

Public Works Department

# Stormwater Management Division

## 2014 - Annual Report



Working together for a better community



## CONTENTS

<b>CONTENTS.....</b>	<b>1</b>
<b>OUR PARTNERS.....</b>	<b>2</b>
<b>STORMWATER MANAGEMENT DIVISION - OVERVIEW .....</b>	<b>3</b>
<b>STORMWATER MANAGEMENT DIVISION – CORE VALUES.....</b>	<b>4</b>
<b>PRIMARY SYSTEM - OPERATIONS.....</b>	<b>5</b>
<b>DRAINAGE SECTION .....</b>	<b>6</b>
<b>MUNICIPAL SERVICING BENEFIT UNIT (MSBU) SECTION .....</b>	<b>7</b>
<b>PUMP STATIONS AND CONTROL STRUCTURES.....</b>	<b>8</b>
<b>DRAINWELL REPLACEMENT PROGRAM.....</b>	<b>9</b>
<b>CONTRACT ADMINISTRATION SECTION .....</b>	<b>10</b>
<b>NATIONAL FLOOD INSURANCE PROGRAM (NFIP) &amp; COMMUNITY RATING SYSTEM (CRS).....</b>	<b>11</b>
<b>RAINFALL MONITORING PROGRAM.....</b>	<b>12</b>
<b>DRAINAGE MASTER PLAN UPDATES .....</b>	<b>13</b>
<b>CAPITAL IMPROVEMENT PROGRAM .....</b>	<b>14</b>
<b>CAPITAL IMPROVEMENT PROGRAM – PROJECT HIGHLIGHT .....</b>	<b>15</b>
<b>POND SUSTAINABILITY .....</b>	<b>18</b>
<b>BATHYMETRIC PROJECT .....</b>	<b>19</b>
<b>2014 ACCOMPLISHMENTS .....</b>	<b>20</b>
<b>STORMWATER MANAGEMENT DIVISION STAFF .....</b>	<b>A</b>
<b>ORANGE COUNTY GOVERNMENT .....</b>	<b>B</b>

OUR PARTNERS



## STORMWATER MANAGEMENT DIVISION - OVERVIEW

This year we celebrate the reorganization of the Stormwater Management Division which has come full circle from 20 years ago with the return of the former operations sections and the addition of the MSBU pond maintenance section. 2014 has been an exciting and busy year for us as we have adjusted to the new organization and everyone is happy and excited about our future challenges and responsibilities.

The Stormwater Management Division is one of seven divisions that make up the Orange County Public Works Department. In the 1980's the Stormwater Management Division was called the "Water Management Department" and had approximately 65 employees. It included engineers and technicians who designed and managed drainage capital improvement projects, and a superintendent who supervised the operation sections which included drainage, spray, drainwell, pump station, heavy equipment and construction crews. Around 1992 the name was changed to Stormwater Management and the operation sections were consolidated with the Highway Maintenance operations to later become Roads and Drainage. For the past 20 years the Stormwater Management Division operated as a planning and engineering design organization responsible for the County's stormwater capital improvement program, floodplain permitting, rainfall program, and administration of FEMA's National Flood Insurance Program and Community Rating System program.



RODNEY J. LYNN, P.E., CFM,  
MANAGER

Today's Stormwater Management Division has 104 highly skilled and dedicated individuals which include: equipment operators, technicians, foremen, coordinators, inspectors, administrative assistants, and engineers. The Division is now responsible for the planning, engineering design, operation and maintenance of the primary drainage systems within Unincorporated Orange County. This system includes over 1,700 stormwater ponds, 95 miles of canals, 18 pump stations, over 50 major control structures, 80 drainwells, and 5 dams. In addition, the division has retained its responsibilities for several programs including floodplain management, CRS, and rainfall.

In this annual report we have highlighted some of our accomplishments and successes achieved by the Division during 2014. We hope that you enjoy reading and learning about our division as much as we are proud to be a part of it.

Thank you,

A handwritten signature in black ink, appearing to read "Rod", written in a cursive, stylized font.

## STORMWATER MANAGEMENT DIVISION – CORE VALLUES

Stormwater Management's team purpose is to improve the community and environment by delivering technically sound flood mitigation and superior customer service. We strive to deliver timely, innovative, and sustainable solutions to improve maintenance operations and reduce costs.

We are:

