Right-of-Way Preservation Map and Related Analyses

Plant City, Florida

June 2010

Prepared for:

Prepared by:

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Planners + Engineers

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Introduction

The City of Plant City, in a coordinated effort with the Hillsborough County Metropolitan Planning Organization (MPO), has developed a Right-of-Way Preservation Map to identify future right-of-way needs for anticipated expansions to the transportation network within the City of Plant City and adjacent portions of unincorporated Hillsborough County. This map implements Policy 1.F.1 in the Transportation Element of the *Comprehensive Plan for the City of Plant City*, which states as follows:

> ***TE Policy1.F.1:*** *Within one year of the effective date of this Element, the City shall develop and adopt a right-of-way preservation map for the purposes of preserving corridors for transportation use. The right-of-way map shall provide general alignments and standards for all transportation corridors and support development patterns as defined in the Future Land Use Element.*

In addition to the creation of the map itself, this report documents the component analyses, including the review of existing plans and studies used to determine the study network, the review of the implementing jurisdictions' standard cross sections, and the evaluation of drainage and wetlands impacts. Furthermore, this effort includes two related analyses that were conducted to meet the City's ongoing transportation planning needs: 1) a detailed evaluation of selected roadways within the City for potential bicycle and pedestrian facility improvements, and 2) identification of preliminary recommendations for long-term strategies that could be employed to improve the operating capabilities of selected intersections.

Creation of the Right-of-Way Preservation Map

The Primary output of this City/MPO initiative is the Right-of-Way Preservation Map. This map is intended to assist the City in preserving corridors that will be necessary to implement identified long-term expansions to the transportation network. The mapping process began with a review of existing plans and studies to identify the study network corridors and their future year lane needs. The process then continued with a review of jurisdictional standard cross sections to calculate the necessary right-of-way widths for those corridors.

Review of Existing Plans and Studies

Numerous planning documents were reviewed to determine those major roadways within the study area that have been previously identified for either widening (additional lanes) or new construction. The primary source for this review is the Highway Needs Assessment map from the recently adopted *Hillsborough County MPO 2035 Long Range Transportation Plan*, which shows numerous roads within and around Plant City that fall into one of these two categories. Other reviewed sources included the *Northeast Plant City Area Master Plan* (2008), the *Plant City Multi-Modal Transportation Needs Plan* (2000), and the *Plant City Midtown Redevelopment Vision Plan* (2007).[1] The *Long Range Transportation Plan's* Bicycle and Trail Needs Assessment was also reviewed to determine which of the projects listed in one or more of the other sources also have an identified trail need, which affects the needed right-of-way. The study network that resulted from this review of existing plans and studies is shown in Table 1.

Table 1 Study Network

Road Name	From	To	Type	Trail Need?	LRTP[1]	NEMP[2]	MMNP[3]
Trapnell Road	SR 39	Jim Johnson Road Ext.	4-lane		Y		Y
Trapnell Road	Old Mulberry Road	County Line Road	2-lane (new)		Y		
Jim Johnson Road	Jap Tucker Road	Alexander Street	4-lane		Y		
Jim Johnson Road Ext.	Trapnell Road	Jim Johnson Road	4-lane (new)	Y	Y		Y
Rice Road Ext.	Coronet Road	Wiggins Road	2-lane (new)		Y		
US 92	Forbes Road	Thonotosassa Road	4-lane		Y		
US 92	Park Road	County Line Road	4-lane	Y	Y		
Alexander Street Ext.	I-4	SR 39	4-lane (new)		Y		Y
Martin Luther King, Jr. Blvd	Alexander Street	Wheeler Street	4-lane		Y		
Sam Allen Road	Alexander Street Ext.	Wilder Road	4-lane		Y	Y	Y
Sam Allen Road Ext.	Wilder Road	Swindell Road	4-lane (new)		Y	Y	
Swindell Road	Sam Allen Road Ext.	County Line Road	4-lane		Y	Y	
Midway Road Ext.	Alexander Street Ext.	Wilder Road	4-lane (new)		Y	Y	
Midway Road	Wilder Road	Charlie Taylor Road	4-lane		Y	Y	
Midway Road Ext.	Charlie Taylor Road	County Line Road Ext.	4-lane (new)		Y	Y	
Knights Griffin Road	SR 39	County Line Road Ext.	4-lane		Y	Y	
SR 39	Alexander Street Ext.	Knights Griffin Road	4-lane	Y	Y		
County Line Road Ext.	Swindell Road	Knights Griffin Road	4-lane (new)		Y	Y	
Park Road	North Frontage Road	Sam Allen Road	4-lane		Y	Y	Y
Park Road Ext.	Sam Allen Road	Knights Griffin Road	2-lane (new)			Y	
Williams Road Ext.	Wilder Road	Knights Griffin Road	2-lane (new)			Y	
Joe McIntosh Road Ext.	Alexander Street Ext.	SR 39	2-lane (new)			Y	
Cherry Street Ext.	Wilder Road	Wiggins Road	2-lane (new)			Y	
Lampp Road Ext. (E-W)	Lampp Road	County Line Road Ext.	2-lane (new)			Y	
Lampp Road Ext. (N-S)	Lampp Road Ext. (E-W)	Charlie Taylor Road	2-lane (new)			Y	

[1] Hillsborough County MPO 2035 Long Range Transportation Plan
[2] Northeast Plant City Area Master Plan
[3] Plant City Multi-Modal Transportation Needs Plan

[1] The last of these documents identifies several roadway extensions in the midtown area which were not added to the study network because they are local streets, hence outside the scope of this study.

Review of Standard Cross Sections

Following the identification of the study network, the standard cross sections for the three primary implementing jurisdictions (Florida Department of Transportation, City of Plant City, and Hillsborough County) were reviewed to establish the right-of-way preservation needs for each of the corridors shown in Table 1.

For the FDOT cross sections, the values for lane widths, clear zone requirements, required median widths, etc., were taken from the FDOT *Plans Preparation Manual*. The Florida *GreenBook* was used to obtain values for city cross sections. City cross sections were used as opposed to county cross sections for the following reasons:

- the County has standard cross sections in their development guidelines, not a specific set of design standards; and
- by using the City cross sections instead of the County's development guidelines cross sections, we allow for the flexibility to include widths and features not currently in the County's development guidelines and preserve right-of-way accordingly.

For each jurisdiction, a series of cross section width tables was created, all of which are included in Appendix A. Each series includes the following cross section types:

- 2-lane urban;
- 4-lane urban;
- 2-lane rural;
- 4-lane rural;
- 2-lane urban with trail;
- 4-lane urban with trail;
- 2-lane rural with trail; and
- 4-lane rural with trail.

All study network corridors were assigned to one of these categories based on the lane needs, jurisdiction, and surrounding area type. The corridors fell into one of seven cross section types (out of the twenty-four possible cross sections), as shown in the Right-of-

Way Preservation Map (Figure 1). Plan view cross section graphics for the seven incorporated cross sections are shown in Appendix B.

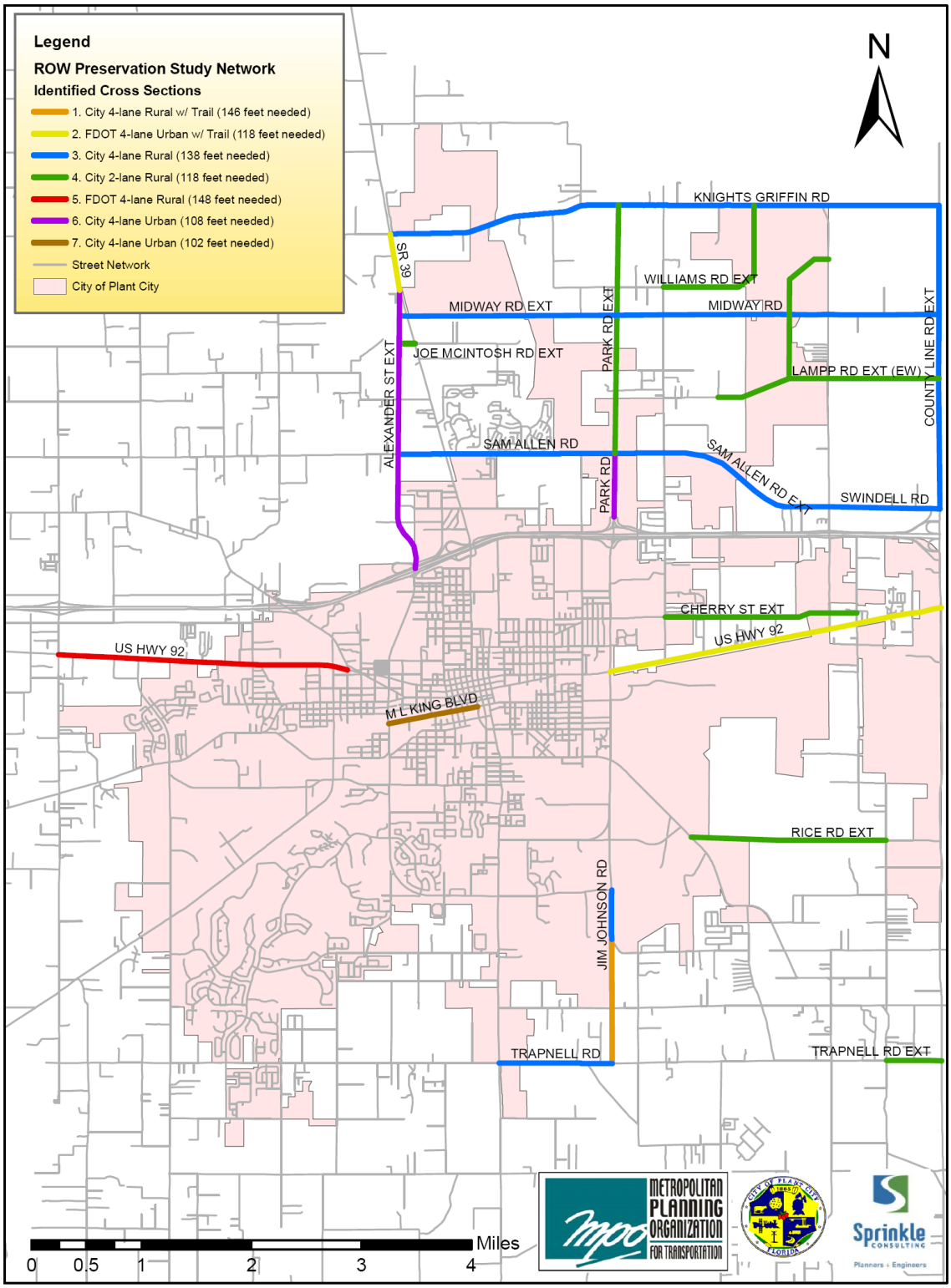

Figure 1 Plant City Right-of-Way Preservation Map

Drainage Considerations

Drainage needs are an important consideration for right-of-way preservation planning. Standard drainage practice in Florida uses the Soils Conservation Service Technical Release – 55 (TR-55)[2] methods for estimating stormwater runoff. This method assigns Curve Numbers (runoff coefficients) to different land uses based on the hydrologic groups of the underlying soils.

Two tables (Tables 2 and 3) were prepared based on the TR-55 method, and include different runoff volumes for each of the four different Hydrologic Soil Groups (A, B, C & D). Table 2 provides an acre-ft volume needed for each lane-mile of new roadway. Table 3 provides an acre-ft volume needed per mile for widening a two-lane roadway to four lanes. Each of the tables has a step-by-step example on how to apply them to different scenarios. Tables 2 and 3 are shown on the following page.

Topography and present drainage characteristics can also influence the volume of a stormwater facility. These characteristics can be simplified into two categories, Open and Closed Basins. An Open Basin simply refers to a drainage area that has a positive outfall, such as an existing drainage facility or a lake. A Closed Basin refers to drainage areas that do not have an outfall; these areas are at the “bottom” of a hill and stormwater runoff accumulates at the bottom. Open Basins are typically required by the Southwest Florida Water Management District (SWFWMD) and Hillsborough County to be designed to a 25-Year/24-Hour storm event. Closed Basins are typically required to be designed to a 100-Year/24-Hour storm event. Detailed calculations for the development of Tables 2 and 3 are shown in Appendix C.

[2] USDA, NRCS TR-55: http://www.wsi.nrcs.usda.gov/products/w2q/H&H/docs/other/TR55_documentation.pdf

TABLE 2 - Estimated Stormwater Treatment and Attenuation Volume per Lane-Mile of New Roadway*

Storm-Event	*Hydrologic Soil Group A*	*Hydrologic Soil Group B*	*Hydrologic Soil Group C*	*Hydrologic Soil Group D*
Open Basin†	*1.105 Ac-ft ** *	*0.729 Ac-ft*	*0.480 Ac-ft*	*0.362 Ac-ft*
Closed Basin†	*1.407 Ac-ft*	*0.843 Ac-ft*	*0.528 Ac-ft*	*0.389 Ac-ft*

Example for estimating drainage areas for a New Roadway:

A new 10 mile stretch of a 2 lane roadway and its alignment falls entirely within a Hydrologic Soil Group A. A 4ft depressional area is planned to be used as a stormwater facility. The site is at the "bottom" of the hill and does not have an outfall for drainage (Closed-Basin).
1) The proposed roadway is within a Closed-Basin and Hydrologic Soil Group A (1.407 Ac-ft per Lane-Mile)
2) The proposed roadway will run for 10 miles and has 2 lanes (10 x 2 = 20 Lane-Mile)
3) Multiply 20 by 1.407 Ac-ft = 28.14 Ac-ft
4) A 4ft depressional area is to be used as a stormwater facility. Divide 28.14 Ac-ft per 4 ft = 7.04 Acres
5) The 10 mile, 2 lane roadway will approximately need 7.04 Acres of a 4ft deep stormwater facility.

Existing Conditions
(2-Lane Rural) 148ft ROW

Proposed Conditions
(4-Lane Rural) 148ft ROW

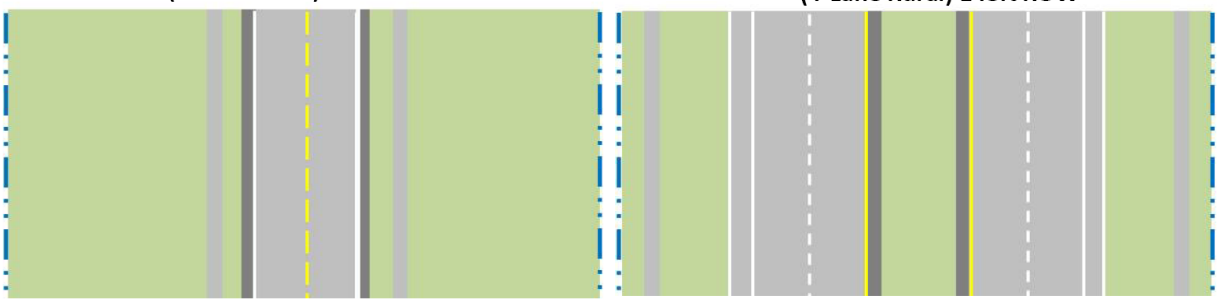

TABLE 3 - Estimated Stormwater Treatment and Attenuation Volume per Mile (Widening from 2 to 4 lanes)*

Storm-Event	*Hydrologic Soil Group A*	*Hydrologic Soil Group B*	*Hydrologic Soil Group C*	*Hydrologic Soil Group D*
Open Basin†	*1.805 Ac-ft ** *	*1.173 Ac-ft*	*0.771 Ac-ft*	*0.581 Ac-ft*
Closed Basin†	*2.284 Ac-ft*	*1.356 Ac-ft*	*0.849 Ac-ft*	*0.626 Ac-ft*

Note: This table only estimates the drainage volume needed for the roadway widening. This volume is to be added to the drainage volume for the existing 2 lane facility.

Example for estimating drainage areas for a Roadway Widening (2 to 4 lanes):

An existing 5 mile 2 lane roadway is to be widened to 4 lanes, and it is located within Hydrologic Soil Group D. The existing facility has a 3ft deep stormwater facility within a 1 Acre parcel. The roadway discharges stormwater runoff to a nearby lake (positive outfall » Open-Basin).
1) The roadway is within an Open-Basin and Hydrologic Soil Group D (0.581 Ac-ft per Mile)
2) The roadway runs for 5 miles. Multiply 5 x 0.581 Ac-ft = 2.91 Ac-ft
3) A 3ft depressional area is to be used as a stormwater facility. Divide 2.91 Ac-ft per 3 ft = 0.97 Acres
4) The 5 mile widening (2 to 4 lanes) will approximately need 0.97 Acres of a 3ft deep stormwater facility.
5) The existing 1 Acre, 3ft deep stormwater facility will need to be enlarged to cover 1.97 Acres.

† Open Basin assumes the roadway has a drainage outfall, and uses the 25-Year/24-Hour Storm Event
Closed Basin assumes the roadway does not have an outfall and uses the 100-Year/24-Hour Storm Event

* Excludes any areas needed for conveyance.

** The Ac-ft measure represents one foot of water covering an acre of land.

Note: These tables follow the principles outlined in the United Stated Department of Agriculture, Natural Resources Conservation Service Technical Release-55: "*Urban Hydrology for Small Watersheds*".

Wetlands Considerations

As a part of the right-of-way preservation determinations, wetland areas within the proposed routes need to be identified. The National Wetlands Inventory (NWI) is a commonly used planning tool to evaluate the approximate location of known wetlands. A GIS file from the National Wetlands Inventory was downloaded from *http://www.fws.gov/wetlands/Data/DataDownload.html* in March 2010. A new GIS layer was created that included all study network roadway corridors and their respective recommended preservation widths. These two layers were intersected to obtain the amount of wetlands within the identified right-of-way areas. This new layer was then used to quantify the percentage of wetland areas within each of the proposed corridor right-of-way areas. Table 4 shows the percentage of wetlands within each of the proposed corridors. Nine graphical maps of sections of the study area, included as Appendix D, were prepared to show the location of the wetland areas within the proposed roadway rights-of-way.

