APPENDIX I

SW 10th Street Connector & I-95 Interchange Supplemental Traffic Forecast Scenarios
SW 10th Street at I-95 – Alternatives Analysis Memorandum

MEMORANDUM

Date: May 26, 2020

To: Robert Bostian, Project Management, FDOT District 4

From: Andrew Velasquez, AECOM Program Manager, Planning and Traffic Engineering
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Subject: **SW 10th Street Connector & I-95 Interchange Supplemental Traffic Forecast Scenarios**

FPN(s): 436964-1, 439891-1

Counties: Broward (86)

At the request of the Florida Department of Transportation (FDOT) District 4, Florida's Turnpike Enterprise (FTE) staff was tasked with evaluating additional forecast scenarios addressing potential modifications to the SW 10th Street Connector ramps to and from I-95. With the changes in traffic demand associated with the I-95 connections, the intermediate access ramp connections between the Florida's Turnpike and I-95 interchanges were also revisited and new forecast scenarios were developed. Furthermore, the Sawgrass Expressway/Turnpike interchange configuration has been revised since the previous forecast, resulting in a modified forecast affecting the new scenarios.

This memorandum is prepared in support of the I-95 Project Development and Environment (PD&E) study from SW 10th Street to Hillsboro Boulevard (FPID 436964-1) and the SW 10th Street Connector PD&E study (FPID 439891-1). This memorandum provides supplemental traffic forecast scenarios to the *Project Traffic Forecast Memorandum (PTFM)*, dated January 2019, and the *SW 10th Street Connector Toll-Free Project Traffic Forecast Memorandum,* dated November 2019. The Alternative 3D 1.3b non-tolled forecast from the November 2019 memo is now referred to as "Base PD&E Concept" since this forecast was used in the draft *SW 10th Street Connector PD&E Project Traffic Analysis Report (PTAR)*, dated September 2019.

Since the publication of the draft *SW 10th Street Connector PD&E PTAR,* FTE has revised the interchange configuration at the Sawgrass Expressway/Turnpike interchange to remove the express lanes along the Sawgrass Expressway, and change the Turnpike Mainline configuration from two express lanes in each direction to one managed lane in each direction. The direct

connect ramps to/from the Turnpike south and from/to the SW 10th Street Connector east were changed to connect to the Turnpike general lanes only, instead of the Turnpike express lanes only. These changes are reflected in each new forecast scenario for the SW 10th Street Connector.

For simplification purposes, new scenario names were established in this memo rather than retaining previously named forecast scenario names. Scenarios A, B, and C describe three basic intermediate access options for the SW 10th Street Connector, as described below:

Scenario A: Provides intermediate access for local SW 10th Street, serving Powerline Road (to/from the east) and Newport Center Drive (to/from the west).

Scenario B: Provides no access between local SW 10th Street and the SW 10th Street Connector; no ramps to serve either Powerline Road or Newport Center Drive.

Scenario C: Provides access east of Military Trail for local SW 10th Street, serving Newport Center Drive to/from the west. There is no access to/from Powerline Road.

For each scenario, three sub-scenarios describe the connection possibilities for the SW 10th Street Connector with the I-95 general use lanes (GULs) and express lanes (ELs), as describe below:

Sub-scenario 1: Connects to/from I-95 ELs only.

Sub-scenario 2: Connects to/from I-95 GULs, as well as I-95 ELs.

Sub-scenario 3: Connects to/from I-95 GULs only.

The scenario and sub-scenarios combinations create nine unique forecast scenarios (A1, A2, A3, B1, B2, B3, C1, C2, and C3), as summarized in **Table 1**. **Appendix A** also provides a schematic for each scenario east of the Sawgrass Expressway/Turnpike interchange. **Appendix B** provides the consolidated diagram with Sawgrass Expressway, Turnpike, SW 10th Street, and I-95 for the previous Base PD&E Concept and Scenario A2. The latest update of the Turnpike/Sawgrass interchange as shown in A2 can be described as follows:

- Sawgrass Expressway: 5 GTLs instead of 3 GTLs + 2 Els
- Turnpike Mainline: 1 Managed Lane + 4 GTLs instead of 2 ELs + 3 GTLs
- Sawgrass/Turnpike Interchange: No EL Direct Connect
- Turnpike to SW 10th Connector (from south to east): GTLs connection instead of ELs

Table 1: SW 10th Street Connector Forecast Scenarios Summary

Scenario	Turnpike Interchange		Intermediate Access between Turnpike and I-95		I-95 Interchange Connection		
	GUL	EL	East of Powerline Rd.	East of Military Tr.	EL	EL & GUL	GUL
PD&E Base	X	X	X	X	X		
A1	X		X	X	X		
A2	X		X	X		X	
A3	X		X	X			X
B1	X				X		
B2	X					X	
B3	X						X
C1	X			X	X		
C2	X			X		X	
C3	X			X			X

Initial Directional Design Hour Volumes (DDHVs) were developed for the 2040 AM period only in order to compare and shortlist these scenarios for further analysis. The traffic forecasting process was accomplished using the Express Lane Time-of-Day (ELToD) model to identify traffic volume split between connector lanes and local lanes. The ELToD model encompasses the area of three study corridors:

- Florida's Turnpike corridor between Lake Worth Road and Atlantic Boulevard
- I-95 corridor between Congress Avenue and Atlantic Boulevard
- Sawgrass/SW 10th Street corridor between University Drive and Natura Boulevard

The trip matrices from the Southeast Regional Planning Model (SERPM) were used as input to the subarea ELToD Model. Each of the scenarios was coded into ELToD to estimate the managed lane and local lane traffic. ELToD can model toll and non-toll portions of the system in one cohesive model network. In these forecast scenarios, the only express lane portion is I-95 Express since the other priced managed lane toll components were removed from SW 10th Street, Sawgrass Expressway, and the Turnpike Mainline.

Figures 1 through 3 present the SW 10th Street Connector and local lane 2040 AM DDHVs along SW 10th Street between the Turnpike and I-95 for each scenario in comparison to the Base PD&E Concept. The SW 10th Street local lane volumes for both directions are shown at three locations: west of Powerline Road, west of Military Trail, and west of Newport Center Drive.

Figure 1: Year 2040 AM Peak Hour Scenario A Traffic Forecasts

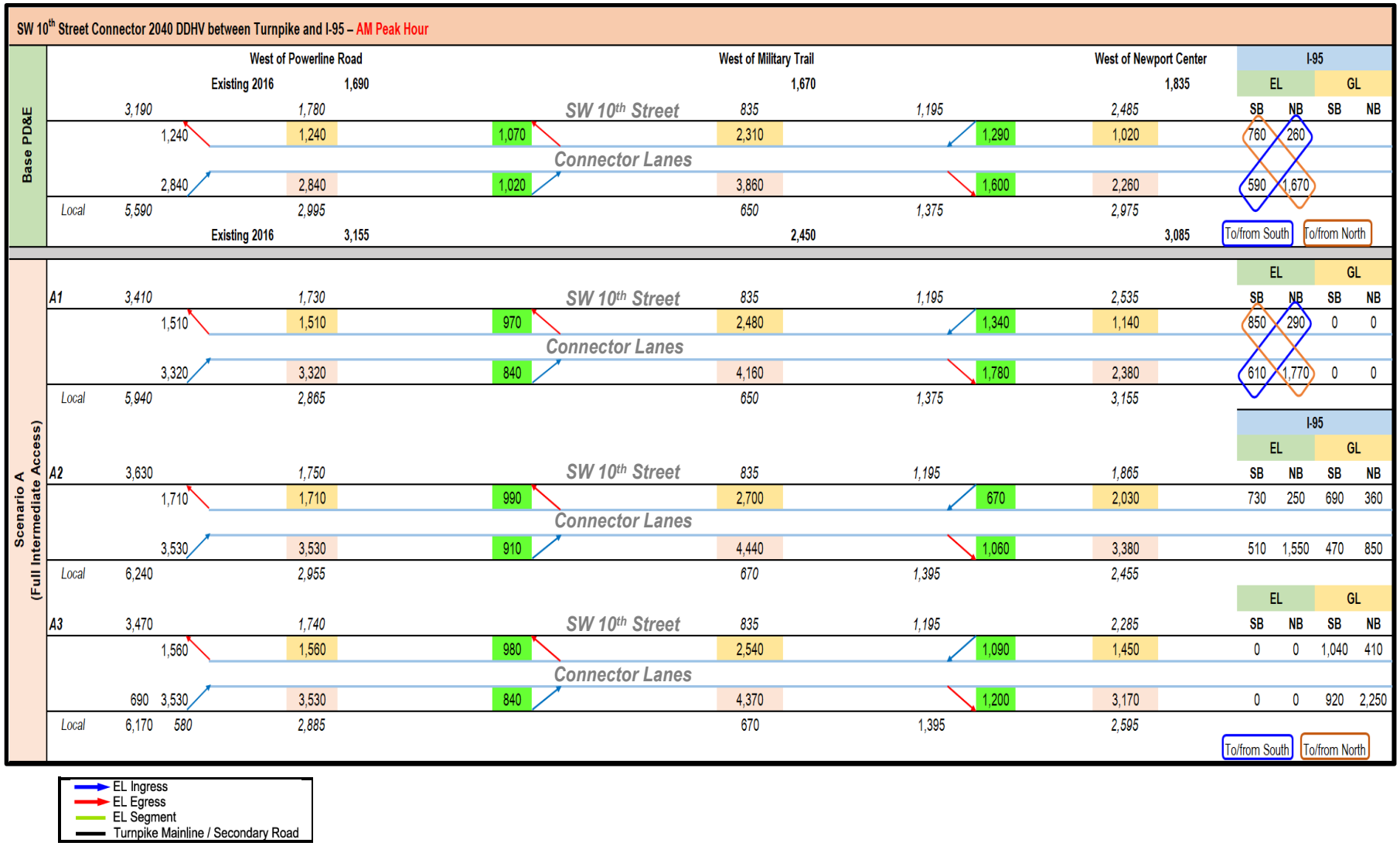


Figure 2: Year 2040 AM Peak Hour Scenario B Traffic Forecasts

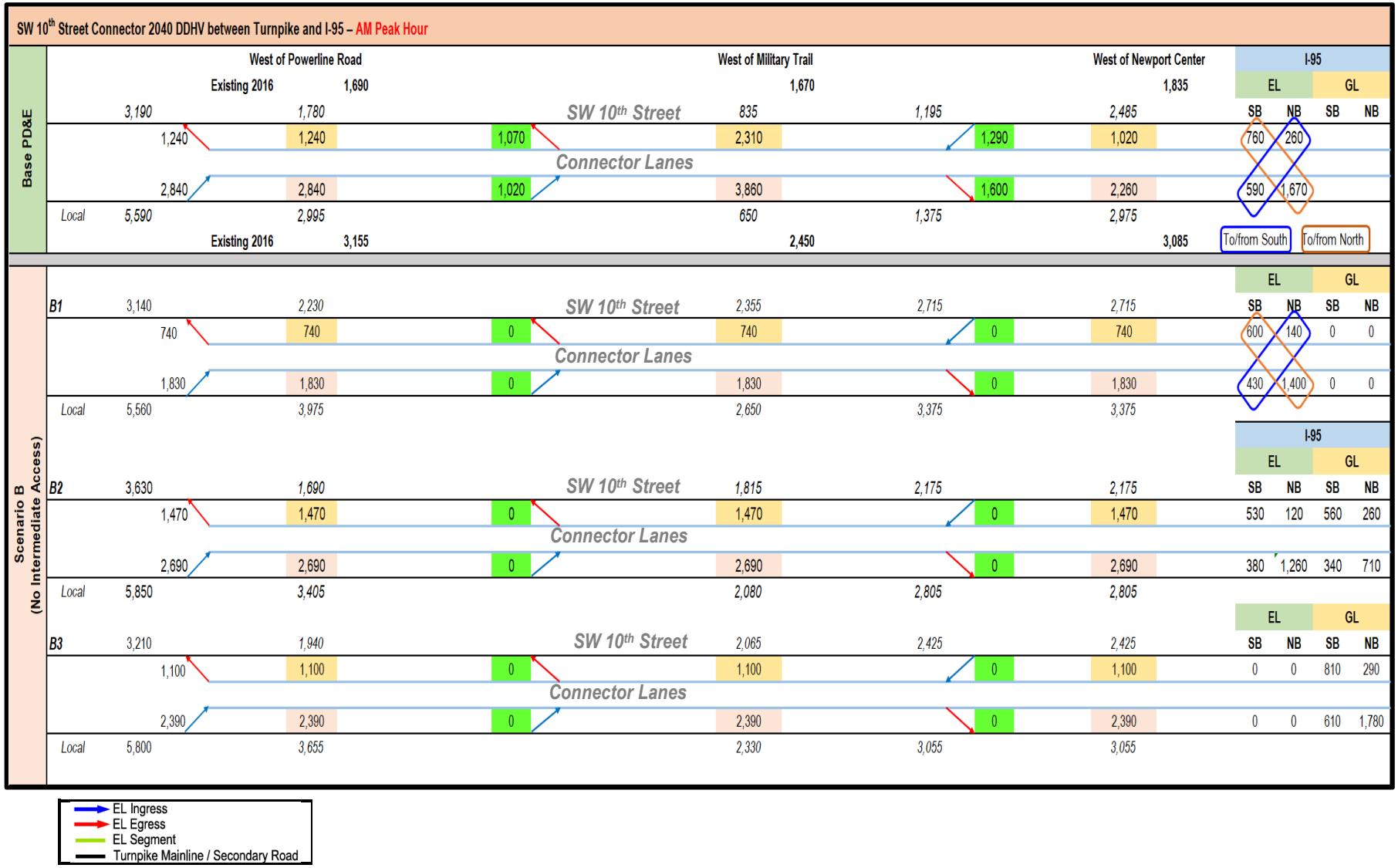
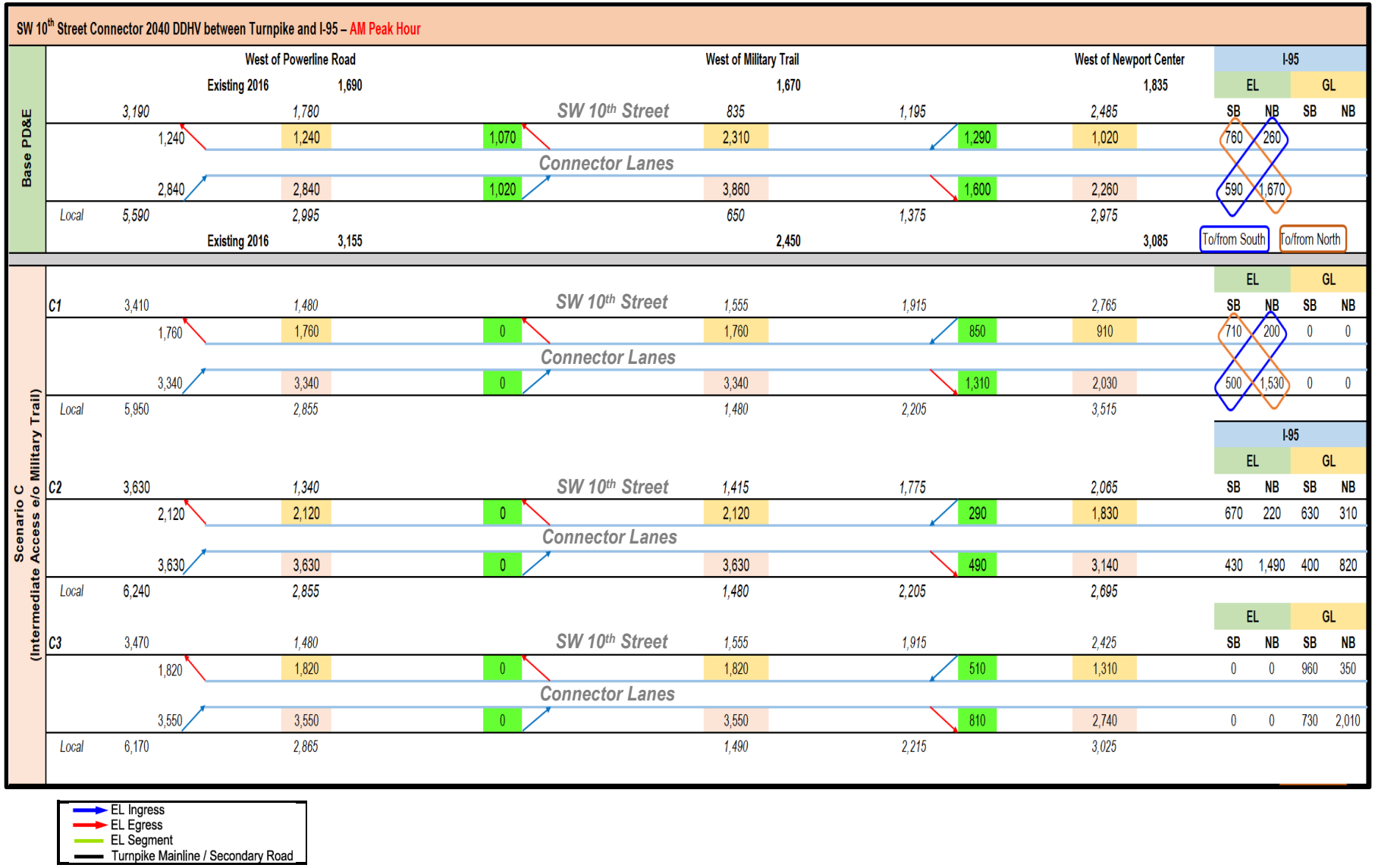


Figure 3: Year 2040 AM Peak Hour Scenario C Traffic Forecasts



An important aspect of the new scenarios is the connection to the I-95 GULs. With the general use connection, the anticipated volume on the SW 10th Street Connector increases, and local lane traffic decreases. Additionally, the connection to the I-95 GULs also affects the traffic volumes on I-95. As a way to compare the alternatives with one another and the Base PD&E Concept, the I-95 general use traffic north and south of SW 10th Street is provided in **Table 2**. Additionally, the sum of the SW 10th Street local lane traffic at each of the three locations shown on **Figures 1 through 3** is also provided in **Table 2.** The scenarios were then ranked from low volume to high volume. Higher volumes on the I-95 GULs or SW 10th Street local lanes are undesirable and would suggest degraded operations compared to the Base PD&E Concept.

Table 2: SW 10th Street Connector Intermediate Access Scenarios Evaluation

Evaluated Scenarios (2040 AM)	PD&E Base Full Access between Turnpike and I-95	Full Access between Turnpike and I-95			No Access between Turnpike and I-95			Partial Access between Turnpike and I-95		
		(A1) EL Only	(A2) EL & GUL	(A3) GUL Only	(B1) EL Only	(B2) EL & GUL	(B3) GUL Only	(C1) EL Only	(C2) EL & GUL	(C3) GUL Only
I-95 GUL NB North of Hillsboro Blvd (vphpl)*	1,730	1,700	1,810	2,130	1,810	1,830	2,220	1,790	1,810	2,140
I-95 GUL NB South of SW 10th (vphpl)*	1,830	1,780	1,800	1,830	1,910	1,820	1,940	1,860	1,790	1,840
Rank (Based on higher value per lane volume)		3	1	7	6	5	9	4	2	8
SW 10th Local Traffic**	11,720	11,860	10,530	11,010	17,390	13,970	15,470	13,740	11,850	12,840
	%	101%	90%	94%	148%	119%	132%	117%	101%	110%
Rank (Based on % of the Base PD&E concept)		3	1	2	9	7	8	6	4	5

* *Red indicates I-95 mainline volumes per lane exceeds LOS D target*

** *SW 10th local lane volumes for both directions at three locations: west of Powerline Road, west of Military Trail, and west of Newport Center Drive.*

The findings based on the traffic forecast comparison can be summarized as follows:

- Scenarios A3, B3, and C3 have forecasted traffic volumes on the I-95 GULs that exceed the target Level of Service (LOS) D threshold (based on the FDOT Generalized Service Volume tables) north of the Hillsboro Boulevard interchange.
- Scenarios B1, B2, and B3 have traffic volumes on the SW 10th Street local lanes that are 19 to 48 percent higher than the Base PD&E Concept. This will result in degraded level of service conditions compared to the Base PD&E Concept. Correspondingly, the SW 10th Street Connector will be underutilized, with peak directional volumes in the range of 1,830 vehicles per hour (vph) to 2,630 vph.
- Scenarios A1, B1, and C1 maintain the Base PD&E Concept between the SW 10th Street Connector and I-95 express lanes and are less preferred by the City of Deerfield Beach. The Scenario A1 traffic volume for the egress east of Military Trail is 1,780 vph, which is approaching the practical capacity of a single lane ramp. The traffic operations approaching I-95 will be degraded compared to the Base PD&E Concept.

Based on the findings from the traffic volume comparisons and considering the project goal to achieve concurrence from the City of Deerfield Beach, the project team determined that Scenarios A2 and C2 should move forward for further operational analysis by the PD&E teams. Scenario D2 was introduced as a hybrid option and presented to the City of Deerfield Beach. Although this scenario will not be analyzed further, the traffic volumes are provided herein for documentation purposes. Scenario D2 provides an eastbound ingress and westbound egress serving Powerline Road to and from the east. There are no access ramps serving Newport Center Drive. The three scenarios (A2, C2, and D2) are illustrated on **Figure 4**. The 2040 AM and PM SW 10th Street Connector volumes between the Turnpike and I-95 for Scenarios A2, C2, and D2 are presented on **Figures 5 and 6**, respectively.

