Hillsborough Avenue (US 92/SR 600)

Project Development and Environment (PD&E) Study

From 50th Street to West of Interstate 4

Hillsborough County, Florida

FINAL

Preliminary Engineering Analysis (PEA)

WPI Segment No.:	430054-1
FAP Number:	Not Applicable
ETDM Project No.:	13312

Prepared for:

Florida Department of Transportation
District Seven
11201 North McKinley Drive
Tampa, FL 33612-6456

Manuel Santos, EI
FDOT Project Manager

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Prepared by:

American Consulting Engineers of Florida, LLC
2818 Cypress Ridge Boulevard, Suite 200 ▪ Wesley Chapel, FL ▪ 33544

Manuel Santos, EI
FDOT Project Manager

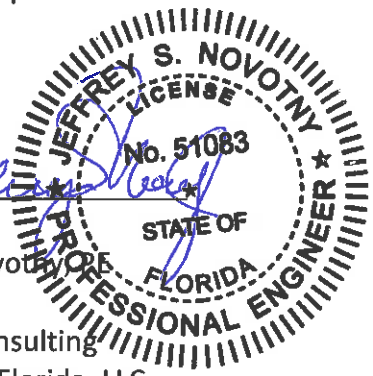
December 2012

PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with American Consulting Engineers of Florida, LLC, a Florida Limited Liability Company, authorized to operate as an engineering business, Certificate of Authorization No. 9302, by the State of Florida Department of Professional Regulation, and that I have prepared or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for:

WPI Segment Number:	**430054-1**
FAP Project Number:	**Not Applicable**
Project:	**Hillsborough Avenue (US 92/SR 600) from 50th Street to West of Interstate 4**
County:	**Hillsborough**
FDOT Project Manager:	**Manuel Santos, EI**

I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgment and experience.



SIGNATURE: _____

NAME: Jeffrey S. Novotny, PE

FIRM: American Consulting Engineers of Florida, LLC

P.E. No.: 51083

DATE: Nov. 13, 2012

PREFACE

The purpose of this report is to document the existing conditions and the alternatives analysis that was conducted for the proposed Hillsborough Avenue project. This report is one of a series of project reports:

- *State Environmental Impact Report (SEIR)*
- *Preliminary Engineering Analysis (PEA)*
- *Environmental Technical Compendium (ETC)*
- *Cultural Resource Assessment Survey, and*
- *Traffic Technical Memorandum*

Environmental conditions and expected project effects are documented in the *ETC* and are summarized in the *SEIR*.

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List of Acronyms

A

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Official
ADT	Average Daily Traffic
AF	Axle Conversion Factor

B

BOR	Basis of Review

D

DCIA	Directly Connected Impervious Areas
DDHV	Directional Design Hour Volumes
DHT	Design Hour Trucks
DHV	Design Hour Volumes

E

ERP	Environmental Resource Permit
ETC	Environmental Technical Compendium

F

FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FFBW	Front Face of Back Wall
FSUTMS	Florida Standard Urban Transportation Modeling System
FTI	Florida Traffic Information

G

GIS	Geographic Information Systems

H

HART	Hillsborough Area Regional Transit
HCM	Highway Capacity Manual

L

LOS	Level of Service
LRE	Long Range Estimate

M

MOT	Maintenance of Traffic
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MSE	Mechanically Stabilized Earth

N

NPDES	National Pollutant Discharge Elimination System

P

PPM	Plans Preparation Manual

R

ROW	Right of Way

S

SEIR	State Environmental Impact Report
SF	Seasonal Adjustment Factor
SIS	Strategic Intermodal System
SMF	Stormwater Management Facility
SWFWMD	Southwest Florida Water Management District

T

TBRPM	Tampa Bay Regional Planning Model
TBD	To Be Determined
TSM	Transportation Systems Management
TWSC	two-way stop controlled

V

VPD	Vehicles per Day

W

WBID	Water Body ID

INTRODUCTION

Hillsborough Avenue (Roadway ID No. 10-030-000) is an east/west facility, which in its entirety, extends from a western terminus at US 19 in Pinellas County to an eastern terminus east of Orient Road with a direct connection to Interstate 4 (I-4). Within the limits of this project, Hillsborough Avenue is designated as US 92/SR 600. **Figure A** shows an aerial photo of the study area.

Project Description

The Florida Department of Transportation (FDOT) conducted a Project Development and Environment (PD&E) Study to evaluate the widening of approximately 2 miles along Hillsborough Avenue from 50th Street to west of I-4. Hillsborough Avenue is a major east-west arterial in central Hillsborough County that connects US 301 and I-4 and provides access to many commercial, industrial and residential areas within central Hillsborough County. The roadway is to be improved from an existing 4-lane divided to a 6-lane divided roadway. The approximate beginning and ending mileposts are 3.015 and 4.772, respectively. The sections, townships, and ranges where the project is located are summarized in **Table A**.

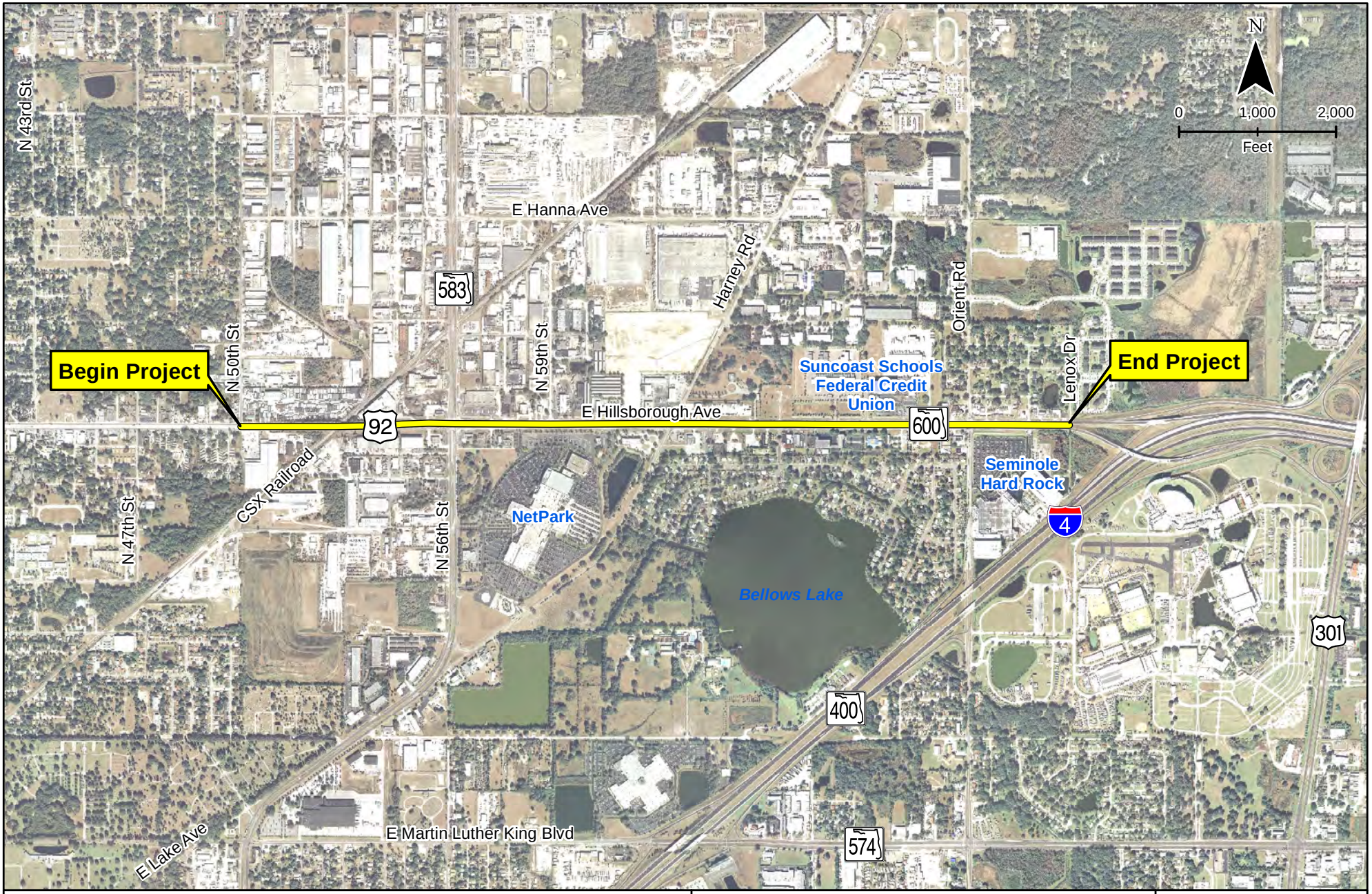
Table A Sections, Townships, Ranges

Sections	Townships	Ranges
Hillsborough County		
33, 34, 35, 36	28 S	19 E
01, 02, 03, 04	29 S	19 E

The purpose of this report along with other support documents is to document the engineering and environmental analysis performed to support decisions related to project alternatives. In addition, it summarizes existing conditions, documents the purpose and need for the project, and documents other data related to preliminary design concepts. These preliminary design concepts establish the functional or conceptual requirements that will be the starting point for the final design phase.

Newsletters were distributed to announce the Public Hearing, which was held on Monday, September 17, 2012 from 5:00 p.m. until 7:00 p.m. at the Chloe Coney Urban Enterprise Center, CDC of Tampa, 1907 E. Hillsborough Avenue in Tampa. The formal portion of the hearing began at approximately 6:00 p.m. and was moderated by Kirk Bogen, FDOT District Seven Environmental Management Engineer. There were approximately 14 attendees (public), including a representative for Senator Kathy Castor (Chloe Coney, District Director). No comments were made during the hearing (oral or written). FDOT staff and their consultant answered questions that citizens had during the informal part of the hearing. Copies of the display graphics, the PowerPoint slides, and attendance rosters are included in the Public

Hearing Scrapbook that was prepared for this project and is located in the project files (Refer to **Section 7** for the complete Public Involvement Summary). The proposed improvements as shown in Appendix A of this report, were presented to the public for their review and comments.



Hillsborough Avenue (SR 600/US 92) Corridor Study

From 50th Street to West of Interstate 4 (I-4)

WPI Segment No. 430054-1

Hillsborough County

Project Location Map

Figure A

Study Purpose and PD&E Process

The objective of the PD&E study process is to provide the documentation necessary to reach a decision on the type, conceptual design, and specific location of the improvements identified as being needed. Factors considered include transportation needs, socioeconomic and environmental impacts, and engineering requirements. In general terms, the process involves the following steps:

(1) the establishment of project need

(2) the gathering and analysis of detailed information regarding the natural and cultural features of the study area

(3) the development of a number of alternatives for meeting the project need

(4) the selection of a Recommended Alternative, and

(5) documenting the entire process in a series of reports

During the process, communication with the affected public was accomplished directly, through public meetings, and indirectly, through interaction with elected officials and agency representatives.

The FDOT's Efficient Transportation Decision Making (ETDM) process provided agencies and the public access to project planning information, as well as potentially affected environmental resources through use of the internet via the Environmental Screening Tool (EST). The tool allows interaction among transportation planners, regulatory agencies and affected communities to provide input on projects. The agency representatives involved in the interaction are referred to as the Environmental Technical Advisory Team, or ETAT members. The team provided a review of the projects on a variety of areas such as environmental and community impacts. Key features of the ETDM Process included:

- early agency and community involvement
- early identification of avoidance and mitigation strategies
- access to comprehensive data in standardized formats
- reviews and studies focused on key issues
- permit issuance linked to National Environmental Policy Act (NEPA) reviews
- maximized use of technology for coordination, project scoping and communication

ETDM provides the ability for early agency interaction and coordination during project development, which can improve the quality of decisions and reduce cost and time delays during the PD&E Study.

Project Purpose and Need

The purpose and need for the proposed project includes the following items:

- To provide **additional highway capacity** along Hillsborough Avenue to meet future travel demands.
- To **safely accommodate** future vehicle traffic as well as non-motorized users.
- To provide improved **hurricane/emergency evacuation** for portions of Hillsborough County.
- To provide improvements **consistent with local transportation plans** while obtaining **community support** and **minimizing community impacts**.
- To develop a transportation solution that is **financially feasible** for FDOT to build, operate, and maintain.

Additional factors are discussed below.

The Regional Network and FIHS/SIS Requirements

The Hillsborough Avenue project would provide an important link in the regional transportation network. Hillsborough Avenue is a major east-west facility within Hillsborough County that connects I-4 and US 301. With this improvement there will be 6-lanes of capacity along Hillsborough Avenue from US 19 in Pinellas County to I-4 in Hillsborough County. East of I-4, this roadway is a 2-lane facility that connects to eastern Hillsborough County and into Polk County.

Hillsborough Avenue is functionally classified as an "urban principal arterial – other". While Hillsborough Avenue is not on the Strategic Intermodal System (SIS), it terminates east of Orient Road with a direct connection to I-4 which connects to I-75 and I-275, both of which are SIS facilities. The SIS is a statewide network of highways, railways, waterways and transportation hubs that handle the bulk of Florida's passenger and freight traffic.

Transportation Demand and Levels of Service

There are five signalized intersections located within the study limits, all of which have at least one approach operating at Level of Service (LOS) E or F during the existing design hour. In 2010, Hillsborough Avenue, from 50th Street to west of I-4, carried between 36,200 and 41,900 vehicles per day (vpd). This segment of Hillsborough Avenue is projected to carry volumes between 67,600 and 79,600 vpd by 2040, which would yield a failing LOS. Without this proposed project, the traffic congestion is expected to become more severe and could hinder economic growth in the areas served by this corridor.

Emergency Evacuation

Hillsborough Avenue is designated as an emergency evacuation route by Hillsborough County Emergency Management. This roadway connects to major highways including I-4, US 301, and I-

275. As Hillsborough County's population grows, this existing route's capability to provide a satisfactory LOS for emergency evacuation will continue to decrease.

Multimodal Service

Currently, there are no designated bicycle facilities located within the study limits; however, there are existing paved shoulders that bicyclists can use. Bicycle and pedestrian facilities are planned for the proposed project and will be evaluated as part of this PD&E Study. The Hillsborough Area Regional Transit (HART) currently has four bus routes that run along Hillsborough Avenue and three bus routes that intersect Hillsborough Avenue within the study limits. There is an existing bus transfer facility at the Netpark Transfer Center located approximately 0.5 mile south of Hillsborough Avenue along 56th Street near Harney Road. HART is presently studying a potential East-West Metro Rapid Line (Bus Rapid Transit), a portion of which is planned to run along Hillsborough Avenue from I-275 (west of the project) to 56th Street.

Safety

There were 726 crashes reported between 50th Street and I-4 on Hillsborough Avenue during the 5-year period of 2005-2009. Rear-end crashes accounted for 50 percent of the total crashes, angle crashes accounted for 22 percent, sideswipe crashes accounted for 7 percent, left-turn crashes accounted for 6 percent, and the remaining 15 percent of the crashes were the result of other miscellaneous traffic movements. It is anticipated that safety will be enhanced due to capacity improvements as well as related intersection improvements. The proposed improvements would reduce congestion and improve congestion-related safety issues.

Consistency with Transportation Plans

This project is included in the Hillsborough County Metropolitan Planning Organization's (MPO's) Year 2035 Long-Range Transportation Plan (LRTP) in the Cost Affordable Plan. The West Central Florida MPO Chair's Coordinating Committee (CCC) Hillsborough Avenue is in the Cost Affordable 2025 Plan classified as a "regional road" in west central Florida.

Table B Hillsborough MPO LRTP Cost Affordable Plan

Phase	Time Period
PD&E/Preliminary Engineering	2016-2020
Right of Way	2021-2025
Construction	2026-2030

SECTION 1 – EXISTING CONDITIONS

1.1 Existing Roadway Characteristics

1.1.1 Functional Classification

Hillsborough Avenue is functionally classified as an "urban principal arterial – other". While Hillsborough Avenue is not on the Strategic Intermodal System (SIS), it terminates east of Orient Road with a direct connection to I-4 which in turn connects to I-75 and I-275, both of which are SIS facilities. The SIS is a statewide network of highways, railways, waterways and transportation hubs that handle the bulk of Florida's passenger and freight traffic.

1.1.2 Typical Sections and Posted Speed Limits

The existing primary roadway typical section is shown in **Figure 1-1**. Within the study limits,

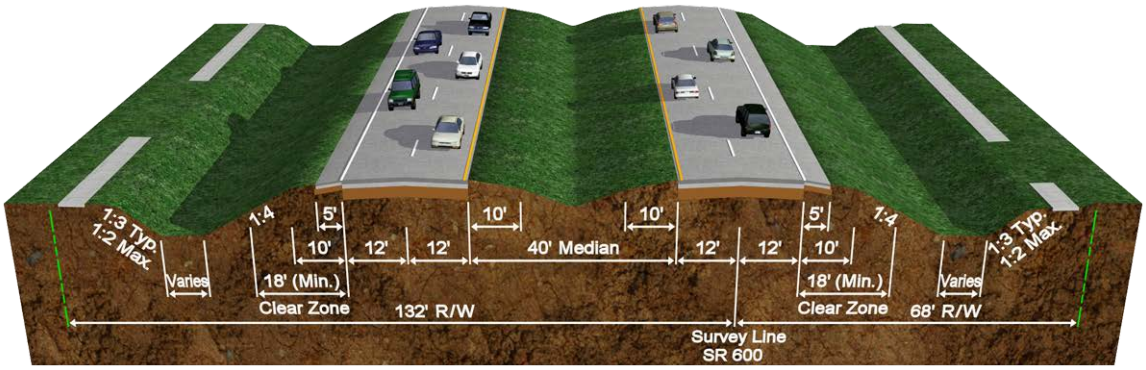


Figure 1-1 Existing Roadway Typical Section

Hillsborough Avenue is a 4-lane divided roadway section with 12-foot lanes. There are 10-foot outside shoulders (5-foot paved) and 10-foot inside shoulders. The depressed grass median is 40-ft wide. Sidewalks are nearly continuous on the north side, and new sidewalk is being constructed on the south side as part of a 3R (resurfacing) project to be let in late 2012 (FPID nos. 427149-1-52-01 and 427169-1-52-01). This 3R project will also complete the sidewalk gaps on the north side. On the roadway approaches to the bridge over CSX railroad (located between 50th and 56th Streets) the typical section narrows to a 4-foot raised-separator median, which was ostensibly designed to reduce right of way (ROW) requirements when the roadway was originally widened/reconstructed in 1954. **Figure 1-2** includes photos of the existing highway.

The posted speed limits on Hillsborough Avenue are 45 miles per hour (mph) from 50th Street to a point approximately 840 feet east of Harney Road and 50 mph from that point to west of I-4. The limits for the posted speeds are shown in **Figure 1-3** along with additional information including mileposts and stationing.

East of 50th Street, facing west

At bridge over CSX RR tracks, facing west

Westbound approach to the bridge, facing west

At N. 56th Street, facing west

Approximately 0.15 miles east of N. 56th Street, facing west

Approximately 350 feet west of Harney Road, facing east

Hillsborough Avenue (SR 600/US 92) PD&E Study ***From 50th Street to Interstate 4*** WPI Segment No. 430054 1 Hillsborough County	**Photos of Existing Hillsborough Avenue**	**Figure 1-2** Page 1 of 2

Approximately 320 feet west of Harney Road, facing west

Approximately 500 feet west of Harney Road, facing west

Approximately 0.30 miles west of Orient Road, facing west

East of Orient Road, looking east towards the ramps to I-4 Ramps

1.1.3 Pedestrian and Bicycle Facilities

Sidewalks will be completed on both sides of Hillsborough Avenue as part of the planned resurfacing project mentioned in the preceding section. The existing typical sections do not include bicycle lanes; however, 5-foot paved shoulders are available for use by bicyclists in most areas. In addition, the planned 3R project includes construction of "keyhole" bicycle lanes between right-turn lanes and thru lanes to provide for bicycle lane continuity.

1.1.4 Right of Way

Existing ROW varies in width from approximately 104 to 240 feet, with 200 feet being the typical width in most areas. Approximate widths are summarized by segment in **Table 1-1.**

Table 1-1 Existing Right of Way Widths

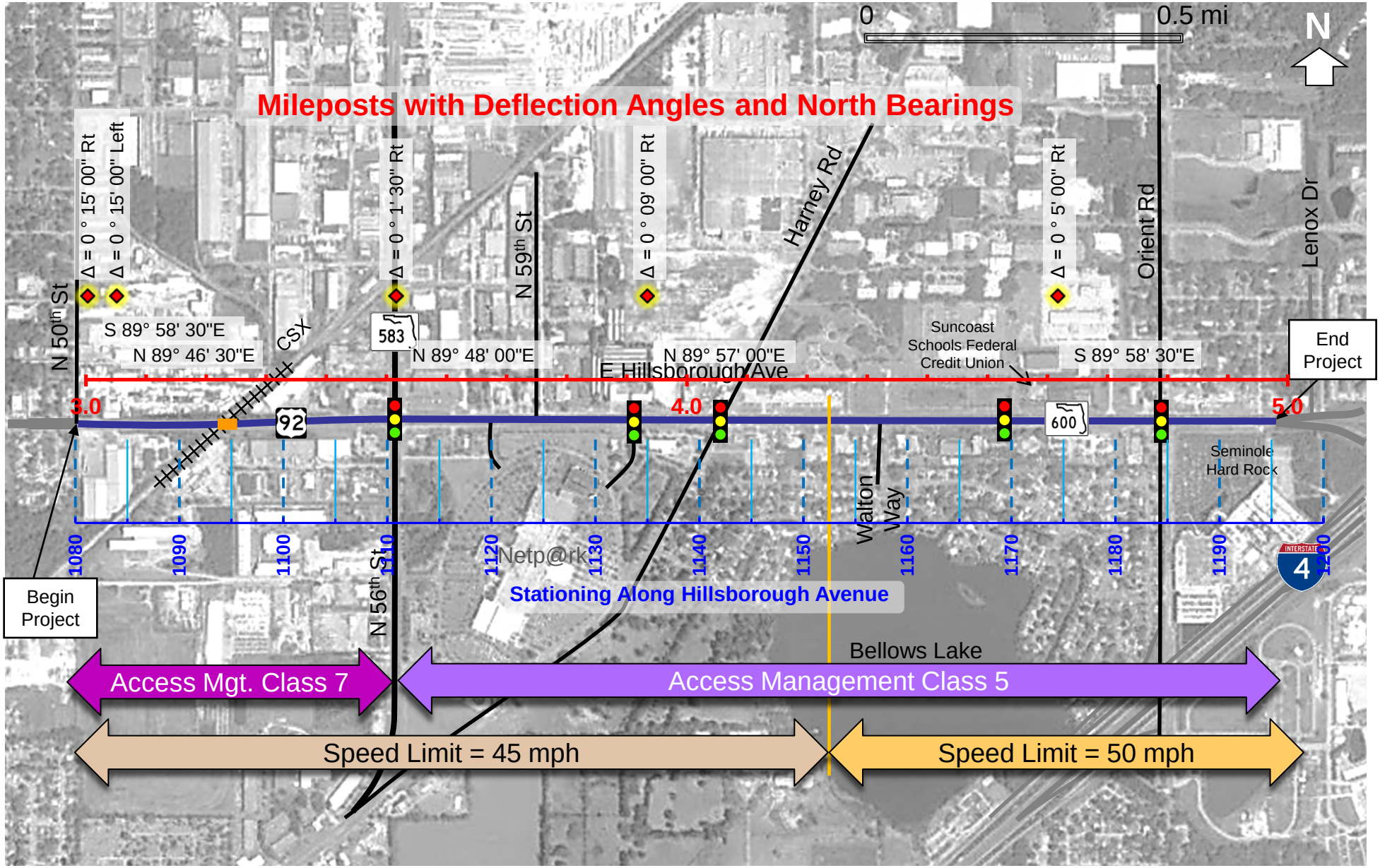
From Approx. Station	To Approx. Station	From Nearest Cross St	To Nearest Cross Street	Approx. Segment Distance (mi.)	Approx. ROW on North Side	Approx. ROW on South Side	Total Approx. ROW (ft)
1081+00	1084+50	50th Street	Bridge Approach	0.07	45	59	104
1084+50	1092+00	Bridge Approach	Begin Bridge	0.14	45-90	59-101	170
1092+00	1100+96	Begin Bridge	End Bridge	0.17	87	99	186
1100+96	1108+50	End Bridge	56th St.	0.14	160-120	80	200-240
1108+50	1121+00	56th St.	59th St.	0.24	115	85	200
1121+00	1136+40	59th St.	Harney Rd.	0.29	115	85	200
1136+40	1174+30	Harney Rd.	Orient Rd.	0.72	110-96	90-104	200
1174+30	1187+34	Orient Rd.	Lenox Dr.	0.25	96-91	104-109	200
			Total Distance	2.01			

1.1.5 Horizontal Alignment

In most areas, the existing 4-lane rural highway is centered in the existing ROW. There are no horizontal curves within this segment of Hillsborough Avenue along the survey baseline, and there are four minor changes in the bearing, as shown on **Figure 1-3**.

1.1.6 Vertical Alignment

There are 13 vertical curves based on the 1954 as-built plans. **Table 1-2** shows the existing vertical curves and the calculated K values. The vertical profile at the bridge over the CSX railroad is shown at the end of the conceptual design plans (**Appendix A**).



Hillsborough Avenue (SR 600/US 92) PD&E Study
From 50th Street to Interstate 4
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Existing Roadway Characteristics

Figure 1-3

Table 1-2 Existing Vertical Curves

Vertical Curve Location (VPI Station)	Crest (C) or Sag (S)	Curve Length (ft)	Grade In (%)	Grade Out (%)	K Value (L/A)	Min. K per PPM	Is Minimum K Standard Met?
Posted Speed: 45 MPH							
1093+81.24	C	960	3.00	-3.00	160	98	Yes
1101+38.46	S	300	-3.00	-1.35	182	79	Yes
1113+00.00	C	300	-1.35	0.00	222	98	Yes
1117+50.00	S	300	0.00	1.36	221	79	Yes
1125+50.00	C	300	1.36	0.28	278	98	Yes
1130+50.00	C	500	0.28	-2.99	153	98	Yes
1137+50.00	S	300	-2.99	-1.10	159	79	Yes
Posted Speed: 50 MPH							
1143+50.00	S	300	-1.10	0.00	273	96	Yes
1154+50.00	S	200	0.00	1.15	174	96	Yes
1162+00.00	C	400	1.15	0.00	348	136	Yes
1168+00.00	C	300	0.00	-0.73	411	136	Yes
1174+00.00	C	200	-0.73	-1.25	385	136	Yes
1185+00.00	S	200	-1.25	0.00	160	96	Yes

Source: Curves for Centerline of Construction, from 1954 As-Built Plans

1.1.7 Drainage

Existing Drainage Patterns

The study area is within the jurisdiction of the Southwest Florida Water Management District (SWFWMD) Tampa Regulation Office. The study area falls within the Hillsborough River Watershed and within two SWFWMD drainage basins: The Hillsborough River Basin west of Harney Road and the Tampa Bay and Coastal Areas Basin east of Harney Road.