**Compassionate** – for our citizens and the environment

**Timely** and **Responsive** – to our customers

**Professional** and **Competent** – in our work

**Innovative** and **Sustainable** – in our approach

**Passionate** – about the quality of our work

**Friendly** and **Positive** – in our attitudes

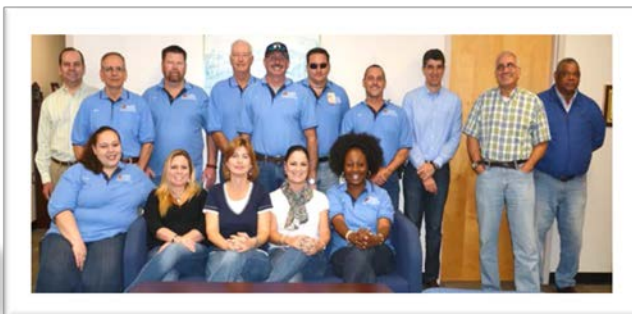
**Team Players**



MSBU Staff



Drainage Crew



ADMINISTRATION

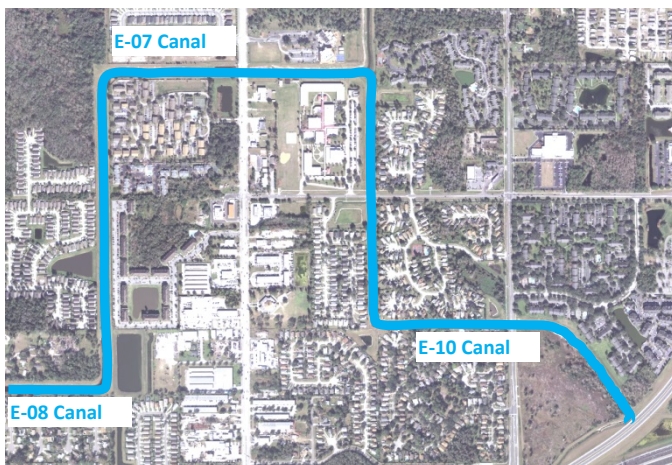


## PRIMARY SYSTEM - OPERATIONS

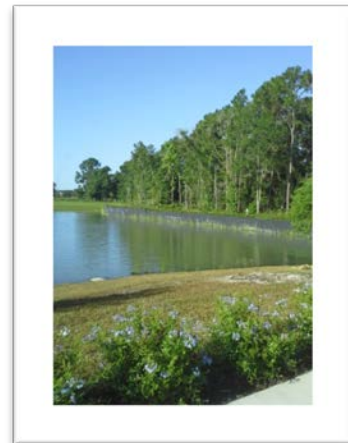
Among the primary responsibilities of the Stormwater Management Division is the proper maintenance of Orange County's primary stormwater system. The primary stormwater system consists of lake to lake connections, large canals, regional and subdivision ponds, drainwells, pump stations, and control structures. Maintenance of the primary system is crucial for the proper flow of water during normal conditions, but most importantly during large storm events. A properly working stormwater conveyance system is essential to eliminate potential flooding problems, be it nuisance flooding or structural flooding.

The primary system maintenance is under the care of highly dedicated individuals with intimate knowledge of the system. Maintenance personnel include coordinators, foremen, senior foremen, chemical spray technicians, equipment operators, and maintenance persons. Specialized crews include pump station operators and drainwell leaders.

The division's maintenance responsibility is shared between the Drainage Section and the Municipal Service Benefit Unit Section (MSBU). Primary system maintenance consists of removal of any blockages along the system, repairs of canal and pond banks, repairs of pump station equipment, and the operation and repair or replacement of control structures and drainwells. Auxiliary structures and equipment, including access gates and fences, are also maintained to allow for the safe operation of equipment. The MSBU section provides similar maintenance for County stormwater ponds.



**PRIMARY CANALS WITHIN ORANGE COUNTY**



**STORMWATER PONDS**



**LITTLE WEKIVA RIVER CANAL**

## DRAINAGE SECTION

The Drainage Section provides maintenance to County owned portions of the primary system. Maintenance activities are grouped based on which portion of the primary system is being maintained. Primary canal maintenance consists of removal of any blockages along canals, repairs of canal banks, and the repair or replacement of access gates and fences. Removal of sediments and vegetative growth from primary outfall canals is a critical service performed by our crews.



**CANAL BANK RESTORATION**

Areas with limited access or areas with steep slopes are maintained by our hand crews. Maintenance of these hard to reach areas includes fence repairs, mowing, and laying sod.

Stormwater structures, such as pump stations, drainwells, and control structures, are also maintained by the Stormwater Management staff. Staff ensures each structure is operating and maintained as designed.

Pond maintenance crews are responsible for the upkeep of County owned stormwater ponds. Pond maintenance includes mowing, grass clipping removal, brush control, edging, fence and gate repairs, and removal of debris.



**SPECIALIZED EQUIPMENT - AIRBOAT**



**PRIMARY CANAL MAINTENANCE**

The Stormwater Management staff also includes a spray crew. Its main responsibility is to spray canals, ponds, and right-of-way areas to prevent excessive weed and algae growth. The spray section crew is also responsible for the grass carp program.

Due to the large size of the primary system, a portion of the system is maintained with the help of private contractors. These contractors supplement in-house crews. Work performed by contractors is inspected by County personnel to ensure maintenance activities meet the County's high standards.

### Drainage - Quick Facts

Over 240 tons of debris was removed from the primary system in 2014

Over 9,000 acres of land servicing the primary system was mowed during 2014



## MUNICIPAL SERVICING BENEFIT UNIT (MSBU) SECTION

The Municipal Servicing Benefit Unit (MSBU) section provides maintenance to MSBU ponds located within subdivisions of unincorporated Orange County. Maintenance of MSBU ponds includes a broad range of activities. These efforts help restore the ponds to the original design criteria and enhance their structural integrity. Proper maintenance of the ponds ensures adequate storage volumes for flood prevention and control.

MSBU pond maintenance is normally a joint effort between in-house crews and outside contractors. In-house crews regularly perform maintenance activities and inspections of all MSBU ponds to ensure that adequate maintenance is provided. If deficiencies are identified, inspection notes are provided to the appropriate maintenance staff. Routine inspections ensure that

in-house staff  
and contractors  
are providing the  
highest level of  
maintenance.