Table 4 National Wetlands Inventory Areas within Proposed Rights-of-Way

Street Name	From	To	Length (mi)	ROW Need (ft)	ROW Need (sf)	Wetlands Intersect (sf)	Wetlands Intersect (%)	Map Sheet(s)
Trapnell Rd	SR 39	Jim Johnson Rd Ext	1.03	138	764,747	3,212	0%	5
Trapnell Rd Ext	Old Mulberry Rd	County Line Rd	0.50	118	324,946	23,101	7%	9
Jim Johnson Rd	Jap Tucker Rd	Alexander St	0.45	138	341,820	36,344	11%	5
Jim Johnson Rd Ext	Trapnell Rd	Jim Johnson Rd	1.13	146	886,420	55,935	6%	5
Rice Rd Ext	Coronet Rd	Wiggins Rd	1.77	118	1,114,156	473,508	42%	8
US Hwy 92	Forbes Rd	Thonotosassa Rd	2.63	186	2,613,813	69,940	3%	1
US Hwy 92	Park Rd	County Line Rd	3.07	118	1,921,660	0	0%	4,7,8
Alexander St Ext	I-4	SR 39	2.58	108	1,480,596	490,042	33%	2,3
Martin Luther King, Jr. Blvd	Alexander St	Wheeler St	0.83	102	452,500	0	0%	4
Sam Allen Rd	Alexander St Ext	Wilder Rd	2.42	138	1,775,768	23,205	1%	3,7
Sam Allen Rd Ext	Wilder Rd	Swindell Rd	1.25	138	924,171	111,836	12%	7
Swindell Rd	Sam Allen Rd Ext	Charlie Taylor Rd	1.41	138	1,040,699	2,484	0%	7
Midway Rd Ext	Alexander St Ext	Wilder Rd	2.40	138	1,763,673	532,237	30%	2,6
Midway Rd	Wilder Rd	Charlie Taylor Rd	1.50	138	1,106,459	11,810	1%	6
Midway Rd Ext	Charlie Taylor Rd	County Line Rd Ext	1.01	138	749,131	17,964	2%	6
Knights Griffin Rd	SR 39	County Line Rd Ext	5.03	138	3,678,878	39,002	1%	2,6
SR 39	Alexander St Ext	Knights Griffin Rd	0.52	118	335,233	0	0%	2
County Line Rd Ext	Swindell Rd	Knights Griffin Rd	2.76	138	2,027,541	596,425	29%	6,7
Park Rd	N Frontage Rd	Sam Allen Rd	0.58	108	340,364	0	0%	3
Park Rd Ext	Sam Allen Rd	Knights Griffin Rd	2.26	118	1,417,352	118,976	8%	2,3
Williams Rd Ext	Wilder Rd	Knights Griffin Rd	1.50	118	943,377	54,401	6%	6
Joe Mcintosh Ext	Alexander St Ext	SR 39	0.14	118	98,642	22,266	23%	2
Cherry St Ext	Wilder Rd	Wiggins Rd	1.75	118	1,101,235	0	0%	7
Lampp Rd Ext (E-W)	Lampp Rd	County Line Rd Ext	2.04	118	1,279,809	224,198	18%	6,7
Lampp Rd Ext (N-S)	Lamp Rd Ext (E-W)	Charlie Taylor Rd	1.33	118	836,710	128,528	15%	6

Site-Specific Intersection Recommendations

An additional task of this project is the development of recommendations for future improvements to the intersections of Park and County Line Roads with North and South Frontage Roads (see area map in Figure 2 below).

A site visit revealed that queue lengths, although quite long, seemed to be resulting from a lack of gaps in the traffic streams on the Park Road and County Line Road and not from excessive volumes on the frontage roads. The lack of gaps appears to stem from the randomness of the arrivals at the intersections. Continuous flow right turn lanes off of the interstate account for the randomness of the southbound arrivals at the southern frontage road on Park Road. Significant distances to the nearest signals to the south contribute to the randomness of the northbound arrivals. There are no signals at the interchange on County Line Road. It was therefore hypothesized that the operations of the corridor, not the geometrics, might be the root cause of the queues and delays on the frontage road approaches to Park Road and County Line Road.

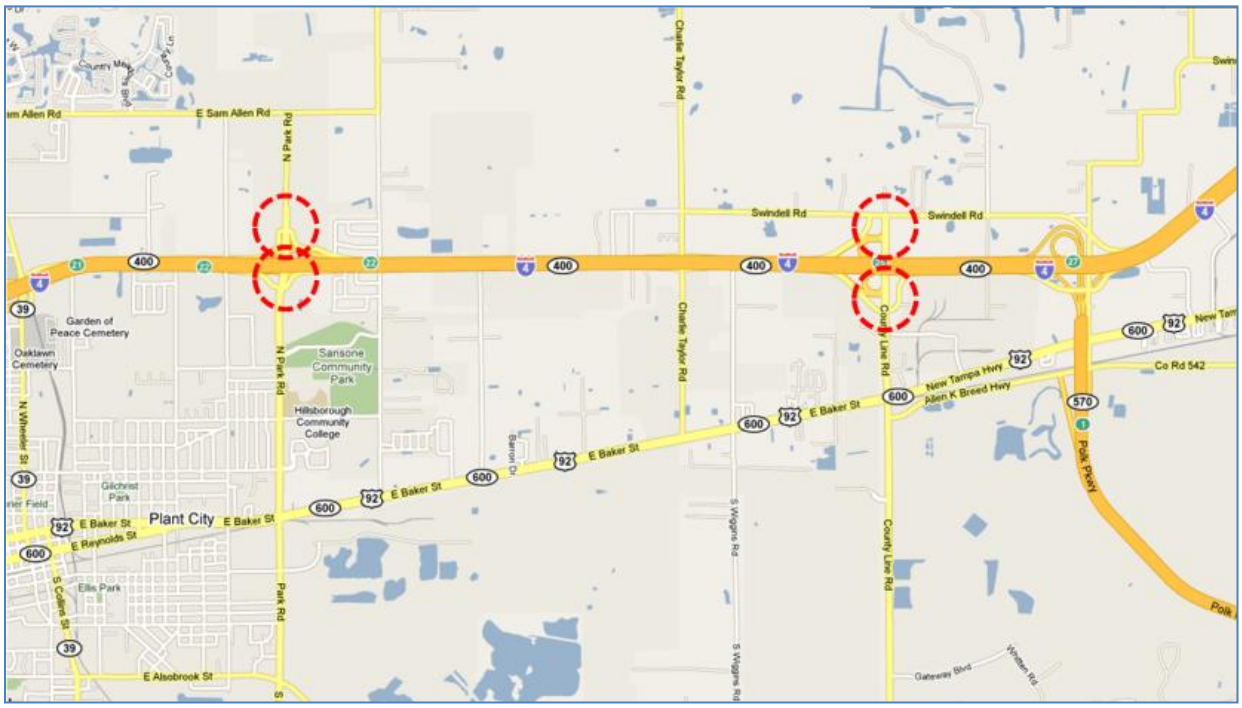

Figure 2 Study Intersection Area Map

To evaluate this hypothesis, a Critical Flow Sum Analysis was performed on three of the intersections in question. In this analysis (essentially the same as that used in the 1985 *Highway Capacity Manual* for planning purposes) the maximum number of potential conflicting through vehicles per lane and left turn vehicles per lane are summed to determine a sum of critical flows. Typically an intersection with a sum of critical flows less than 1200 vehicles per lane per hour (vplph) can be made to operate at an acceptable level of services.

Sprinkle Consulting has traffic counts from several traffic impact studies that have been performed over the last several years. These counts were used for this analysis. The following peak hour traffic volume counts were used for the analysis:

- County Line Road and South Frontage Road (May 2007)
- Park Road and North Frontage Road (August 2006)
- Park Road and South Frontage Road (August 2006)

Of the three intersections, the maximum number of conflicting movements is 623 vehicles per lane (at Park Road and South Frontage Road). Even if the traffic volume is doubled (to 1246 vehicles per lane) the intersection may still function at an acceptable level of service. To further test the geometric capacity of the intersection at Park Road and South Frontage Road, an HCS analysis was performed using double the volumes reported for Park Road and South Frontage Road. While the eastbound approach failed (LOS F) in the current configuration, the analysis suggests it would perform acceptably if a separate left turn lane were provided.

Even for a doubling of traffic volume there is no apparent need to modify the existing intersection geometry in the near future. At present, it is the random distribution of traffic between the various northbound and southbound lanes on Park Road and County Line Road that restricts through, left, and right turn movements from North and South Frontage Road. With signalization these intersections could function acceptably.

These findings should not be taken to suggest that the best solution is to signalize the frontage road intersections. Ideally, Park Road and County Line Road would be evaluated as corridors to determine the best potential signal configurations along these roads to minimize delay for all users.

Figure 3 on the following page shows the results of the Critical Flow Analyses. A Highway Capacity Software (HCS) report for Park Road at South Frontage Road, with the traffic doubled from the current volumes, and with a left turn lane added on the eastbound approach, is provided as Figure 4.

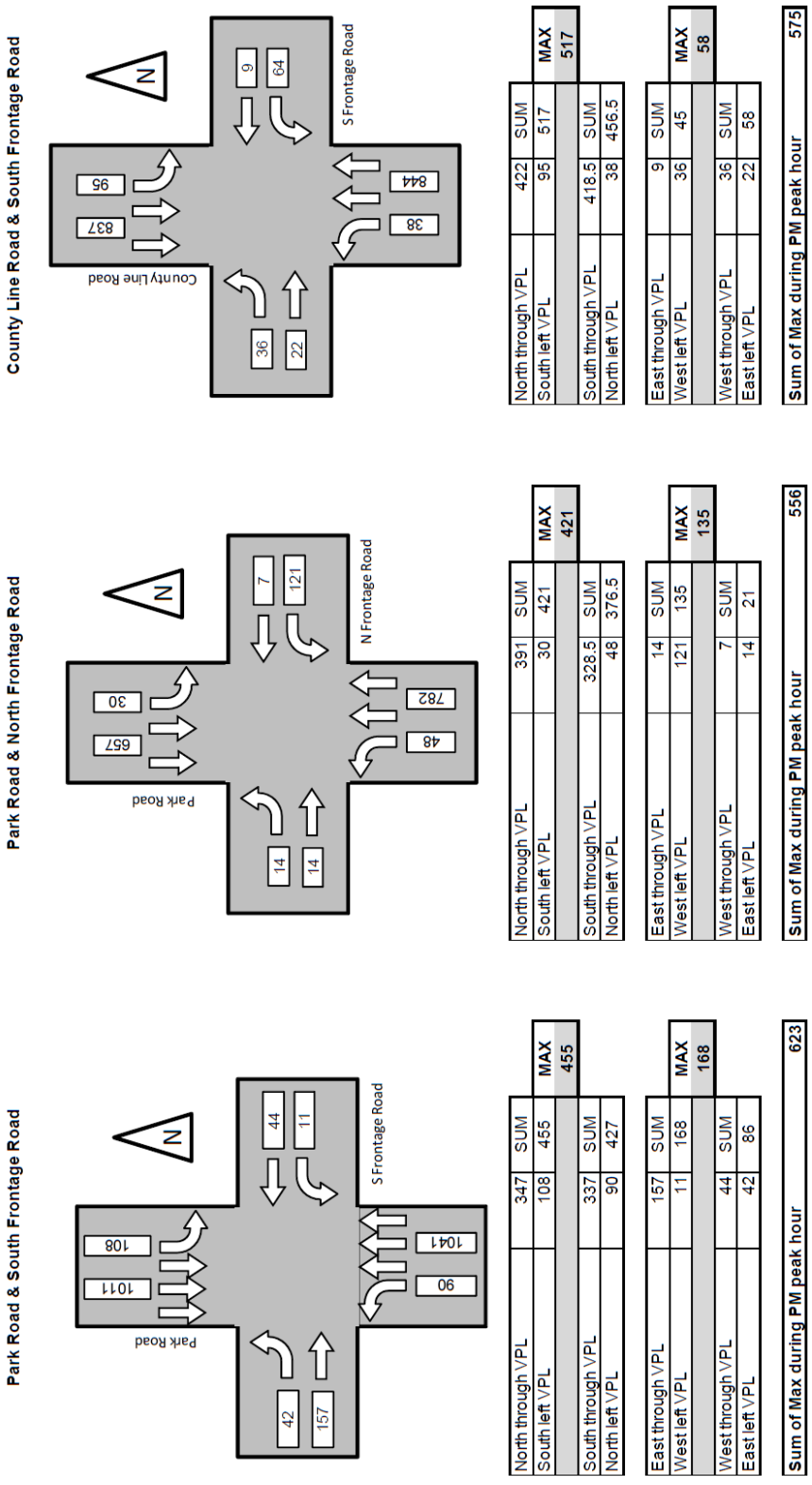

Figure 3 Analysis of Critical Flows

SHORT REPORT

General Information		Site Information	
Analyst	*PSM*	Intersection	*Park Rd @ S Frontage Rd*
Agency or Co.	*SCI*	Area Type	*All other areas*
Date Performed	*4/28/2010*	Jurisdiction	
Time Period	*PM peak*	Analysis Year	*future (double 2006 volume)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*1*	*0*	*0*	*1*	*1*	*1*	*3*		*1*	*3*	
Lane Group	*L*	*LTR*			*LT*	*R*	*L*	*T*		*L*	*T*	
Volume (vph)	*84*	*314*	*0*	*22*	*88*	*0*	*180*	*2082*		*216*	*2022*	
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*		*0.90*	*0.90*	
Pretimed/Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*		*P*	*P*	
Startup Lost Time	*2.0*	*2.0*			*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	
Extension of Effective Green	*2.0*	*2.0*			*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	
Arrival Type	*3*	*3*			*3*	*3*	*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*			*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*	
Lane Width	*12.0*	*12.0*			*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*			*0*	*0*	*0*	*0*		*0*	*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	EW Perm	02	03	04	Excl. Left	Thru Only	07	08
Timing	G = *26.0*	G = *0.0*	G = *0.0*	G = *0.0*	G = *22.0*	G = *50.0*	G = *0.0*	G = *0.0*
	Y = *5*	Y = *0*	Y = *0*	Y = *0*	Y = *5*	Y = *5*	Y = *0*	Y = *0*
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *113.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*93*	*349*			*122*	*0*	*200*	*2313*		*240*	*2247*	
Lane Group Capacity	*282*	*437*			*271*	*372*	*351*	*2290*		*351*	*2290*	
v/c Ratio	*0.33*	*0.80*			*0.45*	*0.00*	*0.57*	*1.01*		*0.68*	*0.98*	
Green Ratio	*0.23*	*0.23*			*0.23*	*0.23*	*0.19*	*0.44*		*0.19*	*0.44*	
Uniform Delay d_1	*36.2*	*41.0*			*37.4*	*33.5*	*41.2*	*31.5*		*42.3*	*31.0*	
Delay Factor k	*0.50*	*0.50*			*0.50*	*0.50*	*0.50*	*0.50*		*0.50*	*0.50*	
Incremental Delay d_2	*3.1*	*14.1*			*5.3*	*0.0*	*6.6*	*21.3*		*10.3*	*14.9*	
PF Factor	*1.000*	*1.000*			*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*	
Control Delay	*39.3*	*55.2*			*42.7*	*33.5*	*47.8*	*52.8*		*52.6*	*45.9*	
Lane Group LOS	*D*	*E*			*D*	*C*	*D*	*D*		*D*	*D*	
Approach Delay	*51.8*			*42.7*			*52.4*			*46.6*		
Approach LOS	*D*			*D*			*D*			*D*		
Intersection Delay	*49.5*			Intersection LOS			*D*					

