



City of Miami Department of Resilience and Public Works Stormwater Management Program

Program Description

Just over 56.6 square miles, the City of Miami has more than 471,000 residents with \$53B in property value. One of the country's most vulnerable coastal areas, Miami experiences risk from king tides and tidal flooding, sea level rise, tropical storms, and increased precipitation. The Department of Resilience and Public Works has responsibility for the waterfront, stormwater and drainage systems, pump stations, canals, and roadways. The Engineering Division's Stormwater-NPDES Section has 22 employees to administer Florida Department of Environmental Protection NPDES permit FLS000002-04, while the Operations Division's Stormwater Section has 10 employees to maintain the stormwater system.

The Department's overall \$56.4M annual budget is partially funded through a stormwater utility fee that collects \$14.4M annually. In 2020, \$9.9M was spent on stormwater capital improvement projects (includes Miami Forever Bond funding). The fee is currently assessed at \$3.50 per Equivalent Residential Unit (ERU).



The Department's Strategic Plan includes goals to improve the Stormwater System through drainage enhancements and system investments, enhanced compliance with the Municipal Separate Storm Sewer System (MS4) permit to meet National Pollutant



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Discharge Elimination System (NPDES) responsibilities, and reduce the number of areas impacted by chronic flooding. The Stormwater Management Program is key to achieving this goal. It prioritizes capital infrastructure improvements while the department modernizes to become more efficient in permitting, management, and maintenance of stormwater assets. Residents passed the Miami Forever Bond in 2018, providing \$400M for resilience projects. Focusing on modernization, integrated resilience and adaptability planning, and environmental quality within the program will ensure cleaner waterways and enable the City to meet the future needs of a vibrant global city.

The Stormwater Management Program consists of:

- Stormwater Master Planning, using modeling of watershed basins and integrated sea level rise projections to prioritize citywide long-term solutions and address aging/undersized infrastructure

- Stormwater Improvement Program to design, construct, and upgrade infrastructure to address localized flooding problems



- Implementation of GIS Database & Asset Management Program to proactively manage and maintain stormwater infrastructure

- Maintenance & Operation of 13 stormwater pump stations with corresponding generators and monitoring alarm systems

- Centralized tracking system to monitor flood complaints/issues from residents

- Operational grid system and workorder program to schedule maintenance and repairs

- Street Sweeping Program



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- NPDES compliance and water quality monitoring programs to reduce TMDLs and improve water quality.



- Canal and Navigable Waterway Debris Removal using Scavenger 2000 watercraft to remove trash, debris and hazards from waterways and conduct oxygen injection to improve water quality

- Stormwater Pollution Prevention Plan review and MS4 inspection program to ensure compliance with NPDES permits for all development over ½ acres

- Maintenance and inspection program for major outfalls and seawalls

- Partnership with Miami River Commission to provide environmental education that reduces pollution and promotes cleaner waterways

- King Tide response program to implement short term measures to counter extreme tide events

- One-way tidal valve program to reduce tidally influenced flooding

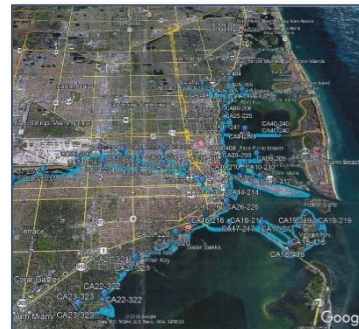
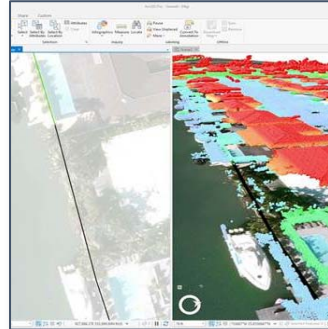
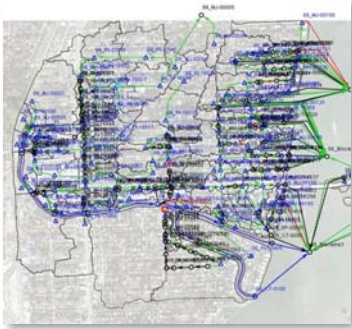
- Beautification program to enhance the City's appearance through well-maintained green spaces along major corridors and medians to include swales, landscaping, trees, and vegetation



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Stormwater Master Plan. The city has spent more than two years updating its stormwater master plan. This project digitized more than 33,000 plan sheets of existing stormwater drainage systems into digital maps of the system and created a CP-SWMM 1D and 2D model to determine infrastructure needs based on Sea Level Rise, rising water table, and increased rainfall projections, and multiple design storm events. Analysis also included mapping of historic flooding reports, a citywide seawall elevation and condition analysis, updating of design standards, benefit-cost analysis, seawall elevation recommendations, and recommendations for prioritization of projects within a twenty-year projection of Capital Improvement Programming.