**MSBU POND BERM REPAIR**

herbicide treatment along fence lines. Fencing along ponds and any inlet or outfall structure servicing the pond are inspected and repaired as necessary.

If a routine inspection reveals that aquatic vegetation covers 15% or more of the pond surface area, a herbicide spray crew is scheduled for aquatic spray control. If 50% or more of the pond surface area is covered by vegetative growth, the pond is scheduled for cleaning, using heavy equipment.

The MSBU section is also responsible for the Grass Carp Program. This program consists of stocking selected ponds with triploid grass carp. This type of carp feeds on nuisance plants thereby controlling excessive aquatic weed growth within the ponds. The grass carp that are used are sterile and unable to reproduce. A permit from the Florida Fish and Wildlife Conservation Commission is required prior to the use of grass carps.



**ALGAE CONTROL SPRAYING**

Among the more common maintenance activities are the removal of sediments and vegetation growth. Slopes and berms may also be reshaped as necessary. Unsuitable excavated material generated from maintenance activities is then transported directly to the landfill.

The maintenance crews are responsible for mowing, litter and grass clipping removal, brush control, edging, and



**STOCKING POND WITH GRASS CARP**

### MSBU - Quick Facts

Over 230 ponds are stocked with grass carp

Over 700 acres of MSBU ponds were sprayed for aquatic vegetation control in 2014

## PUMP STATIONS AND CONTROL STRUCTURES

The Stormwater Management Division maintains 18 pump stations. A pump station is an artificial mechanical system which discharges floodwater against gravity. Pump stations are designed to reduce flood levels and flood duration in low lying areas. A pump station is either equipped with an above or below ground pump, which is powered by either an electrical or diesel motor. These pumps are activated either manually or automatically through the use of a float system. The pumps are activated when the water level exceeds a pre-set elevation. Pump data is relayed via telemetry and alarms are sent to staff.

Pump stations are maintained on a biweekly schedule to ensure that they are fully operational. Maintenance activities include: cleaning debris from intake screens, removing sediment build-up in the intake area, repairing the security fencing, and repairing embankment and erosion failures. Pump station oilers are filled, motors and back-up generators are run and inspected, outlet pipes are cleaned, and all building and access areas are inspected and maintained.



**PUMP STATION MOTORS**



**GENERATORS**

Stormwater Management maintains 52 major drainage control structures. A control structure is a man-made structure designed to regulate water flow through rivers, canals, and to control lake water levels. Proper design and maintenance of control structures helps to reduce flooding impacts to downstream areas, including residential, commercial, and natural systems. Examples of control structures maintained by Stormwater Management include dams, weirs, and gate valves.

Control structures are regularly inspected, maintained, and

repaired to ensure

proper operation and function of the structure.

Maintenance operation consists of mowing, debris and sediment removal, embankment and slope repairs, and structural repairs.



**CONTROL STRUCTURE**

### Pump Stations & Control Structures - Quick Facts

**18 Pump Stations and 52 Control Structures are maintained by Stormwater Management**

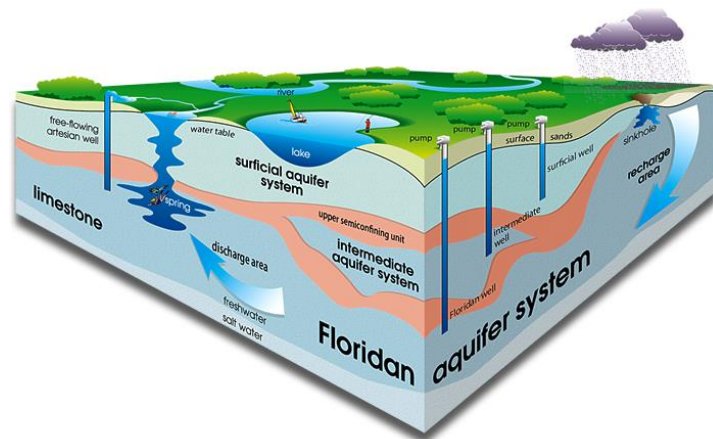
**Pump Station are being upgraded and integrated with our Rainfall Monitoring Program to use telemetry to send data in "real-time"**

## DRAINWELL REPLACEMENT PROGRAM

The main source of water for most residents of central Florida comes from the underground aquifer known as the Floridan aquifer. Aquifers can be thought of as vast underground, porous rocks that hold water and

allow water to move through cavities within the rock. Aquifers are typically composed of different types of earthen materials, such as sand, shell and rock. The Floridan aquifer system is made up of a sequence of voids, permeable limestone and dolomite rocks.

The Floridan aquifer is among the highest producing aquifers in the world and stretches over a vast portion of Southeastern United States. The aquifer is found throughout Florida, southern portions of Alabama, South Carolina, and



Georgia. The thickness of the aquifer varies from about 250 feet in Georgia to about 3,000 feet in south Florida. The Floridan aquifer system has been divided into an upper and lower aquifer separated by a unit of less permeable rocks.

The water stored in the aquifer is replenished, or recharged, by infiltration of rainfall into the ground. Stormwater drainwells contribute to ground water recharge by providing a connection from the ground surface to the upper aquifer.

Nationwide, there are over 70,000 stormwater drainwells. Approximately 2,000 drainwells are in Florida. Currently, there are 80 active drainwells being maintained within unincorporated Orange County.