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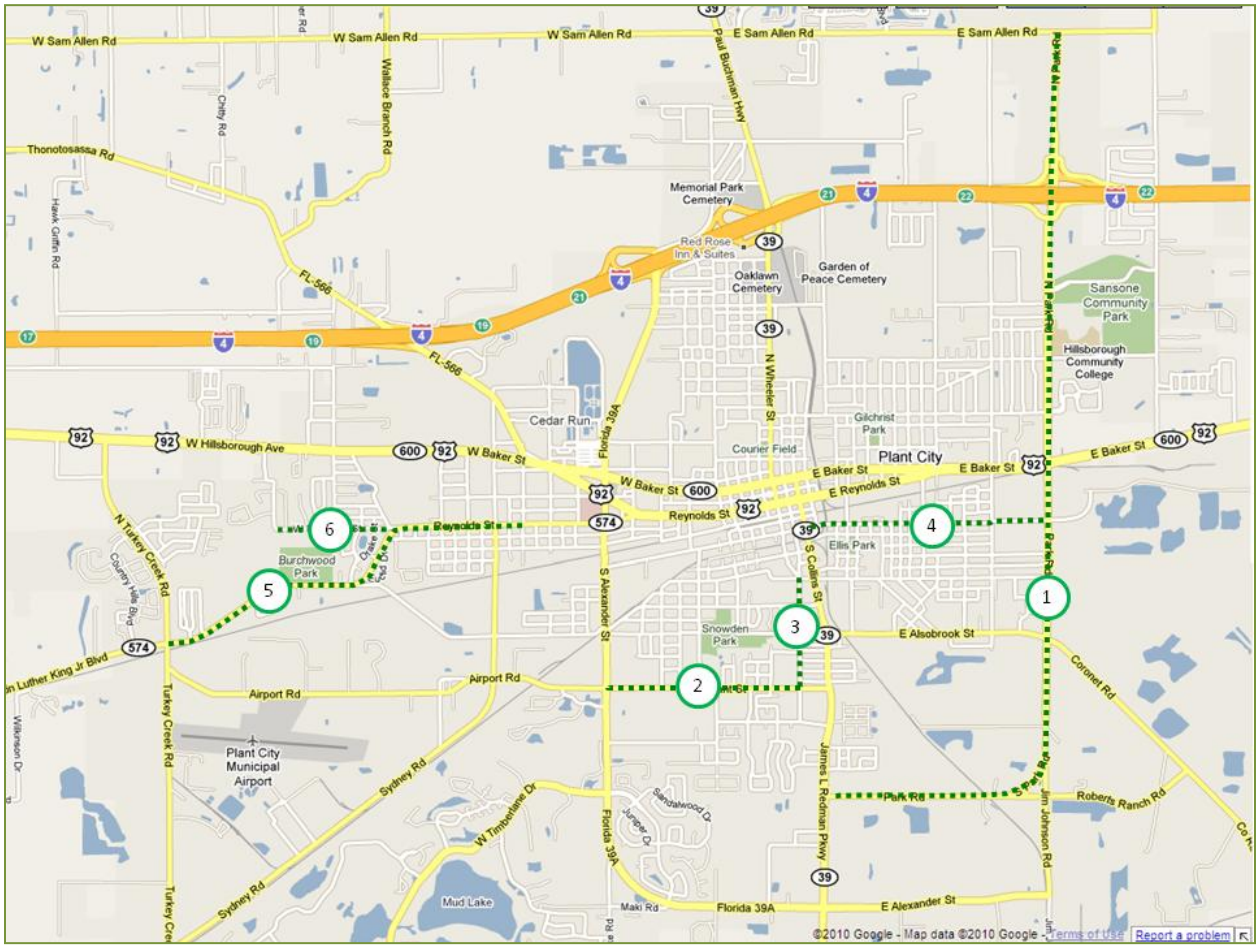
Figure 4 HCS Report for Park Road & South Frontage Road

Bicycle and Pedestrian Facility Analyses for Selected Corridors

Another task of the Right-of-Way Preservation Map project is the evaluation of up to six local City roadway sections for the potential inclusion of bicycle and pedestrian facilities. For this effort, the City requested the following roadway sections be reviewed:

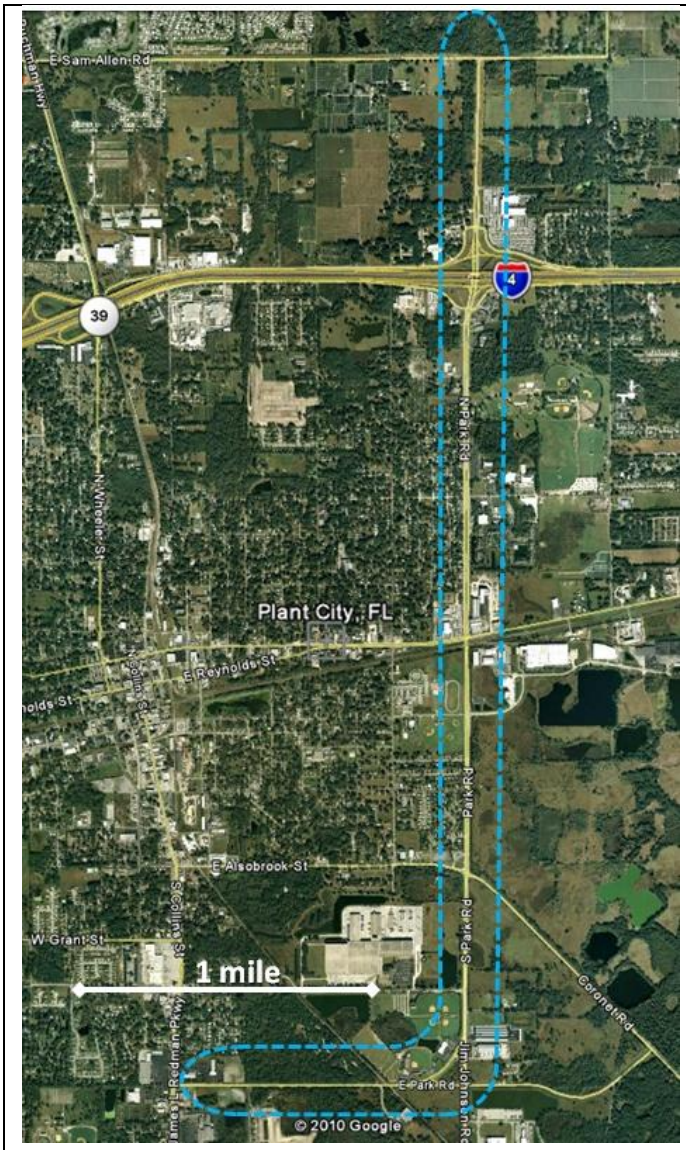
1. Park Road – from Walden Woods Dr @ East Park Road to Sam Allen Road;
2. Grant Street – From Evers Street to Alexander Street;
3. Evers Street – From Grant Street to Alabama Street;
4. E. Martin Luther King, Jr. Blvd – From Park Road to Downtown;
5. SR 574 - from Turkey Creek Road to Lemon Street; and
6. Country Hills/W. Reynolds St - from Country Hills ROW to SR 574.

These sections are mapped below:



A review of the potential for bike and pedestrian facilities on each of the roadways based on existing rights-of-way and roadside profiles follows.

Park Road – Walden Woods Drive to Sam Allen Road



Section 1- Park Street from Walden Woods Drive to Sam Allen Road

Park Road from Walden Woods Drive to Sam Allen Road is a 4.1 mile long section.

It begins at Walden Woods Drive as East Park Road, a two-lane roadway with no paved shoulders and sidewalks existing for only about 560 feet along the frontage of the Walden Woods development. This two lane section continues until the intersection with South Park Road. It appears that paved shoulders (even wide paved shoulders or buffered bike lanes – see below) could be provided along this section with minimal grading of existing shoulders. The provision of sidewalks along this section of East Park Road would require reshaping the shoulder.

As an alternative, a shared-use path could be constructed along the north side of this roadway. The construction would require reshaping the shoulders and swale, and drainage would likely be impacted. However, from the property appraiser's website it appears Plant City owns the property north of the roadway. Consequently any impacts

to drainage could conceivably be mitigated on the parcel to the north of East Park Road. The pathway could extend from the intersection of James L. Redman Parkway past the baseball stadium complex and, in fact, to the signalized intersection of South Park Road and Albertson's Drive.

Regardless of whether a shared use path or sidewalk is provided, some modification will be required at the railroad crossing.

This analysis section continues north along South Park Road. From its intersection with East Park Road continuing north to East Baker Street, South Park Road is a divided four-lane roadway with paved shoulders. The paved shoulders provide a facility for bicycles along this section. However, if a higher level facility is desired, the paved shoulders could be widened with minimal grading. Alternatively the lanes on the roadway could be narrowed to 11 feet to provide for wider shoulders/bike lanes or even buffered bike lanes. There appears to be adequate space to construct a sidewalk on either side of the roadway (a short section currently exists in front of Buckeye Storage Units). However, at some locations the side of the swale is rather steep; this would require handrails be installed to protect sidewalk users from the swale.[3]

A shared use path would be difficult to fit into the existing right-of-way. Given the need to separate the trail from the roadway (including the shoulder) by at least five feet, a significant amount of regrading would be required. It is likely the drainage requirements of the roadway would

[3]The requirement for shielding pedestrians from a swale or drop-off is found in the Florida DOT's Plans Preparation Manual: a drop-off greater than 10 inches that is closer than 2 feet from the pedestrians' or bicyclists' pathway or edge of sidewalk should be considered a hazard and shielded. Also, a slope steeper than 1:2 that begins closer than 2 feet from the pedestrians' or bicyclists' pathway or edge of sidewalk should be considered a hazard and shielded when the total drop-off is greater than 30 inches.

require the construction of either retaining walls or boardwalks.

From Baker Street north to just north of I-4, North Park Road is a six-lane roadway divided roadway with curb and gutter. The asphalt is 38 feet wide between the right-hand edge of the pavement and the median; it is striped with 14-foot outside curb lanes (once a standard striping to accommodate bicyclists). Given the available asphalt, the roadway could be restriped to provide three 11-foot lanes a 5-foot bike lane.

Most of this section has sidewalks. The exception is north of South Frontage Road on the west side of the Park Road. There is adequate right-of-way to continue the sidewalk to North Frontage Road.

Construction of a shared use path along this section of Park Road would be difficult. While much of the section appears to have adequate right-of-way for a 10-foot path, five feet from the back of curb, FDOT standards now recommend a minimum of 12-feet of width. This means the path would be too close to the roadway.

The northernmost section of this analysis roadway extends from North Frontage Road to Sam Allen Road. The section is an undivided two-lane roadway with no paved shoulders or sidewalks. However, the shoulders are relatively flat and there is adequate right-of-way to install paved shoulders, sidewalks, and/or a shared use path. Minimal grading would be required to construct any of these facilities.

Buffered bike lanes are bike lanes that are separated from the general travel lanes by a hatched out space sometimes referred to as a comfort stripe. These facilities are hypothesized to have several advantages:

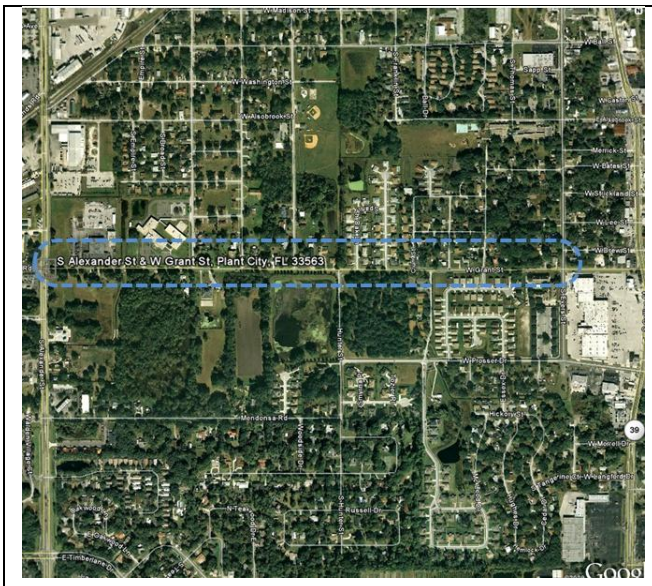
- Because they are one way and located on the roadway pavement, they do not present the same “wrong way” riding hazards and lack of motorists perception associated with shared use paths adjacent to the roadway

- Research has shown that the separation stripe between bicyclists and motorists is a very significant factor when considering bicyclists perceived safety and comfort. By providing additional separation to the bicyclists, this perceived level of safety and comfort should be increased.
- Wider edge lines have been shown to reduce many types of nighttime crashes. It is thought that this is because motorists can spend less effort in identifying where the roadway edgeline is and more effort observing the surrounding environment. These higher emphasis markings should enhance this benefit.

Florida examples of buffered bike lanes with comfort stripes

Grant Street –Evers Street to Alexander Street

Grant Street from Alexander Street to Evers Street is a two-lane undivided roadway, approximately 22 feet wide, without curb and gutter.



Section 2- Grant Street from Alexander Street to Evers Street

Most of the Grant Street analysis section has relatively gently sloping paved shoulders. However, on the west end across from the Simmons Career Center, the shoulders fall off rather suddenly only a few feet from the edge of the roadway.

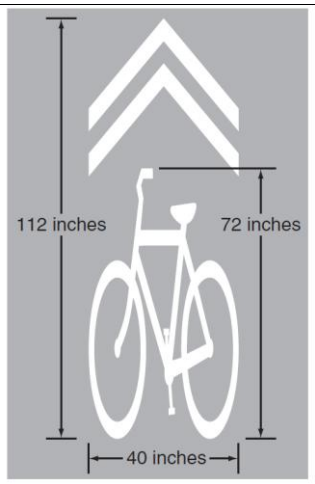
It would be possible to add paved shoulders along this short portion of the roadway, but it is not recommended they be marked and signed as bike lanes. If rumble stripes are used, paved shoulders could provide a safety benefit to motorists along the roadway as well as serving bicyclists. Along the rest of the section, adding paved shoulders could be accomplished with minimal regrading. At some intersections, where curbs exist, the curbs would have to be modified to provide for bike shoulders.

Sidewalks are intermittently present along Grant Street. Where there are gaps, it appears that sidewalks could be constructed with some reshaping of the swales. The exception is the aforementioned location across from Simmons Career Center where it is not likely a sidewalk could be constructed.

Providing both sidewalks and paved shoulders would be challenging. Given the grades of the shoulders in some locations, separation distances between sidewalks and roadway lanes would be minimal. Providing paved shoulders as well would result in a narrow grass strip between the asphalt and the sidewalk; typically such strips on non-curb and gutter roadways become maintenance problems and rut out.

It is also unlikely a shared use path could be easily constructed along this section. The shoulders and swales would have to be completely regarded. Drainage would have to be addressed, possibly by installing cross drains.

If the intent of improving this roadway is to provide connectivity in a recreational bike system, consideration should be given to installing Shared Lane Markings[4] along the roadway. If used, the centers of the Shared Lane Markings should be at least 4 feet from the edge of the pavement.



Shared Lane Marking

[4] Section 9C.07, *Manual on Uniform Traffic Control Devices*, FHWA, 2009.

Evers Street –Grant Street to Alabama Street

Evers Street is a three lane street, one lane each north and southbound and a two-way left turn lane. The pavement is 36 feet wide.

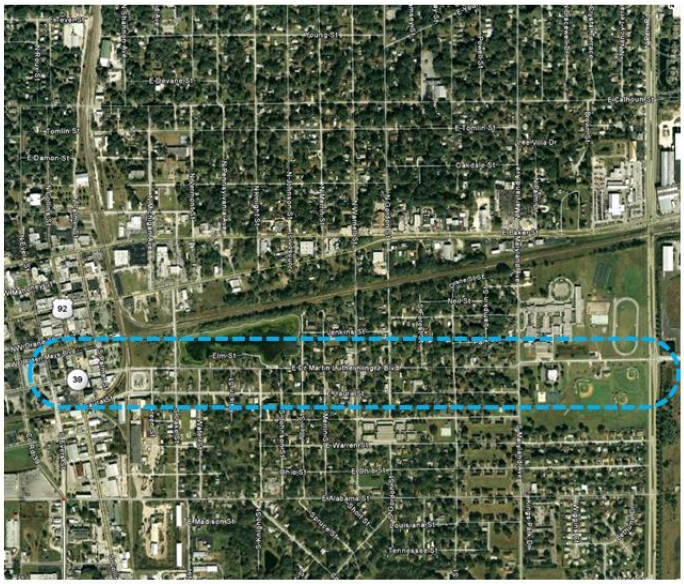
Section 3 – Evers Street from Grant Street to Alabama Street

There is not adequate width along Evers Street to create bike lanes and maintain the three-lane section. As an alternative, SHARED LANE MARKINGS could be installed along the roadway. If the City wishes to be aggressive in pursuing bicycle facilities along Evers Street, the two-way left turn lane could be removed and buffered bike lanes striped along the roadway. Striping would have to be designed to accommodate the left turn lane at Ball Street.

Construction of a shared use path would not be feasible on this section.

Sidewalks are present only on the east side of the street from Grant Street to Merrick Street. There is space to put a sidewalk on the west side of Evers Street, however in some locations it would need to be placed at the back of curb. From Merrick Street to Aslobrook Street there are sidewalks on both sides of the street. North of Alsobrook Street, the sidewalk is present only on the west side of the street; however, there is space to add a sidewalk on the east side.

E. Martin Luther King, Jr. Boulevard - Collins Street to Park Road



Section 4 – E Martin Luther King, Jr. Blvd from Downtown (Collins Street) to Park Road

The first two blocks of this analysis roadway, from Collins Street to the railroad tracks, are in downtown Plant City. On this segment there is on-street parking on the south side of the street. The roadway is 34' wide. Even if narrow parking lanes (7 feet wide) were used, the remaining 27 feet of roadway width would be insufficient to stripe bike lanes (bike lanes next to parking should be 5 feet wide). SHARED LANE MARKINGS would be an appropriate treatment for this location.

From just east of the railroad tracks to South Gordon Street, Martin Luther King, Jr. Boulevard is a 20-foot wide roadway with curbing and sidewalks on the north side of the street. It appears that there is adequate right-of-way on the south side of the street to provide space for bike lanes. However, this would require more than providing typical

shoulder paving. The widening of the roadway would shift the travel lanes south (to provide for a westbound bike lane). Consequently full depth base would be required for (at least four feet) of the road widening. Given the limited right-of-way, it appears that widening the road to provide bike lanes would eliminate the potential for adding sidewalks on the south side of the street. If the roadway is not widened, sidewalks can be provided on the south side of the roadway.

From South Gordon Street to South Maryland Avenue, the Martin Luther King, Jr. Boulevard does not have curb and gutter. The north side sidewalk is maintained with an approximately 5-foot separation from the roadway. Paved shoulders could be installed on both sides of the roadway along this section. However, the maintenance of the narrow buffer between the sidewalk (and any future south side sidewalk) and pavement would be an issue. Widening to the south would be an option; again, this eliminates the potential for adding a south side sidewalk. If the roadway is not widened, sidewalks can be provided on the south side of the roadway.

If the first two sections of Martin Luther King, Jr. Boulevard, from the railroad tracks to South Maryland Avenue, are not widened to provide shoulders, the SHARED LANE MARKING could be considered along these sections.