Stormwater Design, Construction and Repair Improvements Program. This annual program is for the design, repair and installation of stormwater management systems at various locations, citywide. In response to complaints received by our Department, the program resolves approximately 30 areas of flooding concerns annually using a combination of in-house engineering design and contracted consultants. A contractor then performs construction, including installation of exfiltration trench systems, manholes, catch basins, and cross pipes as well as repair and upgrade of existing stormwater systems. In 2020, \$9.9M was spent on capital improvements, to include the Fairview RD Flood Mitigation project, Tidal Valve Installation project, Jose Marti Flood Mitigation project, NW 17th ST Flood Mitigation project, and numerous other projects.



Seawall Ordinance. The city of Miami has more than 86 miles of shoreline, including 50 miles of seawalls. To prevent flooding due to King Tides and storm surge as 21 to 40" of sea level rise is projected over the next 50 years, city ordinances regarding shorelines are being updated to raise the minimum heights from 3.45 FT to 6 FT NAVD. The program will be implemented over time, as seawalls are replaced in due course or as flooding occurs in neighborhoods due to overtopping, allowing for a systematic raising of seawall heights throughout the city. The city is also advocating for changes to the PACE program to provide financial support to homeowners making improvements to reduce their vulnerability to flooding.

Legislative Initiatives to Reduce Contaminants entering Biscayne Bay: The city enacted ordinances to ban the use of glyphosate products within the Right-of-Way and public parks, restricted use of fertilizers during the rainy season, requires landscape contractor training on Florida-friendly landscaping practices when using fertilizers, and is prohibiting polystyrene product use in parks and other city owned/maintained recreational facilities.



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Curb Inlet Screens – Following a pilot program to assess different technologies, the city funded and is procuring 1000 curb inlet screens to prevent debris and trash from entering the stormwater system in the downtown area. It is expected that these devices will prevent 135,000 lbs of debris (annually) from entering the city’s stormwater management system.



Seawall Condition Assessment Program: This was an internal review of existing conditions of the city’s seawalls to assess the elevations and structural conditions. Assessments are being used to identify and prioritize future improvements required to elevate and repair or replace seawalls and reduce flooding along waterfront areas.



Pump Station and Standby Diesel Generator Maintenance Contracts: The city’s Pump Station maintenance contract provides for regular maintenance of the structural, electrical, and mechanical equipment/components in our 13 stormwater pump stations, consisting of 11 vertical pumps and 19 submersible pumps for a total contract cost of \$1,040,779 per year. The Standby Diesel Generators Maintenance Contract, at a contract cost of \$49,000 per year, provides for regular maintenance of 12 diesel standby generators, ensuring the pump stations are ready and fully operational in case of an electric power loss.





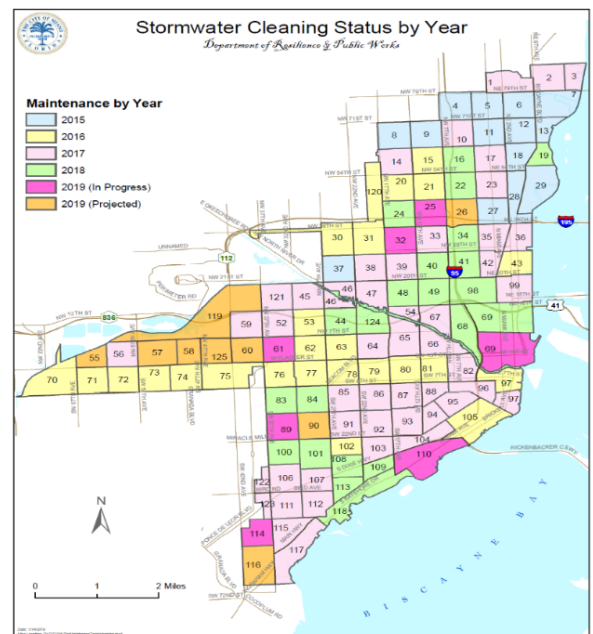
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MS4 Inspection Program: This is an internal program with Engineers and Technicians that are FDEP Certified in erosion and sediment control inspection, performing weekly inspections on 218+ active construction sites of ½ acres or more of total disturbed land. Stormwater Pollution Prevention Plans are reviewed and an NPDES permit is issued to MS4 sites. Prior to obtaining final inspection approvals, the contractor of the MS4 is responsible for cleaning the adjacent stormwater systems with vactor trucks in the presence of an NPDES Inspector to ensure all sediments and contaminants generated by their work is removed from the system.