**DRAINWELL ACCESS VAULT**

### Drainwells - Quick Facts

Drainwell diameters range from 6" to 20"

6 drainwells were replaced in 2014

52 drainwells have been replaced out of a total of 80.

Drainwells can clog due to leaves, grass, litter, and sedimentation.

The first drainwell in Orange County was drilled in 1904 with the highest number of drainwells drilled in 1960 following Hurricane Donna. Drainwells are essential to help alleviate flooding, recharge the aquifer, and control lake levels.

Stormwater Management Division is responsible for the maintenance of 80 drainwells. Drainwells are inspected biweekly for clogging and structural damage. When a drainwell is not working as designed, it is cleaned and video logged in order to evaluate the well's condition. A determination is made whether a replacement well is needed.

The replacement of a well follows strict guidelines set by the Florida Department of Environmental Protection. Some guidelines include a potable well inventory within a 1-mile radius of the replacement well, a monitoring plan, and sampling and testing of the injected water for contaminants.



## CONTRACT ADMINISTRATION SECTION

The Contract Administration Section of the Stormwater Management Division is responsible for managing ten term contracts. These term contracts are used throughout Orange County for maintenance of the primary drainage system. The Contract Administration Section is also responsible for inspecting all work performed under the term contracts.

Term contracts include items required for proper maintenance of the primary drainage system. Some of the items included are: installation and repair of fences, tree trimming, sod placement, mowing, control structure repairs, and general maintenance of retention ponds and canals.

In 2014, Stormwater Management inspectors performed over five thousand inspections. Stormwater Management inspectors ensure that work contracted to a private company meets the strict guidelines set by Orange County.



**INFRASTRUCTURE REHABILITATION**



**NEW FENCE INSTALLATION**

Many of the County maintained ponds are enclosed by fences, which serve as a safety barrier to separate residential and commercial property from County property. Fences that have deteriorated overtime or are damaged are replaced. Over twelve thousand linear feet of fence work was completed in 2014.

Tree maintenance is an important service provided by Stormwater Management. Tree contractors ensure that trees are properly trimmed. This protects power lines, eliminates overhanging branches over private property, and along pedestrian paths and walkways.

Unhealthy trees due to age or damage are inspected and replaced as necessary. Stumps are grinded and debris is removed.



**TREE TRIMMING OPERATION**

### Contracts Administration – Quick Facts

Over 5,300 inspections were conducted during 2014

12,000 linear feet of fences was installed in 2014

9300 acres were contractually mowed in 2014

379 Delivery Orders were completed in 2014

## NATIONAL FLOOD INSURANCE PROGRAM (NFIP) & COMMUNITY RATING SYSTEM (CRS)

### NFIP

To better serve its residents, Orange County participates in the National Flood Insurance Program (NFIP). Orange County began participating in the NFIP program in the late 1970's. Orange County's participation in the NFIP is managed by the Stormwater Management Division.

The NFIP is a Federal program managed by the Federal Emergency Management Agency (FEMA). The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a program enabling property owners in participating communities to purchase flood insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages.



FLOODPLAINS FORM AN IMPORTANT PART OF A SUSTAINABLE COMMUNITY

Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

### CRS

FEMA also developed a second program named the Community Rating System (CRS). The CRS is a program implemented to reward communities which undertake floodplain activities beyond NFIP requirements. The CRS is an incentive based program where points are awarded for various activities. The greater the number of activities and points earned by a community, the greater the reduction in flood insurance premiums for its residents.

#### NFIP & CRS Quick Facts

Orange County is ranked among the top 4 % of participating communities nationally.

There are approximately 13,000 NFIP policies in effect in Orange County.

Due to Orange County's efforts, residents are saving a combined total of \$800,000 per year on insurance premiums.

There are currently 1,211 communities nationwide participating in the CRS program. 216 in Florida.

329 floodplain permits were issued by the Stormwater Management Division in 2014.

Orange County began participation in the CRS program in 1991. Through its effort, Orange County has currently earned enough CRS points to be awarded a Class 5 rating. The CRS Class 5 rating means that residents of Orange County are receiving a maximum discount of 25% on their flood insurance premium. Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from Stormwater Management's efforts. Stormwater Management works to meet the goals of the CRS. These goals include reducing flood losses, facilitate accurate insurance ratings, and promote the awareness of flood insurance.



## RAINFALL MONITORING PROGRAM

Orange County's Rainfall Monitoring Program was initiated in 1986 and has been operated and maintained by the Stormwater Management Division since the program's inception. Orange County's rainfall network consists of fourteen monitoring stations that are strategically located to maximize coverage of the County.

Orange County is divided into a total of twelve major drainage basins. The rainfall monitoring network records data in ten of these basins (Big and Little Econlockhatchee Rivers, Howell Branch, Little Wekiva River, Shingle Creek, Boggy Creek, Lake Apopka, Cyress Creek, Lake Hart, and Reedy Creek basins). All fourteen sensing stations collect rainfall data. Twelve of these stations also record water stage levels.

