new work orders to develop their documented bi-weekly schedule of work along with a meeting to finalize the effort. Some work may be inserted into their schedules related to high priorities, response work or direction from senior leadership. In these cases, the supervisors will communicate directly with the impacted crews for reassignment. Drainage, Road and Bridge also utilizes established routines, backlog work, their annual performance plans and new work orders to develop their bi-weekly schedule of work. Some work may be inserted into their schedules related to high priorities or direction from senior leadership. In these cases, the supervisors will

communicate directly with the impacted crews for reassignment. Most of this Division's backlog work is stored within the Lucity database.

Mosquito Control's work is assigned by function or supervisor. A schedule is prepared for the Division Director without a meeting to discuss, yet the Activity Project Manager routinely attends. Most coordination is addresses prior to scheduling meetings. The herbicide application tasks go to the appropriate crew leader and the remaining work is assigned by supervisors who have specific inspectors responsible for their zones. Inspectors then perform work as needed based on complaints and observations in their zones. Chemical application work is primarily response and scientifically driven utilizing data on surveillance's trap counts, service requests and lab results from the sentinel chicken flock. This scientific data is not stored in Lucity.

Solid Waste's scheduling varies by supervisor as most of their work is routine and dependent on refuse volumes received at the transfer station and landfill. In general, supervisors meet with staff in the morning for daily assignments. A weekly assignment of employee schedule is also developed to ensure coverage of the landfill and transfer station and is not developed from Lucity.

Traffic Engineering's Signals also utilize established routines, backlog work, their annual performance plans and new work orders to develop their bi-weekly schedule of work with meetings to discuss and finalize. Much of their work is related to signal and traffic device preventative maintenance routines. Signal workers will check in at the Holly Hill Yard to ensure there is not an emergency. As with several of the other Divisions, some work may be inserted into their schedules related to high priorities or direction from senior leadership. In this case the supervisors will communicate directly with the impacted crews for reassignment. Most of this backlog work is stored within the Lucity database.

Water Resources and Utilities also utilizes established routines, backlog work, their annual performance plans and new work orders to develop their bi-weekly schedule of work. Some work is routine based like staffing the water and wastewater plants. As with several of the other Divisions, some work may be inserted into their schedules related to high priorities or direction from senior leadership. In these cases, the supervisors will communicate directly with the impacted crews for reassignment. Most of this Division's backlog work is stored within the Lucity database.

2.6 Controlling / Improving

2.6.1 Work Flow

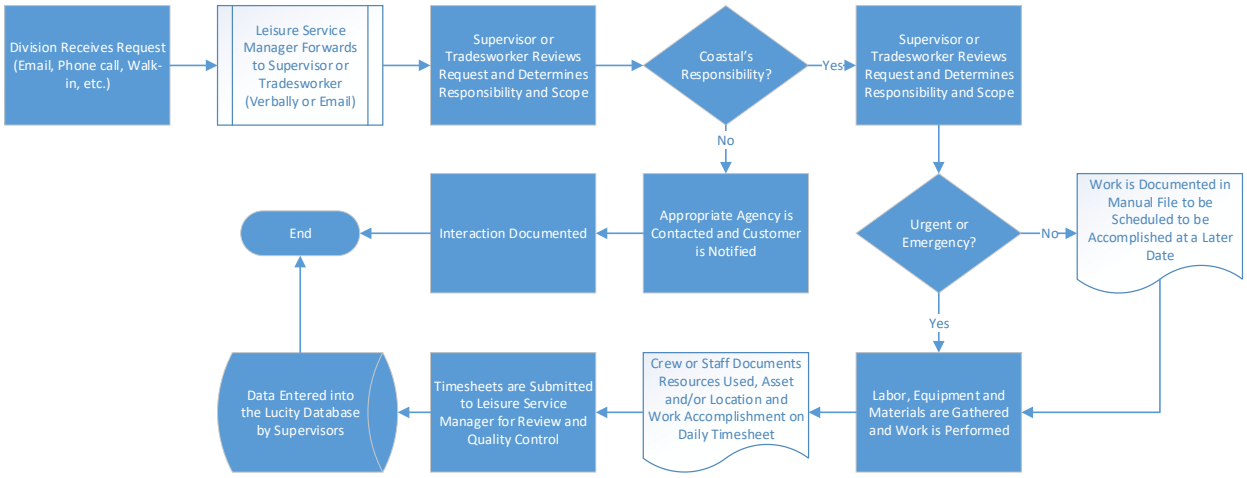
Figure 2-122 through Figure 2-127 provide a general overview of the workflows that are found within each of the operational Divisions. The Figure with the outline below describes how work is identified, evaluated, assigned, scheduled, completed and documented. All groups have similar processes with some minor differences. If this is an emergency call, the work is directly assigned to the appropriate employee and the work is done with the process documented after the fact. However, most work is not in this category and is managed following these steps.

2.6.1.1 Coastal

For the Coastal Division, service requests are received primarily through email or in person from internal customers, such as Beach Safety. The Leisure Service Manager will receive the original request, then pass it to the appropriate supervisor or tradesworker verbally or through email. The

supervisor or tradesworker will review the request, determine the responsibility and priority. Each supervisor or tradesworker keeps a written record of requests to be scheduled later if they cannot be addressed immediately. If it is determined that it is not Coastal's responsibility from the initial information received or through inspection of the request, the requester will be notified and the correct contact information will be provided for resolution. If the work order is determined to be urgent or an emergency, the respective senior supervisor will be notified, crews dispatched, resources gathered and work completed. If the request is determined to be the responsibility of Coastal, staff will secure the needed equipment and materials and complete the work. Upon completion, the employee will record labor and equipment hours, materials, and work quantities on daily timesheets. These timesheets are submitted to Leisure Services Manager for quality control then entered into the Lucity System by the Supervisors. After all entries are made against the work order, the work order will be closed. This workflow is shown in Figure 2-122.

Figure 2-122
General Work Flow – Coastal



2.6.1.2 Drainage Task Team (DTT)

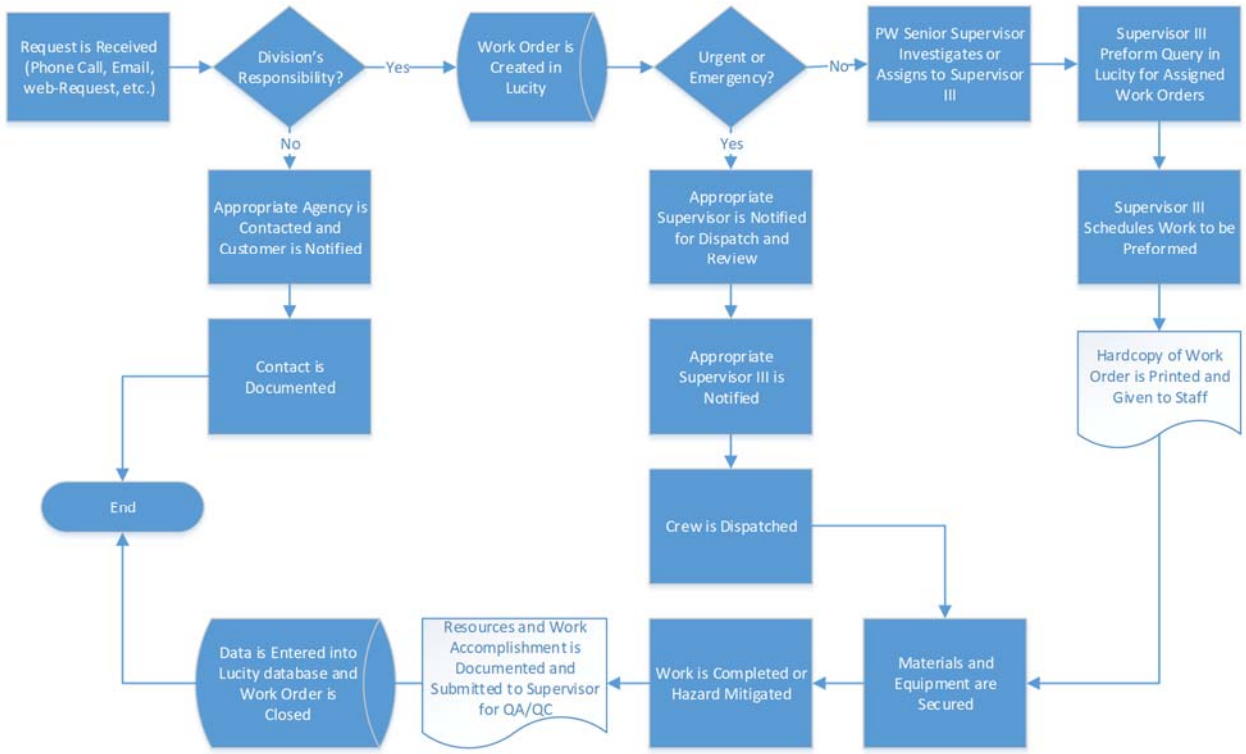
Service requests are received through various methods, including phone calls, emails, walk-ins, and the County's web request form. After being received, a determination for responsibility is made for the request. If it is determined that it is not Drainage's responsibility from the initial information, the investing staff will follow established protocol, contact the requester and provide them the correct contact information for resolution.

If the request is determined to be the Division's responsibility, one of the Public Works Services Supervisors will forward the request to the appropriate Supervisor III for planning and completion. The Supervisor III will also create a work order in the Lucity system using the request information and associated work request number. This links the request to the work order so that once the work order is completed the request is also closed.

If the work order is determined to be urgent or an emergency, the respective senior supervisor will be notified, crews dispatched, resources gathered and work completed. The work is prioritized by the respective Public Works Services Supervisor. After discovering new work order assignments, the Supervisor III will print a hardcopy of the work order from the Lucity system to be given to the crew for work completion. After receiving the work order, the crews

will secure the needed equipment and materials completing the work as scheduled. Upon completion, the crew will record labor and equipment hours, materials, and work quantities on daily timesheets. These timesheets are quality controlled by the appropriate Public Works Services Supervisor and submitted to administrative staff for entry into the Lucity database. After all entries are made against the work order, the respective Public Works Services Supervisor will close the work order. This workflow is shown in Figure 2-123.

Figure 2-123
General Work Flow – DTT



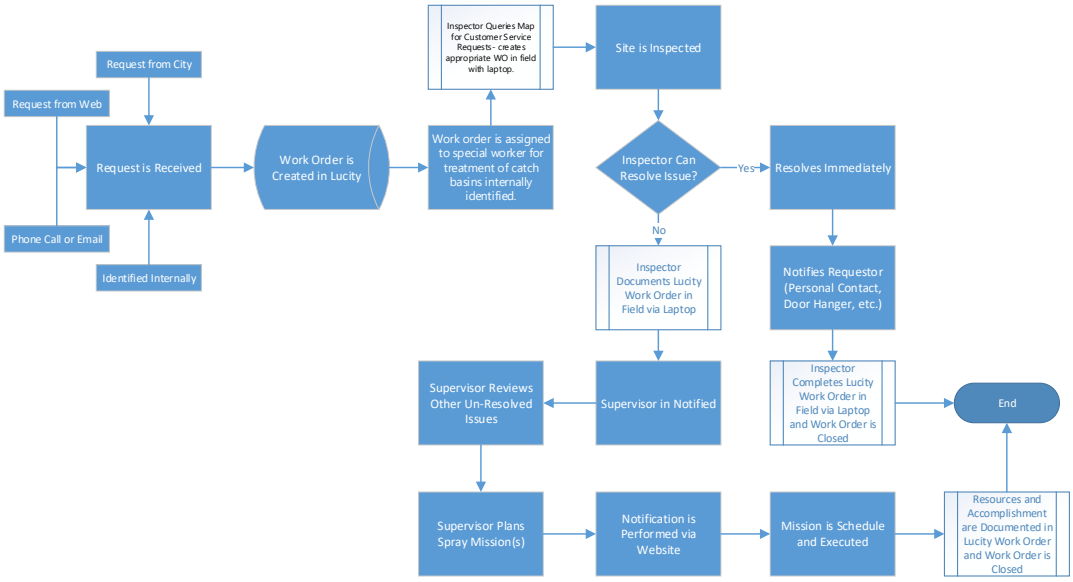
There is no graphic for Road and Bridge because the process is near identical to the work flow for Drainage.

2.6.1.3 Mosquito Control

Work is identified through a combination of techniques. These include staff in the field, requests by contract cities, web requests or by citizen calls or emails. Requests are gathered and a work order is created in the Lucity database and assigned for inspection. Inspectors will query the Lucity system for work assignments. The inspector will travel to the site for inspection. If the issue can be resolved, the inspector will resolve immediately and notify the requested either in-person or through a door hanger left at the location. After work is completed, the inspector will document the resolution and resources used in the Lucity work order via their laptop in the field and then the work order is closed in field for supervisors to QC and then complete. If the issue cannot be resolved, the inspector will document in the work order and notify their supervisor. The supervisor will query the Lucity system for other unresolved issues for spray mission planning. Mission(s) are planned and notifications are made via the County's website. Then the mission(s) are executed with resources and accomplishment documented in the Lucity work order, which is then closed. This workflow is shown in Figure 2-124.

It should be noted that complaint work flows used by the Division is supplemented by a scientific approach. A considerable amount of work is analytical based, which is not flowcharted including work assigned based on data collected on aerial spray mission observations, trap counts and evaluation of species, chicken blood analysis and landing rate counts supplemented with historical experience and complaint. Using this data, managers plan methods to address specific issues including aerial and ground efforts. This is done by using data to plan areas to be attacked and how best to address needs with different applications for adulticide and larvicide products. The work done is tracked in Lucity but support data is not.

Figure 2-124
General Work Flow – Mosquito Control

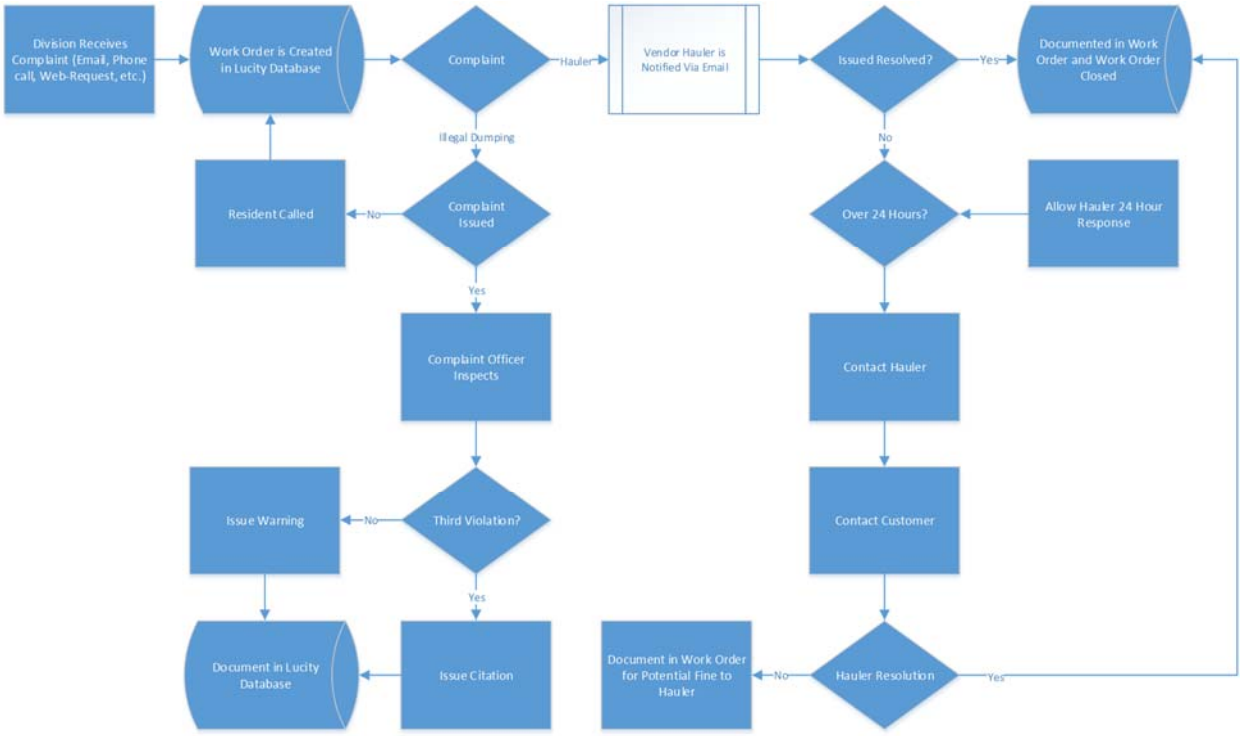


2.6.1.4 Solid Waste Division

Service requests are primarily generated through requests by citizen calls and through web requests. Citizen calls are logged into the Lucity database as a work order and an email is sent to the appropriate vendor hauler. If the problem still exists, Solid Waste verifies that the problem has existed for 24 hours or more. If it has been less than 24 hours, no action is taken to allow the vendor time to respond.

Items that are compliance related such as discarded tires, trash piles and illegal dumping are forwarded to administrative staff and are also entered into the Lucity database. A compliance inspector receives the complaint and inspects the location. If the location has had less than three violations, a warning is issued and the complaint is completed in the Lucity system. If the location has had three or more violations, a citation is issued to the responsible party. Once the citation has been issued, the complaint is closed in the Lucity system. This workflow is shown in Figure 2-125.

Figure 2-125
General Work Flow – Solid Waste

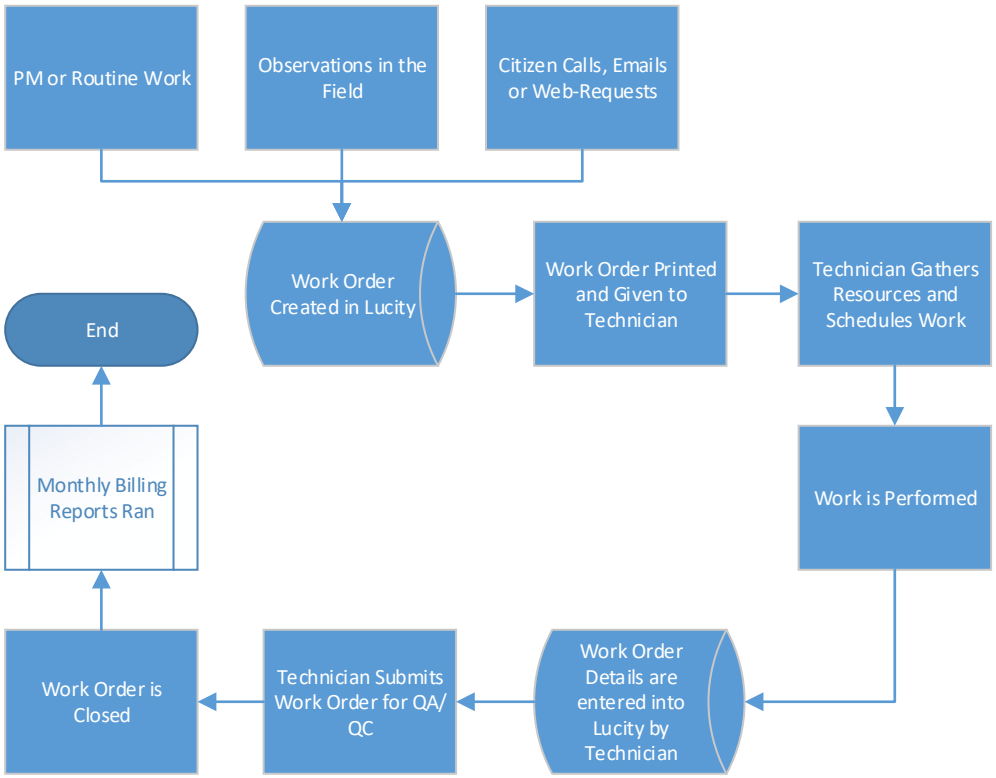


2.6.1.5 Traffic Engineering

Work is generated either by staff viewing repairs needed in the field, a citizen complaint, police call, city request or through routine maintenance work. In the case of field staff initiated requests and citizen complaints, a manual form is created to document the service request. The form is then given to the supervisor to create a work order in Lucity. Work orders for maintenance work are also created in the Lucity database then assigned to a technician. Once the work order is assigned, the technician will gather needed resources to compete the assignment, schedule and complete the work order.

Once the work is complete, the technician finalizes the work order, includes labor and equipment hours, materials, and accomplishment. The work order will be reviewed for QA/QC and then closed. Reports are then run using the Lucity database for monthly reports and billing. This workflow is shown in Figure 2-126.

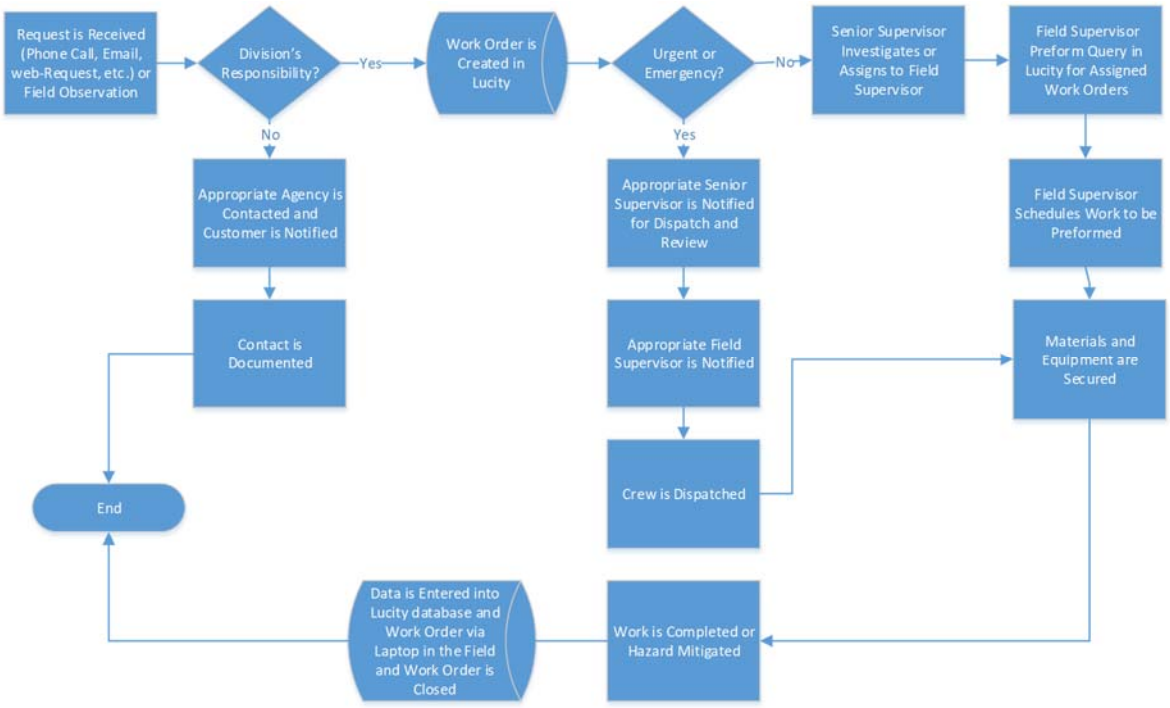
Figure 2-126
General Work Flow – Traffic Engineering



2.6.1.6 Water Resources & Utilities

Service requests are received through various methods, including phone calls, emails, and the County's web request form. After being received, a determination of responsibility is made for the request. If it is determined that it is not Water Resources and Utilities' responsibility from the initial information, the investing staff will follow established protocol, contact the requester and provide them the correct contact information for resolution. If the request is determined to be the Division's responsibility, a work order is entered into the Lucity system and assigned to the appropriate supervisor for planning and completion. If the work order is determined to be urgent or an emergency, the respective senior supervisor will be notified, crews dispatched, resources gathered and work completed. The work is prioritized by the respective supervisor based on area of responsibility. Field supervisors query the Lucity system for work assignments. After receiving the work order, the crews secure the needed equipment and materials completing the work as scheduled. Upon completion, the crew records labor and equipment hours, materials, and work quantities in the Lucity database via their laptop computer in the field and the work order is closed. This workflow is shown in Figure 2-127.

Figure 2-127
General Work Flow – Water Resources and Utilities



2.6.2 Work Reporting and Tracking

The County utilizes a slightly different work tracking approach for each Division within Public Works yet all track similar data. All operational Divisions share access to the Lucity CMMS, yet often utilize the tool differently for work reporting and tracking. For example, Mosquito Control and Water Resources and Utilities accesses the Lucity database in the field using laptop computers. Field staff access work requests and work orders, as well as record resources used in work orders directly in the database. Although some connectivity issues exist as the result of poor cell coverage, both Divisions are attempting to become operationally paperless. In contrast, Road and Bridge, Drainage, Traffic Engineering, Solid Waste and Coastal track service requests, work orders, time, materials and accomplishment on paper forms for entry in the CMMS later.

All work is tracked with labor and equipment and material by activity by location, zone or asset to a specific work order. Some work orders are proactively generated, while other are based on a specific project or need. In addition, each division does track time to the County's payroll system, Kronos.

2.6.3 System Outputs and Monitoring

The data collected is used by the Division Director and Public Works Administration for monitoring accomplishment, productivity and cost by activity against each performance plan and budget. Systems outputs include monthly work status reports, as shown in Figure 2-128. Although in some cases, reports and evaluations are prepared in response to some inquiries or requests from elected leaders, senior management or customers about cost for effort. At any given time, Division Directors or their support staff can run and create such outputs either electronically or in hard copy.

The format report in Figure 2-128 is reviewed by all groups each month and difference and variance to the work plan noted. The report is used for a status and some groups action and adjustment of work. It is also used as support for annual update of their future performance and work plans and budget needs. This data is used by the different groups at both the division level and departments level to manage their work, provide status and make decisions.

Figure 2-128
Work Status Report

Work Status Report (By Department Then Task)

Fiscal Year **2016**
January - December

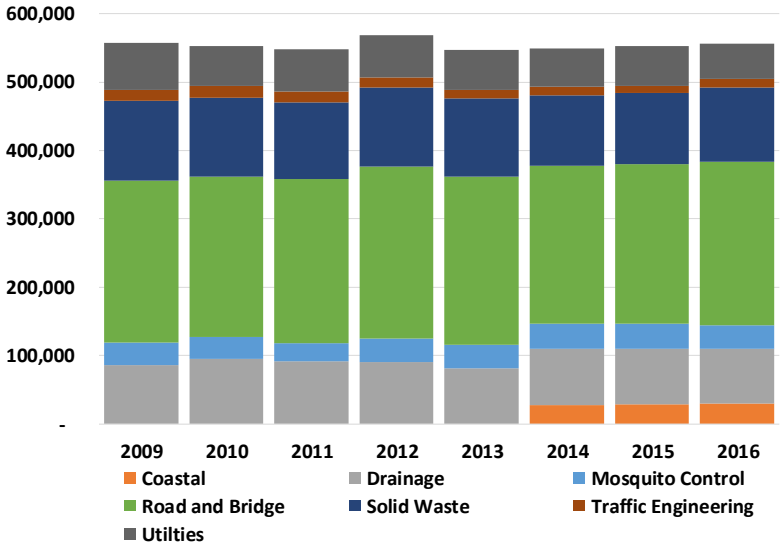
Department / Task		Unit of Measure	Labor Days Plan	Labor Days Actual	Accomplishment Plan	Accomplishment Actual	Total Cost Plan	Total Cost Actual	Unit per Hour Plan	Unit per Hour Actual	Unit Cost Plan	Unit Cost Actual	YTD Labor Days Plan	YTD Labor Days Actual	YTD Accomplishment Plan	YTD Accomplishment Actual
Department: UT - Utilities																
7410	LOCK OFFS/DISCONNECTS/RECO	Each	93	104	2,500	1,927	$27,474	$36,458	3.38	2.32	$10.99	$18.92	93	104	2,500	1,927
7501	MAJOR WATER PLANT OPS	Hours	582	759	4,657	5	$250,325	$326,564	1.00	0.00	$53.75	$65,312.86	582	759	4,657	5
7503	WATER SAMPLING	Samples	9	8	180	152	$3,870	$5,998	2.50	2.29	$21.50	$39.46	9	8	180	152
7506	FLUSHING	Each	0	1	0	12	$0	$285	1.00	1.92	$0.00	$23.76	-1	1	0	12
7507	WATER PACKAGE PLANT OPERAT	Hours	33	117	260	0	$13,977	$55,696	1.00	0.00	$53.76	$0.00	33	117	260	0
7510	CONSECUTIVE SYSTEM OPS	Hours	52	58	416	4	$22,382	$24,940	1.00	0.01	$53.80	$6,235.01	52	58	416	4
7511	MONITORING WELL LEVELS	Each	5	3	96	56	$2,064	$1,205	2.50	2.24	$21.50	$21.52	5	3	96	56
7601	MAJOR WW PLANT OPERATIONS	Hours	1,375	1,199	11,000	0	$564,706	$424,067	1.00	0.00	$51.34	$0.00	1,375	1,199	11,000	0
7603	WW SAMPLING	Samples	0	0	0	0	$0	$0	0.00	0.00	$0.00	$0.00	-1	0	0	0
7611	WW PACKAGE PLANT OPERATION	Hours	59	140	468	0	$25,155	$59,868	1.00	0.00	$53.75	$0.00	59	140	468	0
7905	CONSTRUCTION INSPECTION - UT	Each	9	12	100	103	$3,274	$4,448	1.38	1.11	$32.74	$43.18	9	12	100	103
9900	MISC WORK	Hours	0	11	0	0	$0	$3,947	1.00	0.00	$0.00	$0.00	-1	11	0	0
9905	EQUIPMENT MAINT/FLEET SERVIC	Hours	12	3	100	0	$3,132	$1,175	1.00	0.00	$31.32	$0.00	12	3	100	0
9907	VEHICLE MAINT AND CARE	Hours	12	5	100	0	$3,976	$1,900	1.00	0.00	$39.76	$0.00	12	5	100	0
9910	YARD MAINTENANCE	Hours	0	3	0	0	$0	$918	0.00	0.00	$0.00	$0.00	-1	3	0	0
9925	WAREHOUSE	Hours	12	26	100	0	$4,501	$8,920	1.00	0.00	$45.01	$0.00	12	26	100	0
	Department Totals:		4,921	4,296			$1,975,972	$1,900,792					7,078	6,373		
	Fiscal Year Totals:		43,940	41,733			$23,128,434	$21,065,386					62,336	60,626		

Other reports and outputs are created using linkage to the GIS database. This include basic information on FEMA reporting and disaster response outputs as well as billing support and individual project analysis.

2.6.4 Work Reporting Hours

Figure 2-129 shows data from the Lucity database of the reported of labor hours for the operational Divisions. Overall the total reported work hours have remained consistent yet all groups hours with exception of Coastal have reduced. Coastal was added in 2014, and this addition makes up some difference of the reduction of the other groups. From 2009 through 2013 the operational Divisions averaged 554,841 annual hours. From 2015 through 2016 they averaged 552,848, a reduction of 1,993 or less than 1% between the two periods.

Figure 2-129
Historical Labor Hours



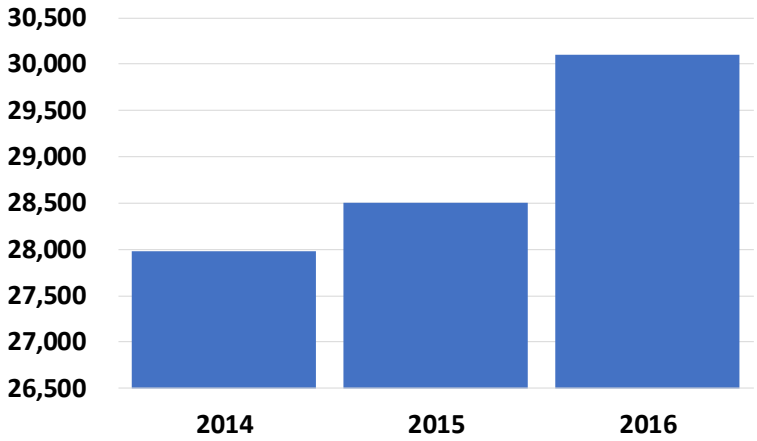
Looking at the reporting data from each of the groups shows them having similar trends with exception of Coastal, which was incorporated as part of Public Works.