Citywide Monitoring Program: this is a contract to monitor 33 locations in the city for compliance with their NPDES Permits. The results are analyzed by city staff and submitted to FDEP in the city’s annual report. The parameters are per approved NPDES permit cycle requirements. In 2020, the city added 3 locations at the Little River WBID3287 as part of the newly adopted area for monitoring, cleaning, and inspection of current and anticipated future development. The cost to complete testing and provide the annual report is \$97,000 per year.

Flooding and Illicit Discharge Reporting Tools: The city created two tools to provide for better reporting of flooding and/or pollution incidents. In cooperation with iSeeChange, residents report flooding problems using an app-based platform. Reports are instantly transmitted to operations teams for an expedited response, and they include geotagging, pictures, and detailed descriptions to enable faster and more effective responses to the reported observations. The illicit discharge tool allows residents to report discharging of sediments or other potential contaminants through outfalls into the waterways, allowing inspectors to quickly respond and determine the source(s) of contamination. As appropriate, the violators may be cited, assessed fines, or construction sites issued stop work orders until the NPDES violations are cleared.

Stormwater System Cleaning: In addition to in-house stormwater vactor crews, the city supplements their cleaning efforts with an annual maintenance contract for a contractor to clean/desilt inlets, manholes, crosspipes, French drains, outfalls, covered ditches, weir structures, deep drainage wells, and EcoSense boxes. The city is divided into 123 maintenance grids that are rotated on a 4-year cycle. In any given year, approximately 190,000 linear feet of pipes and 3,800 structures are cleaned at an annual cost of \$1,000,000 per year. In addition, the city maintains a Vactor Truck Decanting Station, located at 1290 NW 20 Street, where the city’s vactor trucks decant, and a contractor hauls away the 20 ft containers full of debris. Approximately 532 tons of debris is removed from this station, annually, at an annual cost of \$63,000.



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Canal Cleaning Maintenance Contract: This contract provides for implementation of a maintenance plan in accordance with the MS4 regulations to clean, inspect, and maintain all canal banks and keep waterways free of litter, debris, and unwanted vegetation. The locations of regular maintenance are Lawrence Waterway, Comfort Canal, Wagner Creek, NE 21 Street Bay Cove, NE 28 Street Bay Cove, Ademar Canal, and Davis Canal. In addition, the contractor removes dead animals and other items illegally dumped in the canals to maintain the condition of water channels to prevent and alleviate severe street flooding. The annual cost of this contract is \$866,286.



Scavenger 2000 Decontamination Vessel Contract: This is an annual maintenance contract for the Scavenger 2000 vessel to decontaminate waterways and use deep injection of oxygen within the waters of the Miami River and all navigable canals, including Biscayne Bay, the American Airlines Arena and Bayfront Park waterfronts, Dinner Key Marina, and more. As a result of this regular cleaning and use of oxygen injection technology, the Department of Environmental Resource Management's water sampling data for oxygen content in the major waterbodies surrounding Miami has shown effectiveness in decreasing the BOD (lack of oxygen) in the region. The annual cost of this contract is \$250,000 per year.



Beautification and Maintenance Contracts: This is a program for the continuous enhancing of the appearance of swales and public Right-of-Way with the installation of native trees, landscaping, and natural features. Community involvement is encouraged through the Adopt a Traffic Circle and Adopt a Median programs.





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Keep Miami Beautiful: This is an ongoing initiative with the Departments of Solid Waste, Resilience & Public Works, and the NET Offices to have street sweeping, hand broom workers remove daily litter and fine sediments from our streets, promoting good best management practices. The removal of fine debris from the curb and gutter and streets is key to decreasing the amount of debris collected in the stormwater system, which ultimately ends up in the outfall discharge points and deposits in our waterways and Bay areas.



King Tide and Tidal Valve Program: This is a new initiative initiated in 2019 to improve the response to King Tides by implementing short term measures for extreme tide events, such as advanced deployment of portable pumps and public notifications of potential flooding events. Additionally, the city has been aggressively installing one-way tidal valves in outfalls through an annual program to reduce tidally influenced flooding. With Capital funds in the city's budget, as well as various grant funds from FDEP, the city has installed 103 tidal valves to date and intends on continuing this effort to ultimately install valves at every outfall in the city's stormwater management system.



Street Sweeping: The city conducts street sweeping 7 days a week using 8 street sweepers to remove trash and debris at an annual cost of \$690,000. In the past year street sweeping vehicles covered 31,000 miles and removed 340 tons of sediment and debris.