The rainfall monitoring network has been improved throughout the years to its current "real-time" configuration. All information is transmitted from each field monitoring station via radio telemetry or cellular connection to give a true "real-time" network. With this technology, it is possible to monitor each station from the Stormwater Management Division office and address any problems as they occur. With the implementation of "real-time" rainfall data acquisition, the rainfall program has benefited from more accurate data, faster reporting, and more efficient data storage and analysis. Data is automatically retrieved and transferred to a database that is used to publish a monthly rainfall report summarizing daily totals of rainfall, average flow, and average stage elevation. At the end of each calendar year, the rainfall data is summarized in a yearly report.



TYPICAL RAINFALL STATION EQUIPMENT



VISTA DATA VISION – RAINFALL SENSOR MANAGEMENT

Stormwater Management continually strives to enhance the rainfall monitoring program. Stormwater Management is currently investigating the feasibility of making rainfall data publicly available through the internet using Vista Data Vision software. Stormwater Management is also coordinating with the Environmental Protection Division to investigate the possibility of relocating some gauging stations to collect water quality data in addition to rainfall data at critical locations within Orange County.

means of recording rainfall during natural emergencies (i.e. hurricanes). In addition, collected rainfall data has been successfully used to aid in hydrologic modeling for the design of capital improvement projects undertaken by the Stormwater Management Division.

The rainfall monitoring program has benefited Orange County and its residents by having an accurate and reliable

### Rainfall Program Quick Facts

14 rainfall monitoring stations in operation

Rainfall stations transmit data in "real-time"

Rainfall stations being gradually upgraded to transmit via cellular network

## DRAINAGE MASTER PLAN UPDATES

In the late 1980's, the Stormwater Management Division initiated a program to study the major drainage basins of Orange County. Prior to this effort, only limited data was available. A Stormwater Management Master Plan was prepared for each major drainage basin studied. Stormwater Management Master Plans are comprehensive studies which inventory drainage structures, document flooding problems, analyze drainage patterns, and identify deficiencies in the conveyance system. Master Plans also provide recommendations to remedy any identified deficiency.

Stormwater Master Plans have been an invaluable tool for planning of capital improvement projects designed to alleviate flooding. However, existing Stormwater Master Plans are now between 10 to 20 years old. The development boom experienced by Orange County during this time period has dramatically altered the drainage patterns first documented in the Master Plans. Due to these changes, existing Master Plans no longer accurately reflect current conditions.

In 2014, a multi-year effort was initiated to update the Master Plans to reflect existing conditions. Geographic Information Systems (GIS) technology is being used to store and analyze spatial information obtained from multiple sources, including topography, soils, land use, jurisdictional boundaries, permit information and other hydrological features.

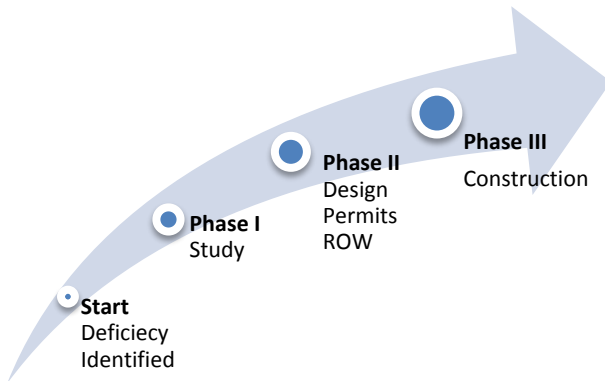
When completed, the updated Master Plans will provide a more complete understanding of how the primary stormwater system functions, including interactions between lakes, ponds, canals, pump stations, drainwells and groundwater.



MAJOR DRAINAGE BASINS WITHIN ORANGE COUNTY

## CAPITAL IMPROVEMENT PROGRAM

One of the primary duties of the Stormwater Management Division is the implementation of our capital improvement project (CIP) program. Stormwater CIPs are projects designed to improve the existing primary drainage system. CIPs often replace or improve old stormwater drainage systems to reduce the risk of flooding or improve stormwater conveyance. CIPs can range from small projects, such as a culvert replacements and bank regrading, to regional wide improvements.



A typical CIP project includes three distinct phases. Phase I, or Study Phase, consists of assessing flooding and developing stormwater improvement alternatives. In Phase II, or Final Design, plans and specifications are developed, permits are obtained for the recommended improvement alternative, and right-of-way/easement is acquired. Phase III involves construction of the selected alternative.

During 2014, over thirty CIP projects were being managed by Stormwater Management Division. The various CIPs were at different phases. 2014 saw the construction of four major CIP projects. Nine CIP projects progressed to their design phase. Fifteen new CIP studies were either initiated and ten were completed during 2014.



**BANK REGRADE AND REPAIR**



**CANAL REHABILITATION**

CIP Program - Quick Facts	
4 CIP projects were constructed in 2014	
9 CIP projects progressed to Phase II design in 2014	
10 CIP project studies were completed in 2014	
15 CIP studies were initiated in 2014	