The study area also includes Florida Department of Environmental Protection (FDEP) Water Body ID (WBID) 1579 (Bellows Lake Outlet) and WBID 1443E1 (Hillsborough Reservoir). Both of these WBIDs are listed as impaired for parameters including dissolved oxygen and nutrients.

The existing conveyance system is an open system of roadside and median ditches and swales. There are also segments of closed storm drain that discharge to the roadside ditches. There are no permitted storm water management facilities (SMFs) associated with the existing roadway. There are five project sub basins based on the existing drainage patterns verified through field review and SWFWMD aerial maps, as listed in **Table 1-3**. In basin 3, it may be necessary to design the SMF for volume as well as discharge. The runoff from Basin 3 works its way to a low area on the east side of North 56th street just south of Hillsborough Avenue. North 56th Street has overtopped at Shadowlawn Avenue in 2004 and 2008. This flooding issue is included in the District VII Flooding inventory (#1006092010639).

Table 1-3 Drainage Basin Divides

Watershed	Regional Drainage Basin	Project Basin	Project Basin Limits From Station to Station	Project Basin Area (acre)	Outfall Description
Hillsborough River	Hillsborough River	1	1081+34 to 1094+00	5.81	West of 50th Street
		2	1094+00 to 1108+50	6.66	South on 56th Street
		3	1108+50 to 1136+00	12.63	1114+00 Right
	Tampa Bay and Coastal Areas	4	1136+00 to 1165+90	13.73	CD @ 1145+50
		5	1165+90 to 1187+00	9.69	Drains eastward

A pre-application meeting was held with SWFWMD on December 27, 2011 in order to verify the storm water management criteria applicable for this study. Meeting minutes and drainage calculations are provided in **Appendix B**.

Water Quantity Requirements

Discharge attenuation will be provided to meet pre vs. post discharge rates in accordance with Florida Administrative Code (FAC) 14-86 Critical Storm Evaluation. This attenuation will exceed SFWMD's Environmental Resource Permit (ERP) requirement to provide peak discharge attenuation for the 25-year 24-hour event.

Water Quality Requirements

Water Quality requirements will be per SWFWMD Basis of Review (BOR) Chapter 5. Acceptable treatment methods include either wet detention or dry retention of storm water runoff. A wet detention system shall treat one inch of runoff from the contributing area. For a dry retention system, the first ½ inch of runoff shall be retained. Treatment will be required for new impervious area, directly connected impervious area, and contributing offsite impervious area.

Due to discharge to impaired water bodies, demonstration of no net increase in nutrient discharge will be required through pre vs. post comparison of Nitrogen and Phosphorus loading.

1.1.8 Geotechnical Data

A description of existing soils data is included in **Section 3.8** of the *Environmental Technical Compendium (ETC)*.

1.1.9 Crash Data

There were 726 crashes reported between 50th Street and I-4 on Hillsborough Avenue during the 5-year period of 2005-2009. Overall, rear-end crashes accounted for 50 percent of the total crashes, angle crashes accounted for 22 percent, sideswipe crashes accounted for 7 percent,

left-turn crashes accounted for 6 percent, and the remaining 15 percent of the crashes were the result of other miscellaneous traffic movements. **Table 1-4** summarizes crash types by year.

Table 1-4 Hillsborough Avenue Crash Types

Crash Type	2005	2006	2007	2008	2009	Total	Percentage	Avg./Year
Rear-end	63	82	73	60	85	363	50%	72.6
Angle	28	37	37	25	32	159	22%	31.8
Sideswipe	9	11	11	10	9	50	7%	10
Left-Turn	12	7	10	10	4	43	6%	8.6
Head-On	4	10	4	7	5	30	4%	6
Fixed Object	4	3	4	5	5	21	3%	4.2
Other	10	3	1	4	2	20	3%	4
Right-Turn	3	4	1	1	2	11	2%	2.2
Backed into	3	4	2	1	0	10	1%	2
Moveable Object	3	1	1	1	1	7	1%	1.4
Run-off/Overturn	0	3	2	1	1	7	1%	1.4
Pedestrian/Bicycle	2	0	0	2	1	5	1%	1
Total	**141**	**165**	**146**	**127**	**147**	**726**	100%	145.2

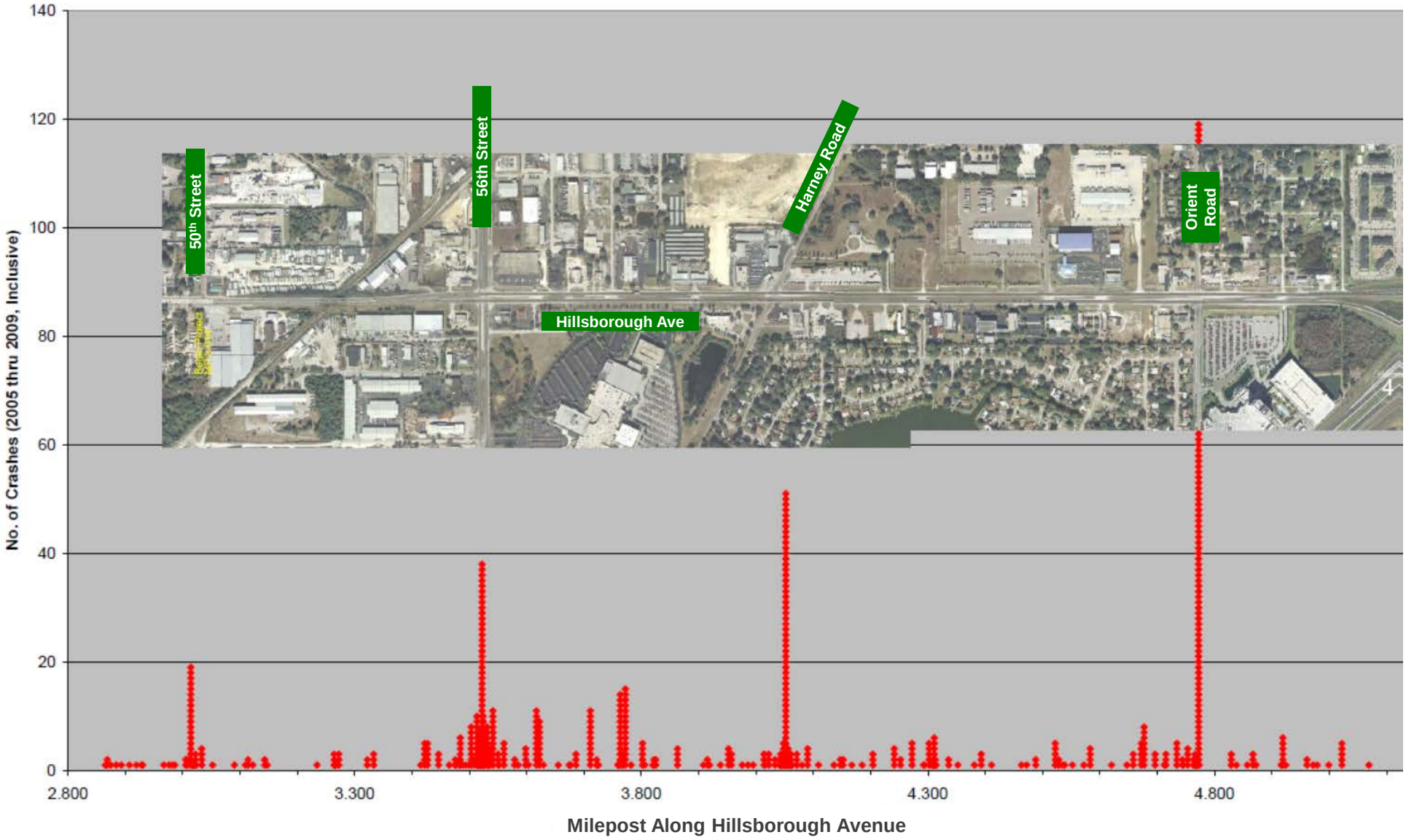
The distribution of crashes by mile post is shown in **Figure 1-4**. As expected, the majority of crashes occurred at major intersections. With construction of the proposed project, it is expected that safety will be enhanced due to capacity improvements, intersection improvements and proposed access management changes.

1.1.10 Intersections and Signalization

There are five signalized intersections included within the study limits: Hillsborough Avenue at 56th Street (SR 583), Net Park Driveway, Harney Road, Suncoast Schools Federal Credit Union/Averitt Express Driveway, and Orient Road. Existing geometry/laneage for the major intersections is shown in **Figure 1-5**. The signalized intersections include crosswalks and pedestrian push buttons and pedestrian signal indications.

1.1.11 Existing Lighting

Street lighting on East Hillsborough Avenue ends at approximately 160 feet east of 50th Street, so except for that short exception, there is no street lighting within the study limits. Near the eastern end of the study area, high-mast lighting is provided in the Hillsborough Avenue/I-4 interchange area, which provides some illumination in the vicinity of the interchange. In addition, 56th Street has street lighting, which provides lighting at the 56th Street/Hillsborough Avenue intersection.



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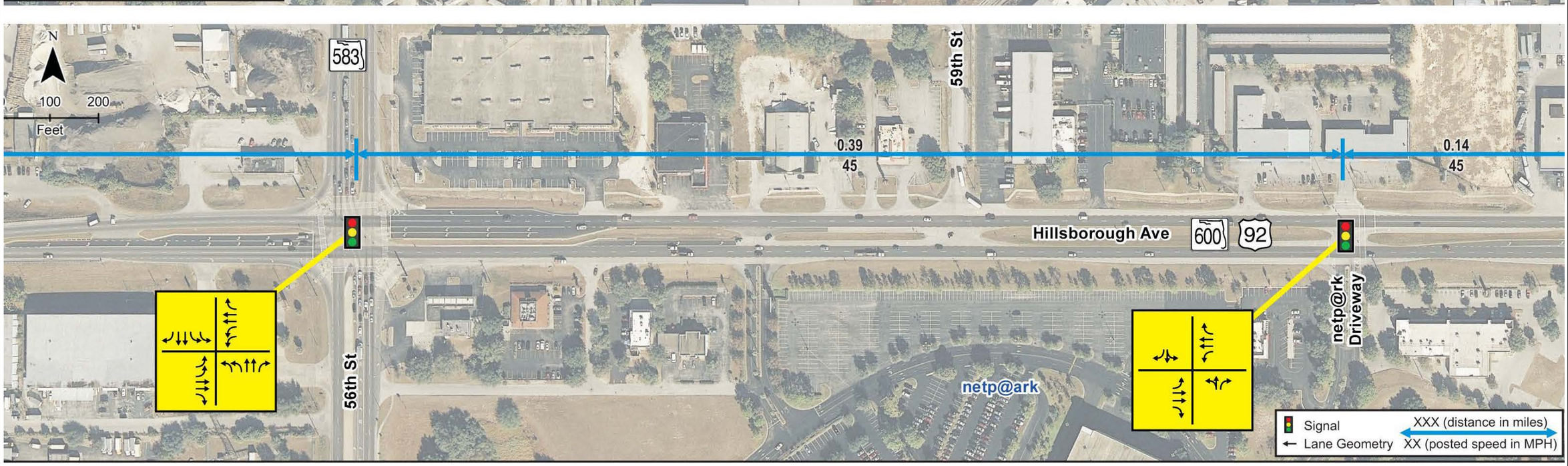
Distribution of Crashes by Milepost
2005 - 2009

Figure 1-4



Hillsborough Avenue (SR 600/US 92) PD&E Study
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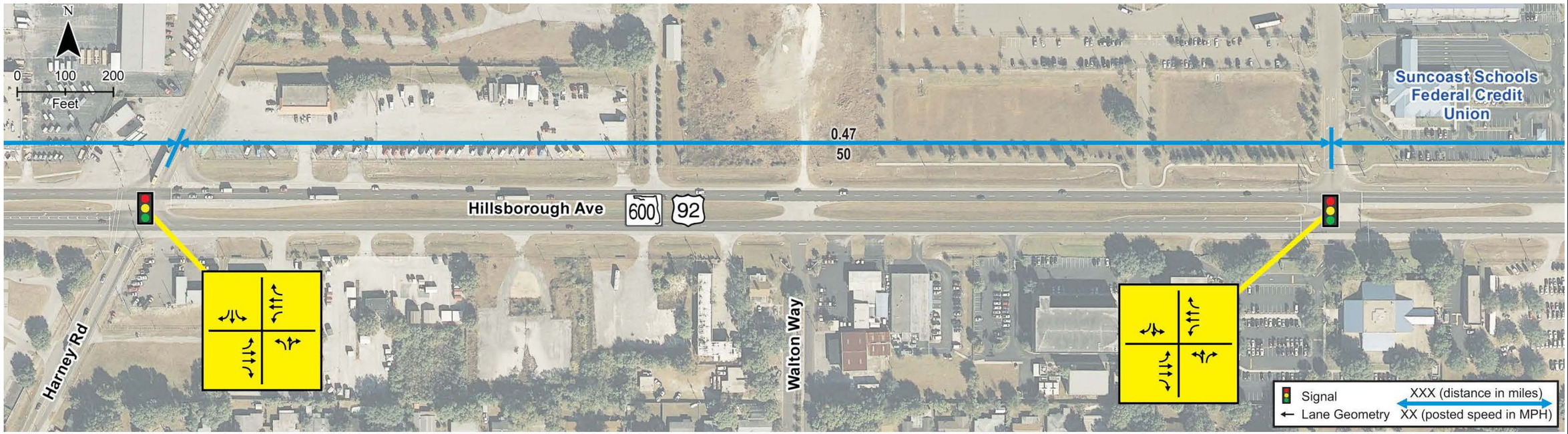
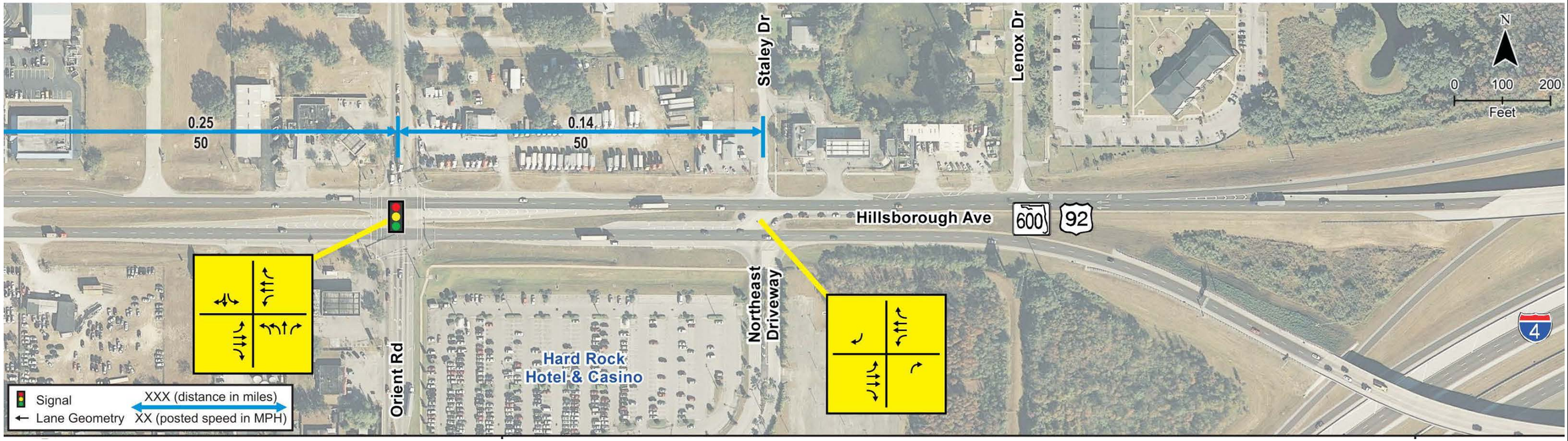
Major Intersections Existing Laneage

Figure 1-5
Sheet 1 of 2





Hillsborough Avenue (SR 600/US 92) PD&E Study
From 50th Street to Interstate 4
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Major Intersections Existing Laneage

Figure 1-5
Sheet 2 of 2

1.1.12 Utilities and Railroads

The following utility companies have facilities located near or within the study limits, based on a Sunshine One Call Ticket dated February 1, 2011:

Utility Owner	Utility Description
Fiberlight LLC	Fiber Optic Cables
TW Telecom	Fiber Optic Cables
AT&T	Communications/Fiber Optic
Pluris Eastlake LLC	Water/Sewer Pipelines
FL Gas Transmission	Gas Pipeline
Verizon Florida	Fiber Optic Cables
Hillsborough County Sheriff's Office	Fiber Optic Cables
Hillsborough County Traffic Services	Communications Cables
Level 3 Communications	Fiber Optic Cables
MCI Communications	Communications/Fiber Optic
TECO Peoples Gas	Gas Pipeline
City of Tampa Water & Sewer	Water & Sewer Pipelines
Tampa Electric Company	Electric Power Lines
Bright House Networks	Cable TV Lines
Tampa Bay Water	Water and Sewer
XO Communications	Fiber Optic Cables

In addition to the utilities listed above, Hillsborough Avenue crosses over a CSX freight railroad line on a bridge located approximately midway between 50th and 56th Streets. This CSX line is double-track and designated as the Neve Spur, which ends north of Hanna Avenue to the northeast. To the south, it connects to other lines via a Wye connection located near 7th Avenue and 37th Street.

1.1.13 Pavement Conditions

The existing pavement condition ranges from fair to poor. A resurfacing project is currently planned for construction in late 2012 from 56th Street to the end of the study limits (FPID nos. 427149-1-52-01 and 427169-1-52-01). This planned resurfacing project will also include sidewalk construction to fill in the missing sidewalk gaps. The original roadway consisted of a two-lane 20-foot wide concrete pavement. Around 1954 the concrete pavement was widened and overlaid with asphalt. Westbound lanes were added using asphaltic concrete pavement to yield a 4-lane roadway. Later projects in the 1980's and 1990's included resurfacing, sidewalk, and other miscellaneous improvements. There are no plans currently to remove the original concrete pavement.

1.1.14 Access Management Classification

The existing highway is classified as Access Management Class 7 west of 56th Street and Class 5 east of 56th Street. The standards for these classes are shown in **Table 1-5**.

Table 1-5 Florida's Access Management Standards

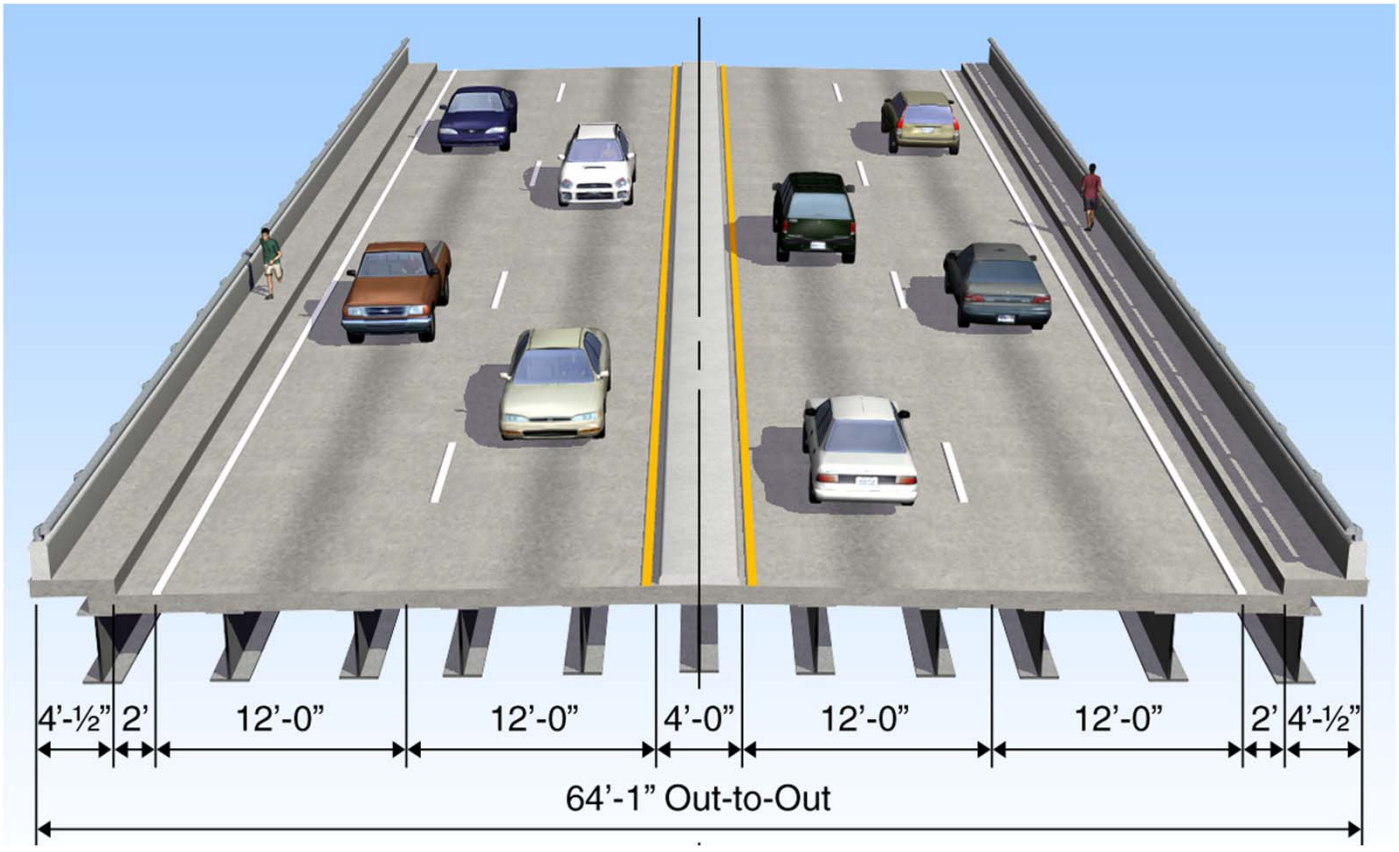
Access Class	Facility Design Features	Minimum Median Opening Spacing			Minimum Signal Spacing	Minimum Connection Spacing
	Median Treatment & Service Roads	Units	Directional (Prohibits left turns from side streets)	Full		>45 mph / ≤ 45 mph (posted speed)
2	Restrictive with Service Roads	ft	1,320	2,640	2,640	1,320/660
		mi	0.25	0.5	0.5	0.25/0.125
3	Restrictive *	ft	1,320	2,640	2,640	660/440
		mi	0.25	0.5	0.5	0.125/0.0833
4	Non-Restrictive	ft	N/A	N/A	2,640	660/440
		mi	N/A	N/A	0.5	0.125/0.0833
5	Restrictive	ft	660 ft	> 45 mph / ≤ 45 mph 2,640/1320	2,640/1320	440/245
		mi	0.125	0.5/0.25	0.5/0.25	0.0833/0.0464
6	Non-Restrictive	ft	N/A	N/A	1320	440/245
		mi	N/A	N/A	0.25	0.0833/0.0464
7	Both Median Types	ft	330	660	1320	125
		mi	0.0625	0.125	0.25	0.0237

* Restrictive means medians which prevent vehicles from crossing due to curbs, grass, or other barriers.
Source: Florida Department of State, Florida Administrative Code, FDOT Rule Chapter 14-97.

1.2 Existing Bridges

There is one bridge structure (Bridge No. 100021) located within the study limits: the Hillsborough Avenue Bridge over the CSX Railroad near mile post 3.234, between 50th and 56th Streets. The existing bridge consists of a poured-in-place concrete deck supported by steel I-beams on prestressed concrete pile bents. This bridge was originally constructed in 1936 with a 55-foot main span and two 54-foot-3-inch approach spans. The original typical section consisted of a 24-foot clear roadway width with concrete railings. This bridge was widened in 1954 to provide dual 26-foot clear roadway sections separated by a raised 4-foot wide concrete separator. On the outside of the roadway sections are 3-foot wide sidewalks with 1-foot 1-inch concrete post and rail barriers. The 1954 widening plans show the approach spans to be slightly longer than the original plans at 54-foot-11¼-inches. The existing bridge typical section is shown in **Figure 1-6** along with a photograph.

Photo source: FDOT's Bridge Inspection Report dated 6/16/09



Existing Bridge Typical Section

The 1954 widening plans show two railroad tracks separated horizontally by 13 feet resulting in a 10-foot offset between the centerline of the tracks to the face of the intermediate bents. The main span provides a minimum vertical clearance of 22 feet over the railroad according to the plans, but the inspection report indicates that the actual vertical clearance is only 21.4 feet.

1.2.1 Existing Bridge Condition

The latest inspection report for this bridge is dated June 16, 2009. At that time, the bridge was given a sufficiency rating of 86.6 and a health index of 96.63 and was classified as "functionally obsolete". The inspection report listed deficiencies in several of the bridge elements which are summarized in the **Table 1-6**.