2.6.4.1 Coastal

Coastal was transferred to the Public Works Department in 2014 from another Department. Though they had previously used Lucity, the data was not in Public Works database.

Over the past three years, they have averaged 28,883 reported labor hours in the Public Works' Lucity database. Each year the Division has shown an increase in reporting as shown in Figure 2-130. Labor reporting increased 552 hours between 2014 and 201,5 while also increasing 1,599 hours between 2015 and 2016.

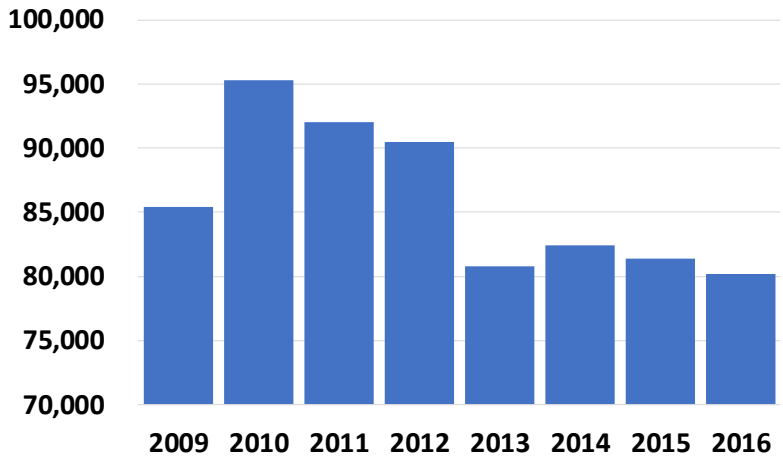
Figure 2-130
Historical Labor Hours – Coastal



2.6.4.2 *Drainage Task Team*

Drainage has averaged 86,806 reported labor hours over the past eight years. As shown in Figure 2-131, there has been a variance between some time periods. For example, the Division averaged 89,635 hours between 2010 and 2012, yet has averaged 81,226 over the past four years. This has been a drop of 9.4% between those time periods.

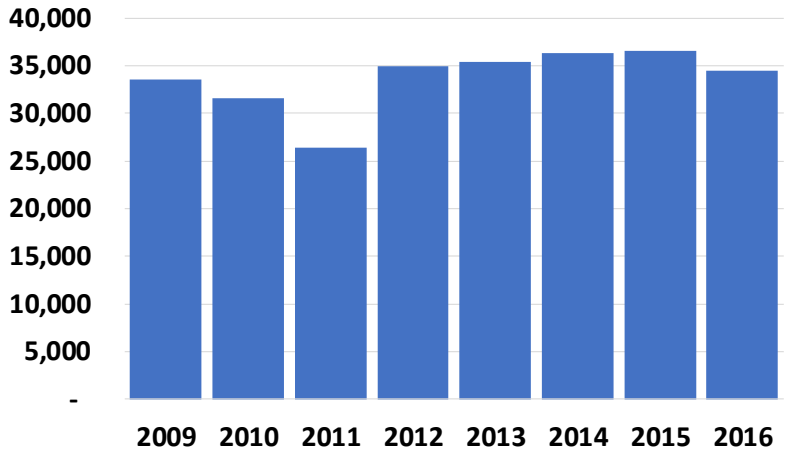
Figure 2-131
Historical Labor Hours – Drainage Task Team



2.6.4.3 *Mosquito Control*

Mosquito Control has averaged 33,650 reported labor hours during same time as Drainage. As shown in Figure 2-132, there has been little variance from 2012 -2016 in reported hours, where from 2009 to 2011 there was a reduction to a low of 26,421 in 2011.

Figure 2-132
Historical Labor Hours – Mosquito Control

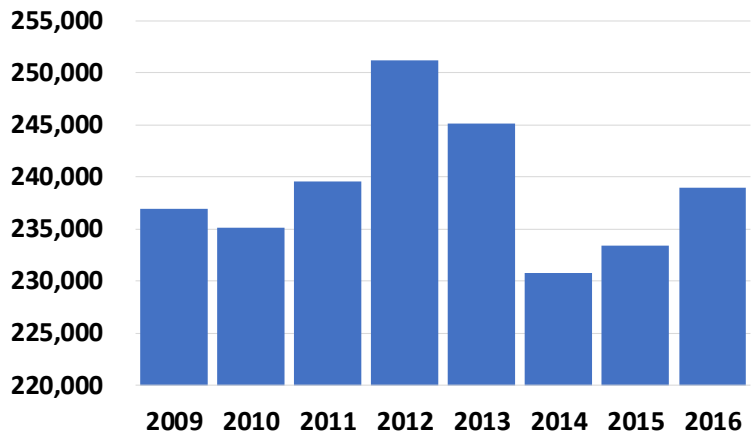


2.6.4.4 *Road and Bridge*

Road and Bridge has averaged since 2009 238,886 reported labor hours in the Lucity database. As shown in Figure 2-133, there has been several variances year to year. Although the average of

the period was 238,886 the low reporting year was in 2014 with 230,842 and high reporting in 2012, with 251,136 hours.

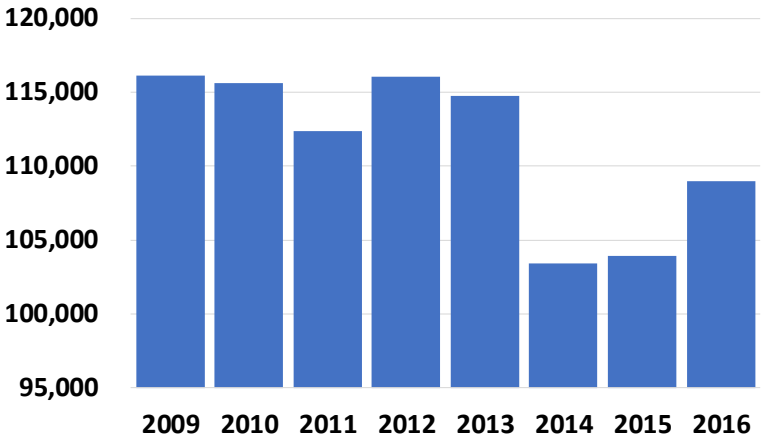
Figure 2-133
Historical Labor Hours – Road and Bridge



2.6.4.5 Solid Waste

Solid Waste reports for the 2009 has averaged 111,401 reporting considerable labor hours variance between years. The Division averaged 114,980 hours between 2009 and 2013, yet has averaged 105,437 over the past three years. This calculates a drop of 8.3% between the 2009-2013 and 2014-2016 averages as shown in Figure 2-134,

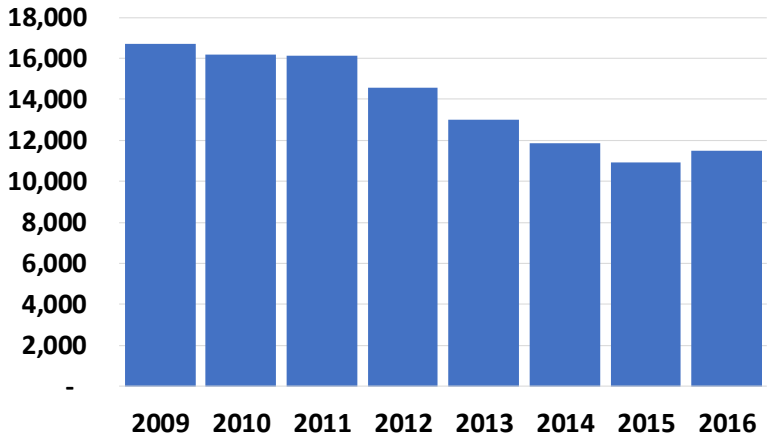
Figure 2-134
Historical Labor Hours – Solid Waste



2.6.4.6 Traffic Engineering

Similar to the other group time periods, Traffic Engineering has an eight-year average of 13,860 reported labor hours. Figure 2-135 shows this has been a steady reduction in reported hours from 16,696 in 2009 to 11,518 in 2016. This change represents a reduction of 5,178 hours or 31%.

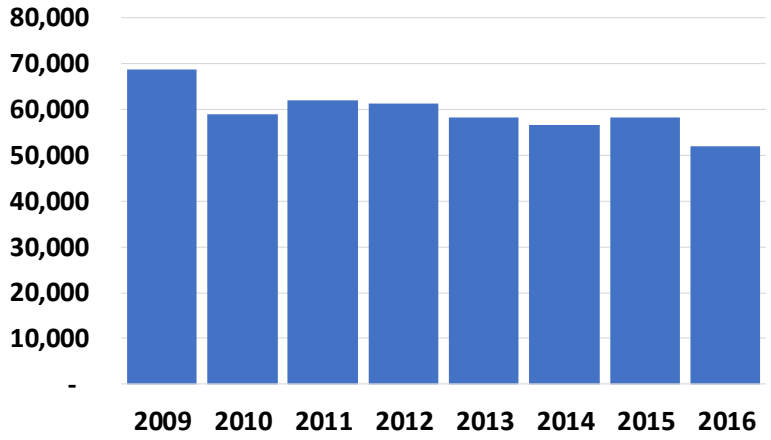
Figure 2-135
Historical Labor Hours – Traffic Engineering



2.6.4.7 Water Resources & Utilities

Water Resources and Utilities has averaged 59,467 reported labor hours since 2009. Similarly, to Traffic, there has also been a steady reduction in reported hours. In 2009, the reported hours were 68,735, which are now 51,823 in 2016. This represents a reduction of 16,912 hours or 24.6% as shown in Figure 2-136.

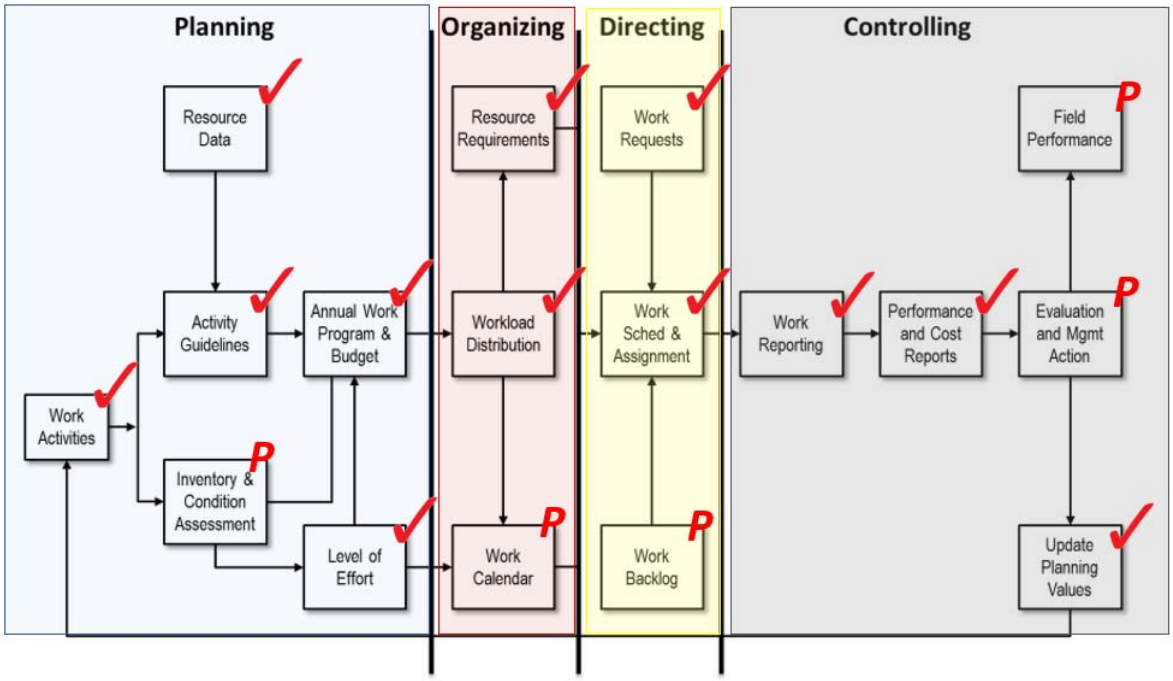
Figure 2-136
Historical Labor Hours – Water Resources and Utilities



2.6.5 Continuous Improvement Process

All operational Divisions now appear to address each of the elements found in the four general phases of the ideal maintenance management process (American Public Works Association, 2008), yet they vary in magnitude and approach. This is shown in Figure 2-137 with the ideal maintenance management process with check "✓" marks to indicate compliance by the operational Divisions and "P" values to indicate partial compliance. These are four functional areas with the various components in the Figure - planning (light blur shaded area), organizing (orange), directing (yellow) and controlling (grey).

Figure 2-137
Ideal Process as Compared to Existing Processes



In the planning area, all groups have work activities, as well as documented guidelines depicting details of each activity. These practices are also updated annually. Resource data of rates and amount is available and routinely updated for labor, equipment, materials, contract amounts and material unit cost. The County has utilized a robust GIS database for their infrastructure asset, which is linked to the Lucity database. Employees have a broad general understanding of its use with several highly skilled employees spread within the Department. Level of effort for each of the activities have been established based on historical data and desired frequencies such as number of mowing cycles or number of water valves planned to be turned. Work programs and budgets are developed annually for each Division with some detailed to a sub-level, identifying costs and estimated work accomplishment by activity by program.

For the organizing part of the process, work load distribution and annual work calendars are created for the annual plan for each group depicting the months' work by activity that is planned. These capabilities are used to project labor and equipment resource needs that match the work plan.

In the third function (directing), work requests are systematically generated for all work, through automated systems and automated linkages between receiving requests and completion of work. Most Divisions utilize the CMMS to store back-log work orders with few using ancillary manual systems. Some short-term assignment of work occurs daily, yet there are also some undocumented maintenance routines. Biweekly schedules are completed and utilized to varying degrees. Inventory control systems are implemented and are primarily dependent upon the CMMS with some related manual processes in place.

The final function, the controlling aspect of the process is utilized. All work by activity is reported in the Lucity database with related labor, equipment and material costs, in addition to

accomplishment. The data is used by most in monitoring of field crews and work performance. Key supervisors review results. The systematic evaluation of work performance and costing based on system outputs is performed by the respective Division Directors, Operations Manager, and their direct reports monthly.

All groups follow this process, yet some utilize the system more for improvement, while others focus more on it as meeting a department requirement. Some functions are being performed or partially being performed, yet a continuous improvement process is in place for all groups with some functionality in scheduling and output interpretation lacking.

SECTION 3 FINDINGS / OPPORTUNITIES

This section provides support information and analysis of opportunities to improve maintenance operations at Volusia County's Public Works Department within the Divisions of Coastal, Mosquito Control, Road and Bridge, Traffic Engineering, Solid Waste, and Water Resources and Utilities.

LAC's research and analysis used in the identification of findings in this section will provide a basis for specific recommendations for improvement. The section 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 opportunities 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 agency. Using the baseline information along with field observations and maintenance expertise, LAC evaluated the Division's operations from several points of view.

The following findings are based on observations, interviews, data collection, comparisons, prior knowledge of the agency and evaluation. The fifty-two (52) findings are classified into five categories in their respective sections of 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.

It should be noted that much of the support information used to determine the findings is derived from the baseline information in the previous section, and was "point-in-time" data obtained from the agency and interviews with staff. Most baseline information is not repeated in this section and only referenced for the sake of brevity.

3.1 General

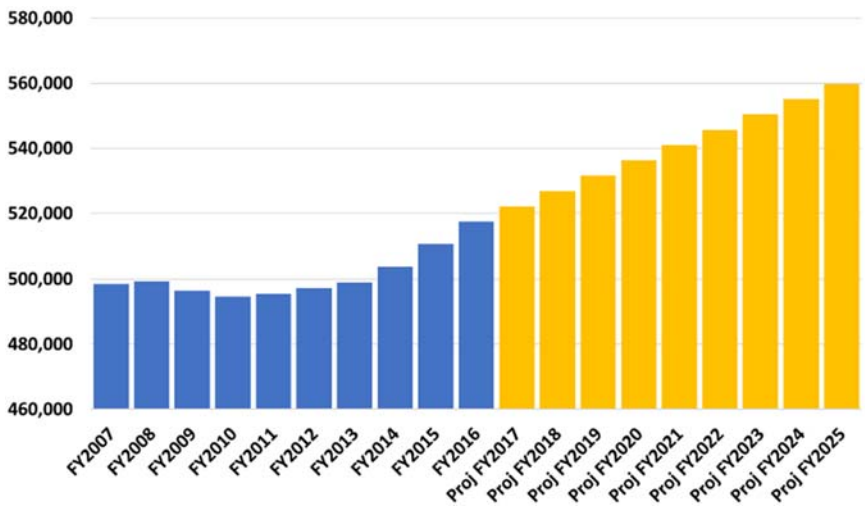
3.1.1 The County population has increased 3.8% over the last ten years and is projected to grow an additional 8.42% by 2025, which could require additional resources to meet increases in population needs and related assets.

The County's Economic Development Department reports that the County's population in 2016 was 521,338 (Volusia County Economic Development, 2017). Over the past ten years the County has seen a 3.8% growth in population, although in FY2009 and FY2010 the County experienced a reduction in population of .56% and .38% respectively. They recovered the population loss of these two years by FY2012. The County is projected to grow an additional 8.42% by 2025 (Volusia County Finance Department, 2017). Figure 3-1 shows the historical population in blue and the projected annual population in yellow.

With this projected growth, additional resources including labor, equipment, materials, as well as monetary resources for contracted services and capital improvement (CIP) may be required to meet the increase in population and the growth in associated assets.

The use of the Lucity database planning features are essential to proactively plan and project resource needs based upon the current and projected increases in asset inventories, levels of service, as well as the desires of senior management and elected officials.

Figure 3-1
County Population



3.1.2 Public Works has clearly demonstrated the ability to change and made a commitment to improve. They are further acknowledged and recognized by the industry and their peers in Public Works as a leader in efficient and effective operations.

Each operational Division of the Public Works Department is clearly demonstrating innovative methods of addressing maintenance and operations. Their focus has confirmed the Department's ability to make positive change and shows their commitment to continuous improvement. This commitment has also been recognized within the Public Works' industry and with their peers as leaders in efficient and effective operations. Some examples of this recognition include:

- Several agencies in Florida and other states having visited and contacted the Public Works Department related to their implementation of the Lucity database and their business processes.
- Members of the Department being selected to make numerous presentations to their peers at state and national conferences related to efficient and effective operations.
- Members of the Department having written and published several articles on their efficient and effective operations. Some of these publications include:
  - Florida Engineering Society
  - PublicWorks.com
  - Government Engineering
  - APWA Reporter
  - WingBeats
- The Department received the 2012 Special Achievement in GIS (SAG) Award from ESRI, for their integration of ArcServer Webmap and the Lucity database.

- The previous Public Works Director received Florida Association of County Engineers and Road Superintendent's (FACERS) Urban Engineer of the Year Award in 2010.
- The previous Public Works Director received APWA Florida's Public Works Director of the Year Award in 2012.
- An administrative leader received APWA's 2012 National Professional Manager of the Year in the Administrative Management Category.

3.1.3 The Department and Division's mission statements, generally support the County's mission, vision and goals. Some divisional mission statements reference both effective and efficient elements.

The County, Public Works Department and some of its Divisions have outlined a direction with several documented mission statements. The County has published a vision and three goals, in addition to its mission statement for achieving them. The Department and some of its Divisions' mission statements support the County's statement through reference to both effective and efficient operations.

The Coastal Division mission statement emphasizes effective operations through, "*Manage, maintain and improve coastal parks, beach access and coastal recreational facilities…*" The Mosquito Control Division's mission statement, emphasizes effective operations through, "*…provide [providing] an Integrated Pest Management (IPM) program for mosquitoes and other arthropods of public health importance based upon a surveillance system targeting both nuisance and disease-important mosquito species."*

3.1.4 Public Works has fully or partially implemented and institutionalized 87% of the 2007 Final Report recommendations.

In 2007, LA Consulting, Inc. (LAC), previously known as Lorick Associates was retained by Volusia County to provide consulting services for improving operations using management and technology best practices. The original phase final report outlined and provided an action plan of how maintenance and operations could be improved through implementing the basic management principles of planning, organizing, directing and controlling/improving. The evaluation included the Divisions of Mosquito Control, Road and Bridge, Solid Waste, Traffic Engineering and Water Resources and Utilities. At the time, the Coastal Division was within the Leisure Service Division, which reported to the Growth and Resource Management Department and not part of the original evaluation.

The final report of phase one identified opportunities to improve in all identified aspects (e.g. organizational structure, labor and equipment usage, technology needs, asset management, work effectiveness, and work efficiency) of operations. The report also provided ninety-one (91) specific recommendations in four categories including: fourteen (14) in General, thirty-one (31) in Planning, thirty-five (35) in Organizing, as well as eleven (11) related to Directing/Controlling (11). LAC was also retained to assist in the implementation of several key recommendations from the phase one final report.

Currently, there are 13% recommendations with a status of not completed, 42% partially completed, and 45% are completed. Further, there are an additional seven or 17% that are no longer applicable or are out of the Department's control, yet they are still basic best business

processes. Figure 3-2 shows the original recommendations yet to be implemented. In addition, the highlighted recommendations are out of the control of the Department.

Figure 3-2
2007 Recommendations in Not Completed Status

1	Annually select and utilize capable employee teams to implement improvement processes.
5	Mosquito Control should allocate and assign resources to the west side and utilize existing road barns for work staging.
10	Integrate manual log with GPS system and new CMMS.
28	Restrict commercial activity at Landfill to two hours in advance of closing.
38	Purchase equipment technology for compactors to optimize cover and monitor compaction and grade.
44	Implement one simplified project management system for all groups throughout Construction Engineering and link to GIS. The system should focus on cost and schedule and be utilized for CIP. Fully automate and systematize work assignment and coordination.
49	Continue to use contract meter readers and evaluate outsourcing other more manual related support tasks such as meter installation after the CMMS is installed.
51	Establish process for allocating projects evenly among project managers and utilize designer as small project manager.
56	Traffic sign and signal staff should be allocated throughout the County with resource allotment to the west side where the larger amount of County assets exists. Consider utilizing other staff, such as mowing, for sign support during the winter off season.
67	Consider integration of Utility Engineers under Construction Engineering and at a minimum utilize the same project management system.
69	Establish an internal service fund. Fleet should manage and own all equipment and rent/lease back to divisions. Establish life cycle costing to allow for optimal replacement of fleet and link to a replacement
70	Fleet should bill based upon actual year expenditures incurred rather than prior year.

The recommendations that have been implemented resulted in considerable improvement. Several industry presentations and publications in Government Engineering, Florida Engineering Society and Public Works Magazine, as well as State and National APWA presentations on the successful implementation of such recommendations provides data on agencies that have documented saving of millions of dollars.

3.1.5 The Lucity system is now used and allows for process improvement, yet the system may be even more powerful when all functions of the latest web capabilities are rolled out.

The Lucity Computerized Maintenance Management System (CMMS), previously known as the GBA Master Series, was implemented expeditiously in approximately four months from the selection and purchase of the software by the County. The system is the primary work management database used by the operational Divisions of the Public Works Department with the Department's goal of tracking 100% of their work efforts including labor, equipment, materials and accomplishment.

Although the system was state of the art when originally purchased, Lucity has continued to provide upgrades and improvements to their software. Originally, the software was configured to be a server-based database with the user's accessing the system using a desktop personal computer. Today, a web-based version of the Lucity software is available. Several of the Divisions are utilizing some functions of the latest version. For example, Water Resources Utilities, Mosquito Control and Traffic Engineering field staff remotely access the Lucity database via laptop computer to create work orders, receive work requests, as well as record labor and equipment hours, materials used and work accomplishment. The use of this

functionality has allowed for increased efficiency, reducing or eliminating the need for paper work request/work orders and time spent in an office environment entering data.

3.2 Planning

3.2.1 The operational Divisions have several reporting locations with three locations being shared. All except the Holly Hill Yard appear strategically located for their assigned assets with a more optimal grouping or integration of yards possible.

The Department maintains many asset classes and their features related to roads, bridges, drainage, traffic signals and signs, mosquito control, coastal parks, water treatment and distribution, wastewater collection and wastewater reclamation and transmission. With this volume and location diversity of assets and the geographical size of the County, The Public Works Department's Divisions have several reporting locations for staff, equipment and materials to be staged.

Three locations, including the Holly Hill Yard, New Smyrna Beach Yard, and the County's Transfer Station located on S.R.-44 have sites, which are shared between Divisions. The Holly Hill Yard is shared between Road and Bridge and Traffic Engineering-Signals. The New Smyrna Beach Yard is shared between Road and Bridge and staff from Coastal. The Transfer Station is shared between Solid Waste' Transfer Station staff and Water Resources and Utilities' Maintenance & Field Operations and Water & Wastewater Operations groups.

Most of the yard locations appear to be strategically located in relationship to the assets they are responsible for, except for the Holly Hill Yard. For example, travel time from Holly Hill to Deland can take approximately thirty-five (35) minutes one way, Debary forty-five (45) minutes, and Pierson forty (40) minutes. County staff has also shared the concern that the property in Holly Hill floods during heavy rains and storm events and is documented in photographs.

Although, the remaining yards appear to be strategically located, a more optimal configuration may be possible through the centralizing of all Public Works services in a single centralized location with some minor staging. This would include most Public Works Divisions, except for staff and equipment of the Solid Waste Division Transfer Station and Landfill and Water Resources and Utilities Division's Water and Wastewater plant operations and the Coastal Division.

3.2.2 The number of signalized intersections have increased by 9% since 2006.

The number of traffic signals in 2006, at the time of Public Works' original evaluation was approximately 305, as reported in LAC's 2007 final report. From 2007 to 2017, the number of signalized intersections have grown to 332 and an additional 249 other illuminated traffic control devices. This is an increase of approximately 9%. Over this same period, staffing of the Traffic Engineering Division has reduced by sixteen (16) or 43%. It should be noted that the responsibility of roadway markings and sign maintenance and repair, as well as the associated staffing was transferred to the Road and Bridge Division in 2007/08.

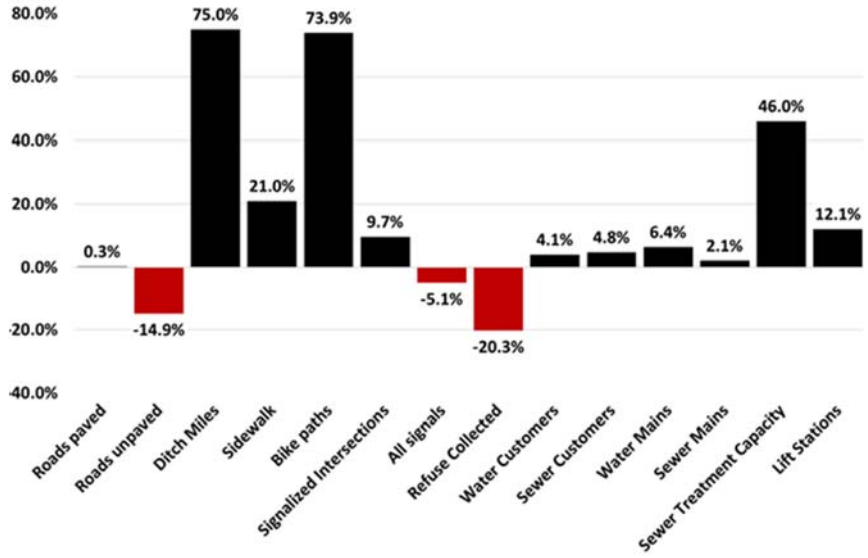
3.2.3 Most asset classes have increased in number of units from 2006. The largest increase was in ditch miles, sidewalk miles, bike paths and sewerage treatment capacity. The decreases have been in dirt road miles, refuse collection and all signals.

Using historical Comprehensive Annual Financial Report (CAFR) data posted on the County's website, it appears most asset classes have increased between 2006 and 2016 (Volusia County Finance Department, 2017). The largest increase in assets by percentage has been in ditch miles at 75%, bike paths at almost 74%, and sidewalk miles at 21%. Other increases include Paved Roads, Signalized Intersections, Water Mains, Sewer Mains and Lift Stations.

Other non-asset but related maintenance and operational data, is also shown in Figure 3-3. Refuse Collection has decreased just over 20% and Water Customers have increased over 4%, Sewer Customer 4.8%, and Sewer Treatment Capacity of the Water Resources and Utilities Division has increased 46%. Staff has also reported that Coastal will also be adding seven additional off beach parking lots and associated assets.

Reductions have been in Unpaved Roads, all related traffic signals including school crossings, railroad crossings, and flashing beacons, and Refuse Collected.

Figure 3-3
Asset Changes



3.2.4 Benchmarks of staffing per asset show mixed results. Roadway miles higher and traffic signals lower. Benchmarks of staffing per water and sewer assets show both to be lower.

As shown in Figure 3-4 through Figure 3-7, the benchmarks of staff per asset class shows mixed results. For example, in Figure 3-4 the field staff per 100 miles of road for the Road and Bridge Division is shown to be slightly higher that other LAC benchmark agencies, where Figure 3-5 shows Traffic Engineering's staff per ten signalized intersections to be over 70% less than other benchmark agencies.

Figure 3-4
Staff per 100 miles of Paved Road

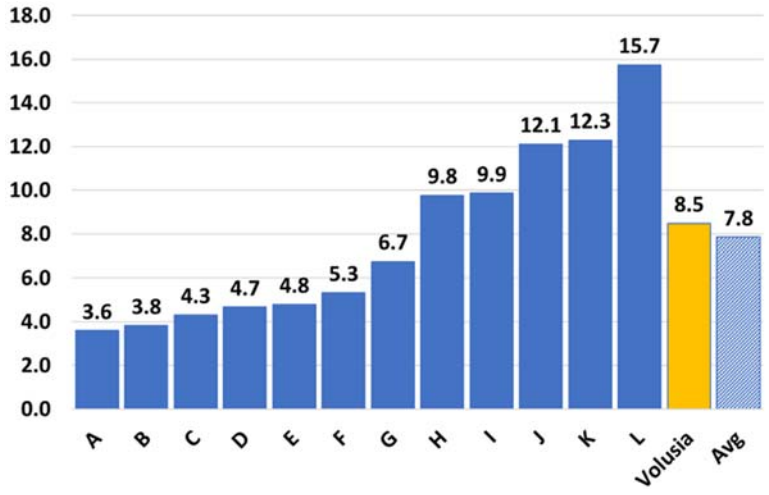
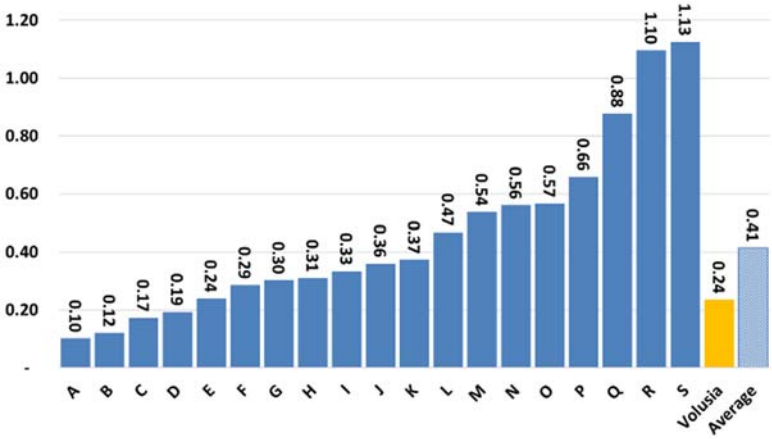


Figure 3-5
Staff per 10 Signalized Intersections



Other mixed results can also be found in the Water Resources and Utilities Division. As shown in Figure 3-6, the staff per 100 miles of sewer line is higher than other benchmark agencies. It should be noted that the Water Resources and Utilities Division is unique in that field staff are responsible for both water and wastewater assets. This allows for increased staffing flexibility over other agencies. The same applies to the benchmark of staff per 100 miles of water line as shown in Figure 3-7. Using LAC benchmark average of agencies with more than 1,000 miles of water line, Water Resources and Utilities is higher, while for agencies with less than 1,000 miles the Division is slightly lower. Water Utilities maintain approximately 250 miles of water main and 200 miles of sewer main, which may be influenced by economy of scale when compared to benchmark agencies.