**DRAINAGE STRUCTURE CONSTRUCTION**



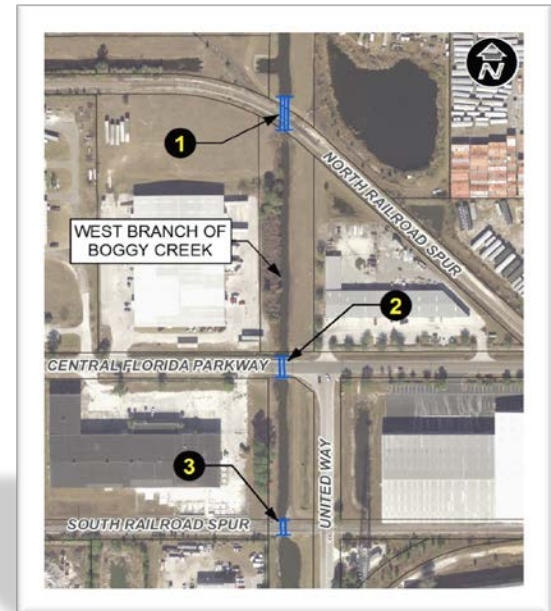
## CAPITAL IMPROVEMENT PROGRAM – PROJECT HIGHLIGHT

The Regency Industrial Park area is located in the southcentral portion of Orange County. The project area is located just east of the Florida Turnpike and west of Orange Avenue. Regency Industrial Park is characterized by large number of warehouses and commercial buildings. The major hydrologic feature in the area is the west branch of Boggy Creek.

Historically, several locations along the project area had experienced flooding following moderate to severe storm events. The area surrounding the intersection of Boggy Creek (West Branch) and the Central Florida Parkway was most susceptible to flooding. The reason for the flooding was due to three undersized culverts that could not adequately convey stormwater runoff.

Stormwater Management completed a study to investigate the cause of flooding and evaluate alternatives to minimize or eliminate the flooding. Due to the high cost of available alternatives, Orange County applied for and obtained grant funding through FEMA's Hazard Mitigation Grant Program (HMGP). A sub-grant agreement with FEMA, through the State of Florida's Division of Emergency Management (DEM), was reached and funding totaling \$1.25 million was obtained for this project.

The project involved the replacement of three existing culverts to improve conveyance and reduce flood stages. The project was complicated by the fact that the surrounding businesses had daily commercial traffic. Two of the three culverts replaced were along a CSX train spur that was in active use. Careful coordination was required between all agencies and owners. 2014 saw the successful completion of the Regency Industrial Park project.



REGENCY INDUSTRIAL PARK – CULVERT LOCATIONS

### Regency Industrial Park – Flooding





### Regency Industrial Park - Improvements

In order to minimize future flooding occurrences, the existing culverts serving the area were replaced.



Before – Existing double 48in culverts at southern railroad spur.



After – Double 10ft x 5ft concrete box culverts.





Before – Existing double 77in x 52in culverts at Central Florida Parkway.



After – Double 10ft x 5ft concrete box culverts.



Before - Existing 48in steel culverts at railroad crossing.



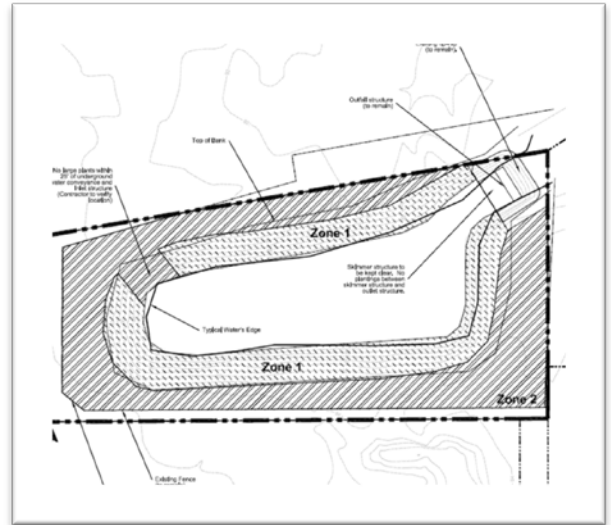
After – Large 10ft x 5ft concrete box culvert installed.

## POND SUSTAINABILITY

As part of Stormwater Management's continuing effort to efficiently maintain the primary system, a new pond maintenance approach is being studied. The purpose of the project is to reduce pond maintenance expenditures by decreasing the need for routine mowing and spraying activities.

Traditional maintenance methods require the application of large quantities of chemicals and placement of sod. In contrast, pond sustainability incorporates the planting of locally appropriate vegetation or encouraging existing native plantings to spread within each pond site. A successful vegetative implementation is achieved when the cost benefits due to savings in routine maintenance exceed the initial capital costs of pond vegetation planting.

The first phase of this project was to analyze six example ponds, MSBU and non-MSBU. The pond locations were selected to be representative of the varied conditions existing throughout the County. Results from the study indicate that pond sustainability is a viable option and will provide financial benefits. However, these financial benefits may take approximately seven years to



**POND PLANTING SCHEME**



**NATIVE PLANT OPTIONS**

materialize. The primary reason for the delayed financial benefits is the high initial capital cost of replacing existing sod with the appropriate vegetation. The study also cited that in addition to the monetary savings in maintenance costs, environmental benefits may be realized. Examples of potential environmental benefits include enhanced water quality, opportunities for recreational activities, and value of littoral wetlands to local habitat.

The analysis results indicated the pond vegetation concept is feasible in approximately 86% of existing ponds when only considering maintenance avoidance costs. This number increases to 99% when incorporating all environmental benefits.

The second phase of this project will involve a pilot project consisting of the planting of select vegetation on a specific number of ponds. The selected ponds will require a multi-year monitoring effort to confirm the initial findings of the study. Potential overall savings, if implemented on all applicable ponds countywide, could be in the order of \$20 million dollars over a 10 year period.



