



I-Drive Transit Feasibility and Alternative Technology Assessment

Tradeshow Boulevard
Stormwater Report



March 12, 2021

ABBREVIATIONS

Ac-Ft	Acre-Feet
ADT	Average Daily Trips
cfs	Cubic Feet per Second
DWMA	Donald W. McIntosh Associates, Inc.
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
HGL	Hydraulic Gradeline
ICPR	Interconnected Channel Pond Routing (software)
RCA	Roadway Conceptual Analysis
RCP	Reinforced Concrete Pipe
SFWMD	South Florida Water Management District
USACE	U.S. Army Corps of Engineers
vpd	Vehicles Per Day
VWCD	Valencia Water Control District



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1.0 Introduction

1.1 Background

The International Drive Transit Feasibility and Alternative Technology Assessment (TFATA) will analyze the potential of implementing a premium transit service as an urban circulator operating within the International Drive District (I-Drive District). In addition, the analysis will also evaluate the potential of implementing improvements to Tradeshow Boulevard, to include the provision of additional vehicular travel and transit lanes extending from Destination Parkway to Universal Boulevard.

The purpose of the study is to address increasing transportation needs within the I-Drive District and to implement a sustainable multimodal system that reflects and complements the surrounding environment. The International Drive 2040 Vision Plan approved by the Orange County Board of County Commissioners on February 2016 includes a policy direction intended to further enhance and sustain the economic viability of the International Drive District and the Orange County Convention Center. Carefully planning and designing for an effective premium transit system with multiple transportation modes can achieve the intent and purpose of the Board's policy and will be essential to the existing and future growth of the I-Drive District.

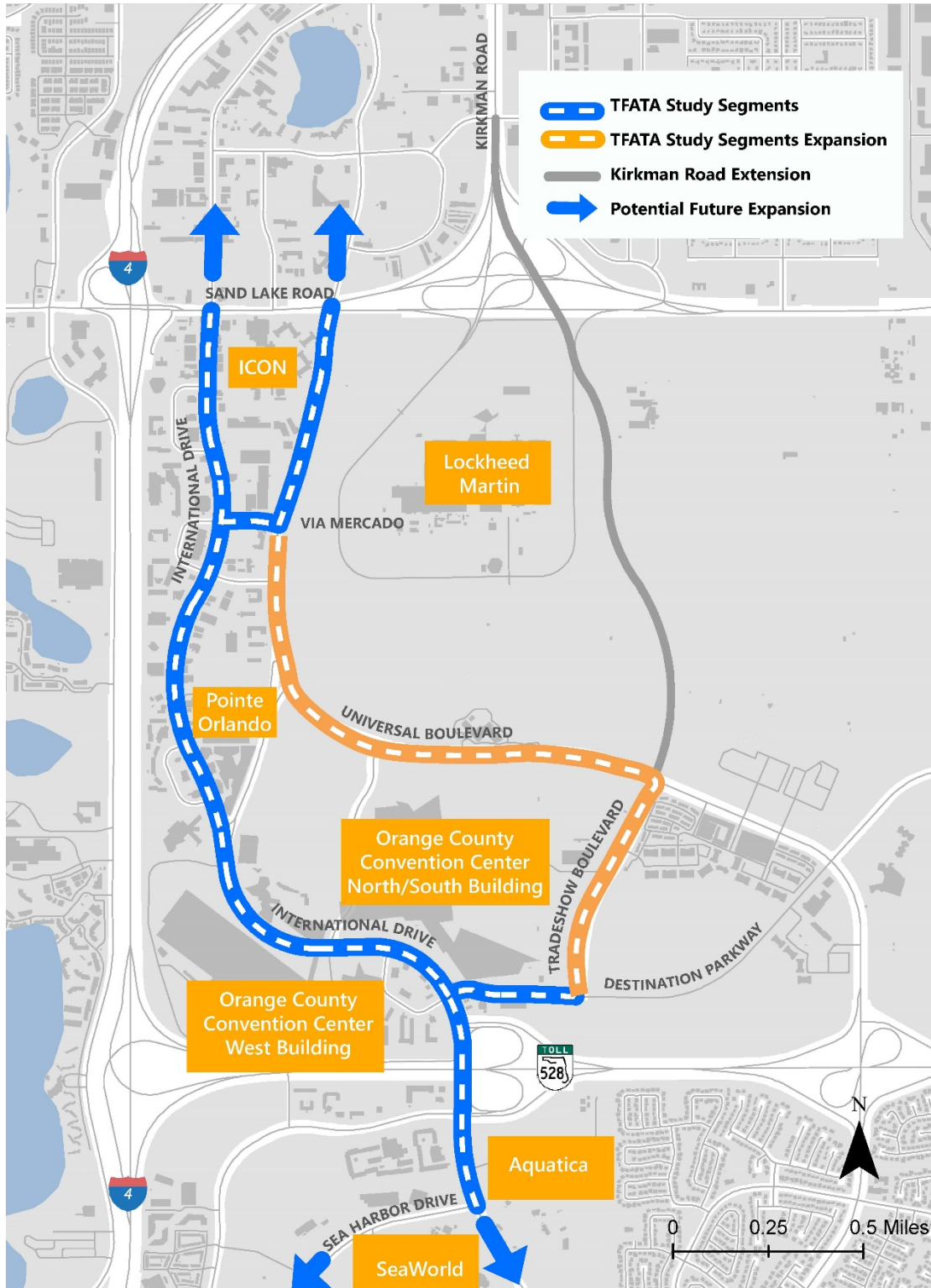
1.2 Study Area

The study area for a potential premium transit service is illustrated in Figure 1, including key roadway segments where the existing I-Ride Trolley operates between Sand Lake Road and Orange County's Destination Parkway Superstop, and continues further south to Sea Harbor Drive.

Roadway capacity improvements for Tradeshow Boulevard are being studied to better manage traffic demand within the study area and in response to the planned Kirkman Road extension. Improvements for Tradeshow Boulevard are being considered from Universal Boulevard to Destination Parkway.