Detailed 2020 and 2040 AM and PM turning movement projections are provided in **Appendix C** for the Base PD&E Concept, A2, and C2 for an expanded analysis area that includes intersections north and south of SW 10th Street and the interchanges at Hillsboro Boulevard and Sample Road. The 2020 and 2040 Annual Average Daily Traffic (AADT) was re-estimated for A2 and C2 for the SW 10th Street Connector and these volumes are provided in **Appendix D**.

Figure 4. I-95 Express and I-95 General Use Lane Connections (Scenarios A2, C2, and D2)

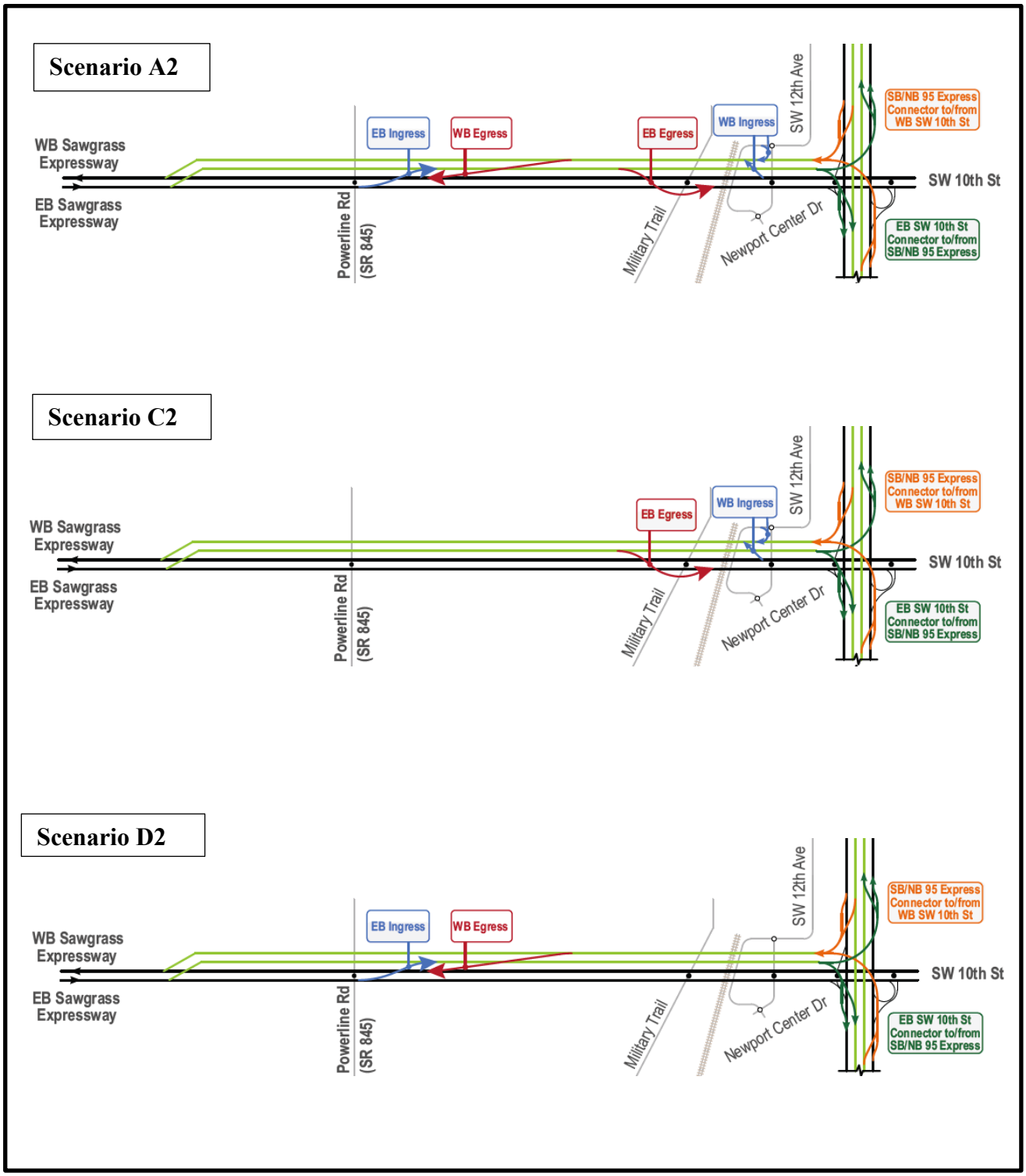


Figure 5: Year 2040 AM Peak Hour Traffic Forecasts

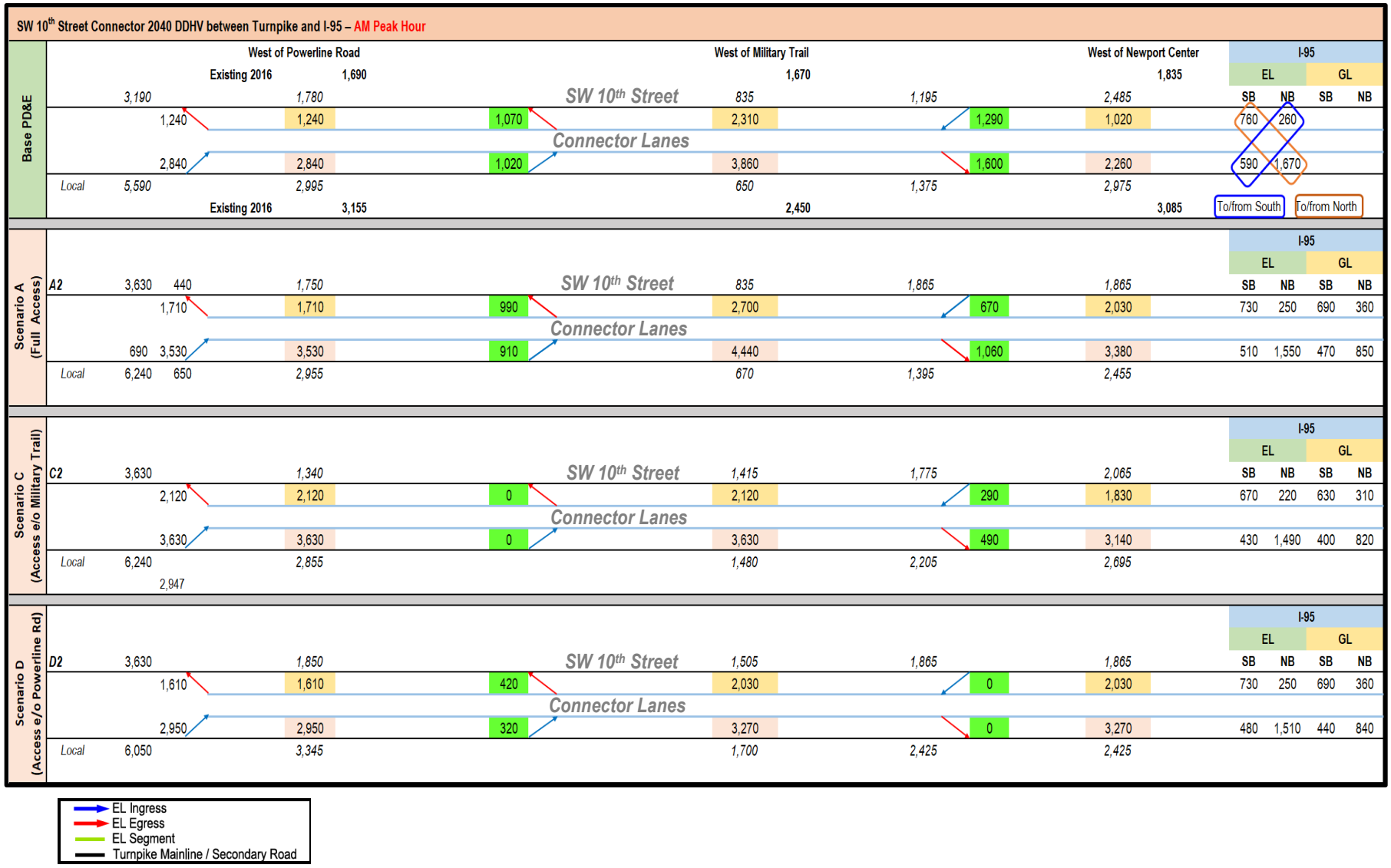
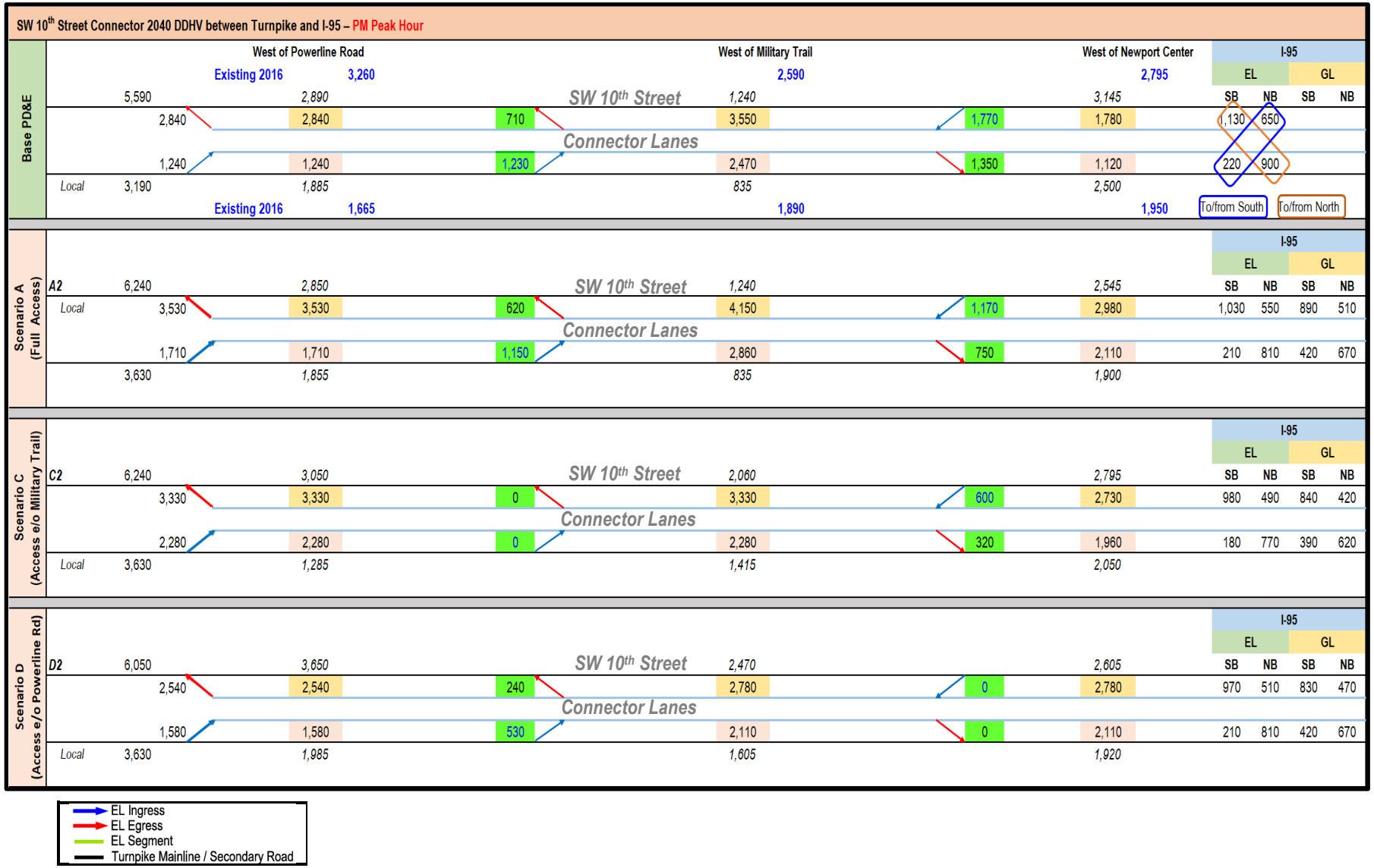


Figure 6: Year 2040 PM Peak Hour Traffic Forecasts



APPENDIX A

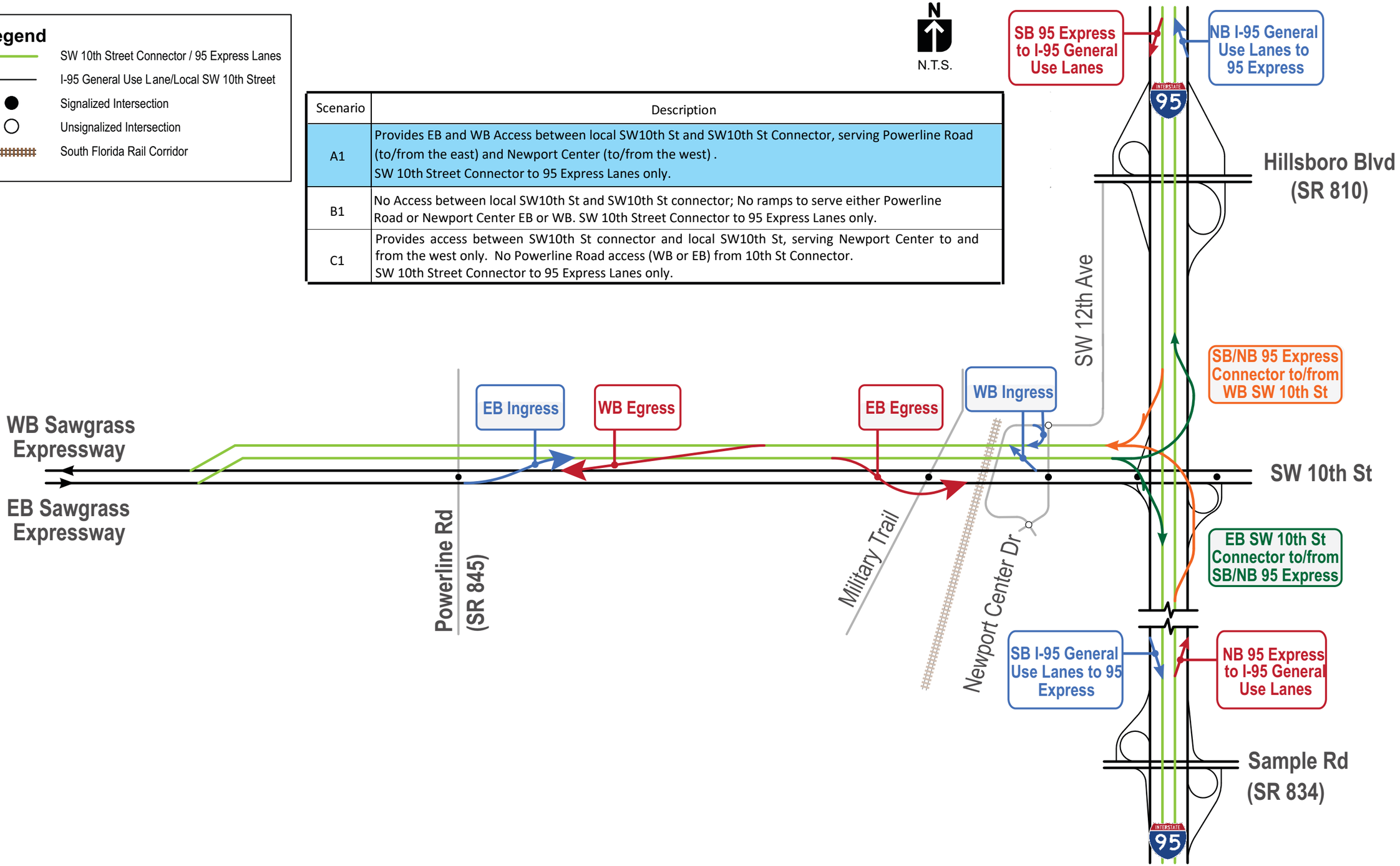
Legend

- SW 10th Street Connector / 95 Express Lanes
- I-95 General Use Lane/Local SW 10th Street
- Signalized Intersection
- Unsignalized Intersection
- South Florida Rail Corridor

N

N.T.S.

Scenario	Description
A1	Provides EB and WB Access between local SW10th St and SW10th St Connector, serving Powerline Road (to/from the east) and Newport Center (to/from the west) . SW 10th Street Connector to 95 Express Lanes only.
B1	No Access between local SW10th St and SW10th St connector; No ramps to serve either Powerline Road or Newport Center EB or WB. SW 10th Street Connector to 95 Express Lanes only.
C1	Provides access between SW10th St connector and local SW10th St, serving Newport Center to and from the west only. No Powerline Road access (WB or EB) from 10th St Connector. SW 10th Street Connector to 95 Express Lanes only.



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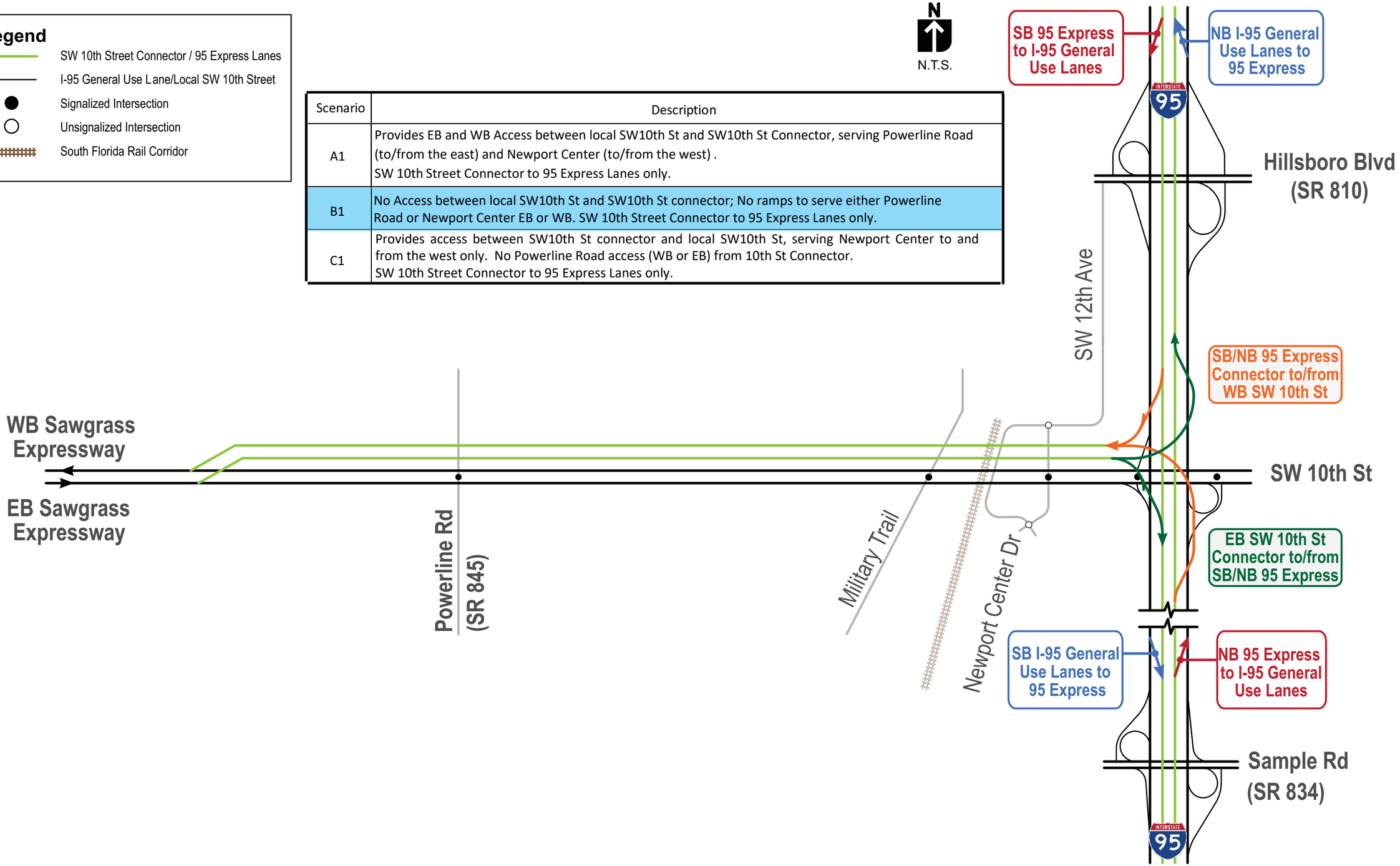

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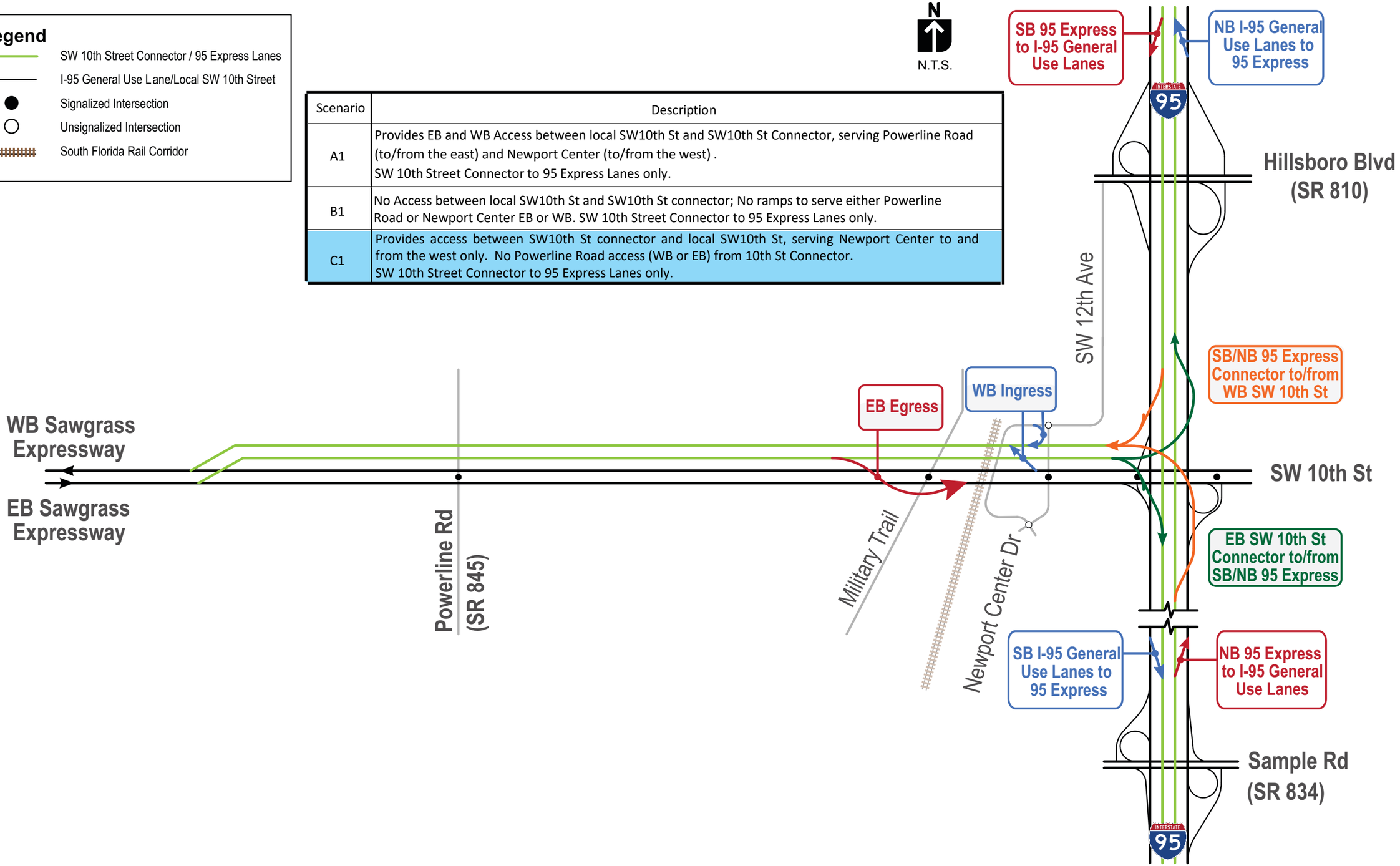
C1	Provides access between SW10th St connector and local SW10th St, serving Newport Center to and from the west only. No Powerline Road access (WB or EB) from 10th St Connector. SW 10th Street Connector to 95 Express Lanes only.