**NATIVE PLANT OPTIONS**

## BATHYMETRIC PROJECT

In order to improve maintenance efforts and comply with water management permits, Stormwater Management initiated a bathymetric survey of County maintained wet ponds. Currently, no bathymetric data is available to determine sedimentation build up, which hampers the proper operation of wet ponds. The bathymetric survey will be conducted by the University of South Florida (USF). The project was initiated in 2014 with an expected completion date of 2017. The bathymetric survey will include data for over 1200 ponds.

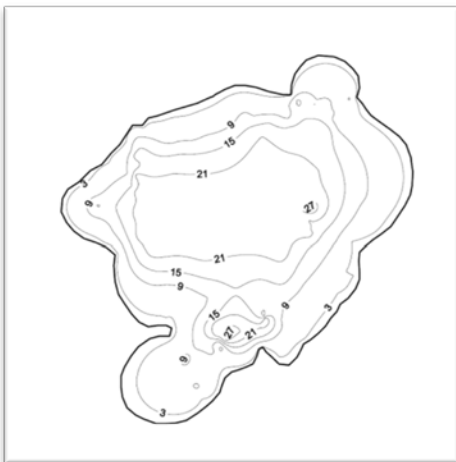
Bathymetry is defined as the measurement of water depth at various locations in a body of water. A bathymetric map is similar to a contour map in that it shows the relative gradient of elevations. In making a bathymetric map, a recording sonar depth finder is used along with a global positioning system to accurately map the location and depth of each reading. USF uses bathymetric mapping equipment operated from small boats. This provides for easier maneuvering and quicker set up time.

A typical bathymetric mapping operation begins with the researcher mapping a course around the perimeter of a lake.

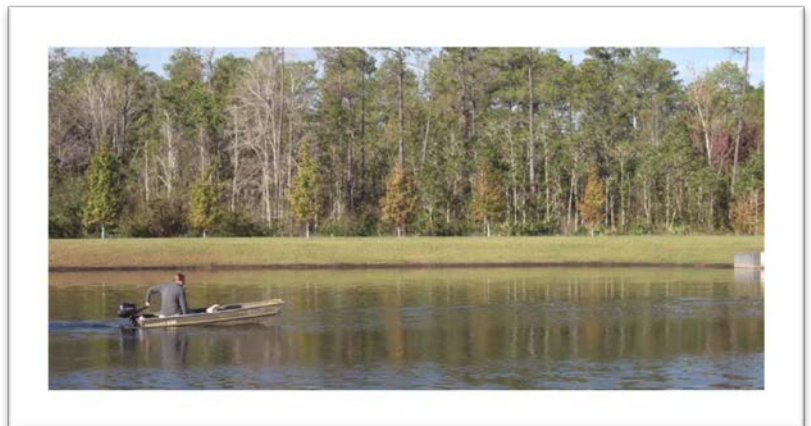
The researcher then navigates parallel transects using the depth finder to store various depths of the lake in a consistent pattern. This recorded data is then reviewed, analyzed, and processed to create a three-dimensional dataset. This dataset is used to create detailed one-foot bathymetric map. Since the water level of a lake changes over time, bathymetric maps should indicate the lake level at the time it was made.



1' BATHYMETRIC MAP WITH AERIAL MAP



1' BATHYMETRIC MAP



USF PERSONELL CONDUCTING POND MAPPING



## 2014 ACCOMPLISHMENTS

### Drainwell Replacement Program

#### Constructed (6)

- Lake Hourglass
- Ohio Street
- Cambridge Avenue
- Lake Jessamine
- Ben Hogan
- Lake San Susan

#### Under Construction (3)

- Little Lake Fairview
- Lake Fair
- Lake Pineloch

#### Final Design (1)

- Lake Serene

#### Preliminary Design (1)

- Lake Page

#### Engineering Evaluation (2)

- Lake Hubbard
- Lake Florence

### Capital Improvement Program

#### Constructed (4)

- Regency Industrial Park – HMGP Grant Project
- Powers Drive
- Randolph Avenue
- Evergreen Park

#### Under Design (9)

- Little Wekiva River Restoration at Kathleen Drive
- Little Wekiva River Restoration at Edgewater Drive
- Peppermill Pond
- Estates Lake Clarice Pond

- Meadow Woods Pond
- Hansel Road Pond
- Belmont Estates
- Fairvilla Park Outfall
- Full Sail Pond

#### Flood Management Studies Completed (10)

- Master Plan Assessment
- Stormwater Needs Assessment
- Riverdale Road
- Irwin Manor
- E-1 Canal Crossing
- Woodsmere Pump Station
- Orange County Industrial Park
- Pond Sustainability
- Stormwater Pond Permit Inventory
- Orange County Lakes Fact Sheets

#### Studies in Progress (15)

- Boggy Creek Watershed
- Shingle Creek Watershed
- Little Econ Watershed
- Big Econ Watershed
- Little Wekiva Watershed
- Big Wekiva Watershed
- Lake Hart Watershed
- Reedy Creek Watershed
- Lake Apopka Watershed
- Cypress Watershed Watershed
- Westside Manor Pump Station
- Bonnie Brook Pump Station
- Verona Park Pump Station
- Swann Lake Pump Station
- West Orange Townhomes