Figure 3-6
Staff per 100 miles of Sewer Line

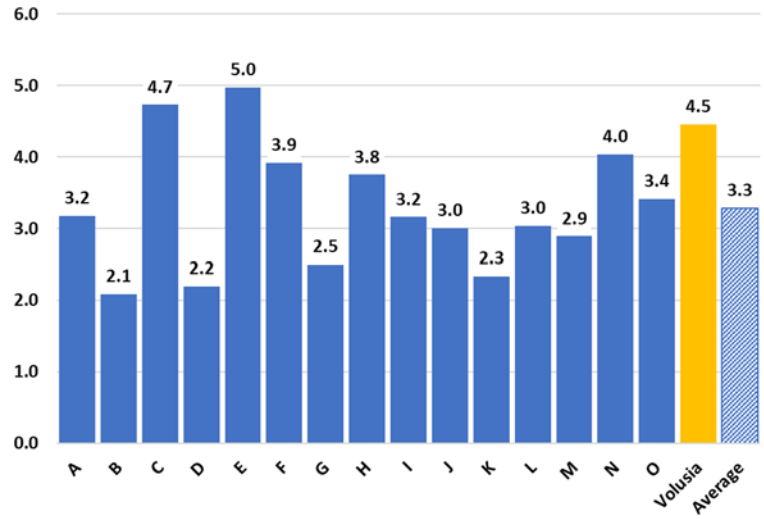
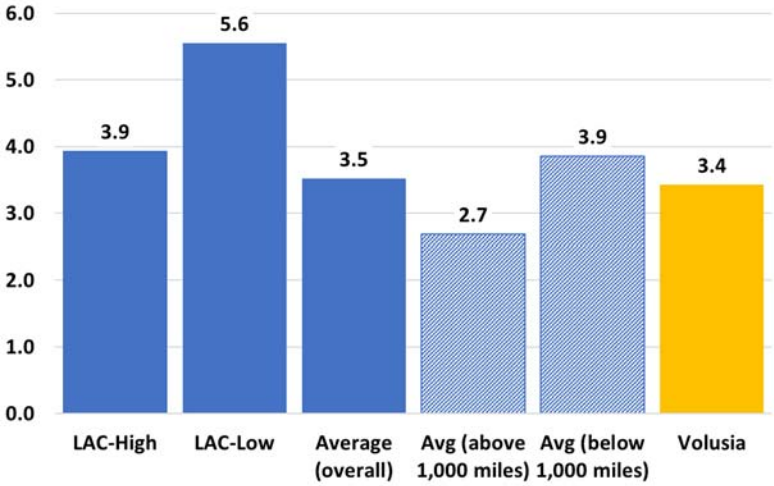


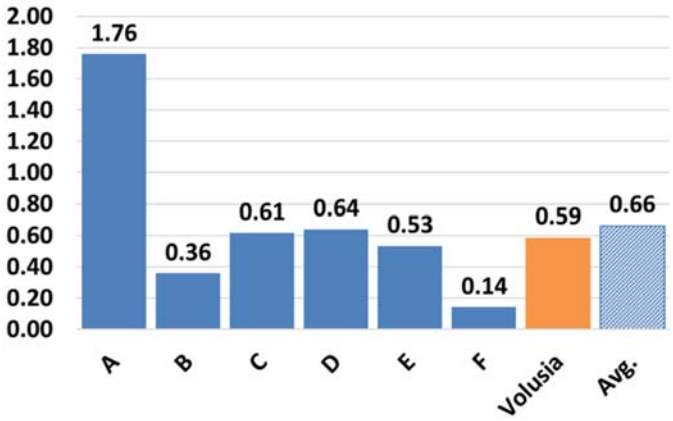
Figure 3-7
Staff per 100 miles of Water Line



3.2.5 Mosquito staff per 10,000 residents is lower in comparison to other Florida benchmark agencies, yet staff augments operations with part-time employees.

Although, the Mosquito Control Division is primarily a response based operation with a very limited number of traditional asset classes, Figure 3-8 compares the number of staff per 10,000 residents to those of other benchmark Florida agencies. As compared, the Mosquito Control Divisions staff value is slightly lower than that of the benchmark agencies, where the high is 1.76 staff per 10,000 and .14 being the low.

Figure 3-8
Staff per 10,000 Residents



3.2.6 Public Works has entered into contractual agreements with fifteen agencies to provide five categories of services. Mosquito Control also has agreements with Plantation Bay and Eagle Rock homeowner's associations.

The County has entered into several interlocal agreements with communities within Volusia County. These communities are listed in Figure 2-69 of Section 2- Baseline. The services provided upon request include Road and Bridge, Mosquito Control and Traffic Engineering activities. In addition, Water Resources and Utilities provide monitoring of the Southwest Pumping Station and provide plant maintenance at Bill Keller Park, both for the City of Debary and the County. Contractual agreements also had existed for Orange City in the southwest. Current contracts include Plantation Bay in the northeast and Eagle Rock.

Most services are based upon requests from the agencies, except for signal maintenance performed by Traffic Engineering's Traffic Signal group where support is complete. The County has contracted with all fifteen communities to provide the inspection, maintenance and repair of the signals at their signalized intersections.

3.2.7 County supports and is reimbursed by the FDOT and cities. For FDOT, the County has chosen not to accept the updated additional reimbursement process while the City has accepted it.

The Signal Operations and Maintenance group within the Traffic Engineering Division is responsible for all signal operations for the County signals. They are also responsible for signal operations of twelve additional agencies, as well as Florida Department of Transportation's (FDOT) signalized intersections found both in unincorporated Volusia County and the contracted cities. The support provided to the contracted cities also includes the preparation of billing documents that are submitted to the FDOT for reimbursement.

Historically, local agencies in Florida have maintained FDOT signalized intersections. FDOT would make compensations based on the number of approaches of a given intersection. Recently the FDOT has proposed and offered an alternative method of compensation based on the number of FDOT assets within the boundaries of a specific agency. All agencies in which Traffic Engineering provides signalized intersection inspection, maintenance and repairs have chosen to

utilize the new form of reimbursement, yet the County has made the choice to maintain the original agreement.

Figure 3-9 and Figure 3-10 compare the historical FDOT reimbursement method with projections of the new method, applied to the same group of signalized intersections for both the County and contract agencies. Over the past five years, the average County revenue has been approximately $186,400 with the cost of support being approximately $369,500. This represents a loss of $183,000 annually shown in red. The city support for FDOT has experienced similar results with the average annual revenue has been $154,400 at a cost of $228,600 or an annual loss of $74,200 shown in red. The County work for Cities/FDOT signals is on a cost basis, so the loss for those city signals is incurred by the cities.

Applying the new compensation method, the projected County revenue would be $434,900 annually and the cost of support would be approximately $369,500. This would represent a positive cash flow of $65,300 shown in black. Applying this method to the city support, which the cities are using, projected revenue is to be $349,900 with the cost of support of $228,600. This represents a positive cash flow of $121,200. Currently, the cities are implementing the new process so they do have a positive cash flow, while the County could have that positive cash flow as shown in Figure 3-10, but the County has chosen to keep a prior agreement even though there is a loss to the County.

Figure 3-9
Historical FDOT Support

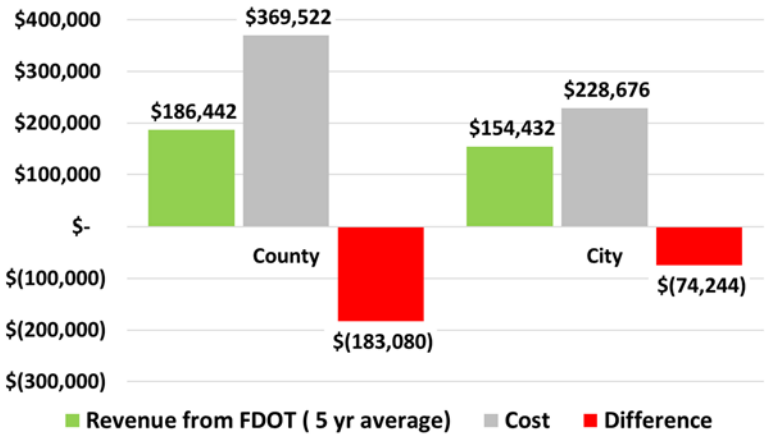
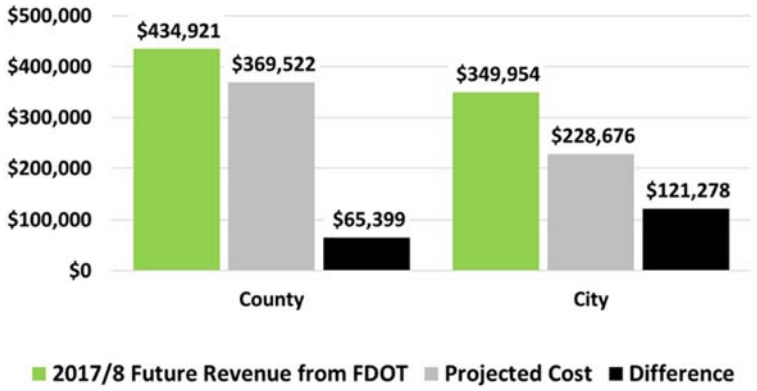


Figure 3-10
Projected FDOT Support with New Rates



Many other Counties in the State have chosen to accept this agreement. Volusia has decided, due to concern of risk, that if a mast arm and pole were damaged that the cost of replacement of $10,000 to $20,000 (County staff estimate) may exceed reimbursement. The number of such mast arm repairs over the last 10 years from traffic staff interviews has occurred only once. The reimbursement of such a mast arm would be the responsibility of the County to collect the cost from the responsible party (most likely a moving vehicle that damaged the mast arm). If unsuccessful at getting compensation from the responsible entity or insurance, then the County could request and receive reimbursement by the State. The verbiage in the agreement to cover this risk situation has not been acceptable to the County Traffic management.

3.2.8 Each operational Division has developed and utilizes activity lists with specific reporting units, yet numerous (190) units and task descriptions have historically changed, making it difficult to historically benchmark some specific activities.

Each of the operational Divisions originally in the implementation of the Lucity database and associated business processes, developed and documented specific lists of activities. These, along with associated reporting units, are used for planning and tracking work. Each activity list is stored within the Lucity system where work accomplishment is tracked in addition to labor and equipment hours, and materials used.

In review of the Lucity system data, it appears that several units and task descriptions have been modified since the original development during implementation. It is estimated that 190 changes have been made since 2007. Some of these examples are shown in Figure 3-11. The result of these modifications causes difficulty in use of historical system data to determine trends establishing benchmarks, as well as measuring productivity and costing. In some cases, conversions can be made between reporting units yet others cannot. For example, in the case of 2302- Ditch Clean Hand, Ditch Mile[s] can be converted to Feet or Linear Feet, yet not Hours or Traps.

Figure 3-11
Examples of Modifications

Task Number	Task Description	Unit of Measure
2000	DITCH INSPECTION/SURVEY	Acres
2000	DITCH INSPECTION/SURVEY	Ditch Mile
2000	DITCH INSPECTION/SURVEY	Hours
2000	DITCH INSPECTION/SURVEY	Linear Feet
2001	GROUND MOSQUITO FIELD INSPECTION	Hours
2001	GROUND MOSQUITO FIELD INSPECTION	Sites
2001	GROUND MOSQUITO INSPECTION	Sites
2302	DITCH CLEAN - HAND	Ditch Mile
2302	DITCH CLEAN - HAND	Feet
2302	DITCH CLEAN - HAND	Hours
2302	DITCH CLEAN - HAND	Linear Feet
2302	DITCH CLEAN - HAND	Traps
2303	DITCH CLEAN/MECHANICAL	Linear Feet
2303	DITCH CLEANING/MECHANICAL - HAUL	Linear Feet
2303	ROADSIDE DITCH CLEAN/MECHANICAL	Linear Feet
2304	RETENTION AREA CONSTRUCTION	Acres
2304	RETENTION AREA CONSTRUCTION	Square Foot
2307	HAND CLEAN DRAINAGE BOX	Each
2307	HAND CLEAN DRAINAGE BOX	Hours
2307	HAND CLEAN DRAINAGE BOX	Linear Feet
2310	SHOULDER REPAIR - HAND	Hours
2310	SHOULDER REPAIR - HAND	Linear Feet
2310	SHOULDER REPAIR - HAND	Square Foot
2310	SHOULDER REPAIR - HAND	Ton

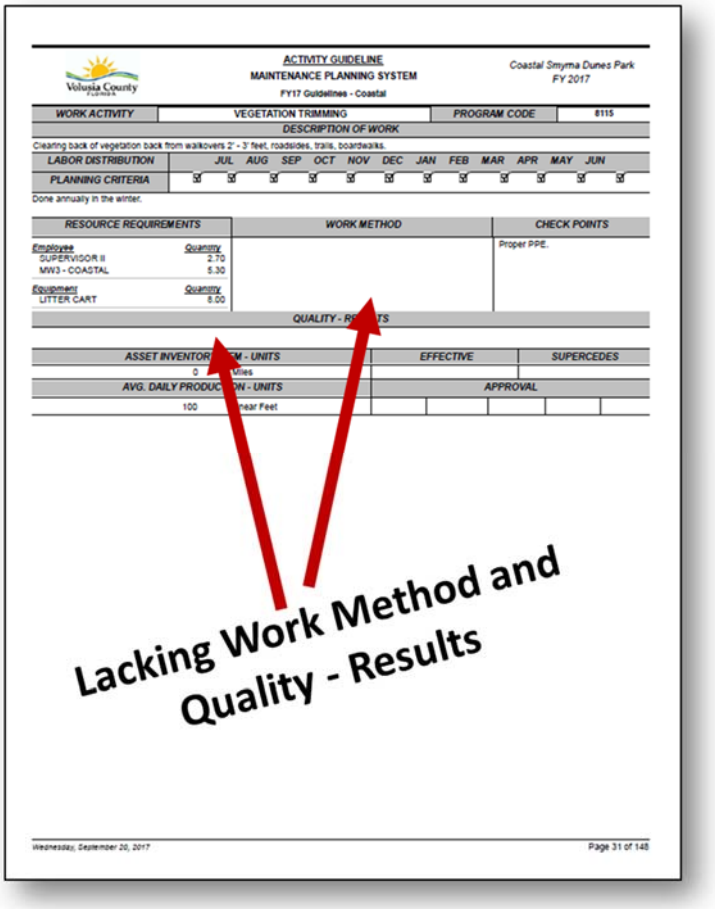
3.2.9 Although each operational Division has developed and documented activity guidelines to manage their work efforts, some are lacking detail.

In coordination with the development of the original activity lists, guidelines were developed and documented for each activity. Each guideline is named and includes an activity code, description of the activity, planning criteria, resource needs (labor, equipment and materials), work methods and check points, expected quality/results, specific inventory, and expected average daily production. These guidelines are also stored in the Lucity database. Annually, each operational division will review and make appropriate modifications to specific guidelines.

It appears that some guidelines are missing critical detail. The purpose of these guidelines is to aid field employees in the communication of specific expectations, as well as to assist supervisors and managers in providing accountability.

Figure 3-12 shows an example of an activity guideline with missing information. In this instance, the work methods and quality-results have been omitted. Resources include the number and class of employee, the number and class of equipment, as well as materials and estimated qualities to be used for accomplishing the task.

Figure 3-12
Example of Missing Guideline Information



3.2.10 The majority (53%) of Coastal' s productive activities are reported in hours and lack specific reporting units and are difficult to evaluate. Of non-hourly work activities, Coastal' s historical top two activities have been Routine Access Maintenance and Restroom Cleaning.

The primary focus of the Coastal Division effort is a combination of maintenance, operations, customer service and contract administration. 53% of their activities are reported in hours as their work accomplishment. Hours as a work accomplishment provides no value in measuring efficiency, setting benchmarks, or measuring the effectiveness to operational changes.

Of the non-hourly work activities, their historical top two activities have been Routine Access Maintenance and Restroom Cleaning. As shown in Figure 3-13, their restrooms cleaned per day has increased 40% between FY14 and FY17. Further, Figure 3-14 shows a decrease in total number of restroom cleaned annually. This may be resulting from the majority of restroom cleaning being performed through contracted services.

Figure 3-13
Restrooms Cleaned Per Day

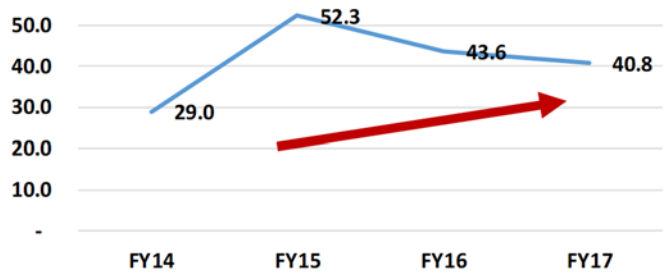
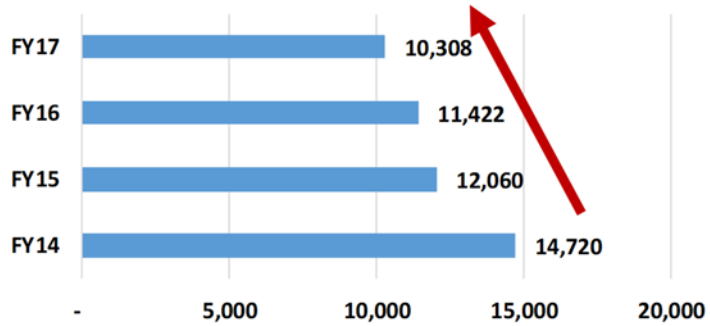


Figure 3-14
Total Restrooms Cleaned Annually



3.2.11 Drainage's historical top two activities of non-hourly work activities have been Install Drainage Pipe and Roadside Ditch Clean/Mechanical.

Although the DTT is not a separate Division, but a function performed within the Road and Bridge Division, this function is critical to the management of stormwater and maintenance of Mosquito Control ditches.

Historically, the non-hourly work activities performed in this group, Install Drainage Pipe and Roadside Ditch Clean/Mechanical has contributed to their largest effort. Shown in Figure 3-15, the linear feet (LF) of installed drainage pipe a day has increased 89% and the total linear feet of drainage pipe installed annually has fluctuated, yet has dramatically increased (225%) over the past three years. This is shown in Figure 3-16.

Figure 3-15
LF of Pipe Installed Per Day

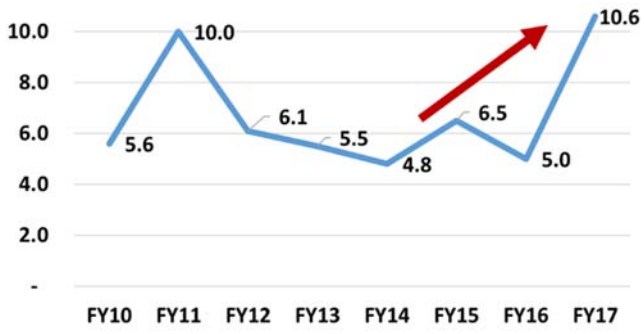
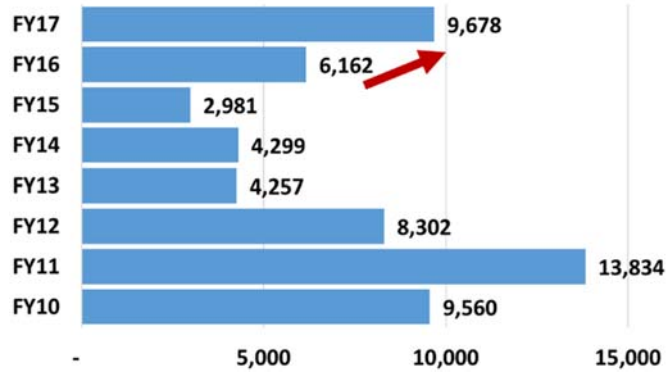


Figure 3-16
Total LF of Pipe Installed Annually



The second of the two major activites for this group, Roadside Ditch Clean/Mechanical has seen annual variances in both the accomplishment per day and units accomplished. As compared to FY2010, the LF of mechanical ditch cleaning has seen a reduction of 16% and the total linear footage (LF) of ditch cleaned mechanically has also seen a reduction of 16% in FY16. Both are shown in Figure 3-17 and Figure 3-18 respectively.

Figure 3-17
LF of Roadside Ditch Clean/Mech Per Day

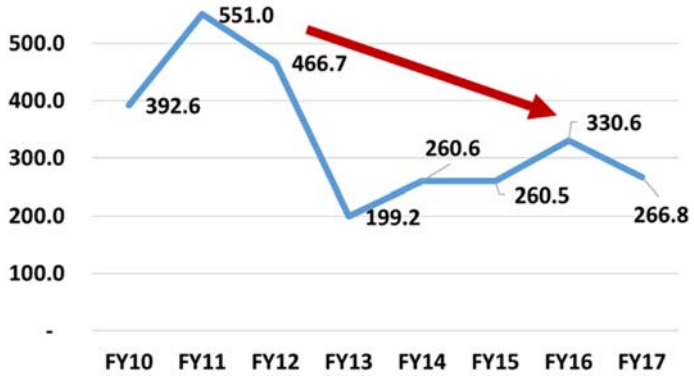
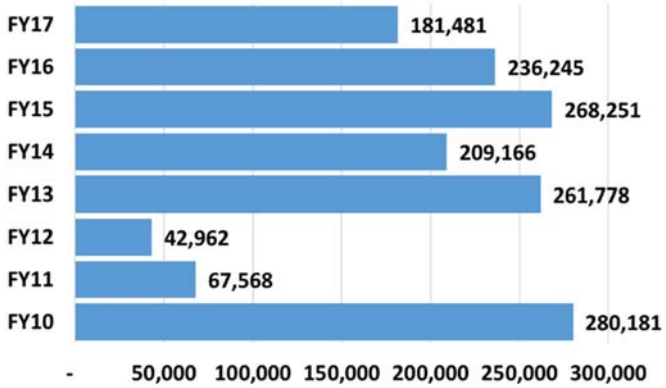


Figure 3-18
Total LF of Roadside Ditch Clean/Mech Annually



Another notable activity, which also accounts for major efforts of this group, is Right of Way Mowing Flat. As with Install Drainage Pipe, this activity has shown significant increases in both LF mowed in a day and the total accomplished annually. Figure 3-19 and Figure 3-20 show the increases in both measurements. LF of Right of Way Mowing Flat's accomplished in a day has increased 87% and the annual amount accomplished has increased 429%.

Figure 3-19
LF of Right-of-Way Mowing Per Day

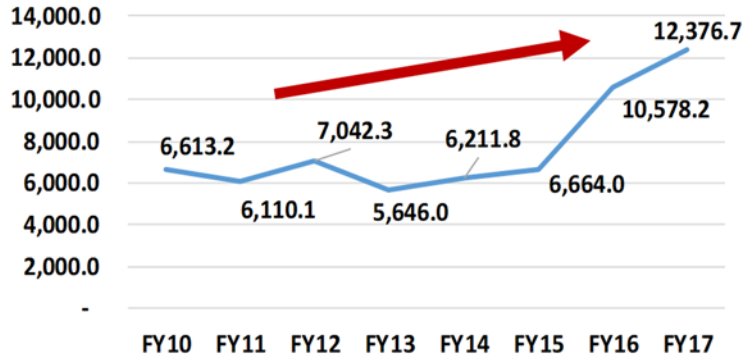
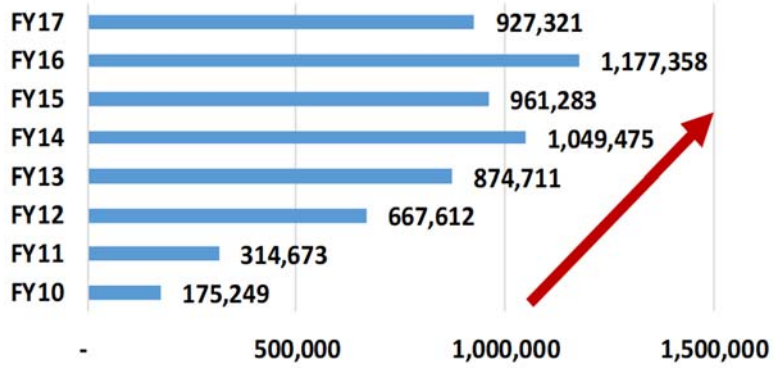


Figure 3-20
Total LF of Right-of-Way Mowing Annually



3.2.12 Mosquito Control's historical top two activities of non-hourly work activities have been Mosquito Trapping and Ground Mosquito Field Inspection.

The Mosquito Control Division is primarily a response driven group, yet there are several activities they perform that can be annually compared for efficiency measurements. Of these activities, their top two have historically been Mosquito Trapping and Ground Mosquito Field Inspection. As compared to FY10, the number of mosquito traps touched per day has increased 10.5 or almost three times the amount in FY17. The number of Mosquito traps touched annually has increased over 8,000 in FY17 or eight times the amount, as compared to FY10. It should be noted that staff has reported that the method of accounting for this activity has historically changed over the seven-year period. These metrics are shown in Figure 3-21 and Figure 3-22 respectively. The following graphs show Ground Mosquito Field Inspection, the second most performed activity, in Figure 3-23 and Figure 3-24. These comparisons show considerable variance from year to year in inspections total and those done by day. It appears methods to

record these inspections have changed, thus making comparison difficult. Staff reports that through FY14, inspection quantities per day were estimated versus actual accomplishment.

Figure 3-21
Mosquito Traps Touched Per Day

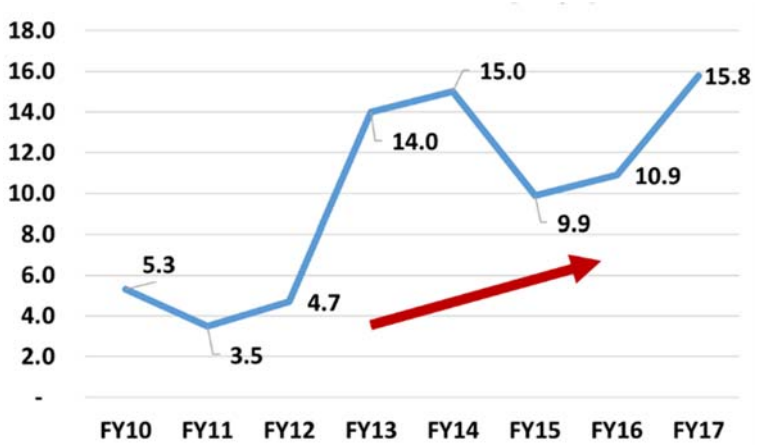


Figure 3-22
Mosquito Traps Touched Annually

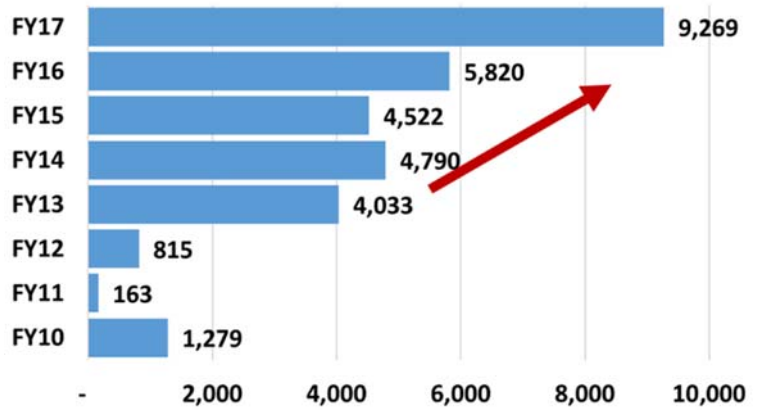


Figure 3-23
Inspections Per Day

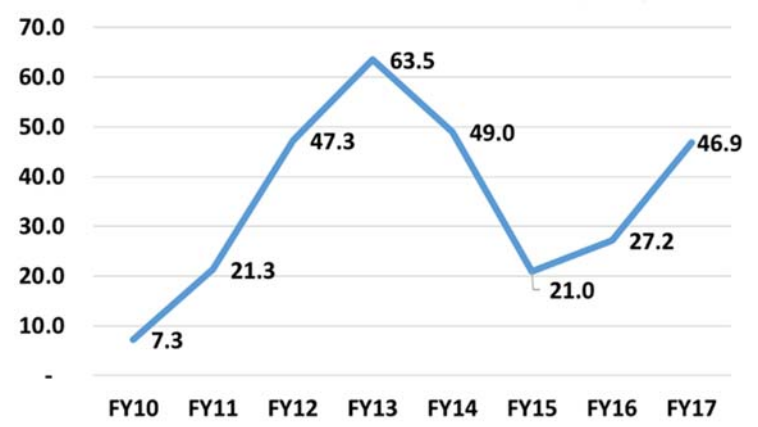
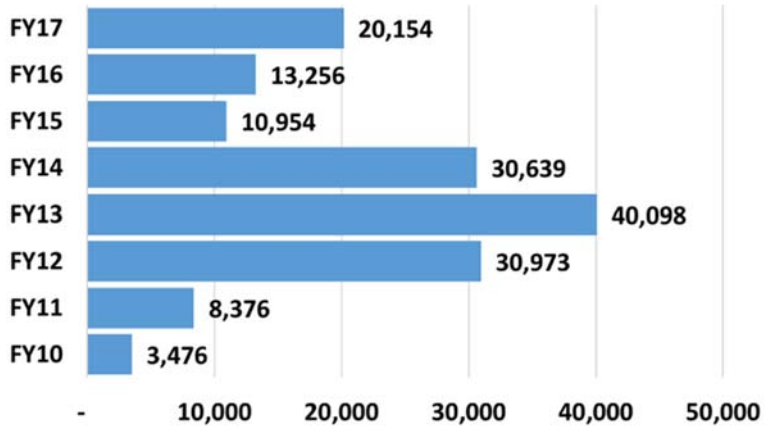


Figure 3-24
Inspections Annually



Two additional activities, Truck Adulticiding and Helicopter Adulticiding, are also critical to the mission of the Division. Over the seven-year period, Truck Adulticiding has remained consistent with a slight reduction in acres treated daily, yet has shown a dramatic increase in total acres treated annually. The acres treated annually in FY17 has increased over five times as compared to FY10. The annual comparisons are shown in Figure 3-25 and Figure 3-26.
Figure 3-26Figure 3-27 and Figure 3-28 show the annual comparisons for Helicopter Adulticiding. Helicopter Adulticiding has shown a considerable increase in acres per day with an increase of 22,069.8 acres or almost seven times, comparing FY10 through FY16. Data from the Lucity system shows the annual acres treated has dramatically decreased, almost twelve times, from FY15 through FY16. This may be the result of using contracted services for this activity. Further, staff reports that historically internal helicopter and contracted fixed wing efforts were mixed together, resulting in erroneous accomplishment data.