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- Unsignalized Intersection
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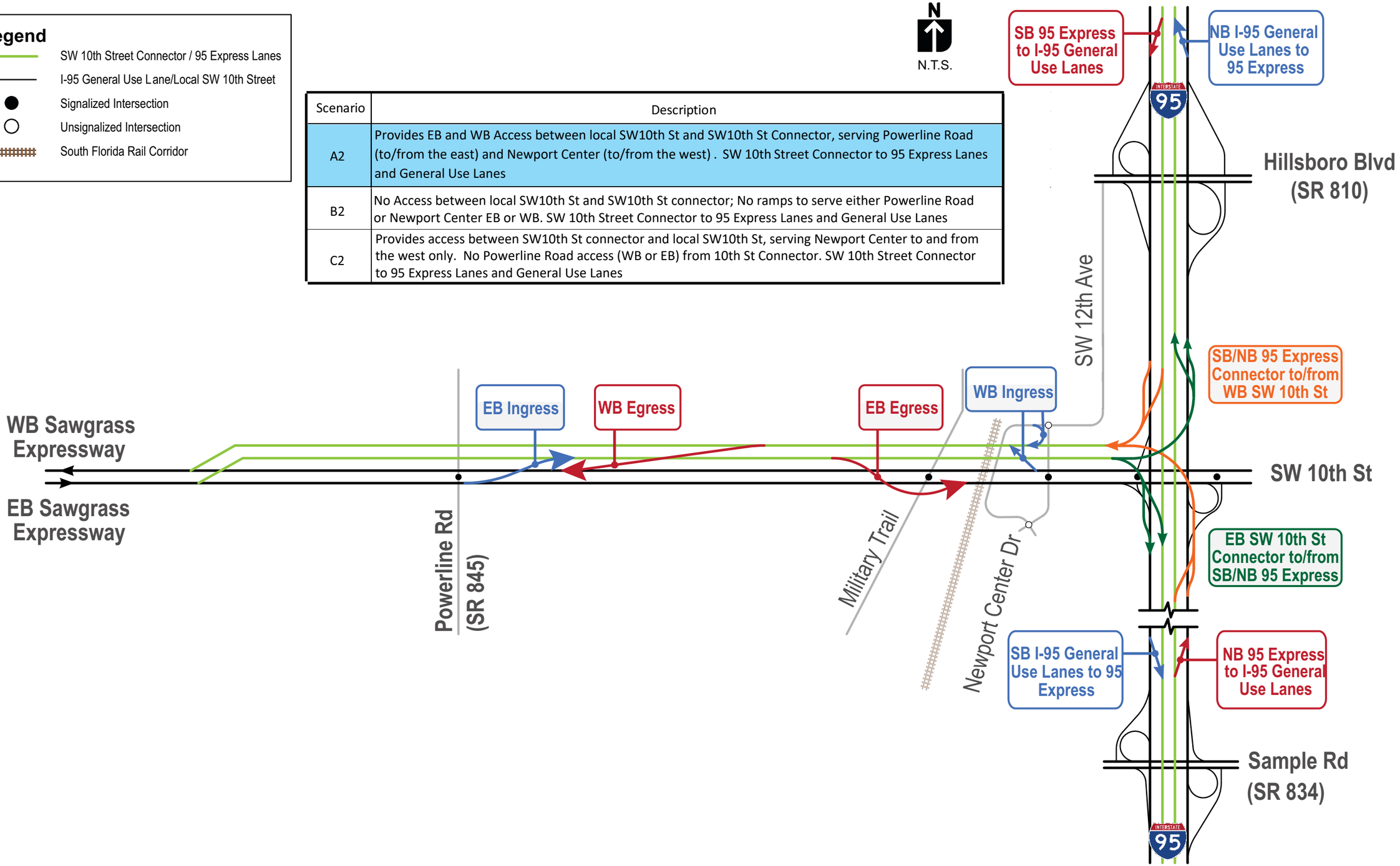
N

N.T.S.

Scenario	Description
A2	Provides EB and WB Access between local SW10th St and SW10th St Connector, serving Powerline Road (to/from the east) and Newport Center (to/from the west) . SW 10th Street Connector to 95 Express Lanes and General Use Lanes
B2	No Access between local SW10th St and SW10th St connector; No ramps to serve either Powerline Road or Newport Center EB or WB. SW 10th Street Connector to 95 Express Lanes and General Use Lanes
C2	Provides access between SW10th St connector and local SW10th St, serving Newport Center to and from the west only. No Powerline Road access (WB or EB) from 10th St Connector. SW 10th Street Connector to 95 Express Lanes and General Use Lanes



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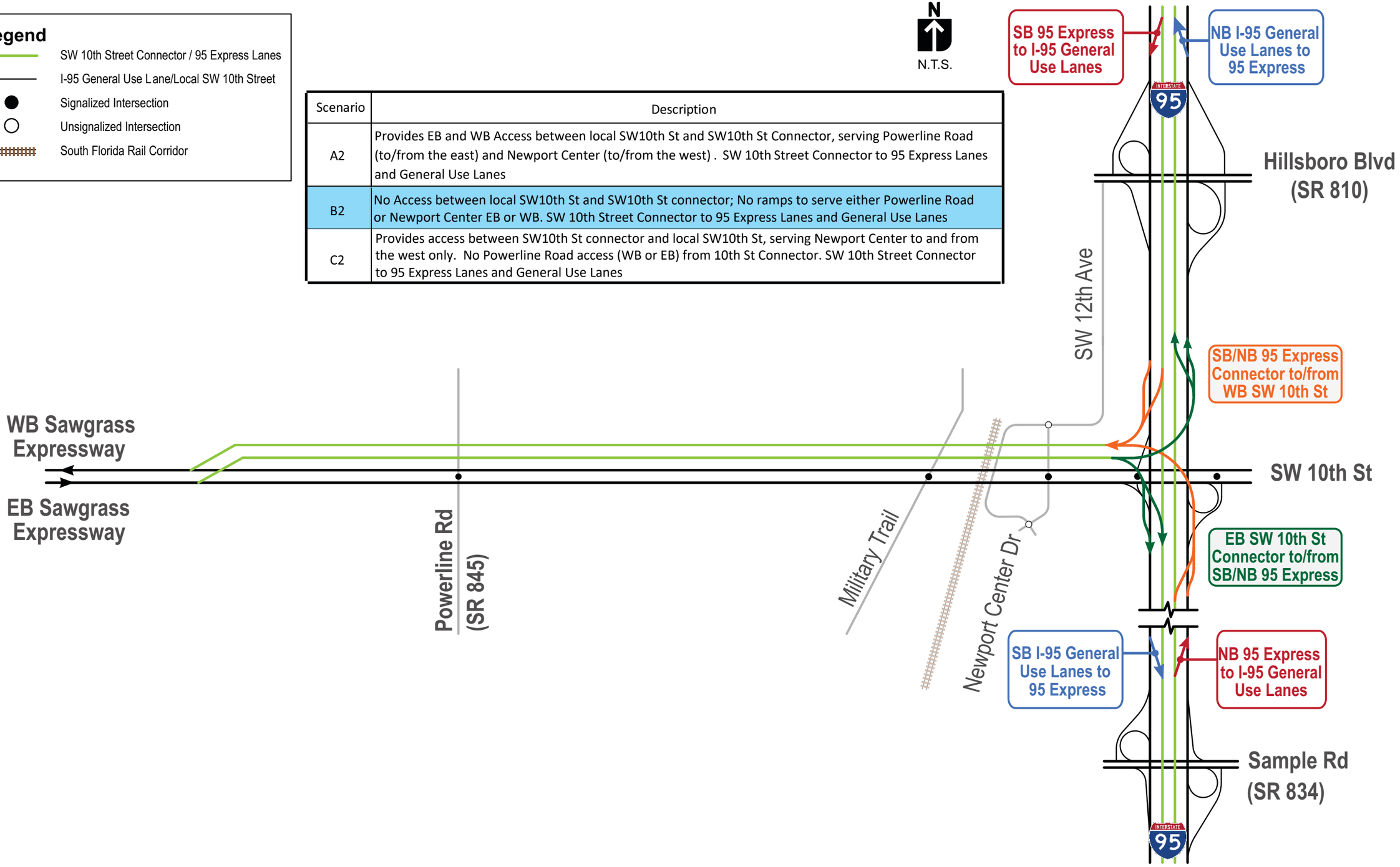
Scenario	Description
A2	Provides EB and WB Access between local SW10th St and SW10th St Connector, serving Powerline Road (to/from the east) and Newport Center (to/from the west) . SW 10th Street Connector to 95 Express Lanes and General Use Lanes
B2	No Access between local SW10th St and SW10th St connector; No ramps to serve either Powerline Road or Newport Center EB or WB. SW 10th Street Connector to 95 Express Lanes and General Use Lanes
C2	Provides access between SW10th St connector and local SW10th St, serving Newport Center to and from the west only. No Powerline Road access (WB or EB) from 10th St Connector. SW 10th Street Connector to 95 Express Lanes and General Use Lanes



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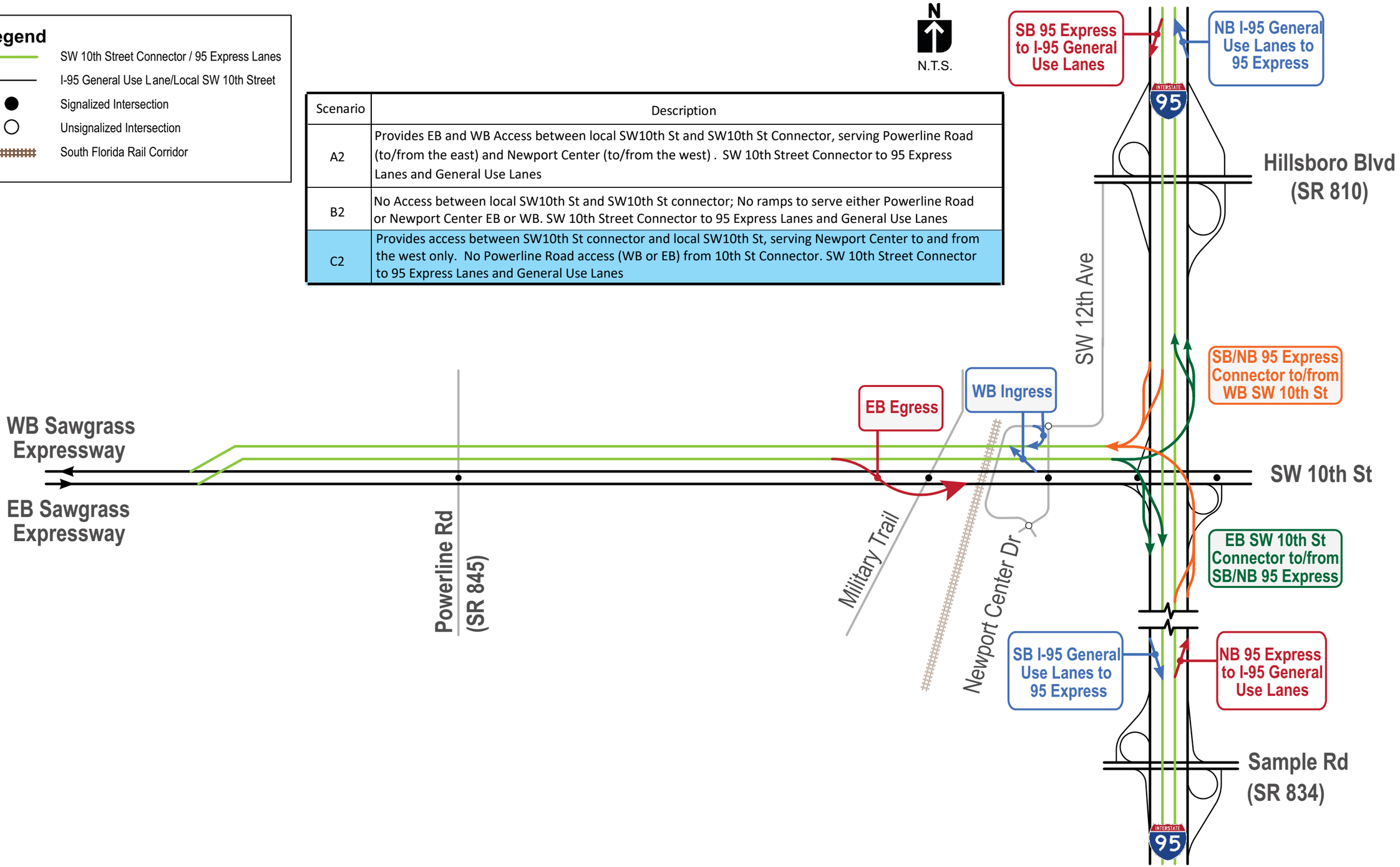
Scenario	Description
A2	Provides EB and WB Access between local SW10th St and SW10th St Connector, serving Powerline Road (to/from the east) and Newport Center (to/from the west) . SW 10th Street Connector to 95 Express Lanes and General Use Lanes
B2	No Access between local SW10th St and SW10th St connector; No ramps to serve either Powerline Road or Newport Center EB or WB. SW 10th Street Connector to 95 Express Lanes and General Use Lanes
C2	Provides access between SW10th St connector and local SW10th St, serving Newport Center to and from the west only. No Powerline Road access (WB or EB) from 10th St Connector. SW 10th Street Connector to 95 Express Lanes and General Use Lanes



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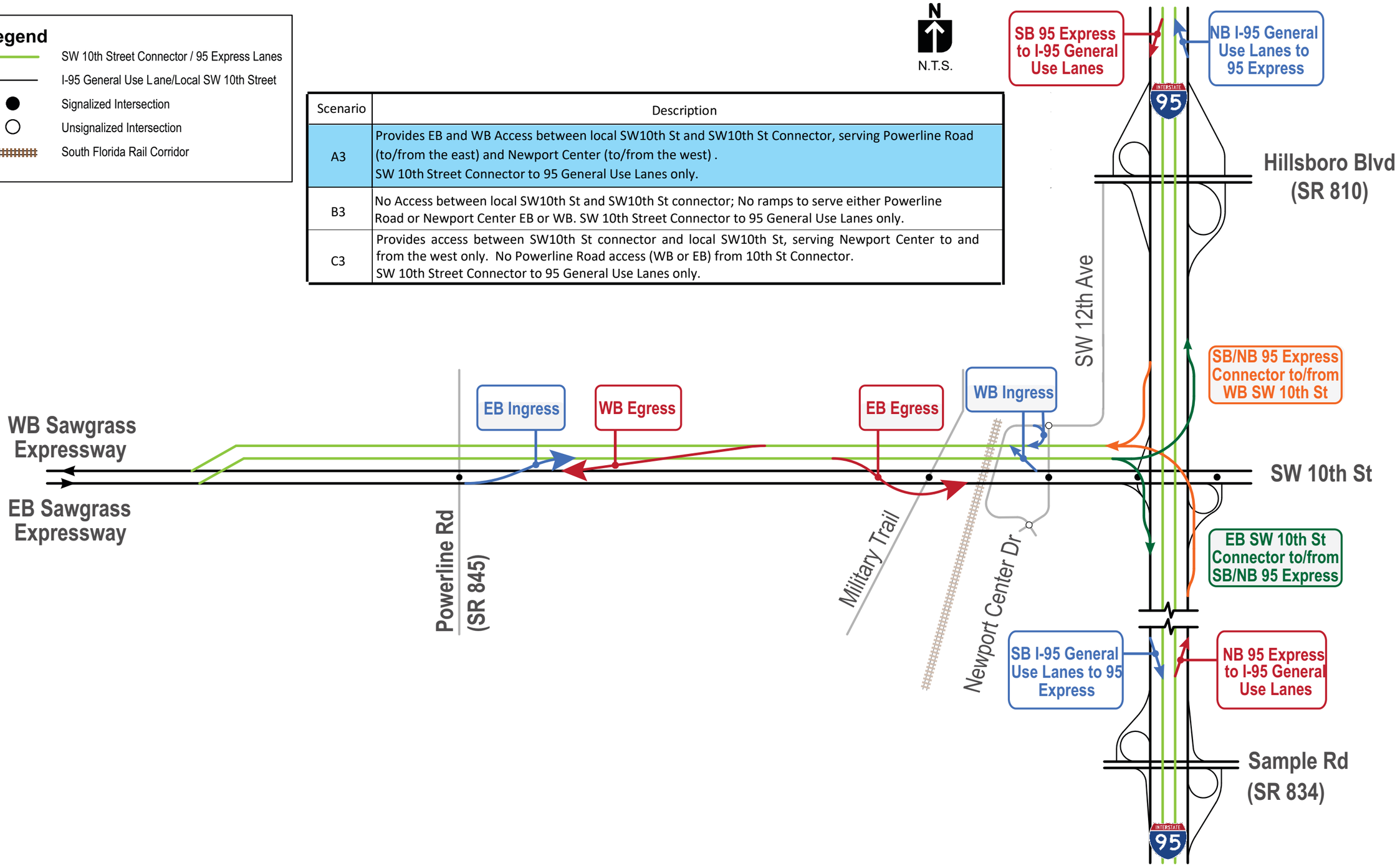
Scenario	Description
A3	Provides EB and WB Access between local SW10th St and SW10th St Connector, serving Powerline Road (to/from the east) and Newport Center (to/from the west) . SW 10th Street Connector to 95 General Use Lanes only.
B3	No Access between local SW10th St and SW10th St connector; No ramps to serve either Powerline Road or Newport Center EB or WB. SW 10th Street Connector to 95 General Use Lanes only.
C3	Provides access between SW10th St connector and local SW10th St, serving Newport Center to and from the west only. No Powerline Road access (WB or EB) from 10th St Connector. SW 10th Street Connector to 95 General Use Lanes only.