Figure 1 | Study Area



2.0 Existing Conditions

2.1 Hydrologic and Natural Features

2.1.1 Hydrologic and Natural Features

The analysis of the study area hydrology and natural features occurs within Section 36 of Township 23 South, Range 28 East; Section 1 of Township 24 South, Range 28 East; Section 6 of Township 24 South, Range 29 East; and Section 12 of Township 24 South, Range 28 East to include Sea Harbor Drive. The study area occurs within the boundaries of the South Florida Water Management District (SFWMD) in the Shingle Creek watershed. Please note that the stormwater runoff from the study area discharges into the stormwater master system bounded by Sand Lake Road to the north, Shingle Creek to the east, Beachline Expressway (State Road 528) to the south, and Interstate 4 to the west. The study is also located adjacent to the Valencia Water Control District (VWCD). The VWCD boundary begins along the south right-of-way line of State Road 528 and extends southward. However, it should be noted that the existing stormwater management facilities and the drainage conveyance systems associated with this study area do not discharge to the VWCD system.

This environmental review and assessment describe the identification of wetlands, surface waters, floodplains, and potential habitats for protected species. Scientific data obtained and utilized during the data collection phase included:

- U.S. Army Corps of Engineers
- Florida Natural Areas Inventory (FNAI)
- South Florida Water Management District databases
- Florida Department of Environmental Protection
- Florida Land Use and Cover Classification Systems
- Natural Resources Conservation Service
- Federal Emergency Management Agency (FEMA) Flood Insurance Studies and Flood Insurance Rate Maps
- Florida Fish and Wildlife IPaC tool and specific site indicators



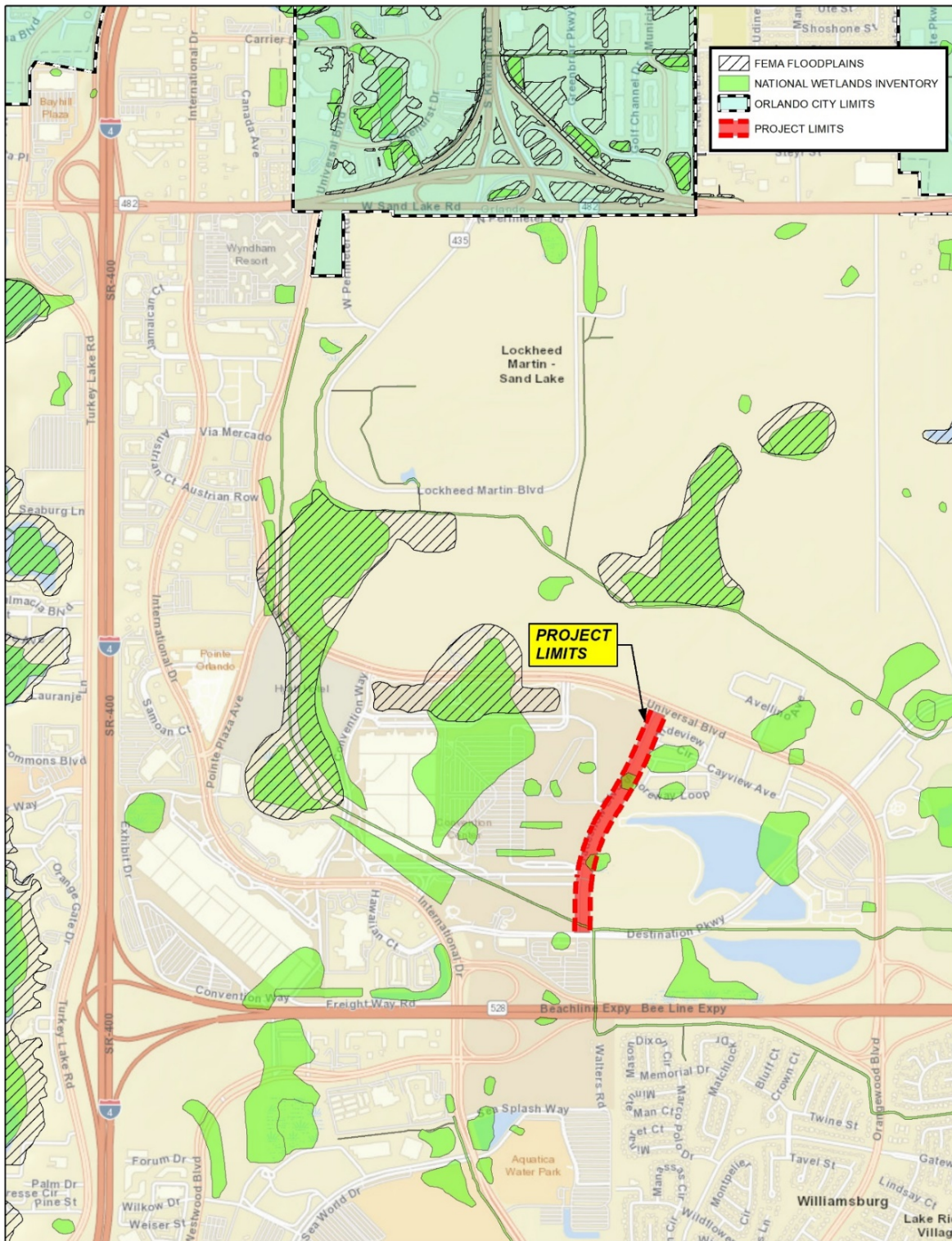
2.1.2 Wetlands and Surface Waters

Federal, state, and local regulatory agencies have jurisdictional authority over the wetlands/surface waters within the study area. These agencies include the U.S. Army Corps of Engineers, SFWMD, VWCD, and Orange County Environmental Protection Division. As a result, impacts associated with the proposed I-Drive District improvements may require regulatory permits and compensatory mitigation for agencies that claim jurisdiction over these systems.