Table 1-6 Inspection Report Deficiencies

Bridge Element	Deficiency
Asphalt Overlay	Cracking up to ¼" width with minor upheaval over joint
Concrete Deck	Between 2% and 10% of total deck area exhibits minor map cracking up to $^{1}/_{64}$" widths with light efflorescence and spalling with exposed reinforcing resulting in minimal section loss
Expansion Joint	219 LF of joint is showing signs of seepage on the caps below
Rolled Steel Beams	Localized chipping and peeling of paint with minor surface corrosion and pitting up to ½" deep at beam ends
Concrete End Diaphragm	1.2'x8"x3" spall with exposed and corroded reinforcing
Bearings	Heavy corrosion with corrosive delamination and pitting up to $^{1}/_{8}$" on the fixed bearings and $^{1}/_{64}$" on the moveable bearings – there are also a few bearing bolts that are not completely torqued down and have 50% section loss
Bent Cap	Bent Cap 3 has a 4' long x $^{1}/_{16}$" wide crack between beams 3-5 and 3-6 which extends across the underside of the cap
Slope Protection	210 SF of sand/cement bag slope protection is displaced
Timber Retaining Wall	Timber planks for retaining wall at toe of abutment slopes exhibit splitting, cracking and crushing up to 8' lengths primarily in the lower 2' of the wall resulting in leakage of fill

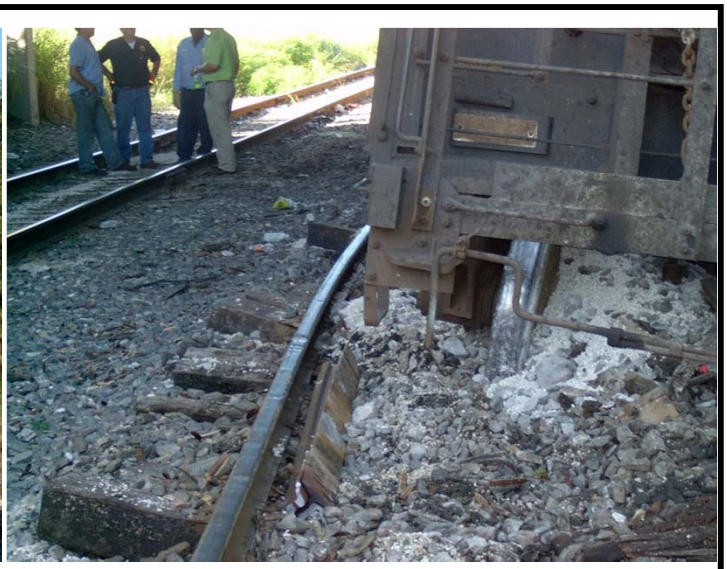
This bridge was designed for H20-44 vehicular loading with an Operating Rating of 52 tons and an Inventory Rating of 32 tons and is not posted. The Average Daily Traffic (ADT) count for this bridge is 45,000 vehicles with 5 percent classified as trucks.

A train derailment reportedly occurred in 2011 in which a box car grazed a bridge pier. Photos taken at the scene following the derailment are included in **Figure 1-7.** In addition, staff from the Department conducted a field inspection in late 2011 and took the following measurements at the railroad tracks under the Hillsborough Avenue bridge:

Main Line (east set of tracks): 10' 4" from CL of track to wall

Siding: 8' from CL of track to wall

Between tracks: from CL to CL is 15' 8"



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Train Derailment Photos

Figure 1-7

Staff noticed that some of the wooden barrier wall had been burned and was rotted. They also observed several places where someone had installed plywood with metal support to help support the wall.

1.2.2 Suitability for Widening

There are several criteria that need to be considered when determining whether a bridge is suitable for widening. A primary condition is the structural condition of the bridge. The existing load rating indicates that the bridge does not need to be posted and would therefore be suitable for widening. However, there are several deficiencies that are listed above that raise concerns about the strength of the bridge; in particular, the crack in bent cap 3 and the spalls and map cracking on the bottom of the concrete deck. There are also many other deficiencies that will need to repaired if the bridge is to be widened.

The geometric layout of the bridge is another consideration in determining whether a bridge can be widened. Currently, the bridge has a 21.4-foot vertical clearance and a 10-foot horizontal offset between the bent and the centerline of the CSX railroad track. Section 2.10 of the *Plans Preparation Manual (PPM)* requires a vertical clearance of 23-feet-6-inches which includes a 12-inch allowance for future rail resurfacing and raising of the track. Widening to the outside could be accomplished without reducing the vertical clearance by using shorter steel beams, but the existing bridge fails to meet the existing requirement even when the 12-inch allowance is not taken into account. The existing 10-foot horizontal clearance also does not meet the required horizontal clearance of 18 feet when a crash wall is used and 25 feet without a crash wall as specified in Section 6.3.3 of the *PPM*.

Another issue that must be addressed is whether the structure can resist crash loads or be protected from impact. The existing intermediate pile bents are not capable of resisting a crash load from a train and would need to be protected using a crash wall; however, there is not enough horizontal clear space to locate a wall between the railroad track and the bent. The post and rail traffic barrier on the existing bridge is also substandard but this would be corrected by widening on the outside.

The long term cost of maintaining this bridge needs to be taken into account when proposing the widening of this bridge. The bridge was originally constructed in 1936 and has surpassed its 75 year design life. While this does not mean that the bridge cannot function for another 75 years, it does mean that more expensive maintenance repairs will likely be needed more often.

Considering all of the above issues, the Hillsborough Avenue Bridge over the CSX Railroad is recommended for *replacement* instead of *widening*.

SECTION 2 – DESIGN CONTROLS AND STANDARDS

Table 2-1 gives design criteria related to the proposed bridge replacement for the Hillsborough Avenue Bridge over the CSX railroad. This proposed bridge is discussed in **Section 6.13**.

Table 2-1 Design Criteria for Hillsborough Avenue Bridge over Railroad

DESIGN ELEMENT	CRITERIA	SOURCE
Vertical Clearances for Bridges Roadway over Railroad	23'-6"	[(1)] Table 2.10.1
Horizontal Clearances for Railroads	18' (with crash walls) 25' (without crash walls)	[(1)] Table 6.3.3
SOURCE: [(1)] FDOT *Plans Preparation Manual*, Volume I English (Revised 2012)		

Table 2-2 gives general roadway design criteria which are applicable to this project, based primarily on FDOT's PPM and the American Association of State Highway and Transportation Official's (AASHTO) *A Policy of Geometric Design of Highways and Streets (the "Green Book").* In addition to these criteria, horizontal and vertical clearance requirements for the bridge over the CSX railroad were discussed in the previous section. Potential design exceptions and variations are discussed in **Section 6**.

Table 2-2 Hillsborough Avenue Roadway Design Criteria

DESIGN ELEMENT	6L Suburban Typical Section	6L Urban	6L High-Speed Urban	SOURCE
Functional Classification	Urban Principal Arterial			FDOT SLD
Design Year	2040	2040	2040	Traffic Report
Design Speed	50 mph	45 mph*	50 mph	(2) Sections 2.16.1, 1.9.1
Design Vehicle	WB-62FL	WB-62FL	WB-62FL	(2) Section 1.12
Horizontal Alignment				
Maximum Superelevation	0.05	0.05	0.05	(2) Sections 2.16.10, 2.9
	(use 0.10 table)		(use 0.10 table)	
Maximum Curvature	8° 15'	8° 15'	8° 15'	(2) Table 2.8.3
Maximum Curvature w/o Superelevation	0° 30'	2° 45'	0° 30'	(2) Table 2.8.4
Max. Deflection w/o Horizontal Curve	0° 45' 00"	1° 00' 00"	0° 45' 00"	(2) Table 2.8.1a
Minimum Length of Horizontal Curve	750' Desirable,	675' Desirable,	750' Desirable,	(2) Table 2.8.2a
	400' Minimum	400' Minimum	400' Minimum	
Superelevation Rate	1 :160	1 :150	1 :160	(2) Tables 2.9.3, 2.9.4
Vertical Alignment				
Maximum Grade	6.00%	6.00%	6.00%	(2) Section 2.16.8, Table 2.6.1
Minimum Grade	0.30%	0.30%	0.30%	(2) Table 2.6.4
Min. Distance Between VPI's	250 ft	250 ft	250 ft	(2) Table 2.6.4
Curves	136	98	136	(2) Table 2.8.5
Min. K Value for Sag Vertical Curves	96	79	96	(2) Table 2.8.6
Minimum Curve Length	Crest: 300 ft Sag: 200 ft	Crest & Sag: 135 ft or KA (whichever is greater)	Crest: 300 ft Sag: 200 ft	(2) Tables 2.8.5, 2.8.6
Max. Change In Grade w/o Vertical Curve	0.60%	0.70%	0.60%	(2) Table 2.6.2
Clearance for the Roadway Base Course above the Base Clearance	3'	1'	3'	(2) Table 2.6.3
Roadway Cross-Section				
Lane Widths	12'	11'-12' *	12'	(2) Table 2.1.1
Cross Slopes (Roadway)	2% two inside lanes 3% outside lane	2% two inside lanes 3% outside lane	2% two inside lanes 3% outside lane	(2) Figure 2.1.1
Cross Slopes (Shoulder)	6% (Shoulder)	------	------	(2) Table 2.3.2
Median Width	30'	22'	30'	(2) Section 2.16.4, Table 2.2.1
Shoulders	Full Width 8' Paved Width 5' (outside)	------	Paved Width 6.5' (outside)	(2) Section 2.16.5
	Paved Width 6.5' (median)	------	Paved Width 6.5' (median)	
Horizontal Clearance	24' from travel lane	4' from face of curb	24' from travel lane	(2) Table 2.11.11, Section 2.16.11
Slopes				(2) Table 2.4.1
Front	1 :6 to edge of HC, then 1:3	1 :6 to edge of HC, then 1:3	1 :6 to edge of HC, then 1:3	
Back	1 :4 when R/W permits or 1:3	1 :4 when R/W permits or 1:3	1 :4 when R/W permits or 1:3	
Minimum Border Width	29'	14' without bike lanes	29'	(2) Section 2.16.7, Table 2.5.2
Access Classification	Class 5 & 7	Class 5 & 7	Class 5 & 7	FDOT's RCI Database
Minimum Level Of Service (Arterial)	D	D	D	(3) FDOT's LOS Standards

Sources: (1) AASHTO "Policy On Geometric Design Of Highways And Streets" (2011)
(2) FDOT Plans Preparation Manual, Volume I English (Revised 2012)
(3) 2007 LOS Issue Papers (2002 LOS Handbook Addendum) and Generalized Q/LOS Tables
*Applies to the segment between 50th and 56th Streets, including the bridge over the CSX railroad.

SECTION 3 – TRAFFIC

Information in this section was summarized from the *Draft Traffic Technical Memorandum* prepared by HDR Engineering, dated March 2012.

3.1 Existing Traffic Volumes

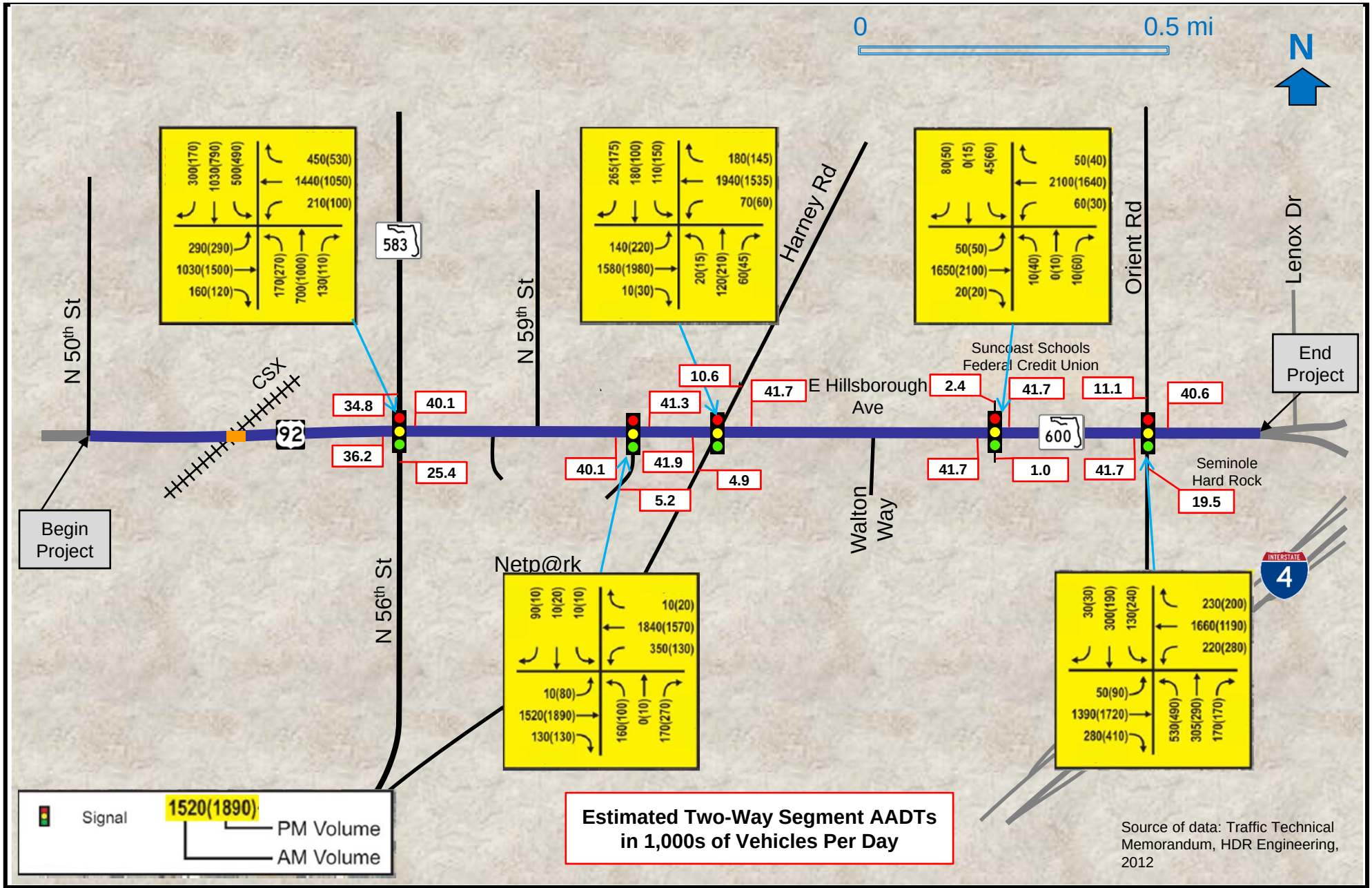
The existing year (2010) Annual Average Daily Traffic (AADT) volumes were estimated from automatic counters, which collected data for a 72-hour period between December 7, 2010 and December 9, 2010, and December 14, 2010 and December 16, 2010. The daily counts obtained from the field data were multiplied by a seasonal adjustment factor (SF) of 1.03 for the corresponding week of the count and an axle conversion factor (AF) of 0.97 to estimate the AADT. These factors were obtained from the 2010 FDOT Florida Traffic Information (FTI) DVD published by the FDOT. The estimated existing year (2010) AADT volumes are shown in **Figure 3-1**. Existing Year (2010) AADTs were estimated to range from 36,200 to 41,900 vehicles per day (VPD). The existing year (2010) Directional Design Hour Volumes (DDHV) were obtained by multiplying the AADT volumes by the recommended K_{30}- and D_{30}-factors of 9.4 percent and 56.0 percent, respectively (discussed below in **Section 3.4**).

3.2 Multimodal Transportation System Considerations

Access to intermodal facilities and movement of goods and freight are important considerations in the development of the Hillsborough County transportation system. Hillsborough Avenue provides access to the East Central Tampa Industrial Area, which includes Net Park near Orient Road and 56th Street. Improvements to Hillsborough Avenue will accommodate the expected increase in truck traffic and enhance truck access.

Hillsborough Area Regional Transit (HART) provides transit services on Hillsborough Avenue and the surrounding roadways (**Figure 3-2**). Route 34 is an established fixed route that provides an east/west link along Hillsborough Avenue from the Northwest Transfer Center to the Net Park Transfer Center. This route has 30 minute headways Monday through Saturday, as well as one-hour headways on Sunday. Transit service begins at 4:30 AM and ends at 1:00 AM Monday through Friday with reduced operating hours on the weekend; specifically, 6:30 AM to 10:30 PM on Saturday and 7:00 AM to 10:00 PM on Sunday. Route 32 provides an east/west link from the West Tampa Transfer Center to the Mango Wal-Mart with a stop at the Net Park Transfer Center and a portion of the route traversing along Hillsborough Avenue. Route 15 provides an east/west link from the Westshore Plaza Transfer Center to the Net Park Transfer Center, with a portion of this route running along Hillsborough Avenue. In addition, Express Routes 23X and 51X, and local routes 6, 39, 41, and 57 operate in the immediate vicinity of the study corridor.

In addition to freight and bus transit modes, bicyclists and pedestrians are also important considerations within the corridor. The planned improvements will link together two existing



Hillsborough Avenue (SR 600/US 92) PD&E Study

From 50th Street to Interstate 4

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Existing (2010) AADT Estimates and Turning Volumes

Figure 3-1

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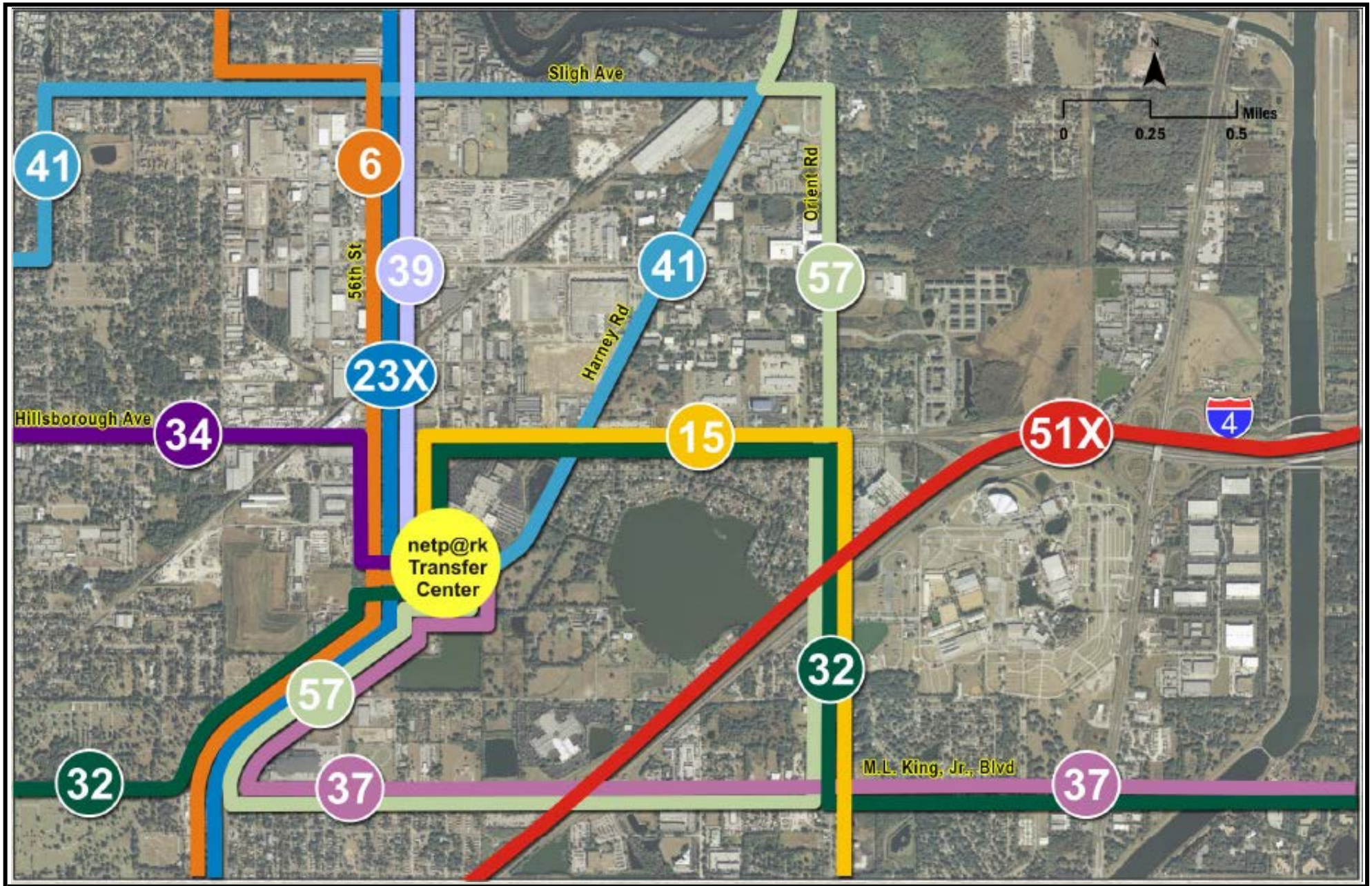

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Map of HART Bus Routes

Figure 3-2

bikeways and add sidewalks. This will enhance the bicycle and pedestrian access to transit stops and the employment centers in the East Central Tampa Industrial Area. The sidewalk improvements are included in the Hillsborough County Metropolitan Planning Organization (MPO) *2025 Comprehensive Pedestrian Plan*. The bicycle improvements are called for in the Hillsborough County *Comprehensive Bicycle Plan*.

3.3 Existing Capacity/Level of Service Analysis

Signalized intersection Level of Service (LOS) was estimated using the *Highway Capacity Manual (HCM)* module of the Synchro 7.0 Version (Build 761) software. Existing year (2010) lane geometry, design hour turning movement traffic volumes, and signal timing plans obtained from the Hillsborough County Traffic Operations Division were used in the analysis. The existing year (2010) LOS for the five study intersections are summarized in **Table 3-1** and are shown in **Figure 3-3**.

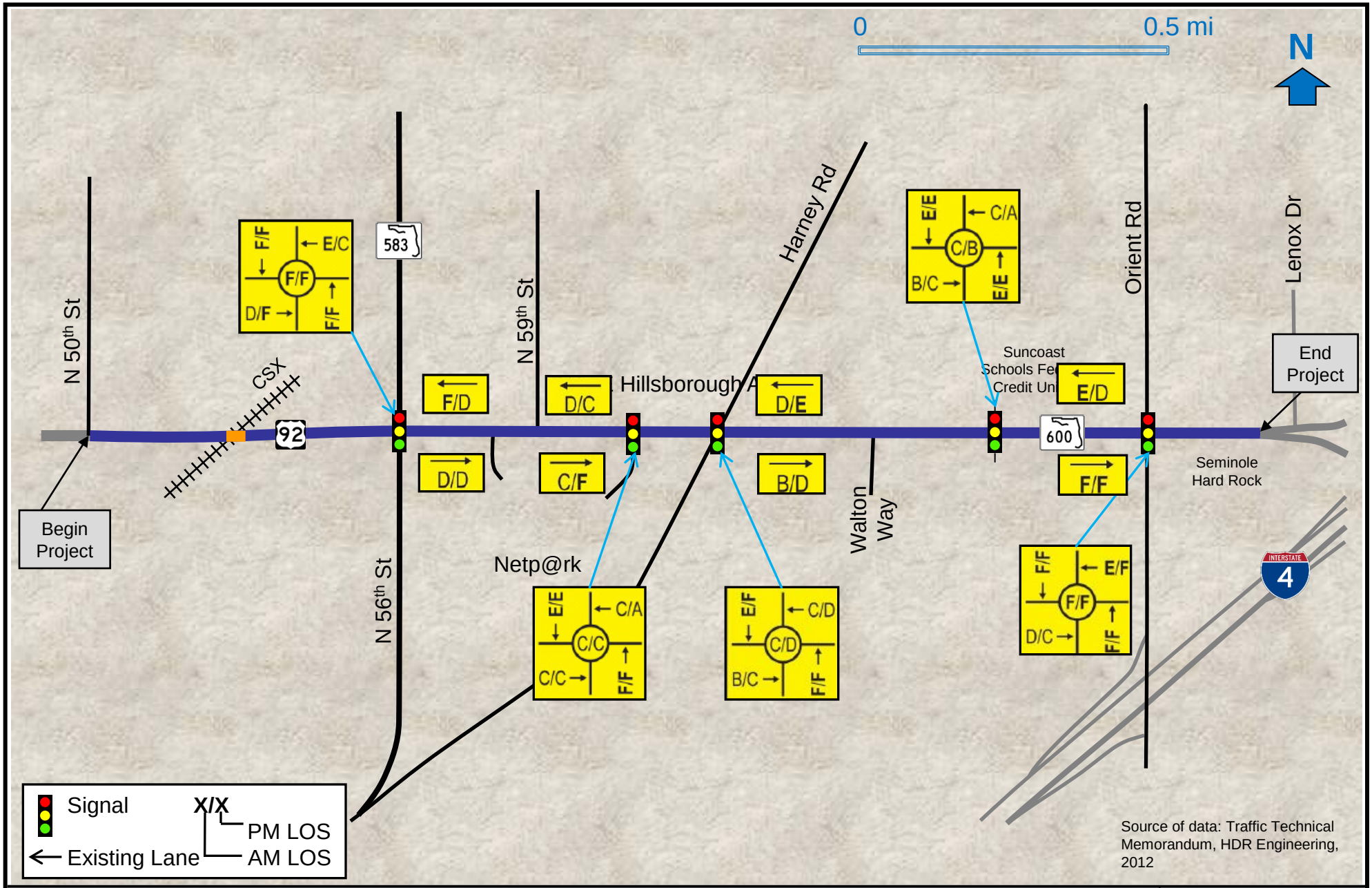
Table 3-1 Existing Year (2010) Hillsborough Avenue Intersection LOS Summary

Cross-Street	Level of Service (LOS) AM/PM				
	Hillsborough Avenue		NB	SB	Overall
	EB Mainline	WB Mainline			
56th Street (SR 583)	D / **F**	**E** / C	**F / F**	**F / F**	**F / F**
Net Park Driveway	C / C	C / A	**F / F**	**E / E**	C / C
Harney Road	B / C	C / D	**F / F**	**E / F**	C / D
Suncoast Schools Federal Credit Union/Averitt Express Driveway	B / C	C / A	**E / E**	**E / E**	C / B
Orient Road	D / C	**E / F**	**F / F**	**F / F**	**F / F**

Bold – Indicates level of service exceeding the minimum acceptable level of service standard D.

Existing Year (2010) Arterial Analysis

The existing year (2010) Hillsborough Avenue arterial segment LOS analyses were conducted using the estimated existing year (2010) design hour volumes. The arterial segment LOS analysis was conducted using the Synchro 7.0 Version (Build 761) software. For the arterial analysis, the free flow speed was assumed to be the posted speed limit. The Hillsborough Avenue arterial functional and design categories were determined to be Principal Arterial and High-Speed (posted speed limit 45-55 mph), respectively, based on Exhibit 10-4 of the *HCM 2000*. The urban street class of the Hillsborough Avenue arterial was established as Class I using Exhibit 10-3 of the *HCM 2000*. The existing arterial LOS results for the eastbound and westbound directions of Hillsborough Avenue are summarized in **Table 3-2** and **Table 3-3**, respectively. These same LOS values are shown in **Figure 3-3**.