Legend

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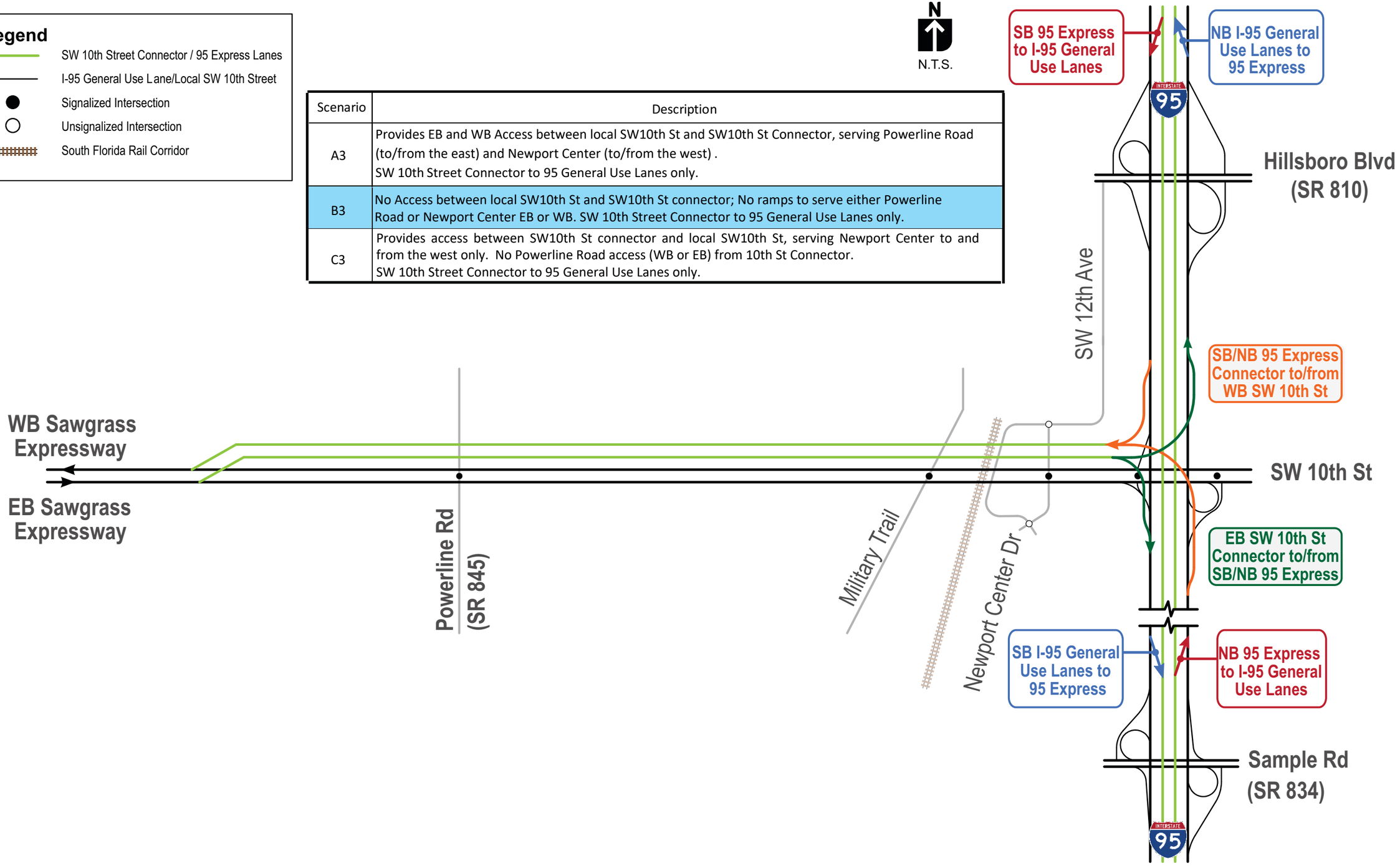
Scenario	Description
A3	Provides EB and WB Access between local SW10th St and SW10th St Connector, serving Powerline Road (to/from the east) and Newport Center (to/from the west) . SW 10th Street Connector to 95 General Use Lanes only.
B3	No Access between local SW10th St and SW10th St connector; No ramps to serve either Powerline Road or Newport Center EB or WB. SW 10th Street Connector to 95 General Use Lanes only.
C3	Provides access between SW10th St connector and local SW10th St, serving Newport Center to and from the west only. No Powerline Road access (WB or EB) from 10th St Connector. SW 10th Street Connector to 95 General Use Lanes only.



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Scenario	Description
A3	Provides EB and WB Access between local SW10th St and SW10th St Connector, serving Powerline Road (to/from the east) and Newport Center (to/from the west) . SW 10th Street Connector to 95 General Use Lanes only.
B3	No Access between local SW10th St and SW10th St connector; No ramps to serve either Powerline Road or Newport Center EB or WB. SW 10th Street Connector to 95 General Use Lanes only.
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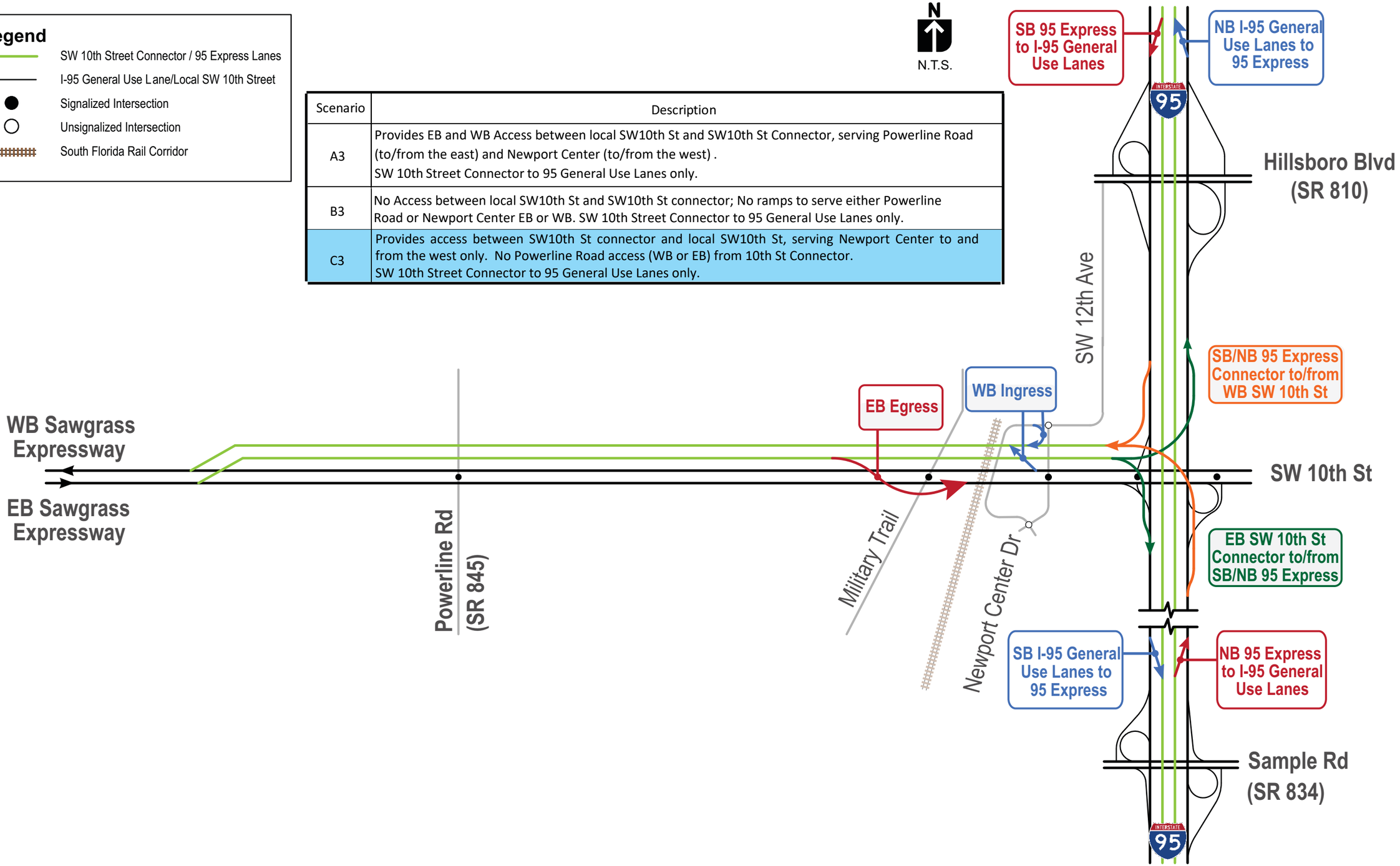


APPENDIX B

DRAFT PLAN

Base PD&E Concept

LEGEND
- 1st Accessible Ramp After EL Egress
- 1st Accessible Ramp Before EL Ingress
- EL Ingress
- EL Egress
- EL Segment
- Turnpike Mainline / Secondary Road
- Dynamic Toll Gantry
- Static + Dynamic Toll Gantry
- Static Toll Gantry
- Turnpike DMS Control
- D4 DMS Control
- Turnpike EL Segment Control
- D4 EL Segment Control
- (#) 437224-1 Scope Toll Site Number

FLORIDA'S TURNPIKE

TOLL 869

SR-806/Atlantic Ave (MP 81)

SR-808/Glades Rd (MP 75)

Coral Ridge Dr (MP 13)

SR-817/University Dr (MP 15)

US-441/SR-7 (MP 18)

Lyons Rd (MP 19)

Waterways Dr

Independence Dr

SR 845/Powerline Rd (MP 22)

SR 834/Sample Rd (MP 69)

SR-912/Coconut Creek Pkwy (MP 67)

SR-814/Atlantic Blvd (MP 65)

Pompano Service Plaza (MP 65)

Sawgrass Extension

SW 10th St WB

SW 10th St EB

SW 10th St

Military Trl

Linton Blvd

Congress Ave

SR-794/Yamato Rd

Spanish River Blvd

SR-808/Glades Rd

Palmetto Park Rd

SR 811/Hillsboro Blvd

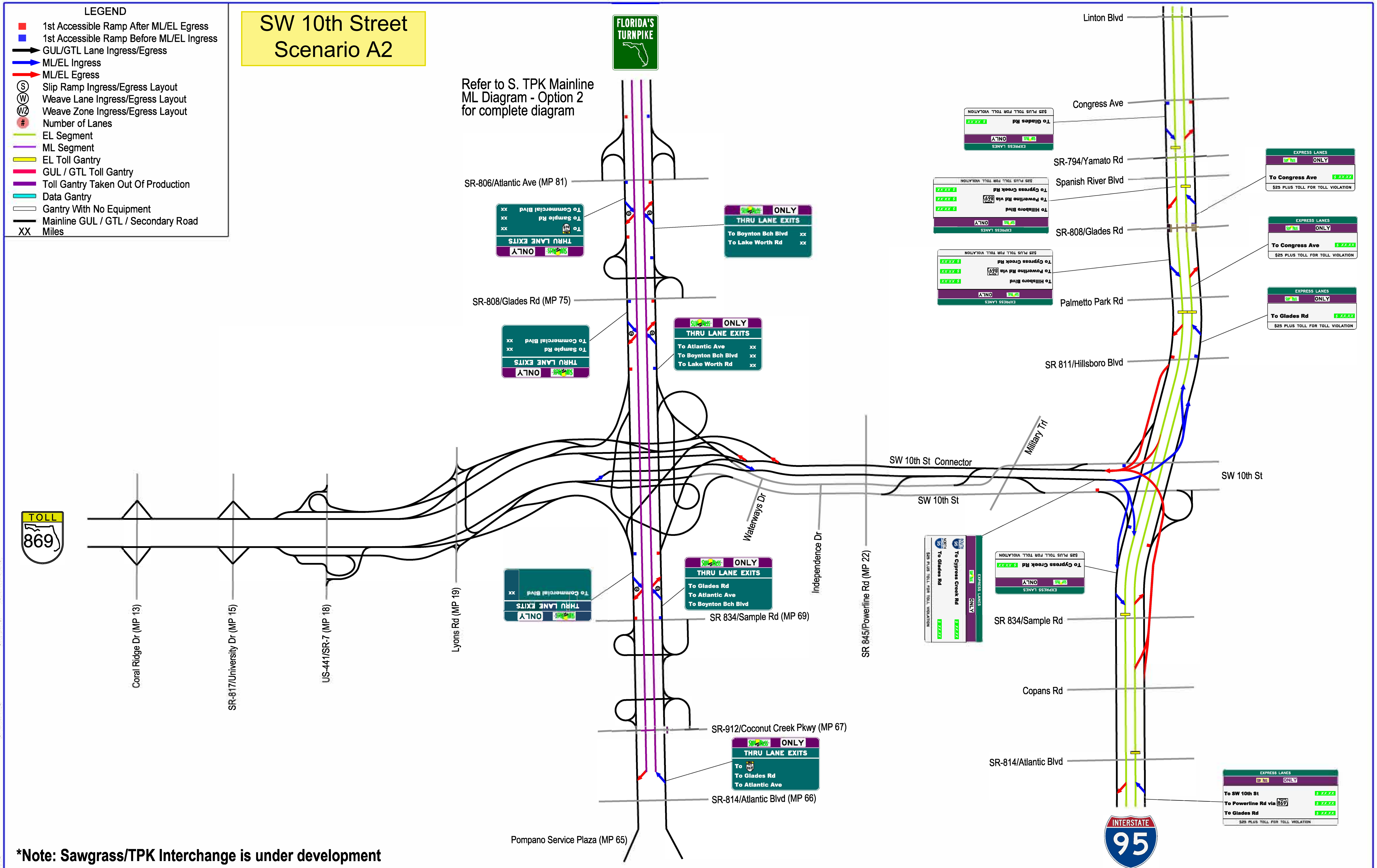
SR 834/Sample Rd

Copans Rd

SR-814/Atlantic Blvd

INTERSTATE 95

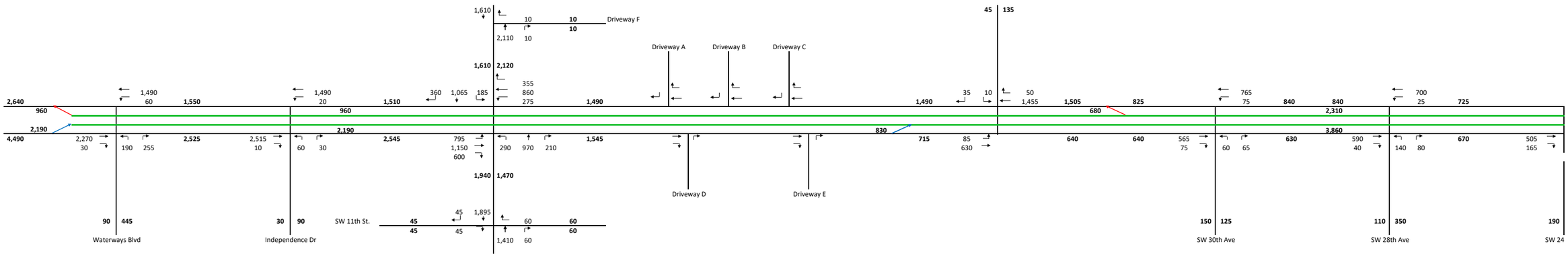
DRAFT PLAN



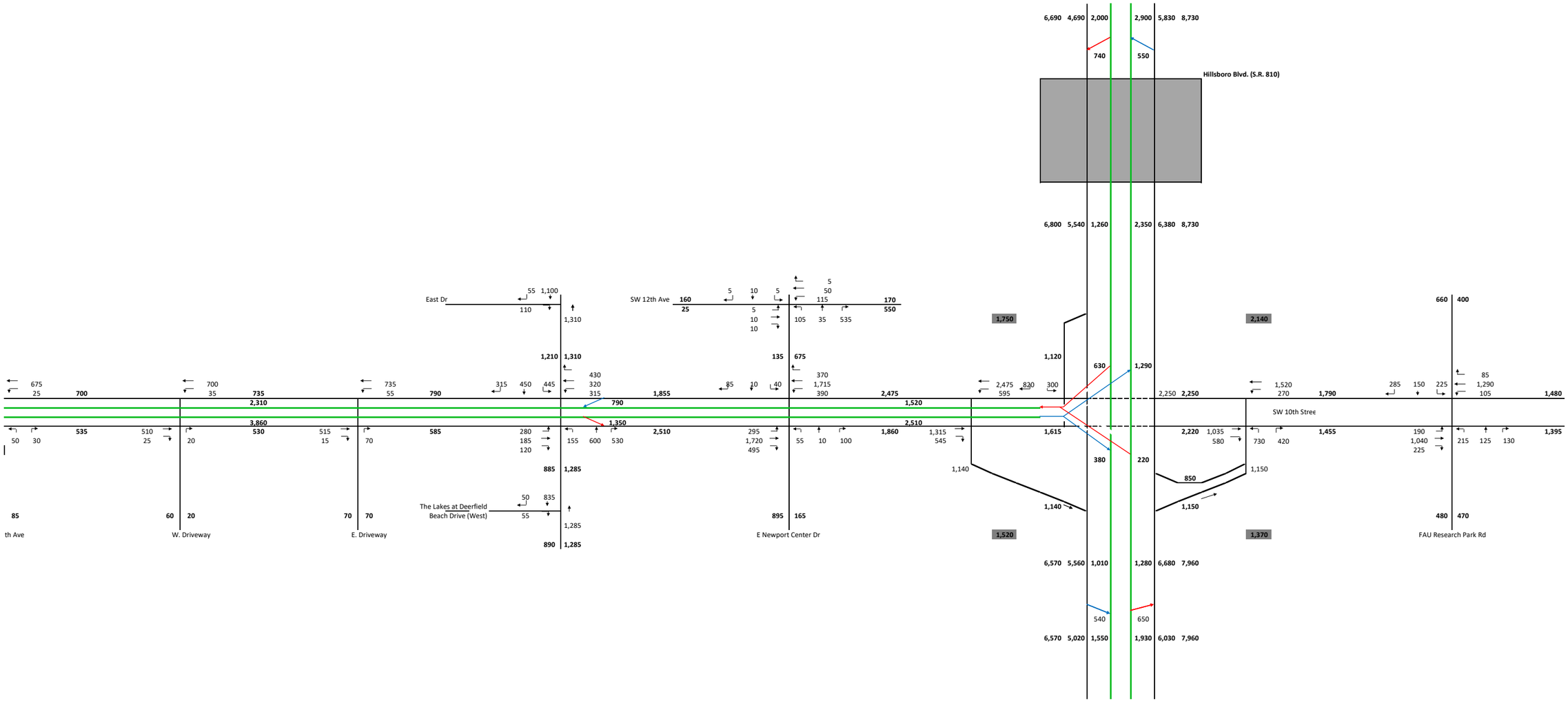
Note: Sawgrass/TPK Interchange is under development

APPENDIX C

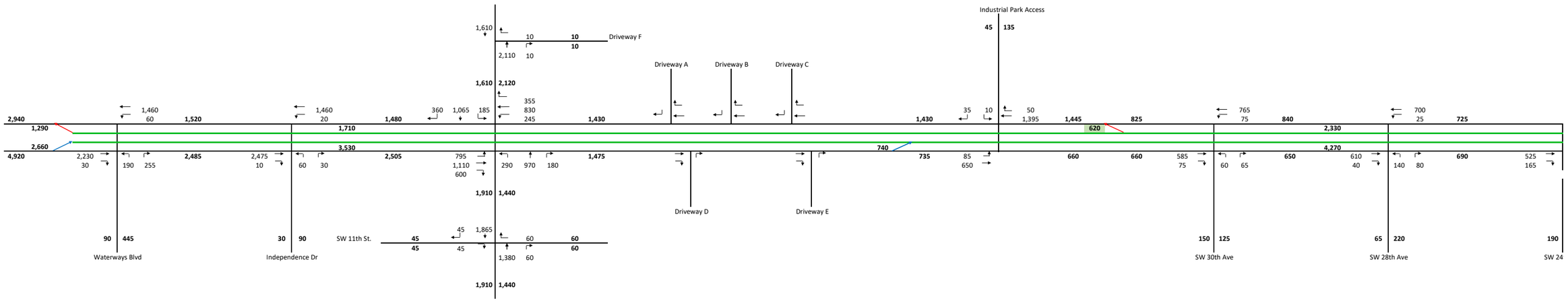
Appendix C


Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

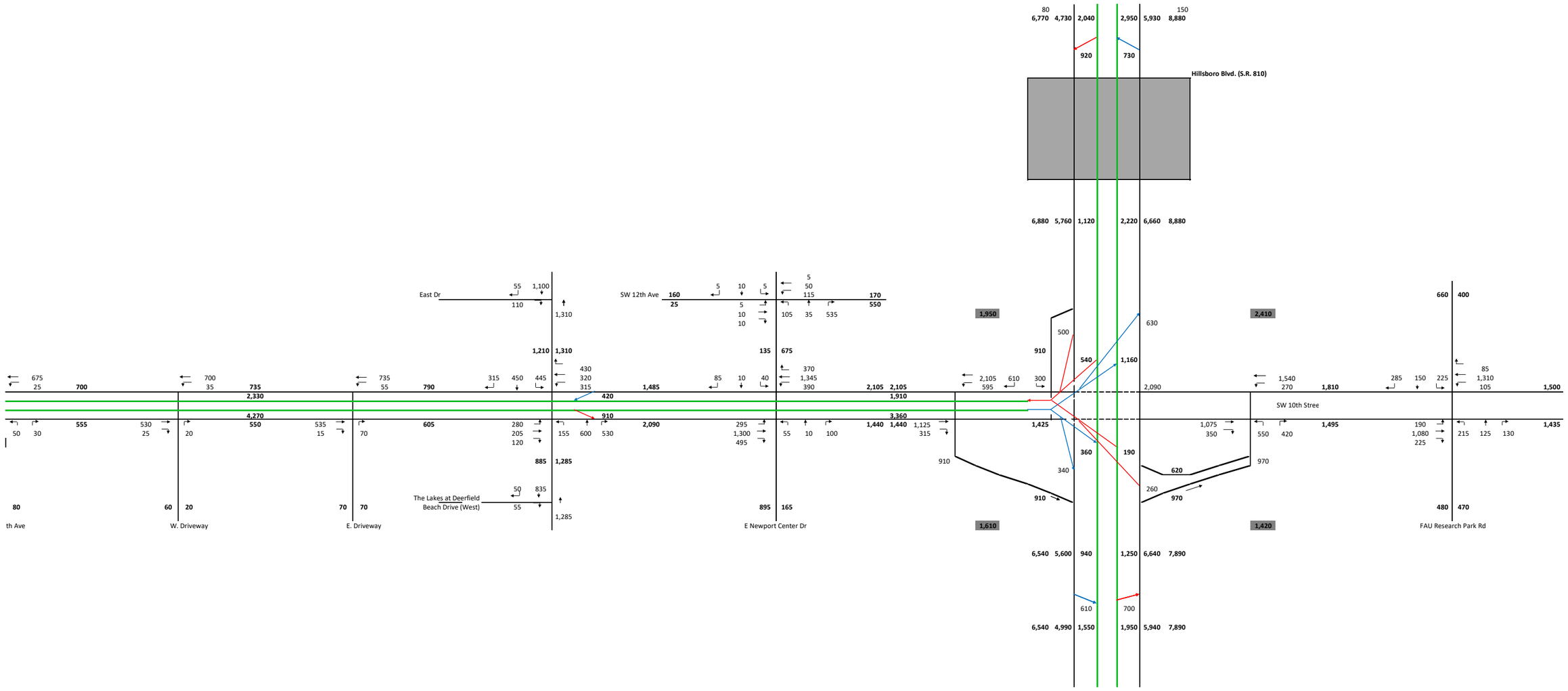
Appendix C


Hillsboro Blvd. (S.R. 810)
SW 10th Stree
East Dr
SW 12th Ave
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