There are jurisdictional wetlands within the existing I-Drive study area that consist of freshwater forested/shrub wetland, freshwater emergent wetland, and freshwater ponds (refer to Figure 2). Surface water impacts are anticipated associated with Orange County's Newover Canal (aka S-11 Canal) that passes under Tradeshow Boulevard. In addition, minor wetland impacts (less than 0.1 acre) are anticipated with an existing isolated cypress bayhead located east of Tradeshow Boulevard and north of the Newover Canal. All other wetland and surface water systems outside of the right-of-way will likely not be impacted by the transit improvements or the Tradeshow Boulevard roadway improvements. Figure 2 displays the floodplains and wetlands within the study area based on the National Wetlands Inventory published by the U.S. Fish and Wildlife Service. However, the wetland inventory has not been updated by the U.S. Fish and Wildlife Service to reflect current urban conditions.



Figure 2 | Floodplains and Wetlands



2.2.1 Conservation Areas

Tibet-Butler Preserve and the Shingle Creek conservation areas are approximately 3.6 miles west and 1.7 miles east, respectively, from the study area. There are no known conservation areas within the study corridor.

2.2.2 Mitigation Sites

Mitigation banks offering state and federal mitigation bank credits for freshwater wetlands were available within the Kissimmee River Watershed at the time of this review. Mitigation banks provide an alternative to permittee-responsible mitigation and mitigation banks are preferred by the permitting agencies. If mitigation were to be required, efforts should be made to purchase mitigation credits from a mitigation bank within the watershed of impact.

The study area was within the service areas of ten mitigation banks including, Florida, Quickdraw, Collany, Reedy Creek, Southport Ranch, Shingle Creek, Hatchineha Ranch, Split Oak Forest, Bullfrog Bay, and Twin Oaks. Final mitigation requirements, including wetland credit type and mitigation bank credit availability, would be determined during the permitting and design phase.

3.0 Tradeshow Boulevard Drainage Analysis

3.1 Drainage Criteria and Permitting

The drainage design for the Tradeshow Boulevard project is regulated by the Orange County Public Works Department and the South Florida Water Management District (SFWMD). As previously stated in Section 2.1.1., the study area does not discharge flows to the VWCD. Therefore, the VWCD will not have regulatory authority over the proposed Tradeshow Boulevard roadway improvements. Drainage design within Orange County is regulated by the Code of Ordinances, Chapter 34 (Subdivision Regulations), Article VII (Stormwater Management), Divisions 1 (General Requirements), 2 (General Design Criteria), and 3 (Hydraulic Design Criteria). In some cases, Orange County may also refer to the Florida Department of Transportation (FDOT) Drainage Manual. With respect to the SFWMD, they are regulated by the Environmental Resource Permit Applicant's Handbook (Volumes I and II).

Given the Tradeshow Boulevard project is located within a positive outfall (open) basin, in lieu of a closed (land-locked) basin, the Orange County and SFWMD design criteria associated with the primary drainage system (i.e., stormwater management ponds) is to regulate the peak discharge rate into Shingle Creek, which discharges into Lake Tohopekaliga and eventually into the Kissimmee River. More specifically, the peak rate of discharge (aka peak runoff rate) after development related improvements must be less than or equal to the peak rate of discharge that existed prior to development. In addition, Orange County and SFWMD require that the stormwater management ponds provide water quality treatment volume to reduce pollutant loads to the receiving water body. Regarding the secondary drainage system (i.e., storm sewer systems), Orange County, not the SFWMD, regulates the design of the drainage inlets and storm sewer conveyance systems.



Based on the regulations previously stated, the following design criteria pertains to the proposed Tradeshow Boulevard improvements:

3.1.1 Primary Drainage System (Stormwater Ponds)

- Water Quantity (Peak Rate Attenuation Volume)
 - 25-year / 72-hour design storm event for the South Florida Water Management District.
 - 25-year / 24-hour design storm event for Orange County.
 - 1-foot of freeboard between the design high water elevation and the lowest berm/inside top of bank elevation for the design storm event.
 - The minimum road centerline elevation shall be set at or above the 10-year / 24-hour design high water elevation, as established by the South Florida Water Management District.
 - The design high water elevation for the 100-year / 24-hour storm event shall be contained within the stormwater ponds and not exceed adjacent building finished floor elevations, as established by the South Florida Water Management District.

- Water Quality (Pollution Abatement Volume)
 - Wet Detention – treatment volume shall be the greater of the first inch of runoff from the contributing drainage basin or 2.5 inches of runoff times the proposed percentage of imperviousness (excluding water bodies). The outfall structure should be designed to drawdown no more than one-half inch of the required treatment volume within 24 hours following the design storm event.
 - Dry Retention – dry retention treatment volume shall be equal to 50 percent of the amounts computed for wet detention. Dry retention ponds must be designed to recover the water quality treatment volume within 72 hours following a storm event.
 - The bottom of a required retention or detention with filtration pond shall be a minimum of three (3) feet above the estimated wet-season water table.
 - Design criteria for pollution abatement utilizing wet retention or detention with filtration: Wet bottom ponds will be allowed, provided that a minimum of six (6) feet of water depth below the control water level is provided and that a maximum length to width ration of two (2) to one (1) is maintained.
 - The pollution abatement volume recovery rate shall be as required by the SFWMD.