Figure 3-25
Truck Adulticiding Acres Per Day

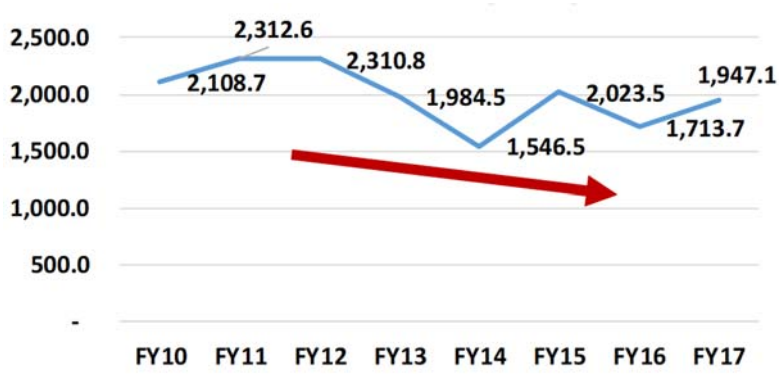


Figure 3-26

Truck Adulticiding Acres Annually

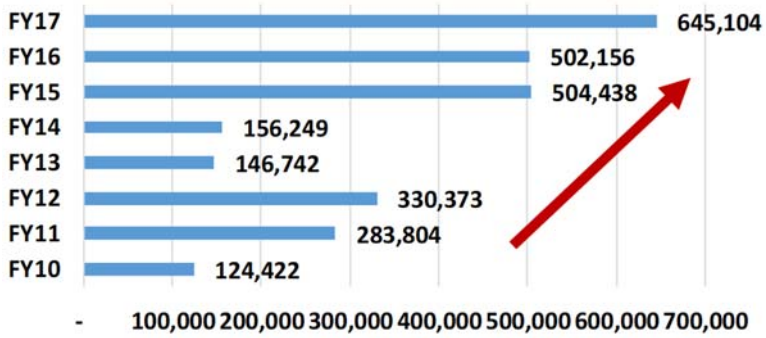


Figure 3-27
Helicopter Adulticiding Acres Per Day

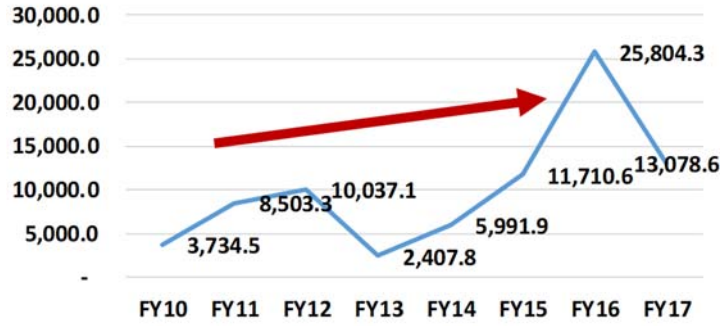
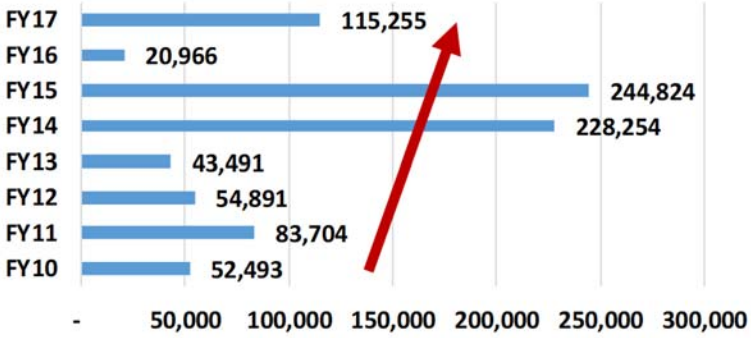


Figure 3-28
Helicopter Adulticiding Acres Annually



3.2.13 Road and Bridge's historical top two activities of non-hourly work activities have been Premowing/Trim/Litter Removal and Sidewalk Repair. Mixed results have occurred in these and other several key activities.

The activities performed by the Road and Bridge Division is a combination of routines and response to service requests. Three activities which fall within the routines category are Tree Trimming, Pre-Mowing/Trim/Litter Removal, and Flat Mowing. Pre-Mowing/Trim/Litter Removal is often a support function of the Flat Mowing activity that prepares the area for mowing. Shown in Figure 3-29 and Figure 3-30, acres per day has increased 27% from FY10 through FY16 and the annual acres produced have almost doubled. Figure 3-31 and Figure 3-32

show the productivity comparisons for Flat Mowing. Flat Mowing acres per day has increased almost 24%, and the annual acres mowed has increased almost 42% from FY10 through FY16.

Figure 3-29
Acres Per Day

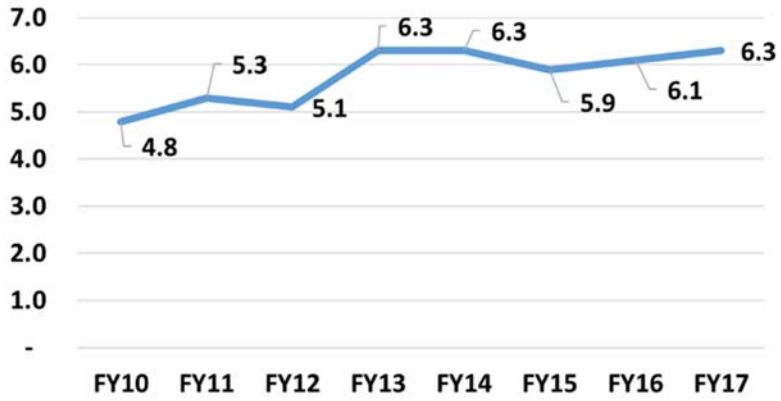


Figure 3-30
Annual Acres

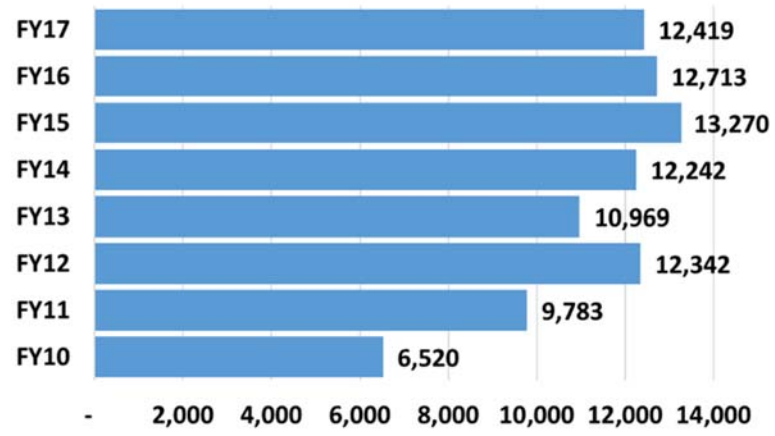


Figure 3-31
Acres Mowed Per Day

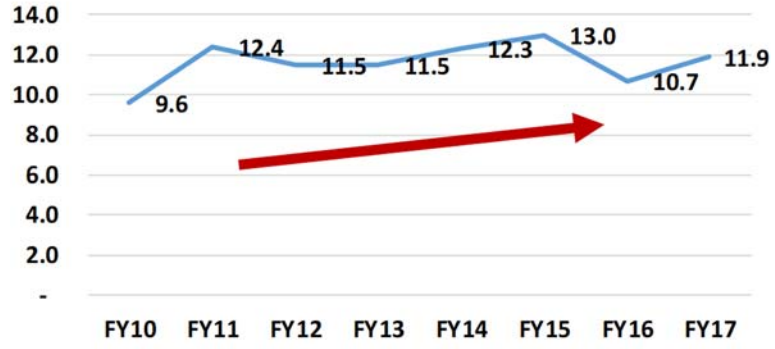
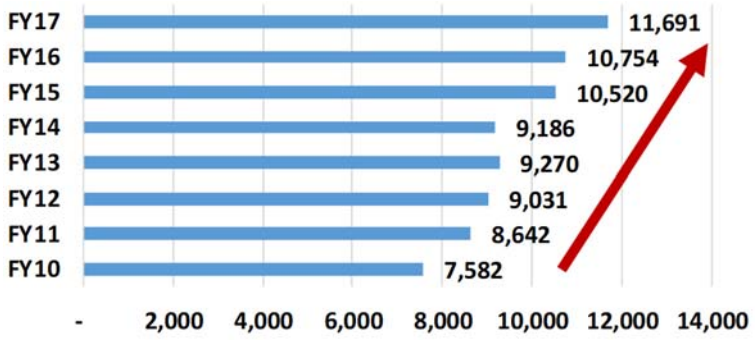


Figure 3-32
Annual Acres Mowed



Two additional activities and their metrics are shown in Figure 3-33 through Figure 3-36. Figure 3-33 shows the linear feet (LF) of tree trimming has increased by almost 2% and the total LF accomplished annually has increased by over 46% comparing FY10 through FY16, shown in Figure 3-34.

Figure 3-35 and Figure 3-36 show the performance metrics for Sidewalk Repair. This activity has shown a decrease of almost 48% in square feet (SF) of sidewalk repaired per day, yet an increase of almost 86% in SF repaired per year, comparing FY10 through FY16.

Figure 3-33
LF of Tree Trimming Per Day

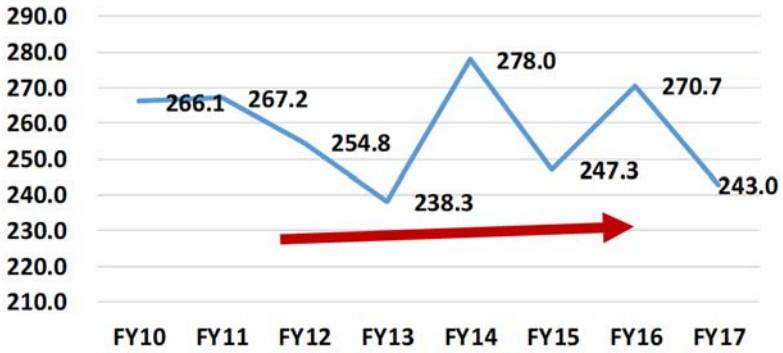


Figure 3-34
Annual LF of Trees Trimmed

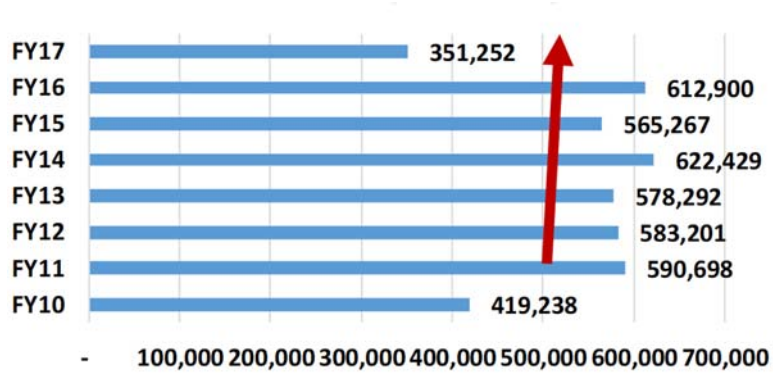


Figure 3-35
SF of Sidewalk Per Day

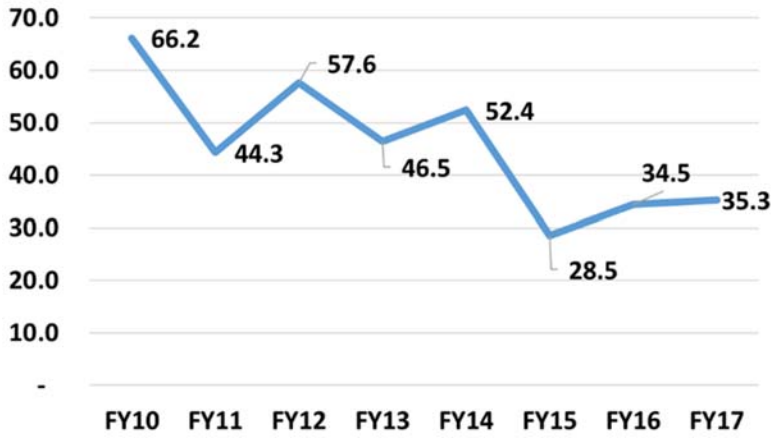
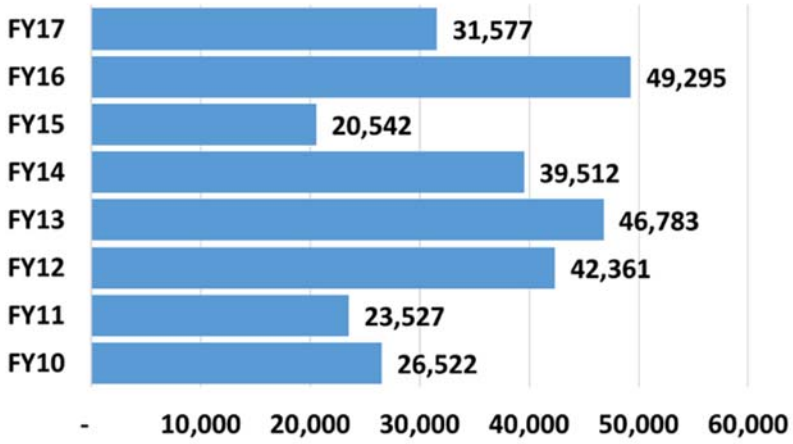


Figure 3-36
Annual SF of Sidewalk Repaired



3.2.14 Solid Waste's historical top two activities of non-hourly work activities, has been Refuse Hauling and Compaction of Waste- Class I. Both have shown dramatic productivity increase since 2006.

Most of Solid Waste's activities are routine based and contingent upon the amount of refuse which is collected and brought to the Transfer Station and Landfill. Of the non-hourly based activities, Refuse Hauling and Compaction of Waste-Class I, have historically been their top two activities. Both activities have shown a dramatic increase in productivity as compared to FY10.

Figure 3-37 shows the increase in tons compacted daily of 95% between FY10 and FY17. The total tons compacted annually has increased over 14%, as shown in Figure 3-38. Figure 3-39 shows a productivity increase of over 27% comparing FY11 with FY17. The annual tons hauled has increased almost 16% comparing FY11 with FY17, as shown in Figure 3-40. Comparisons in this activity were made starting in FY11 as the result of questionable data accuracy from FY10.

Figure 3-37
Tons Per Day Compaction-Class I

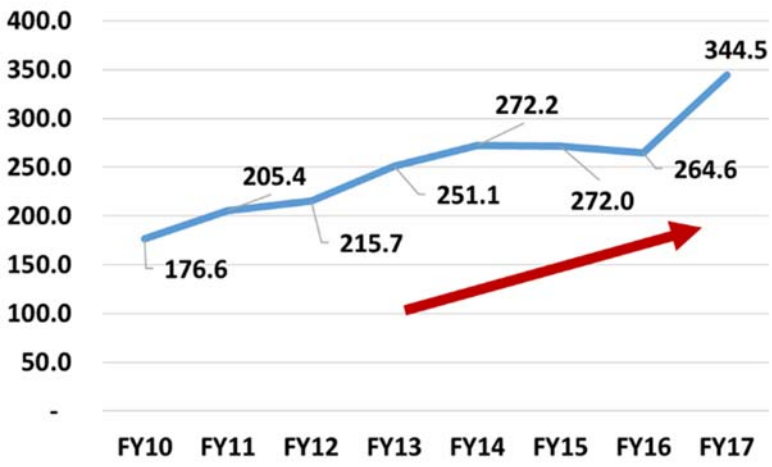


Figure 3-38
Annual Tons of Compaction-Class I

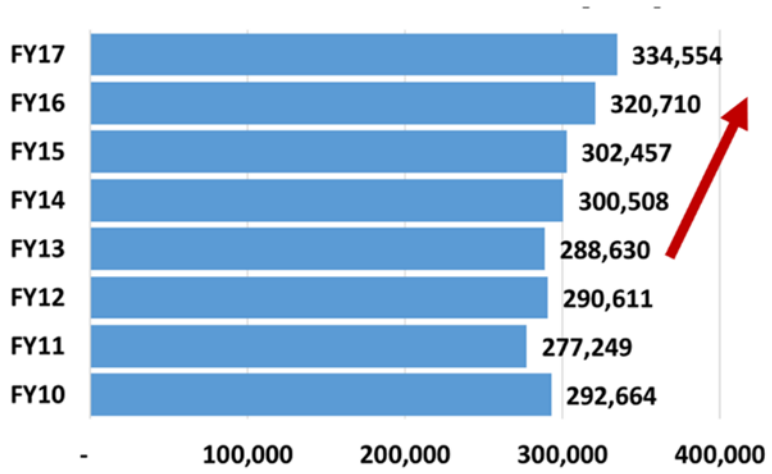


Figure 3-39
Tons Per Day of Refuse Hauling

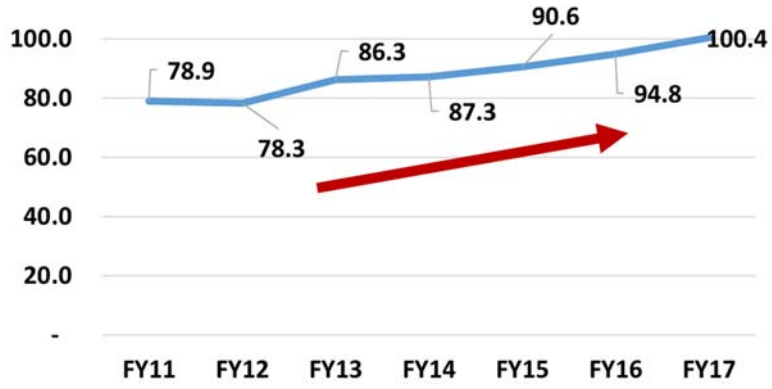
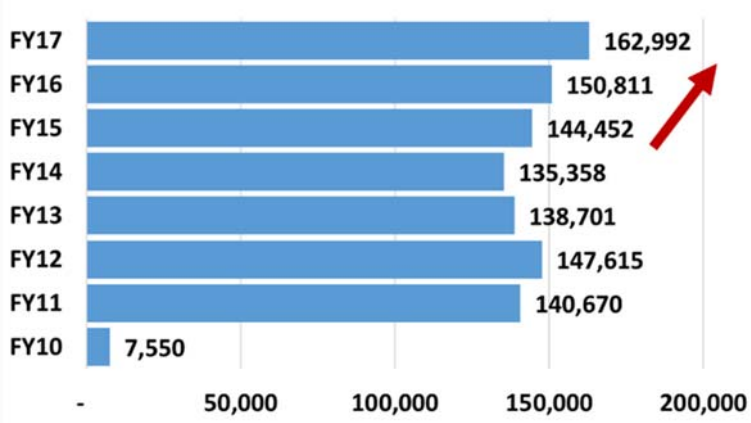


Figure 3-40
Annual Tons of Refuse Hauling



3.2.15 Traffic Engineering's historical top two non-hourly work activities have been Signal Repair and Trouble Call. Traffic PMs showed considerable success at reducing Trouble Call effort.

The Traffic Engineering Signals group perform both proactive routines, such as Signal Preventive Maintenance (PM), and response based work, such as Signal Repairs and Trouble Calls. When analyzing Lucity data for these three activities, it appears that the focus of Signal PM has shown considerable success in effectiveness. Figure 3-41 and Figure 3-42 show the performance metrics for the activity of Signal PM. Figure 3-41 shows a 42% a day increase in signal PMs performed. Figure 3-42 shows an increase of over 10% in signal PMs performed annually when comparing FY10 through FY16.

Figure 3-41
Signal PMs Per Day

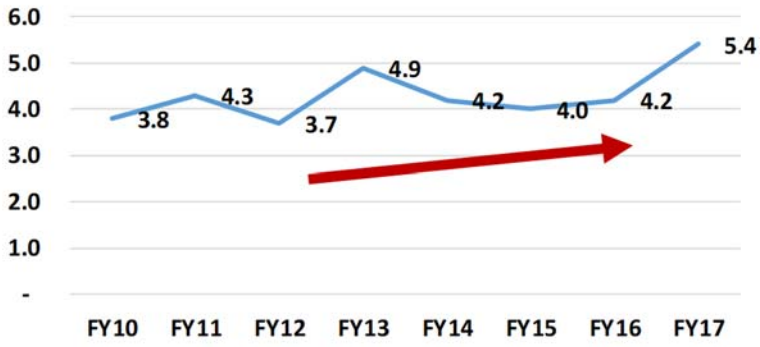
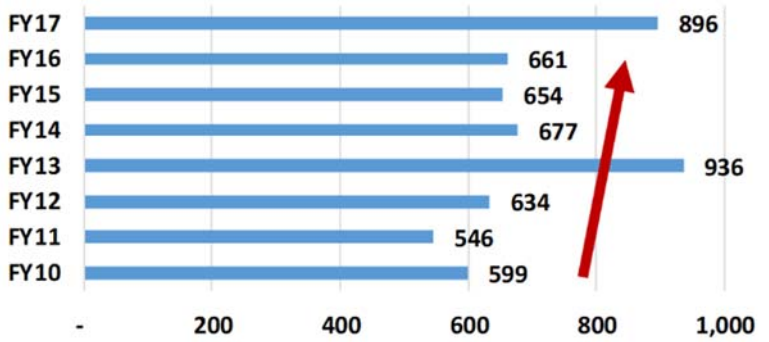


Figure 3-42
Annual Signal PMs



The activity of Signal PM has a direct impact on the other two response based activities, Signal Repair and Trouble Calls. Figure 3-43 and Figure 3-44 show the comparative metrics of signal repairs. This work is identified during PMs and performed then or scheduled later. In these comparisons, the number of signal repairs performed each day have decreased by almost 44% when comparing FY10 to FY17, yet the number of annual signal repairs has also decreased by almost 15% comparing FY10 through FY16, as shown in Figure 3-44. The uptick in FY17 was a result of major damage from Hurricane Matthew.

Figure 3-43
Signal Repair Per Day

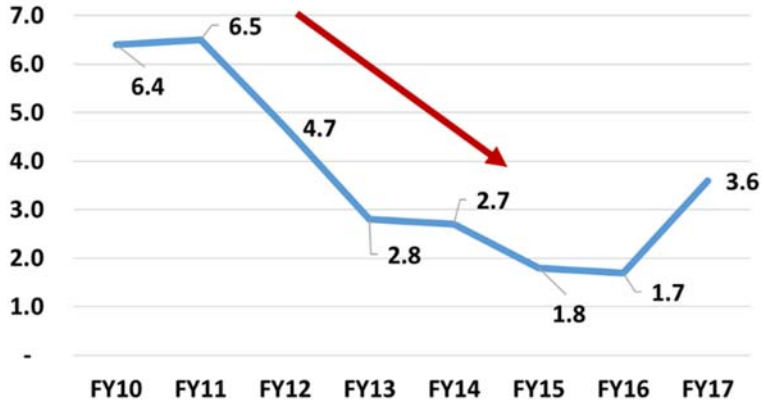
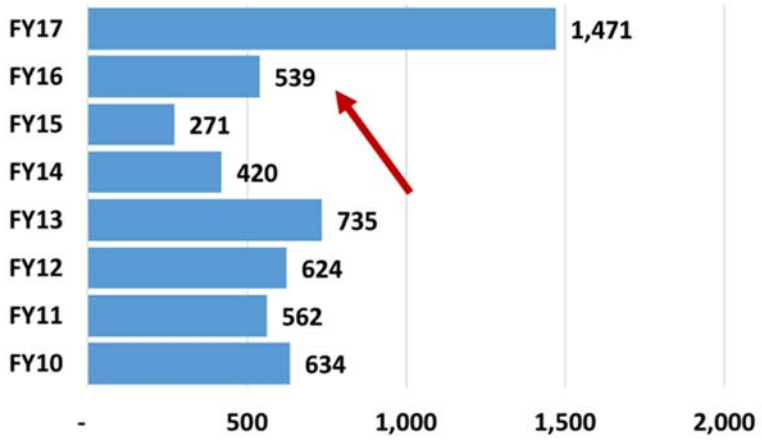


Figure 3-44
Annual Signal Repairs



Trouble calls are response efforts that have reduced in total with the amount done per day lowered. Figure 3-45 and Figure 3-46 show the comparative metrics of trouble calls. Trouble calls per day have decreased by over 14% as compared between FY10 and FY17, as shown in Figure 3-45. The annual trouble calls have also decreased by 50% as shown in Figure 3-46.

Figure 3-45
Trouble Calls Per Day

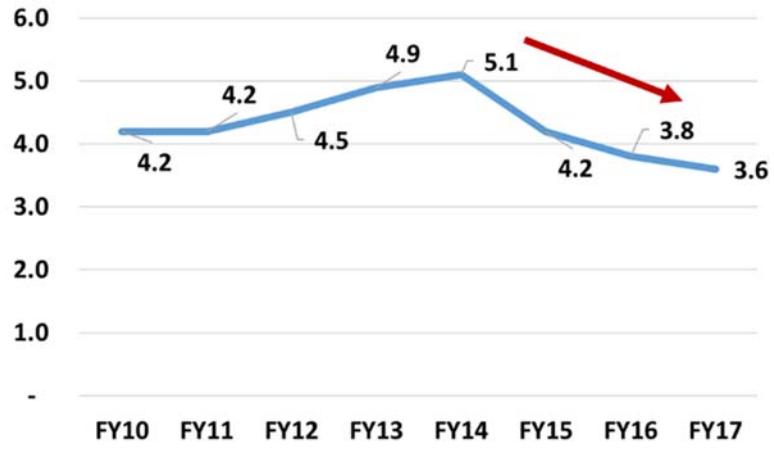
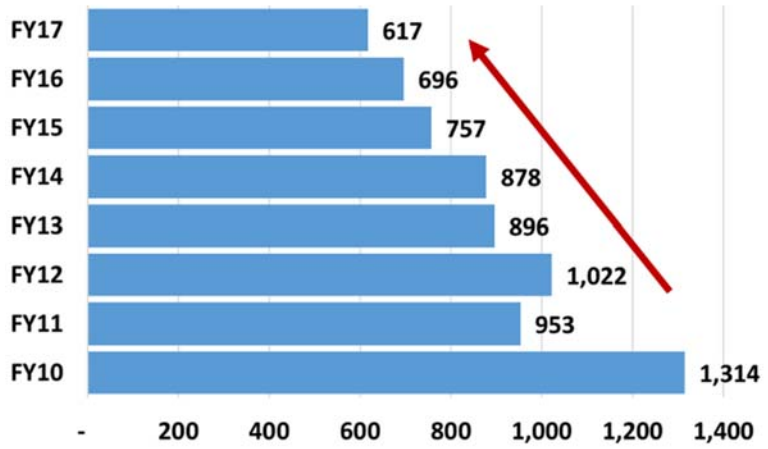


Figure 3-46
Annual Trouble Calls



3.2.16 For the two largest activities performed by Water Resources and Utilities add little analytical value by the way they are being measured.

The two activities in which Water Resources and Utilities utilize the most labor resources are Major Wastewater Plant Operations at 30% of their total hours and Major Water Plant Operations at 24%. Lucity is an asset and work management system, while water and wastewater are operations efforts with many subtasks.

Although essential to the mission of the Division, both activities have reporting units in hours, which provides little analytical value related to measuring efficiency. These activities are general in nature and several sub-activities are performed under these two activities, further resulting in difficulty for managers and supervisors to use system data to monitor efficiency or adherence to planning goals.

3.2.17 PM activities of valve turning, hydrant maintenance, CCTV inspection and sewer line cleaning are minimally being reported in Lucity yet appear some more work is being done.

The preventative maintenance (PM) activities of Valve Turning, Hydrant Maintenance, Closed-Circuit Television Inspection (CCTV) and Sewer Line Cleaning are being minimally reported in the Lucity database. Although, the Division has provided hardcopy records of accomplishment for some of these activities. Staff has reported with some confirmation, that valve turning is performed on major valves annually and all valves every three years. It should also be noted that hydrant maintenance is performed through contracted services and not through internal efforts.

Although these PM activities appear to be performed often, the ability of the Division and the Department's Administrative group to use Lucity data for work routine confirmation, measurement of performance and the monitoring of accomplishment against an annual performance plan is hindered by the lack of fully tracking these maintenance activities in the Lucity database.

3.2.18 Water top non-hourly work activities are Lift Station PM-MTC and Turn On/Off. In the past two years, Turn On/Off and Lock Offs/Disconnects activities have begun

to be performed by distribution staff, where previously this was performed through contract support.

The top two non-hourly work activities include Lift Station PM-MTC and Turn On/Off. It should be noted that the activity of Turn On/Off and associated Lock Offs/Disconnects have begun to be performed by the distribution staff of the Division, where previously this was performed through contracted services. Figure 3-47 and Figure 3-48 show the performance metrics of performing PMs and maintenance on lift stations. Figure 3-47 shows historical variances in average daily production in lift stations per day, with 7.3 as the high in FY12 and a low of 3.8 in FY13. Figure 3-48 shows consistent growth in lift station PMs performed from FY12 through FY17, with an increase of over 410 or almost 29%.

Figure 3-47
Lift Station PM/Maintenance Per Day

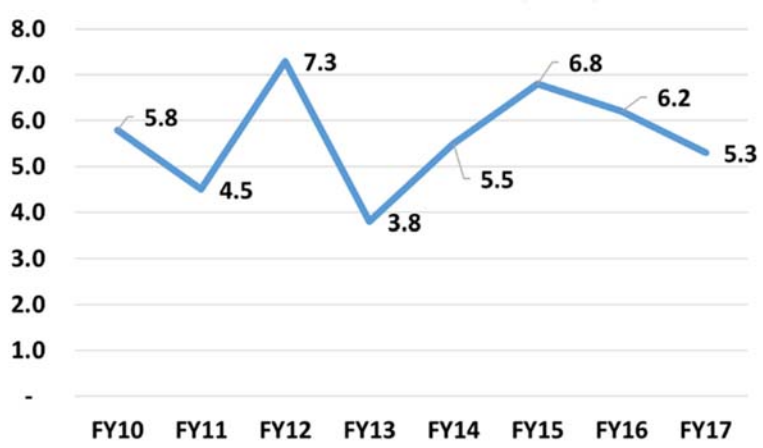


Figure 3-48
Annual Lift Station PM/Maintenance

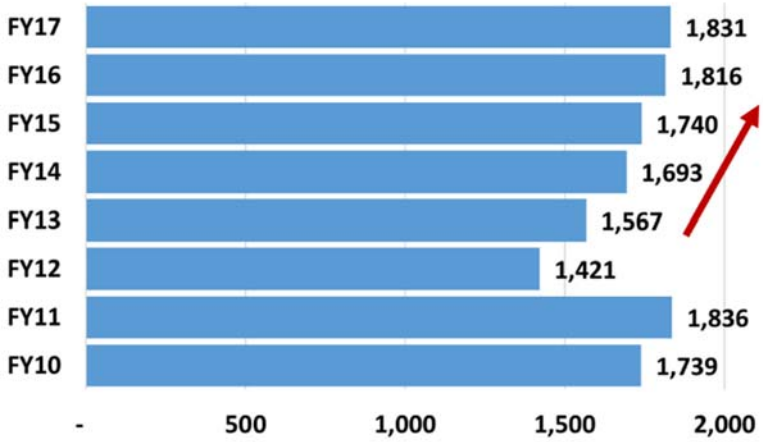


Figure 3-49 and Figure 3-50 show the performance measurements in average daily production and amount work accomplished for the activity of Turn On/Off. Figure 3-49 shows a decrease of just over 26%, comparing FY10 to FY17 and annual Turn On/Offs remaining consistent, as shown in Figure 3-50 with one outlying year in FY12 of 4,244 turn on and offs.

Figure 3-49

Turn On/Offs Per Day

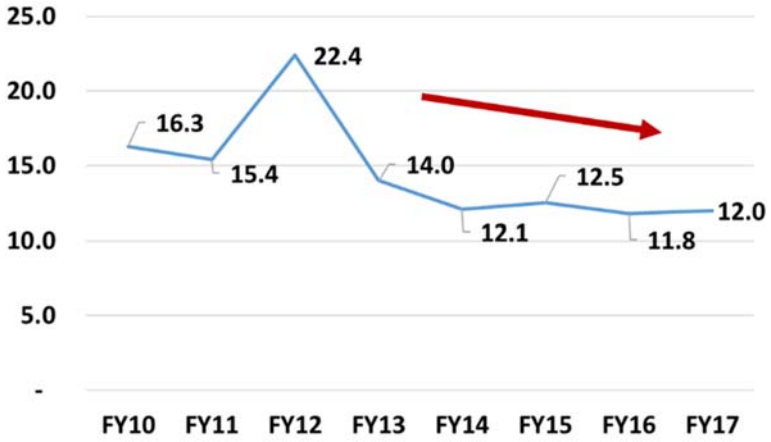
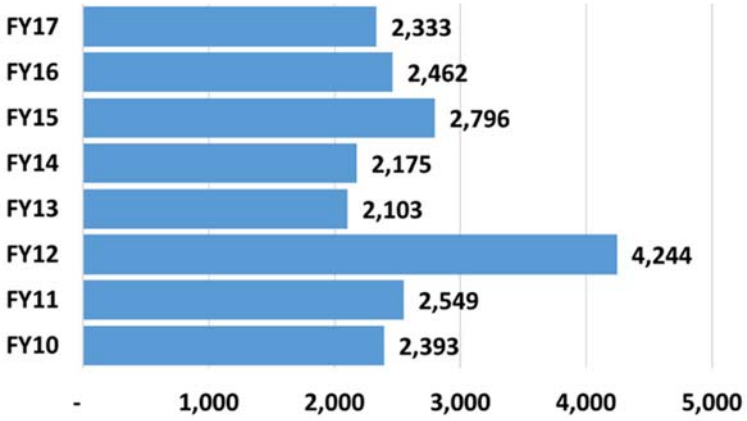


Figure 3-50
Annual Turn On/Offs



3.2.19 Considerable resources ($865k) are used by Drainage and funded by Mosquito Control. This is performed without a detailed plan or agreement between the groups of what is the goal or to be achieved until 2017.