East of South Maryland Avenue to Park Road South, the Martin Luther King, Jr. Boulevard right-of-way widens significantly. A sidewalk is present for the first block on the south side of the road. Paved shoulders/bike lanes could be added along this section; sidewalks could be added (extended) to Park Road South. There is adequate right-of-way along this last section to construct a shared use path on either side of Martin Luther King, Jr. Boulevard.

SR 574 - Turkey Creek Road to Lemon Street

From the beginning of this analysis section at Turkey Creek Road to the intersection with West Reynolds Street, SR 574 is a two-lane roadway with paved shoulders and no sidewalks. There is no bike lane "slot" between the right-turn and through lanes at Turkey Creek Road; to complete a bike lane to the end of the section, this would have to be added. To provide a shared use path separated from the roadway shoulder by at least 5 feet,[5] at least 27 feet of right-of-way is required, or a suitable barrier must be provided. There does not appear to be enough right-of-way on either side of SR 574 to both develop a shared use path and maintain drainage swales. A path could possibly be fit within the right-of-way, but it would require significant reshaping of the swales and the installation of (at the least) guardrail.

Section 5 – SR 574 from Turkey Creek Road to Lemon Street

If the City desires to improve the bicycling conditions along this roadway, buffered bike lanes could be considered. The travel lanes could be narrowed to 11 feet and a 3-foot buffer provided to 4-foot bike lanes.

Sidewalks could be fit on this section. However there are numerous locations where boardwalk may be

[5] The 1991 AASHTO *Guide for the Development of Bicycle Facilities* stated when "the distance between the edge of the roadway and the bicycle path is less than 5 feet, a suitable divider may be considered." There was some confusion among designers that this meant 5 feet from the edge of the travel lanes. However, AASHTO defines the roadway as inclusive of the shoulders. The 1999 AASHTO *Guide for the Development of Bicycles* was modified to read when "the distance between the edge of the shoulder and the bicycle path is less than 5 feet, a suitable physical barrier is recommended."

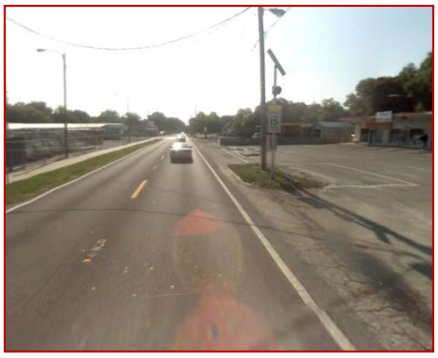
needed to maintain swales and would definitely be required to cross the creek.

East of West Reynolds Street and continuing to Edwards Street, a sidewalk is present on the north side of SR 574. It appears a shared use path could be constructed along the north side of SR 574; guardrail would be required to shield the path. Alternatively, buffered bike lanes could be considered along this section.

Sidewalk could be added to the south side of the street with minimal grading. One exception is an approximately 50 foot section between Ritter and May Streets where a swale may need to be regraded or piped.

West of Edwards Street to Lemon Street, SR 574 does not have paved shoulders. However, shoulders/bike lanes could be added with only minimal grading required.

It appears right-of-way is available to add sidewalks on the south side of SR 574. Some modification to the parking area across from Plum Street would need to be performed.



W. Reynolds Street - Country Hills ROW to SR 574

West Reynolds St - from Country Hills ROW to SR 574

Most of West Reynolds Street is a 22-foot wide two lane roadway with 2- to 6-foot graded shoulders. Paved shoulders could be added to this roadway; however, some swale reshaping would be required.

On the south side of the roadway, the right-of-way appears to be constrained. It is unlikely both shoulders and sidewalks could be constructed on this side. There appears to be space to construct both shoulders and sidewalks on the north side.

Between Pevetty Drive and Walter Drive, West Reynolds is curbed; it would not be possible to install bike lanes without reconstructing the curbing and associated drainage structures. SHARED LANE MARKINGS could be used on this section. Sidewalks could be constructed along this section.

Appendix A: Existing Standard Cross Sections by Jurisdiction

FDOT 2-lane Urban	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	2	6*
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Travel lane	12	12
Median	19.5ˣ	22ˣ
Travel lane	12	12
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	2	6*
Sidewalk	5	5
Offset to R/W line	2	2
Subtotal	**73.5**	**84**
Recommended	**74**	**84**

**Provides space for transverse curb ramps*

ˣProvides spaces for a median LT lane or a two-way LT lane

FDOT 4-lane Urban	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	4	6*
Curb (Type F) and Gutter	2	2
Bike Lane	4	4
Two-travel lanes	24	24
Median	22	22
Two-travel lanes	24	24
Bike Lane	4	4
Curb (Type F) and Gutter	2	2
Clear	4	6*
Sidewalk	5	5
Offset to R/W line	2	2
Subtotal	**104**	**108**
Recommended	**104**	**108**

**Provides space for transverse curb ramps*

FDOT 2-lane Rural	Desirable Minimum	< 45 mph Recommended	45 to 55 mph Recommended	55 mph Recommended
Offset to R/W line	6	6	6	6
Sidewalk	5	5	5	5
Clear	16	18*	24*	30*
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Travel Lane	12	12	12	12
Median	40	40	40	40
Travel Lane	12	12	12	12
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	16	18*	24*	30*
Sidewalk	5	5	5	5
Offset to R/W line	6	6	6	6
Subtotal	**134**	**138**	**150**	**162**
Recommended	**134**	**138**	**150**	**162**

**Places sidewalk outside of clear zone, also provides space for drainage*

FDOT 4-lane Rural	Desirable Minimum	< 45 mph Recommended	45 to 55 mph Recommended	55 mph Recommended
Offset to R/W line	6	6	6	6
Sidewalk	5	5	5	5
Clear	16	18*	24*	30*
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Two-travel lanes	24	24	24	24
Median	40	40	40	40
Two-travel lanes	24	24	24	24
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	16	18*	24*	30*
Sidewalk	5	5	5	5
Offset to R/W line	6	6	6	6
Subtotal	**158**	**162**	**174**	**186**
Recommended	**158**	**162**	**174**	**186**

**Places sidewalk outside of clear zone, also provides space for drainage*

FDOT 2-lane Urban w/ Trail	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	2	6*
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Travel lane	12	12
Median	19.5ˣ	22ˣ
Travel lane	12	12
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	4	8*
Trail	12	12
Offset to R/W line	2	2
Subtotal	**82.5**	**93**
Recommended	**84**	**94**

**Provides space for transverse curb ramps and intersection treatments for trail*

ˣProvides spaces for a median LT lane or a two-way LT lane

FDOT 4-lane Urban w/ Trail	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	4	6*
Curb (Type F) and Gutter	2	2
Bike Lane	4	4
Two-travel lanes	24	24
Median	22	22
Two-travel lanes	24	24
Bike Lane	4	4
Curb (Type F) and Gutter	2	2
Clear	4	8*
Trail	12	12
Offset to R/W line	2	2
Subtotal	**111**	**117**
Recommended	**112**	**118**

*Provides space for transverse curb ramps and intersection treatments for trail

FDOT 2-lane Rural w/ Trail	Desirable Minimum	< 45 mph Recommended	45 to 55 mph Recommended	55 mph Recommended
Offset to R/W line	6	6	6	6
Sidewalk	5	5	5	5
Clear	16	18*	24*	30*
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Travel Lane	12	12	12	12
Median	40	40	40	40
Travel Lane	12	12	12	12
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	16	18*	24*	30*
Trail	12	12	12	12
Offset to R/W line	6	6	6	6
Subtotal	**141**	**145**	**157**	**169**
Recommended	**142**	**146**	**158**	**170**

**Places sidewalk and trail outside of clear zone, also provides space for drainage*

FDOT 4-lane Rural w/ Trail	Desirable Minimum	< 45 mph Recommended	45 to 55 mph Recommended	55 mph Recommended
Offset to R/W line	6	6	6	6
Sidewalk	5	5	5	5
Clear	16	18*	24*	30*
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Two-travel lanes	24	24	24	24
Median	40	40	40	40
Two-travel lanes	24	24	24	24
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	16	18*	24*	30*
Trail	12	12	12	12
Offset to R/W line	6	6	6	6
Subtotal	**165**	**169**	**181**	**193**
Recommended	**166**	**170**	**182**	**194**

**Places sidewalk and trail outside of clear zone, also provides space for drainage*

City 2-lane Urban	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	2	6*
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Travel lane	12	12
Median	15.5×	15.5×
Travel lane	12	12
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	2	6*
Sidewalk	5	5
Offset to R/W line	2	2
Subtotal	**69.5**	**77.5**
Recommended	**70**	**78**

**Provides space for transverse curb ramps*
×Provides spaces for a median LT lane or a two-way LT lane

City 4-lane Urban	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	2	6*
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Two-travel lanes	24	24
Median	15.5	15.5
Two-travel lanes	24	24
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	2	6*
Sidewalk	5	5
Offset to R/W line	2	2
Subtotal	**93.5**	**101.5**
Recommended	**94**	**102**

**Provides space for transverse curb ramps*

City 2-lane Rural	Desirable Minimum	< 55 mph speed limit Recommended	55 mph speed limit Recommended
Offset to R/W line	2	2	2
Sidewalk	5	5	5
Clear	2	10	16*
Shoulder	8	8	8
Curb (miami) and Gutter	2	2	2
Bike Lane	4	4	4
Travel Lane	12	12	12
Space for turn lanes	15.5	15.5	19.5
Travel lane	12	12	12
Bike Lane	4	4	4
Curb (miami) and Gutter	2	2	2
Shoulder	8	8	8
Clear	2	10	16*
Sidewalk	5	5	5
Offset to R/W line	2	2	2
Subtotal	**85.5**	**101.5**	**117.5**
Recommended	**86**	**102**	**118**

**Places sidewalk outside of clear zone, also provides space for drainage*

City 4-lane Rural	Desirable Minimum	< 55 mph speed limit Recommended	55 mph speed limit Recommended
Offset to R/W line	2	2	2
Sidewalk	5	5	5
Clear	2	10	16*
Shoulder	8	8	8
Curb (miami) and Gutter	2	2	2
Bike Lane	4	4	4
Two travel lanes	24	24	24
Median	15.5	15.5	15.5
Two travel lanes	24	24	24
Bike Lane	4	4	4
Curb (miami) and Gutter	2	2	2
Shoulder	8	8	8
Clear	2	10	16*
Sidewalk	5	5	5
Offset to R/W line	2	2	2
Subtotal	**109.5**	**125.5**	**137.5**
Recommended	**110**	**126**	**138**

**Places sidewalk outside of clear zone, also provides space for drainage*

City 2-lane Urban w/ Trail	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	2	6*
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Travel lane	12	12
Median	15.5ˣ	15.5ˣ
Travel lane	12	12
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	5	8*
Trail	12	12
Offset to R/W line	2	2
Subtotal	**79.5**	**86.5**
Recommended	**80**	**88**

**Provides space for transverse curb ramps and intersection treatments for trail*
ˣProvides spaces for a median LT lane or a two-way LT lane

City 4-lane Urban w/ Trail	Desirable Minimum	Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	2	6*
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Two-travel lanes	24	24
Median	15.5ˣ	15.5ˣ
Two-travel lanes	24	24
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	5	8*
Trail	12	12
Offset to R/W line	2	2
Subtotal	**103.5**	**110.5**
Recommended	**104**	**112**

**Provides space for transverse curb ramps and intersection treatments for trail*

City 2-lane Rural w/ Trail	Desirable Minimum	< 55 mph speed limit Recommended	55 mph speed limit Recommended
Offset to R/W line	2	2	2
Sidewalk	5	5	5
Clear	2	10	16*
Shoulder	8	8	8
Curb (miami) and Gutter	2	2	2
Bike Lane	4	4	4
Travel Lane	12	12	12
Space for turn lanes	15.5	15.5	19.5
Travel lane	12	12	12
Bike Lane	4	4	4
Curb (miami) and Gutter	2	2	2
Shoulder	8	8	8
Clear	5	10	16*
Trail	12	12	12
Offset to R/W line	2	2	2
Subtotal	**95.5**	**108.5**	**124.5**
Recommended	**96**	**110**	**126**

**Places sidewalk and trail outside of clear zone, also provides space for drainage*

City 4-lane Rural w/ Trail	Desirable Minimum	< 55 mph speed limit Recommended	55 mph speed limit Recommended
Offset to R/W line	2	2	2
Sidewalk	5	5	5
Clear	2	10	16*
Shoulder	8	8	8
Curb (miami) and Gutter	2	2	2
Bike Lane	4	4	4
Two-travel lanes	24	24	24
Median	15.5	15.5	15.5
Two-travel lanes	24	24	24
Bike Lane	4	4	4
Curb (miami) and Gutter	2	2	2
Shoulder	8	8	8
Clear	5	10	16*
Trail	12	12	12
Offset to R/W line	2	2	2
Subtotal	**119.5**	**132.5**	**144.5**
Recommended	**120**	**134**	**146**

**Places sidewalk and trail outside of clear zone, also provides space for drainage*

County 2-lane Urban	Desirable Minimum	35 mph Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	7	7
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Travel lane	12	12
Median	19.5*	22
Travel lane	12	12
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	7	7
Sidewalk	5	5
Offset to R/W line	2	2
Subtotal	**83.5**	**86**
Recommended	**84**	**86**

**Provides spaces for a median LT lane or a two-way LT lane*

County 4-lane Urban	County Minimum	45 mph Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	7	7
Curb (Type F) and Gutter	2	2
Bike Lane	4	4
Two-travel lanes	24	24
Median	22	22
Two-travel lanes	24	24
Bike Lane	4	4
Curb (Type F) and Gutter	2	2
Clear	7	7
Sidewalk	5	5
Offset to R/W line	2	2
Subtotal	**110**	**110**
Recommended	**110**	**110**

County 2-lane Rural	Desirable Minimum	<40 mph Recommended	40 - 50 mph Recommended	55 mph Recommended
Offset to R/W line	2	2	2	2
Sidewalk	5	5	5	5
Clear	21	21	23	30
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Travel Lane	10	12	12	12
Median	19.5*	22*	22*	40
Travel Lane	10	12	12	12
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	21	21	23	30
Sidewalk	5	5	5	5
Offset to R/W line	2	2	2	2
Subtotal	**111.5**	**118**	**122**	**154**
Recommended	**112**	**118**	**122**	**154**

**Provides spaces for a median LT lane or a two-way LT lane*

County 4-lane Rural	Desirable Minimum	<40 mph Recommended	40 - 50 mph Recommended	55 mph Recommended
Offset to R/W line	2	2	2	2
Sidewalk	5	5	5	5
Clear	21	21	23	30
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Two-travel lanes	24	24	24	24
Median	22	22	22	40
Two-travel lanes	24	24	24	24
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	21	21	23	30
Sidewalk	5	5	5	5
Offset to R/W line	2	2	2	2
Subtotal	**142**	**142**	**146**	**178**
Recommended	**142**	**142**	**146**	**178**

County 2-lane Urban w/ Trail	Desirable Minimum	35 mph Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	7	7
Curb (type F) and Gutter	2	2
Bike Lane	4	4
Travel lane	12	12
Median	19.5*	22
Travel lane	12	12
Bike Lane	4	4
Curb (type F) and Gutter	2	2
Clear	7	7
Trail	12	12
Offset to R/W line	2	2
Subtotal	**90.5**	**93**
Recommended	**91**	**94**

**Provides spaces for a median LT lane or a two-way LT lane*

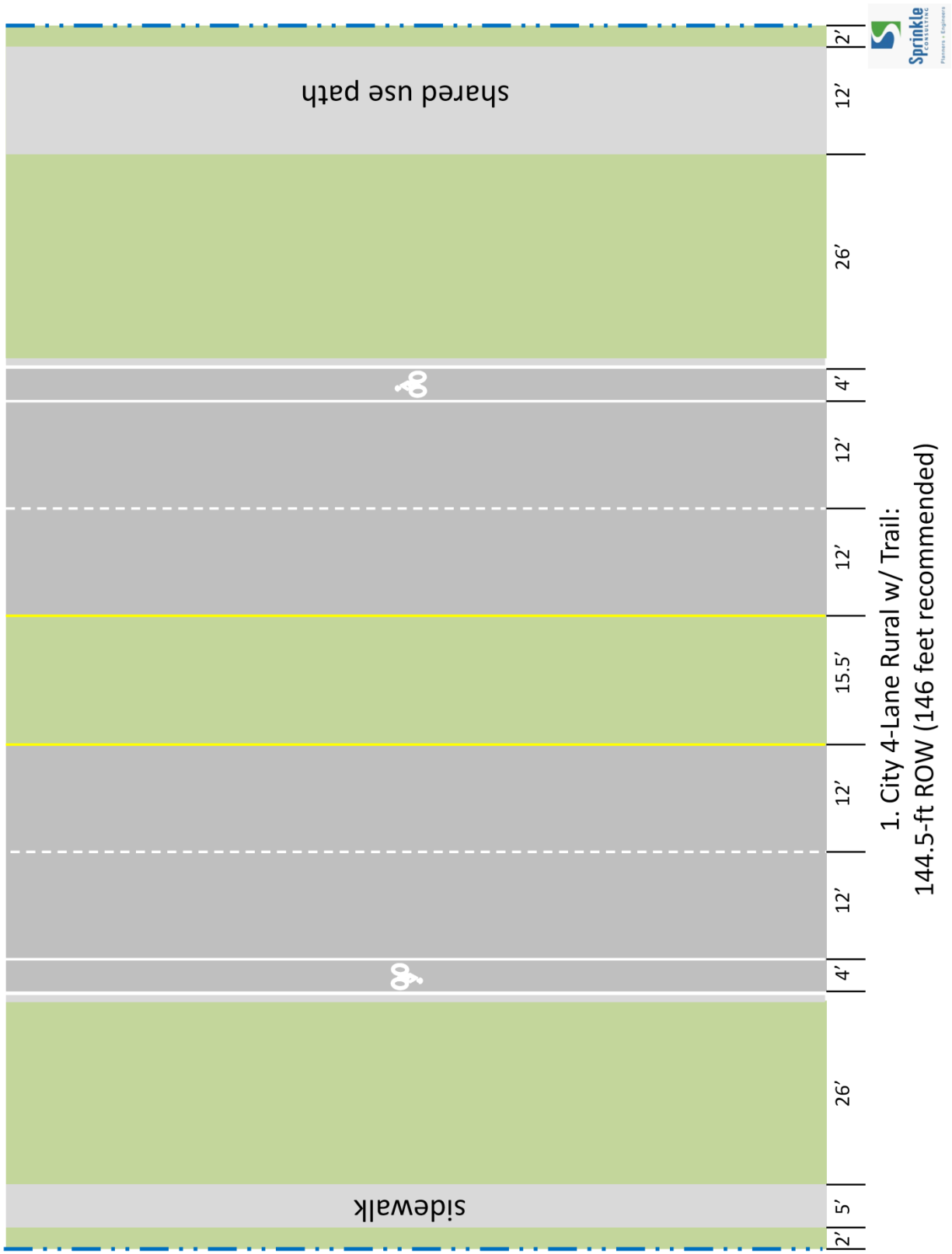
County 4-lane Urban w/ Trail	County Minimum	45 mph Recommended
Offset to R/W line	2	2
Sidewalk	5	5
Clear	7	7
Curb (Type F) and Gutter	2	2
Bike Lane	4	4
Two-travel lanes	24	24
Median	22	22
Two-travel lanes	24	24
Bike Lane	4	4
Curb (Type F) and Gutter	2	2
Clear	7	7
Trail	12	12
Offset to R/W line	2	2
Subtotal	**117**	**117**
Recommended	**118**	**118**

