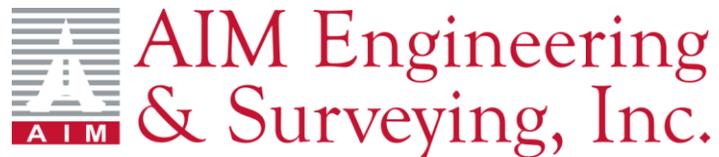


City of Cape Coral
Stormwater Master Plan – Phase II
May, 2015

Executive Summary



Together With:



The City of Cape Coral (City) is one of the largest strategically planned communities in the State of Florida. In forecasting the future stormwater demands of the City, the City's Stormwater Master Plan (SMP) is divided into two phases. The first phase, completed in 2012, focused on the Northwest quadrant of the City. The second phase, completed by AIM Engineering and Surveying in 2015 consists of three parts:

1. Development of City-Wide model of the primary conveyance system, including canals, weirs and interconnecting structures and assess needs for system improvements,
2. Establishment of a Water Quality Management Plan and propose initial Best Management Practice (BMP) projects improve water quality, and
3. Review the City's Stormwater Maintenance Master Plan (SMMP), prepared by Public Works Staff.

Part One

AIM and ADA Engineering, in partnership with City staff developed a regional model of the City of Cape Coral's primary conveyance system. The MIKE SHE/MIKE 11 integrated surface-groundwater modeling tool was utilized to develop the regional model, which included the City's canal and water control structure system, as well as contributing watershed areas outside the limits of the City which interact with the City's system. The model domain covers 520 square miles, which includes the City, Yucca Pens Preserve, and the Fred C. Babcock/Cecil M. Webb Wildlife Management Area. This detailed model configuration accounts for structures controlling the flow of water, connection to groundwater, topography, land use/vegetation, rainfall, irrigation, evapotranspiration, lateral inflow from groundwater, pump and transfer stations, and subsurface properties. A large field surveying effort captured and/or verified dimension, elevations, and other properties of major canals and City water control structures.

The calibration period (2012) of the model utilized available City measured and recorded data from 2012. Then, 2013 data was used to validate the model's calibration. Once calibrated to a satisfactory correlation variance given the data provided, a series of design storm simulations were developed, implemented, and analyzed to determine the performance of the City's primary canals and water control structures within the various Basins. The results from 25-year design storm analysis were used to compare the maximum water elevation at the weirs to the road elevations to estimate flooding extent within the basins. Weirs 1 and 20 (basins 15 and 18 respectively) demonstrated a greater total length of roads flooded compared to the other basins. Therefore, three structural design modifications (scenarios) were proposed and modeled for both Weir 1 and Weir 20 with varying degrees of cost and peak stage reduction. In addition, a separate analysis determined which basins within the City might provide additional water storage during storm events by raising the existing operable structure crests. The results show Basins 1 through 10 provide greater potential for additional water quality storage and water supply without significantly increasing flooding during storms if weirs are raised.

The Stormwater Model Report demonstrates that the City's primary canal and water control structure system functions well during a 25-year design storm event. The majority of reported flooding issues within the City appear to be caused by secondary drainage system issues, such as areas with low elevations, insufficient pipe sizes or blocked pipes, or areas significantly distant from primary drainage canals. Using boundary conditions from the City -wide model secondary flooding issues were evaluated in three sub-basin areas using Ad-ICPR. The results are summarized in the Hydraulic Analysis Summary Report included herein.

Part Two

The City established water quality improvement requirements through the National Pollutant Discharge Elimination System (NPDES) Municipal Storm Sewer MS4 Permit (MS4 Permit) requirements and the Caloosahatchee Estuary Basin Management Action Plan (BMAP) adoption. In Part 2 of the SMP, AIM teamed with Tetra Tech to develop a Water Quality Management Plan for the City to show continuous progress towards meeting water quality goals in the most cost effective manner possible. The Water Quality Management Plan positions the City to coordinate with state and federal agencies and to successfully apply for grant funding by providing a scientific, measureable basis for gaining project credit on the MS4 Permit and BMAP. Enhanced understanding of the water quality issues within the watershed, recommended Best Management Practices (BMPs), and the creation of available lower-cost water quality options were also developed.

Twelve BMP concept plans including street sweeping, wet ponds, bioretention, dry swales, stormwater wetland, filter marshes, and bioswales were modeled for the City's use in meeting established water quality targets and in pursuit of other funding sources. The 12 conceptual designs included in this report were chosen through a robust screening process. In the initial step, the team established selection criteria to pair potential BMPs with potential sites. The first screening looked at 38,000 potential sites. A three prong selection process narrowed the potential locations to 120 sites. These sites were then field evaluated to select 15 candidate sites and identify each site's most appropriate BMP for computer modeling. Additional BMP implementation areas identified through collaboration with the City included other technical and community planning selection factors. After the modeling determined the potential load reductions and potential effects of implementation for each site, AIM prepared conceptual design plans with associated cost opinions for 12 of the most cost effective sites.

The City continues to take significant steps towards improving water quality throughout the City, making progress toward meeting the goals of the Caloosahatchee BMAP. AIM recommends the City claim credit for current efforts including septic tank to sewer conversion, street sweeping and BMP maintenance activities, as well as total nitrogen removal in freshwater canal systems controlled by weir structures. Claiming credit for current City initiatives, along with phased implementation of the conceptual and distributive BMP plans, equips the City with a defensible means of demonstrating progress toward meeting water quality goals.

Part Three

In Part Three, AIM reviewed the City's Stormwater Maintenance Master Plan document (SMMP) prepared by City Public Works staff. This SMMP identifies and quantifies operation and maintenance practices including maintenance activities and schedules, life expectancy of facilities, and staffing needs. AIM reviewed eleven maintenance activities to evaluate each area's level of service, correlation with other City plans and ordinances, life expectancy, proposed maintenance activities and schedule, consistency with applicable permitting criteria, and comparison to other similar municipality planning documents.

Overall, the City's SMMP is robust and proactive in planning efforts and demonstrates that the Public Works Department performs activities necessary to maintain the stormwater management system. AIM provided recommendations to enhance the SMMP, including expanded background narrative section(s), enhancement of the GIS database, methodologies to increase certain field staff efficiencies, and the preparation of a maintenance manual to promote consistency of activities.