Each operational Division of the Department utilizes a line item budget based on historical expenditures and anticipated needs. In addition, various sources are used to fund the repair and maintenance of their infrastructure assets. For example, the Mosquito Control Division uses funds received for mosquito control activities performed for contract agencies, also using intergovernmental revenues and assessments. The function of drainage is performed through the Road and Bridge Division with some effort funded through a stormwater utility and the County's general fund.

Approximately $865,000 is being used annually by the Road and Bridge Division (R&B) to perform maintenance activities on Mosquito Control ditches and canals in the eastern portion of the County. Although, the work is performed by R&B, the effort is funded through the Mosquito Control Division. The planned resources for these maintenance activities are combined with other non-Mosquito Control ditch maintenance efforts being performed by the Drainage Task Team, however, the Mosquito Control work is tracked and billed separately to Mosquito Control.

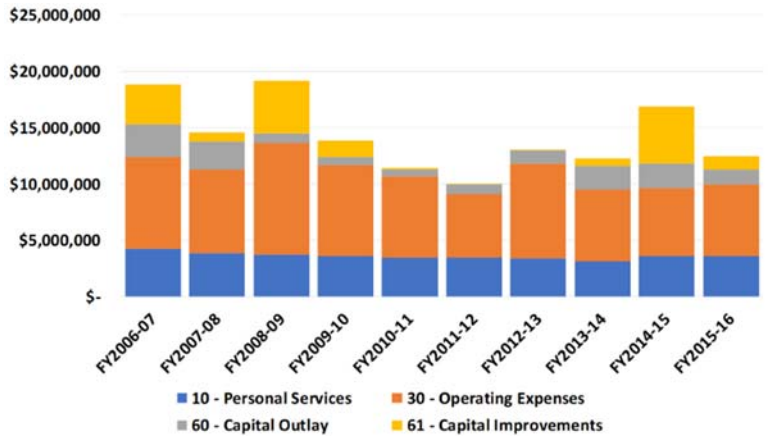
The support drainage work had been done based on past R&B experience and supervisor's judgment with some input from Mosquito control. Recently, Road and Bridge developed and documented a maintenance plan for providing maintenance to Mosquito Control's ditches. This October 1st of 2017 plan is still combined with that of other ditch maintenance efforts. This combining of these planned efforts makes the monitoring of efficiency more difficult for the leadership of Mosquito Control.

3.2.20 Solid Waste expenditures have reduced considerably over last ten years.

The Solid Waste Division is funded through various sources, including tipping fees, annual collection fees, recycling sales, license and permit feed, as well as intergovernmental revenues. The Division expenditures over the past ten years have reduced considerably.

Figure 3-51 shows the historical expenditures in the categories of Personal Services, Operating Expenses, Capital Outlay, and Capital Improvement. Comparing FY2006-07 through FY2015-16, the Division has reduced Personal Services by $606,445 or 14.3%, Operating Expenses by $1.85 million or 22.6%, Capital Outlay by $1.53 million or 53.8%, and Capital Improvement by $2.36 million or 66.3. Overall the Division has reduced expenditures by approximately $14.25 million or 33.8%.

Figure 3-51
Solid Waste's Historical Expenditures



3.2.21 MC and Coastal expenditures have been relatively constant over last ten years with exception of capital. MC purchased a new helicopter and Coastal purchased more property.

Comparing FY2006-07 through FY2015-16, The Mosquito Control and Coastal Division's expenditures have remained relatively consistent, except for Capital Outlay in the Mosquito Control Division and Capital Improvements for the Coastal Division.

In the case of the Mosquito Control, the Division saw a large expense ($2.09 million) related to helicopter purchase and maintenance in FY2014-15. The Division's average outlay was $271,200 annually with FY2014-15 removed from the calculation. In the case of the Coastal Division, the purchase of land for off beach parking was also made in FY2014-15. Coastal capital outlay in FY2014-15 was $9.82 million with an average of $625,400 annually, removing FY2014-15 from the calculation. Figure 3-52 and Figure 3-53 show the historical expenditures of both Divisions.

Figure 3-52
Mosquito Control's Expenditures

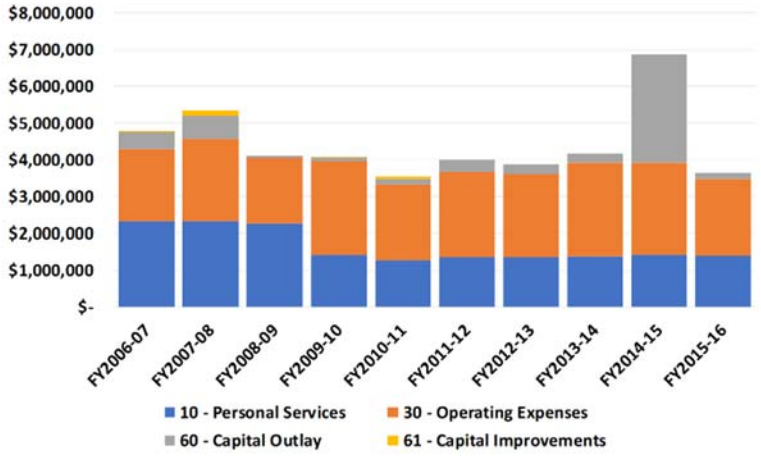
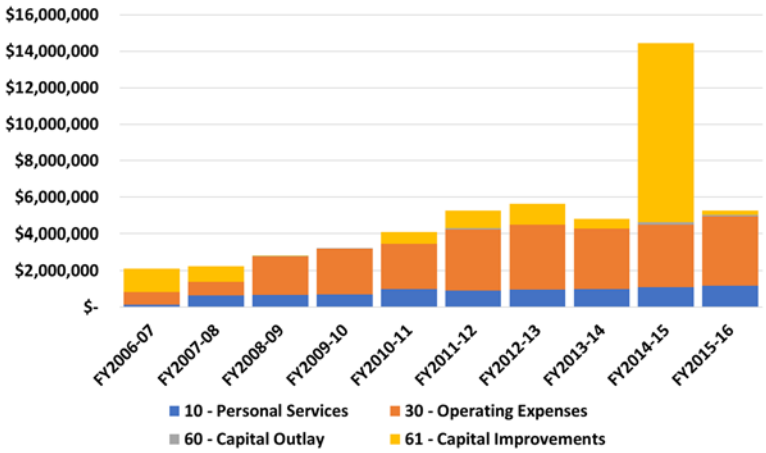


Figure 3-53
Coastal's Expenditures

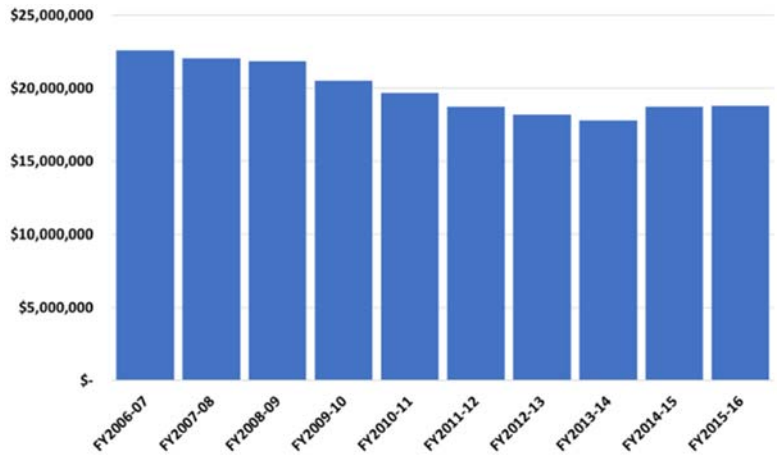


3.2.22 When considering inflation, the overall personal services expenditures have decrease approximately 16.8% or $3.8 million comparing 2007 with 2016.

Analyzing budgetary expenditures of all operational Divisions, considering the rate of inflation based on the Consumer Price Index for the United States, the overall Personal Services expenditures have decreased from FY2006-07 to FY2015-16. The Department saw a reduction of approximately $3.8 million or 16.8%.

Figure 3-54 shows the historical budgetary expenditures of Personal Services from FY2006-07 through FY2015-16.

Figure 3-54
Expenditures of Personal Services



3.2.23 Budget performance measures used are all effective based, yet the mission statement indicates efficiency is part of Department's direction.

Each of the operational Divisions compile line item budgets to be included in the Department's overall budget. In addition, each Division includes a list of performance measures that they are expecting to accomplish. Most measures were found to focus upon an accomplishment or effectiveness type of measure (number of walkovers reconstructed, number of catch basins inspected, number of immature mosquito sites with newly stocked minnows, tons of asphalt repairs, etc.) or input (number of inserts mailed annually, number of plants owned, etc.).

Although, these performance measures are included in the County's final budget document, they lack specific linkage to the cost of the performance measures and the actual budgets. Also, this method and class of performance measures may support the effective elements of the Department's mission while lacking an efficiency component.

Benchmark agencies develop and publish sets of performance measures, which address both effectiveness and efficiency elements. The value of both components allows for the communication of clear expectations to staff, and provides for transparency and accountability to the public and elected officials of doing the right work in an efficient manner.

3.3 Organizing

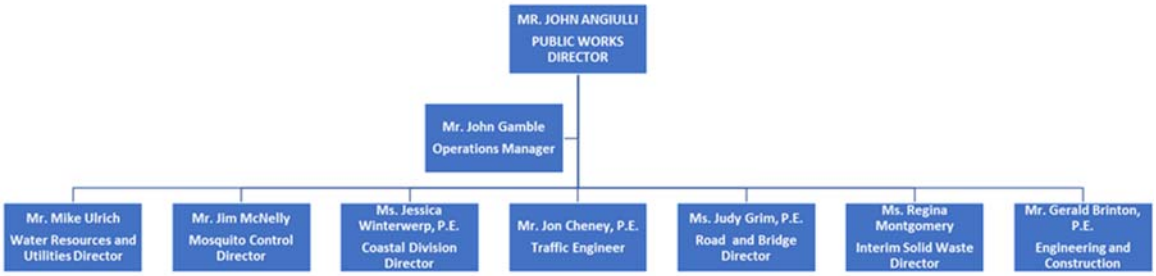
3.3.1 Span of controls are within benchmark range within the operational Divisions with some lower ratios that are based on function.

The Public Works Department is a multiple layered organization with several Divisions reporting to the Public Works Director. The management and leadership organizational structure of the Department includes six operational Divisions, as well as Administration and the Engineering and Construction Division. The six operational Divisions include Coastal, Mosquito Control, Road and Bridge, Traffic Engineering, Solid Waste, and Water Resources and Utilities. Figure 3-55 shows the general organizational structure of the Department.

Comparing the spans of control of each of the operational Divisions, as well as the management and leadership structure to industry benchmarks, most spans of control are within benchmark ranges of 1:4 to 1:8. However, there are a few exceptions which are based on function. These

include the Activity Project Manager in the Coastal Division with a ratio of 1:1, Road and Bridges' Administrative Coordinator II with a ratio of 1:2 and Civil Engineer III at 1:1, Traffic Engineering's Planner III and Administrative Coordinator both with ratios of 1:2, and Water Resources and Utilities' Public Works Services Supervisor with a ratio of 1:2. In all cases these are specialty functions that are unique but do require interface with their immediate supervisor.

Figure 3-55
Organizational Structure of Public Works



3.3.2 Success in Volusia systems are based on having key system and administrative processes in place.

Success, as experienced by the Department over the past ten years, is based upon having key system and administrative processes developed, implemented and institutionalized within the organization. These processes and related tools have had support by executive and senior leadership of the County. The expectation of success and continuous improvement has been communicated and executed by the Department's operational staff. This success has also required departmental operations staff to coordinate efforts within and outside of the Department.

For example, the Department has and continues to coordinate efforts with the County's IT and GIS staff, the coordination of software and configuration efforts through the software vendor, and the continual coordination of effort and focus on improvement between the operational Divisions and the Public Works' Administrative group.

3.3.3 In Road and Bridge, most spans of control are within the benchmark range with the ratio for Director exceeding an acceptable range.

Road and Bridge is responsible for the maintenance of County's roadways, mowing, cemeteries, signs, markings and bridges. The Drainage Task Team is responsible for the repair, maintenance and operation of the County's stormwater assets. The Road and Bridge Division and Drainage Task Team are both led by a single Division Director.

Span of control is the number of subordinates that a manager or supervisor directly controls. This ratio can vary with the type and complexity of work, established routines performed, or their subordinates need for direct supervision. 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. Conversely, if work is routine, repetitive and more completely defined, then a higher span is appropriate. Most spans of control within the Division are found to be within benchmark ranges except for the Road and Bridge Director with a span of control of 1:9.

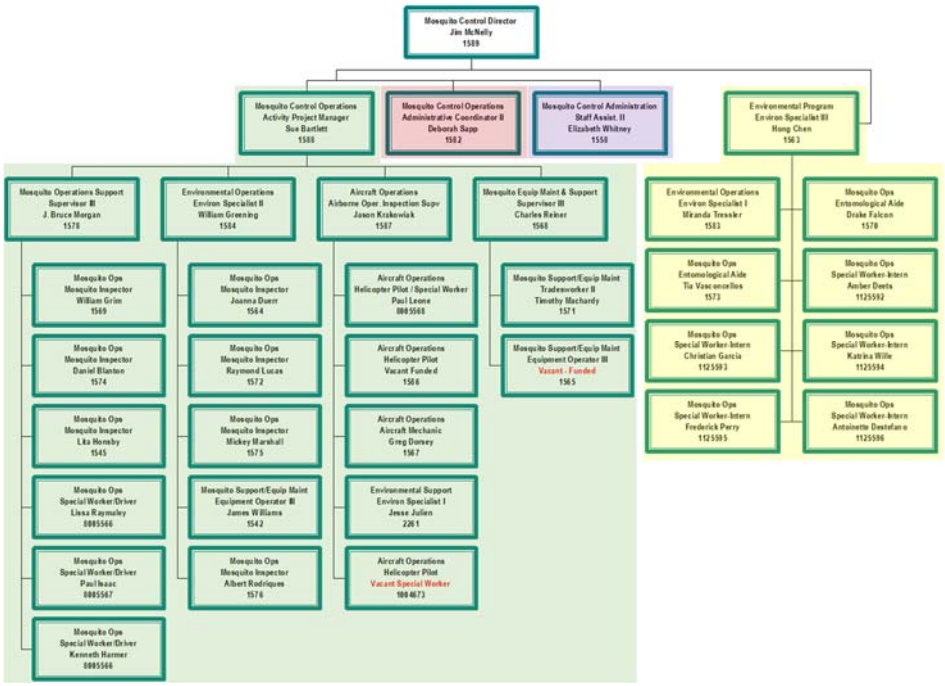
3.3.4 In Mosquito Control, four direct reports have uneven work and staff responsibilities.

The Mosquito Control Division is responsible for the abatement of mosquitoes through inspection, chemical application (truck and helicopter), the setting and monitoring of mosquito traps and testing sentinel chickens. Mosquito Control has twenty-nine full-time employees and eleven half-time employees.

The Division is led by the Mosquito Control Division Director and has a span of control of 1:4. The Environmental Specialist III, which leads the Division's Environmental Programs span of control is 1:8 and the Activity Project Manager has a span of control of 1:4. This Manager is responsible for the oversight of all operational activities of the Division, including inspections, environmental operations, aircraft operations, as well as equipment maintenance and support.

Although the Activity Project Manager has support through direct reports, the staff responsibility of the Division is found to be unevenly distributed among the Director's four direct reports. This is shown in Figure 3-56. Environmental Programs is highlighted in yellow, purple Administration, pink the Mosquito Control Operations Administrative Coordinator II, and in green the Mosquito Control Operations.

Figure 3-56
Mosquito Control's Organizational Structure



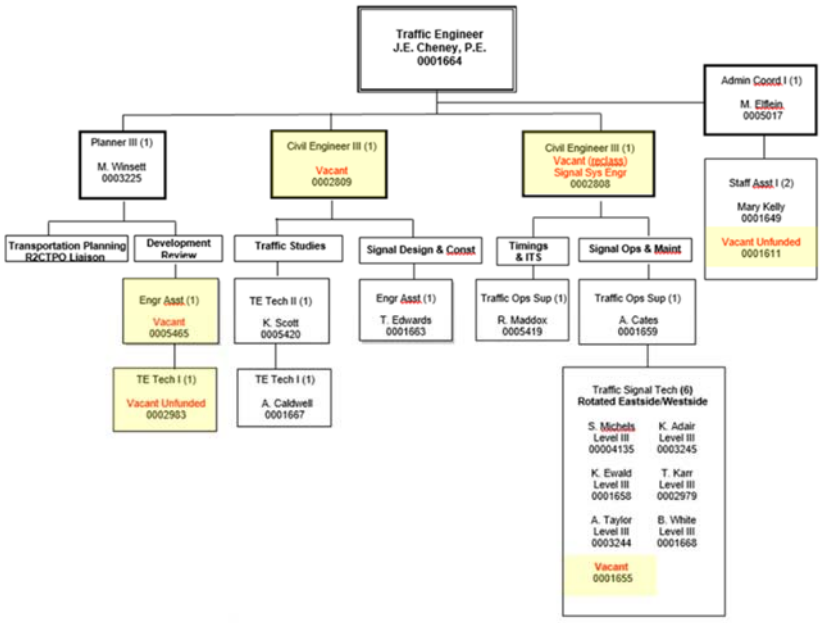
3.3.5 Though budgeted span of control is low in Traffic Engineering, key senior positions are vacant.

Traffic Engineering is responsible for the repair, maintenance, inspection and operations of traffic signals. In addition, Traffic Engineering performs or monitors traffic studies and controls signal timing. Traffic Engineering has twenty-one full-time positions. The Division is led by the County's Traffic Engineer who has a span of control of 1:4. The Planner III and Administrative

Coordinator I both have spans of control of 1:2. The Civil Engineer III has a span of control of 1:3 and the span of control for the Traffic Operations Supervisor is 1:7.

A span of control ratio of 1:4-8 is a desirable benchmark and good business practice. In the case of Traffic Engineering, some spans of control are below or at the lower range of the desired benchmark, yet are based upon functional needs of the Division. Several key senior positions (Civil Engineer III and Civil Engineer III, Signal Systems Engineer) are vacant, resulting in a temporary increase in the span of control ratio for the Traffic Engineer from 1:4 to 1:6, although, still within the desired benchmark range. Traffic Engineering organization is shown in Figure 3-57.

Figure 3-57
Traffic Engineering's Organizational Structure



3.3.6 The Solid Waste direct reports have work, and staff responsibilities that are evenly distributed.

The Solid Waste Division is responsible for the operation of Tomoka Landfill and Transfer Station, as well as consumer waste collection, recycling and educational programs. Solid Waste has sixty-nine full-time positions. This Division is led by the Solid Waste Division Director, which has a span of control of 1:3. This position's direct reports include a Fiscal Manager, Civil Engineer, and Environmental Specialist III, which have spans of control of 1:4, 1:5 and 1:5 respectively.

Although the span of control for the Division Director is slightly below normal benchmarks, the position's direct reports have well balanced and evenly distributed responsibilities, which support the mission of the Solid Waste Division.

3.3.7 Utilities is a complex organization with many functions for all aspects of water and wastewater.

The Water Resources and Utilities Division is responsible for the repair, maintenance and operation of water and sewer treatment plants, as well as water quality, utility billing, water distribution lines, sewer collections lines and adjoining assets such as manholes and meters. The Division has sixty-two full-time positions and two special workers, of which one is full-time and the other is part-time. The Division is led by the Water Resources and Utilities Director who has a span of control of 1:4. The Public Works Services Supervisor has a span of control of 1:2. The Civil Engineer has a span of control of 1:3. The Operations Manager and Waste Supervisor both have spans of control of 1:4. The Wastewater Supervisor has a span of control of 1:8. The span of control for the Administrative Coordinator is 1:9.

A complex organization is one that could have many layers, wide spans of control and several reporting locations (Tolbert & Hall, 2009). The Water Resources and Utilities Division has six vertical layers going from Director to the lowest level of employees (Tradesworker I). Also, there is spatial complexity with several different reporting locations, which include water and wastewater plants. This organizational complexity makes communication, control and coordination difficult to obtain.

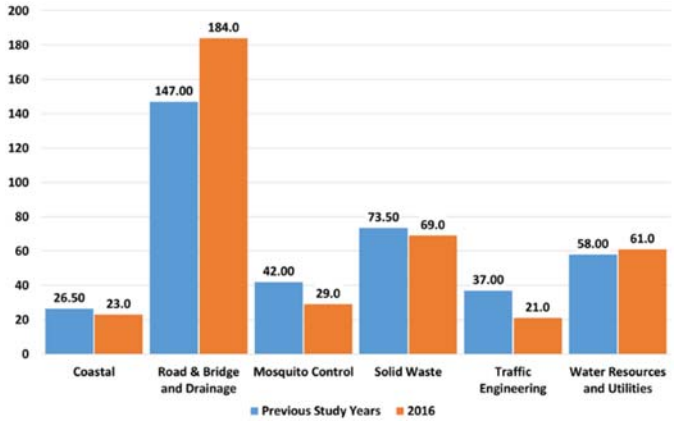
Also, some execution is unique in the industry where the Division's water distribution and wastewater collections employees work and address issues in both water and wastewater assets. This provides flexibility in staffing and increased efficiency in addressing the repair and maintenance of assets. Typically, these functions are separated by asset type in other similar agencies.

3.3.8 Staffing has decreased since LAC's 2007 report in all Divisions except for Water Resources and Road & Bridge and Drainage. R&B increase is a direct result of absorbing the drainage resources from Mosquito Control and signs and marking resources from Traffic Engineering.

The Public Works Department has 446 full-time and 13 part-time budgeted positions. The Coastal Division was added in FY2015, which added twenty-one full-time and two half-time positions to the Department's total. Over the past ten years, through operational realignments some functions and related labor resources have been transferred to other Divisions. For example, the responsibility of traffic markings and sign maintenance and repair moved from Traffic Engineering to the Road and Bridge Division. Likewise, drainage activities and related labor resources were transferred from Mosquito Control to the Road and Bridge's Drainage Task Team.

Comparing staffing levels of 2009, which was the year of LAC's evaluation final report for the Coastal Division and 2007 being the year of LAC's evaluation final report for the remainder of the current operational Divisions with 2017 data, Coastal has reduced staff by 3.5 FTEs or 13%. Further changes have included Mosquito Control's reduction of thirteen staff or 31%, Road and Bridge adding thirty-seven staff or 25%, Solid Waste reducing staff by four and a half or 6%, Traffic Engineering reducing staff by sixteen or 43%, and Water Resources and Utilities added three FTEs or 5%. Overall, the operational Divisions have added six and a half FTEs or 1.8%. These comparisons are shown in Figure 3-58.

Figure 3-58
Staffing Comparisons



3.3.9 Each Division addresses and staffs after hours response and on call as independent silos. They are based on function and perceived need. This assignment is similar to staffing levels in FY 2007.

The Public Works Department has several distinct Divisions, which address a wide variety of unique operational functions. Each Division is led by a Director and their associated direct reports. Each operational group primarily operates independent of one another with some support from the Administrative group located at the TCK Building in Deland.

All Divisions provide 24/7 coverage through various schedules and methods. For example, in addition to their normal hours of operations, Traffic Signals utilize a six week on-call rotation using three statuses, Primary, Secondary, and Off Call in response to afterhours calls or emergencies. The Primary is the first to respond to a call out, drives a vehicle home and receives a minimum of two hours of pay for a call out. The Secondary is the Primary's first support if needed. Water Resources and Utilities utilize four on-call staff, one east-side, one west-side, one water and one supervisor. Their on-call rotations are ten days on and four days off. Road and Bridge utilize six employees on-call. They include one east-side traffic signs and one west-side. They also have Tree and Bridge on-call employees. Solid Waste does not have a formalized after-hours call out schedule, yet they do have an emergency contact list they utilize if needed. Similar, Mosquito Control does not utilize an on-call employee, yet if needed, a supervisor will be called out. Coastal utilizes an unwritten policy for on-call rotation of one person every two weeks.

All methods of after-hours coverage are based on functional responsibility and perceived needs by the individual Divisions. Although, Divisions may occasionally work together in support capacities to address some complex or unique circumstance, yet normally they work in separate silos.

3.3.10 Employees work different shifts depending on coverage and division desires. The different shift's rationale lack documented justification.

Generally, most Road and Bridge and Solid Waste crews work four days over a one-week period for 40 hours throughout the year with alternating Mondays and Fridays off (split 4 days at 10

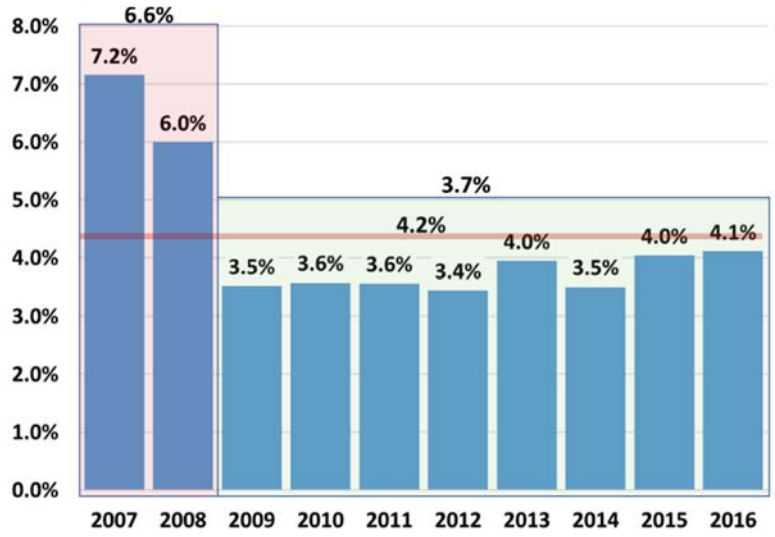
hours). This allows for 5-day coverage. Traffic Engineering and Mosquito Control work 5 days at 8 hours. The Water Resources and Utilities Division provides seven-days-a-week coverage for water and wastewater treatment plants from 7:30am to 11:30pm. The remaining employees for Water Resources and Utilities work 5 days at 8 hours with a few employees working 4 days at 10 hours. Solid Waste generally works 4 days at 10 hours. Due to the hours of operation of the Tomoka Landfill and Transfer station, some employees work 3 days at 11 hours with 1 day at 7 hours schedules to provide coverage on the weekend. Coastal works 7 day a week, 365 days a year, 5 days at 8 hours. Staff reports, as the result of staff shortages schedules have tended to 6 days a week and 8 hours a day. Tradesworkers within Coastal work 4 days a week at 10 hours a day.

These varying shifts and schedules are dependent on management's concept of operational function, yet are also influenced by divisional desires. Currently, there lacks a documented justification for these variation in schedules. Some schedules appear to be warranted as the result of operational need, function and state mandates for water and wastewater plants in Water Resources and Utilities, yet performance plans for plant operational activities are not based on mandated staffing requirements.

3.3.11 Overall the Operational Divisions have shown a significant drop in overtime usage of nearly 1/2 since 2007.

For the past ten years, the operational Divisions have averaged 28,883 hours of overtime annually, which represent an average of 4.2% of all reported hours being overtime. Overall, the Divisions have significantly reduced overtime when comparing 2007 with 2016. Figure 3-59 shows the average percentage of overtime for 2007 and 2008 at an average of 6.6% (pink), compared to an average of 3.7% from 2009 through 2016 (green). This is a reduction of just under 3% between the two periods or just over 3% when comparing 2007 with 2016. As compared to LAC's benchmark database, the Division's average is found below similar benchmark agencies.

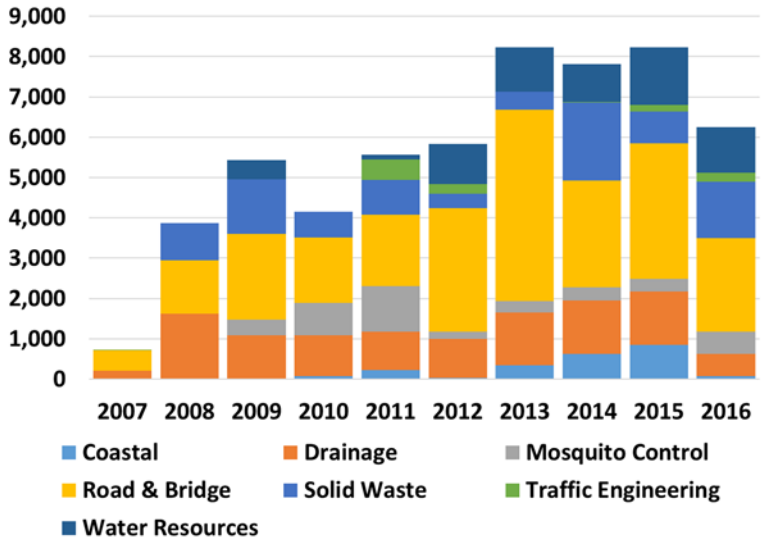
Figure 3-59
Overtime Comparisons



3.3.12 FMLA has increased in the last ten years, yet is still within Benchmark range.

Benchmark indicators are used to measure the impact of leave including Family Medical Leave Act (FMLA) time. From 2007 through 2016 reported FMLA has averaged 5,612 hours annually. In addition, the use of this class has increased considerably, yet groups are found to be within the benchmark range of similar agencies. The use of historical FMLA hours are shown in Figure 3-60.

Figure 3-60
Historical FMLA Hours

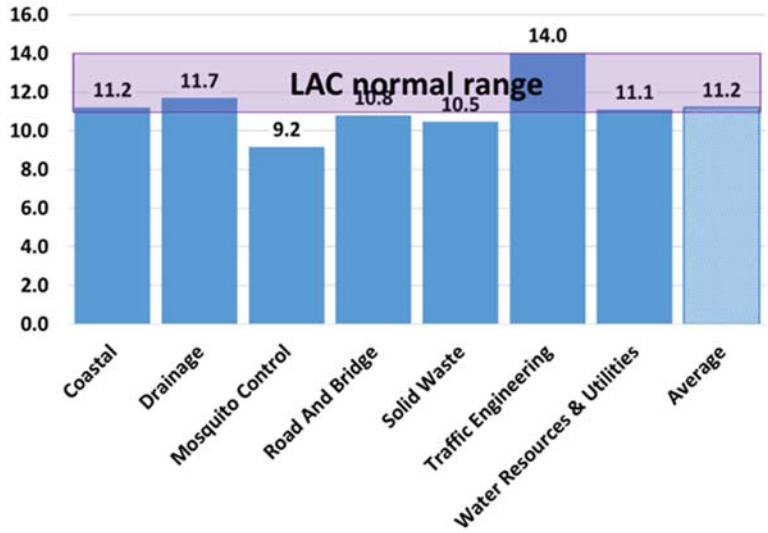


The impact of FMLA results in less available work time for production and has added pressure on those who are working to be more effective or to work additional time.

3.3.13 Most Division employee's lengths of service are below or within benchmark range with a minimal change from 2006. However, many seasoned leaders that have guided the department will most likely be leaving in the near future requiring younger staff to move up or new staff added.

The average employee length of service for the Divisions is approximately eleven years. Figure 3-61 shows the average years of service by Division. Traffic Engineering has the highest average at fourteen years and Mosquito Control with the lowest at 9.2. The LAC benchmark range is between twelve and fourteen years for most agencies with most of the operational Divisions falling within this range except for Mosquito Control and Solid Waste, which both fell below the benchmark.