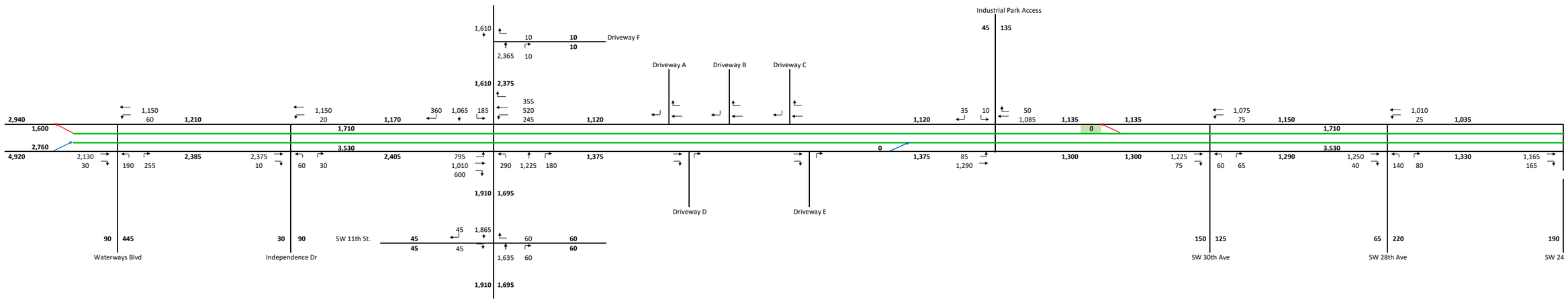
Appendix C


Industrial Park Access
Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

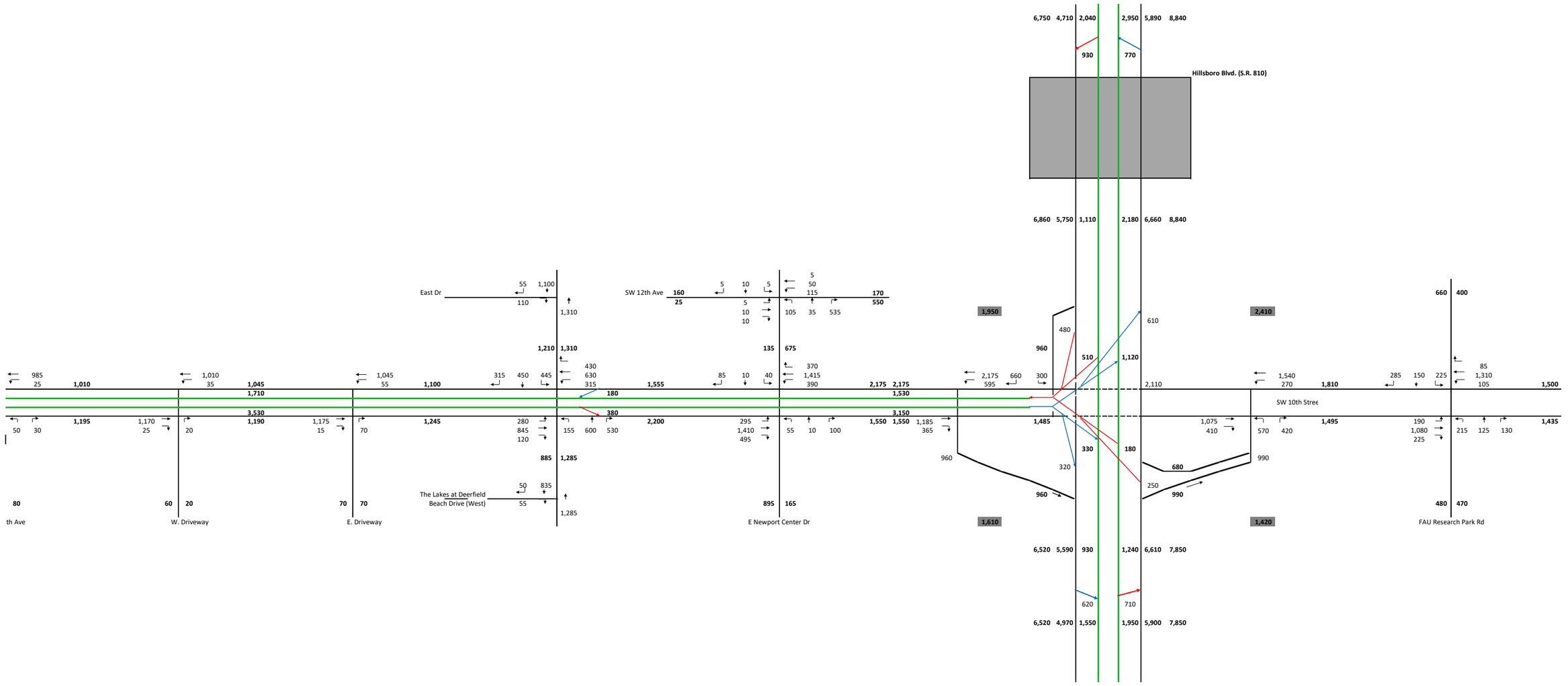
Appendix C


Hillsboro Blvd. (S.R. 810)
SW 10th Stree
East Dr
SW 12th Ave
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

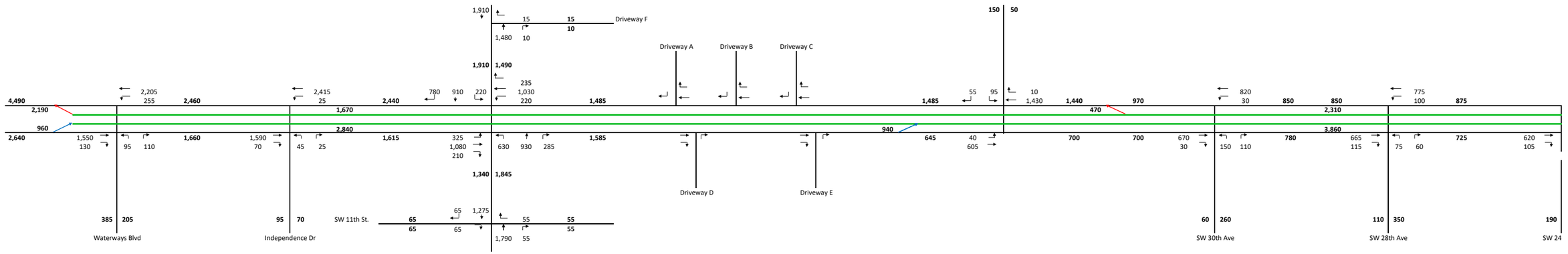
Appendix C


Industrial Park Access
45 135
1,610
10 10 Driveway F
2,365 10
1,610 2,375
Driveway A
Driveway B
Driveway C
2,940
1,600
2,760
4,920
1,150 60 1,210
1,150 20 1,170
360 1,065 185
355 520 245 1,120
1,120
35 10
50 1,085 1,135
1,135
0
1,075 75 1,150
1,710
1,010 25 1,035
3,530
2,130 30
190 255 2,385
2,375 10
60 30 2,405
795 1,010 600
290 1,225 180 1,375
1,375
85 1,290
1,300 1,300
1,225 75
60 65 1,290
1,250 40
140 80 1,330
1,165 165
1,910 1,695
Driveway D
Driveway E
90 445
Waterways Blvd
30 90
Independence Dr
SW 11th St.
45 45
45 45 1,865
60 60
1,635 60
1,910 1,695
150 125
SW 30th Ave
65 220
SW 28th Ave
190
SW 24

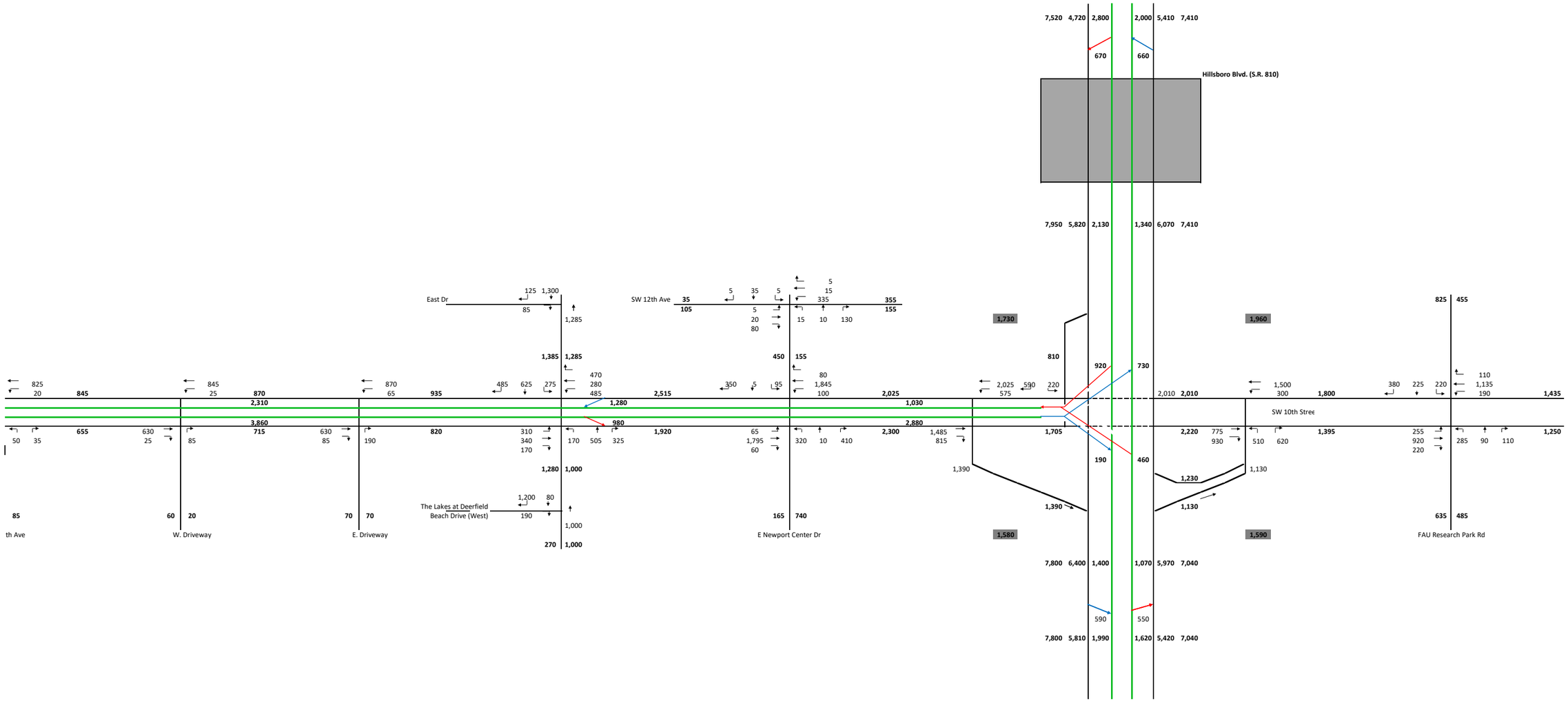
Appendix C


Hillsboro Blvd. (S.R. 810)
SW 10th Stree
East Dr
SW 12th Ave
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

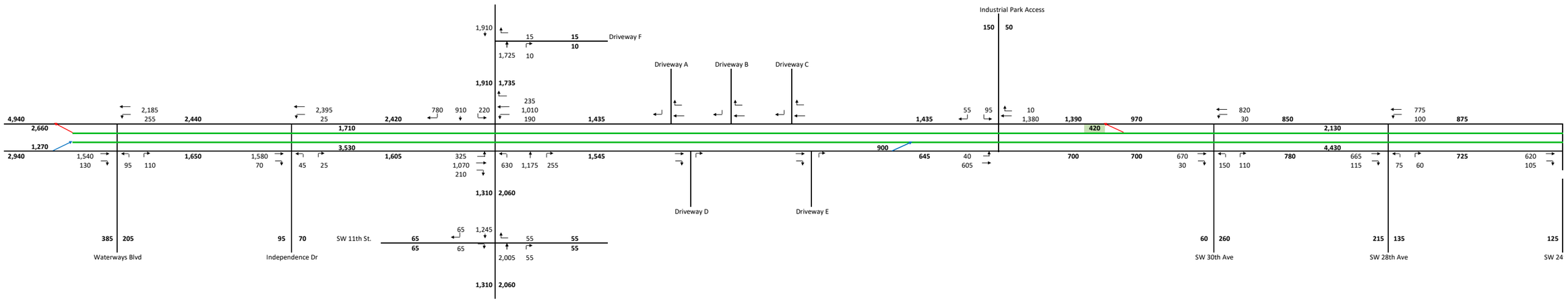
Appendix C


Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

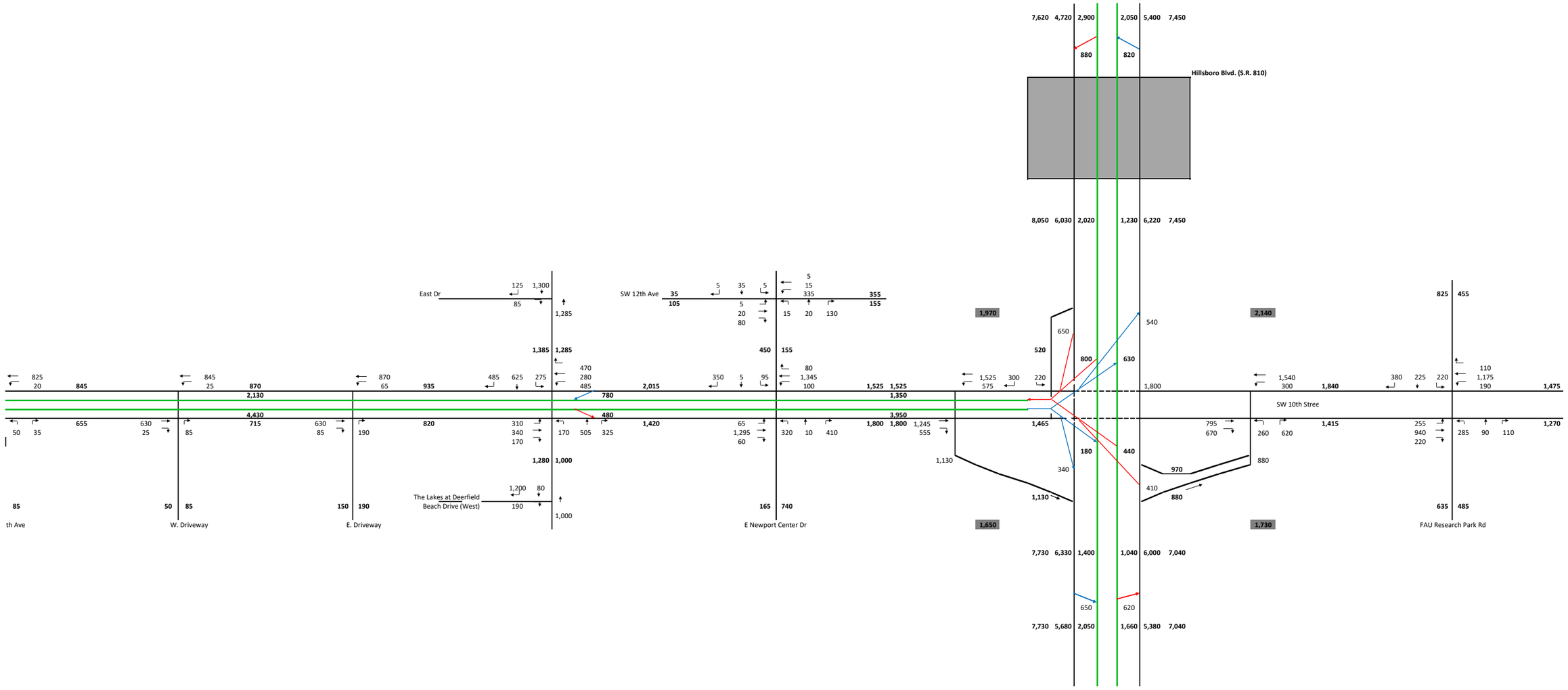
Appendix C


Hillsboro Blvd. (S.R. 810)
East Dr
SW 12th Ave
SW 10th Stree
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

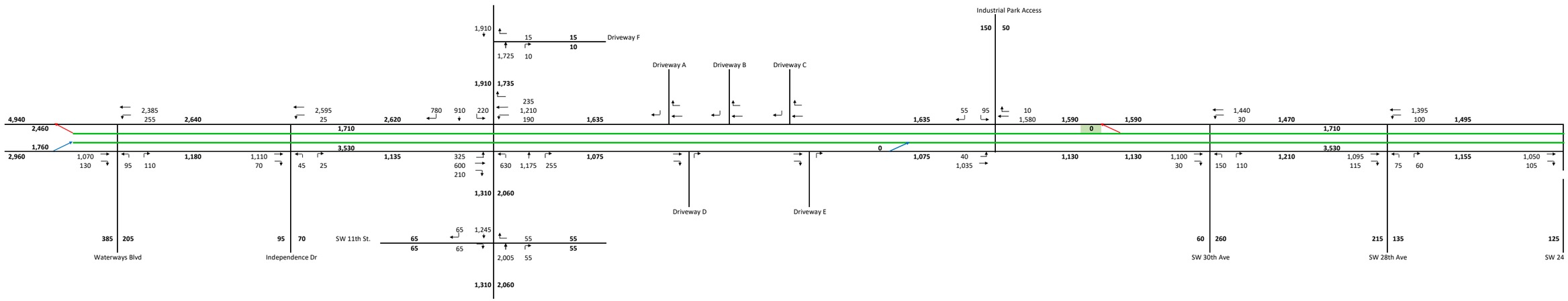
Appendix C


Industrial Park Access
Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

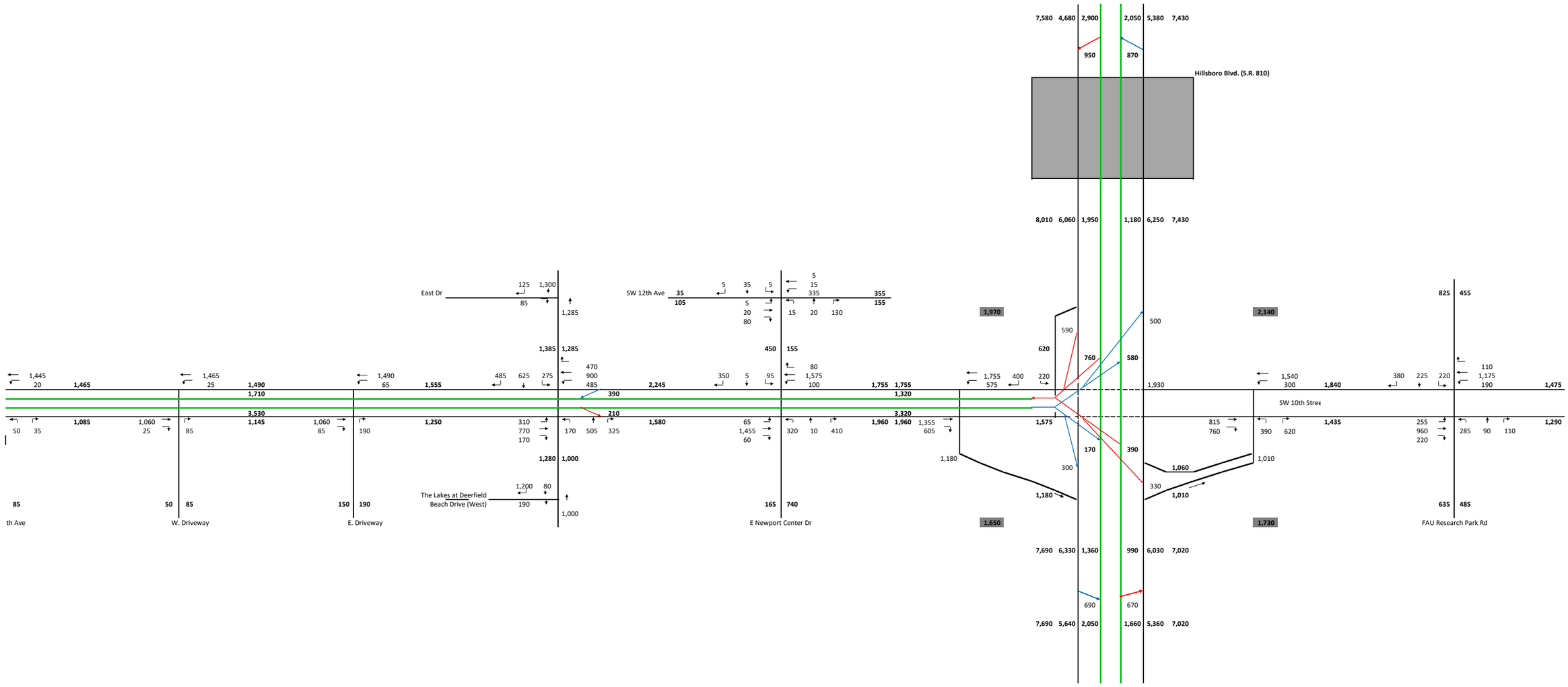
Appendix C


Hillsboro Blvd. (S.R. 810)
East Dr
SW 12th Ave
SW 10th Stree
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