3.1.2 Secondary Drainage System (Storm Sewer Systems)

- Hydraulic Gradeline (HGL) – Per Article VII (Stormwater Management) of Chapter 34 (Subdivision Regulations), of the Orange County Land Development Code, Section 34-266(e), the design storm frequency to be utilized for the design of the pavement drainage shall set the hydraulic gradient line at six (6) inches below gutter for a 10-year frequency storm. The hydraulic gradient line for the storm sewer system shall be computed taking into consideration the design tailwater on the system and the energy losses associated with entrance into and exit from the system, friction through the system, and turbulence in the individual manholes/catch-basins/junction boxes within the system.
- Inlet Capacity – Per Section 34-266(h) of the Orange County Land Development Code, Florida Department of Transportation (FDOT) Types 1 and 3 (single) inlets shall be located such that a maximum of 4.1 and 1.9 cfs, respectively, shall be intercepted during the ten-year frequency storm. Regarding Types 2 and 4 (sump) inlets, they shall be located such that a maximum of 9.0 and 6.5 cfs, respectively, shall be captured during the ten-year frequency storm. Bypass flow is limited to a maximum of one (1) cfs. Off-site flows from impervious areas of more than one-half (0.5) acre shall be intercepted prior to the right-of-way line. No part of an inlet structure shall be located within a curb radius or in front of the access to the stormwater pond.
- Spread of Water – Inlets shall be located at all low points, intersections, and along continuous grades to prevent the spread of water from exceeding tolerable limits. The acceptable tolerable limits for roadways with projected volumes in excess of an ADT of three thousand five hundred (3,500) vpd is defined as approximately one-half (½) the traveled lane width. With respect to inlets at low points (sumps), these inlets shall be designed to intercept one hundred (100) percent of the design flow without exceeding the allowable spread of water onto the traveled lanes as defined above. On roadways with greater than an ADT of three thousand five hundred (3,500) vpd, in order to prevent siltation and to provide for a safety factor against clogging of a single inlet in a sump location, multiple inlets are required at all sump locations. The spread of water computations shall be based on a design rainfall intensity of 4-inches per hour.
- Orange County will purchase all necessary right-of-way needed to construct and maintain the roadway and drainage conveyance systems up to the point of outfall. However, to authorize construction of the Tradeshow Boulevard improvements, a Right-of-Way Utilization Permit will be required from Orange County and an Environmental Resource Permit (ERP) will be required from the SFWMD. Please note that, based on conversations with the Orange County Highway Construction Division, the contractor is responsible for securing a Right-of-Way Utilization Permit prior to construction in order to keep records of the project and for inspection scheduling purposes; however, the permit fee will most likely be waived. In addition, the contractor will be responsible for securing a Maintenance of Traffic Permit. Note that Orange County will not be required to secure a Right of Way Use Agreement. Additionally, it should be noted that since the proposed improvements only



involve minor impacts to an isolated wetland system (less than 0.1 acre) and minor surface water impacts to the Newover Canal, a U.S. Army Corps of Engineers (USACOE) permit will not be required. In this case, a No Permit Required (NPR) letter from the USACOE will need to be secured during the design phase. In addition, based on the extent of the proposed works, a Drainage Connection Permit will not be required from the FDOT.

3.2 Drainage Impacts

3.2.1 Preliminary Drainage Design Analysis

The Tradeshow Boulevard project is located within a watershed known as the Sand Lake Road Complex (SLRC) which is bounded by West Sand Lake Road (State Road 482) to the north, Shingle Creek to the east, Martin Anderson Beachline Expressway (State Road 528) to the south, and Interstate 4 to the west. The SLRC watershed is approximately 3,000 acres in size and encompasses the Orange County Convention Center, Lockheed Martin Corporation (South Orlando facility), the future Universal Studios Epic Theme Park, and numerous hotels, restaurants, and retail development along International Drive and Universal Boulevard.

The watershed consists of two major conveyance systems (Central Canal and the Newover Canal) and numerous interconnected stormwater ponds that eventually discharge to Shingle Creek at multiple locations. Based on a Master Stormwater System Drainage Basin Map associated with a recent comprehensive Drainage Analysis prepared by Donald W. McIntosh Associates, Inc. (DWMA), the Tradeshow Boulevard project falls within the following four (4) drainage basins (refer to Figure 3):

- Universal Boulevard Basin;
- Orange County Convention Center Basin;
- Newover Canal Basin; and
- Canadian Court Basin

Within these four (4) drainage basins, the Tradeshow Boulevard project specifically falls within the following drainage sub-basins (refer to Figure 4):

- OC-4 (Orange County Convention Center) Sub-Basin;
- SRoad (Universal Boulevard) Sub-Basin;
- NC-5A (Newover Canal) Sub-Basin;
- PZI-11A (Canadian Court) Sub-Basin

It is also important to note that each drainage sub-basin is associated with the following stormwater ponds and/or receiving water bodies (refer to Figure 5):

- Pond OC-4 (Sub-basin OC-4)
- Ponds OC-1A / OC-1B (Sub-basin SRoad)
- Newover Canal (Sub-basin NC-5A)
- Ponds 9A / 10A (Sub-basin PZI-11A)