Figure 3-61
Years of Service



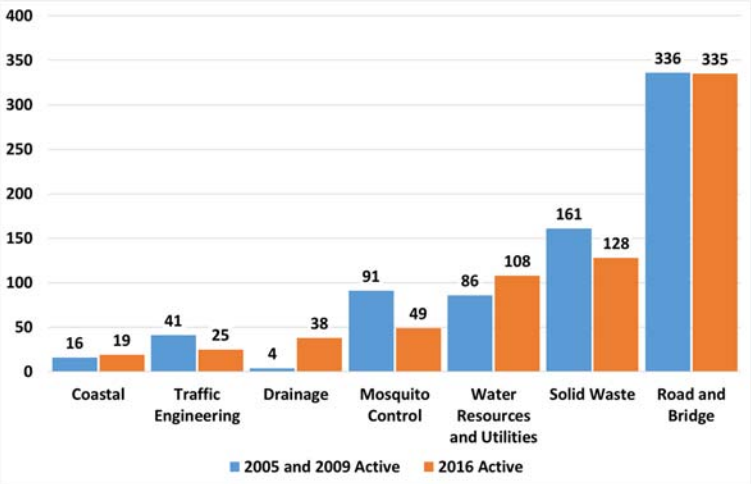
Although, with a relatively low length of service in comparison to benchmark agencies, several senior employees who provide key leadership and guidance, have the potential for retirement or leaving employment soon. This puts the Department at risk of losing vital institutional knowledge. As a result, junior employees will require additional training or the addition of new staff will be required to meet the absence of this leadership. This will result in a need to have institutionalized processes to adjust to this change.

Several benchmark agencies have established mentoring, data and system processes to capture this knowledge and transfer it back to the agencies' employees. Also, a succession plan for coverage of the most likely departures of key staff is missing.

3.3.14 Four of the seven Divisions have reduced the number of equipment as compared to prior study years. Overall the operational Divisions have reduced the fleet size by thirty-three or 4.5%.

Using data provided from the Fleet Management in 2005 and 2016 of active equipment, there are 702 pieces equipment assigned to the Public Works Department's operational Divisions, this includes eighteen from the Coastal Division. Comparing the previous year's equipment totals, the Divisions have reduced equipment by 4.5% overall. The comparisons are shown in Figure 3-62. Like labor resources over the past ten years, some functions and related equipment resources have been transferred to other Divisions through operational realignments.

Figure 3-62
Equipment Total Comparisons



3.3.15 Overall, the average equipment rates in the Divisions have shown an increase of approximately 15% when comparing 2015 to 2016.

Vehicle and equipment rates are annually and systematically calculated by the Administrative group using data produced from the County's Fleet Management Lucity database. The data provided by Fleet Management includes fuel, repair and maintenance, lease/rental, and appreciation or depreciation costs There are currently seventy-seven equipment codes in the Lucity database that can be selected and charged against work orders. The calculated rates are all "out of yard" hours including preparatory and travel time.

All calculations performed by Administration utilizes Lucity usage hours except for rental equipment. Using and analyzing provided data, it appears that over half, or forty-one of the seventy-seven rates have been reduced from FY15/16 to FY16/17.

The overall average equipment rates have shown an increase of approximately 15% when FY15/16 and FY16/17 are compared. The cause of this overall increase is currently unconfirmed, yet the greatest decrease in hourly cost is for the Hydro Seeder of $1,326.44, or 75% less in FY16/17 than in FY15/16, and the largest increase was for the Bulldozer Cat6 at $160.79 an hour or 176% more in FY16/17 than in FY15/16.

3.3.16 Warehouse processes vary between Divisions, some utilize "rolling" warehouses, and others have dedicated warehouse staff to provide oversight of the receipt and issuance of materials. Coastal utilizes manual forms to maintain their material inventories.

The primary tool used for controlling material inventories is the Lucity database for most Divisions through its functionality and the associated business processes implemented after the initial evaluation reports. Yet, some manual systems are also being utilized for the temporary recording of material usage before being entered against work orders in Lucity. Coastal is utilizing manual forms and an external database to the Lucity system for controlling their

material inventory. Staff reports they will be moving exclusively to the Lucity system for inventory control in early 2018.

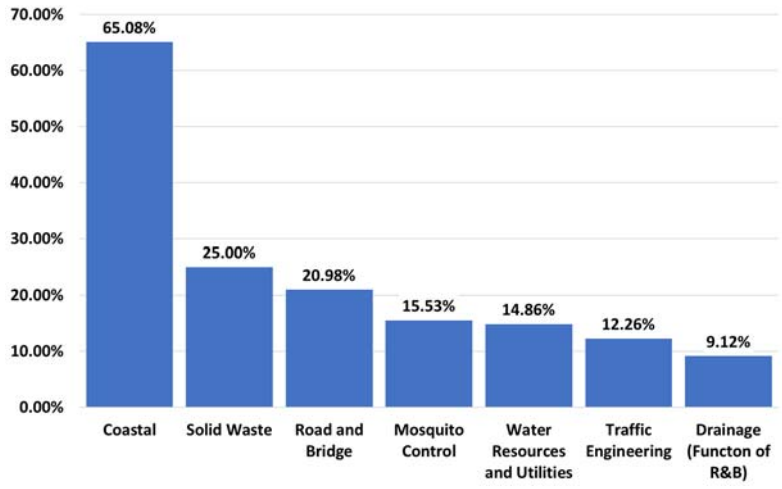
The control and issuance of materials are addressed differently from Division to Division. For example, Mosquito Control and Water Resources and Utilities have unstaffed primary warehouses, yet also utilize "truck warehouses" for issuing parts and materials to specific crews and employees. This allows for easy access to commonly used materials in the field, preventing them from having to travel to their respective yards and reducing their need for warehouse visits. In contrast, the Roads and Bridge Division has a dedicated warehouse person to receive and issue parts and materials.

3.3.17 The use of contracted services to augment maintenance and operations varies between Divisions. Approximately 2/3 of Coastal' s Operating Expense in 2016 was for Contracted Services.

All Divisions augment in-house maintenance, repair and operational efforts using various contractual services. For example, the Coastal Division utilizes contracts for restroom cleaning and beach maintenance. The Beach Maintenance contract includes several services, such as ramp grading and sweeping, garbage pickup and disposal, toll booth transportation and minor repair, beach maintenance worker/porter, beach conservation post replacement/removal, and beach fire ring transport/placement. Coastal also utilizes master agreements for such repair and maintenance activities as painting restrooms, new playgrounds, pest removal and splash pad maintenance. Water Resources and Utilities uses contracts for sewer main jet and vacuum functions, and another for sewer line video inspection services. Solid Waste uses contractors for waste and recycle collection. Mosquito Control uses contractors for aerial adulticide spraying of mosquitos, and the other Divisions use contracted services for various other support functions.

Figure 3-63 shows the percentage of each Division's operating budgets that were dedicated to contracted services in 2016. The highest percentage was found in the Coastal Division, where over 65% was dedicated to contracted services for various support functions.

Figure 3-63
Percentage of Operating Budgets/Contracts



3.3.18 Coastal has maintenance functions, yet their main role is that of contract administrator and project manager.

The twenty-three members of the Coastal Division are responsible for the repair and maintenance of several parks and facilities unique to the County parks system and the east central Florida area. These parks include two high use facilities - Lighthouse Point Park, located north of the Ponce Inlet and Smyrna Dunes Park located on the south of the Ponce Inlet, as well as ten other beachside parks. These include such assets as restrooms, boardwalks, fishing piers and jetty. In addition, they are responsible for the inspection, repair and maintenance of one hundred-one dune walkovers, 35 vehicle ramps, three (3) beach access sidewalks, four (4) beach access trails/paths.

Coastal has several parks and numerous related infrastructure assets they are responsible for and they also administer and manage two large essential contracts. One for restroom cleaning and the other for what is referred to as "Beach Maintenance." The Beach Maintenance contract includes several services including ramp grading and sweeping, garbage pickup and disposal, toll booth transportation and minor repair, beach maintenance worker/porter, beach conservation post replacement/removal, and beach fire ring transport/placement.

3.3.19 Public Works Administration annually calculates two overhead rates per operational Division, including inside and outside. There appears to be a lack of understanding by the operational divisions on the methodology of the overhead calculation.

In addition to several support functions, the Public Works Department's Administrative section is responsible for creating and monitoring the budget, as well as calculating each Division's annual overhead rates. The separate rates are calculated for internal charges for work which is performed for agencies within the County, as well as external for work that is performed for others outside the County. These rates have a direct influence on the unit and overall cost of work performed by the Divisions. Although, these calculations are made annually, it appears there is a lack of understanding by the Division Directors and their support staff in the process and methodology Administration uses in determining the Division's specific overhead rates.

The average internal overhead is 119.49%, and the average external overhead rate is 140.93%.

Figure 3-64 and Figure 3-65 compare 2005 rates to 2016 rates. With these comparisons, the overall rate for outside services has reduced by 5%, and the overall overhead rate for internal services appears to be reduced by 18.23%. No comparison was made for Water Resources and Utilities for internal services, as there was not a rate calculated at the time for overhead for this group.

Figure 3-64
Outside Services Comparisons

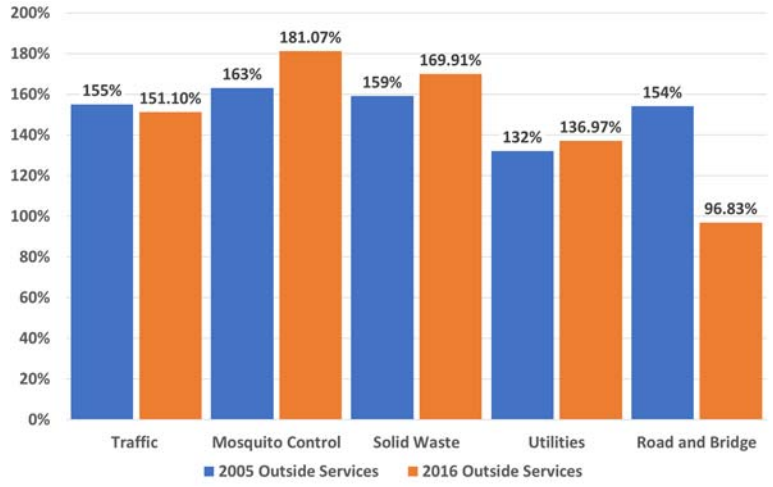
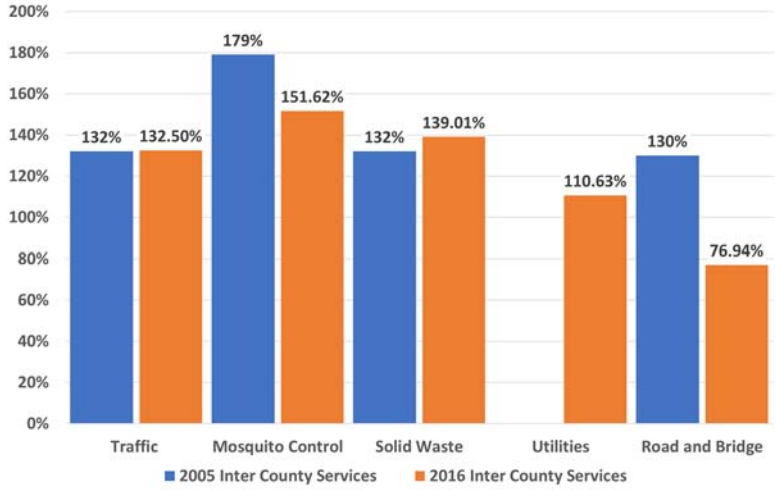


Figure 3-65
Internal Services Comparisons



3.4 Directing and Controlling

3.4.1 Work backlog is primarily stored within the Lucity database, yet Coastal utilizes manual processes to account for planned work and projects.

Once work is identified through various means, it is then planned and scheduled through established business processes. Work scheduling does vary for each Division, yet most utilize a documented short-term or bi-weekly scheduling process, which includes meeting with key staff to discuss and finalize their respective schedules. These prepared and documented schedules include routines, backlog work, new work orders, and work planned from the Division's annual performance plans. While work is planned two weeks in advance, some work may be inserted into finalized schedules related to high priorities with response or direction from senior leadership. In these cases, the supervisor will communicate directly with the impacted crew or employee for reassignment.

Most Divisions utilize the Lucity database to store and prioritize work orders to create a backlog of work waiting to be entered into the respective Division's scheduling process. The only exception is the Coastal Division with most of their backlog work stored in ancillary manual systems. Requests are transferred to the appropriate supervisor or tradesworker, yet they will keep a written record of the request if it cannot be addressed immediately to be scheduled later, versus entering them into the Lucity system to be stored as backlog work.

3.4.2 Work is well controlled and documented in each Division, yet the method varies from Division to Division.

Each Division identifies, evaluates, assigns, schedules, completes and documents work with established business processes. All groups have similar processes with some minor differences.

For several Divisions, service requests are received through email, in person from internal customers, the County's web request form, and by staff identifying needed repairs or through routine maintenance work. In addition to these, Traffic Engineers may receive notifications via law enforcement dispatch or through observation of an issue when monitoring their CCTV malfunctioning signals. The primary request for service related to Solid Waste is resident's inquiries of debris pickup. These requests are addressed through the Divisions administrative staff and does not impact operational staff resources.

Most Divisions have processes in place for receiving requests and converting them into work requests, as well as prioritizing and scheduling their work. These work orders are either scheduled in the following two-week schedules, or they remain in the status of backlog in the Lucity database, to be addressed later. An exception is found within the Coastal Division as requests will be received and then transferred to the appropriate supervisor or tradesworker, yet they will keep a written record of requests if they cannot be addressed immediately, opposed to inspecting them and entering the appropriate work requests into the Lucity system to be stored as backlog work. If the work order in all groups is determined to be urgent or an emergency, the respective senior supervisor will be notified, crews dispatched, resources gathered and work completed.

The documentation of work completed also varies from Division to Division. For example, In Coastal, Road and Bridge and Traffic Engineering, upon completion of work, employees will record labor and equipment hours, materials, and work quantities on daily timesheets. These

timesheets are then quality controlled with some data being entered into the Lucity system by field staff, supervisors, or administrative employees. Exceptions to this process can be found in both the Mosquito Control and Water Resources and Utilities Divisions. Upon completion of work in these Divisions, the crew or employee will record labor and equipment hours, materials, and work quantities directly into the Lucity database via laptop computer in the field and close the work order.

3.4.3 Mosquito Control and Water Utilities has eliminated processes from previous work flow via the use of laptops in the field.

All Divisions have access to the Lucity database and track similar data as it relates to labor and equipment hours, materials used and work accomplishment. Mosquito Control and Water Resources and Utilities Divisions have eliminated steps in their work flow process. For other Divisions, work requests and work orders are typically printed in hardcopy from the Lucity database and distributed to crews or field staff. In the case of Mosquito Control and Water Resources and Utilities, the process is bypassed where the crews or field staff will access the Lucity database via laptop in the field to check the status of any work requests or work orders assigned to them.

In addition, upon their completion of work and the crew or employee recording labor and equipment hours, materials, and work quantities into a manual form, Mosquito Control and Water Resources and Utilities record this information directly into the Lucity database as well via laptop computers and close the work orders.

3.4.4 Work processes vary in the tracking and recording of work performed from Division to Division.

The Divisions utilize slightly different work tracking and recording approaches, yet all track similar data as it relates to labor and equipment hours, materials used and work accomplishment. All Divisions share access to the Lucity CMMS, yet often utilize the tools differently. For example, the Mosquito Control and Water Resources and Utilities Divisions access the Lucity database in the field using laptop computers. Through this access, field staff monitor work requests and work orders, as well as recording resources against work orders directly in the Lucity database. Both Divisions are attempting to become operationally paperless. In contrast, Road and Bridge, Traffic Engineering, Solid Waste and Coastal track service requests, work orders, time, materials and accomplishment on paper forms for entry in the CMMS later using desktop computers.

3.4.5 Most desired management functions are being performed with the use of the CMMS and institutionalized processes for continuous improvement, yet the process lacks integration with efficiency performance measures. Good business practices suggest utilizing and relating measures to the work budget.

Most of the desired management functions are being properly and effectively performed. The elements of the four functions of planning, organizing, directing and controlling are being accomplished using the Lucity CMMS, institutionalized business processes and full support of executive and senior leaders to pursue continuous improvement. It has also been observed that employees have a general understanding of the use of the Lucity CMMS and associated businesses processes with several highly skilled employees spread within the Department.

In planning, all groups have work activities as well as documented guidelines depicting details of each activity. These practices are also reviewed and updated annually through facilitation by the Administrative group. Resource data of rates related to labor, equipment, materials, contract amounts, material unit cost and overhead rates are also routinely updated. The County also utilizes a robust GIS database for their infrastructure assets, which is linked to the primary tool for planning and tracking work, the Lucity database. The levels of effort for each activity have been established based on historical data and desired frequencies. Work programs and budgets are developed annually for each Division with some detailed to a sub-level, identifying costs and estimated work accomplishment by activity and by program.

Through the element of organizing, the process of workload distribution is followed and annual work calendars are created from the annual plan for each group, depicting the months' work by activity that is planned. These capabilities are used to project labor and equipment resources needs that match the work plan and used as another management tool of monitoring planned resources.

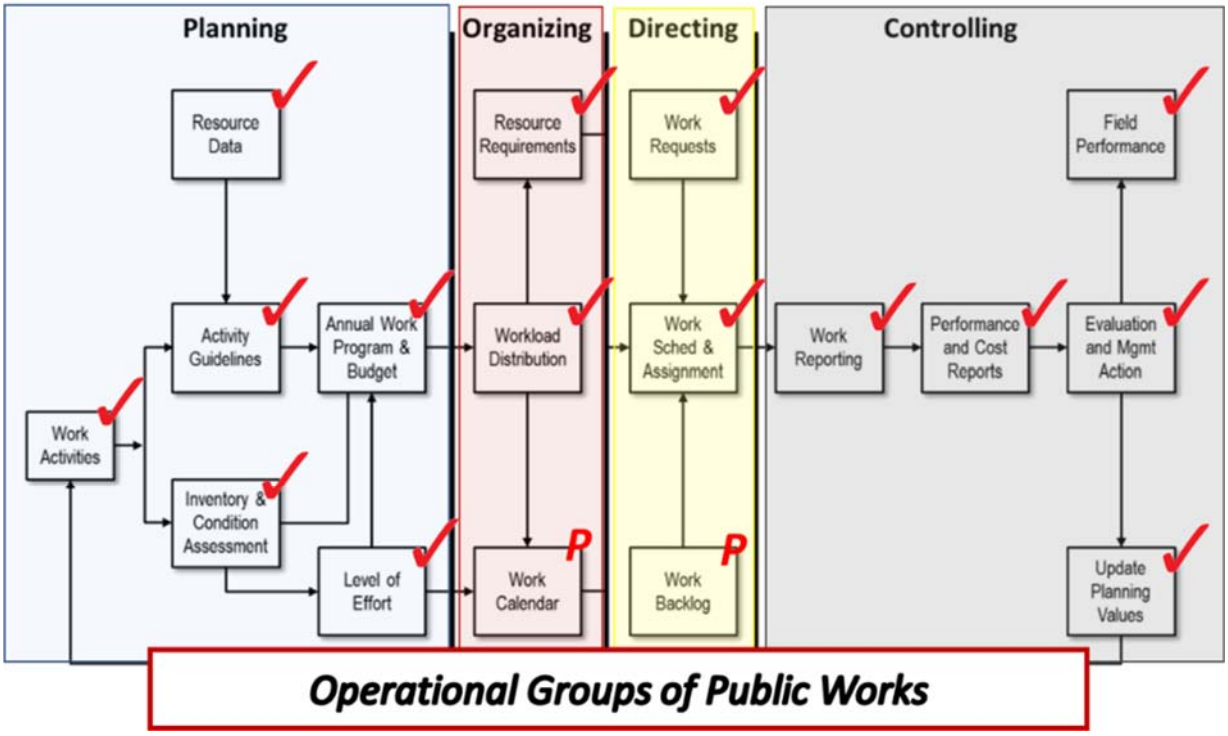
In the function of directing, work requests are systematically generated for all work, through automated systems and automated linkages between receiving requests and completion of work. Most Divisions utilize the CMMS to store backlog work orders with few using ancillary manual systems. Some assignment of work is occurring daily, yet bi-weekly scheduling processes are being utilized to provide short-term direction using backlog work, newly received work orders and planned work from the divisions' respective annual plan. Inventory control system processes are implemented and primarily dependent upon the functionality of the Lucity CMMS and established business processes, while some related manual processes are still in place to control materials.

The final function, controlling, relates to all the work that is reported by activity in the Lucity database. This includes related labor and equipment hours, material quantities used, in addition to accomplishment based upon pre-established reporting units. The data is used by most to monitor field crews and their work performance. The systematic evaluation of work performance and costing based on system outputs is performed by the respective Division Directors, Operations Manager, and their direct reports monthly.

It has also been observed that some Divisions utilize the system and established business processes more effectively, though all Divisions follow the process. Most of the desired management functions are being performed. However, the process lacks the development and integration of efficiency performance measures linked to the approved budget. Good business practices suggest utilizing and relating measures to the work budget to provide transparency to the public and elected officials, as well as a higher level of accountability to the organization. Further, though processes are followed, the data may be more effectively used to establish continuous improvement and look for opportunities to enhance productivity.

Figure 3-66 indicates the specific processes that the Public Works Department is performing compared against the ideal APWA model (American Public Works Association, 2014). A check indicates the process is being performed and a "**P**" indicates the process is partially being performed.

Figure 3-66
Public Works Department's Maintenance Management Model



SECTION 4 RECOMMENDATIONS

This section outlines the details of the recommendations for the operational Divisions of Volusia County's Public Works Department. The forty (40) recommendations are not in order of priority, but are instead in a suggested implementation sequence. In addition, in many cases the recommendations are related so that complete benefits may not occur without the implementation of the prior recommendations. The following recommendations are organized into five groups consisting of general, planning, organizing, directing/scheduling, and controlling/improving to further assist in understanding how to improve existing operations.

4.1 General / Systems

4.1.1 Increase the utilization of employee teams for assisting in the full implementation of continuous improvement opportunities such as development of guidelines, work plans and routines.

Over the past ten years, each operational Division has clearly and consistently demonstrated their ability to institutionalize innovative methods of addressing maintenance and operational efforts. Through committed leadership and dedicated employees, they have reaffirmed their ability to make positive change, while showing their commitment to continuous improvement.

Several recommendations found in the two previous LAC reports referenced the inclusion and utilization of employee teams as a vital component for their implementation and continued growth. Some of these recommendations from the 2007 report included: *34. Utilize employee teams in all groups to clearly define activities and work measurement*, and *35. Establish work methods with employee teams for crew size, method, and anticipated accomplishment with facilitation for benchmarks.*

As the Department continues to affirm their ability to make positive change, they should increase their utilization of employee teams for assisting in the full implementation of continuous improvement opportunities. The continued benefit of this involvement is the on-going establishment of buy-in and the further institutionalization of best management practices at all levels of the Department. Employee involvement at all levels of the organization will also aid in equipping employees for potential advancement in the organization through the application of best business practices.

4.1.2 Fully implement all recommendations from the 2007 and 2009 final reports. If recommendations are no longer applicable, document rationale for not implementing.

In 2007, LA Consulting, Inc. (LAC), previously known as Lorick Associates, was retained by Volusia County's Public Works Department through a competitive bid process, to provide consulting services for improving operations using management and technology best practices. Further, in 2009 LAC was subsequently retained by the County to provide similar services to the Coastal Division, which was in another Department.

Both previous efforts by LAC identified specific opportunities to improve operations and maintenance. From the 2007 final report, 13% of the recommendations are not completed, 42% partially completed, and 45% completed. In addition, there are seven of the not completed that

are no longer applicable or are out of the Department's control, yet they are still basic best business processes that should be implemented.

The 2009 final report identified forty-two (42) specific recommendations for improving operations using management and technology best practices in the Coastal Division. Currently, 20% are not complete, while some are no longer applicable as the result of the Division being reassigned to Public Works, and other organizational changes.

The Public Works Department should implement all applicable recommendations from the 2007 and 2009 final reports. If recommendations are no longer pertinent to their current operations, the Department should document and report to executive management the reasons for not fully implementing. For the recommendations that may apply to other Departments, Public Works' Administration should share the specific recommendations to the appropriate group for consideration of implementation.

4.1.3 Obtain an American Public Works Association (APWA) accreditation by utilizing all available technology and improvement tools with experienced leadership support.

The operational Divisions of Public Works are performing many positive and innovative processes. As outlined in the American Public Works Association's "Public Works Management Practices Manual," a program exists where an agency can progress through a process, meeting specific standards established by APWA for accreditation (American Public Works Association, 2014). This accreditation demonstrates that an agency has established methods, processes and policies to guide them in the effective use of their resources.

In 1996, APWA began to grant accreditation to agencies that submitted to the self-accreditation process, 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 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 will 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 granted for a period of four years with a semi-annual update required to demonstrate continued compliance. The cost for this effort is less than $10,000, paid to APWA for processing and the professionals who must certify this effort.

The Public Works Department should apply for the APWA accreditation through the program. This would encourage the Department to establish and document industry standards and processes, as well as have tools for employees to effectively manage their work. This accreditation would provide acknowledgement to the public and elected leaders that the Department has the processes in place to optimize the provided financial resources. As a result of forward and proactive direction by leadership, many processes, technologies and improvement tools are already in place.

4.1.4 Develop specific goals and objectives for all groups, including quantifiable efficiency and effective performance measures, which link to the vision and mission statements, using employee teams to provide input. Select, utilize and institutionalize a combination of efficiency and effectiveness measures for Budget and CAFR while utilizing for help in determining operational success.

The operational Divisions have historically developed explicit goals and reported their accomplishments in the County's budget documents, yet most are inventory, accomplishment and/or effectiveness based measurements.

The County, Public Works Department, and its' Divisions, have all developed and published mission statements. Each mission statement provides a clear purpose with rationales for their existence, while providing support for the overall mission of the County. Mission statements can help guide actions, provide a path, and guide decision-making (American Public Works Association, 2008; Bain & Company, 2013; Balanced Score Card Institute, 2014).

The operational Divisions should utilize a facilitated management team to establish specific goals, that will identify specific efficiency and effectiveness measures, which are reviewed and approved by the associated Division Director and Public Works Director. These established goals, along with mission and vision statements, should be included in the budget documents and the Comprehensive Annual Financial Report (CAFR).

The goals should be linked to specific quantifiable performance measures. These performance measures should include 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 included in the goals and performance measures.

These measures should be integrated with the Lucity database, and results gathered from system outputs. The system and associated business processes should directly facilitate automated status reports that can be standardized and utilized by all groups including those whom create the County's budget documents and populate the CAFR reporting. This would allow for the performance measures to be readily computed, as well as monitored on a continuous basis. The implementation of this recommendation will increase 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.

4.1.5 Report the performance measures in the County's budget documents and the CAFR so they can be reviewed and approved by the associated Division Director and Public Works Director.

Volusia County's Finance Department publishes the County's CAFR each year. Reports posted on the Department's website from 1998 through 2016 indicate most asset class quantities have increased over the past ten years (Volusia County Finance Department, 2017). Other reported data includes refuse collection for the Solid Waste Division, as well as the number of water customers and sewer customers, and the sewer treatment capacity for the Water Resources and Utilities Division.

Although, these are important data points to be used in projecting resource requirements, they lack the ability to measure performance productivity and provide further associated accountability.

The Public Works Department should report the established performance measures discussed in Recommendation 4.1.4 in the County's budget Documents, and within the CAFR. The reported data should be retrieved directly from the Department's Lucity CMMS through an automated process. Further, all reported data should be reviewed and approved by the associated Division Director and Public Works Director before being shared with the Finance Department.

4.1.6 Fully implement and utilize functionalities of the Lucity system. Standardize usage of the web-based tool, while configuring functionality applicable to each Division.

The Lucity CMMS is the primary work management database used by the operational Divisions of the Public Works Department. The Department's goal is to track 100% of their work efforts including labor, equipment, materials and accomplishment.

Although the system was state-of-the-art when originally purchased and implemented, Lucity has continued to provide upgrades and improvements to their software. Originally, the software was configured to be a server-based system with user's accessing the system through a personal desktop computer. Today, with the advent of wireless technology and the industry move to web-based solutions, Lucity has followed suit and has also developed a web-based version of their software. Several of the Divisions are utilizing some functions of the latest version, yet not all are fully functional.

With the software system improvements offered by Lucity, the Department should fully implement and utilize all functions of the system to plan work, manage resources and monitor accomplishment. Within this implementation, the usage of web-based functionality should be standardized, while applying functionalities applicable to each Division.

4.2 Planning

4.2.1 Identify, optimize and centralize yard locations for most operational staff and Division management and consider one main location. This would exclude employees for the Utilities, Transfer Station, Landfill, and Coastal Division.

The Public Works Department maintains many asset classes and their features related to roads, bridges, drainage, traffic signals and signs, mosquito control, coastal parks, water treatment and distribution, as well as wastewater collection, and wastewater reclamation and transmission. With this volume, diversity of assets, and the geographical size of the County, the Public Works Department's operational Divisions must have several reporting locations for staff, equipment and materials to be staged.

Although, most maintenance yards appear to be strategically located, a more optimal configuration may be possible through the centralizing of several Public Works services in a single location with some minor staging of equipment and labor resources on a project basis.

The County should consider centralizing maintenance yard locations for most operational staff in addition to their management staffing. This would include most of the Public Works Divisions, except for the staff and equipment of the Solid Waste Division Transfer Station and Landfill,

Water Resources and Utilities Division Water and Wastewater plant operations, and Coastal Division resources.

This would optimize resources, potentially leading to equipment and labor sharing, as well as reduce travel time in some instances. This would also potentially reduce other operational costs of maintaining multiple maintenance yards. An economic study should be conducted considering the benefits and cost of such a consolidation.

4.2.2 Enhance and utilize Lucity's planning functionality for projecting resource needs within the budgeting process. Adjust annually, accounting for changes related to levels of service as well as population and asset changes.

The Department develops work programs and budgets annually for each Division. Costs and estimated work accomplishment by activity and program are identified through this process. Resource data rates related to labor, equipment, materials, contract amounts, material unit cost and overhead rates are also routinely updated. The levels of effort for each activity are also established based on historical data and desired frequencies.

The County has seen a 3.8% growth in population over the past ten years with a projected growth of an additional 8.42% by 2025. In addition, it appears that most asset classes have increased between 2006 and 2016. It is expected that assets associated with the projected population growth will also increase. With this projected growth, additional resources including labor, equipment, materials, as well as monetary resources for contracted services and capital improvement projects (CIP) may be required to meet the increase in associated assets.

The use of the Lucity database planning features are essential to proactively plan and project resource needs based upon the current and projected increases in asset inventories, levels of service, as well as the desires of senior management and elected officials.

The Department should enhance and fully utilize Lucity's planning functionality for forecasting future resource needs. Senior and executive management, as well as elected officials should be made aware of these projections during the budgeting process. Further, adjustments should be made annually, accounting for changes related to levels of service, as well as population and asset changes.

4.2.3 Conduct an internal evaluation of Coastal Division staffing needs and retention with consideration for increased contract staffing for maintenance and operations.

The primary focus of the Coastal Division effort is a combination of maintenance, operations, customer service and contract administration. Most of their activities lack a unit of measure and are reported in hours only. This precludes using some of Lucity's capabilities to project needs. A lack of work accomplishment units provides little value in measuring efficiency, setting benchmarks, or measuring the effectiveness to operational changes.

The Division should develop and utilize reporting units (linear feet, acres, square feet, etc.,) which provide the ability to measure efficiency, set benchmarks, measure the effectiveness to operational changes, as well as project resource needs for maintenance and operations. Also, Public Works' Administration should assist the Division in performing an internal evaluation of staffing needs based on established levels of service, desires of senior and elected officials, and asset inventories. With the evaluation, considerations should be explored related to the retention of in-house staff and the impact on levels of service. In addition, considerations should be made

for increasing contracted services for maintenance and operations if a solution for the retention of in-house staff cannot be identified.

4.2.4 Utilize FDOT's latest reimbursement method for FDOT signal maintenance or discontinue support of FDOT assets. Document all contract issues not directly covered, such as the repair of mast arm assets.