Hillsborough Avenue (SR 600/US 92) PD&E Study

From 50th Street to Interstate 4

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Hillsborough County

Existing (2010) Levels of Service

Figure 3-3

Table 3-2 Existing Year (2010) Hillsborough Avenue Arterial Eastbound LOS Summary

Hillsborough Avenue Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
56th Street (SR 583) to Net Park Driveway	0.39	45	22.0	21.6	D	D
Net Park Driveway to Harney Road	0.14	45	30.3	13.6	C	**F**
Harney Road to Suncoast Schools Federal Credit Union/Averitt Express Driveway	0.47	50	34.6	26.8	B	D
Suncoast Schools Federal Credit Union/Averitt Express Driveway to Orient Road	0.25	50	12.2	13.9	**F**	**F**
56th Street to Orient Road **(Entire Eastbound Arterial)**	1.25	45-50	22.3	19.6	D	**E**

Table 3-3 Existing Year (2010) Hillsborough Avenue Arterial Westbound LOS Summary

Hillsborough Avenue Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
Orient Road to Suncoast Schools Federal Credit Union/Averitt Express Driveway	0.25	50	17.0	25.5	**E**	D
Suncoast Schools Federal Credit Union/Averitt Express Driveway to Harney Road	0.47	50	22.3	20.7	D	**E**
Harney Road to Net Park Driveway	0.14	45	21.3	32.6	D	C
Net Park Driveway to 56th Street (SR 583)	0.39	45	12.5	25.6	**F**	D
West of I-4 to 56th Street **(Entire Westbound Arterial)**	1.25	45-50	17.0	24.0	**E**	D

The existing year (2010) signalized intersection analysis indicates that all of the five Hillsborough Avenue study intersections have at least one approach operating at LOS E or F during the design hour. The existing year (2010) arterial analysis shows that in the AM peak period, the entire westbound (peak direction) arterial from 56th Street to Orient Road operates at LOS E and in the PM peak period, the entire eastbound (peak direction) arterial operates at LOS E.

3.4 Traffic Design Parameters

The recommended design hour traffic factors were estimated using historical traffic count data obtained from the FDOT's 2010 FTI DVD for the 5-year period from 2006-2010. Based on 5-year averages of the recorded traffic characteristics and comparison of these average values to state and national acceptable ranges obtained from the *FDOT Project Traffic Forecasting Handbook*, the design hour traffic factors recommended for the Hillsborough Avenue study corridor are as follows:

- K_{30} = 9.4 percent;
- D_{30} = 56.0 percent; and
- DHT = 5 percent (T_{24} = 9.2 percent)

The K_{30} (or Design Hour) Factor is of major importance in the determination of Design Hour Volumes (DHV). It is defined as the ratio of DHV to the AADT occurring during the 30th highest hour of the year.

The directional "D Factor" is defined as the percentage of design hour traffic in the dominant direction of flow. The directional distribution factor or D_{30}, is based on the 200th Highest Hour Traffic Count Report and is referred to as D_{30}.

DHT stands for Design Hour Trucks and it represents the percent heavy vehicles expected during the design hour. The DHT is typically about half of the 24-hour Truck Factor (T_{24}) percentage.

3.5 Methodology for Development of Future Traffic

For traffic analysis purposes, the following traffic years were agreed on among the study team:

Existing Year:	2010
Opening Year:	2020
Mid-Year:	2030
Design Year:	2040 (Build & No-Build Scenarios)

Future traffic projections were developed using the Tampa Bay Regional Planning Model (TBRPM), Version 7.0. The TBRPM is based on the Florida Standard Urban Transportation Modeling Structure (FSUTMS) and is recognized by the Florida Department of Transportation (FDOT), as well as the five MPOs located within FDOT District 7, as the accepted travel demand forecasting model for the Tampa Bay region. The TBRPM includes Hillsborough, Pinellas, Pasco, Hernando, and Citrus Counties. Prior to running the model to develop future traffic projections, a base year model validation (reasonableness check) was performed for the study area, and the model volumes were found to be within the acceptable range.

The cost feasible plan 2035 TBRPM represents 6-lane Build conditions from west of 56th Street to I-4. Without any major capacity improvements, the annual growth rate is expected to be nearly one percent as observed in recent short term growth trends. Therefore, a minimal growth rate of one percent was applied to model year (2035) AADTs and manually smoothed in order to project design year (2040) AADTs. Opening year (2020) AADTs were calculated by interpolating between existing year (2010) and future year (2040) AADTs.

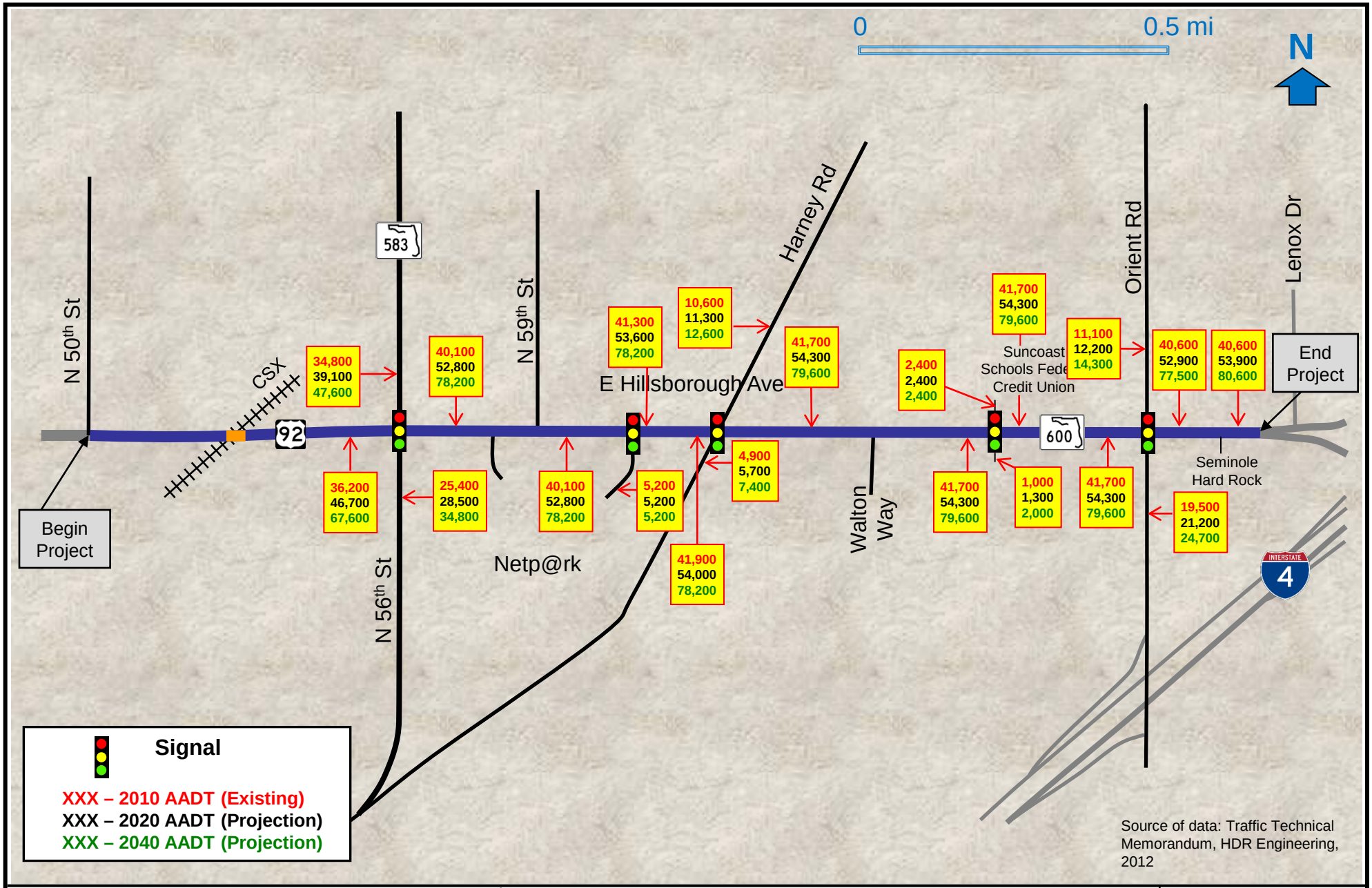
3.6 Future-Year AADTs and Design Hour Volumes

Table 3-4 provides a summary of AADT traffic projections for the Hillsborough Avenue Study Corridor. In addition, AADTs are shown in **Figure 3-4**.

Table 3-4 Summary of Hillsborough Avenue AADT Projections

Traffic Count Location	Year 2010 Counts AADT	Year 2020 Projected AADT	Year 2035 Model AADT	Year 2040 Projected AADT[1]
Hillsborough Avenue				
West of 56th Street (SR 583)	36,200	46,700	63,700	67,600
East of 56th Street (SR 583)	40,100	52,800	74,500	78,200
West of Net Park Driveway	40,100	52,800	74,500	78,200
East of Net Park Driveway	41,300	53,600	74,500	78,200
West of Harney Road	41,900	54,000	74,500	78,200
East of Harney Road	41,700	54,300	75,800	79,600
West of Suncoast Schools Federal Credit Union/Averitt Express Driveway	41,700	54,300	75,800	79,600
East of Suncoast Schools Federal Credit Union/Averitt Express Driveway	41,700	54,300	75,800	79,600
West of Orient Road	41,700	54,300	75,800	79,600
East of Orient Road	40,600	52,900	74,100	77,500
West of Hard Rock Hotel and Casino Northeast Driveway	40,600	52,900	74,100	77,500
56th Street (SR 583)				
South of Hillsborough Avenue	25,400	28,500	33,100	34,800
North of Hillsborough Avenue	34,800	39,100	45,300	47,600
Net Park Driveway				
South of Hillsborough Avenue	5,200	5,200	5,200	5,200
Harney Road				
South of Hillsborough Avenue	4,900	5,700	7,000[2]	7,400
North of Hillsborough Avenue	10,600	11,300	12,000[2]	12,600
Suncoast Schools Federal Credit Union/Averitt Express Driveway				
South of Hillsborough Avenue	1,000	1,300	2,000[2]	2,000
North of Hillsborough Avenue	2,400	2,400	2,400	2,400
Orient Road				
South of Hillsborough Avenue	19,500	21,200	23,500	24,700
North of Hillsborough Avenue	11,100	12,200	13,400	14,300

[1]A growth rate of 1.0% was applied to the 2035 volumes; however, for the driveways 0% growth was assumed
[2]Manual adjustments were made to the model volumes



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From 50th Street to Interstate 4
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AADT for 2010, 2020 and 2040

Figure 3-4

Based on existing traffic count data, westbound Hillsborough Avenue was selected as the peak direction for the AM period, and eastbound Hillsborough Avenue was assumed to be the peak direction of travel during the PM peak period. These assumptions of peak travel directions during the AM and PM peak periods were used in the development of design year (2040) and opening year (2020) design hour turning movement volumes.

The design year (2040) DDHV were obtained by multiplying the 2040 AADT volumes by the K_{30}-factor of 9.4 percent and the D_{30}-factor of 56.0 percent. Design hour turning movements were developed for the PM peak period by multiplying existing year (2010) manually smoothed turning movement percentages with the 2040 DDHV. A manual smoothing process was performed in order to satisfy the K_{30}- and D_{30}-factors and to balance traffic flows between adjacent intersections. The AM peak period turning movement volumes were developed by reversing the peak direction of travel. The resulting design year (2040) AM and PM peak hour turning movement volumes (same for both Build and No-Build Alternatives) are included in **Figure 3-5.**

3.7 Future Conditions

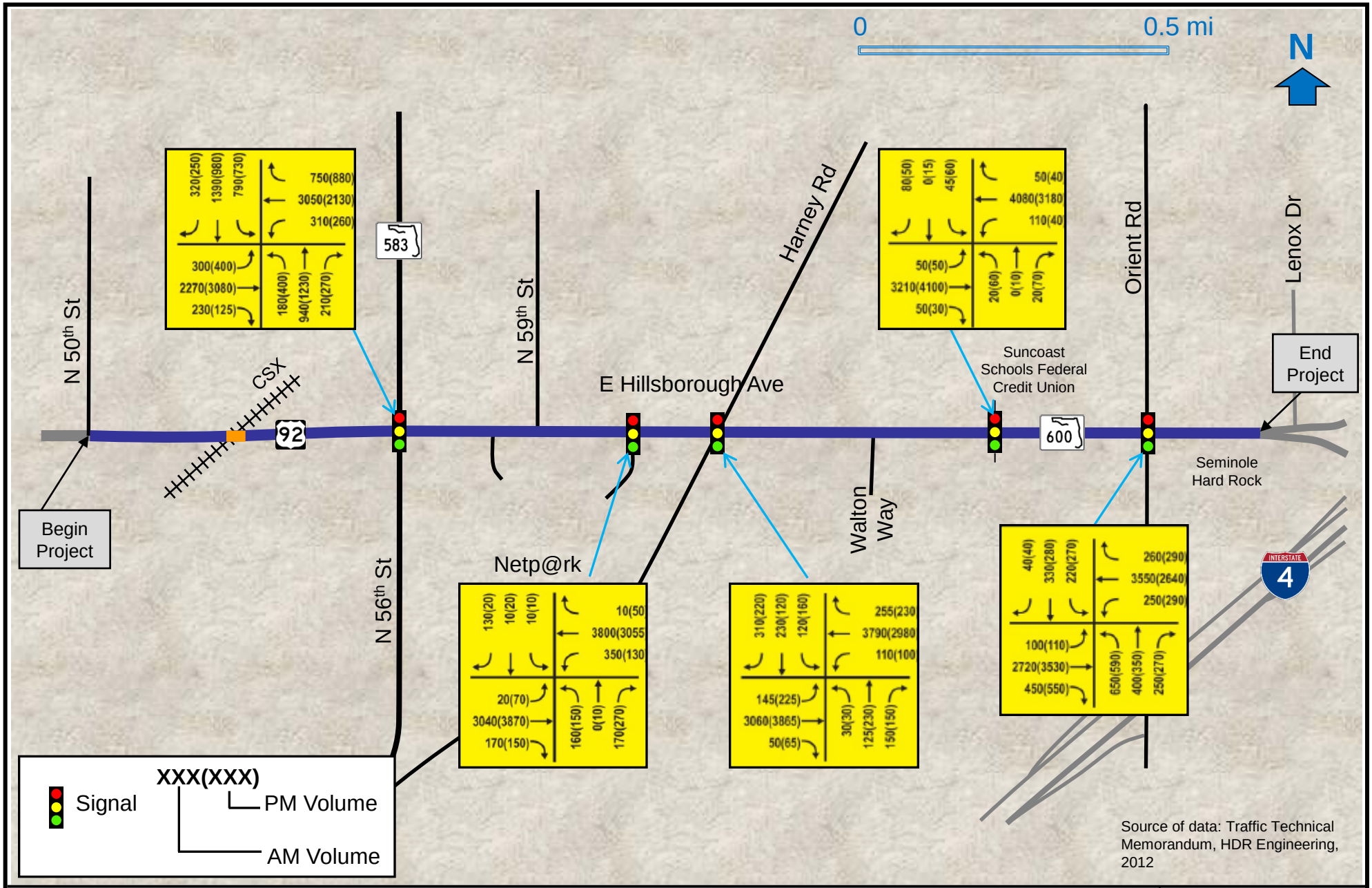
3.7.1 No-Build Alternative Projected Traffic Conditions

Signalized intersection LOS was estimated using the *HCM* methodology module of the Synchro software. For the No-Build intersection LOS analysis, existing year (2010) geometric conditions and design year (2040) Build (six-lanes) design hour turning movement traffic volumes, with respect to individual intersections, were used. By using the design year (2040) Build (six-lanes) volumes, as opposed to using the TBRPM to obtain a separate set of No-Build volumes, the benefit of the Build Alternative can be measured. In anticipation of increased traffic volumes, signal timing was optimized to reflect the higher traffic volumes that can be expected in the future. For this scenario all intersections were found to operate at LOS F in both the AM and PM peak periods. In addition, the overall arterial was found to operate at LOS F for the same periods. More detailed information is available in the *Traffic Technical Memorandum* prepared for this study.

3.7.2 Build Alternative Projected Traffic Conditions

3.7.2.1 Year 2040 Build Intersection Level of Service Analysis

For the Build Alternative, Hillsborough Avenue from 50th Street to west of I-4 is assumed to be a six-lane facility. Highway capacity analyses were conducted to determine the intersection lane geometry along Hillsborough Avenue. In addition to widening Hillsborough Avenue to six lanes, limited cross street improvements were also recommended for the Build Alternative. Signalized intersection LOS was estimated using the *HCM* methodology module of Synchro software.



Source of data: Traffic Technical Memorandum, HDR Engineering, 2012

Hillsborough Avenue (SR 600/US 92) PD&E Study
From 50th Street to Interstate 4
WPI Segment No. 430054 1
Hillsborough County

Design Year (2040) Directional Design Hour Volumes

Figure 3-5

Signal timing was optimized to reflect the addition of the recommended lane geometry in the future. The analysis results for the five study intersections are summarized in **Table 3-5**. The design year (2040) recommended Build Alternative lane geometry and LOS is also shown on **Figure 3-6**. The design year (2040) Synchro intersection analysis sheets for the Build conditions are included in the *Traffic Technical Memorandum*.

Table 3-5 Year 2040 Build Intersection LOS

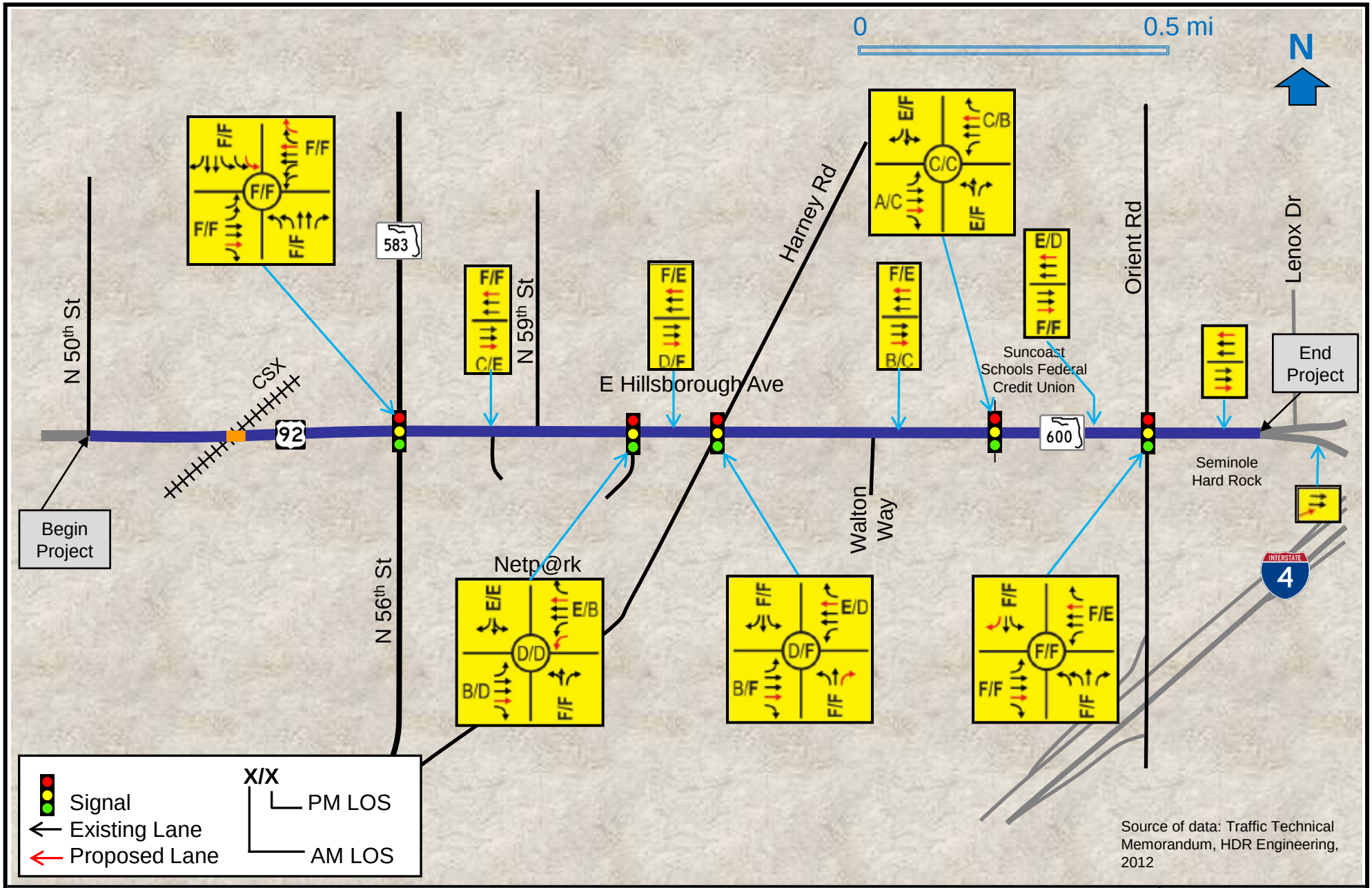
Cross-Street	Level of Service (LOS)				
	Hillsborough Avenue EB Mainline AM / PM	Hillsborough Avenue WB Mainline AM / PM	NB AM / PM	SB AM / PM	Overall AM / PM
56th Street (SR 583)	**F / F**	**F / F**	**F / F**	**F / F**	**F / F**
Net Park Driveway	B / D	**E** / B	**F / F**	**E / E**	D / D
Harney Road	B / **F**	**E** / D	**F / F**	**F / F**	D / **F**
Suncoast Schools Federal Credit Union/Averitt Express Driveway	A / C	C / B	**E / F**	**E / F**	C / C
Orient Road	**F / F**	**F / E**	**F / F**	**F / F**	**F / F**

Bold – Indicates level of service exceeding the minimum acceptable level of service standard D.

For the Build Scenario with the design year (2040) design hour traffic conditions, two study intersections on Hillsborough Avenue (at Net Park Driveway and Suncoast Schools Federal Credit Union/Averitt Express Driveway) have an overall intersection LOS D or better for both the AM and PM peak periods. In addition, the intersection at Harney Road has an overall intersection LOS D for the AM Peak Period; however, during the PM peak period this intersection is projected to experience LOS F conditions. The study intersections at 56th Street and Orient Road are operating at failing LOS for both the AM and PM peak periods under design year (2040) Build conditions; however, the overall signal delay is significantly reduced

3.7.2.2 Year 2040 Build Arterial Analysis

The design year (2040) Build arterial LOS analyses for the Hillsborough Avenue were conducted using the estimated design year (2040) DDHV. The arterial segment LOS analysis was conducted using the Synchro 7.0 Version (Build 761) software. For the arterial analysis, the free flow speed was assumed to be the posted speed limit. The Hillsborough Avenue arterial functional and design categories were determined to be Principal Arterial and High-Speed (posted speed limit 45-55 mph), respectively, based on Exhibit 10-4 of the *HCM 2000*. The urban street class of the Hillsborough Avenue arterial was established as Class I using Exhibit 10-3 of the *HCM 2000*. The Hillsborough Avenue eastbound and westbound arterial segment LOS results for the design year (2040) Build conditions are summarized in **Tables 3-6** and **3-7,** respectively, and shown in **Figure 3-6**.



Hillsborough Avenue (SR 600/US 92) PD&E Study
From 50th Street to Interstate 4
WPI Segment No. 430054 1
Hillsborough County

Design Year (2040) Build Alternative LOS and Lane Geometry

Figure 3-6

Table 3-6 Year 2040 Build Arterial Eastbound LOS Summary

Hillsborough Avenue Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
56th Street (SR 583) to Net Park Driveway	0.39	45	29.1	16.1	C	E
Net Park Driveway to Harney Road	0.14	45	24.9	4.4	D	F
Harney Road to Suncoast Schools Federal Credit Union/Averitt Express Driveway	0.47	50	40.1	29.7	B	C
Suncoast Schools Federal Credit Union/Averitt Express Driveway to Orient Road	0.25	50	5.7	3.2	F	F
56th Street to Orient Road (Entire Eastbound Arterial)	1.25	45-50	16.8	8.3	E	F

Table 3-7 Year 2040 Build Arterial Westbound LOS Summary

Hillsborough Avenue Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
Orient Road to Suncoast Schools Federal Credit Union/Averitt Express Driveway	0.25	50	16.3	24.7	E	D
Suncoast Schools Federal Credit Union/Averitt Express Driveway to Harney Road	0.47	50	15.4	18.7	F	E
Harney Road to Net Park Driveway	0.14	45	8.1	18.3	F	E
Net Park Driveway to 56th Street (SR 583)	0.39	45	5.0	8.3	F	F
West of I-4 to 56th Street (Entire Westbound Arterial)	1.25	45-50	8.8	13.9	F	F

The design year (2040) Build Alternative arterial analysis indicates that the segment from Harney Road to Suncoast Schools Federal Credit Union/Averitt Express Driveway is expected to operate above the LOS D standard in the eastbound direction during both the AM and PM peak periods. In addition, the segments from 56th Street (SR 583) to Net Park Driveway and Net Park Driveway to Harney Road are expected to operate above the LOS D standard in the eastbound direction during the AM peak period. The segment from Suncoast Schools Federal Credit Union/Averitt Express Driveway to Orient Road is also expected to operate above the LOS D standard in the westbound direction during the PM peak period.

Overall, Hillsborough Avenue will experience improvements in LOS and a decrease in delay times when it is widened from a four-lane facility to a six-lane facility. Based on the Synchro analysis for 2040, compared to the no-build case, the build (6-lane) alternative is predicted to experience an overall average 74 percent decrease in signal delay and a 206 percent increase in arterial speed (3.9 mph vs. 12 mph). When Hillsborough Avenue is widened to six-lanes, the

additional through lane, in both the eastbound and westbound directions, will connect at the west end of the study corridor to the existing six-lane section which currently terminates east of 50th Street. At the east end of the study corridor the eastbound through lane will merge back into a two-lane section along the on-ramp to eastbound I-4 and the westbound through lane will commence where the exit ramp from westbound I-4 to westbound Hillsborough Avenue was previously a merge lane.

While some approaches will continue to experience deficient LOS conditions at intersections, the overall corridor will operate more efficiently. In order to achieve the LOS D standard for all study intersections and arterials in the design year (2040) Hillsborough Avenue would need to be widened to eight-lanes and the cross streets would need to be improved, as described below. However, such improvements are not recommended since they are not included in the 2035 Cost Affordable Roadway Plan component of the Hillsborough County MPOs *2035 Long Range Transportation Plan*.