Figure 3 | Master Stormwater System Drainage Basin Map

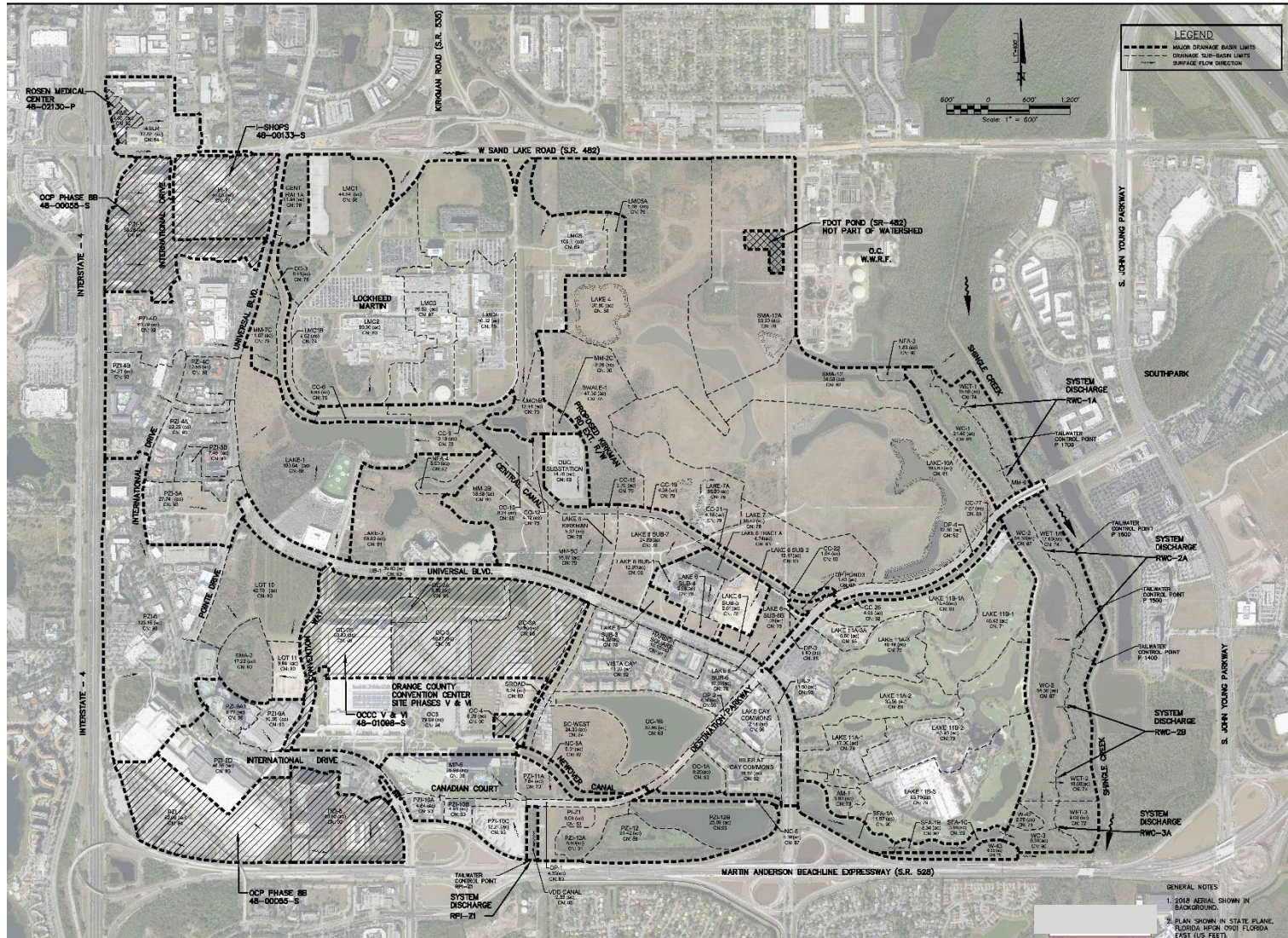


Figure 4 | Tradeshow Boulevard Sub-Basin Map

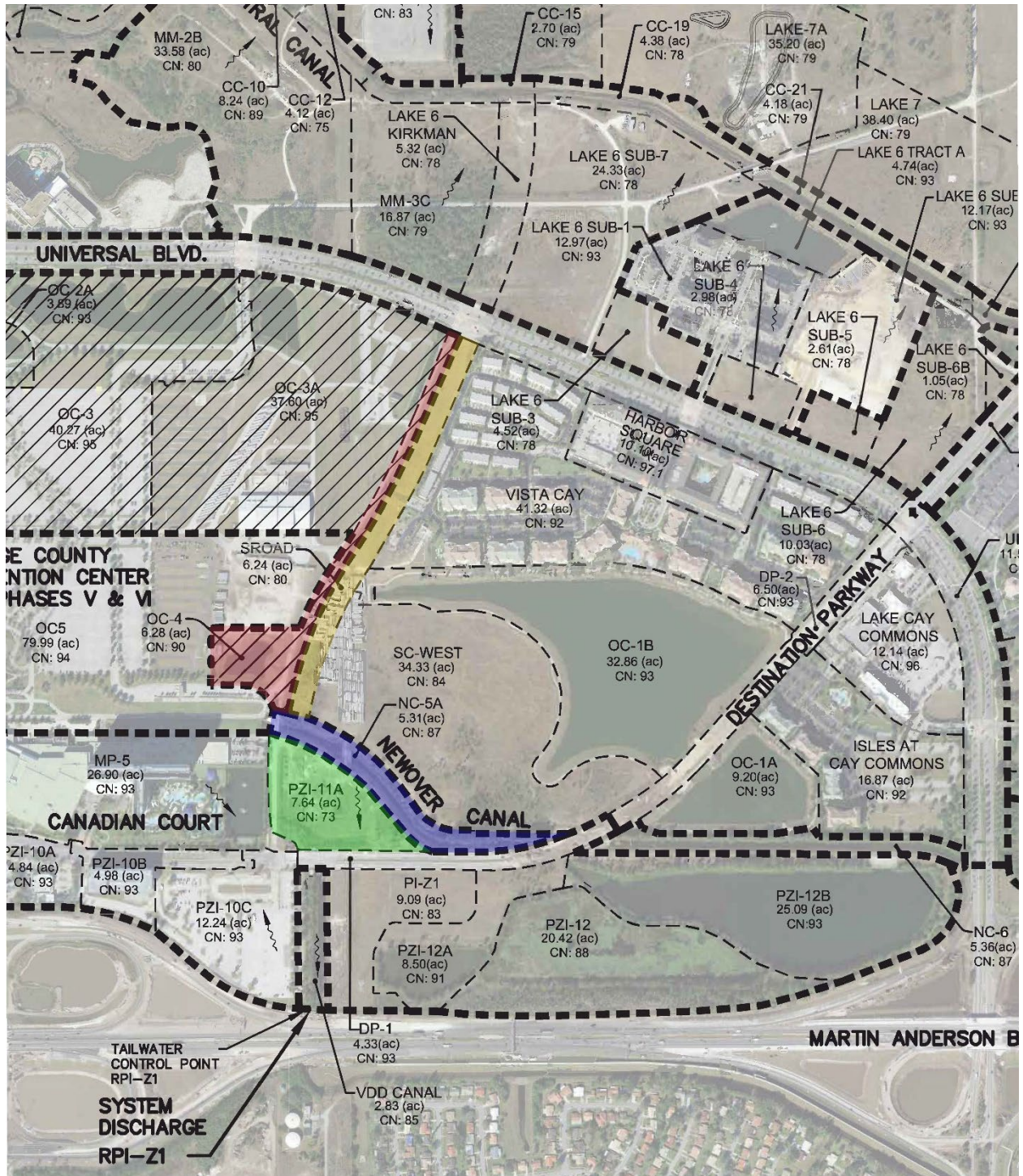
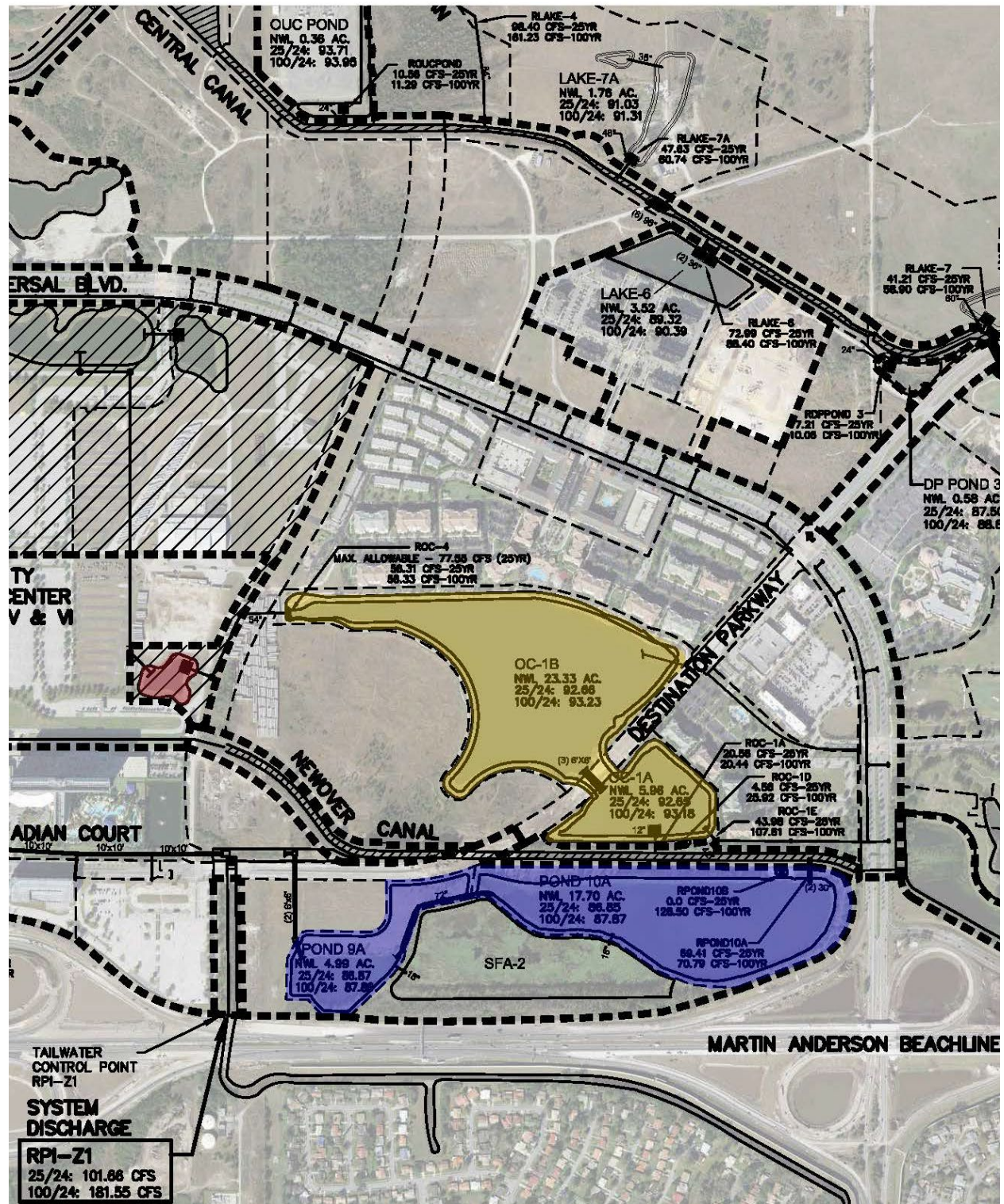