County 2-lane Rural w/ Trail	Desirable Minimum	<40 mph Recommended	40 - 50 mph Recommended	55 mph Recommended
Offset to R/W line	2	2	2	2
Sidewalk	5	5	5	5
Clear	21	21	23	30
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Travel Lane	10	12	12	12
Median	19.5*	22*	22*	40
Travel Lane	10	12	12	12
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	21	21	23	30
Trail	12	12	12	12
Offset to R/W line	2	2	2	2
Subtotal	**118.5**	**125**	**129**	**161**
Recommended	**120**	**126**	**130**	**162**

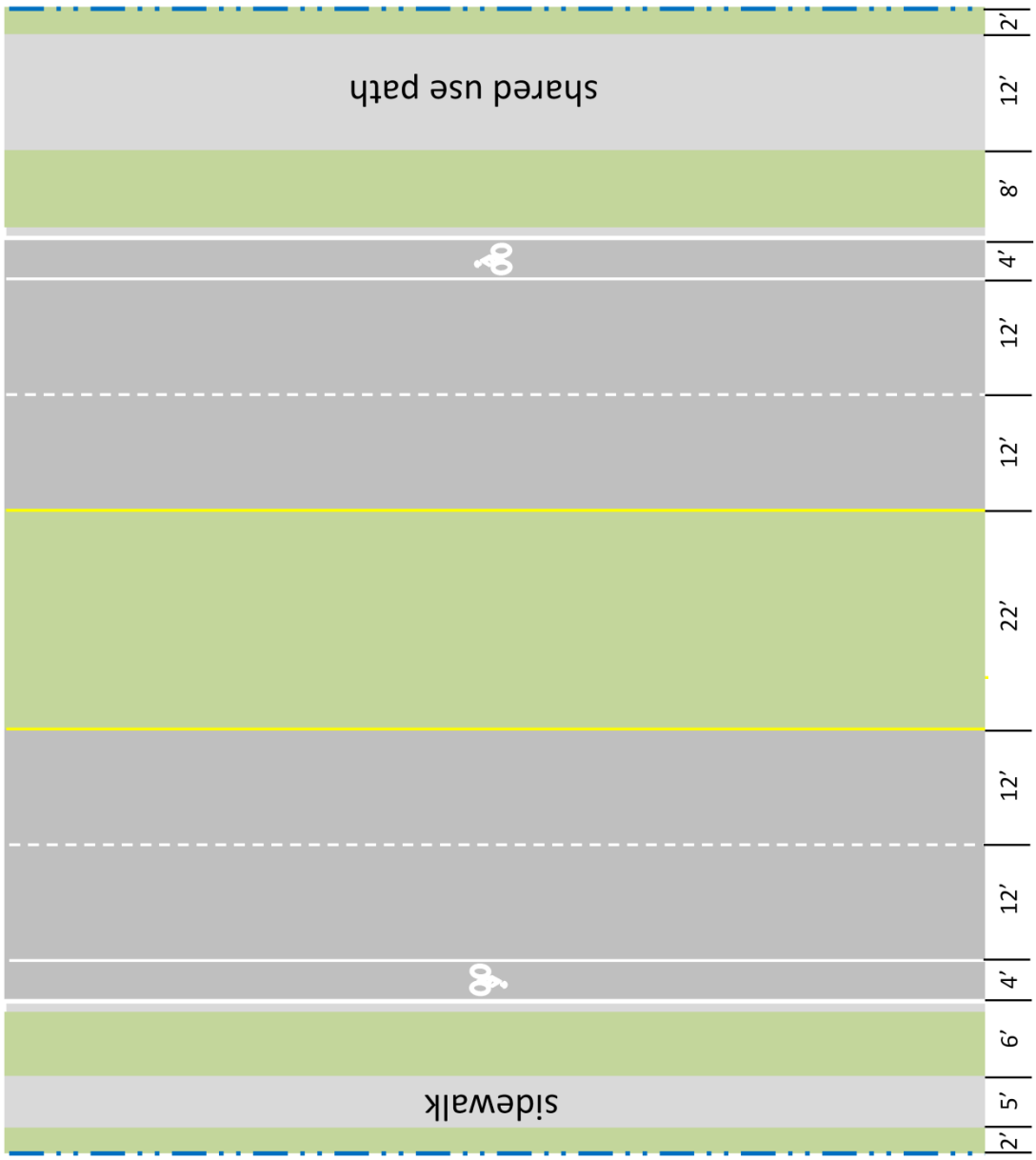
**Provides spaces for a median LT lane or a two-way LT lane*

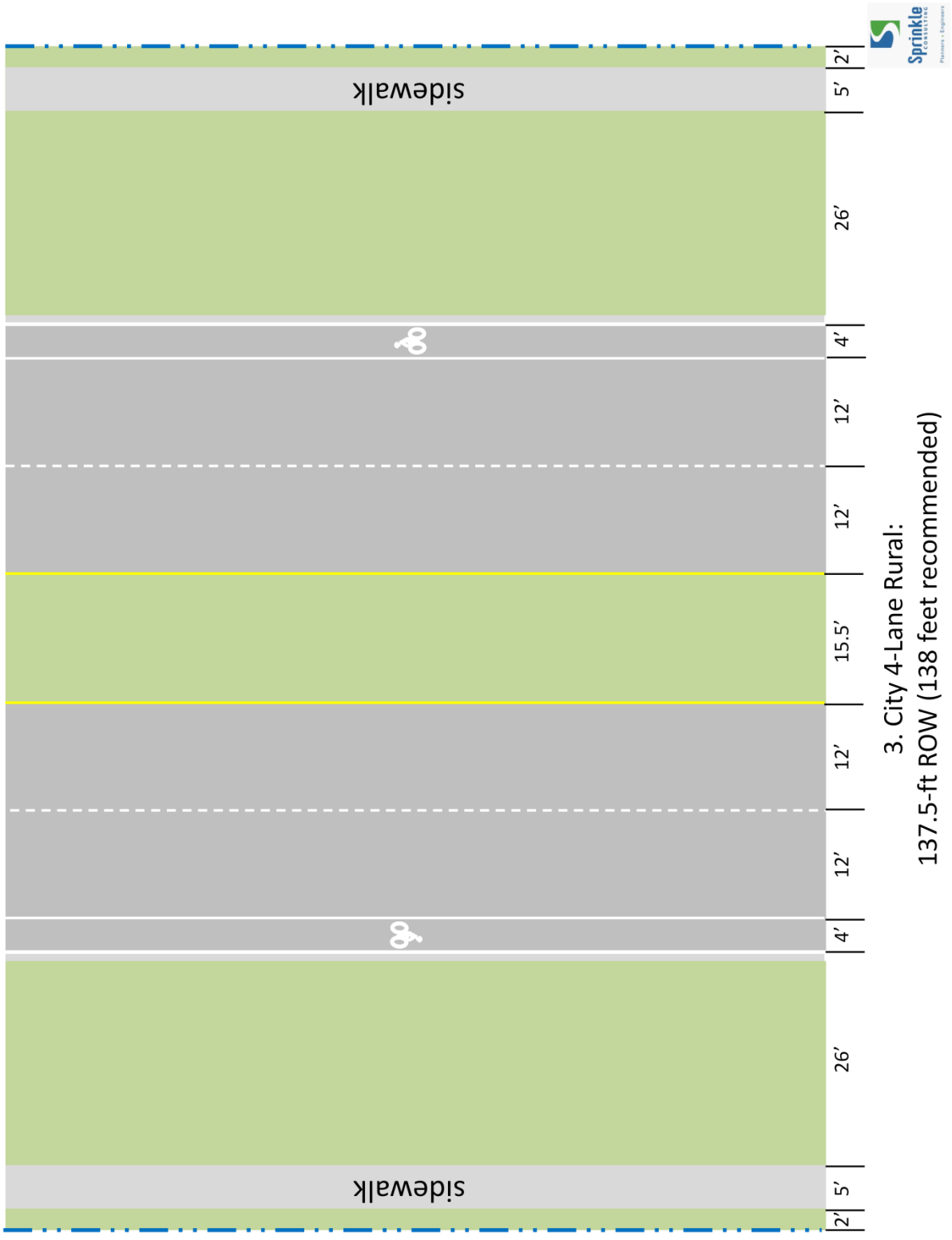
County 4-lane Rural	Desirable Minimum	<40 mph Recommended	40 - 50 mph Recommended	55 mph Recommended
Offset to R/W line	2	2	2	2
Sidewalk	5	5	5	5
Clear	21	21	23	30
Graded Shoulder	3	3	3	3
Paved Shoulder/Bike Lane	5	5	5	5
Two-travel lanes	24	24	24	24
Median	22	22	22	40
Two-travel lanes	24	24	24	24
Paved Shoulder/Bike Lane	5	5	5	5
Graded Shoulder	3	3	3	3
Clear	21	21	23	30
Trail	12	12	12	12
Offset to R/W line	2	2	2	2
Subtotal	**149**	**149**	**153**	**185**
Recommended	**150**	**150**	**154**	**186**

Appendix B: Right-of-Way Preservation Map Cross Section Drawings

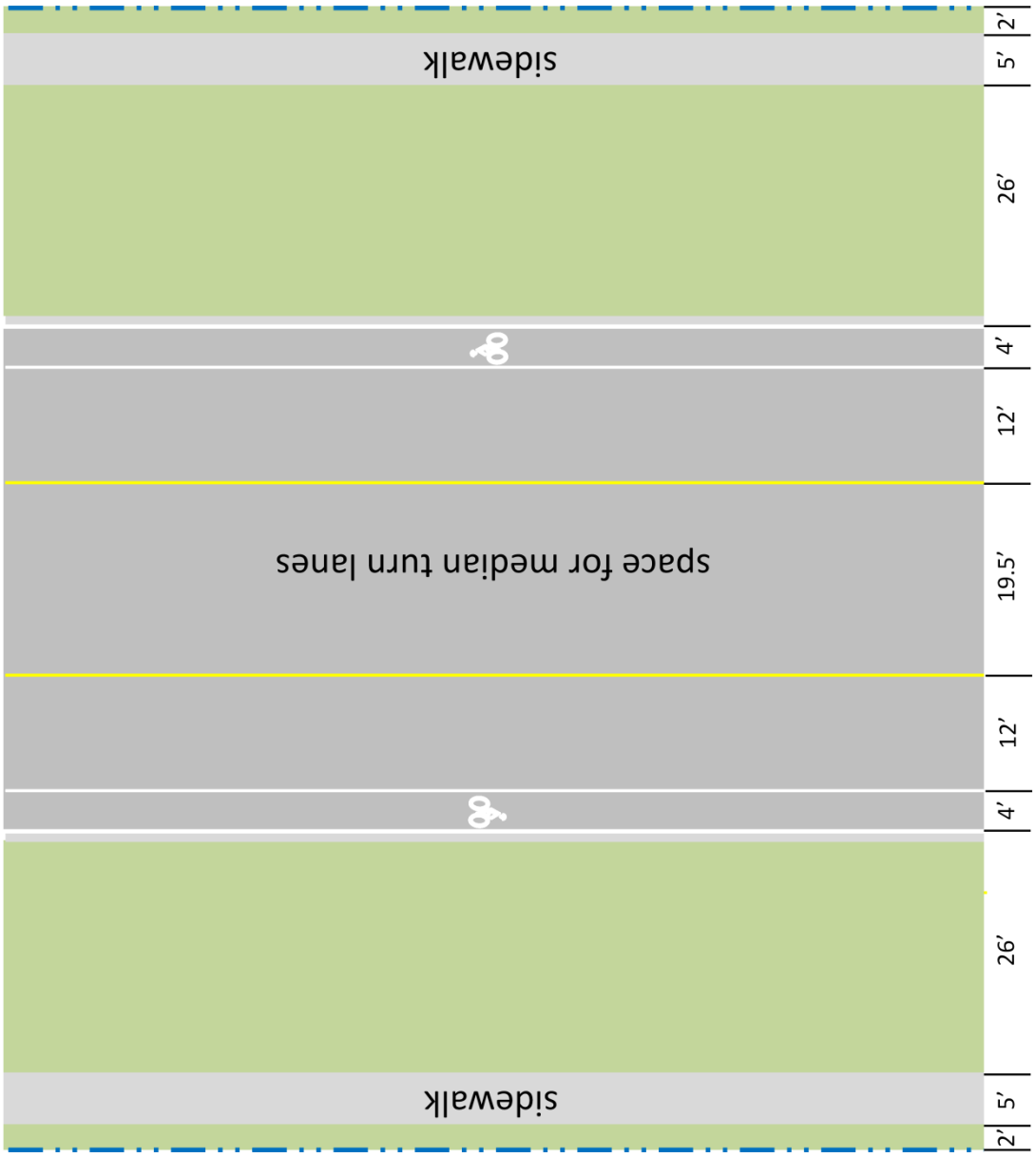


1. City 4-Lane Rural w/ Trail:
144.5-ft ROW (146 feet recommended)

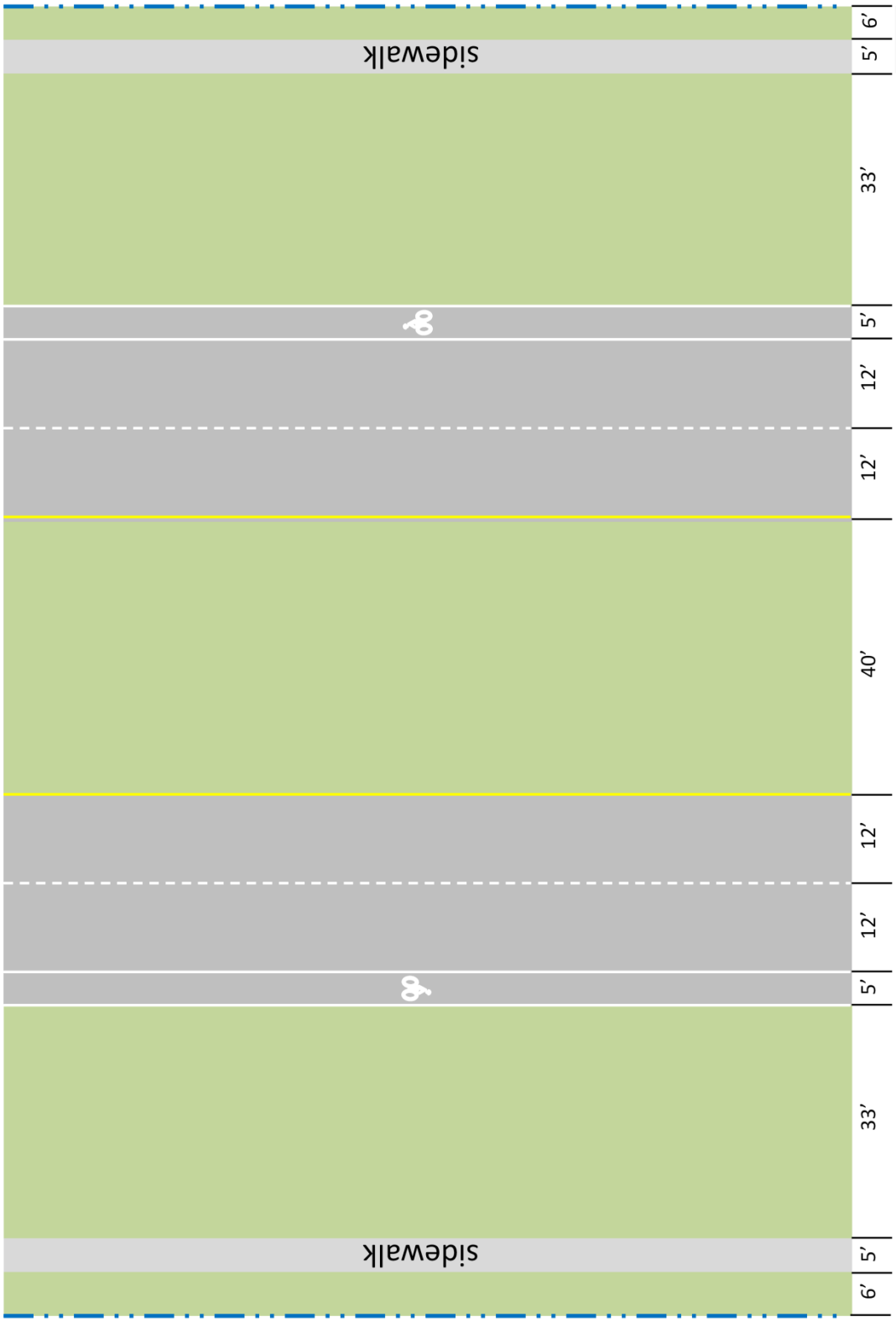

2. FDOT 4-Lane Urban w/ Trail:
117-ft ROW (118 feet recommended
sidewalk
shared use path
2'
5'
6'
4'
12'
12'
12'
22'
12'
12'
4'
8'
12'
2'