3.7.2.3 Year 2040 Eight-Lane Arterial Analysis

Since the widening of Hillsborough Avenue to six lanes would not be adequate to achieve the LOS standard D for the arterial section and for all the study intersections in the design year (2040), an eight-lane analysis was performed. In addition to the eight-laning of Hillsborough Avenue, the following intersection improvements would be necessary to achieve the LOS D:

- *56th Street*:
    - Addition of a third eastbound-to-northbound left-turn lane
    - Free flow eastbound-to-southbound right-turn lane with additional receiving lane
    - Addition of a third westbound-to-southbound left-turn lane
    - Free flow westbound-to-northbound right-turn lane with additional receiving lane
    - Addition of a third northbound-to-westbound left-turn lane
    - Addition of a second northbound-to-eastbound right-turn lane
    - Addition of a third southbound-to-eastbound left-turn lane
    - Two additional through lanes in both the northbound and southbound directions
- *Net Park Driveway*:
    - Addition of a second eastbound-to-northbound left-turn lane
    - Addition of a second westbound-to-southbound left-turn lane
- *Harney Road*:
    - Addition of an exclusive northbound-to-eastbound right-turn lane

- *Orient Road*:
    - Addition of a second westbound-to-southbound left-turn lane
    - Addition of a third northbound-to-westbound left-turn lane
    - Addition of a second northbound-to-eastbound right-turn lane
    - Addition of a second southbound-to-eastbound left-turn lane
    - Addition of an exclusive southbound-to-westbound right-turn lane
    - Two additional through lanes in both the northbound and southbound directions

The recommended number of lanes at 56th Street and Orient Road may not be feasible to be built. At these two intersections an interchange option should be considered as it may cost less compared to the right of way costs associated with adding more lanes. Signalized intersection LOS for the design year (2040) eight-lane Build Alternative was estimated using the HCM methodology module of Synchro software. The analysis results for the five study intersections are summarized in **Table 3-8.**

Table 3-8 Design Year (2040) 8-Lane Hillsborough Avenue Intersection Level of Service Summary

Cross-Street	Level of Service (LOS)				
	Hillsborough Avenue EB Mainline AM / PM	Hillsborough Avenue WB Mainline AM / PM	NB AM / PM	SB AM / PM	Overall AM / PM
56th Street (SR 583)	D / **E**	D / C	**E / E**	D / **E**	D / D
Net Park Driveway	C / C	B / B	**E / F**	D / D	C / C
Harney Road	B / C	B / D	**E / F**	**E / E**	B / D
Suncoast Schools Federal Credit Union/Averitt Express Driveway	B / A	A / A	**E / E**	**E / E**	A / A
Orient Road	C / C	D / C	**E / F**	**F / F**	D / D

Bold – Indicates level of service exceeding the minimum acceptable level of service standard D.

The Hillsborough Avenue eastbound and westbound arterial segment LOS results for the design year (2040) eight-lane Build Alternative are summarized in **Table 3-9** and **Table 3-10**, respectively.

Table 3-9 Design Year (2040) 8-Lane Hillsborough Avenue Arterial Eastbound Level of Service Summary

Hillsborough Avenue Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
56th Street (SR 583) to Net Park Driveway	0.39	50	23.9	24.5	D	D
Net Park Driveway to Harney Road	0.14	50	20.4	14.4	E	F
Harney Road to Suncoast Schools Federal Credit Union/Averitt Express Driveway	0.47	50	31.7	41.6	C	B
Suncoast Schools Federal Credit Union/Averitt Express Driveway to Orient Road	0.25	50	16.5	15.4	E	F
56th Street to Orient Road (Entire Eastbound Arterial)	**1.25**	**50**	**23.5**	**23.5**	**D**	**D**

Table 3-10 Design Year (2040) 8-Lane Hillsborough Avenue Arterial Westbound Level of Service Summary

Hillsborough Avenue Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
Orient Road to Suncoast Schools Federal Credit Union/Averitt Express Driveway	0.25	50	34.5	26.2	B	D
Suncoast Schools Federal Credit Union/Averitt Express Driveway to Harney Road	0.47	50	33.5	22.1	C	D
Harney Road to Net Park Driveway	0.14	50	19.2	23.2	E	D
Net Park Driveway to 56th Street (SR 583)	0.39	50	15.2	18.7	F	E
West of I-4 to 56th Street (Entire Westbound Arterial)	**1.25**	**50**	**23.1**	**21.7**	**D**	**D**

SECTION 4 – CORRIDOR ANALYSIS

A corridor analysis is not applicable for this study. The scope of proposed improvements consists of simply adding two lanes to an existing 4-lane segment of Hillsborough Avenue between 50th Street and I-4.

SECTION 5 – ALTERNATIVES ANALYSIS

5.1 No-Build Alternative

The No-Build Alternative would involve postponing major improvements to the existing roadway beyond the design year 2040. This involves leaving existing Hillsborough Avenue as-is, providing only routine maintenance and safety improvements as required.

The *advantages* of the No-Build Alternative include the following:

- No new construction costs
- No disruption to existing land use due to construction
- No disruption to traffic due to construction activities
- No right of way acquisition or relocations, and
- No disturbance to natural resources

The *disadvantages* of the No-Build Alternative include the following:

- Increase in roadway maintenance and user costs
- Increase in traffic congestion
- Increase in potential for traffic crashes
- Deterioration of air quality, and
- Inconsistency with local transportation plans

These advantages and disadvantages, along with other criteria established, will be used in the evaluation process with the Build Alternative. The No-Build Alternative will remain a viable alternative throughout the PD&E Study process.

5.2 Transportation System Management

Transportation Systems Management (TSM) are actions designed to achieve short-range cost-effective transportation improvements. TSM improvements can include:

- Improve the efficiency of an existing roadway;
- Reduce vehicle use in congested areas;
- Improve transit service; and
- Improve internal transit management efficiency

While TSM measures such as signal timing improvements, signing and marking improvements, intersection improvements, and travel demand management strategies could result in small operational improvements, TSM measures alone would not adequately address the major need for the project, which is to increase the roadway capacity to meet projected future travel

demand. Therefore, the TSM Alternative is not considered viable as a replacement for the Build Alternatives. Some TSM improvements could be prudent for FDOT consider as potential *interim* improvements, since construction of the Build Alternative is not currently funded.

5.3 Build Alternatives

The following steps were utilized to develop and evaluate viable Build Alternatives:

- Base concept plans were prepared using all available data regarding existing ROW including county geographic information systems (GIS), FDOT ROW maps, and recent resurfacing plans
- The required number of through lanes and auxiliary turn lanes at major intersections was determined based on the traffic analysis summarized in **Section 3**
- Typical sections were developed based on FDOT's standard design criteria; all alternatives included bicycle lanes and sidewalks
- Alternative alignments were not analyzed as all mainline improvements can be constructed within existing ROW
- One basic Build Alternative was developed (consistent with the project's scope of services)
- The Recommended Alternative is described in **Section 5**, and conceptual design plans for it are included in **Appendix A**
- A 6-lane *suburban* typical section was determined to be the most practicable alternative, given that the existing roadway is 4-lane, and the existing ROW width is 200 feet in most areas. A 6-lane *rural* typical section is feasible but isn't reasonable as it would require 224 feet (+/-) of ROW, which would result in the need for additional ROW as well as impacts to businesses. A 6-lane suburban typical section requires a minimum 182 feet of ROW, so it was determined to be the most feasible typical section to minimize ROW costs and impacts to adjacent businesses and the natural environment. A 6-lane *urban* typical section would also fit within the existing ROW; however, the construction costs would be higher and the allowable design speed would be lower than that of the suburban typical section.

5.4 Selection of Recommended Alternative

The Recommended Build Alternative includes widening the existing highway to a 6-lane divided suburban typical section. Additional turn lanes would be constructed at major intersections, including improvements on the cross roads. Construction of SMFs is also included as part of the proposed project. Some revisions to existing median openings are also proposed as part of the roadway improvements. The Recommended Alternative is described in greater detail in **Section 6**. The recommended alternative was presented to the public at the public hearing held on September 17, 2012.

The *advantages* of the Recommended Build Alternative include the following:

- Improved regional connectivity
- Reduced traffic congestion
- Improved safety with reduced congestion
- Consistency with the Hillsborough County MPO's Year *2035 Long Range Transportation Needs Plan*, and
- Improved bicycle and pedestrian accommodations

The *disadvantages* of the Recommended Build Alternative include the following:

- Costs associated with design, ROW acquisition and construction
- Temporary traffic disruptions and inconveniences to businesses during construction
- Minimal environmental effects (i.e.: traffic, noise)

SECTION 6 – PRELIMINARY DESIGN ALTERNATIVE

6.1 Design Traffic Volumes

Design hour volumes for the design year were shown earlier in **Figure 3-5**. In addition, recommended "traffic design factors" were presented earlier in **Section 3.4**.

6.2 Typical Sections

The primary recommended roadway typical section is shown in **Figure 6-1,** along with the existing typical section. The recommended typical section is a 6-lane suburban roadway with 12-foot lanes, 5-foot shoulder/bike lanes, and sidewalks. The proposed design speed is 50 mph. In the vicinity of the bridge over the CSX railroad, the roadway approaches to the bridge will transition to a narrower urban-type typical section with a narrow median and border widths in order to eliminate the need for acquisition of additional ROW and impacts to adjacent businesses. For this limited segment, the lane widths are proposed to be adjusted to provide 1.5-foot inside shoulders next to the 4-foot raised separator, yielding a 7-foot median (verses the existing 4-foot median in this area). See **Section 6.13** for discussion of the bridge.

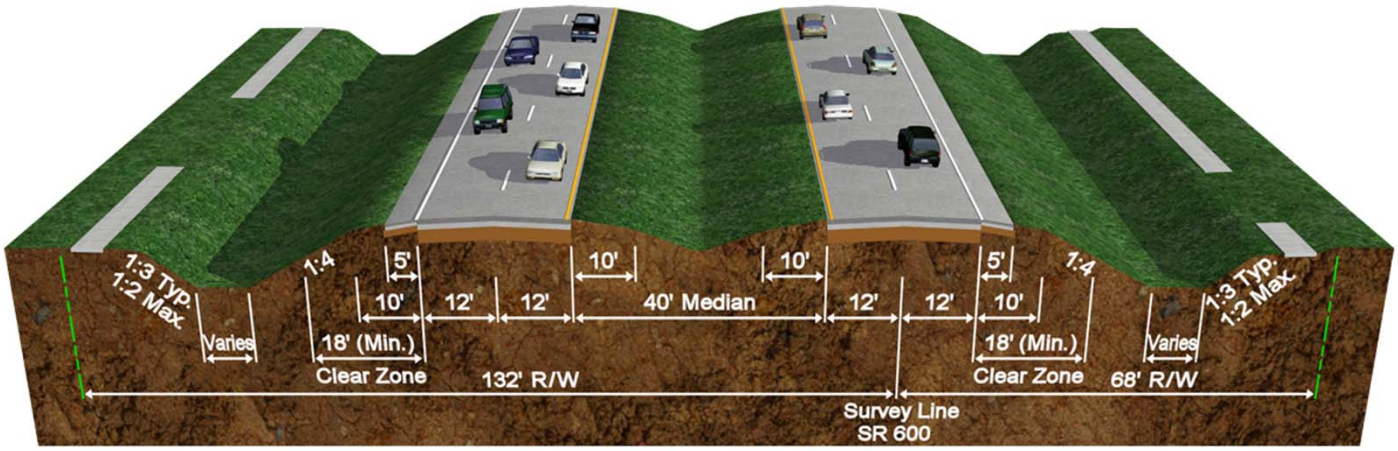
6.3 Intersection Concepts and Signal Analysis

Future proposed lane geometry at major intersections within the study area was shown previously in **Figure 3-6.** In addition, it is also shown on the preliminary conceptual design plans (**Appendix A**). In addition to six-laning Hillsborough Avenue, intersections with turn lane modifications include:

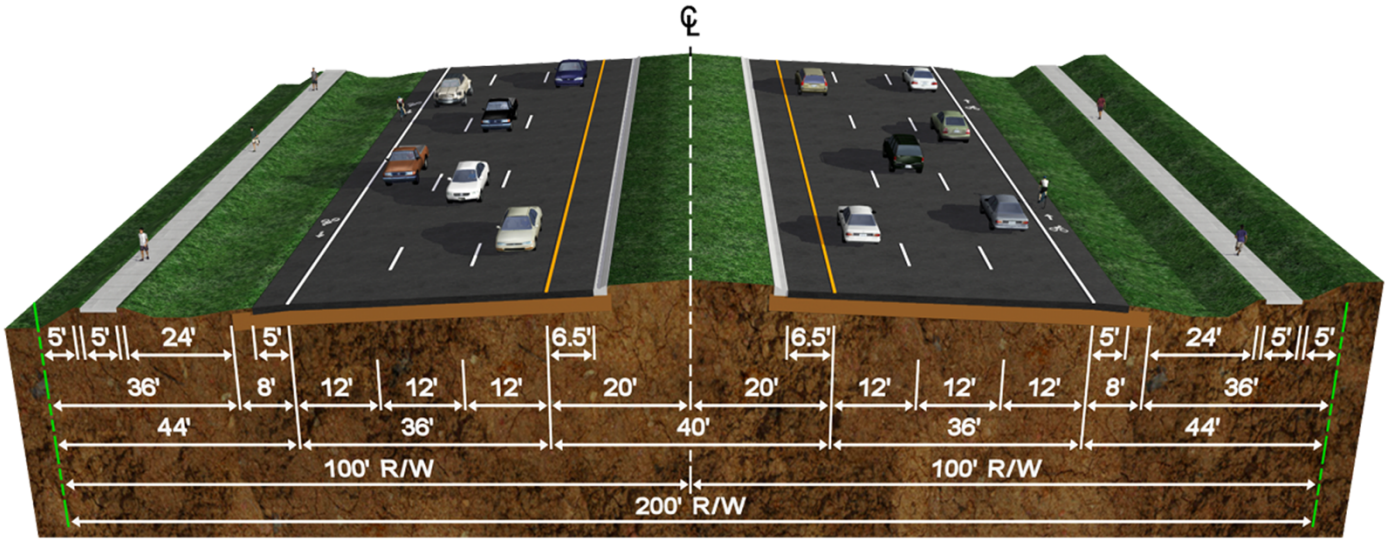
- *56th Street*: addition of a second westbound-to-northbound right-turn lane and a third southbound-to-eastbound left-turn lane
- *Net Park Driveway*: addition of a second westbound-to-southbound left-turn lane
- *Harney Road*: addition of an exclusive northbound-to-eastbound right-turn lane
- *Orient Road*: addition of an exclusive southbound-to-westbound right-turn lane

Since both Harney and Orient Roads are maintained by Hillsborough County, any improvements on these two side streets are shown on the conceptual design plans as "Improvement By Others".

Recommended auxiliary turn lane lengths were developed in the *Traffic Technical Memorandum* prepared for this study. The following information is excerpted from that report.



Existing 4-Lane Rural Typical Section



Proposed Suburban Typical Section
Design Speed = 50 mph

Rev. 7/28/12

Hillsborough Avenue (SR 600/US 92) PD&E Study ***From 50th Street to Interstate 4*** WPI Segment No. 430054 1 Hillsborough County	**Existing and Proposed Roadway Typical Sections**	**Figure 6-1**

Vehicle queue lengths for the study intersections were estimated using the *Red Time Formula Method*. The primary formula used in this method is as follows:

$$95\text{th Percentile Queue Length, ft} = \left[\frac{\text{DHV, }{}^{\text{veh}}/_{\text{hr}} \text{ x } (1 + \text{truck \%}) \text{ x Arrival Factor x } \left(1 - \frac{g}{C}\right) \text{ x Cycle Length, sec x } 25 \text{ }{}^{\text{ft}}/_{\text{veh}}}{3600 \text{ sec/hour x No. of Lanes}}\right]$$

The design year (2040) Build queue lengths are summarized by individual movement in **Table 6-1.** The required deceleration lengths for the intersection turn lanes were determined based on the FDOT Design Standards Index No. 301 which is shown in **Table 6-2**. For the determination of deceleration length, the design speed was assumed to be 5 mph more than the posted speed limit.

Table 6-1 Design Year (2040) Build Queue Lengths

Hillsborough Avenue Intersections	Approach	Movement	Existing Turn Length (feet)	Queue Length (feet)		Deceleration and Taper Length (feet)	Recommended Turn Length (feet)
				AM	PM		
56th Street (SR 583)	Eastbound	Left	675	300	350	240	590*
		Thru		625	800		
		Right	435	250	150	240	490
	Westbound	Left	580	300	275	240	540*
		Thru		800	625		
		Right	350	350	400	240	640
	Northbound	Left	480	200	350	240	590
		Thru		550	675		
		Right	290	300	350	240	590
	Southbound	Left	650	425	400	240	665
		Thru		700	500		
		Right	250	375	350	240	615
Net Park Driveway	Eastbound	Left	625	50	150	240	390*
		Thru		450	475		
		Right	540	125	100	240	365*
	Westbound	Left	430	325	125	240	565
		Thru		400	400		
		Right	90	50	50	240	290
	Northbound	Left-Thru		300	50		
		Right	0	300	425	145	570
	Southbound	Left-Thru		50	50		
		Right	0	250	50	145	395
Harney Road	Eastbound	Left	540	75	125	240	365*
		Thru		400	600		
		Right	450	50	50	240	290*
	Westbound	Left	360	75	75	350	425
		Thru		500	525		
		Right	670	150	175	350	525*
	Northbound	Left	170	75	50	240	315

Hillsborough Avenue Intersections	Approach	Movement	Existing Turn Length (feet)	Queue Length (feet)		Deceleration and Taper Length (feet)	Recommended Turn Length (feet)
				AM	PM		
		Thru	170	75	50	240	315
		Right		250	375		
	Southbound	Left	350	225	275	240	515
		Thru		350	225		
		Right	350	475	325	240	715
Suncoast Schools Federal Credit Union/Averitt Express Driveway	Eastbound	Left	400	50	50	350	400*
		Thru		350	375		
		Right	320	50	50	350	400
	Westbound	Left	290	50	50	350	400
		Thru		375	275		
		Right	660	50	50	350	400*
	Northbound	Left-Thru		50	150		
		Right	0	50	150	145	295
	Southbound	Left-Thru		100	150		
		Right	0	175	100	145	320
Orient Road	Eastbound	Left	475	100	100	350	450*
		Thru		625	750		
		Right	460	375	400	350	750
	Westbound	Left	465	200	175	350	550
		Thru		775	525		
		Right	345	225	225	350	575
	Northbound	Left	340	475	450	185	660
		Thru		525	525		
		Right	345	375	425	185	610
	Southbound	Left	175	375	450	185	635
		Thru		475	450		
		Right	0	75	75	185	260

*The existing turn lane length meets/exceeds the recommended turn lane length; therefore, the existing turn lane length should not be modified if it is not impacted by the widening of Hillsborough Avenue.

Table 6-2 Required Deceleration Lengths for Intersection Turn Lanes

Design Speed (mph)	Urban	Rural
	Total Deceleration and Taper Length, L (feet)	
35	145	---
40	155	---
45	185	---
50	240	290
55	---	350
60	---	405
65	---	460

Source: FDOT Design Standards Index No. 301

The vehicle queue length for the unsignalized two-way stop controlled (TWSC) intersection westbound left-turn movement into the Hard Rock Hotel and Casino Northeast Driveway was estimated using Equation 17-37 from the *HCM 2000*.

$$95\text{th Percentile Queue, veh} = 900T\left[v_x/c_{m,x} - 1 + \sqrt{\left(v_x/c_{m,x} - 1\right)^2 + \frac{\left(3600/c_{m,x}\right)\left(v_x/c_{m,x}\right)}{150T}}\right] \text{ where } \left(c_{m,x}/3600\right)$$

v_x = flow rate for movement x (veh/hr),
$c_{m,x}$ = capacity of movement x (veh/hr), and
T = analysis time period (h) (T = 0.25 for a 15-min period).

The Hard Rock Hotel and Casino Northeast Driveway has a directional median. Tube counts were used to count the westbound-to-southbound left turn volume in an effort to ensure that this movement is not backing up traffic onto westbound Hillsborough Avenue. The observed left turn volumes were 111 and 307 for the AM and PM peak hours, respectively. The storage length of the existing left turn lane is 250 feet. The estimated turn length at the Hard Rock Hotel and Casino Northeast Driveway for the opening year (2020) is 50 feet and 600 feet for the AM and PM peak hours, respectively. In addition, the estimated turn length at the Hard Rock Hotel and Casino Northeast Driveway for the design year (2040) is 225 feet and 1075 feet for the AM and PM peak hours, respectively. The existing storage length cannot be extended to accommodate the design year (2040) queue length because there is not sufficient distance between the existing westbound-to-southbound left turn lane and the I-4 off-ramp. The left turn movement needs to be restricted or signalized for the design year (2040) conditions; however, it is recommended that the queue length be extended to the maximum feasible length as a short-term improvement.

6.4 Alignment and Right of Way Needs

The proposed roadway widening is anticipated to follow the existing roadway alignment with pavement widening to occur on both sides of the existing roadway. Additional ROW will be required for “corner clips” at several intersections and along several cross roads where lanes are either to be added or extended. The total area of additional right of way expected to be acquired is less than 0.1 acre. Specific areas proposed for acquisition are shown on the conceptual design plans.

6.5 Relocations

No relocations of residences or businesses are currently expected. However, relocations could possibly be required for storm water detention ponds once alternative pond sites have been evaluated.

6.6 Construction and Right of Way Costs

The estimated cost of construction of the proposed improvements is approximately $13.6 million, with a breakdown as shown in **Table 6-3.** These costs were estimated using the FDOT's Long Range Estimates (LRE) system in April 2012. Estimates for storm water ponds are very preliminary at this point as specific alternative sites have not yet been identified. For Hillsborough Avenue between 50th and 56th Streets, much of this segment will be totally reconstructed due to the need to construct the new bridge at a higher elevation. East of 56th Street, widening and resurfacing is assumed.

Table 6-3 Estimated Construction Costs

Cost Component	Preliminary Cost Estimate ($millions)
Roadway widening/reconstruction including sidewalks	$6.60
Bridge Replacement over CSX railroad	$2.15
"Retaining" walls on bridge approaches	$1.93
Storm water ponds/drainage	$1.14
Traffic signal modifications & signs	$0.62
MOT, mobilization & 1% contingency	$2.77
Project Unknowns (25%)	$3.77
Total Costs	**$19.0**

*Based on August 1, 2012 LRE MOT = Maintenance of Traffic

The estimated cost for acquisition of additional ROW required for the proposed improvements, including the cost of land required for storm water management facilities (ponds, etc.), is included below.

6.7 Overall Project Cost Estimate

Current cost estimates for the proposed project are shown in **Table 6-4**.

Table 6-4 Recommended Alternative Project Costs

Cost Category	Preliminary Cost Estimate ($millions)
Design and Preliminary Engineering (12%)*	$2.3
Right of Way (ROW) Acquisition - Roadway	$0.68
ROW Acquisition – Storm water Ponds & Floodplain Compensation Sites	$20 - $24
Construction (from **Table 6-3**)	$19.0
Construction Inspection (10%)	$1.9
ROW Acquisition – Storm water Ponds & Floodplain Compensation Sites	$20 - $24
TOTAL	$44 - $48

*percentage of construction cost

6.8 Pedestrian and Bicycle Facilities

All proposed typical sections include sidewalks on both sides as well as 5-foot paved shoulders which will be designated as bicycle lanes. In addition, all signalized intersections are expected to have crosswalks and pedestrian push buttons and signal indications.

6.9 Utility and Railroad Impacts

Relocation of some existing utilities will be required prior to roadway construction. Specific relocation requirements will be identified during the future design phase. No impacts to the CSX railroad are expected since the new bridge will span the tracks. Close coordination with CSX will be required during future project phases to minimize any effects on CSX freight operations on their tracks.

6.10 Traffic Control Plan

A Maintenance of Traffic (MOT) plan will be developed during the final design phase for the proposed project. Special construction phasing will be required in the vicinity of the proposed replacement of the bridge over the CSX tracks, as noted in **Section 6.13**.

6.11 Value Engineering

Not applicable for this proposed project.

6.12 Drainage

Proposed Drainage System

The proposed system will convey storm water runoff to SMFs for water quality treatment and discharge attenuation. For the purpose of this study, sample calculations have been provided in **Appendix B** to demonstrate the required treatment and attenuation. The calculations were based on a typical 100-foot length or roadway, not an actual basin area. Based on the results of the sample nutrient loading calculations it is anticipated that wet detention would be sufficient to meet water quality treatment requirements alone. Dry retention would meet or exceed treatment requirements assuming percolation rates allow for recovery of retained volume. The required attenuation volume is assumed to be Chapter 14-86 FAC critical duration criteria and for the purposes of the sample calculations, a 100-year/8-hour storm was assumed to be the critical storm.

It is assumed that one SMF (pond) will be required in each basin in order to provide treatment for the new impervious area and contributing Directly Connected Impervious Areas (DCIA) as well as meet discharge attenuation requirements which require that the peak discharge is not increased for any point of discharge from the project.

Preliminary Pond Sizing

Preliminary pond size requirements by basin are shown in **Table 6-5**. The estimated required pond size is based upon the approximate area required to provide 1 inch of water quality treatment with a 12-inch depth in the pond, increased by 50 percent for maintenance area, grading etc. Facilities can be combined, where possible, to reduce the number of pond sites and realize efficiencies in maintenance and access areas. The calculations presented in this report are preliminary and help in estimating the preliminary size of the pond site facilities for each basin. The size requirements are preliminary based upon many assumptions and judgments. The pond sizes and locations are subject to change throughout the preliminary engineering and project design phases.

Table 6-5 Preliminary Pond Sizing Requirements

Basin	From Approx. Sta. (ft)	To Approx. Sta. (ft)	Basin Area (ac)	Req. Water Quality (ac-ft)	Req. Water Quantity (Ac-ft)	Est. Req. pond size (ac)
1	1081+34	1094+00	5.81	0.48	0.27	0.7
2	1094+00	1108+50	6.66	0.56	0.30	0.8
3	1108+50	1136+00	12.63	1.05	0.58	1.6
4	1136+00	1165+90	13.73	1.14	0.63	1.7
5	1165+90	1187+00	9.69	0.81	0.44	1.2
Totals	- -	- -	48.5	4.04	2.22	6.0

Required Permits

An Environmental Resource Permit (ERP) will be required from SWFWMD. Should the contractor choose to dewater for construction, a dewatering permit would be required from SWFWMD. A National Pollutant Discharge Elimination System (NPDES) permit will also be required at the time of construction from FDEP.