Figure 5 | Tradeshow Boulevard Stormwater Ponds / Receiving Water Bodies Map



3.2.2 Stormwater Management Facilities

As previously stated, the existing stormwater management facilities (stormwater ponds) that encompass the Tradeshow Boulevard project limits include the following wet detention systems:

- Stormwater Ponds OC-1A / OC-1B
- Stormwater Ponds OC-4
- Stormwater Ponds 9A / 10A

As it will be discussed in the following section (Section 3.2.3.), the capacity of the existing stormwater management ponds was investigated to determine if the additional impervious area associated with the proposed Tradeshow Boulevard typical section concepts could be accommodated. In the event that the existing stormwater management ponds did not have sufficient capacity, the scope of work for this project called for the evaluation of an additional alternative pond concept. More specifically, if it were determined that stormwater Ponds OC-1A / OC-1B could not accommodate Tradeshow Boulevard between the Newover Canal and Universal Boulevard, the following alternative would be evaluated:

- Expand Pond OC-4 within the Orange County Convention Center by approximately 0.25 acres to accommodate the north segment of the proposed Tradeshow Boulevard improvements.

Similarly, if it were concluded that stormwater Ponds 9A / 10A could not be utilized to accommodate Tradeshow Boulevard between Destination Parkway and the Newover Canal, the following alternative would be evaluated:

- Construct a linear pond to be approximately 0.15 acres in size between the Tradeshow Boulevard eastern right-of-way limit and the eastern limit of the existing Duke Energy easement to accommodate the south segment of the proposed Tradeshow Boulevard improvements.

Note that it was determined that the existing stormwater management ponds (i.e., Pond OC-1A / OC-1B and Pond 9A / 10A) have sufficient capacity to accommodate the additional impervious area associated with the proposed Tradeshow Boulevard typical section concepts. Upon the County securing the legal authority required to access and utilize these ponds, expanding Pond OC-4 or constructing an additional linear pond, as described above, will not be necessary.