The Signal Operations and Maintenance group within the Traffic Engineering Division is responsible for all signal operations for the County signals. They also have responsibility via contracts for signal operations of thirteen additional agencies, as well as the Florida Department of Transportation's (FDOT) signalized intersections found both in unincorporated Volusia County and the contracted cities.

Historically, local agencies in Florida have maintained FDOT signalized intersections. FDOT would make compensations based on the number of approaches in each intersection. Recently the FDOT has proposed and offered an alternative method of compensation based on the number of FDOT assets within the boundaries of a specific agency. All agencies in which Traffic Engineering provides signalized intersection inspection, maintenance and repairs, have chosen to utilize the new form of reimbursement, yet the County has made the choice to maintain the original agreement. In addition, most Counties in Florida have taken the same approach using the latest asset-based method. The new method has provided agencies with FDOT contracts to bill larger amounts.

The County has historically lost money by maintaining FDOT signals. It has averaged an annual loss of approximately $183K. From FY2010 to FY2016, the average annual revenue from FDOT to the County was $186,442, while expending $369,522.

The new method creates more revenue, yet has a minor drawback that raised concerns with the County. This situation occurs when a damaged signal pole or other traffic signal asset from a traffic accident must be repaired, as under the new agreement, it is now the responsibility of the agency. The County must try and recoup the full cost of the repair from the offender. If they are unsuccessful, they may request FDOT to pay for the effort. The risk that would occur is that the County may have to cover the cost. However, this has only occurred twice in the last 20 years and cost less than $40,000 per instance as indicated by the County's traffic Foreman.

The County should utilize FDOT's latest reimbursement method for FDOT signal maintenance as this would result in projected revenues of over $434,000 which is a $247,000 increase. As an alternative, the County should discontinue with support of signal inspection, maintenance and repairs for the FDOT as the County is losing monies taking care of the States' assets. If the decision is made to continue support, the latest reimbursement method should be used and the method for repairing issues such as knock downs should be directly covered and documented in the associated contracts.

Applying the new compensation method, the projected County revenue would be $434,900 annually, and the cost of support would be approximately $369,500. This would represent a positive cash flow of $65,300 instead of losing $183,000. If the County chooses to not do the FDOT contract, it does not lose $183,000 annually. The County should either go to the new billing method or stop providing FDOT service without additional compensation.

4.2.5 Negotiate with Cities on FDOT support for options of a fixed amount allocated annually rather than utilizing direct billing.

As discussed in the prior recommendation, the Signal Operations and Maintenance group is responsible for all signal operations for the County signals and thirteen (13) additional agencies, as well as Florida Department of Transportation's (FDOT) areas of responsibility.

All agencies in which Traffic Engineering provides signalized intersection inspection, maintenance and repairs have chosen to utilize the new form of reimbursement when they have FDOT signals in their cities.

Applying the new method of reimbursement to contract agency support, the projected annual revenue would be $349,900, with the cost of support being $228,600. This represents a positive cash flow of $121,200. Currently, the contract agencies are being reimbursed under the new process, resulting in a positive cash flow without doing the work. The County is now performing work for the cities' FDOT related signals. The cities get reimbursed from the State and they then pay the County on a time and material basis for doing the work. The County not only does the work, but also keep records for the cities and must bill the cities in detail for their service.

The County should renegotiate with the cities for support contracts for FDOT assets, to a fixed percentage amount of the FDOT bill (suggest 90%) rather than utilize direct billing. This would allow the County to both reduce administrative cost and record keeping, as well as allow the County to be properly compensated with the State annual increases being accounted for in the State annual cost escalator. This would simplify the process for the cities without the need to process and confirm monthly invoices from the County.

4.2.6 Standardize reporting units and activity descriptions used in the Lucity database. If modifications are desired, determine the impact of the change to benchmarking processes and the development of trends, then get approval from the Director. Fully justify and document all modifications or additions and then establish activities for unit changes.

During the original implementation and configuration of the Lucity database, each of the operational Divisions developed and documented specific lists of activities. These lists, along with associated reporting units, are stored in the Lucity database and used for planning and tracking work accomplishment.

Several work measurement units and task descriptions have been modified since the original development and configuration. It is estimated that 190 changes have been made since 2007. The result of these modifications causes difficulty in the use of historical data in determining trends, establishing benchmarks, as well as measuring productivity as work units have changed. For example, one activity work unit measurement changed from linear feet, to area, to hours. This presents difficulty to fully utilize historical information and creates difficulty in any multiyear comparison.

To ensure system data is useful for performance monitoring, reporting units and activity descriptions used in the Lucity database should be standardized. If modifications or additions are desired by the operational Divisions, justification should be documented and submitted to Administration. Administration should determine the effect of the proposed change and compare it to other benchmarked processes, as well as to the development of trends. After the original

review and the foreseeable impacts are determined, the final approval should be made by the Public Works Director. If a change must be made, then a new activity in Lucity should be created using new measurement units with related productivity estimates. This would prevent compiling data with dissimilar units.

4.2.7 Utilize employee teams to fully populate activity guidelines in the Lucity database with associated detail to be memorialized. Utilize "*Effective*" and "*Supersedes*" fields in guidelines. Have appropriate Division Director review and approve guidelines annually, using the "*Approval*" fields for Division Director's initials and date.

In coordination with the development of the original activity lists, guidelines were also developed and documented for each activity. Each guideline is named and includes an activity code, description of the activity, planning criteria, resource needs (labor, equipment and materials), work methods and check points, expected quality/results, specific inventory, and expected average daily production. Annually, each operational Division reviews and makes appropriate modifications to specific guidelines.

Included in each of the guidelines are fields for *Effective* and *Supersedes* dates, as well as an *Approval* field. The purpose of these guidelines is to aid field employees in the communication of specific expectations, as well as to assist supervisors and managers in providing accountability to staff. After the review of several of the guidelines, it appears that some are missing critical detail such as resource needs and work methods.

The Department should increase the utilization of employee teams to fully populate all activity guidelines with associated details, memorializing them in the Lucity database. If activities are utilized by multiple divisions, consensus should be made on the final version of the guideline. Also, all guidelines should be approved by the appropriate Division Director with the use of Effective and Supersedes date fields, as well as the Approval field populated on each guideline form. This will ensure that all guideline information is populated and vetted, as well as being approved by the associated Division Director.

4.2.8 Consider changing work accomplishment reporting units for all maintenance and repair activities (Coastal, and others) from hourly to a production-based value or document rationale for not changing. For Water Resources and Utilities, develop a group of activities specific to the monitoring and maintenance of wastewater and water plants.

All operational Divisions have developed and documented lists of activities with associated inventories and reporting units. These reporting units allow the groups to develop annual performance based work plans and budgets based upon asset inventories, an average daily production value, and a determined level of service.

Activities which are measured only in hours provide little value in measuring efficiency, setting benchmarks, or measuring the effectiveness to operational changes. In addition, although these activities are essential to the mission of their respective Division, the reporting of only hours as an accomplishment lacks capability for analytical value for measuring efficiency or assistance in resource planning. This also results in managers and supervisors having difficulty using the system data to monitor efficiency or adherence to planning goals.

The operational Divisions should change all measurement units for maintenance and repair activities from hourly to a production-based measurement. For example: each, cubic yard, cycle, linear foot, mile, etc. For those activities in which the reporting unit is to remain hourly, a documented rationale should be made and approved by the associated Division Director and Public Works Director.

In a related situation, the Water Resources and Utilities Division should review the activities related to water and wastewater treatment plant operations, creating more specific activities with production based measurements to further assist managers and supervisors in the use of system data to increase the monitoring of efficiency and encourage adherence to the planning goals.

4.2.9 Correlate surveillance activities with mosquito mitigation to identify effectiveness of treatment activities undertaken. Document methodology and data, then report results to Senior and Executive management.

The Mosquito Control Division is primarily a response driven group with the focus of their activities on effectiveness, yet there are several activities they perform where efficiency measurements can be made. For example, mosquito trapping and ground mosquito field inspections are surveillance activities, which are used to monitor the County's mosquito population. Pesticide application and the execution of spray missions are performed as the result of larval or adult mosquito populations exceeding established parameters.

The Division should establish a methodology and document the correlation between surveillance activities and the performance of spray missions and other pesticide applications to establish an effectiveness measurement for the application of pesticides to mitigate the mosquito population. This methodology, related data, and results should be reported to senior and executive management. This measurement will further aid in the identification of spray mission effectiveness and the use of Divisional resources.

Data exists in the Lucity system that would allow for just such an analysis. The lack of utilizing this information in conducting this effort may result in a critically missed opportunity for making more data driven decisions such as for the extensive effort being done for conducting adulticide and larvicide operations.

4.2.10 Benchmark production and cost per unit of "Sidewalk Repair" activity with private sector. Consider outsourcing sidewalk repair if cost and production is not met under similar conditions. Report results to Road and Bridge Director, as well as Senior Management.

The activities performed by the Road and Bridge Division are a combination of routines and response to service requests. Crew productivity for sidewalk repair has reported a decrease of almost 48% in square feet (SF) of sidewalk repaired per day since FY 2000. The productivity appears to be low and should be evaluated to determine if this activity warrants to be outsourced. At the reported 2017 productivity, a $35,000 savings could potentially occur if work is outsourced and even more if combined with current sidewalk contracts.

The Division and Public Works' Administration should establish benchmarks of productivity and cost-per-unit for this activity, and Lucity data compared monthly by maintenance yard. The results of this analysis should be reported monthly to the Road and Bridge Director as well as Senior Management.

Further, the Department should annually utilize the process outlined in Recommendation 4.3.14, for establishing a systematic procedure to assess future contracting candidates following documented maintenance and operational strategic objectives. Initial data suggests that sidewalk repair work performed by County forces may be a candidate for outsourcing without changes in processes for improvement.

4.2.11 Report status of compliance with preventive plans. Benchmark and document the correlation between preventive maintenance and repair activities. Annually report results to Division Director and Senior Management.

Many of the activities performed by the operational Divisions have shown major improvements over the past ten years, such as Traffic Engineering's response-based activities of signal repairs and trouble calls. This is a direct correlation between the increase in signal preventive maintenance and these response activities.

Although this is just one example, each Division should evaluate and report the status of compliance to their established preventive maintenance plans, as well as benchmarks, and document the correlation between their maintenance plans and associated response-based repair activities. The result of these analysis should be annually reported to the Division Director and Senior Management. This will increase accountability to the adherence of established plans and communicate the importance of preventive maintenance to executive management and elected officials during the budget cycle.

4.2.12 Evaluate adequacy of County crews completing and documenting routine programs including valve turning, hydrant maintenance, CCTV inspection and sewer line cleaning. Accurately report 100% of Water Resources and Utilities' resources used and the accomplishment for preventive maintenance activities in the Lucity database. Evaluate the effectiveness of completing these goals.

The Water Resources and Utilities Division utilizes contracted services for several preventive maintenance (PM) routines, such as hydrant maintenance, closed-circuit television (CCTV) inspection, and sewer line cleaning. They also perform valve turning of major valves annually, and all valves over a three-year period, in-house.

Although these PM activities appear to be performed, the ability of the Division and the Department's Administrative group to use Lucity data for routine work confirmation, measurement of performance and the monitoring of accomplishment against an annual performance plan is hindered by the lack of completely and fully tracking these maintenance activities in the Lucity database.

The Division should perform an evaluation of the compliance and effectiveness of their routine PM programs, including those activities for which contracted services are used. The Division should utilize the Lucity database to accurately report 100% of the resources used in the accomplishment of all PM activities. This will allow for routine confirmation, measurement of performance, and monitoring of accomplishment against an annual performance plan.

The system data should be updated and a complete internal review should be completed to determine the compliance of these routines, and to affirm that the tasks are being done as planned. If they are not being done, the Division should be required to adjust efforts to assure

compliance. Regardless, a memo should be sent from the Division to the Director of Public Works indicating the status of these critical preventative maintenance operations.

4.2.13 Develop a separate performance work plan and budget in the Lucity database for work planned and performed by the Drainage Task Team for Mosquito Control. Compare and report monthly achievement against the plan and discuss with Mosquito Control the status and any adjustments or modification requirements.

Each operational Division of the Department utilizes a line-item budget based on historical expenditures and anticipated needs. In addition, various sources are used to fund the repair and maintenance of their infrastructure assets. For example, the maintenance of mosquito control ditches is performed by the Drainage Task Team (DTT), yet funded by the Mosquito Control Division. Approximately $865,000 is being used annually by the Road and Bridge Division (R&B) to perform these drainage activities. The planned resources for this effort have been combined with other non-Mosquito Control ditch maintenance efforts being performed by the DTT.

The support drainage work had been done based on past Road and Bridge experience, supervisor's judgment, as well as some input from Mosquito Control. Recently, Road and Bridge developed and documented a maintenance plan for providing maintenance to Mosquito Control's ditches. This written plan was compiled in October 2017, yet is still combined with that of other ditch maintenance efforts. The merging of these planned efforts makes the monitoring of work accomplishment, adherence against a work plan, and increased efficiency more difficult to obtain and evaluate for all, including the leadership of Mosquito Control who is funding the effort.

A separate performance work plan and budget should be established in the Lucity database to further assist in providing accountability and status to the currently established maintenance plan for work planned and performed by the DTT for Mosquito Control. In addition, the DTT should report the achievement effort against the performance plan monthly, and discuss the status as well as any adjustments or modification requirements that are needed with Mosquito Control.

4.3 Organizing

4.3.1 Revise spans of control to match industry guidelines, or document justification for those that are outside the benchmark range.

The Public Works Department is a multiple layered organization with several Divisions reporting to the Public Works Director. The management and leadership organizational structure of the Department includes six operational Divisions, as well as the Administration group and an Engineering and Construction Division.

Span of control is the number of subordinates that a manager or supervisor directly controls (Lorick, 2011). This ratio can vary with the type and complexity of work, established routines performed, or their subordinates need for direct supervision. In most cases a range of 1:4-8 is a desirable benchmark and good business practice. However, this is rule of thumb as direct reports in some cases need increased supervision or consistent direction and communication requiring lower span. Conversely, if work is routine, repetitive and more completely defined, then a higher span of control is appropriate. This is the case for custodians where most work is routine and defined and requires less hands-on direction thus a high span can occur.

LAC found that most spans of control for each operational Division are within anticipated benchmark ranges, as well as the management and leadership structure to industry benchmarks. However, there are a few exceptions which are based on function. The exceptions were found mainly in specialty functions that were unique, yet require some interface with their immediate supervisor.

There are two other cases, however, that appears to need further review. The Director of Public Works (DPW) and the Road and Bridge Division Director. First, the DPW position now has nine direct reports, along with an administrative assistant. These functions are all crucial to the operation, yet the span of control for this role exceeds normal benchmarks. In the past, there was a Deputy Director, but the position has not been filled in recent years. The Operations Manager has acted as a strong and experienced staff position, and has helped reduce the impact of such a large span. However, the person staffing that position is retiring. The DPW's span of control should be reviewed through an independent internal evaluation, and opportunities should be evaluated to reduce the ratio.

Most spans of control within the Road and Bridge Division are within benchmark ranges except for the Road and Bridge Director, which has a span of control of 1:9. Although this is slightly higher than the benchmark range of 1:4 to 1:8, a higher span of control may limit the opportunity for access to the Director and reduce accountability of their direct reports. The Department should utilize a facilitated management team to re-organize and optimize the Road and Bridge structure, reducing the span of control of the Division Director to address this condition.

The Administration group should review and revise all spans of control in all the operational Divisions of Public Works to fall within the industry guideline of 1:4 to 1:8, while considering the function of direct reports and their need for direct supervision. The lowering of each supervisor or manager's ratio will provide greater communication and allow for increased accountability from the direct reports. All Divisions outside the industry range, whether high or low, should be outlined with documented justifications, and approved by both the associated Division Director and the Public Works Director.

4.3.2 Study the adequacy and functionality of Coastal to be in the Public Works Department.

The Coastal Division is responsible for the repair and maintenance of several coastal parks and facilities unique to the County's parks system and the east central Florida area. All the Division's assets are located along the County's forty-seven-mile east coast. These assets include 101 dune walk overs, numerous beach access points including vehicle ramps, as well as the County's ten coastal parks. In addition, Division staff is also responsible for the monitoring of beach vendors and several contracts related to operations and maintenance.

As Coastal is in control of several unique asset classes, and maintains an emphasis on service to the visitors of the County's beaches, the Department should perform a study on the adequacy and functionality of the Coastal Division as a member of the Public Works Department. Considerations should be made to move or incorporate the Division into a more directly related organization. They work closely with several other County agencies such as Beach Safety and Environmental Management, as well as having many functions with similarity to the County Parks.

4.3.3 Institutionalize support for key systems and administrative processes through the staffing of key personnel. These staff should have the skills and ability, along with the authority, to provide guidance and administration to the Divisions and Senior Management.

Key leadership roles under the Operations Manager have been instrumental in guiding and facilitating the success of the Department over the past ten years, which is outlined in the appendix. This includes the championing of the Lucity system and developing the administrative processes, which assisted in the implementation of best management practices. This key staff is also heavily involved in emergency response, debris removal and FEMA/FHWA reimbursement. The expectation of success and continuous improvement has been communicated and executed by these key departmental operational staff. These processes and continuous improvement tools have also been supported by the executive and senior leadership of the County.

The Department should continue to institutionalize systems and administrative processes through the staffing of two key organizational personnel in this group to further the pursuit of continuous improvement and success. The Department should ensure that all key administrative staff possess the skills and ability to continue, along with the authority to provide administration of the Lucity system, as well as guidance to the operational Divisions in continuous business process improvement. They should also be able to provide both administrative and functional support for senior management to monitor and guide the eight divisions.

4.3.4 Fully staff Coastal support for contract administration and provide annual training in contract management for key staff. Provide defined structure for contract administration with organizational assignments of responsibilities focused on contracts.

The twenty-three members of the Coastal Division are responsible for the maintenance and operation of several parks and facilities unique to the County parks system and the east central Florida area. To help augment these responsibilities, Coastal also administers several contracts for beach maintenance and operations, as well as maintenance of the County's coastal parks.

The beach maintenance contract includes several services, such as ramp grading and sweeping, garbage pickup and disposal, toll booth transportation and minor repair, a beach maintenance worker/porter, and beach fire ring transport/placement. There is a single staff assigned to administer Coastal Division contracts, with all staff sharing the responsibility of oversight and feedback on the quality of service provided by the contractors.

The County should evaluate the staffing of the in-house contract support function, provide backup staffing, as well as provide annual training related to the management of contracts to aid and provide support for this major effort of contract administration. In addition, a more defined structure for contract administration should be established, that would assign formal responsibilities for contract inspections and administration.

4.3.5 Consider re-organizing the structure of the Mosquito Control Division with the Operations/Activity Project Manager assigned as Deputy Director.

The Mosquito Control Division is responsible for the abatement of mosquitoes through inspection, chemical application (truck and helicopter), the setting and monitoring of mosquito

traps, and testing sentinel chickens. The Division is led by the Mosquito Control Division Director, which has a span of control of 1:4.

The Activity Project Manager is responsible for the oversight of all operational activities including inspections, environmental operations, aircraft operations, as well as equipment maintenance and support. Although, the Activity Project Manager has support through their direct reports, they have the largest staff responsibility of the Division. The responsibility is found to be unevenly distributed among the Division Director's four direct reports.

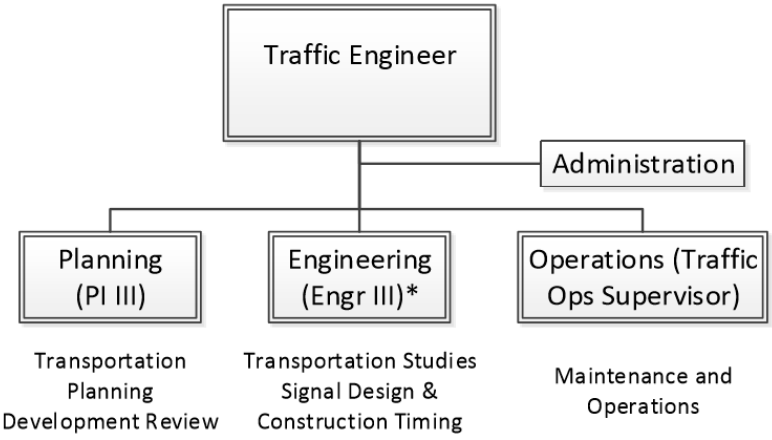
The Department should consider re-organizing the structure of the Mosquito Control Division, with the Activity Project Manager being designated as the Division's Deputy Director to recognize the vital role played in support of the Division's mission. This can either be a formal title change or through a working title. This designation will assist in communicating the responsibility of this staff member, as well as assist in the future solicitation of qualified candidates when the Activity Project Manager leaves employment with the County.

4.3.6 Fully staff a senior position in Traffic Engineering to manage operations, planning and studies. Simplify effort and use outside resources for timing support.

Traffic Engineering is responsible for the repair and maintenance, as well as the inspection and operations of traffic signals. In addition, Traffic Engineering also performs or monitors traffic studies and controls signal timing. The Division is led by the County's Traffic Engineer who has a span of control of 1:4. There are currently two Civil Engineer IIIs vacant in the Division, one who leads Traffic Studies and Signal Design & Construction, and the other which leads the Timing & Intelligent Transportation System (ITS), and Signal Operations & Maintenance.

As the result of workload and similarity of functions, the County should consider filling only one of the two vacant Civil Engineer IIIs, and combining the leadership responsibility of some of the remaining staff under that position. Further, consideration should be made not to fill the staff position currently performing Timings & ITS once the position is vacant, and they should secure outside resources if needed for this support. The County should also consider an organization as shown in Figure 4-1. This would include three direct reports with one vacant EIII (*) being filled, and the traffic timing function switched to this position. There would not be an Engineer in charge of operations and maintenance. This function would be led by the Traffic Operations Supervisor. All new timing and design changes would be the EIII's responsibility. The Traffic Operations Supervisor role is strictly for implementation and maintenance. The specific organization should be facilitated with management staff in its final determination.

Figure 4-1
Suggested Traffic Organizational Chart



The Coastal Division is responsible for the repair and maintenance of several parks and facilities unique to the County parks system and the east central Florida area. The tradesworker staff are responsible for the repair and maintenance of several asset classes such as boardwalks and walkovers, parking areas, and beach access paths. These assets are located along the County's forty-two miles of beaches, which are also separated in two geographical locations, north and south of Ponce Inlet. This group of staff reports directly to the Leisure Service Manager, including one Tradesworker III and two Tradesworker IIs. As discussed in prior Recommendation 4.2.3, the Divisions should conduct an internal evaluation of staffing needs and retention, related to the tradesworkers. The Divisions should also consider having the two Tradesworker IIs report directly to the Tradesworker IIIs, thus reducing the span of control of the Leisure Services Manager.

4.3.7 Standardize and document after-hours policies. Provide equal transparent processes to develop more employees with skills to respond to after-hours events or specialty needs. Consider combining some after-hours functions to reduce the number of on-call staff.

The Public Works Department has several distinct Divisions, which address a wide variety of unique operational functions from the County's beaches and coastal parks to mosquito control. Each operational group primarily operates independently of one another with some support from the Administrative group located at the TCK Building in Deland.

All Divisions provide 24/7 coverage through various schedules and methods. All methods are based on functional responsibility and perceived needs by the individual Divisions. Although, Divisions may occasionally work together in support to address some complex or unique circumstance, yet normally they work in separate silos.

The Divisions should standardize all on-call policies to simplify the Department's after-hours, weekend and holiday coverage. Each policy should provide equal transparent processes with a focus upon developing more employees with the skills to respond and be available for after-hours events and emergencies. In addition, consideration should be made to reduce the total number of staff that are on-call. The Department should combine like functions/responsibilities, such as Road, Trees, and Bridges as well as consider others.

4.3.8 Work shifts should be established based on specific County work needs. A facilitated evaluation of the benefits of different shifts to the County should be conducted with employee team involvement, documenting the negative and positive benefits of each work shift with an optimal strategy.

The operational Divisions of the Department have established and utilize a wide variety of work shifts to address the perceived operational needs of their groups. These varying shifts and schedules are dependent on management's concept of operational functions, yet are also influenced by divisional desires. Currently, the Department lacks a documented justification for these variations in schedules.

Although, some schedules appear to be warranted, a facilitated evaluation should be performed, exploring the specific operational benefits, as well as the shortcomings of each current schedule. The Divisions should identify and document the results of the evaluation. Also, these evaluations should include the use of employee teams for the solicitation of feedback and comments. An example of such an evaluation would be within the Water Resources and Utilities Division related to the staffing and operation of their water and wastewater plants. The Division should explore the operational needs and state mandates for water and wastewater plant operations, and develop performance plans based on such mandated staffing requirements.

4.3.9 Consider the usage of teleconferencing technology in both scheduling and production meetings to allow senior management and other staff to attend, observe and provide input without travel. This would ensure the opportunity for senior management involvement.

The Department maintains many asset classes and their features related to roads, bridges, drainage, traffic signals and signs, mosquito control, coastal parks, water treatment and distribution, wastewater collection, wastewater reclamation and transmission. These assets are located throughout the County's over 1,000 square miles. With this diversity of assets and the geographical size of the County, the Public Works Department's Divisions have several reporting locations for staff, equipment and materials.

The Department should consider the use of internet-based teleconferencing technology for both scheduling and production meetings to provide access to, and promote involvement by senior management. This would allow senior management and other key staff to attend, observe and provide input without being on-site. Assuming just two meetings a week and reducing travel of five people would show benefits of over $20,000 in cost plus opportunity to attend functions that are currently being passed up by some management and supervisors because of travel time.

4.3.10 Establish benchmarks for overtime, worker compensation, and Family Medical Leave Act, monitoring monthly for all Divisions. Benchmark and evaluate impact to operations and have each Division report to the Public Works Director monthly and annually.

For the past ten years, the operational Divisions have averaged almost 29,000 hours of overtime annually, which represents an average of 4.2% of all reported labor hours. Overall, the Divisions have significantly reduced overtime by nearly 50% when comparing 2007 with 2016. The operational Division's average is found to be like other benchmark agencies in the LAC database.

A key to accomplishing work is employee availability. One such benchmark indicator is the use of Family Medical Leave Act (FMLA). From 2007 through 2016, an average of approximately 5,600 annual FMLA hours were reported. Although this class of leave has increased considerably, the Divisions are still found to be within the benchmark range of similar agencies.

These measures impact work related to accomplishment, budgets and staffing. The Public Works Department should establish benchmarks by Division for overtime usage, worker compensation, and Family Medical Leave Act time. These measurements should be monitored monthly with accountability results reported to the Division Directors. Benchmarks and evaluations should be performed on the impact to operations for these measurements, and reported to the Public Works Director both monthly and annually. This would allow the County to monitor these important performance measures, and to assure the Department is within range of similar agencies. Also, this allows management the opportunity to act when some values get out of range during the year.

4.3.11 Document a plan to implement a complete succession plan for all staff levels with input from employee teams. Focus on ensuring skills, experience, education and training are all considered in this process, not length of service only.

The average employee length of service for the operational Divisions is approximately eleven years, with most of the Divisions falling within LAC's benchmark expected range of twelve to fourteen years. Traffic Engineering has the highest average at fourteen years and Mosquito Control with the lowest years of service at 9.2.

Although, with a relatively low length of service in comparison to benchmark agencies, several senior employees who provide key leadership and guidance have the potential for retirement or the opportunity to soon leave employment. This puts the Department at risk of losing vital institutional knowledge and leadership of key operational practices.

As a result, it will be essential for junior employees to obtain additional training or the requirement of the Department to add new staff to meet the absence of this leadership. This will increase the need to have processes institutionalized for this adjustment and transition. Several similar agencies have established mentoring programs, data and formalized system processes to capture this knowledge and transfer it back to the agencies' employees prior to when key leaders and employees leave employment.

The Department should document and implement complete succession plans for all levels of the organization to safeguard the County's investment and capture institutional knowledge. These plans should utilize input from employee teams. Further, these plans should be kept by management and not published, due to personnel rules. These plans will provide a framework that will guide the effort for a sustainable organization as employee departures occur, as well as provide direction for management to ensure training and guidance is constantly provided for employee development. The process should focus on ensuring skills, experience, education and training are all considered, not just length of service. A formal training plan for technical and supervisory functions should be stablished to grow and develop internal staff with both management and technical capabilities.

4.3.12 Compare historical equipment utilization rates and monitor changes in cost allocations annually. Confirm accuracy of all cost when considerable changes occur.

Vehicle and equipment rates are annually and systematically calculated by the Administrative group using data produced from the County's Fleet Management database and equipment hours reported in the Lucity database from the prior year. The data provided by Fleet Management includes fuel, repair and maintenance, lease/rental, and appreciation or depreciation costs. Public Works also uses "out-of-yard" hours including preparatory and travel time, reported in the Lucity database.

Reported data indicates more than half, or forty-one of the seventy-seven rates have reduced from FY15/16 to FY16/17, yet the overall average equipment rates have shown a change of approximately 15% when FY15/16 and FY16/17 are compared. The cause of this overall change is currently unconfirmed.

As the cost of repair and maintenance, fuel, and ownership is a major financial impact to performing work, Public Works Administration should annually compare historical rates from the prior years, monitoring changes in cost allocations and data utilized in each calculation. When considerable changes in data are identified, the accuracy of the data should be confirmed and reviewed with the data provider.

4.3.13 Fully utilize and standardize the inventory control functionality of the Lucity system for tracking and controlling of all materials, eliminating the use of manual forms and ancillary inventory systems. Report key parameters annually for turnover and the cost to maintain inventory, as well as the cost of the inventory itself.

The primary tool used for controlling material inventories is the Lucity database through its functionality and associated business processes, yet some manual systems continue to be utilized for the temporary recording of material usage before entry into the Lucity database. For example, the Coastal Division is utilizing manual forms and an external database to the Lucity system for controlling their material inventory. Staff reports they will be moving exclusively to the Lucity system for inventory control in early 2018.

The Department should fully utilize the inventory control functionality of the Lucity system for tracking and controlling of all materials, eliminating the use of manual forms and ancillary inventory systems. This will allow Administration greater ease of access to all materials related data within the system, including materials prior to being assigned to a work order. Annual reports should also be created to further support this standardization, using Lucity data to report key inventory benchmarks, such as turnover ratios and the cost to maintain inventories, by Division.

4.3.14 Establish and document a systematic procedure to assess future contracting candidates following the documented County maintenance and operations strategic objectives.

All Divisions augment in-house maintenance, repair and operational efforts using various contractual services. For example, the Coastal Division utilizes contracts for restroom cleaning and beach maintenance, while Water Resources and Utilities uses contracts for sewer main jet and vacuum functions, and another contract for sewer line video inspection services. In addition, Solid Waste uses contractors for waste and recycle collection, and Mosquito Control uses contractors for aerial adulticide spraying of mosquitos. The other Divisions use contracted services for various other support functions.

The Department, using Lucity data, should establish and document a systematic procedure to assess future contracting candidates. This procedure should follow the documented maintenance and operations strategic objectives. The Department should annually evaluate all activities and determine whether any activities appear to warrant consideration for outsourcing. The purpose of this process would ensure an internal focus of continuous improvement via external benchmarks and competitiveness. This process should be conducted by Public Works Administration and the results reported to the associated Division Director and Public Works Director.

4.3.15 Public Works Administrative staff should meet with each Division Director and appropriate staff to review and obtain input in a transparent manner on the calculation and methodology used for determining their respective overhead rates in Lucity.

In addition to several support functions, the Public Works Department's Administrative section is responsible for creating and monitoring the budget, as well as calculating each Division's annual overhead rates. The separate rates are calculated for internal charges for work which is performed for agencies within the County, as well as external for work that is performed for others outside the County. These rates have a direct influence on the unit and overall cost of work performed by the Divisions.

Although, these calculations are made annually, it appears there is a lack of understanding by the Division Directors and their support staff in the process and methodology Administration uses in determining the Division's specific overhead rates.

The Public Works Administrative staff should meet with each Division Director annually to review the data used and calculation methodology of their respective overhead rates. The purpose of these meetings will ensure transparency and understanding of the overhead calculation process. In addition, these meetings may assist the Administrative staff in using data that is more specific to each Division, and offer the opportunity to gather feedback from the Directors, enhancing assumptions in the overhead calculations with more succinct data or rationale.