Floodplain Encroachment and Impacts

These are discussed in **Section 3.3** of the *ETC*.

6.13 Bridge Analysis

The recommended typical section for the Hillsborough Avenue replacement bridge over the CSX railroad is shown in **Figure 6-2.** The width of the proposed bridge would be approximately 102-feet out-to-out. This would accommodate the three lanes of traffic in each direction using a 12-foot outside lane, 11.5-foot middle lane and an 11-foot inside lane. Proposed lane widths on the bridge and approaches have been adjusted to help avoid the need for acquisition of additional ROW. The 4-foot raised separator with 1.5-foot inside shoulders would separate the two directions of traffic, providing a 7-foot median versus today's 4-foot median. The recommended typical section includes a 5.5-foot outside shoulder/bicycle lane with an F-shape traffic railing separating the traffic from the 5-foot sidewalk with a parapet and railing.

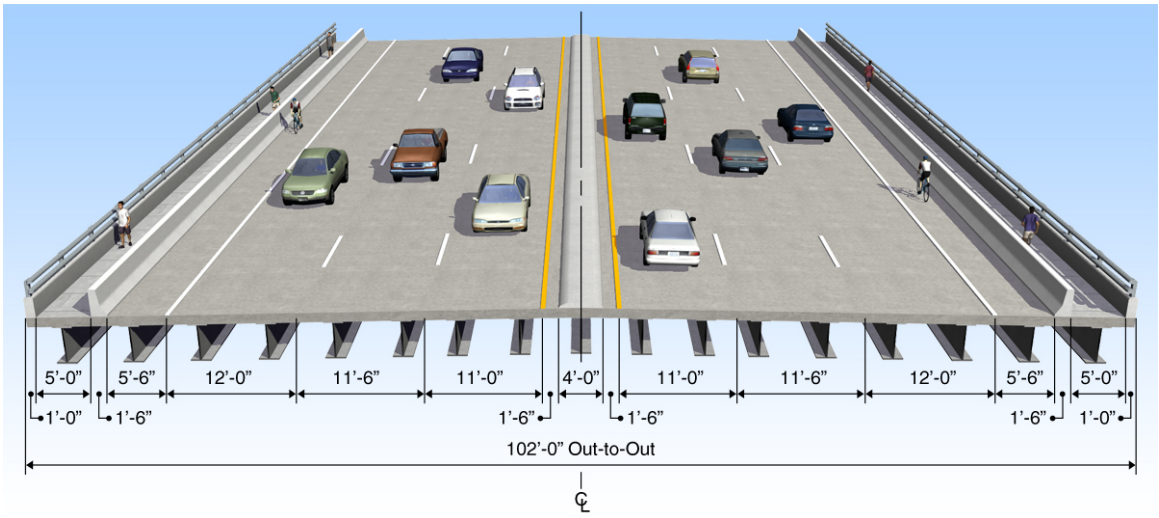
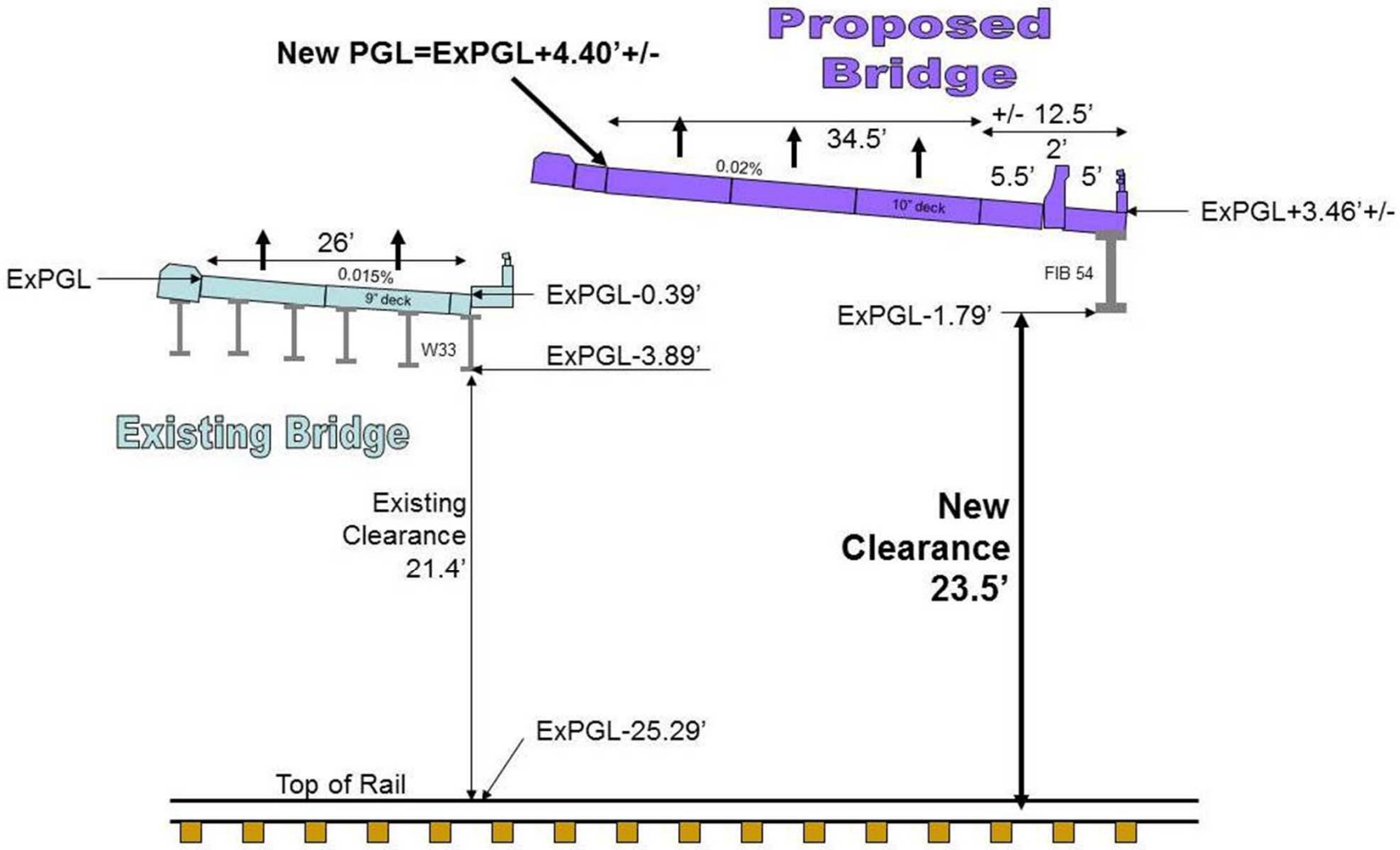


Figure 6-2 Recommended Typical Section for Bridge over CSX Railroad

Two alternative span configurations have been developed for this proposed bridge over the railroad. The first configuration is a single 120-foot span which will require mechanically stabilized earth (MSE) walls to wrap around the end bent. This span length would provide for the 25-foot horizontal clearance from the two railroad tracks that are spaced 13 feet wide. It also provides allowance for 8 feet between the face of the MSE wall and the Front Face of Back Wall (FFBW) when turned to account for the 41° skew. Florida-I 54 Beams with an 8.5-inch thick cast-in-place concrete slab would likely be the most cost-effective superstructure option.

The second span configuration consists of a 104-foot main span which also provides the 25-foot horizontal clearance from the railroad tracks along with intermediate pier that are no more than 5-foot wide. The approach spans would need to be approximately 77 feet to accommodate the front 2:1 (horizontal to vertical) front slope on the spill through abutment. The superstructure for this bridge would likely utilize Florida-I 45 beams on the main span and Florida-I 36 beams on the shorter approach spans.

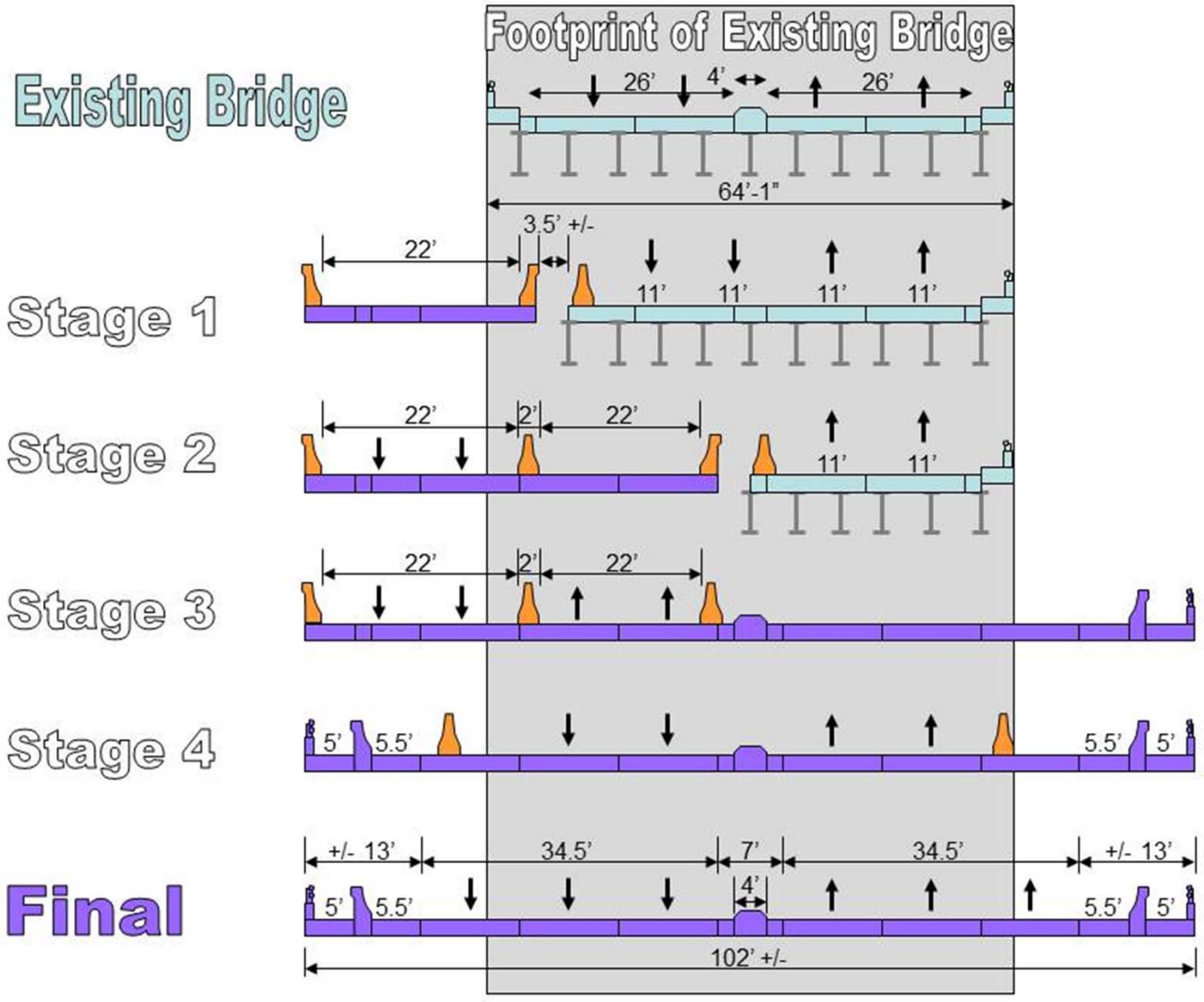
The replacement bridge is proposed to be constructed in stages to eliminate or minimize the need for any ROW acquisition for the bridge construction. The new roadway profile on the new bridge will need to be nearly 3 feet higher than the existing roadway profile in order to meet current vertical clearance requirements for a roadway bridge over railroad tracks (**Figure 6-3**). Special construction phases will be required in the vicinity of the proposed replacement of the bridge over the CSX tracks. A conceptual plan only has been developed and is shown in **Figure 6-4**. A preliminary roadway profile for the new bridge is shown at the end of the conceptual design plans (**Appendix A**).



Rev. 8/7/12

Hillsborough Avenue (SR 600/US 92) PD&E Study ***From 50th Street to Interstate 4*** WPI Segment No. 430054 1 Hillsborough County	**Proposed Vertical Clearance for Bridge over CSX Railroad**	**Figure 6-3**

Hillsborough Avenue Bridge over CSX Railroad



(Design Speed = 45 mph)

Hillsborough Avenue (SR 600/US 92) PD&E Study ***From 50th Street to Interstate 4*** WPI Segment No. 430054 1 Hillsborough County	**Potential Bridge Construction Staging Scenario**	**Figure 6-4**

6.14 Design Exceptions and Variations

In the vicinity of the Hillsborough Avenue Bridge over the CSX railroad tracks, the proposed median is only 7 feet in width; this may require a design variation; in addition, to the west, at the beginning of the proposed limits of construction, the existing median is only 14 feet in width, therefore, a design exception or variation may also be required in this area.

6.15 Access Management

A proposed access management plan is shown in **Figure 6-5,** and a tabular summary of this information is shown in **Table 6-6**. There are currently two different access management classes within the study limits: Class 7 west of 56th Street and Class 5 east of 56th Street. The proposed changes in median openings are necessary to reduce median area conflicts and thus improve traffic safety within the study corridor. Specifically, changes are proposed in the medians at the following locations:

- First median opening west of 56th Street
- First median opening east of 56th Street (at Netpark)
- First median opening west of Orient Road (at Suncoast Schools Federal Credit Union)

6.16 Aesthetics and Landscaping

No special treatments are proposed with respect to either aesthetic or landscaping treatments.

6.17 Highway Lighting

A review of the traffic crash statistics for the crash-studied years revealed that approximately 34 percent of the total reported crashes occurred during dark/dawn/dusk lighting conditions, compared to a statewide average of about 39 percent for 2010. While the nighttime crash rate doesn't appear to be abnormally high based on this comparison, it is recommended that a detailed lighting justification study be conducted during the final design phase, since street lighting currently exists to the west of the study limits for this project.

DRAFT

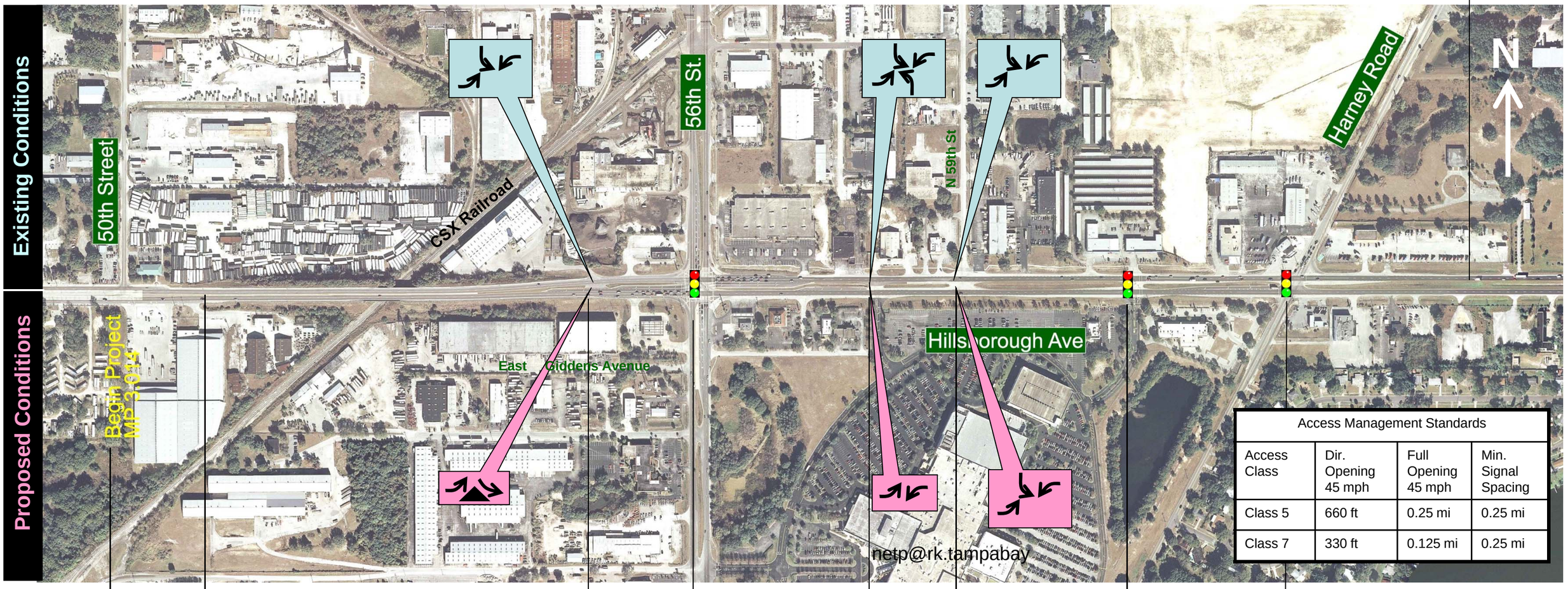
0 0.25 mi

Access Class = 7; Posted Speed Limit = 45 mph

Access Class = 5; Posted Speed Limit = 45 mph

Existing Conditions

Proposed Conditions



Access Management Standards			
Access Class	Dir. Opening 45 mph	Full Opening 45 mph	Min. Signal Spacing
Class 5	660 ft	0.25 mi	0.25 mi
Class 7	330 ft	0.125 mi	0.25 mi

No raised median

500 ft

830 ft

400 ft (Directional needs 660')

800 ft (Full needs 1320')

750 ft

See Next Sheet

0.51 mi

Legend

Full Median Opening

Directional Median Opening

Hillsborough Av (SR 600, US 92) PD&EStudy, From 50th St to I-4 WPI No. 430054-1 4/2012

Recommended Access Management Plan

Figure 6-5
Sheet 1 of 2

DRAFT

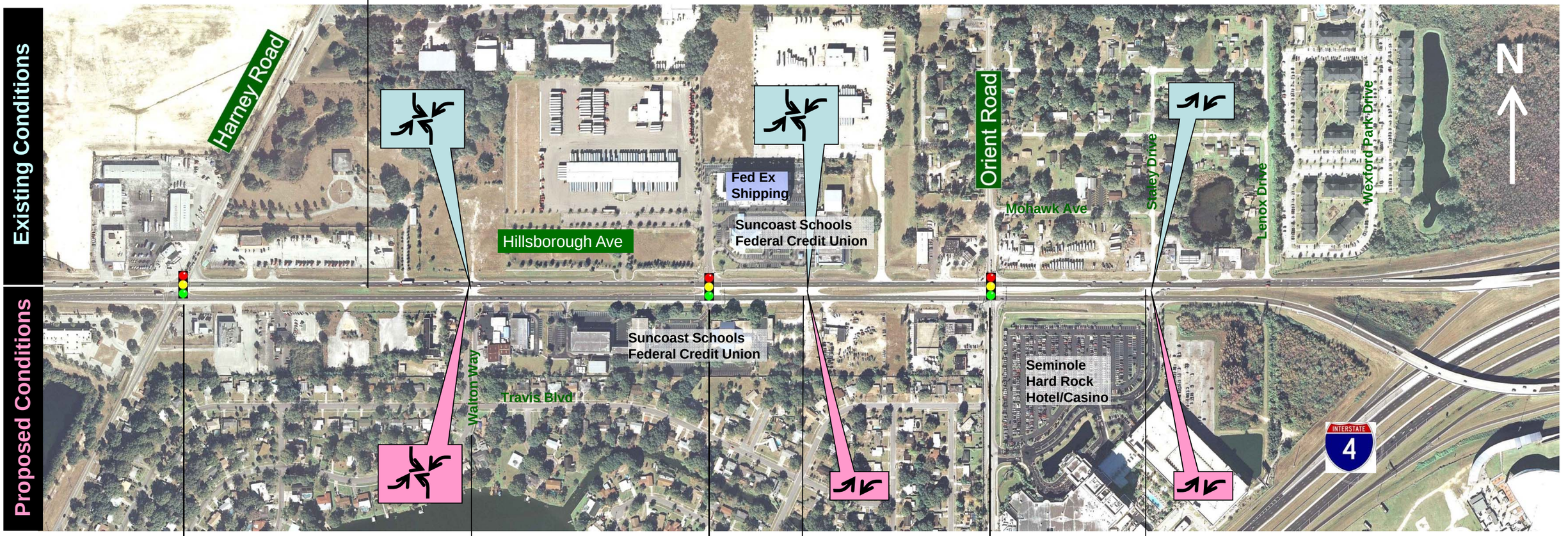
0 0.25 mi

Access Class = 5; Posted Speed Limit = 45 mph

Access Class = 5; Posted Speed Limit = 50 mph

Existing Conditions

Proposed Conditions



See Previous Sheet

0.26 mi

(Need 0.5 mi for 50 mph, meets std for 45 mph)

0.21 mi

(Need 0.5 mi for 50 mph, 0.25 mi for 45 mph)

450 ft

(Need 660 ft to meet standard)

850 ft

750 ft

(Meets standard)

Access Management Standards			
Access Class	Directional Opening	Full Opening 45 mph / 50 mph	Min. Signal Spacing 45 mph / 50 mph
Class 5	660 ft	0.25 mi / 0.50 mi	0.25 mi / 0.50mi

Legend

Full Median Opening

Directional Median Opening

Hillsborough Av (SR 600, US 92) PD&E Study, From 50th St to I-4 WPI No. 430054-1 4/2012

Recommended Access Management Plan

Figure 6-5
Sheet 2 of 2

Table 6-6 Hillsborough Avenue Access Management Review

Hillsborough Avenue (SR 600/US 92) PD&E Study **FPN: 430054-1** Rev. 4/13/12

Access Classification: Acess Classification 5 & 7 (Rule 14-97)

Minimum Median Spacing: Class 5: Directional: 660 feet Full: 1320 feet (45 MPH) 2640 feet (50 MPH) Signal: 1320 feet (45 MPH) 2640 feet (50 MPH)

Class 7: Directional: 330 feet Full: 660 feet Signal: 1320 feet

Access Management - Proposed Median Opening Locations

								Existing (All Distances are in Feet)				Proposed			
								Full/Dir. Openings		Traffic Signals		Directional Openings		Full Openings	
Median Opening #	Posted Speed/ Access Class	Exisitng Median Opening Type	Proposed Median Opening Type	Signal?	North side road/connection	South side road/connection	Intersecting Access Type	Distance Betw een Openings	Meets Std or % Deviation	Distance Betw een Signals	Meets Std or % Deviation	Distance Betw een Openings	Meets Std or % Deviation	Distance Betw een Openings	Meets Std or % Deviation
1	45 mph	Full	Full		50th St	--	Public Side Street								
	7							2200	Meets			2200	Meets		
2	45 mph	Full	Directional		Builders Insulation	--	Business Access							2640	Meets
	7							500	24%			500	Meets		
3	45 mph	Full	Full		56th Street	56th Street	Signalized								
	5							830	37%	2030	Meets	830	Meets	1230	7%
4	45 mph	Full	Directional		RSC Equipment Rental	Netpark LLC	Business Access								
	5							400	70%			400	39%		
5	45 mph	Full	Full		59th St	--	Public Side Street								
	5							800	39%					800	39%
6	45 mph	Full	Full		Sw eedish Motor Cars	Steak n Shake/ Netpark LLC	Signalized								
	5							750	43%	750	43%			750	43%
7	45 mph	Full	Full		Harney Rd	Harney Rd	Signalized								
	5							1375	Meets	2482	6%			1375	Meets
8	50 mph	Full	Full		vacant parcel	Walton Way	Public Side Street								
	5							1100	58%					1100	17%
9	50 mph	Full	Full		Averitt Express/ Suncoast FCU	Suncoast FCU Admin	Signalized								
	5							450	83%	1300	51%	450	32%	1300	2%
10	50 mph	Full	Directional		Suncoast FCU	Eastlake Auto Sales	Business Access/ U-turns								
	5							850	68%			850	Meets		
11	50 mph	Full	Full		Orient Rd	Orient Rd	Signalized								
	5							750	Meets			750	Meets		
12	50 mph	Directional	Directional		Staley Drive	Seminole Hard Rock Hotel/ Casino	Business Access/ Public Side Street								

SECTION 7 – PUBLIC INVOLVEMENT SUMMARY

At the start of the PD&E study, a kickoff newsletter was mailed to adjacent property owners as an effort to notify the public that the study had commenced. Agency coordination commenced with the ETDM Programming Screen and distribution of an Advance Notification. The Hillsborough Avenue PD&E Study Public Hearing was held on Monday, September 17, 2012 from 5:00 p.m. until 7:00 p.m. at the Chloe Coney Urban Enterprise Center, CDC of Tampa, 1907 E. Hillsborough Avenue in Tampa. The formal portion of the hearing began at approximately 6:00 p.m. and was moderated by Kirk Bogen, FDOT District Seven Environmental Management Engineer.

Displays were set up in the main room, depicting the existing and recommended build alternative typical sections, aerial conceptual design roll plot, existing and future traffic projections, proposed median changes, evaluation matrix & project schedule, and other informational boards. Two tables were set up for FDOT's right of way/access management and "adjacent projects" staff. Another table displayed the study documents. A PowerPoint presentation which provided information regarding this study ran continuously in a separate room. Citizens were able to make comments to the court reporter who was available to receive comments for the public hearing record during the open house portion of the hearing and were also given an opportunity to speak during the formal portion of the hearing after filling out a speaker's card. Attendees also had an opportunity to make written comments and drop them into the comment boxes that were available. There were approximately 14 attendees (public), including a representative for Senator Kathy Castor (Chloe Coney, District Director). No comments were made during the hearing (oral or written). FDOT staff and their consultant answered questions that citizens had during the informal part of the hearing.

Questions fielded included pointing out the right of way needs, and a few median access changes. One attendee was pleased that the concepts show adding left turn lanes for the median opening at Walton Way for East Lake Park subdivision – she said it can be a dangerous turn off westbound Hillsborough without a turn lane. Other attendees were pleased to see the sidewalks and bike lanes added to the corridor especially across the bridge over CSX railroad.