#### Surveys in Progress (10)

- Boggy Creek Watershed - Hydraulic Feature Inventory
- Shingle Creek Watershed - Hydraulic Feature Inventory
- Little Econ Watershed - Hydraulic Feature Inventory
- Big Econ Watershed - Hydraulic Feature Inventory

- Little Wekiva Watershed - Hydraulic Feature Inventory
- Big Wekiva Watershed - Hydraulic Feature Inventory
- Lake Hart Watershed - Hydraulic Feature Inventory
- Reedy Creek Watershed - Hydraulic Feature Inventory
- Lake Apopka Watershed - Hydraulic Feature Inventory
- Cypress Watershed - Hydraulic Feature Inventory

#### **Floodplain Management Program**

- FEMA CRS Audit completed.
- Lake Pinto LOMR
- 350 floodplain determination requests were completed.
- 329 floodplain permit applications were reviewed and issued.
- 10 FEMA Letter of Map Revision applications were reviewed and approved.
- Over 35 projects were reviewed for floodplain impacts.

#### **Rainfall Program**

- Published (12) Monthly Rainfall Reports
- Published 2013 Annual Report
- Upgraded rainfall station radio modems to digital cellular modems (8 of 14).
- Purchased rain gauges to be installed at (14) pump station telemetry locations.

#### **Maintenance and Operations**

- 80 drainwells, 52 control structures, and 18 fixed pump stations were maintained.
- Over 12,000 linear feet of fence were installed or repaired.
- 241 tons of trash and debris was removed from the primary system.
- Over 9,000 acres of land servicing the primary system was mowed.
- Over 11,000 acres of land within MSBU ponds was mowed.

- Spraying to control excessive aquatic vegetation was applied to 2,262 acres of the primary system.
- Spraying to control excessive aquatic vegetation was applied to 733 acres of areas within MSBU.
- Removal of sediment, trash and vegetative growth was completed over 132,000 square feet of the primary system.

#### **Miscellaneous**

- Developing Web-based viewer for watershed study/survey information
- Developing pond mowing contracts GIS layers
- Developing Watershed Atlas Map of County's Primary Drainage System
- Developing Pond Fact Sheets



## STORMWATER MANAGEMENT DIVISION STAFF

2014 was a successful year for the Stormwater Management Division due to the significant participation and contribution of its staff members. Special thanks and appreciation is extended to all the individuals listed below for providing their valuable time, effort, and expertise.

Administration Staff				
Rodney Lynn Mirian Haughee Giselle Velazquez	Mike Drozeck Frank Fortunato Liliana Ramirez Kelly Nowell	Daniel Negron Grace Chua Corn Patrick Ford Christina Alvan	Penny Post Yvette Caldwell Michael Church Jim Ingle	Dennis Godwin Michael Watts Jeff Charles
Heavy Equipment				
Michael Hargis Mark Boger Kenneth LaFleur	Jose Garcia Justin States	Michael Kelly Daniel Watson	Allen Middlebrook Larry Norman	Andre Price Isaac Estes
MSBU				
Maria Deal Lenny Malecki James Rotolo Lester Canada Carlton Davidson Derrick Pollard Rupert Cameron	Ivory Sneed Luis Torres Jamey Arnett Robert Hawley Israel Calhoun Israel Quinones Timotheus Byrd	Hector Martinez Charles Figueroa Leroy Cameron Warren Owens Dalton Edwards Caridff Denton	Elliot Ruiz Anirood Rambhacus David Felder Christopher Ballou Shannon Morris Jerry Foster	Ferdinand Salicrup Zachary Martin Freddie Ryles Aaron Church Pacer Holley Brithen Montgomery
Drainage Section				
David McMullen Guy Rocca Steven Lehoist Robert McGrath Deandre Ryles Daniel Miller Jeffrey Beaudin Christopher Glock	Jesse Bishop Herson Rodriguez Michael Mellow Randall Sullivan Alexis Lopez Daniel Anderson Kristopher Mason	Lee Owens Reginald Peoples Bernice Welch Alan Hughes Marcus Holton Calvin Barnes Andre Henry	Prisciliano Huerta Nathan Jackson  Stephan Dodd Derrick Scott Luis Soto-Aleman Arnoldo Velasquez	Mark Herrmann Jose Diaz- Diaz Derric Eccelston Maurice Haywood Jason Horton Roscoe Reed Scott Schroeder

## ORANGE COUNTY GOVERNMENT

The Stormwater Management Division would like to thank the Mayor, Board of County Commissioners, and administrative staff for their continued support as we strive to serve Orange County residents and visitors.



Orange County Mayor  
Teresa Jacobs

District 1 - Commissioner  
S. Scott Boyd

District 2 - Commissioner  
Bryan Nelson

District 3 - Commissioner  
Pete Clarke

District 4 - Commissioner  
Jennifer Thompson

District 5 - Commissioner  
Ted B. Edwards

District 6 - Commissioner  
Victoria P. Siplin

County Administrator  
Ajit Lalchandani

Assistant County Administrator  
Office of Regional Mobility  
Jim Harrison  
Chris Testerman

Public Works Department Director  
Mark V. Massaro, P.E.

Public Works Department Deputy Director  
Joe Kunkel, P.E.

Stormwater Management Division Manager  
Rodney J. Lynn, P.E., CFM