3.2.3 Pond Locations

Prior to evaluating stormwater pond alternatives, the initial step involved estimating the total proposed impervious areas within the 200-ft Tradeshow Boulevard right-of-way associated with the north segment between Universal Boulevard and the Newover Canal and the south segment between Destination Parkway and the Newover Canal. The following step involved the breakdown in the right-of-way area and the impervious area for both segments based on the average of the three (3) typical section concepts:



North Segment

- Length = 2,395 feet
- Total Right-of-Way Area = 11.00 acres
- Impervious Area = 6.95 acres
- Pervious Area = 4.05 acres

South Segment

- Length = 705 feet
- Total Area = 3.24 acres
- Impervious Area = 1.89 acres
- Pervious Area = 1.35 acres

The next step involved establishing the current stormwater characteristics for the SLRC watershed, and more specifically the four (4) drainage basins previously outlined in Section 3.2.1. During the data collection it was confirmed that there has been a very recent update to the SLRC watershed. The following entity received a conceptual permit modification from the SFWMD (Conceptual Permit No. 48-102657-P, Application No. 190910-1786, dated December 27, 2019):

Sand Lake Road Complex Master Stormwater Management System Update

Conceptual Modification of SFWMD ERP 48-0103-S

Drainage Analysis for Current and Future Conditions

(dated September 2019, revised November 2019)

Prepared for: Universal City Development Partners, LTD.

Prepared by: Donald W. McIntosh Associates, Inc.

The purpose of the recently approved SFWMD conceptual permit modification prepared by Donald W, McIntosh Associates was twofold. First, to establish a baseline for flood stages (design high water elevations) and peak discharge rates based on “current” conditions and best available data. Second, to account for future development and determine if the overall SLRC watershed meets the 2005 conceptual permit with respect to flood stages, peak discharge rates, and water quality volume. In regard to the Tradeshow Boulevard RCA, the recent conceptual permit modification drainage analysis prepared by DWMA provides the best available data to utilize as a baseline in order to investigate stormwater management alternatives associated with the proposed Tradeshow Boulevard improvements.

As mentioned in Section 3.2.2, if it could be confirmed that the existing stormwater ponds have sufficient capacity to accommodate the proposed Tradeshow Boulevard improvements with respect to water quality (peak attenuation) and water quality (pollution abatement), investigating alternative stormwater pond alternatives would not be warranted. With that said, the remainder of this section will document the fact that the existing stormwater ponds (Pond OC-1A / OC-1B and Pond 9A / 10A) will have sufficient capacity to accommodate the north and south segments, respectively. Please note that, in the unlikely event that Orange County is unable to secure legal authority to access and utilize Ponds OC-1A / OC-1B, then expanding Pond OC-4 within the Orange County Convention Center would be required. Based on the Supporting Calculations, Pond OC-4 will need to be expanded by approximately 0.25 acres to



accommodate the north segment of the proposed Tradeshow Boulevard improvements. Likewise, if the County is unable to secure legal authority to access and utilize Ponds 9A / 10A, then constructing a stormwater pond between Tradeshow Boulevard and the existing Duke Energy easement would be required. Based on the Supporting Calculations, this new pond will need to be approximately 0.15 acres in size to accommodate the south segment of the proposed Tradeshow Boulevard improvements.

North Segment

The north segment of the Tradeshow Boulevard improvements encompasses drainage sub-basins OC-4 and SROAD, and minor portion of drainage sub-basin NC-5A (refer to Figure 4). Therefore, an option that was considered involved the diversion of a portion of the stormwater runoff from the right-of-way area to Pond OC-4 and the remainder of the right-of-way runoff to Pond OC-1A / OC-1B. However, the preferred option is to direct the stormwater runoff from the entire north segment right-of-way to Ponds OC-1A / OC-1B and determine if sufficient capacity is available.

Regarding drainage sub-basins OC-4 and SROAD and Ponds OC-1A / OC-1B, the following two (2) SFWMD permit files were reviewed to confirm the future land use conditions and stormwater capacity:

- Conceptual Permit No. 48-102657-P
Application No. 190910-1786 (issued 12/27/19)
Universal SLRC Conceptual Permit Modification
- Permit No. 48-01098-S
Application No. 170315-11 (issued 04/04/17)
Orange County Convention Center | North-South Overflow Parking

Based on the recently secured conceptual permit previously referenced, Ponds OC-1A / OC-1B were reanalyzed based on an assumed impervious area of 80% for drainage sub-basin SROAD and the updated design water elevations and peak discharge rates were approved by the SFWMD. Given drainage sub-basin SROAD is 6.24 acres in size, the assumed imperviousness percentage of 80% equates to an impervious area of 4.99 acres. In comparison, the estimated impervious area for the North Segment based on the three (3) proposed typical section concepts is 6.95 acres which exceeds the assumed permitted impervious area threshold of 4.99 acres. Since the proposed impervious area (6.95 acres) exceeds the assumed permitted impervious area (4.99 acres), additional water quality (pollution abatement) volume would be required.

However, Ponds OC-1A / OC-1B were permitted with an exceedance of 115.05 acre-feet of additional water quality volume than that required. Therefore, the required water quality treatment volume associated with the proposed north segment improvements of the Tradeshow Boulevard improvements can be accommodated within Ponds OC-1A / OC-1B.

In regards to the peak attenuation requirements associated with Ponds OC-1A / OC-1B, it should be noted that in order to avoid diverting some of the runoff to Pond OC-4, and the remainder to Ponds OC-1A / OC-1B, it was decided to redirect the entire north segment to Ponds OC-1A / OC-1B and model the design storm event to determine if the additional drainage area could be accommodated. Based on the recently



secured conceptual permit, there are twelve (12) drainage sub-basins that contribute stormwater runoff to Ponds OC-1A / OC-1B for a total drainage area of 300.73 acres and a weighted runoff curve number of 93. Based on the entire North Segment being redirected to Ponds OC-1A / OC-1B, the total drainage area increases to 305.61 acres which constitutes a 4.88-acre increase. Please note that the 4.88 acres of additional drainage area corresponds to the right-of-way area within Sub-Basin OC-4 that will be redirected to Ponds OC-1A / OC-1B. It should be noted that the weighted runoff curve number remained unchanged. Ponds OC-1A / OC-1B were remodeled using the Interconnected Channel and Pond Routing (ICPR) software (Version 4.0) which confirmed that the design high water elevations and peak discharge rates were still in compliance with the recently secured conceptual permit. Refer to the Supporting Calculations for the weighted runoff curve number computations, as well as the ICPR input data and flood routing results, which demonstrates that Ponds OC-1A / OC-1B can accommodate the 4.88-acres of additional drainage area being rerouted from OC-4 to OC-1A / OC-1B.