The comment period ended on Thursday, September 27, 2012. A draft of the public hearing transcript was available within three weeks of the hearing date. A public hearing scrapbook was produced which includes all hearing materials and a brief summary of the hearing information. A certified transcript of the public hearing is included at the end of this Attachment (C).

APPENDIX A

Preliminary Concept Plans

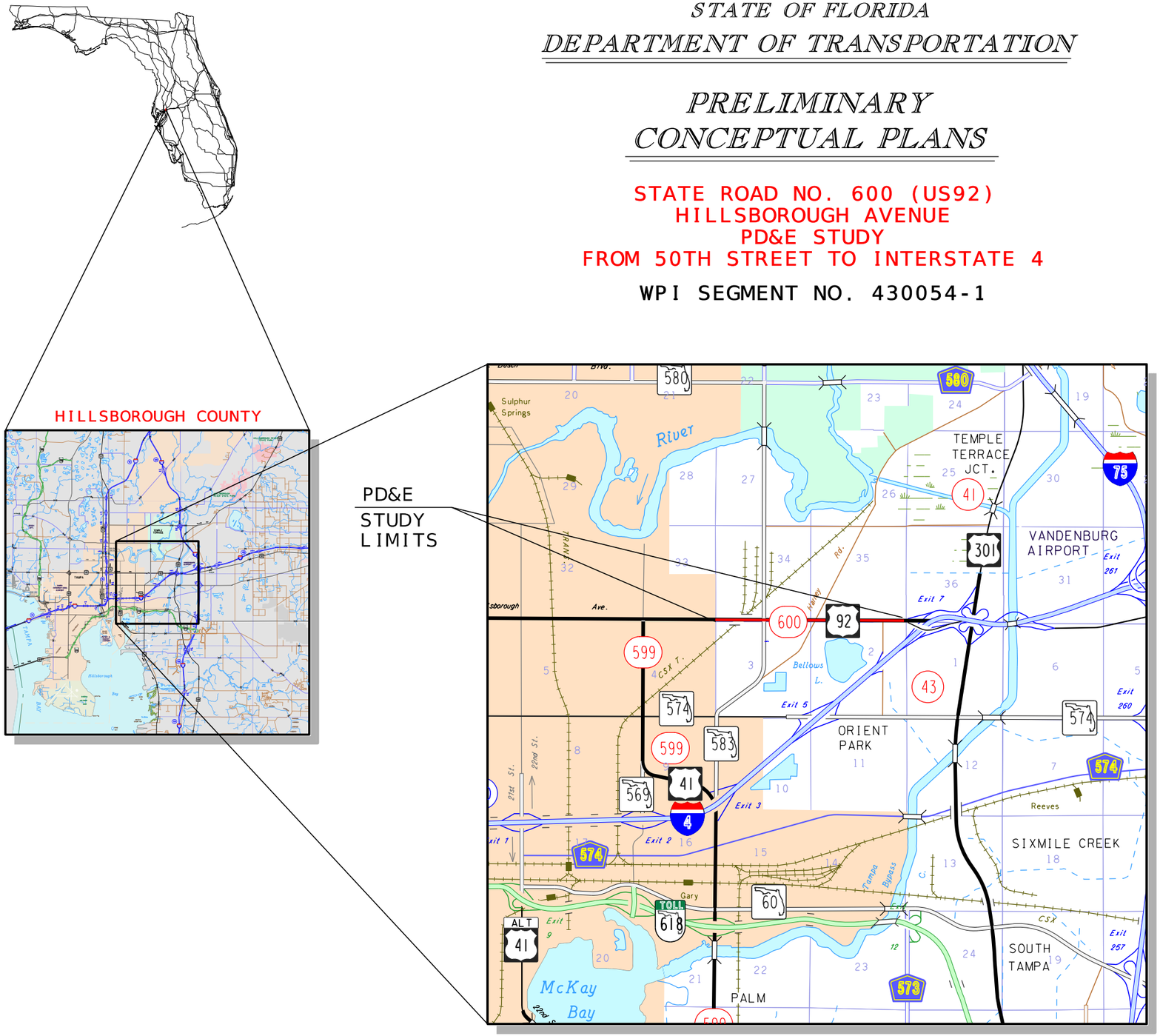
STATE OF FLORIDA

DEPARTMENT OF TRANSPORTATION

PRELIMINARY CONCEPTUAL PLANS

STATE ROAD NO. 600 (US92)
HILLSBOROUGH AVENUE
PD&E STUDY
FROM 50TH STREET TO INTERSTATE 4

WPI SEGMENT NO. 430054-1



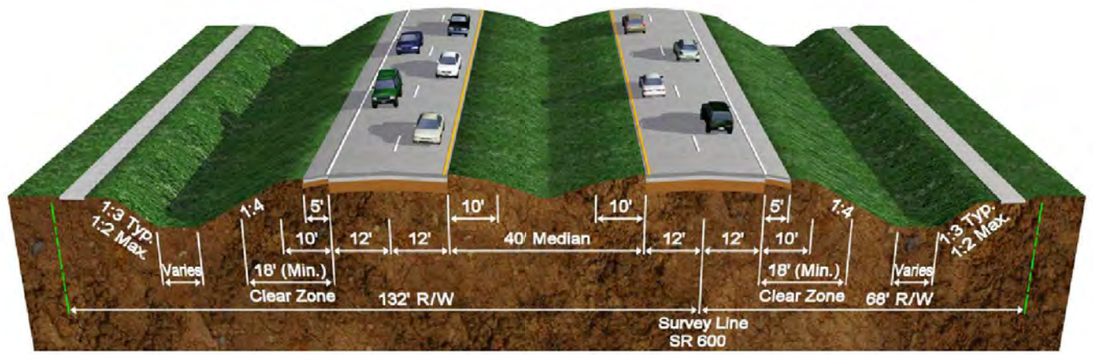
Prepared for:
The Florida Department of Transportation District Seven
Intermodal Systems Development Unit

BY:

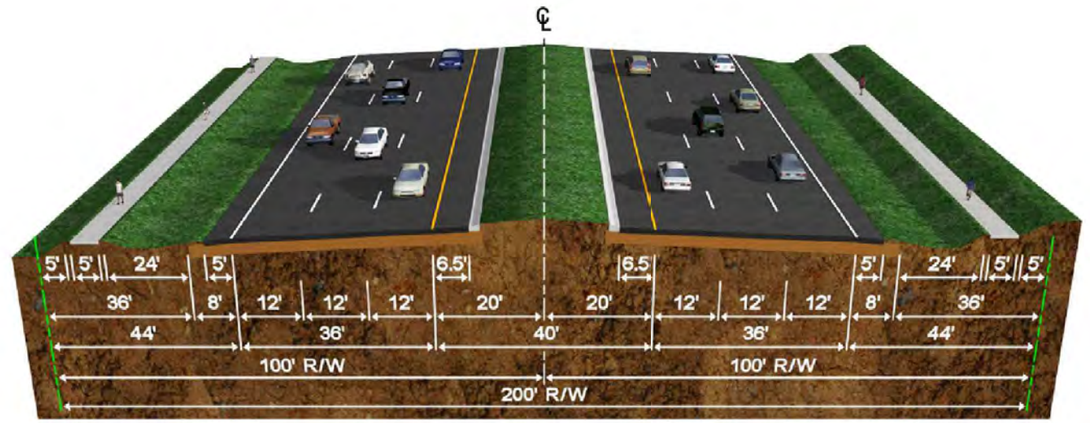
American
Consulting Engineers of Florida, LLC

AUGUST 2012

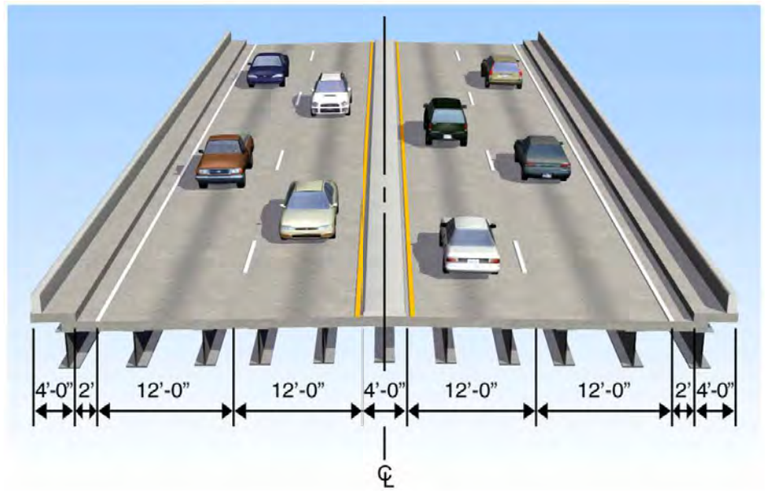
FDOT PROJECT MANAGER: MANUEL SANTOS, EI



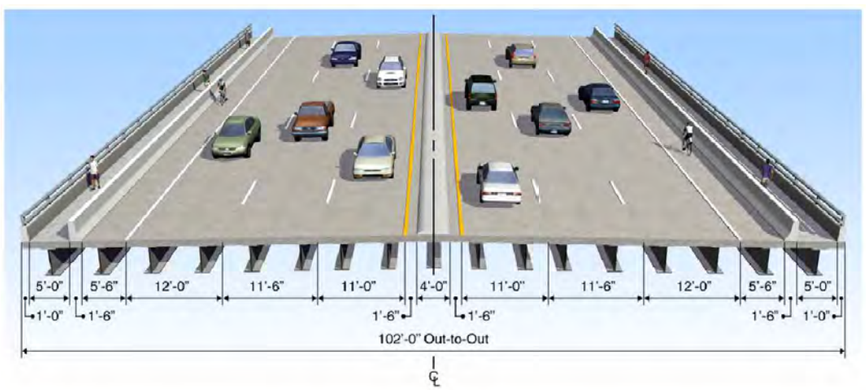
EXISTING 4-LANE RURAL
TYPICAL SECTION



PROPOSED 6-LANE SUBURBAN
TYPICAL SECTION



EXISTING BRIDGE
TYPICAL SECTION



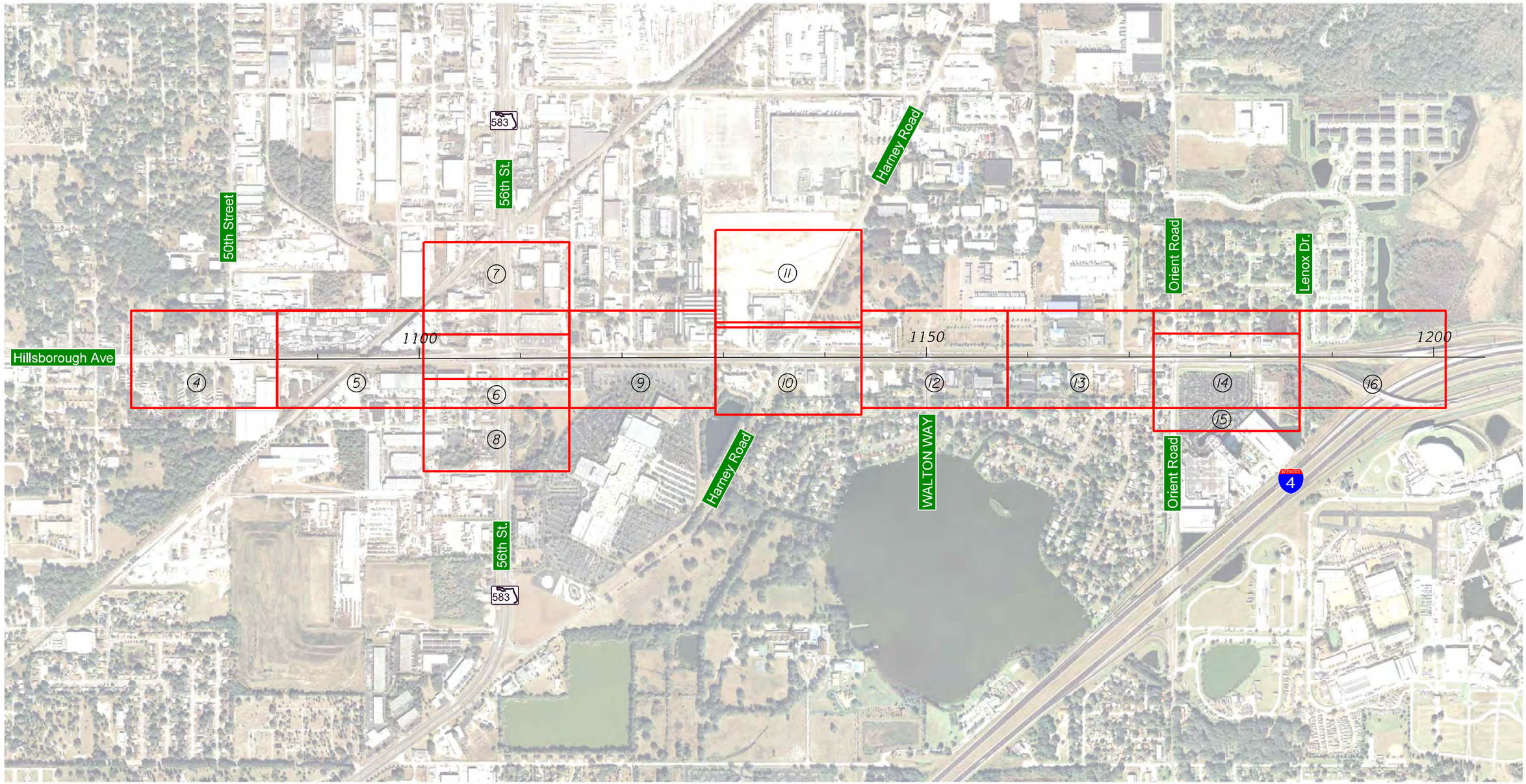
PROPOSED BRIDGE TYPICAL SECTION

American
Consulting Engineers of Florida, LLC
2818 Cypress Ridge Blvd, Suite 200
Wesley Chapel, FL 33544
Phone: (813) 435-2600 Fax: (813) 435-2601
Certificate of Authorization No. 9302
Jeffrey S. Novotny, P.E. No. 51083

HILLSBOROUGH AVE. PD&E STUDY
FROM 50TH ST. TO I-4 RAMPS
CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO.
2



SHEET LAYOUT KEY

American
Consulting Engineers of Florida, LLC
2818 Cypress Ridge Blvd, Suite 200
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Phone: (813) 435-2600 Fax: (813) 435-2601
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Jeffrey S. Novotny, P.E. No. 51083

HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

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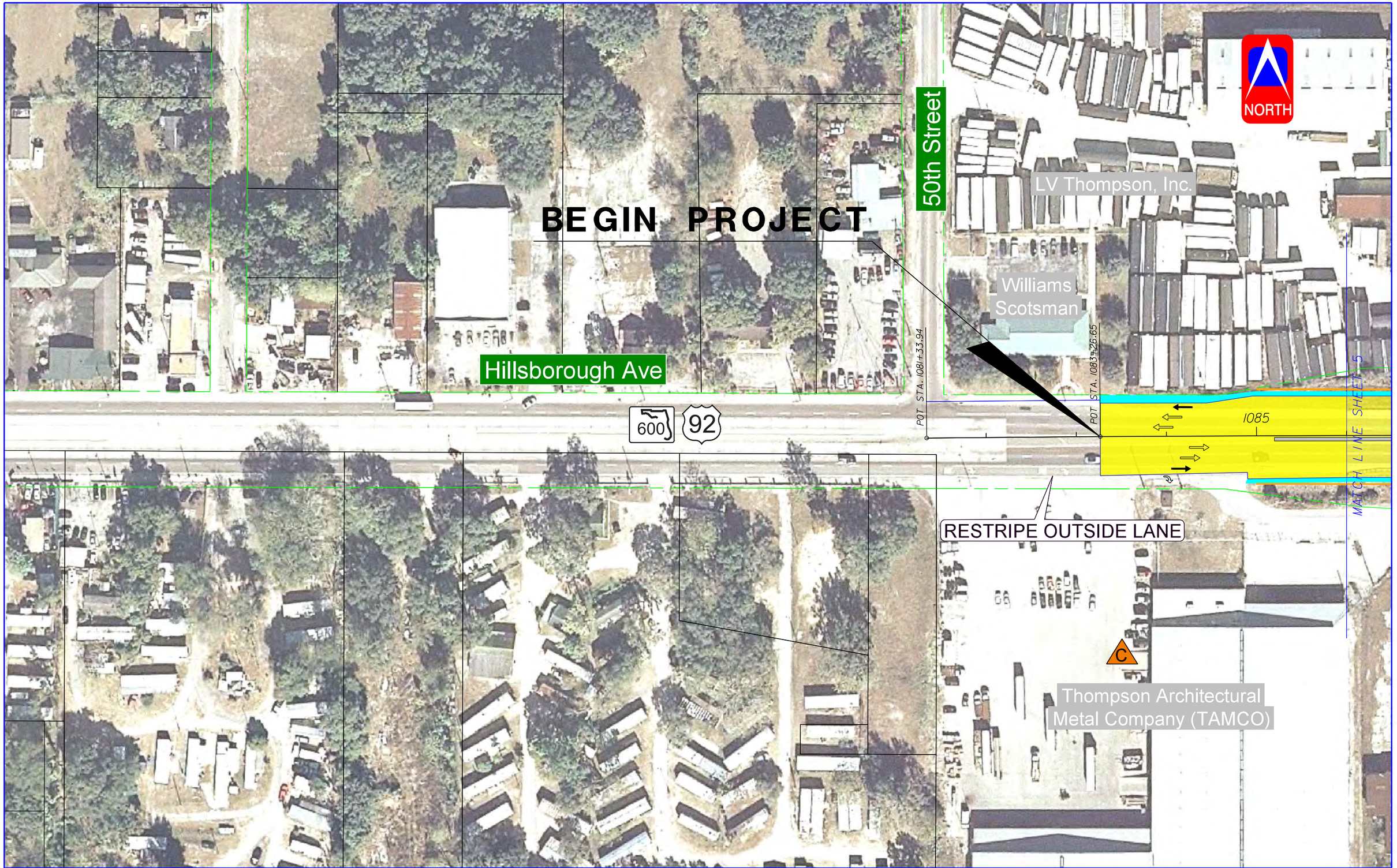

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

DATE OF AERIAL: 2010

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Certificate of Authorization No. 9302
Jeffrey S. Novotny, P.E. No. 51083

HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 4

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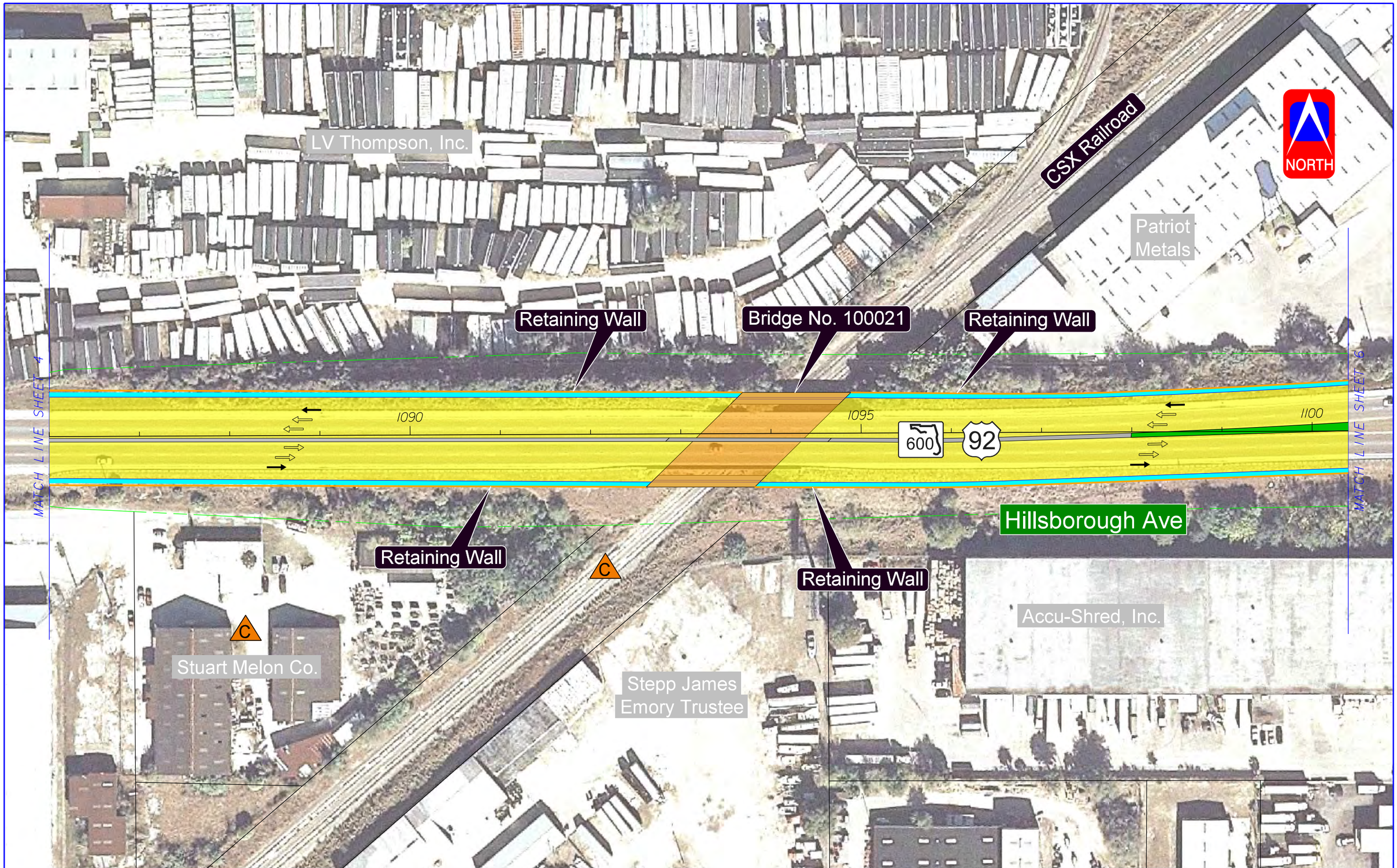

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

DATE OF AERIAL: 2010

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2818 Cypress Ridge Blvd, Suite 200
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Jeffrey S. Novotny, P.E. No. 51083

HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 5

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Patriot Metals

Asphalt Plant

56th St.

Kane's Furniture

NORTH

MATCH LINE SHEET 7

Pleasures Adult Superstore

MATCH LINE SHEET 5

1105

POT STA. 1107+87.70

1110

600

92

MATCH LINE SHEET 9

Hillsborough Ave

Accu-Shred, Inc.

Vacant

Marathon

BP Gas Station

Denny's

Amscot

MATCH LINE SHEET 8

Netpark Access Driveway

583

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100

Feet

DATE OF AERIAL: 2010

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Jeffrey S. Novotny, P.E. No. 51083

HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 6

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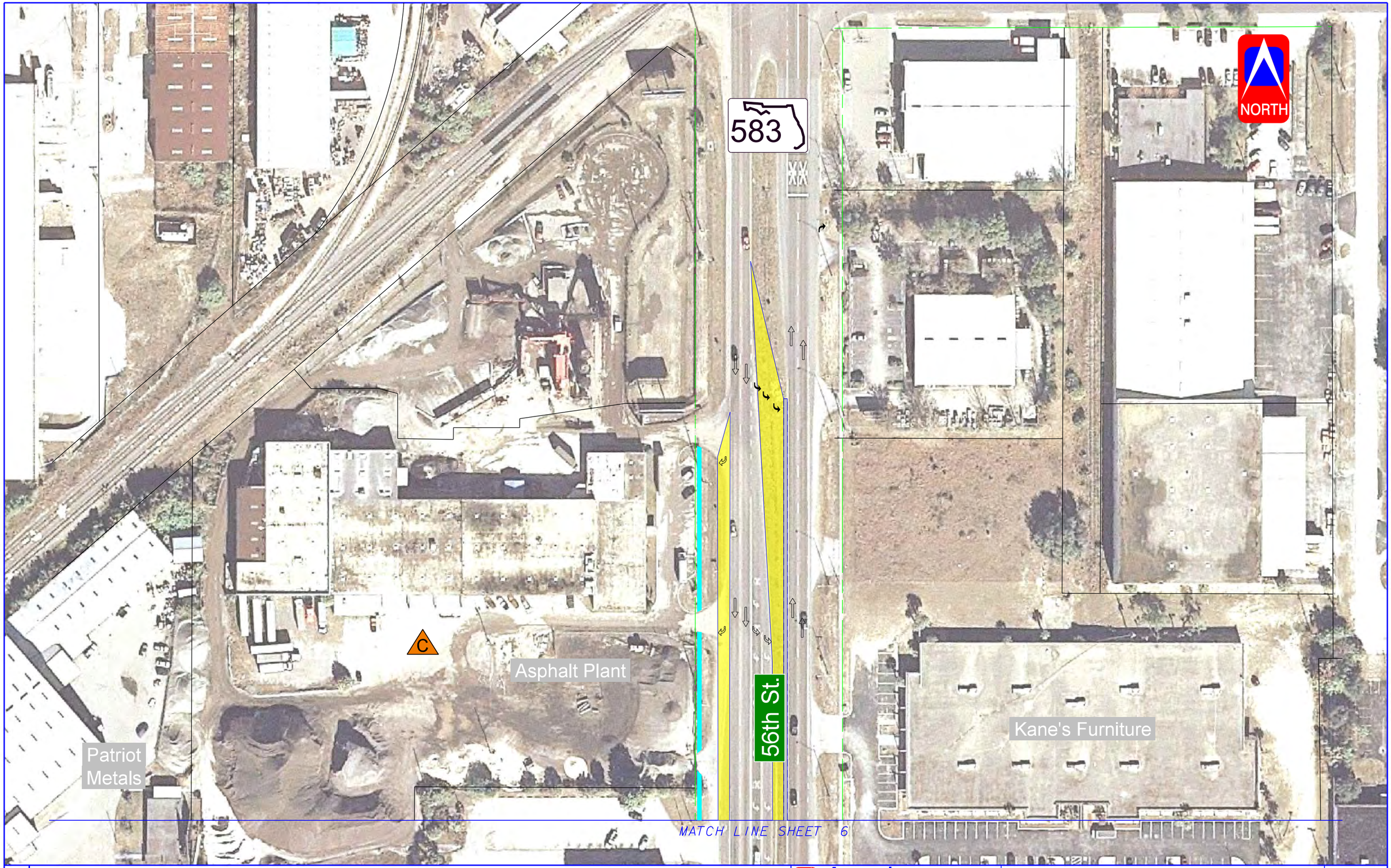

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

DATE OF AERIAL: 2010

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HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 7

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD04.dgn

MATCH LINE SHEET 6

Netpark Access Driveway

583

56th St.