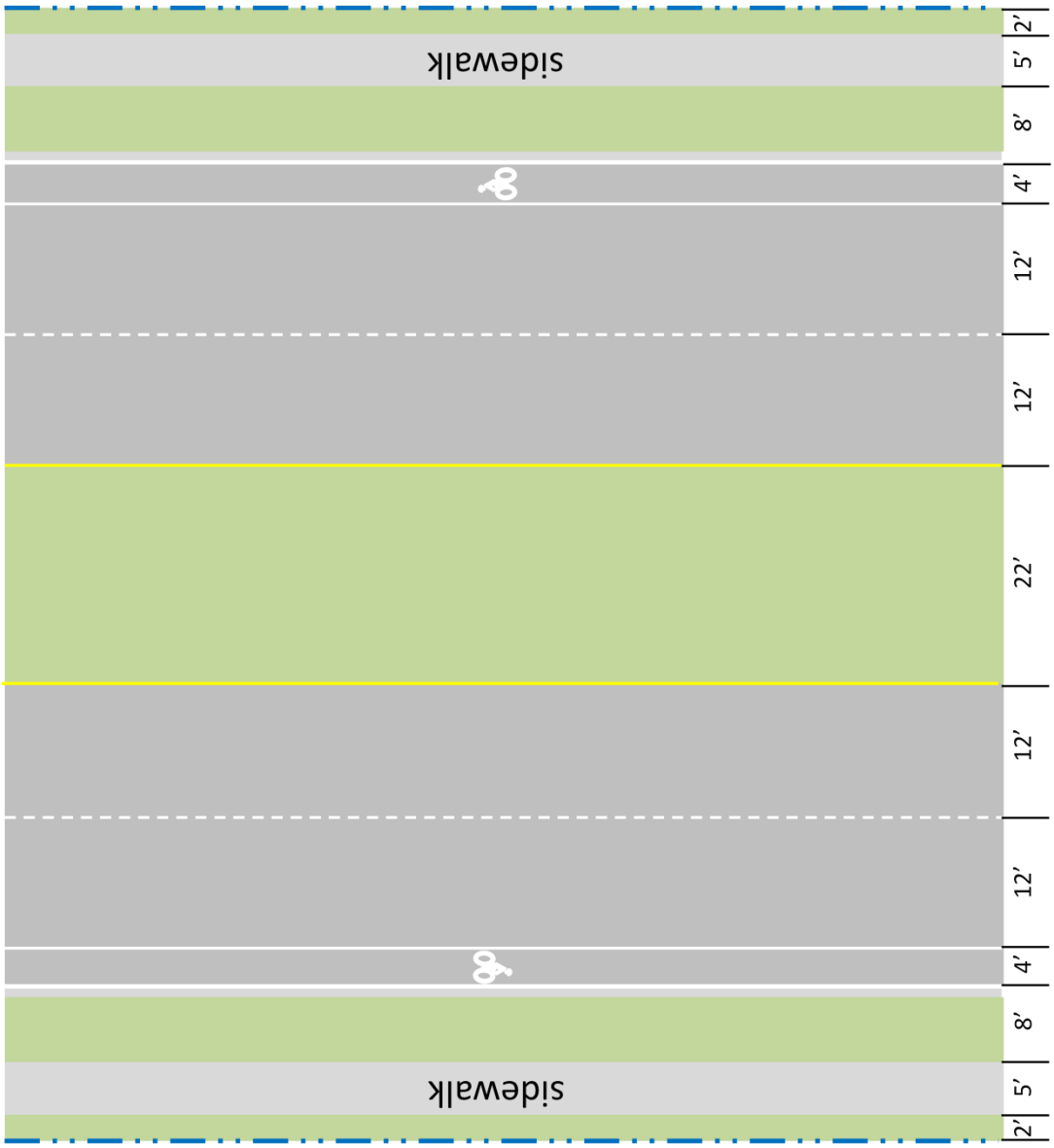
3. City 4-Lane Rural:
137.5-ft ROW (138 feet recommended)



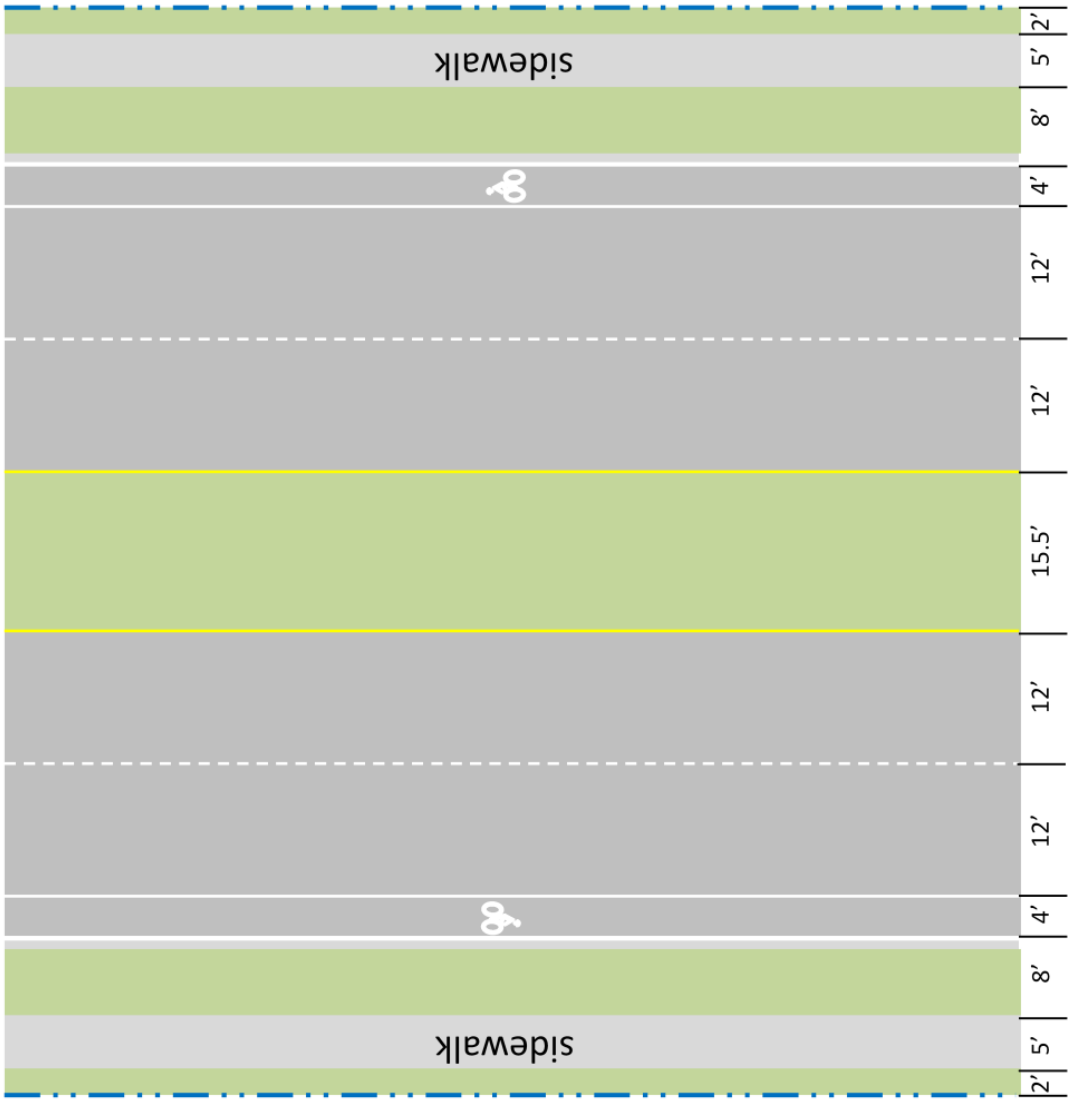
4. City 2-Lane Rural: 117.5-ft ROW (118 feet recommended)



5. FDOT 4-Lane Rural:
186-ft ROW



6. FDOT 4-Lane Urban:
108-ft ROW



7. City 4-Lane Urban:
101.5-ft ROW (102 feet recommended)

Appendix C: Drainage Calculations

Plant City ROW Preservation Drainage Considerations - New Roadway Calculations

Pre Development Cross-Section Summary	
Open area width	17 ft
Impervious per LN-mi	0.00 Acres
Pervious per LN-mi	2.06 Acres

Post Development Cross-Section Summary	
Avg Lane width	14 ft*
Avg Open area width	3 ft**
Impervious per LN-mi	1.70 Acres
Pervious per LN-mi	0.36 Acres
**Assumes 2ft for addt'l impervious areas*	
***For medians, utility strips, etc…*	

SCS Runoff Coeficient per Soil Type

		Hydrologic Group A			*Hydrologic Group B*			*Hydrologic Group C*			*Hydrologic Group D*		
		CN	%	%CN	CN	%	%CN	CN	%	%CN	CN	%	%CN
Pre Development	Impervious	98	0%	0	98	0%	0	98	0%	0	98	0%	0
	Pervious	39	100%	39	61	100%	61	74	100%	74	80	100%	80
	Avg CN			**39**			**61**			**74**			**80**
Post Development	Impervious	98	82%	80.7	98	82%	80.7	98	82%	80.7	98	82%	80.7
	Pervious	39	18%	6.9	61	18%	10.8	74	18%	13.1	80	18%	14.1
	Avg CN			**87.6**			**91.5**			**93.8**			**94.8**

SCS Runoff Volumes per Soil Type

Rainfall (SWFWMD)		*Hydrologic Group A*			*Hydrologic Group B*			*Hydrologic Group C*			*Hydrologic Group D*		
		Pre Ac-ft	Post Ac-ft	Diff. Ac-ft	Pre Ac-ft	Post Ac-ft	Diff. Ac-ft	Pre Ac-ft	Post Ac-ft	Diff. Ac-ft	Pre Ac-ft	Post Ac-ft	Diff. Ac-ft
Open Basin†	8 in	0.199	1.119	**0.921**	0.592	1.199	**0.607**	0.846	1.246	**0.400**	0.966	1.267	**0.301**
Closed Basin†	11 in	0.453	1.625	**1.173**	1.007	1.709	**0.702**	1.318	1.758	**0.440**	1.456	1.781	**0.325**

Estimated Stormwater Treatment and Attenuation Volume per Lane-Mile of New Roadway*

Storm-Event	*Hydrologic Group A*	*Hydrologic Group B*	*Hydrologic Group C*	*Hydrologic Group D*
Open Basin†	*0.921 Ac-ft*	*0.607 Ac-ft*	*0.400 Ac-ft*	*0.301 Ac-ft*
Closed Basin†	*1.173 Ac-ft*	*0.702 Ac-ft*	*0.440 Ac-ft*	*0.325 Ac-ft*

Add 20% to volumes to include drainage facility berms, as required by the SWFWMD and Hills. County

Estimated Stormwater Treatment and Attenuation Volume per Lane-Mile of New Roadway*

Storm-Event	*Hydrologic Group A*	*Hydrologic Group B*	*Hydrologic Group C*	*Hydrologic Group D*
Open Basin†	*1.105 Ac-ft*	*0.729 Ac-ft*	*0.480 Ac-ft*	*0.362 Ac-ft*
Closed Basin†	*1.407 Ac-ft*	*0.843 Ac-ft*	*0.528 Ac-ft*	*0.389 Ac-ft*

Plant City ROW Preservation Drainage Considerations
Widening from 2 to 4 lanes - Calculations

Pre-Development Cross-Section Summary	
Avg Impervious width	44 ft
Avg Open area width	104 ft
Impervious per mi	5.33 Acres
Pervious per mi	12.61 Acres
Total area per mi	17.94 Acres

Post-Development Cross-Section Summary	
Avg Impervious width	76 ft
Avg Open area width	72 ft
Impervious per mi	9.21 Acres
Pervious per mi	8.73 Acres
Total area per mi	17.94 Acres

SCS Runoff Coeficient per Soil Type

		Hydrologic Group A			*Hydrologic Group B*			*Hydrologic Group C*			*Hydrologic Group D*		
		CN	%	%CN	CN	%	%CN	CN	%	%CN	CN	%	%CN
Pre Development	Impervious	98	30%	29.1	98	30%	29.1	98	30%	29.1	98	30%	29.1
	Pervious	39	70%	27.4	61	70%	42.9	74	70%	52.0	80	70%	56.2
	Avg CN			**56.5**			**72.0**			**81.1**			**85.4**
Post Development	Impervious	98	51%	50.3	98	51%	50.3	98	51%	50.3	98	51%	50.3
	Pervious	39	49%	19.0	61	49%	29.7	74	49%	36.0	80	49%	38.9
	Avg CN			**69.3**			**80.0**			**86.3**			**89.2**

SCS Runoff Volumes per Soil Type

Rainfall (SWFWMD)		*Hydrologic Group A*			*Hydrologic Group B*			*Hydrologic Group C*			*Hydrologic Group D*		
		Pre Ac-ft	Post Ac-ft	Diff. Ac-ft	Pre Ac-ft	Post Ac-ft	Diff. Ac-ft	Pre Ac-ft	Post Ac-ft	Diff. Ac-ft	Pre Ac-ft	Post Ac-ft	Diff. Ac-ft
Open Basin†	8 in	3.101	4.605	**1.504**	4.932	5.909	**0.978**	6.049	6.691	**0.642**	6.571	7.055	**0.484**
Closed Basin†	11 in	5.485	7.388	**1.903**	7.779	8.909	**1.130**	9.066	9.773	**0.707**	9.642	10.164	**0.522**

Estimated Stormwater Treatment and Attenuation Volume per Mile (Widening from 2 to 4 lanes)

Storm-Event	*Hydrologic Group A*	*Hydrologic Group B*	*Hydrologic Group C*	*Hydrologic Group D*
Open Basin†	*1.504 Ac-ft*	*0.978 Ac-ft*	*0.642 Ac-ft*	*0.484 Ac-ft*
Closed Basin†	*1.903 Ac-ft*	*1.130 Ac-ft*	*0.707 Ac-ft*	*0.522 Ac-ft*

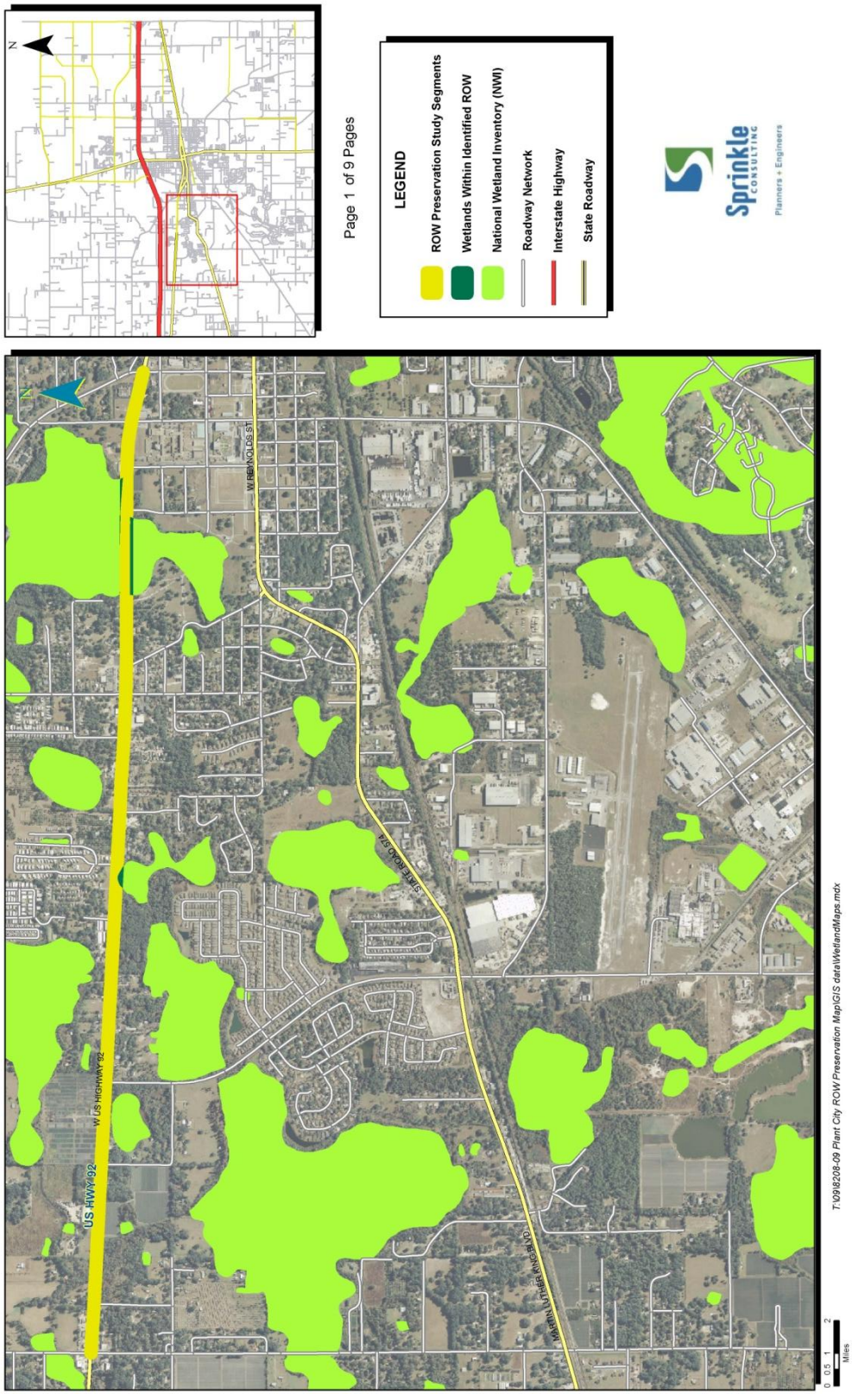
Pre Impervious = (12ft lane + 5ft shoulder + 5ft swk)x2 = 44ft
Post Impervious = (4ft inside shoulder + 24ft lanes + 5ft outside shoulder/bike lane + 5ft swk)x2 = 76ft
Post Pervious = (11ft half median + 19ft clear b/t rdwy and swk + 6ft clear b/t swk and row)x2 = 72ft