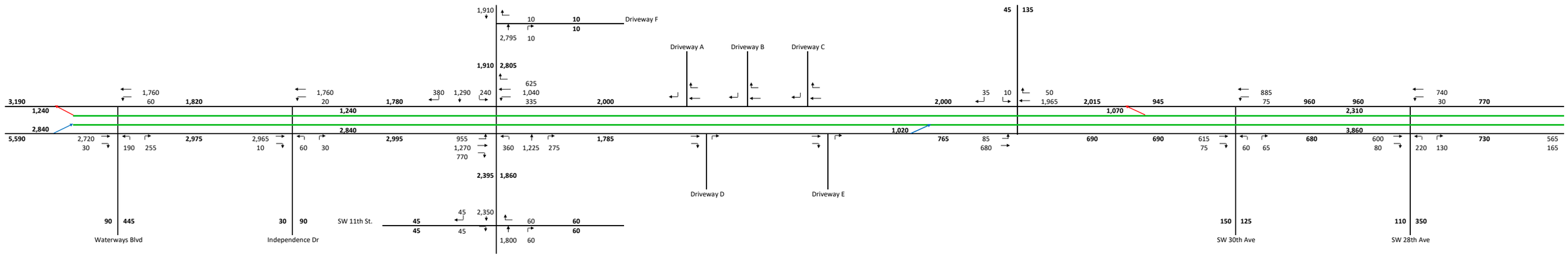
Appendix C


Industrial Park Access
Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

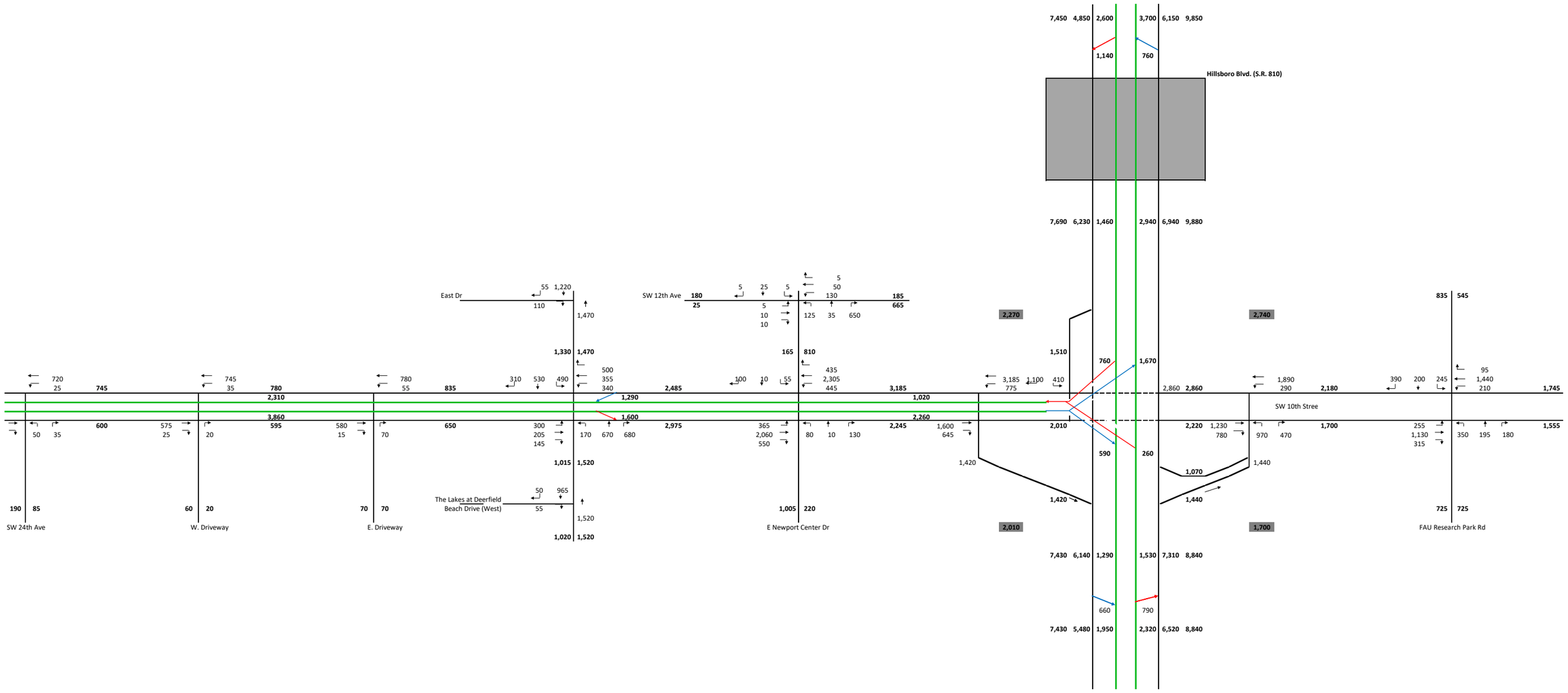
Appendix C


Hillsboro Blvd. (S.R. 810)
SW 10th Stree
East Dr
SW 12th Ave
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

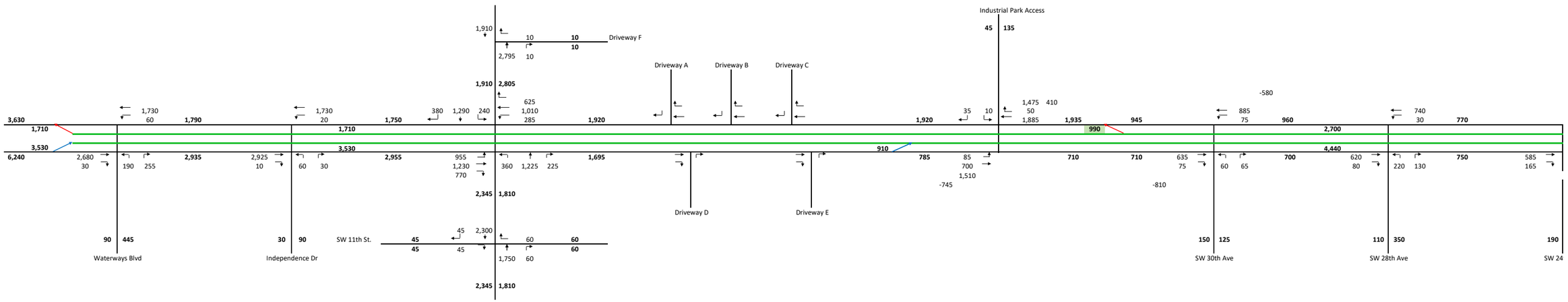
Appendix C


Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave

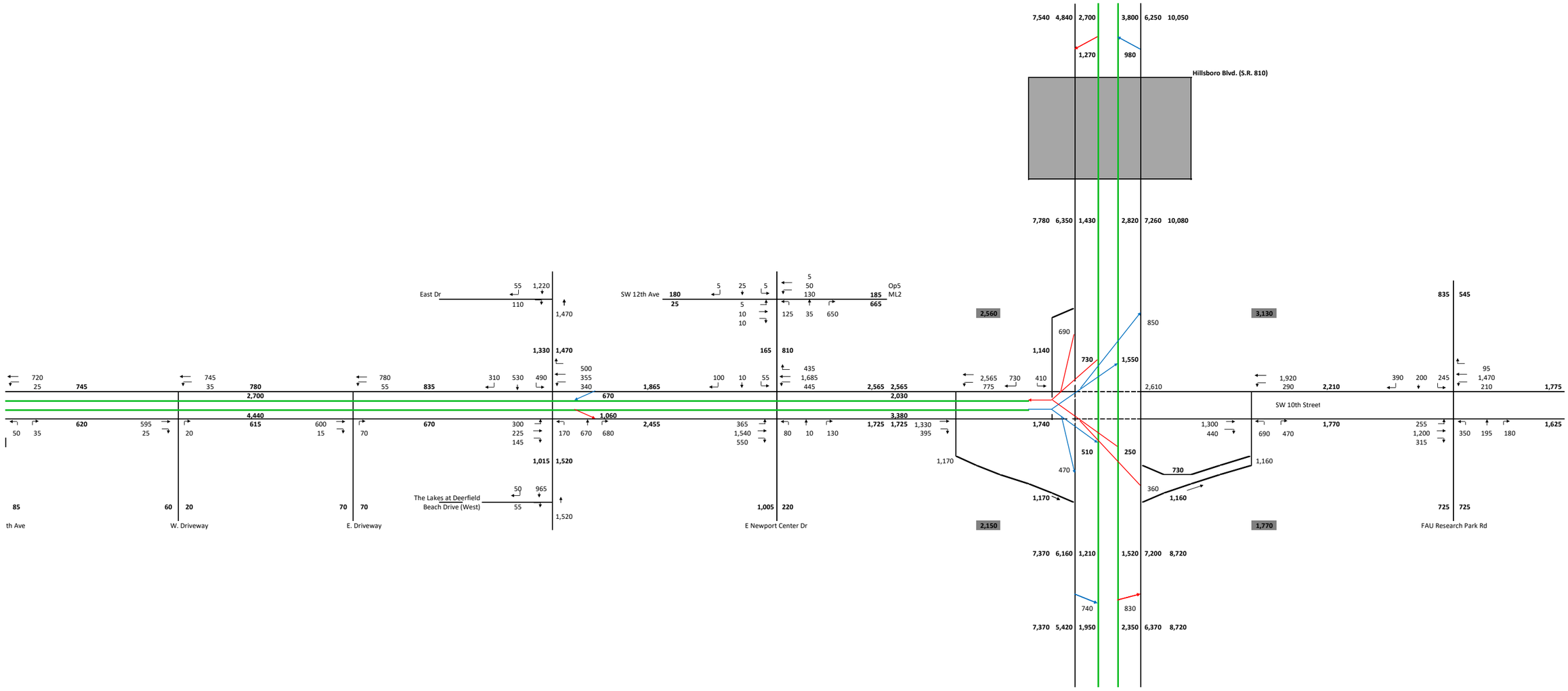
Appendix C


Hillsboro Blvd. (S.R. 810)
East Dr
SW 12th Ave
The Lakes at Deerfield Beach Drive (West)
SW 24th Ave
W. Driveway
E. Driveway
E Newport Center Dr
SW 10th Stree
FAU Research Park Rd

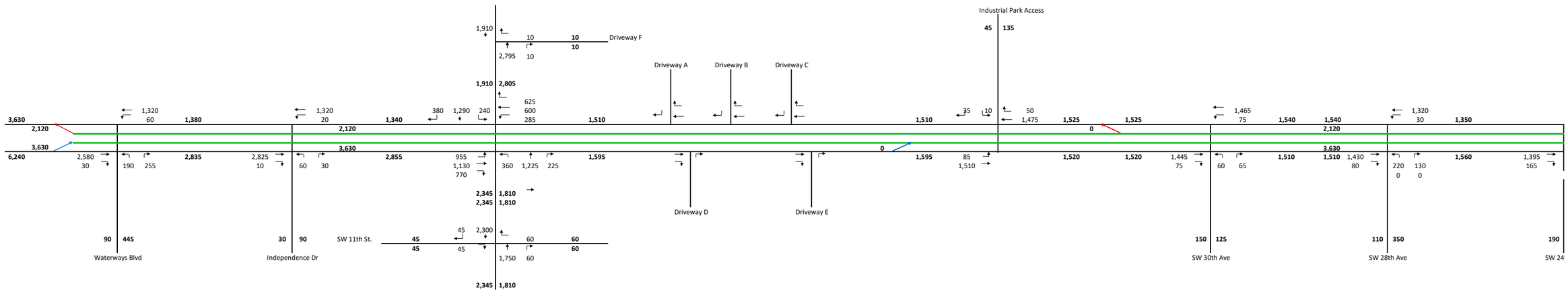
Appendix C


Industrial Park Access
Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

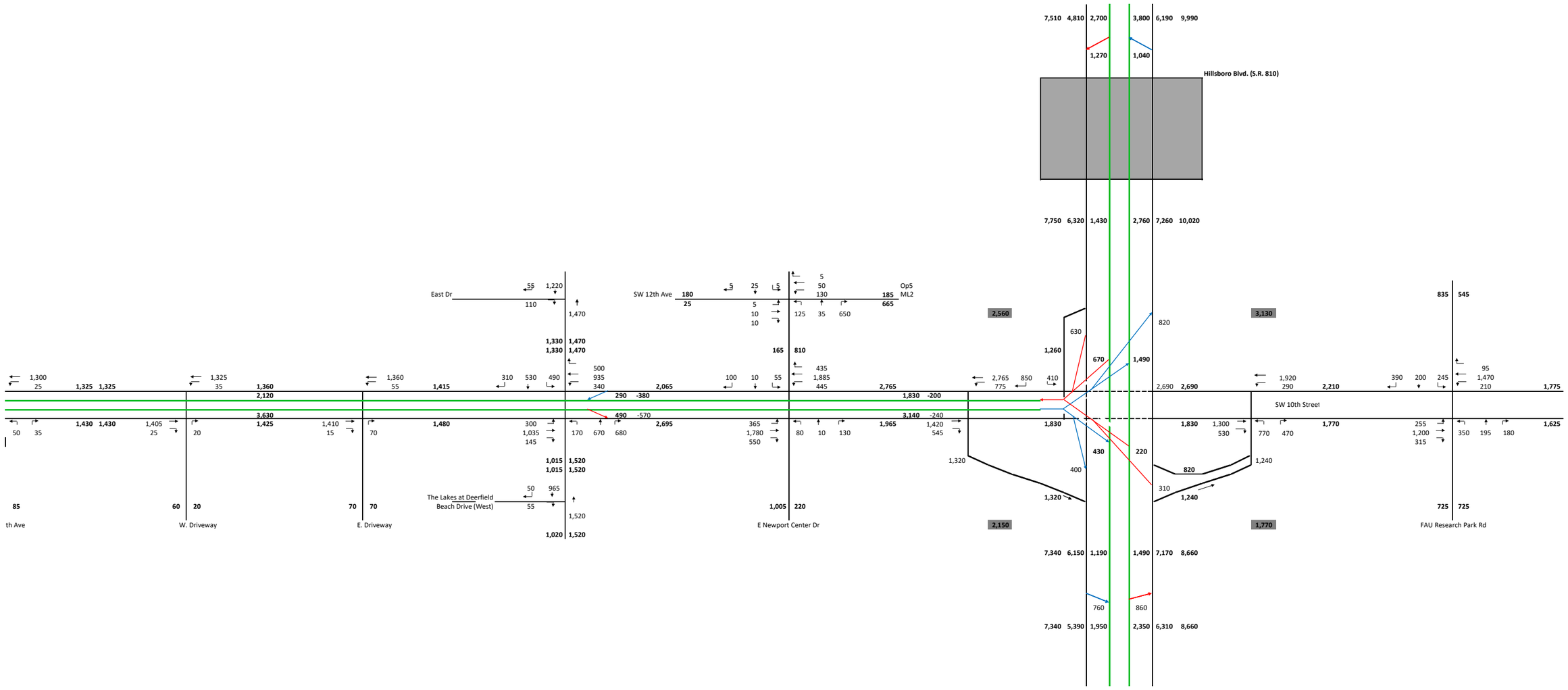
Appendix C


Hillsboro Blvd. (S.R. 810)
SW 10th Street
East Dr
SW 12th Ave
Op5
ML2
th Ave
W. Driveway
E. Driveway
The Lakes at Deerfield Beach Drive (West)
E Newport Center Dr
FAU Research Park Rd

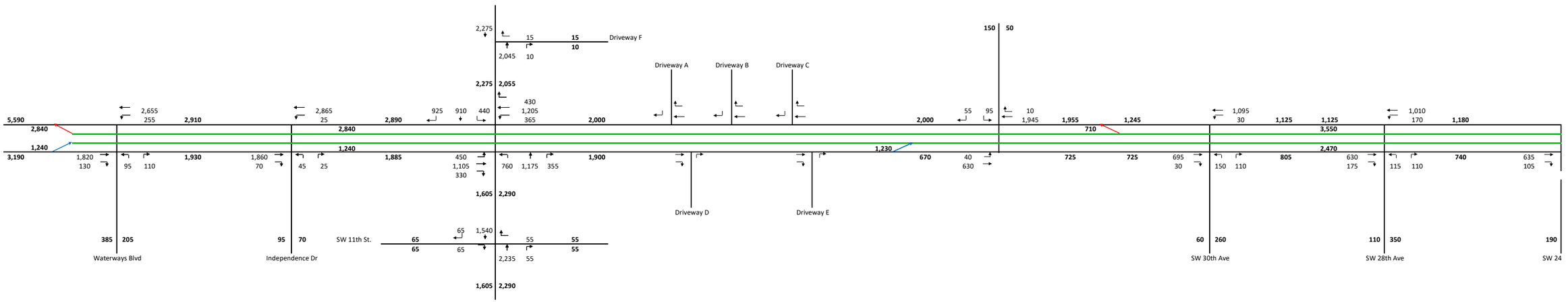
Appendix C


Industrial Park Access
45 135
1,910
10 10 Driveway F
2,795 10
1,910 2,805
Driveway A
Driveway B
Driveway C
625
600
285
3,630
2,120
3,630
6,240
1,320 60
1,380
1,320 20
380 1,290 240
1,340
2,120
3,630
2,855
955
1,130
770
1,510
1,595
35 10
50
1,475
1,525
1,525
0
2,120
3,630
1,520
1,520
1,445
75
1,465
75
1,540
1,540
1,320
30
1,350
1,510
1,510
1,430
80
1,560
1,395
165
2,580
30
190 255
2,835
2,825
10
60 30
360 1,225 225
1,595
85
1,510
60 65
220 130
0 0
2,345 1,810
2,345 1,810
Driveway D
Driveway E
90 445
30 90
SW 11th St.
45 45
45 45
2,300
60 60
60 60
150 125
110 350
190
Waterways Blvd
Independence Dr
1,750 60
SW 30th Ave
SW 28th Ave
SW 24
2,345 1,810