Therefore, it can be concluded that **the existing Ponds OC-1A / OC-1B have sufficient volume (peak attenuation and pollution abatement) to accommodate the proposed North Segment improvements of the Tradeshow Boulevard Improvement Project and will not require to be expanded from their current configurations.** However, as previously stated, in the unlikely event that Orange County is unable to secure legal authority to access and utilize Ponds OC-1A / OC-1B, then expanding Pond OC-4 within the Orange County Convention Center would be required. Based on the Supporting Calculations, Pond OC-4 will need to be expanded by approximately 0.25 to accommodate the north segment of the proposed Tradeshow Boulevard improvements.

South Segment

The south segment of the Tradeshow Boulevard improvements encompasses drainage sub-basin *PZI-11A* and an insignificant portion of Sub-Basin *MP-4* (refer to Figure 2). With that said, the preferred option is to direct the stormwater runoff from the entire south segment right-of-way to Ponds 9A / 10A and determine if sufficient stormwater pond capacity is available. If so, an analysis of an additional pond alternative would be unnecessary.

Regarding drainage sub-basin *PZI-11A* and Ponds 9A / 10A, the following two (2) SFWMD permit files were reviewed to confirm the future land use conditions and stormwater capacity:

- Conceptual Permit No. 48-102657-P
Application No. 190910-1786 (issued 12/27/19)
Universal SLRC Conceptual Permit Modification
- Individual Environmental Resource Permit No. 48-102429-P
Application No. 191028-2144 (issued 02/14/20)
Hilton Orlando Convention Center Hotel

Based on both SFWMD permits previously listed, which represent the latest design approved by the SFWMD to date for the project area, Ponds 9A / 10A were reanalyzed based on an imperviousness percentage of 80% for drainage sub-basin *PZI-11A* and the updated design water elevations and peak



discharge rates approved by the SFWMD. Based on the South Segment's footprint within drainage sub-basin PZI-11A and assuming an 80% impervious area, the impervious area was estimated at 2.59 acres, which proved to be below the average impervious area of the three (3) typical section concepts of 1.89 acres. Since the impervious area associated with the future Tradeshow Boulevard improvements was confirmed to be less than the impervious area anticipated within drainage sub-basin PZI-11A, it can be concluded that **the existing Ponds 9A / 10A have sufficient volume (peak attenuation and pollution abatement) to accept additional flows from the proposed South Segment improvements of the Tradeshow Boulevard Improvement Project and will not require to be expanded from their current configurations.** However, in the unlikely event that Orange County is unable to secure legal authority to access and utilize Ponds 9A / 10A, then constructing a stormwater pond between Tradeshow Boulevard and the existing power easement would be required. Based on the Supporting Calculations, this new pond will need to be approximately 0.15 acres in size to accommodate the south segment of the proposed Tradeshow Boulevard improvements.

3.2.4 Cross Drains

The proposed Tradeshow Boulevard project limits encompass one (1) existing culvert associated with the Newover Canal primary conveyance system that outfalls to Shingle Creek. The existing culvert is an 84-inch RCP that will require to be extended to accommodate the proposed right-of-way improvements. In addition to the culvert being extended, the concrete slope protection / end treatment will need to be reconstructed (refer to the following photographs). Please note that during the design phase, a hydraulic analysis will be required to determine if the upstream flood stage will increase due to the additional friction losses or determine if the increase is *de minimis*. Based on the Orange County Code of Ordinances, Division 3 of Article VII, the 25-year / 24-hour design storm event will be required to analyze the referenced culvert crossing.



Downstream end of the 84-inch RCP culvert crossing (east of Tradeshow Boulevard).



Upstream end of the 84-inch RCP culvert crossing (west of Tradeshow Boulevard).



3.2.5 Floodplains and Floodways

Based on FEMA's Flood Insurance Rate Maps (FIRM) that encompass the SLRC watershed, there are no special flood hazards (floodplains or floodways) to be impacted by the proposed Tradeshow Boulevard improvements. More specifically, based on FIRM Panel 12095C0415F (effective September 25, 2009) no Zone A or AE floodplains, nor regulated floodways (except for Shingle Creek), will be impacted (refer to Figure 2).

3.2.6 Stormwater Permits

As previously stated in Section 3.1, to authorize construction of the Tradeshow Boulevard improvements, a right-of-way utilization permit will be required from Orange County and an Environmental Resource Permit (ERP) will be required from the SFWMD. Based on conversations with the Orange County Highway Construction Division, it is our understanding that the contractor will be responsible for securing a Right-of-Way Utilization Permit prior to construction. It should be noted that since the proposed improvements only involve minor impacts to an isolated wetland system (less than 0.1 acre) and minor surface water impacts to the Newover Canal, (refer to Figure 2), a U.S. Army Corps of Engineers (USACOE) will not be required; however, a No Permit Required (NPR) letter from the USACOE will need to be secured during the design phase. In addition, a Drainage Connection Permit will not be required from the FDOT.

3.2.7 Stormwater Easements

The north-segment of Tradeshow Boulevard will discharge into Ponds OC-1A / OC-1B which encompasses the following breakdown in ownership based on Orange County Property Appraiser's website (percent breakdown based on the approximate top of bank):

Pond OC-1A

- 51% is owned by Orange County
- 49% is owned by Universal City Development Partners

Pond OC-1B

- 91% is owned by Orange County
- 6% is owned by Universal City Development Partners
- 3% is owned by Universal City Property Management III

Given that the north segment will discharge into ponds jointly owned by Orange County and a private entity, the County will need to request permission or secure a drainage easement from Universal City Development Partners.

The south segment of Tradeshow Boulevard will discharge into a stormwater pond currently owned and maintained by the Hilton Orlando (aka A-R HHC Orlando Convention Hotel LLC). Even though the proposed stormwater discharge from this portion of the project has been accounted for and permitted to discharge into Ponds 9A/10A, the County will still need to request permission or secure a drainage easement from the Hilton Orlando to allow the southern segment to outfall into Ponds 9A/10A.