Add 20% to volumes to include drainage facility berms, as required by the SWFWMD and Hills. County

Estimated Stormwater Treatment and Attenuation Volume per Mile (Widening from 2 to 4 lanes)

Storm-Event	*Hydrologic Group A*	*Hydrologic Group B*	*Hydrologic Group C*	*Hydrologic Group D*
Open Basin†	*1.805 Ac-ft*	*1.173 Ac-ft*	*0.771 Ac-ft*	*0.581 Ac-ft*
Closed Basin†	*2.284 Ac-ft*	*1.356 Ac-ft*	*0.849 Ac-ft*	*0.626 Ac-ft*

Appendix D: Wetlands Map Series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Wetlands Within Identified ROW
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Roadway Network
Interstate Highway
State Roadway
Sprinkle CONSULTING
Planners + Engineers
US HWY 92
W US HIGHWAY 92
W REYNOLDS ST
S WILDER RD
MARTIN LUTHER KING BLVD
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Miles
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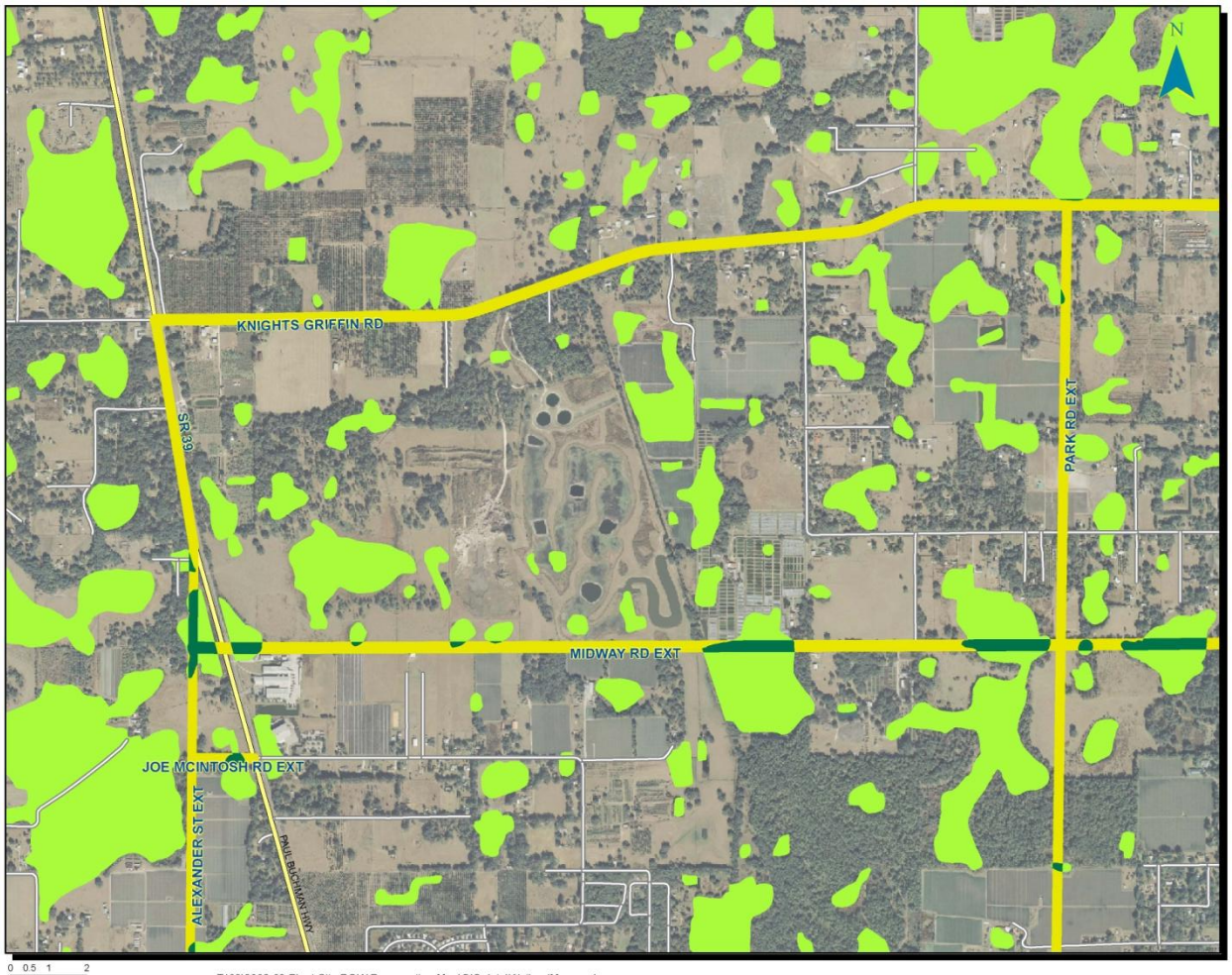

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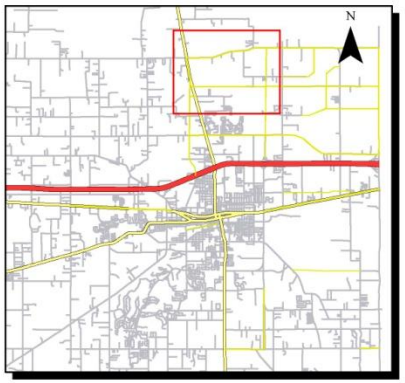

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- Wetlands Within Identified ROW
- National Wetland Inventory (NWI)
- Roadway Network
- Interstate Highway
- State Roadway

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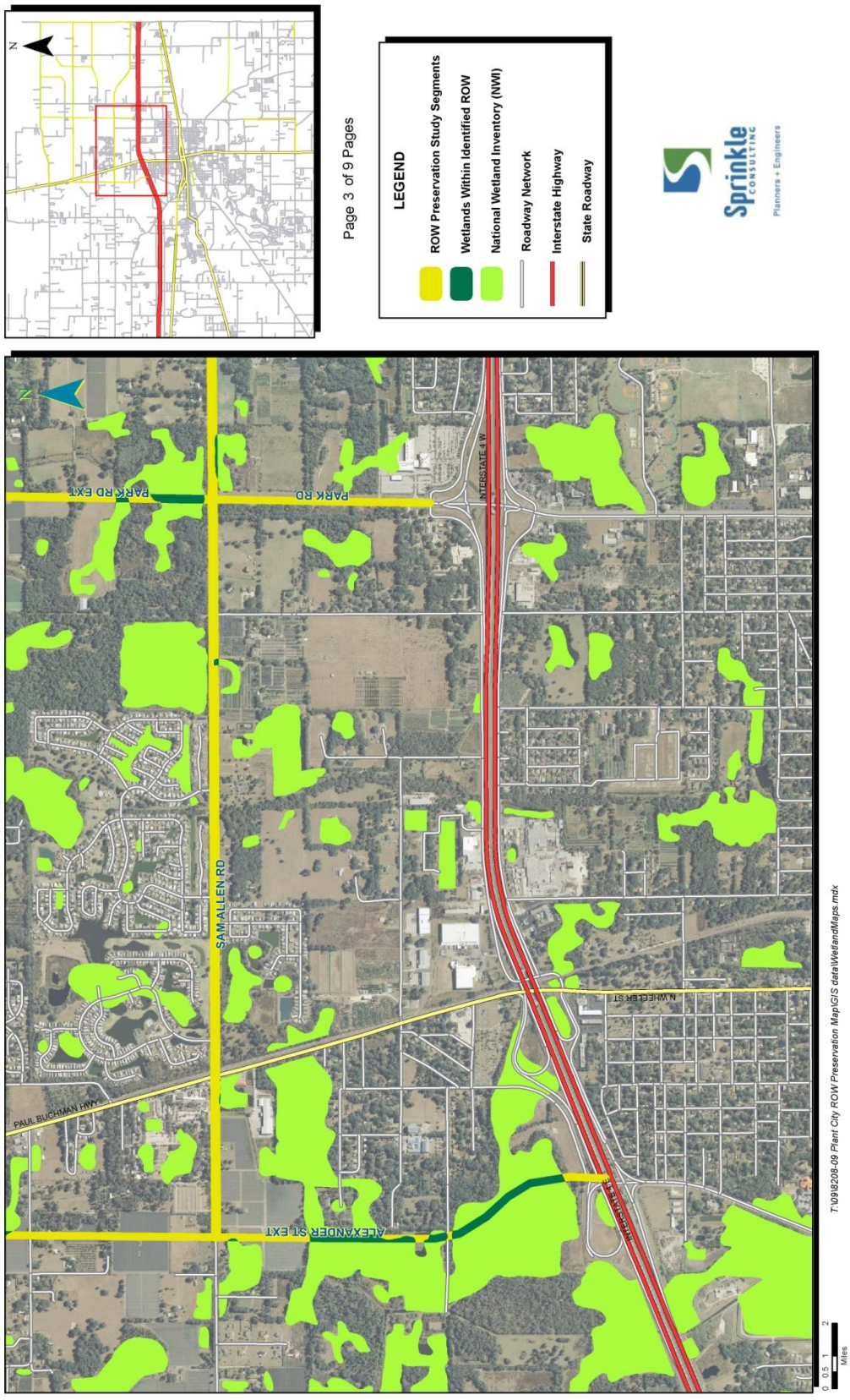
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Roadway Network
Interstate Highway
State Roadway
Sprinkle CONSULTING
Planners + Engineers
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PARK RD
INTERSTATE 4 W
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PAUL BUCHMAN HWY
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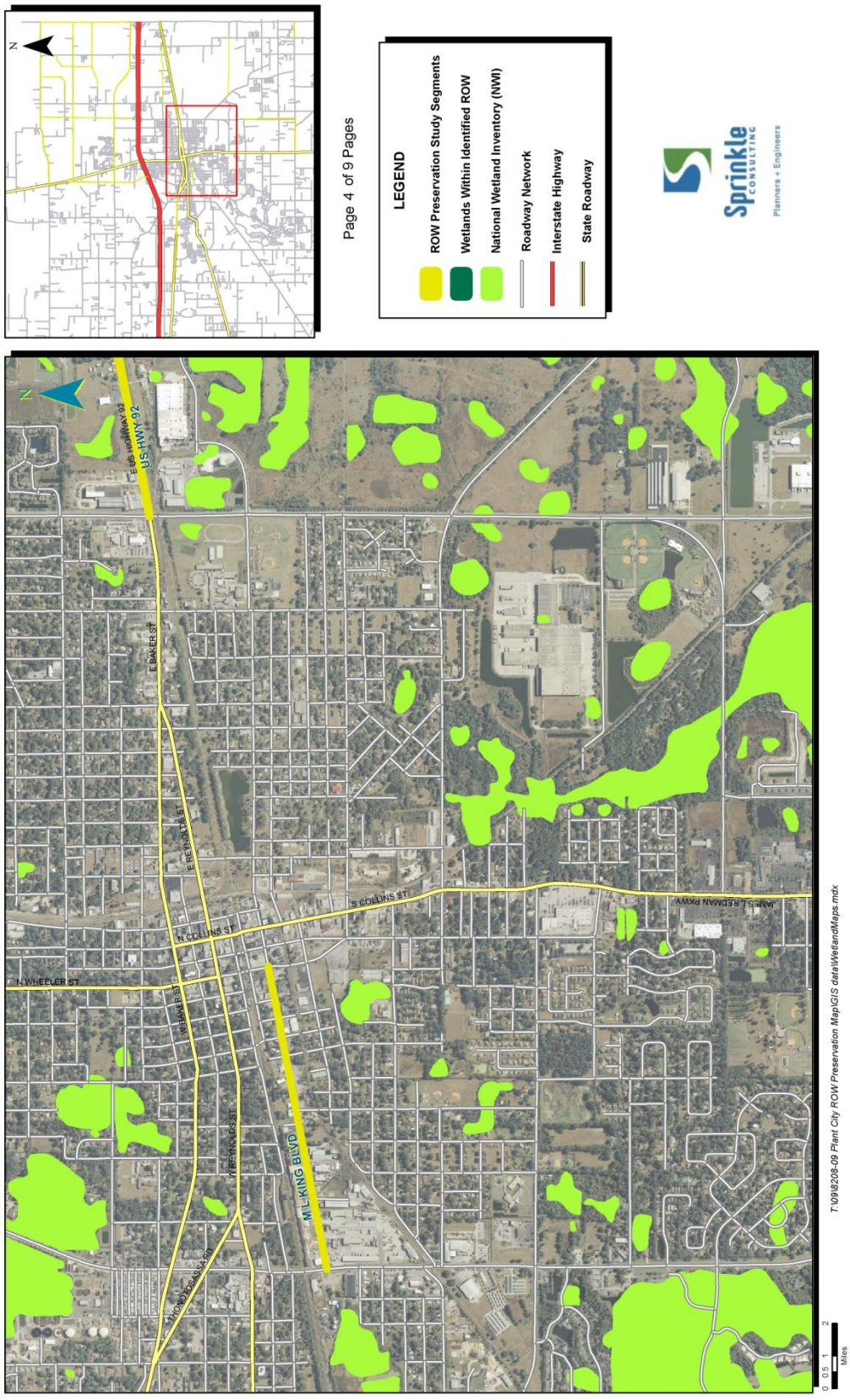
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WEBER ST
W REYNOLDS ST
M L KING BLVD
THONOTOSASSA RD
0 0.5 1 2
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Sprinkle CONSULTING
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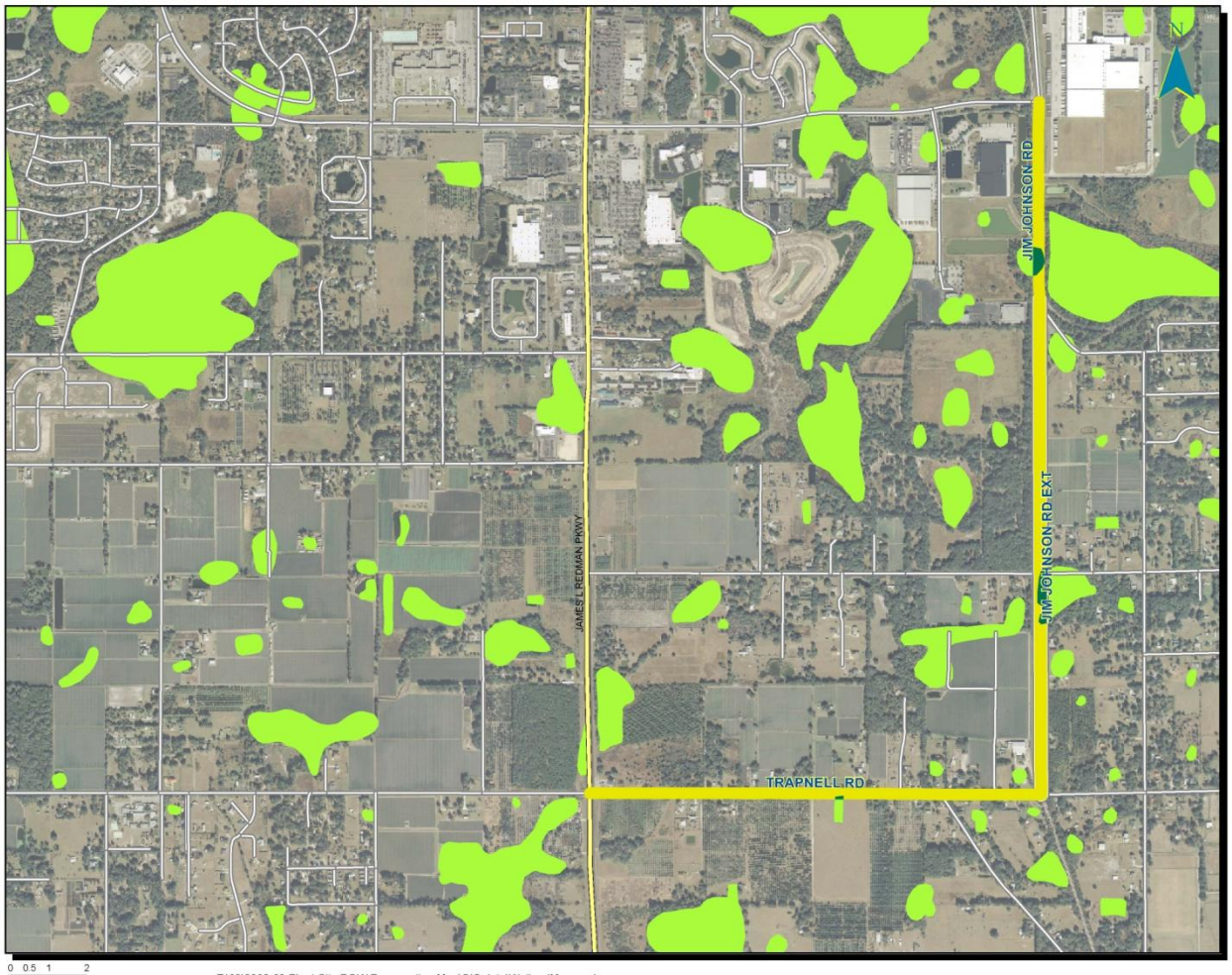