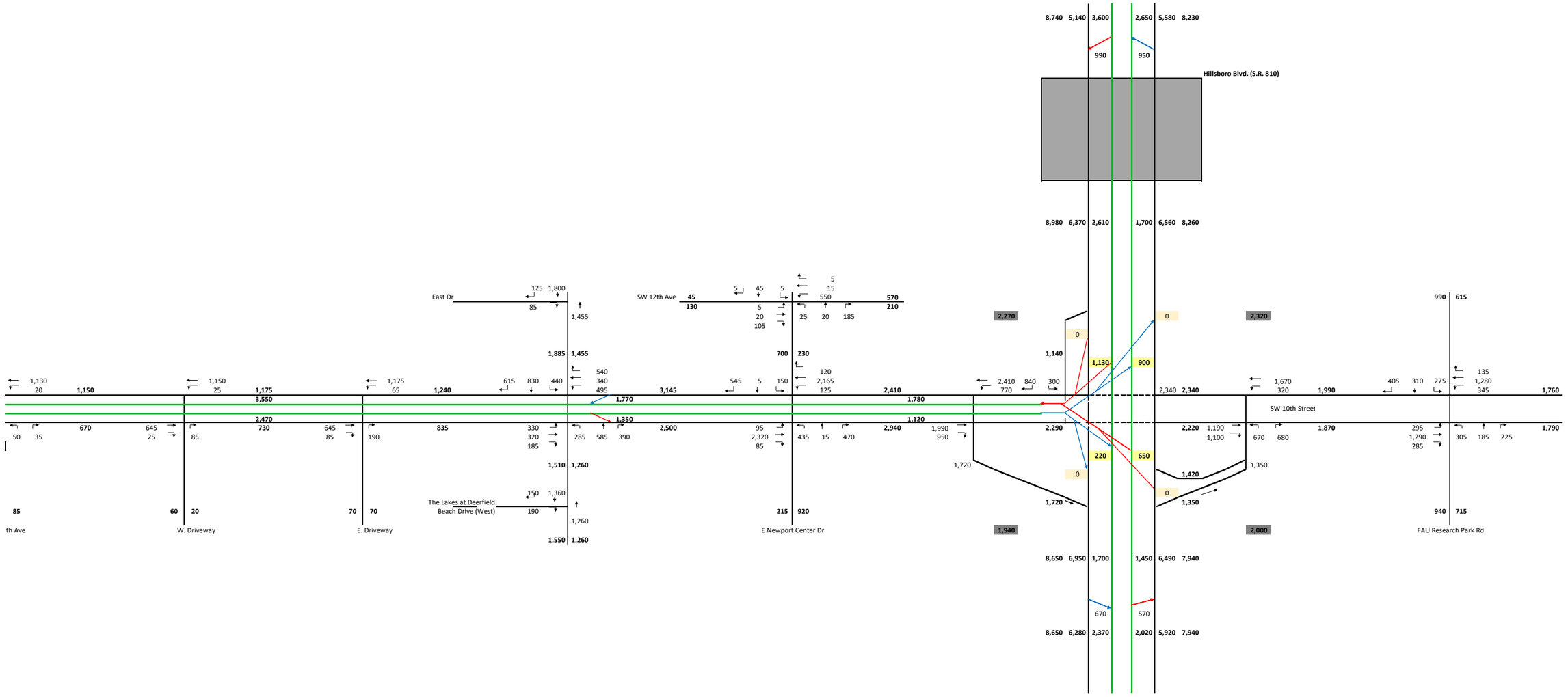
Appendix C


Hillsboro Blvd. (S.R. 810)
SW 10th Street
East Dr
SW 12th Ave
Op5
ML2
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

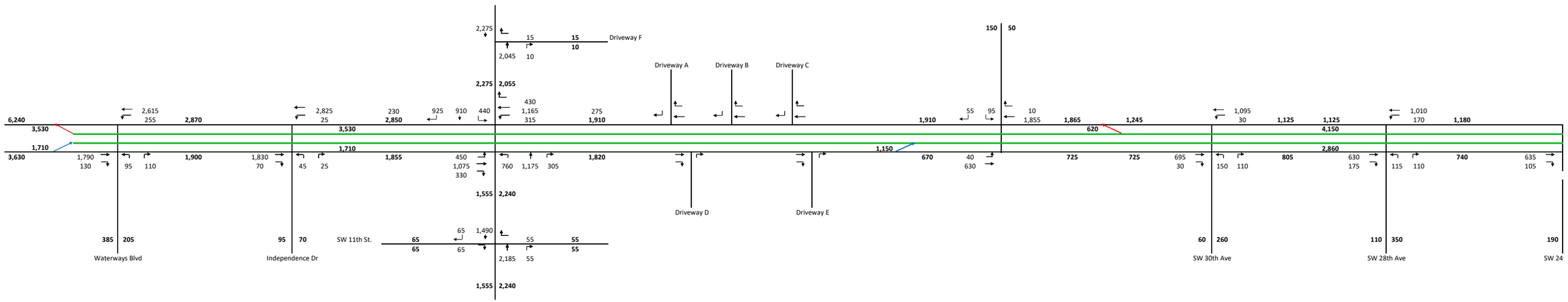
Appendix C


Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

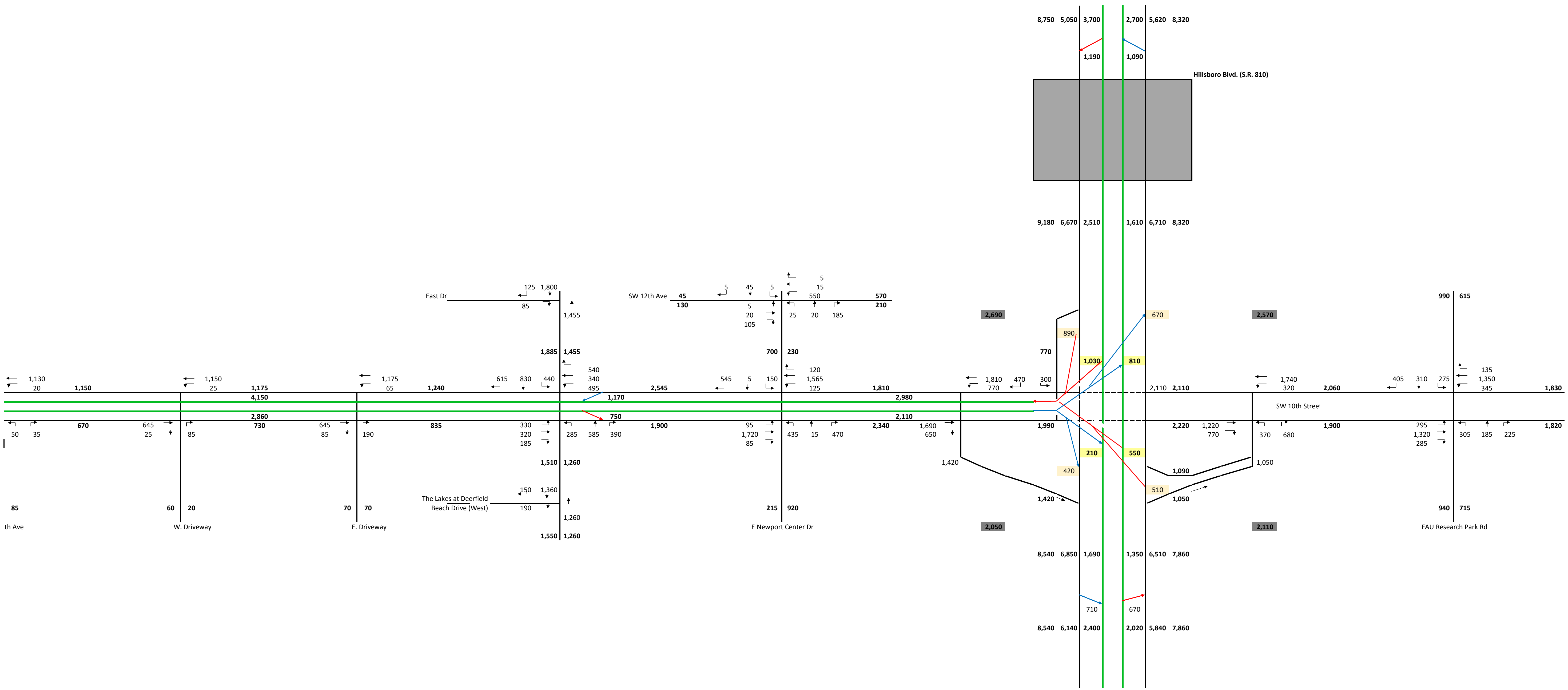
Appendix C


Hillsboro Blvd. (S.R. 810)
SW 10th Street
East Dr
SW 12th Ave
The Lakes at Deerfield Beach Drive (West)
th Ave
W. Driveway
E. Driveway
E Newport Center Dr
FAU Research Park Rd

Appendix C

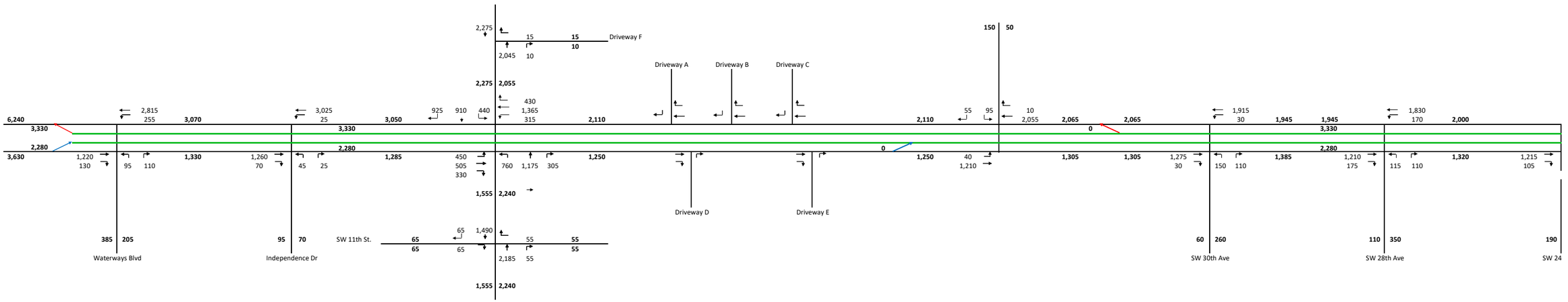

Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

Appendix C

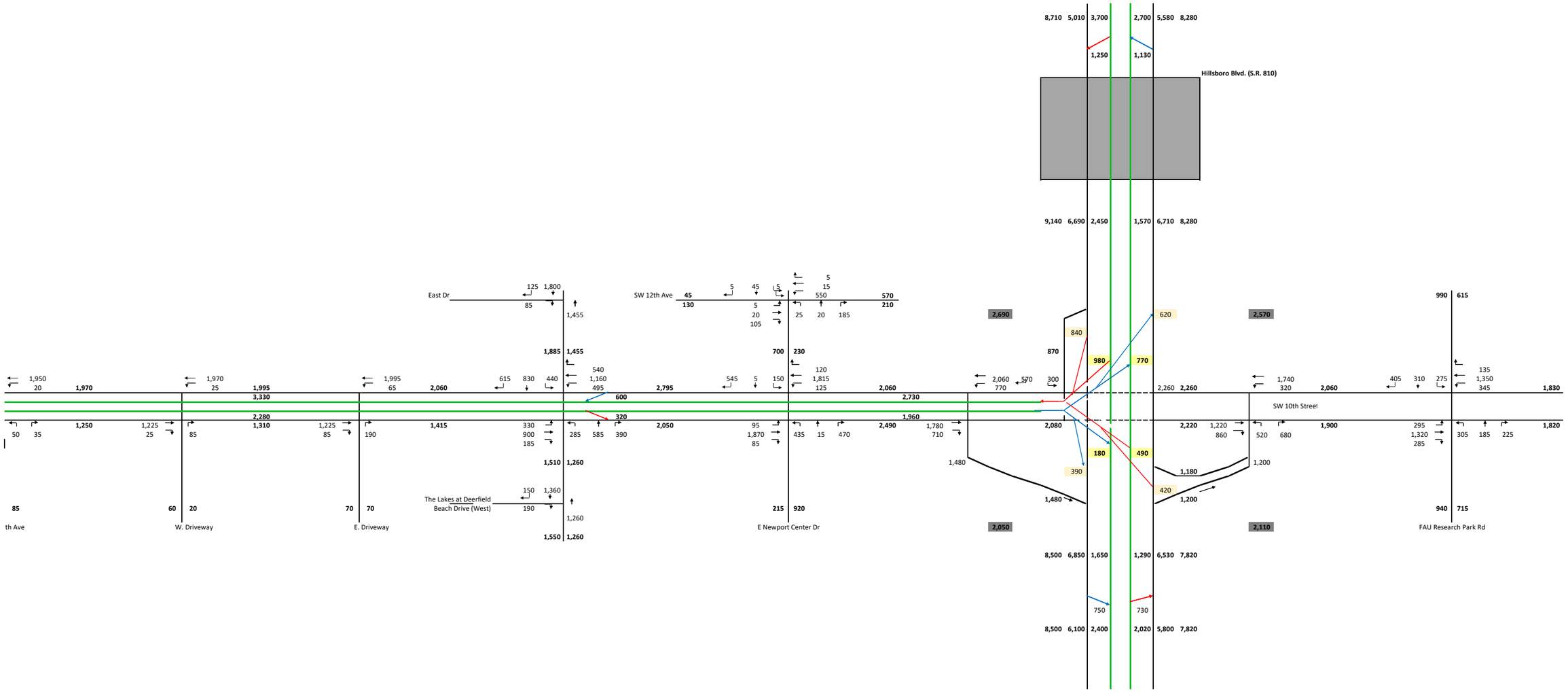


2040 A2 PM DDHV

Appendix C


Driveway F
Driveway A
Driveway B
Driveway C
Driveway D
Driveway E
SW 11th St.
Waterways Blvd
Independence Dr
SW 30th Ave
SW 28th Ave
SW 24

Appendix C

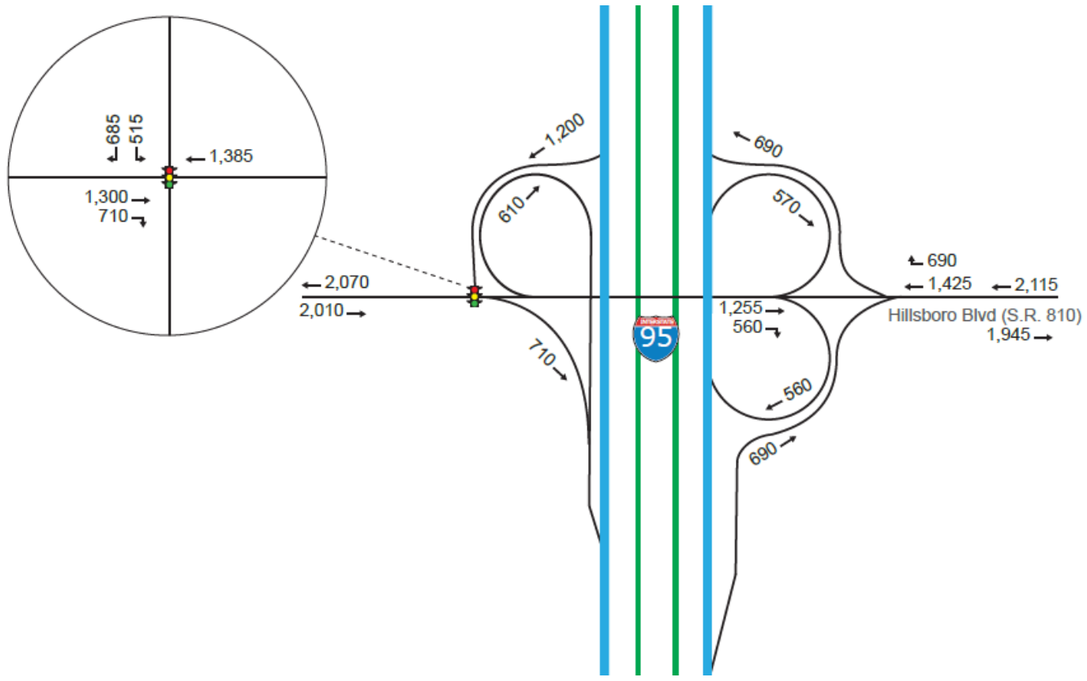


2040 C2 PM DDHV

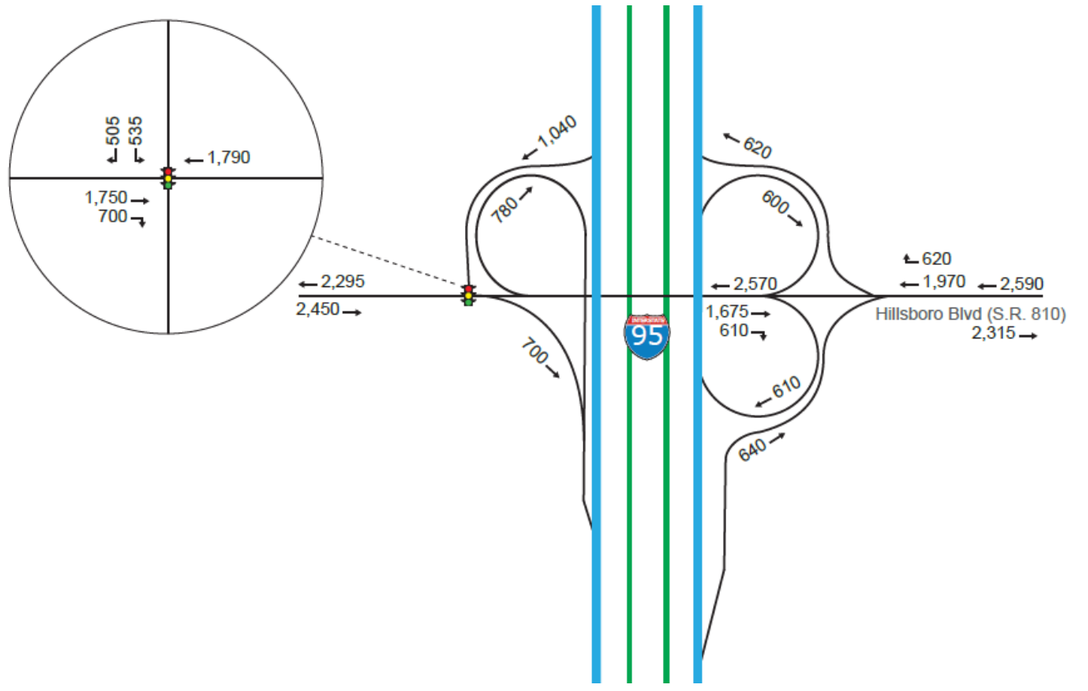
Appendix I

Base PD&E Concept, A2, and C2 – 2020 DDHVs Turns
Hillsboro Blvd and I-95 (S.R. 9)

2020 AM Build DDHV's

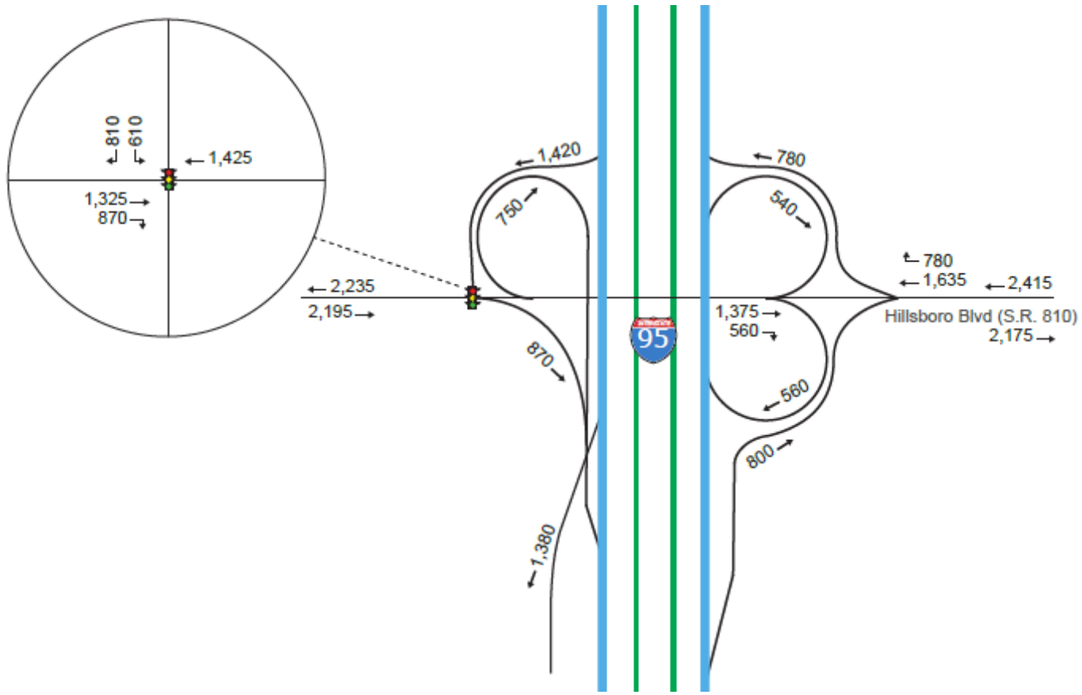


2020 PM Build DDHV's

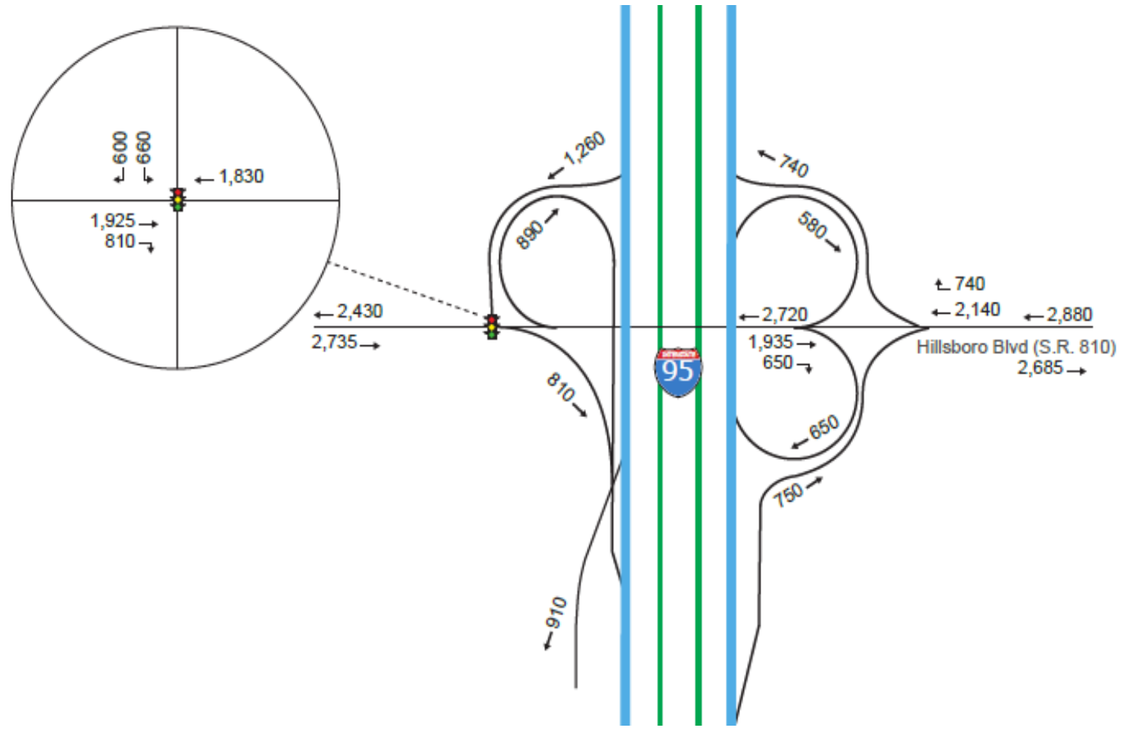


Base PD&E Concept, A2, and C2 – 2040 DDHVs Turns
Hillsboro Blvd and I-95 (S.R. 9)