4.4 Directing / Scheduling

4.4.1 Annually review and update routines in all groups then document and automate in Lucity.

Routines exist for many operational, maintenance and environmental activities. These proactive efforts are performed to protect the County's assets and ensure proper operation, as well as optimize asset life cycles.

Water Resources and Utilities inspect, maintain and perform repairs on 120 lift stations with 108 having telemetry. These stations are visited 76 monthly, 9 weekly, and 22 bi-weekly. All visits are planned and scheduled on routines. In addition, they turn all key water valves along major distribution mains on an annual basis, and valves on smaller mains on a 3-year cycle, as well as exercise all hydrants annually through contracted services.

Traffic Engineering performs the inspection and maintains and performs the repairs on numerous traffic related assets. Many routines have been developed and implemented internally, yet some, such as traffic signal preventative maintenance routines, are established through interlocal and

Florida Department of Transportation (FDOT) agreements of frequency with the County performing preventative maintenance routines on all assets twice a year.

Road and Bridge also utilizes routines and maintenance cycles for their assets and features. These routines include dirt road grading, mowing by functional class, tree trimming, pavement markings, and right-of-way herbicide spraying.

Routines are essential for protecting the County's assets and ensuring proper operation, as well as for optimizing the asset's life cycle. The Department's Administrative groups should annually review and update all routines performed by in-house and contracted services. This review should include confirmation of asset inventories, funding availability and desired levels of service. An attempt should be made to establish as many activities as possible in routines, and automate them in the Lucity system. All routines, and associated work plans and budgets should be approved by the associated Division Director and Director of Public Works.

4.4.2 All work requests received and work orders not scheduled in their respective Division's bi-weekly schedule should be stored and backlogged in the Lucity database. These should be used in future short-term schedules. Further, the Division Directors must be involved in the scheduling process and approve the biweekly plan.

After work is identified, it is planned and scheduled through established business processes. Work scheduling does vary for each Division, yet most utilize a documented short-term or bi-weekly scheduling process. Most Divisions utilize the Lucity database to store and prioritize work orders to create a backlog of work waiting for entry into the respective Division's scheduling process. The only exception is the Coastal Division who has most of their backlog work stored in ancillary manual systems. Requests are routinely transferred to the appropriate tradesworker who keeps a written record of the request if the work cannot be performed immediately, versus creating a work order and entering into the Lucity system to be stored as backlog work.

All work requests received and work orders not scheduled in their respective Division's bi-weekly schedule should be stored and backlogged in the Lucity database. These work orders should be used in future short-term schedules. This will allow Directors and supervisors access to data for the projection of short term resource needs based on customer requests, levels of service, and average daily production. This will provide increased accountability for internal employees and contracted services.

In addition, all scheduling groups should have formal meetings, except for Solid Waste. All scheduling meetings should also have the Division Director in attendance or, at a minimum, obtain approval from the associated Division Directors for each schedule prior to start of the scheduling period. In the meetings, prior scheduled tasks not completed should be explained with associated planned actions for future completion. The completed schedules should be posted and a copy forwarded to the Director of Public Works.

4.5 Controlling / Improving

4.5.1 Fully develop and document all work flows of each Division's work processes then publish and annually review with key staff. Use as a tool to identify and eliminate elements of each process to increase efficiency without sacrificing quality or availability of information.

Each Division identifies, evaluates, assigns, schedules, completes and documents work with established business processes. All groups have similar processes with some minor differences.

All Divisions have access to the Lucity database and track similar data as it relates to labor and equipment hours, materials used and work accomplishment. Mosquito Control, Water Resources and Utilities, and the Traffic Engineering Division have eliminated some steps in their work flow process using automation. They have implemented a process in which crews or field staff will access the Lucity database via a laptop in the field to check the status of any work requests or work orders assigned to them.

Each Division should fully develop and document all work flows of their Divisions' work processes. These work flows should be published and annually reviewed with key staff and employee teams to affirm the process is still valid. These tools should be used to identify and eliminate unnecessary elements, as well as increase efficiency without sacrificing quality or availability of information. All modifications should be reviewed and approved by the associated Division Director and Public Works Director.

4.5.2 Standardize reporting procedures, account for one hundred percent (100%) of employee time in the Lucity database used in work unit production and all contract units and dollars in separate activities.

The operational Divisions utilize slightly different work tracking and recording approaches, yet all track similar data as it relates to labor and equipment hours, materials used and work accomplishment. All Divisions share access to the Lucity system, yet often utilize the tool differently. For example, the Mosquito Control, Water Resources and Utilities, and Traffic Engineering Divisions access the Lucity database in the field using laptop computers and can record work order data in real time in the field. In contrast, Road and Bridge, Solid Waste and Coastal Divisions track service requests, work orders, time, materials and accomplishment on paper forms for entry in the CMMS later, using desktop computers.

The Department should standardize reporting procedures for all operational Divisions and account for 100% of employee time in the Lucity database used in work unit production. In addition, the Divisions should utilize the same concept related to contractors and outsourced support production, by developing separate activities with contract units and identifying associated financial resources.

4.5.3 Establish a quality control process to ensure completeness and accuracy of data capture in Lucity. Conduct an after-the-fact review of the data collected monthly, and report the status to the Director in addition to the monthly reports.

The goal of the Public Works Department is to capture 100% of the operational Division's time in the Lucity database as well as contracts. The purpose of this goal is to collect data for monitoring the efficiency and effectiveness of maintenance and operations at both the Department and Division level. With this data, Division Directors and their direct reports can make operational decisions based upon real information. The data and established levels of service also provide increased accountability and communicate expectations to field employees.

The level of reporting work accomplishment, labor and equipment hours, as well as materials used exceeds many other like agencies. However, the consistency and accuracy of the data captured is questionable at times. The lack of quality control procedures has affected the validity

of the data, which makes the system outputs and the ability to use the information to make informed decisions for management uncertain.

The Department should establish a quality control process to ensure data quality, reliability, and accurate information in the Lucity database. After-the-fact reviews of the data collected should be conducted monthly, and findings should be reported to the associated Division Director and Department Director in a monthly report. This will provide an increased level of accountability for data entry, as well as instill confidence in the Division Directors and their direct reports that they have accurate information to make operational decisions.

4.5.4 Continue to institutionalize the improvement process with current and future employees. Proactively communicate and publish efficiency and effectiveness results to Executive Management, elected officials and the public. Annually compare key parameters for major activities to other agencies and utilize as a mechanism to improve. Educate and institutionalize new staff to this structure using best business practices.

The elements of the four functions of the ideal maintenance management process, planning, organizing, directing and controlling are being accomplished using the Lucity CMMS, institutionalized business processes, and full support of executive and senior leadership. Some Divisions utilize the system and established business processes more effectively than others, though all Divisions follow the process with most of the desired management functions being performed.

The recommendations that have been implemented over the past ten years have resulted in considerable improvement. Several industry presentations and publications in Government Engineering, Florida Engineering Society and Public Works Magazine, as well as State and National APWA presentations have highlighted the successful implementation of such recommendations and their success. This commitment and success has also been recognized within the Volusia County Public Works industry, as well as with their peers, as leaders in efficient and effective operations.

However, the process lacks the development and integration of efficiency performance measures linked to the approved budgets. Good business practices suggest utilizing and relating measures to the actual budget to provide transparency to the public and elected officials, as well as a higher level of accountability to the organization. Although processes are followed, others outside of the Department need to understand how this is being successfully utilized.

The Department should continue to institutionalize improvement processes with current and future employees. This should be accomplished through the continued training and exposure of the Lucity system, as well as using collected data for management and operational decisions. Further, all employees hired outside of the Department should possess or be willing to conform to and support the established improvement processes. All new ideas to enhance processes should be considered while keeping the basic structure and utilization of best practices in place.

In addition, the Department should proactively communicate efficient and effective results to the Executive Management, elected officials and the public instead of holding system data internally. The Department, through this communication, should annually compare key parameters for major activities to other agencies, and utilize as a mechanism to improve, while reporting results in the County's budget documents and the CAFR reports to leadership.

SECTION 5 APPENDIX

Ten-Year Evaluation

In May 2007, a report was completed for Public Works outlining the specific actions for improvement. A companion report for Coastal Facilities was completed in December 2009. Since that time Costal Division was organized into Public Works as another working division. The business practices outlined in the recommendations of both reports were implemented, along with the County selecting a computerized management system (Lucity). This appendix outlines the results of this effort by the employees in Public Works since 2007.

During the past ten years since the 2007 evaluation, the Public Works Department has successfully implemented many innovative practices through their willingness to change and their commitment of continuous improvement. This has been possible through a dedicated work force, experienced managers and directors, as well as the support of senior and executive leadership. The results have been impressive with several industry awards and acknowledgement of peers of their success. Many other agencies have come to visit Public Works to try and understand how this has occurred. In summary, the Department has accomplished more work with less equipment, less dollars, and nearly the same number of employees. The following provides some general details of the changes and savings realized by the Department. Some initial saving occurred with specific decisions made in the first three years during and after the study. Additional savings have occurred over the last ten years with utilization of various business process and automation tools including Lucity and a geographical information system.

Immediate Impacts of the Initial Implementation in first three years

The Department realized significant savings in several areas related to operations and maintenance after the implementation of the initial recommendations from the previous studies in 2007 and 2009. This represented approximately $2 million in savings. The following are just a few notable areas.

- The Mosquito Control Division saved $721,000 by reducing internal helicopter maintenance needs via outsourced support, the full allocation of overhead billing, and combining two maintenance yards into one.
- The Solid Waste Division saved $431,000 through the elimination of unneeded holiday and Sunday support, and the modification of work methods for alternative cover at the landfill.
- The Drainage Task Team (DTT) saved $175,000 annually through the elimination of unnecessary internal billing methods, as well as the elimination of travel and redundant efforts already performed by the Road and Bridge and Mosquito Control crew.
- Water Resources and Utilities Division saved $539,000 by reducing water loss and the reduction of capital costs.
- Road and Bridge Division saved $160,000 through the outsourcing of traffic markings and the purchase of pre-made signs instead of in-house production.
- Traffic Engineering saved $55,000 through the elimination of unnecessary travel time by staffing employees closer to the work.

Overall Analysis of Ten-Year Change

Factors

Several factors were considered when evaluating the change, along with information from multiple sources, including Lucity data.

Population and Assets

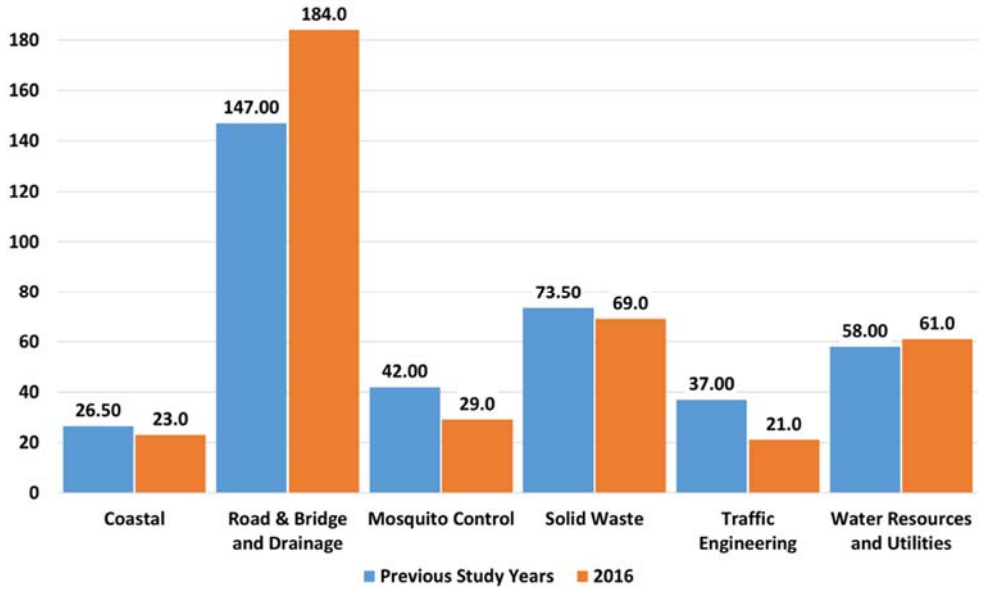
The County's Economic Development Department reports that the County's population in 2016 was 521,338 (Volusia County Economic Development, 2017). Over the past ten years, the County has seen a 3.8 % growth in population with a projected increase of 8.4 % by 2025.

The County's Comprehensive Annual Financial Report (CAFR) data from 2006 through 2016 shows that most asset classes related to Public Works have increased. The largest percentage increase has been in ditch miles at 75 percent, bike paths increased almost 74 percent, and sidewalk miles increased 21 percent. Other asset classes that increased include paved roads, signalized intersections, water mains, sewer mains and lift stations. The CAFRs also reflect changes in other operational indicators that are not assets, such as the decrease in refuse collection of just over 20 percent, the increase in water customers of just over 4 percent, and the increase in sewer customers of approximately 4.8 percent. In Coastal, the number of visitors increased 9.6% during the period as reported by County toll data. The overall impact of all the asset classes is over a 7.5% growth in assets in ten years with many categories having even more.

Budget and Staffing

The amount of labor budgeted over the last ten years were adjusted for inflation using the ENR index (ENR, 2018). The adjusted labor budget showed a reduction of $3.8 million, or 16%. The number of budgeted employees has increased by three positions. The breakdown by Division is shown below in Figure 5-1. Coastal, Mosquito Control, Traffic and Solid Waste staffing reduced. Road and Bridge went up as they took over all drainage responsible for Mosquito Control and signs and marking from traffic. Utilities had a slight increase of two staff even though they had more asset and mandated responsibilities. The overall staffing of the Department showed just a slight increase of 0.8%.

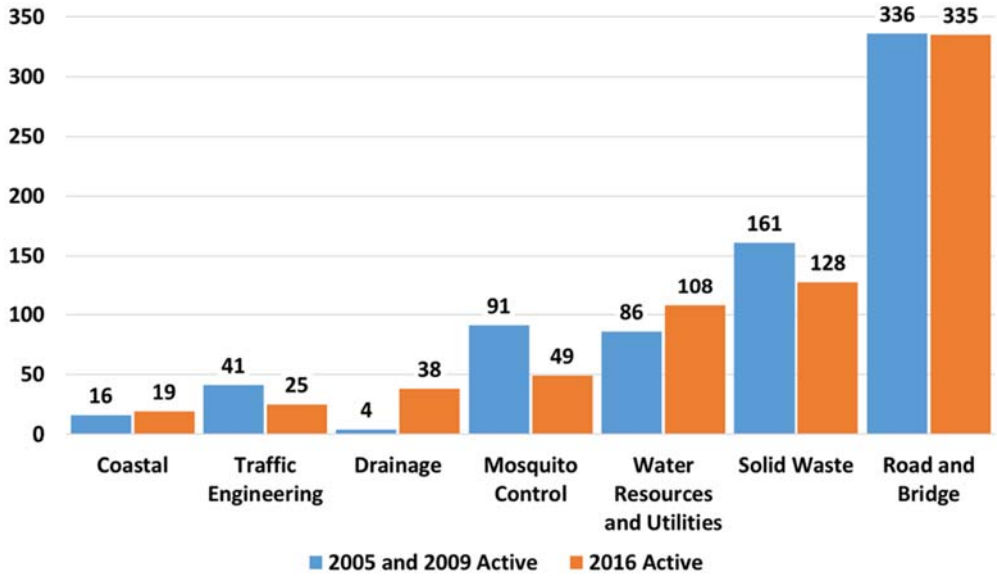
Figure 5-1
Employee Number Change 2007-2016



Equipment

Considerable changes have occurred in equipment with a reduction in pieces of equipment from 2007 till 2016, as shown in Figure 5-2. Some of the reductions are heavy equipment- transfer hauling units, graders and bulldozers. The Department reduced its number of equipment from 735 to 702, or approximately 4.5%. All groups except Utilities and Drainage (part of R&B) had reductions. Drainage numbers increased because of receiving vehicles from Mosquito Control. Mosquito Control no longer uses heavy equipment for cleaning ditches and canal, but instead has Drainage perform this function.

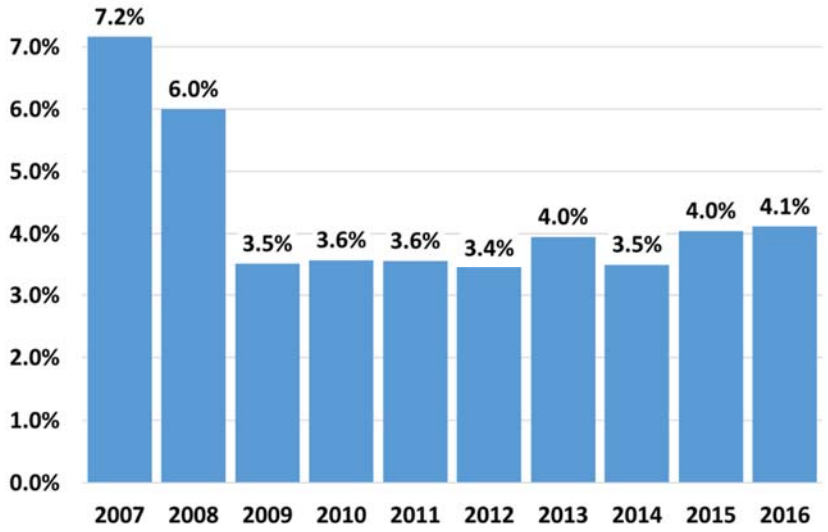
Figure 5-2
Equipment Number Change 2007-2016



Overtime

Public Works, by better scheduling, allocation of resources and management decisions, reduced their overtime dramatically following the 2007 recommendations. Prior to the recommendations, overtime was almost 9% in FY 2005 and 2006. The change has been over 3.1%, or a reduction of 42% from the 2007 amount. Figure 5-3 shows overtime as a percentage of all working hours going from 7.2% in 2007 to around 4% during the last several years.

Figure 5-3
Overtime % of All Work Time Change 2007-2016

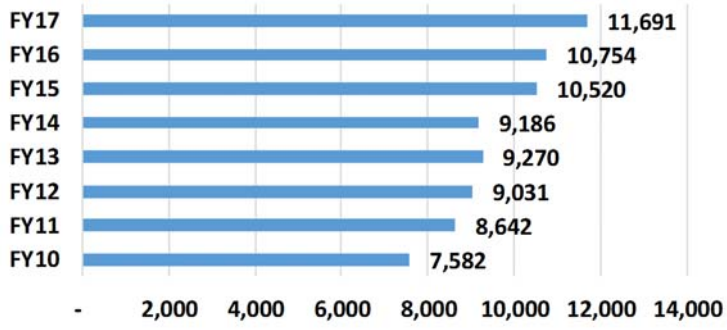


Productivity

The measurement and monitoring of average daily productivity (ADP) is another performance indicator used by high performing organizations. It represents the average crew productivity that was reported for multiple jobs doing similar tasks. Utilizing data from the Department's Lucity CMMS, the Department's top maintenance and repair activities, have shown an increase in average productivity over 10 %. Some detail examples of five key activities are:

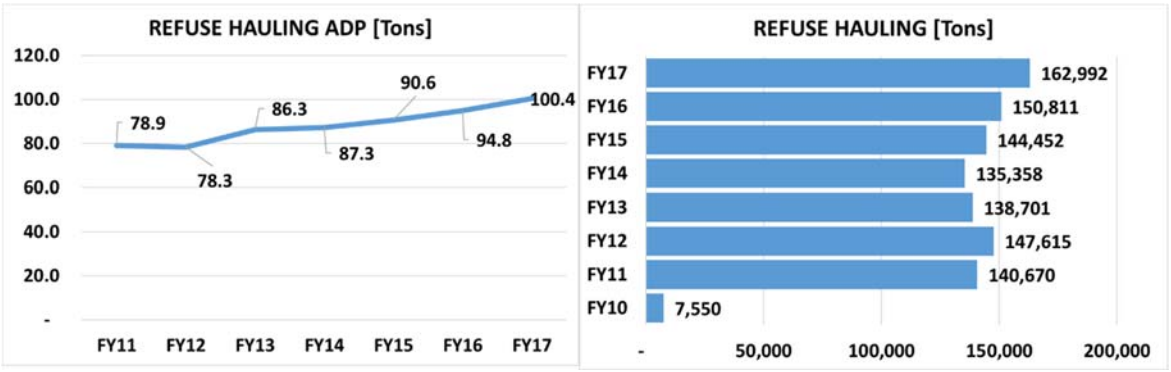
1. Flat mowing increased from 7,582 acres in FY 2010 (when tracking was institutionalized in Lucity) to 11,691 acres in 2017 as shown in Figure 5-4.

Figure 5-4
Acres Mowed from 2010-2017



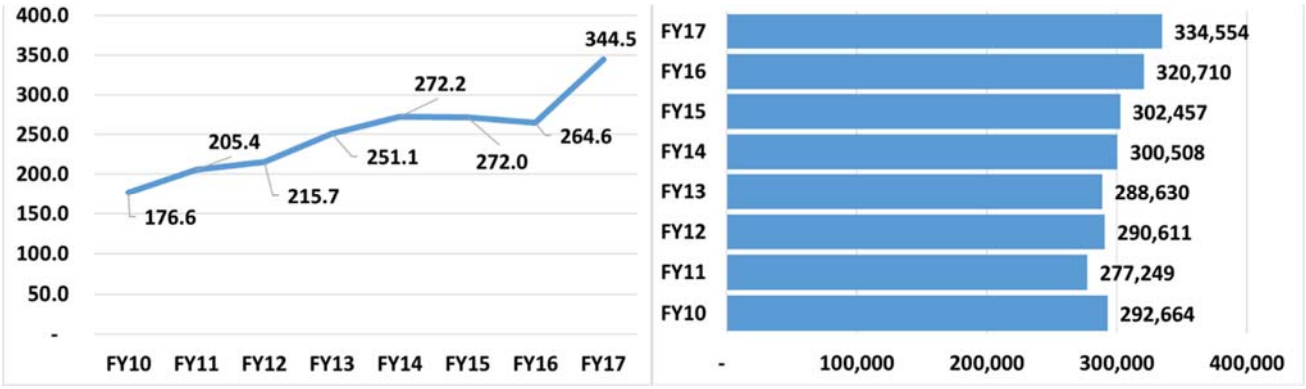
2. Refuse Hauling in tons from the transfer station increased slightly at 14% from 2011 but was done more effectively with productivity increasing. Amount moved daily by each transfer truck production has increased by over 28% as shown in Figure 5-5. FY10 data is not accurate as tracking in Solid Waste was fully implemented in Lucity until FY11.

Figure 5-5
Refuse Productivity and Tons Haul from 2010-2017



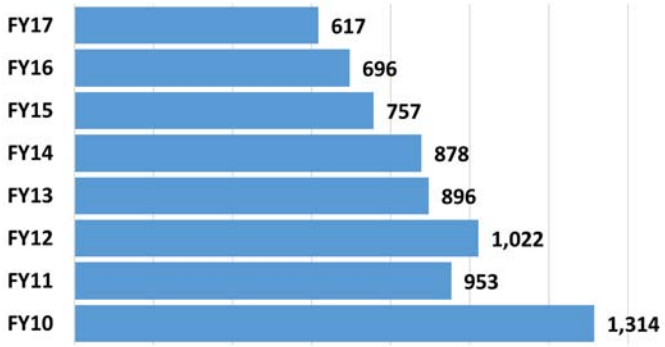
3. Landfill compaction has become much more effective with the realignment of material placement, equipment control on face, better scheduling and monitoring. ADP has nearly doubled to allow for more tons to be compacted with less labor hours as shown in Figure 5-6.

Figure 5-6
Compaction Productivity and Tons Placed from 2010-2017



4. Traffic has shown reduced call outs for repairs and customer requests since 2010 as depicted in Figure 5-7. This is believed to be a result of more effective PMs, better scheduling and technology changes. This improvement occurred with no increase in staff.

Figure 5-7
Traffic Signal Trouble Call Received from 2010-2017



5. Figure 5-8 shows Mosquito Control has double the number of traps monitored since 2013 when Lucity came fully online for MC. This occurred by enhanced scheduling, management direction and focus along with employee actions.

Figure 5-8
Mosquito Trap Monitoring from 2010-2017

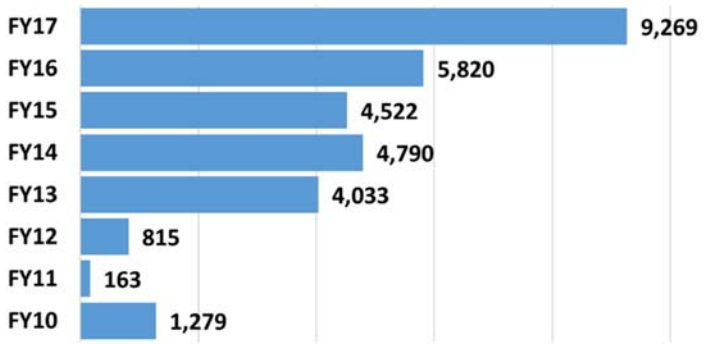


Figure 5-9 shows a summary with several of the top activities by group, comparing initial Lucity production data 2010 with that of 2016. Most (16 out of 21) of these activities have seen increases.

It should be noted that reductions can also be a positive reflection on operations and maintenance practices. For example, the correlation between Traffic Engineering's activity of Signal PM (preventive maintenance) and the activities of Signal Repair and Trouble Calls. The same correlation can be made between Lift Station PM-MTC (preventive maintenance – maintenance) and Lift Station Repair. The increase and focus on preventive maintenance has a positive reduction in the possible repairs of an agency's assets.

Figure 5-9
Public Works Department's Productivity

Activity	Group	Increase/Decrease
RESTROOM CLEANING	Coastal	↑
WALKOVER/BOARDWALK REPAIR	Coastal	↑
INSTALL DRAINAGE PIPE	Drainage Task Team	↓
ROADSIDE DITCH CLEAN/MECHANICAL	Drainage Task Team	↓
ROW MOWING FLAT	Drainage Task Team	↑
GROUND MOSQUITO FIELD INSPECTION	Mosquito Control	↑
MOSQUITO TRAPPING	Mosquito Control	↑
TRUCK ADULTICIDING	Mosquito Control	↑
TREE TRIM	Road and Bridge	↑
PREMOWING/TRIM/LITTER REMOVAL	Road and Bridge	↑
SIDEWALK REPAIR	Road and Bridge	↑
FLAT MOWING	Road and Bridge	↑
REFUSE HAULING (Solid Waste)	Solid Waste	↑
COMPACTION OF WASTE-CLASS I	Solid Waste	↑
COMPACTION OF WASTE-CLASS III	Solid Waste	↓
TROUBLE CALL	Traffic Engineering	↓
SIGNAL REPAIR	Traffic Engineering	↑
SIGNAL PM	Traffic Engineering	↑
LIFT STATION PM-MTC	Water Resources and Utilities	↑
LIFT STATION REPAIR	Water Resources and Utilities	↓
TREATMENT PLANT REPAIR	Water Resources and Utilities	↑

Conclusion

In summary, over the past ten years, the Public Works Department has implemented many innovative practices through their commitment to continuous improvement. This has occurred through a dedicated work force, experienced managers and directors, as well as the support of senior and executive leadership. The results of the Public Works Department's commitment can be quantified for improvement as the result of using the prior mentioned factors as shown in Figure 5-10.

Figure 5-10
Public Works Results Over Ten Years

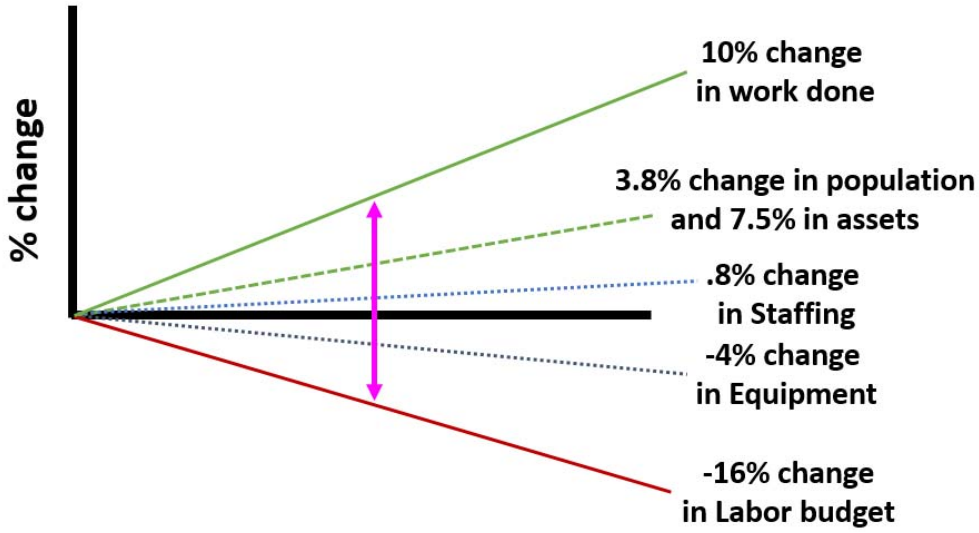
- Increase in population (3.8%) and assets (7.5%)
- Slight increase in number of employees (0.8%)
- Decrease in Personal Services expenditures (16.8%)
- Decrease in overtime (42%)
- Decrease in number of equipment (4.5%)
- Increase in work unit accomplishment (average 10%)

The Department saw an original savings of $2 million during the initial implementation, as well as a $1.9 million reduction in equipment costs due to equipment reduction during the ten-year period. They have also realized 26%, or $2.9 million saving annually through an increase in productivity and a decrease in personal services costs. This equals to an approximate savings of over $32 million during the ten-year period. In addition, although there was an increase of Department staffing of less than 1%, the County saw an increase in both population and assets.

This improvement can further be shown in Figure 5-11. The County in 10 years is doing 10% more work, while the labor cost is 16% less. The difference in the purple line is 26% of saving with a combination of less cost and getting more things accomplished. Also, it should be noted that if staffing was just linked to population, the amount of staff is 3% (3.8%-0.8%) less than would be expected and if linked to assets to be maintained it would 6.7% (7.5%-0.8%) less than expected. The 26% does not even consider the 4.5% reduction in equipment.

In the last ten years the County is doing more work with less equipment and financial resource and about the same staff levels. This is not to indicate that improvement cannot be further made, but rather that the data shows that in the last ten years significant improvement has occurred. Public Works is to be congratulated for accepting an independent report's ideas and then actually implementing those ideas. These have resulted in bearing considerable benefit for County residents by optimizing the provided resources as well as reducing cost.

Figure 5-11
PW Summary of Changes



SECTION 6 ACRONYMS & ABBREVIATIONS

App – Application
APWA – American Public Works Association
AWP – Annual Work Plan
BCC – Board of County Commissioners
BMP – Best Management Practices
CADD – Computer-Aided Design and Drafting
CAFR – Comprehensive Annual Financial Report
CCTV – Closed-Circuit Television
CDL – Commercial Driver's License
CIP – Capital Improvement Program
CMMS – Computerized Maintenance Management System
DBIA – Daytona Beach International Airport
DEP – Department of Environmental Protection
DOT – Department of Transportation
DPW – Director of Public Works
DTT – Drainage Task Team (Mosquito Control Division)
FDOT – Florida Department of Transportation
FEMA – Federal Emergency Management Agency
FMLA – Family Medical Leave Act
FTE – Full-time equivalent employee
FY – Fiscal Year
GIS – Geographic Information System
GPS – Global Positioning System
IPM – Integrated Pest Management
ISF – Internal Service Fund
LAC – LA Consulting, Inc.
LF – Linear feet
MOT – Maintenance of Traffic
M&O – Maintenance and Operations
NE – Northeast
NW – Northwest
PM – Preventive Maintenance
PPE – Personal Protective Equipment
QC – Quality Control
SAG – Special Achievements in GIS
SCADA – Supervisory Control and Data Acquisition
SF – Square foot/feet
SW – Southwest
TCK – Thomas C. Kelly
ULV – ultra-low volume
WW – Wastewater
WWTP – Wastewater Treatment Plant

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