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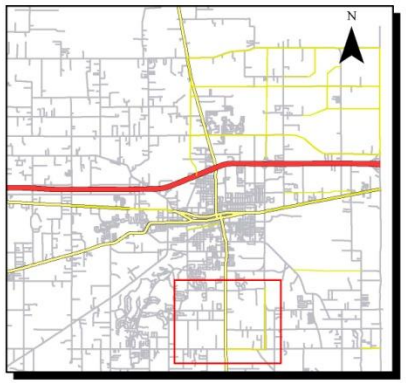

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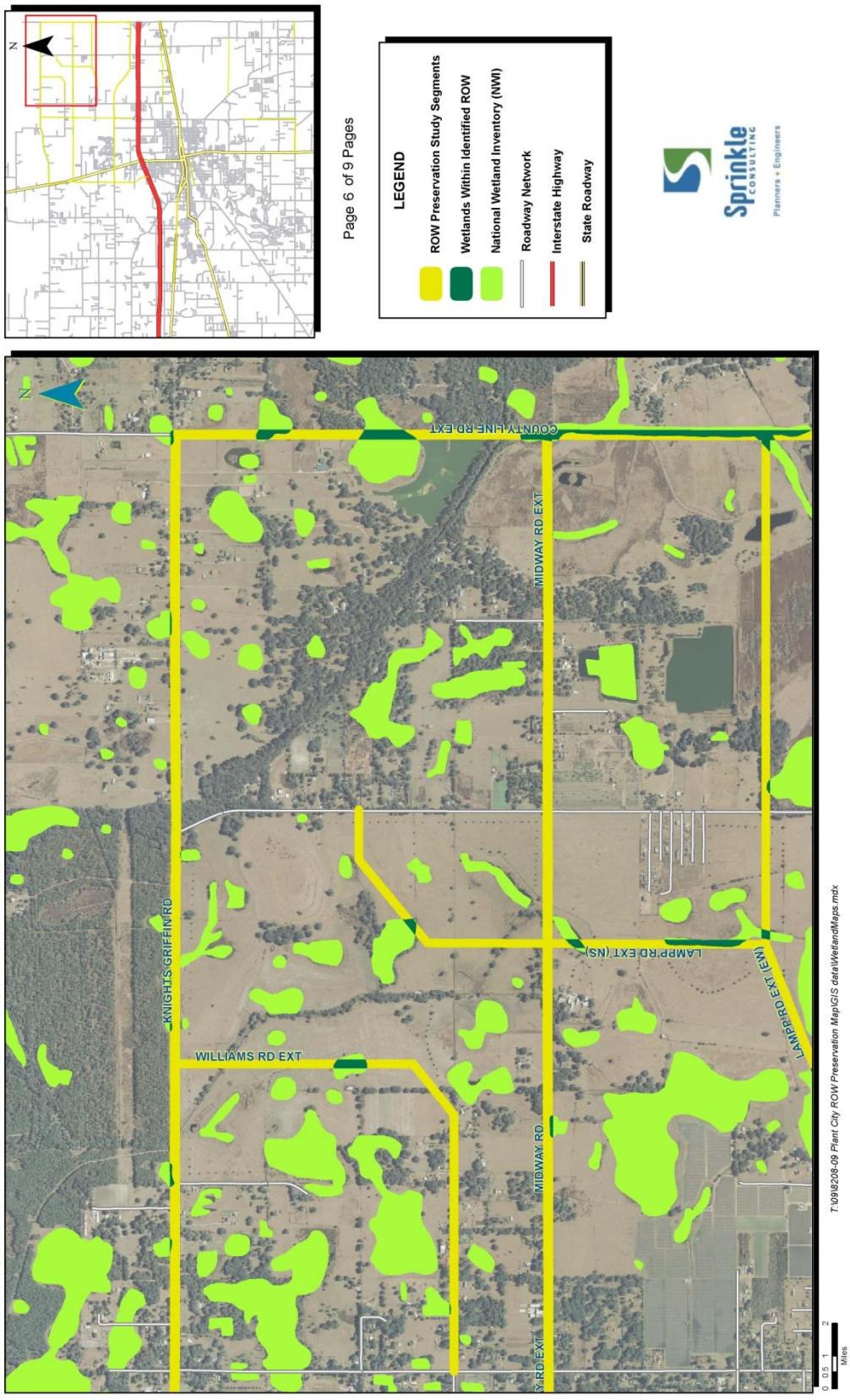
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Roadway Network
Interstate Highway
State Roadway
Sprinkle CONSULTING
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COUNTY LINE RD EXT
MIDWAY RD EXT
KNIGHTS GRIFFIN RD
WILLIAMS RD EXT
LAMPP RD EXT (NS)
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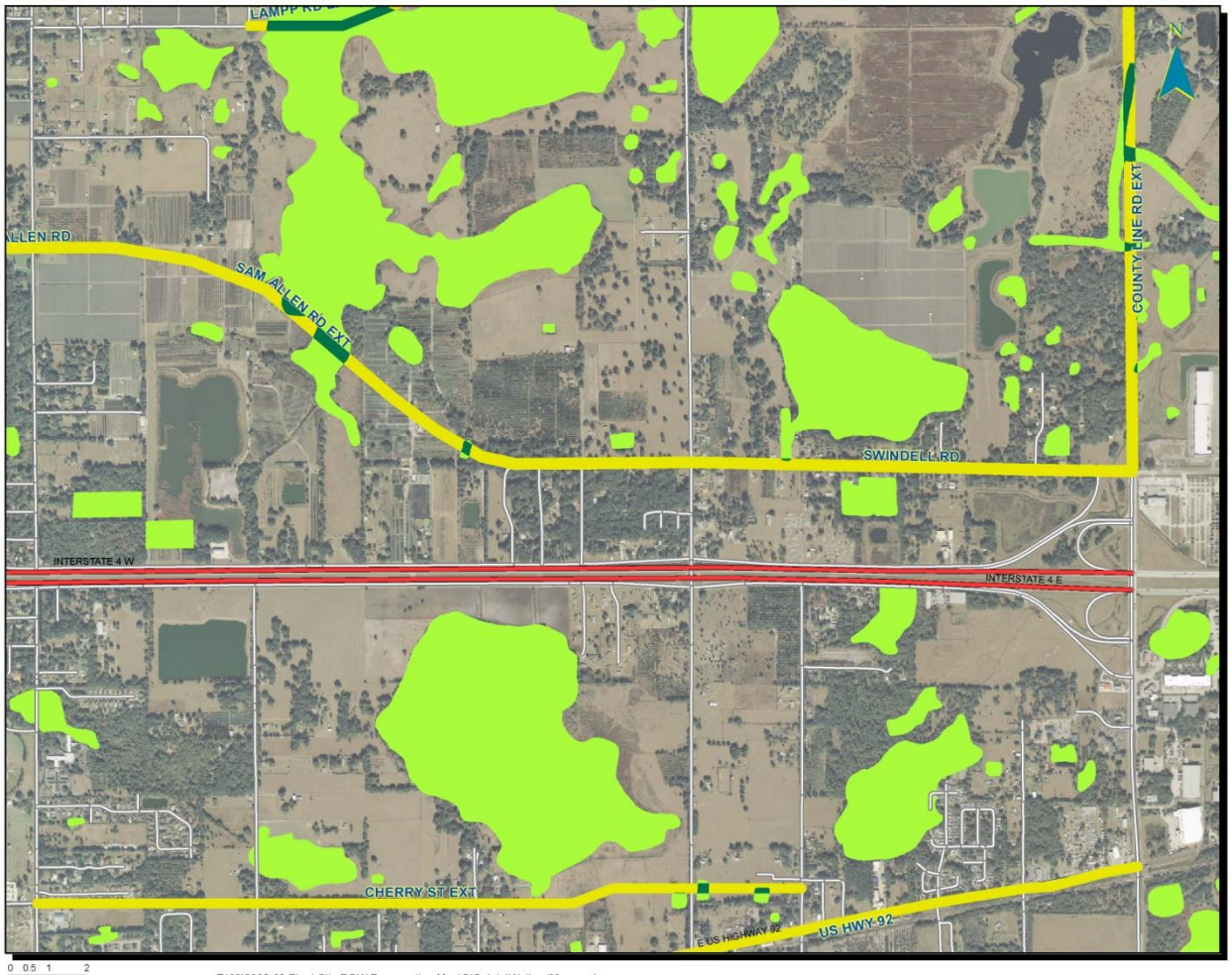

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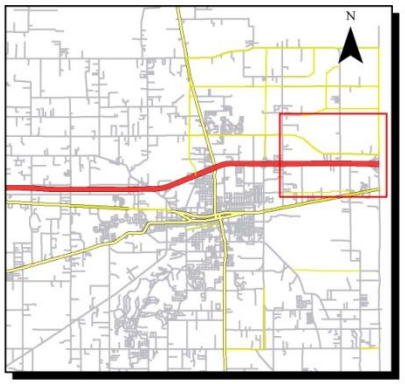

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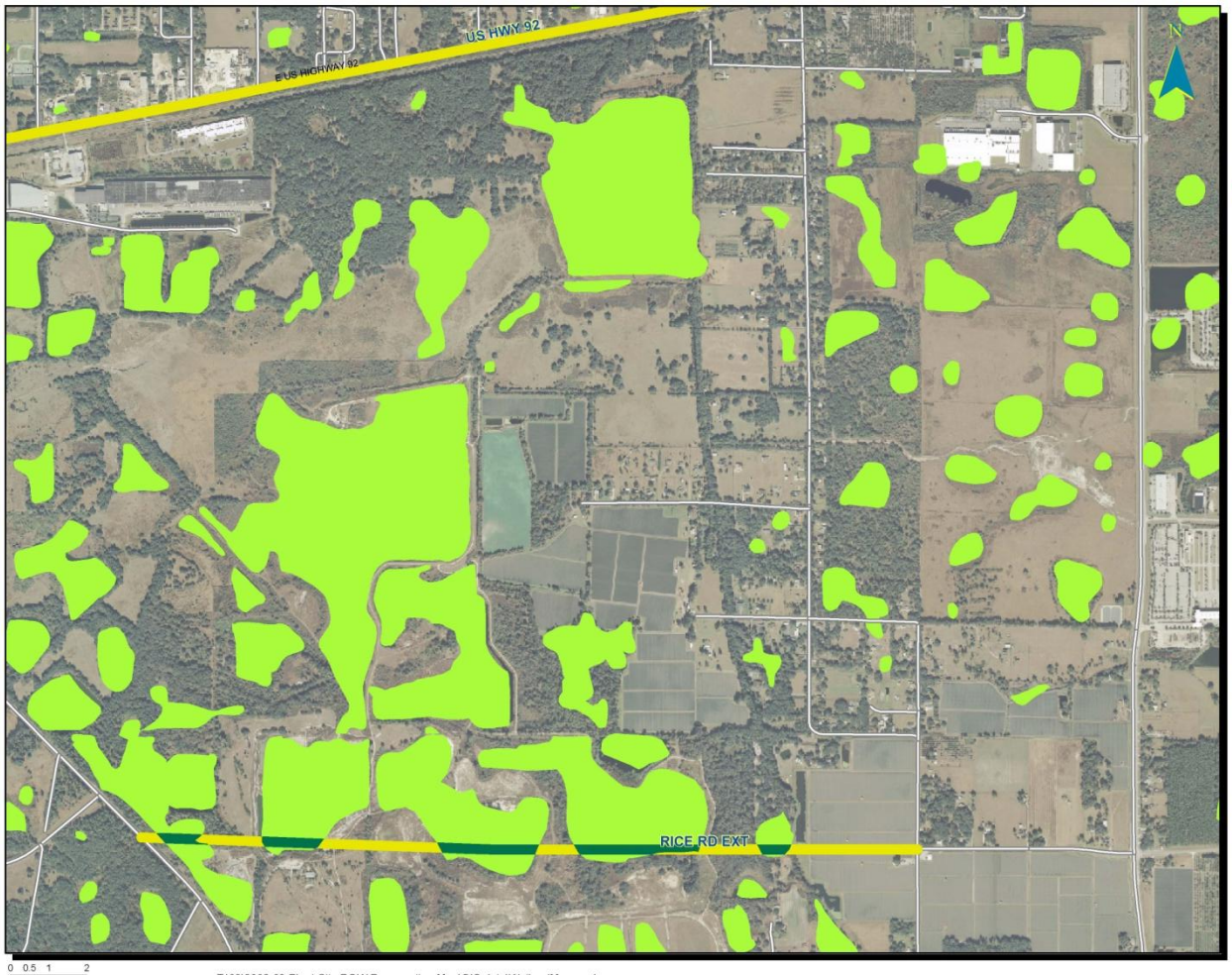

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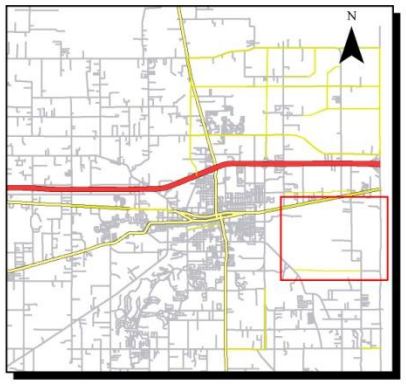

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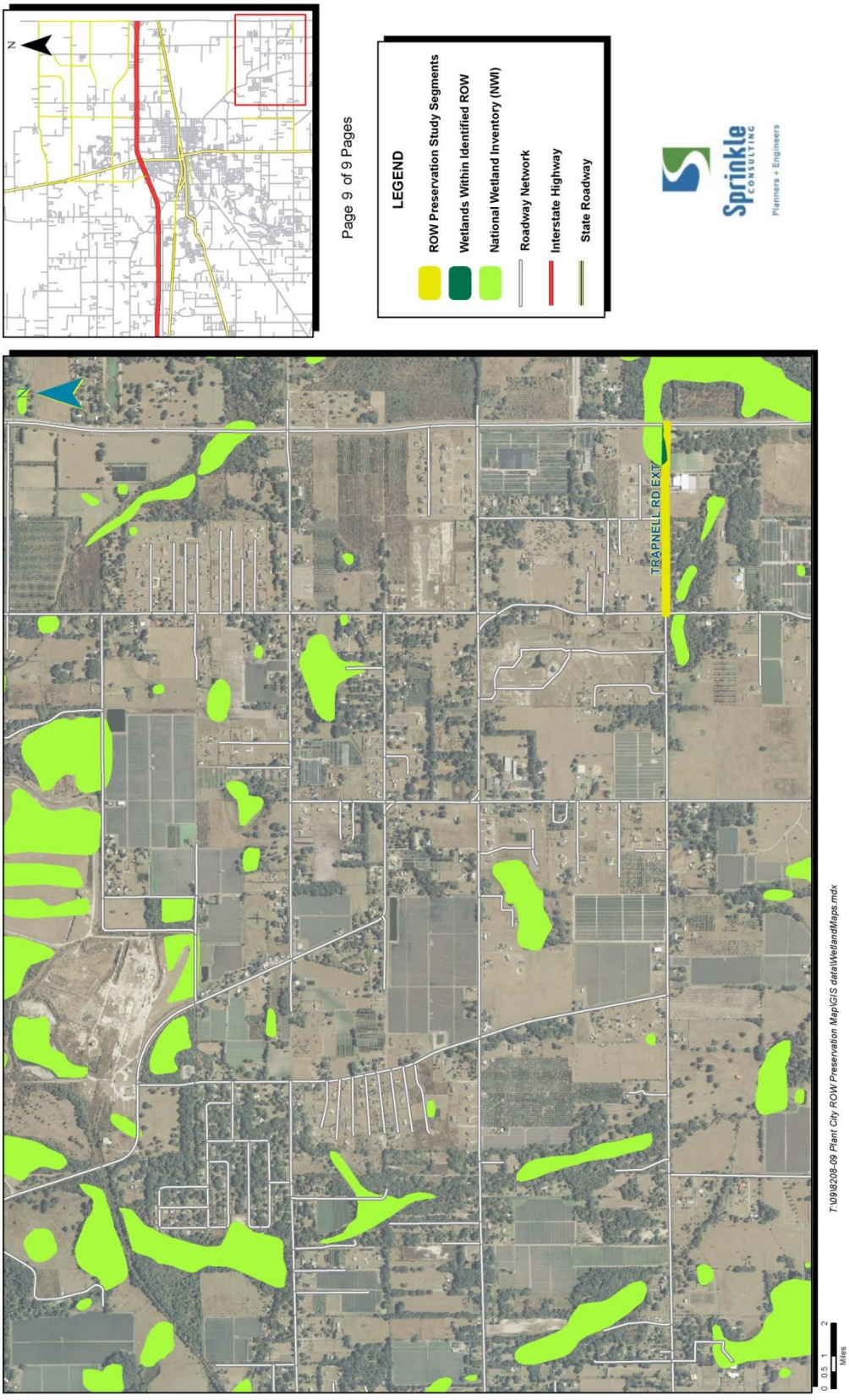
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ROW Preservation Study Segments
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Interstate Highway
State Roadway
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