NORTH

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

DATE OF AERIAL: 2010

American
Consulting Engineers of Florida, LLC
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Jeffrey S. Novotny, P.E. No. 51083

HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 8

Shangri-La Bath & Sauna

Abundant Love Worship Center

Arby's

59th St.

Cummins Power South LLC

Uncle Bob's Self Storage

NORTH

New World Auto Glass

Alpha Electronics

Sweedish Motor Cars

MATCH LINE SHEET 6

MATCH LINE SHEET 10

1115

1120

1125

600

92

Sir Speedy

Hillsborough Ave

Netpark LLC

Steak 'N Shake

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100

Feet

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HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 9

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD06.dgn

MATCH LINE SHEET 11

IMPROVEMENTS BY OTHERS

Nappa Auto Parts

Quick Lube

Citgo

Seletrucks of Tampa

NORTH

MATCH LINE SHEET 9

EOT STA. 1129+95.45

1130

1135

1140

600

92

MATCH LINE SHEET 12

Eastlake Center

Florida Wrecker Sales

Hillsborough Ave

House of Prayer

CU Auto Branch

Auto Insurance

Leah's Cafe

#1 Spa Massage

Hungry Howies

New Wine Outreach Ministry

Subway

Harney Road

IMPROVEMENTS BY OTHERS

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

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HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 10

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD07.dgn

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

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HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 11

Good Shepherd Catholic Church

Seletrucks of Tampa

Vacant

Averitt Express

C

NORTH

MATCH LINE SHEET 10

1145

1150

1155

600

92

MATCH LINE SHEET 13

Vacant (For Sale)

East Lake Inn

Vacant (For Lease)

Walton Way

Emery's Topper Sales

Hillsborough Ave

Vacant Lot

C

Suncoast Schools Federal Credit Union Administration Bldg

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

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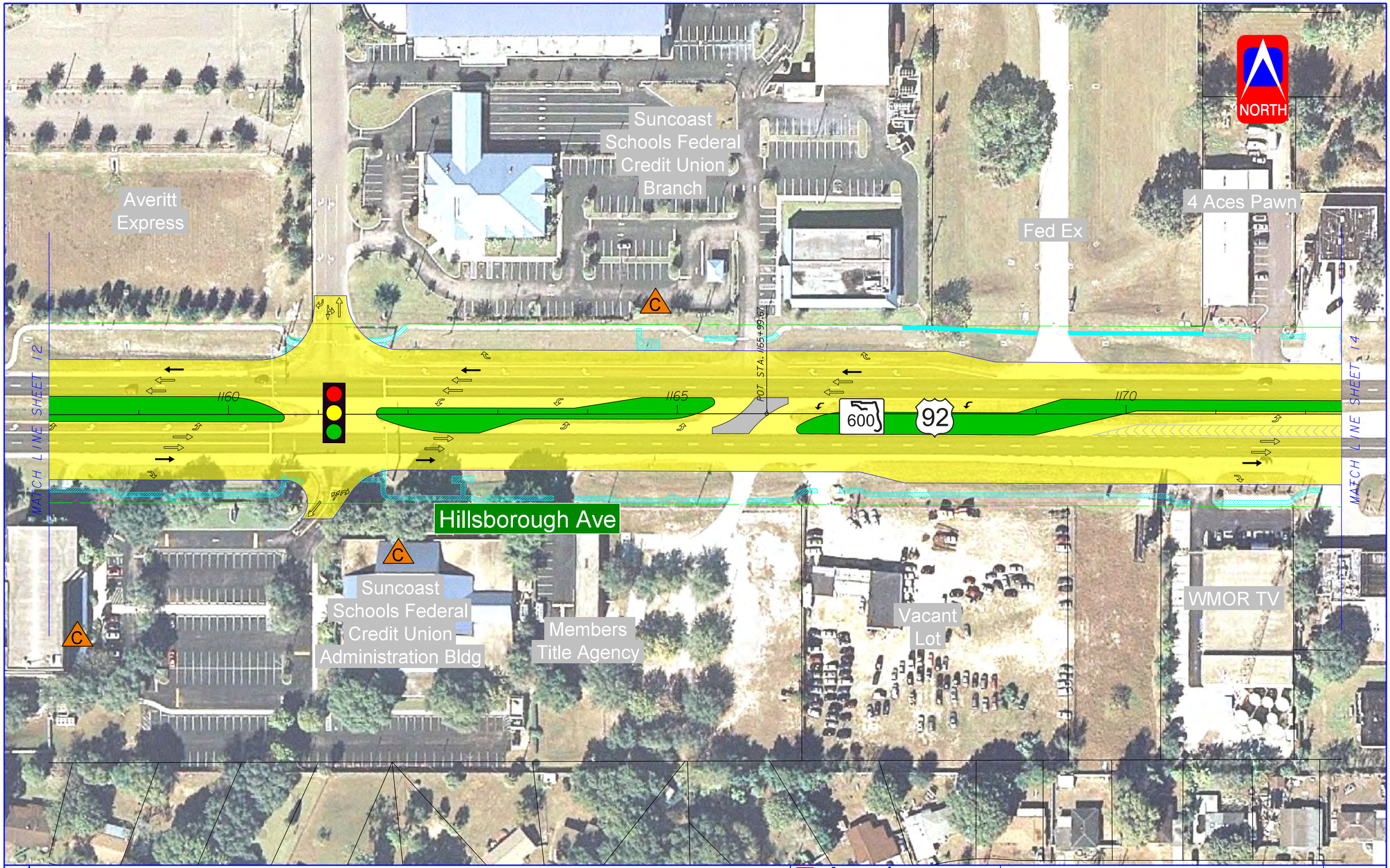
HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 12

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD09.dgn



LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- C POTENTIAL CONTAMINIATION SITE
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0 20 100
Feet

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HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 13

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD10.dgn

Orient Road

IMPROVEMENTS BY OTHERS

Staley Dr

NORTH

Suncoast Truck & Equipment Sales

Shell/ Circle K

Blades of Green Tree Service

Chevron

Vacant (For Sale)

C

1175

1180

1185

600

92

MATCH LINE SHEET 13

MATCH LINE SHEET 16

Hillsborough Ave

Mobil/ One-Stop Food Mart

Seminole Hard Rock Casino

WETLAND 1 (W1)

MATCH LINE SHEET 15

Orient Road

IMPROVEMENTS BY OTHERS

END PROJECT

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- C POTENTIAL CONTAMINIATION SITE
- EXISTING LANE
- PROPOSED LANE
- PROPOSED EDGE OF PAVEMENT
- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100

Feet

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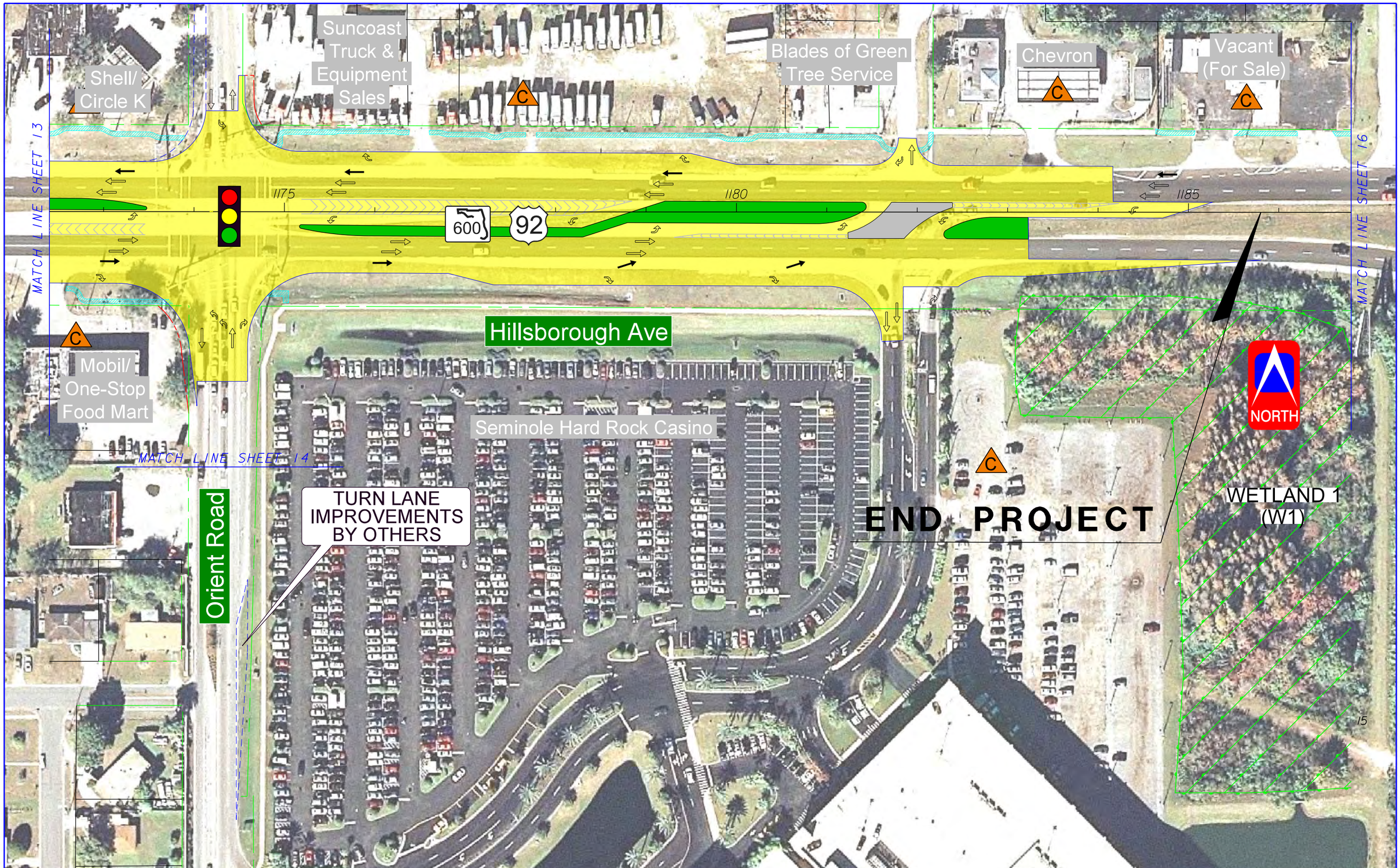
HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 14

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD11.dgn



LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
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- PROPERTY LINES
- EXISTING ROW
- PROPOSED ROW TO BE ACQUIRED

0 20 100
Feet

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HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 15

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD12.dgn

Lenox Dr.

Wexford Apartments

NORTH

600

92

1190

1195

1200

MATCH LINE SHEET 15

WETLAND 2
(W2)

WETLAND 1
(W1)

INTERSTATE
4

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN (CONCRETE)
- PROPOSED MEDIAN (SOD)
- PLANNED / PROPOSED SIDEWALK
- PROPOSED BRIDGE/WALL
- POTENTIAL CONTAMINIATION SITE
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- PROPOSED LANE
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0 20 100
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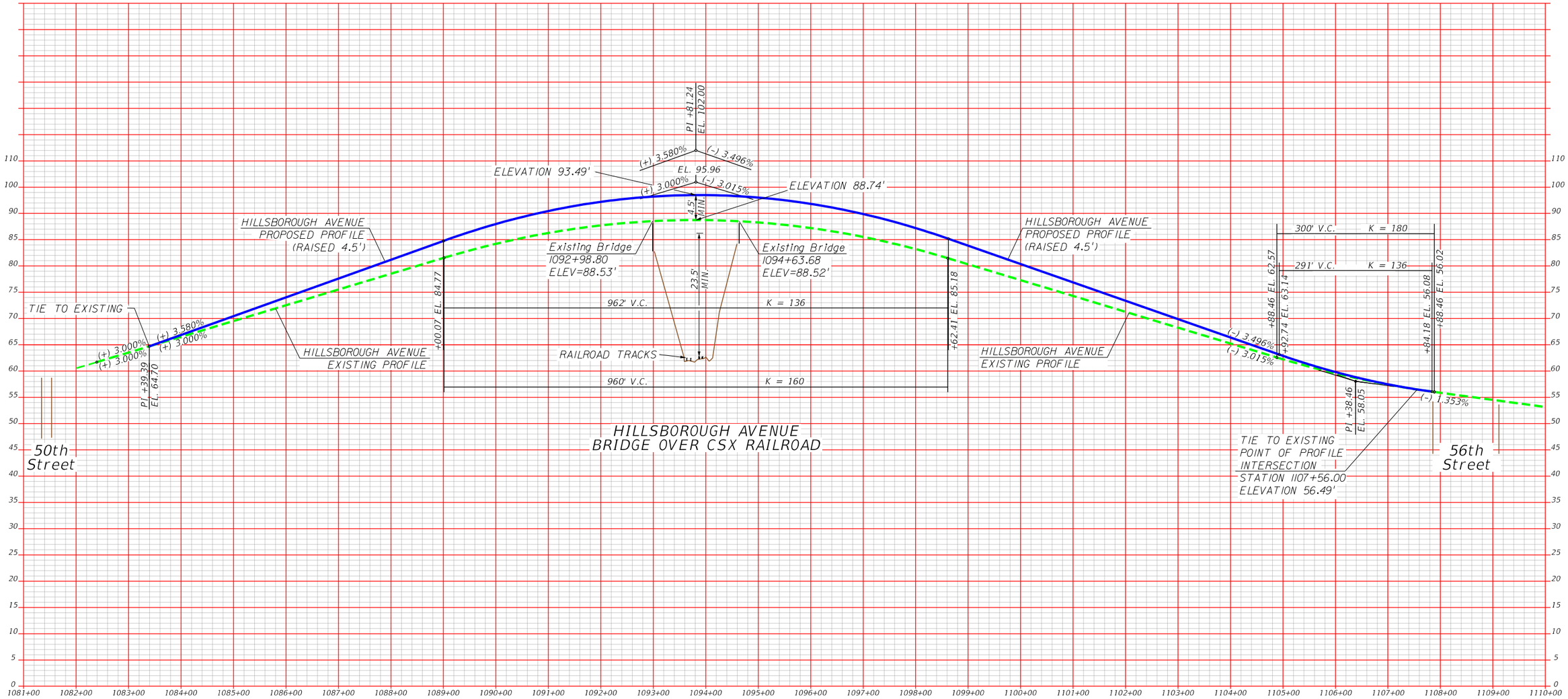
HILLSBOROUGH AVE PD&E STUDY FROM 50TH ST. TO I-4 RAMPS CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 16

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PLANRD13.dgn

HILLSBOROUGH AVENUE PROFILE OVER CSX RAILROAD



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HILLSBOROUGH AVE PD&E STUDY
FROM 50TH ST. TO I-4 RAMPS
CONCEPT PLANS

WPI SEG. NO.: 430054-1

SHEET NO. 17

USER: 5szulgs 8/8/2012 F:\PROJECT\5067733_09\25455212211\roadway\PROFILE_SHEET.DGN

APPENDIX B

Drainage Documentation

IS INTENDED TO FACILITATE AND GUIDE THE DIALOGUE DURING A PRE-APPLICATION MEETING BY PROVIDING "PROMPT LIST" OF DISCUSSION SUBJECTS. IT IS NOT A LIST OF REQUIREMENTS FOR SUBMITTAL BY THE APPLICANT.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
RESOURCE REGULATION DIVISION
PRE-APPLICATION MEETING NOTES

FILE NUMBER:

Date: 12-27-11 10 AM

Project Name: HILLSBOROUGH AVE. - EAST OF HARD ROCK TO 50th St

Attendees:
Raymond Ralls } American Consulting Engineers
Dave Bradehl }
John Emery - Chac Collins } SWFWMD
Scott Hickerson

County: Hills.

Total Land Acreage: 40±

Sec/Twp/Rge: 34,35,36/28/19 – 1,2,3/29/19

Project Acreage: 40±

Prior On-Site/Off-Site Permit Activity:

Project Overview:

Widening Hillsborough Ave. from 4 to 6 lanes. Drains to 2 basins Tampa Bypass Canal & Bellows Lake (both appear to be verified as impaired for DO and/or nutrients). No apparent 100 year floodplain issues.

Environmental Discussion: (Wetlands On-Site, Wetlands on Adjacent Properties, Delineation, T&E species, Easements, Drawdown Issues, Setbacks, Justification, Elimination/Reduction, Permanent/Temporary Impacts, Secondary and Cumulative Impacts, Mitigation Options, SHWL, Upland Habitats, Site Visit, etc.)

- Quantify impacts to surface waters.

Site Information Discussion: (SHW Levels, Floodplain, Tailwater Conditions, Adjacent Off-Site Contributing Sources, Receiving Waterbody, etc.)

Water Quantity Discussions: (Basin Description, Storm Event, Pre/Post Volume, Pre/Post Discharge, etc.)

Attenuate 25yr - 24 hr peak discharge rates to each outfall (Florida modified rainfall distribution).

Water Quality Discussions: (Type of Treatment, Technical Characteristics, Non-presumptive Alternatives, etc.)

Impaired water ~~bodyies~~ bodies, provide impaired water net improvement or presumptive criteria, whichever is greater. Treat new area of impervious or equivalent treatment. Replace any incidental water quality treatment now occurring in existing ditches, swales, etc.

Sovereign Lands Discussion: (Determining Location, Correct Form of Authorization, Content of Application, Assessment of Fees, Coordination with FDEP)

N/A

Operation and Maintenance/Legal Information: (Ownership or Perpetual Control, O&M Entity, O&M Instructions, Homeowner Association Documents, Coastal Zone requirements, etc.)

F.D.O.T.

Application Type and Fee Required:

Concrete Construction - Fee will probably be $2942 -

Other: (Future Pre-Application Meetings, Fast Track, Submittal Date, Construction Start Date, Required District Permits – WUP, WOD, Well Construction, etc.)

Disclaimer: The District ERP pre-application meeting process is a service made available to the public to assist interested parties in preparing for submittal of a permit application. Information shared at pre-application meetings is superseded by the actual permit application submittal. District permit decisions are based upon information submitted during the application process and Rules in effect at the time the application is complete.

Sample Calculation

Existing land use

A 100 ft unit length measurement is used for the sample calculation

$ROW := 200ft$

$Imp_{ex} := 5 \cdot 12ft + 2 \cdot 5ft$ Typical of existing conditions, 4 lanes + an auxilliary and paved shoulders

$Per_{ex} := ROW - Imp_{ex}$ $Per_{ex} = 130\,ft$

$Unit_w := 100ft$

$ExImp_{area} := Imp_{ex} \cdot Unit_w$ $ExImp_{area} = 0.161 \cdot acre$

$ExPer_{area} := Per_{ex} \cdot Unit_w$ $ExPer_{area} = 0.298 \cdot acre$

$Area_{total} := ROW \cdot Unit_w$ $Area_{total} = 0.459 \cdot acre$

Proposed land use

A unit measurement is used for the sample calculation

$ROW = 200\,ft$

$Imp_{pw} := Imp_{ex} + 2 \cdot 12ft$

$Per_{pw} := ROW - Imp_{pw}$ $Per_{pw} = 106\,ft$

$Unit_w = 100\,ft$

$PrImp_{area} := Imp_{pw} \cdot Unit_w$ $PrImp_{area} = 0.216 \cdot acre$

$PrPer_{area} := Per_{pw} \cdot Unit_w$ $PrPer_{area} = 0.243 \cdot acre$

$Area_{total} = 0.459 \cdot acre$

Curve number calculation

$CN_{per} := 60$

$CN_{imp} := 98$

Existing curve number calculation

$$CN_{ex} := \frac{ExPer_{area} \cdot CN_{per} + ExImp_{area} \cdot CN_{imp}}{Area_{total}} \qquad CN_{ex} = 73.30$$

Proposed curve number calculation

$$CN_{pr} := \frac{PrPer_{area} \cdot CN_{per} + PrImp_{area} \cdot CN_{imp}}{Area_{total}} \qquad CN_{pr} = 77.86$$

Design Precipitation Depth

FDOT Drainage Manual 100-yr/8-hr design precipitation depth $P_{FDOT100} := 9.2in$

SWFWMD 25-yr/24-hr design precipitation depth $P_{SWFWMD25} := 8in$

Exisitng runoff volumes per unit area

Runoff volume calculation 100-year/8-hour

Soil Storage $S_{ex100} := \left(\frac{1000}{CN_{ex}} - 10\right)\cdot in$ $S_{ex100} = 3.643\cdot in$

Runoff in Inches $Q_{ex100} := \frac{\left[P_{FDOT100} - \left(0.2\cdot S_{ex100}\right)\right]^2}{P_{FDOT100} + \left(0.8\cdot S_{ex100}\right)}$ $Q_{ex100} = 5.92\cdot in$

Runoff Volume $V_{ex100} := Q_{ex100}\cdot Area_{total}$ $V_{ex100} = 0.227\cdot acre\cdot ft$

Runoff volume calculation 25-year 24-hour

Soil Storage $S_{ex25} := \left(\frac{1000}{CN_{ex}} - 10\right)\cdot in$ $S_{ex25} = 3.643\cdot in$

Runoff in Inches $Q_{ex25} := \frac{\left[P_{SWFWMD25} - \left(0.2\cdot S_{ex25}\right)\right]^2}{P_{SWFWMD25} + \left(0.8\cdot S_{ex25}\right)}$ $Q_{ex25} = 4.84\cdot in$

Runoff Volume $V_{ex25} := Q_{ex25}\cdot Area_{total}$ $V_{ex25} = 0.185\cdot acre\cdot ft$

Proposed runoff volumes per unit area

Runoff volume calculation 100-year/8-hour

Soil Storage $S_{pr100} := \left(\frac{1000}{CN_{pr}} - 10\right)\cdot in$ $S_{pr100} = 2.844\cdot in$

Runoff in Inches $Q_{pr100} := \frac{\left[P_{FDOT100} - \left(0.2\cdot S_{pr100}\right)\right]^2}{P_{FDOT100} + \left(0.8\cdot S_{pr100}\right)}$ $Q_{pr100} = 6.49\cdot in$

Runoff Volume $V_{pr100} := Q_{pr100}\cdot Area_{total}$ $V_{pr100} = 0.248\cdot acre\cdot ft$

Runoff volume calculation 25-year/24-hour

Soil Storage $S_{pr25} := \left(\frac{1000}{CN_{pr}} - 10\right)\cdot in$ $S_{pr25} = 2.844\cdot in$

Runoff in Inches $Q_{pr25} := \frac{\left[P_{SWFWMD25} - \left(0.2\cdot S_{pr25}\right)\right]^2}{P_{SWFWMD25} + \left(0.8\cdot S_{pr25}\right)}$ $Q_{pr25} = 5.37\cdot in$

Runoff Volume $V_{pr25} := Q_{pr25}\cdot Area_{total}$ $V_{pr25} = 0.206\cdot acre\cdot ft$

Nutrient Loading Analysis

Meteorological Zone 4

Annual Precipitation Depth $AP := 51.00\frac{in}{yr}$

Annual Mass Loading concentrations taken from the FDEP, Stormwater Quality Applicant's Handbook, March 2010 Draft

Land Use Category	Total Nitrogen	Total Phosphorus
Highway	$TNhwy := 1.37\cdot\frac{mg}{l}$	$TPhwy := 0.17\cdot\frac{mg}{l}$

Nutrient Loading Calculations

Existing loading

$DCIA_{ex} := \frac{ExImp_{area}}{Area_{total}}$ $DCIA_{ex} = 35.00\cdot\%$

Non DCIA CN $NonDCIA := CN_{per}$ $NonDCIA = 60$

Mean Annual Runoff Coefficients taken from FDEP Stormwater Quality Applicant's Handbook, March 2010 Draft, Appendix E, Zone 4

Mean annual runoff coefficient (CA) $CA_{ex} := 0.314$

Calculate annual runoff (QA) $QA_{ex} := CA_{ex}\cdot AP\cdot Area_{total}$ $QA_{ex} = 0.613\cdot\frac{acre\cdot ft}{yr}$

Calculate annual Nitrogen loading (NA) $NA_{ex} := TNhwy\cdot QA_{ex}$ $NA_{ex} = 2.2827\cdot\frac{lb}{yr}$

Calculate annual Phosphorus loading (PA) $PA_{ex} := TPhwy\cdot QA_{ex}$ $PA_{ex} = 0.2833\cdot\frac{lb}{yr}$

Proposed loading

$DCIA_{pr} := \frac{PrImp_{area}}{Area_{total}}$ $DCIA_{pr} = 47.00 \cdot \%$

Non DCIA CN $NonDCIA := CN_{per}$ $NonDCIA = 60$

Mean Annual Runoff Coefficients taken from FDEP Stormwater Quality Applicant's Handbook, March 2010 Draft, Appendix E, Zone 4

Mean annual runoff coefficient (CA) $CA_{pr} := 0.432 - \left(\frac{0.432 - 0.393}{50\% - 45\%}\right) \cdot (50\% - DCIA_{pr})$ $CA_{pr} = 0.409$

Calculate annual runoff (QA) $QA_{pr} := CA_{pr} \cdot AP \cdot (Area_{total})$ $QA_{pr} = 0.7973 \cdot \frac{acre \cdot ft}{yr}$

Calculate annual Nitrogen loading (NA) $NA_{pr} := TNhwy \cdot QA_{pr}$ $NA_{pr} = 2.9704 \cdot \frac{lb}{yr}$

Calculate annual Phosphorus loading (PA) $PA_{pr} := TPhwy \cdot QA_{pr}$ $PA_{pr} = 0.3686 \cdot \frac{lb}{yr}$

Required removal efficiency

Required Nitrogen removal efficiency $NR_{req} := 1 - \frac{NA_{ex}}{NA_{pr}}$ $NR_{req} = 23.15 \cdot \%$

Required Phosphorus removal efficiency $PR_{req} := 1 - \frac{PA_{ex}}{PA_{pr}}$ $PR_{req} = 23.15 \cdot \%$

Required nutrient removal

Required Nitrogen removal $Nreq_{removal} := NA_{pr} - NA_{ex}$ $Nreq_{removal} = 0.312 \cdot \frac{kg}{yr}$

Required Phosphorus removal $Preq_{removal} := PA_{pr} - PA_{ex}$ $Preq_{removal} = 0.039 \cdot \frac{kg}{yr}$