2040 AM Build DDHV's

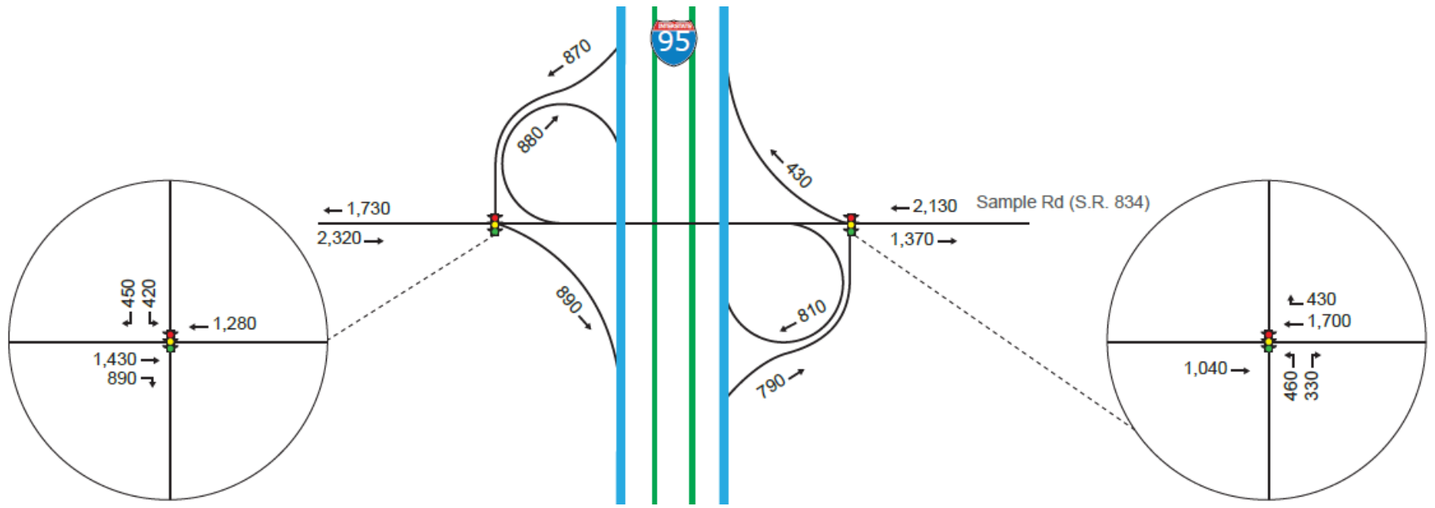


2040 PM Build DDHV's

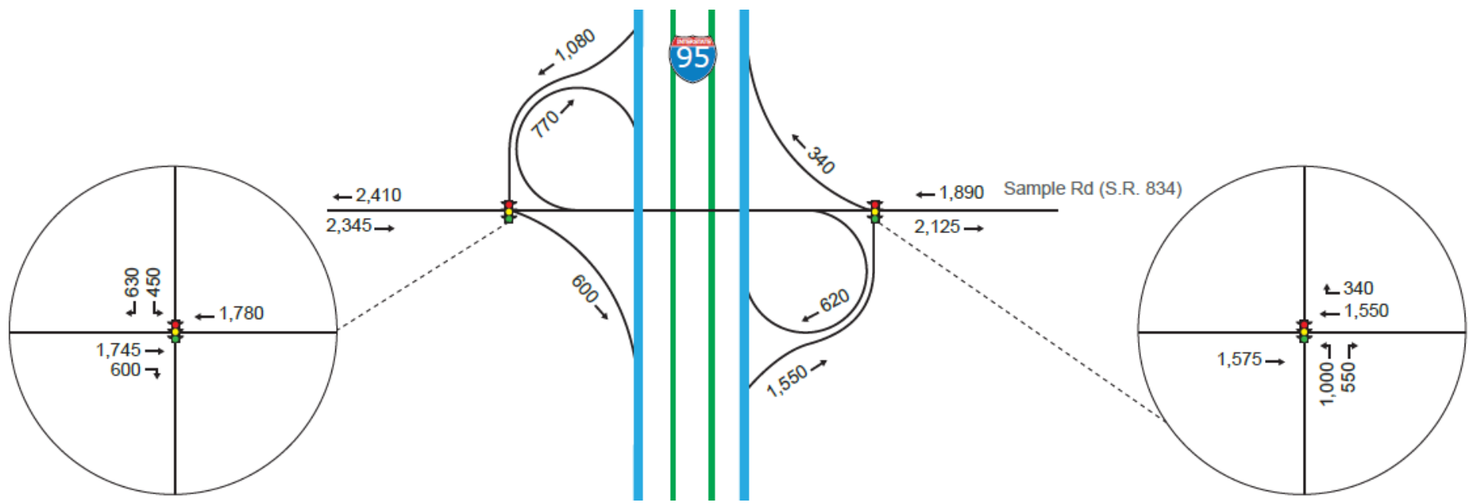


Base PD&E Concept, A2, and C2 – 2020 DDHVs Turns
Sample Rd and I-95 (S.R. 9)

2020 AM Build DDHV's

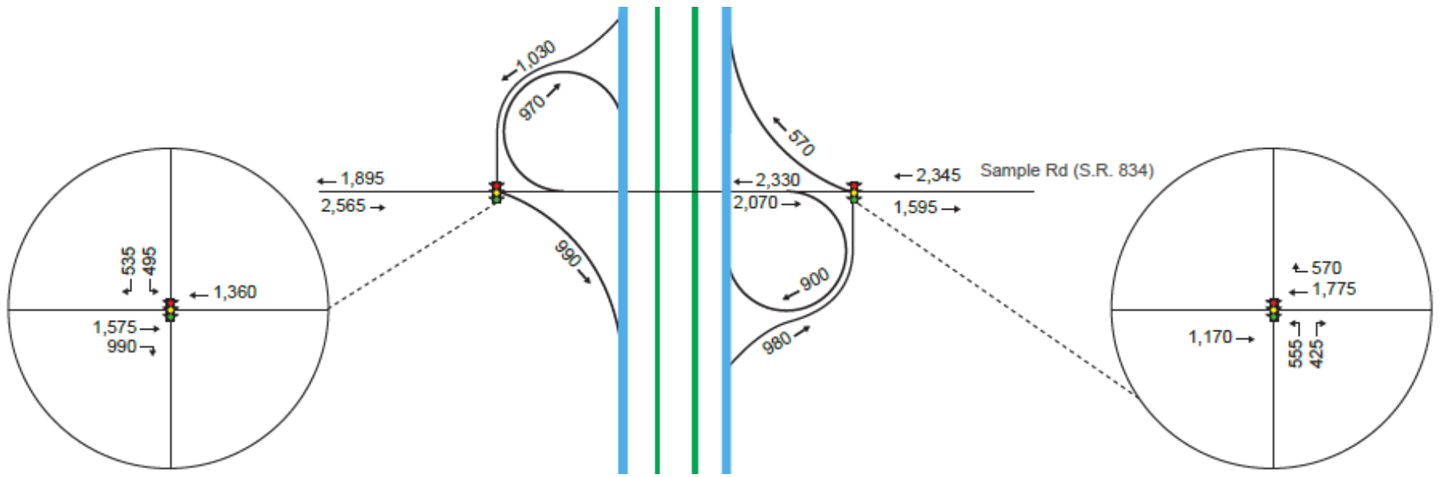


2020 PM Build DDHV's

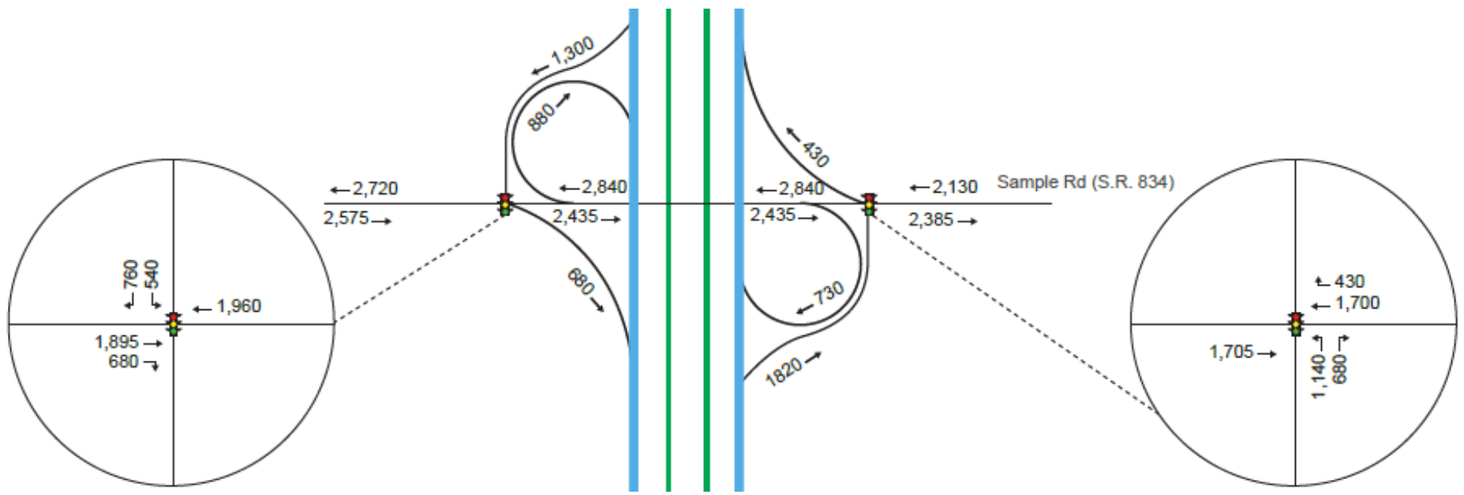


Base PD&E Concept, A2, and C2 – 2040 DDHVs Turns
Sample Rd and I-95 (S.R. 9)

2040 AM Build DDHV's

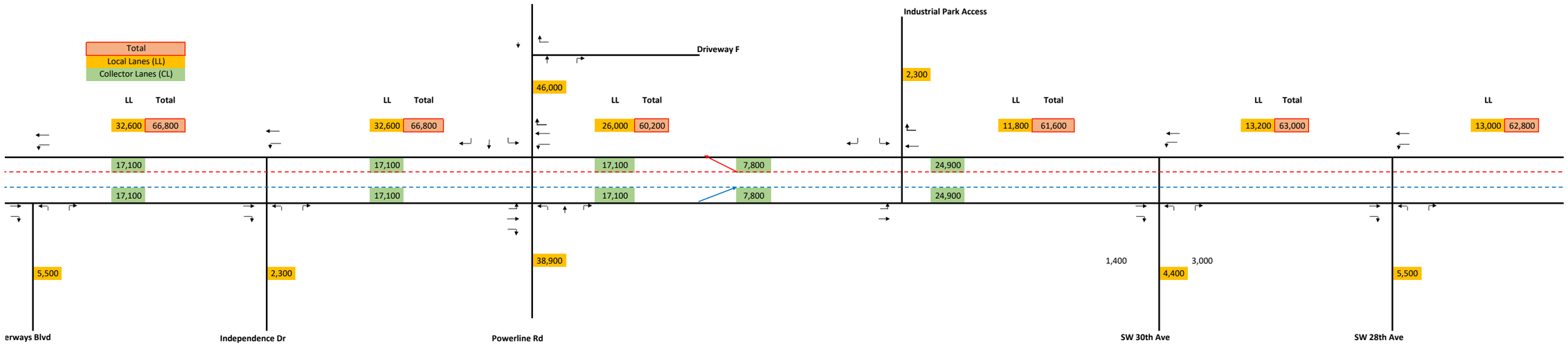


2040 PM Build DDHV's

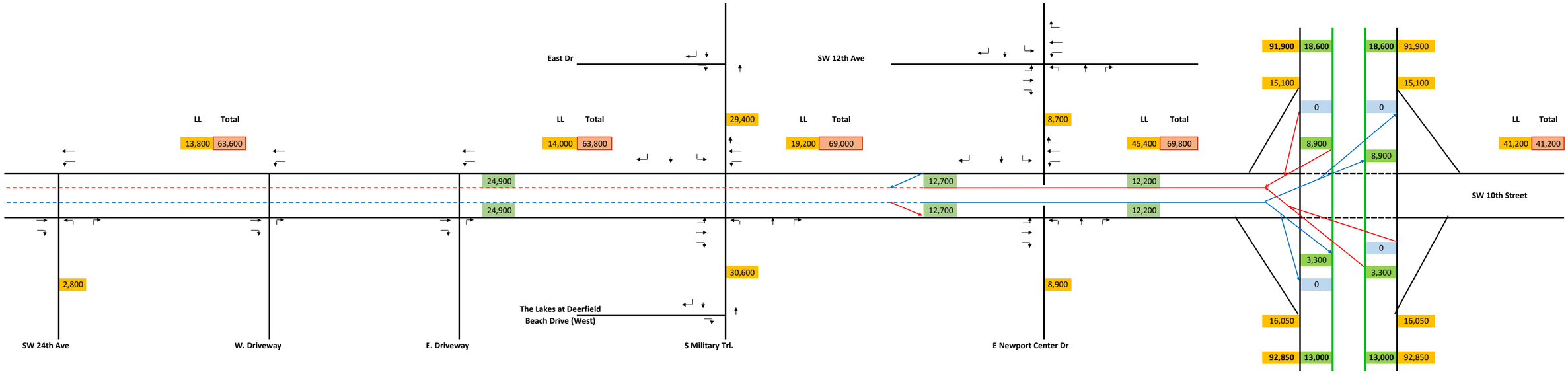


APPENDIX D

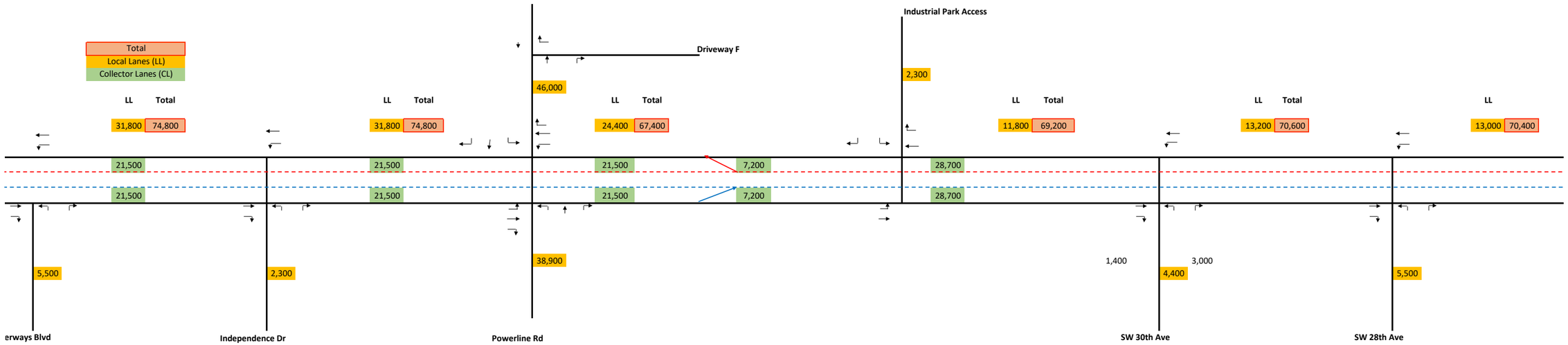
Appendix D


Total
Local Lanes (LL)
Collector Lanes (CL)
LL
Total
32,600
66,800
17,100
17,100
5,500
erways Blvd
32,600
66,800
17,100
17,100
2,300
Independence Dr
46,000
Driveway F
26,000
60,200
17,100
17,100
38,900
Powerline Rd
7,800
7,800
Industrial Park Access
2,300
11,800
61,600
24,900
24,900
1,400
3,000
13,200
63,000
4,400
SW 30th Ave
13,000
62,800
5,500
SW 28th Ave

Appendix D


East Dr
SW 12th Ave
LL Total
13,800 63,600
14,000 63,800
29,400
19,200 69,000
8,700
45,400 69,800
91,900 18,600
18,600 91,900
15,100
15,100
0
0
8,900
8,900
41,200 41,200
24,900
24,900
12,700
12,700
12,200
12,200
SW 10th Street
0
3,300
3,300
0
2,800
30,600
8,900
16,050
16,050
92,850 13,000
13,000 92,850
The Lakes at Deerfield
Beach Drive (West)
SW 24th Ave
W. Driveway
E. Driveway
S Military Trl.
E Newport Center Dr

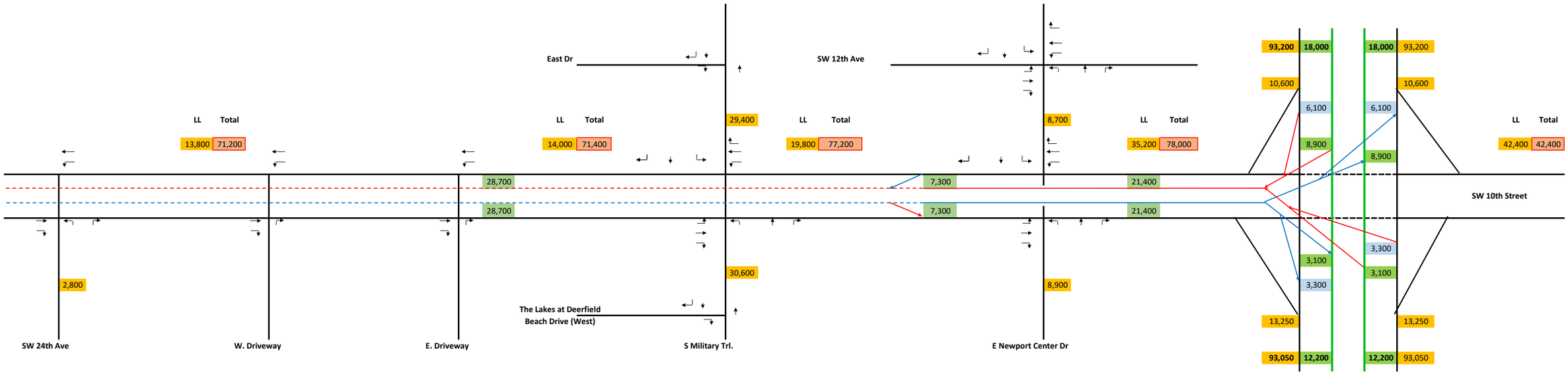
Appendix D



2020 AADT_A2

Appendix I

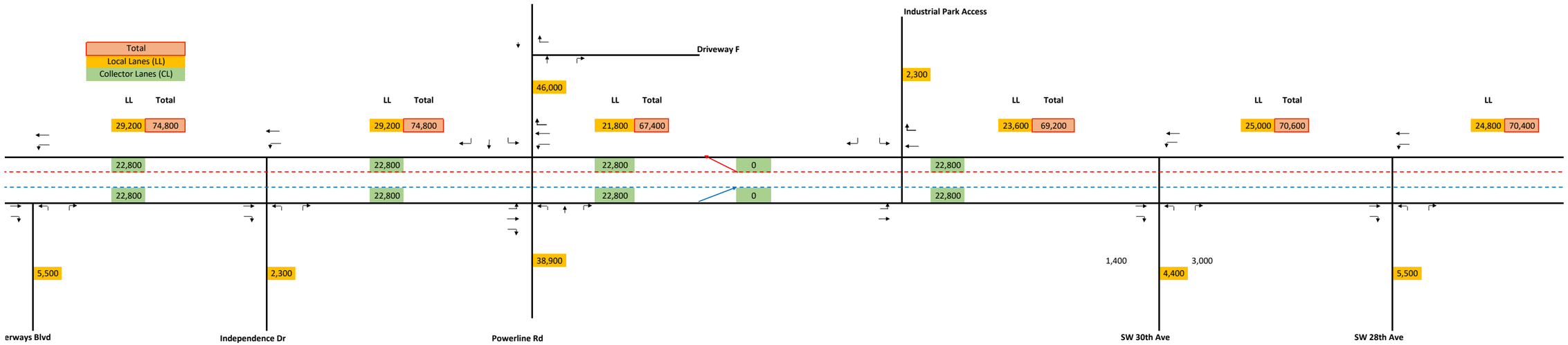
Appendix D



2020 AADT_A2

Appendix I

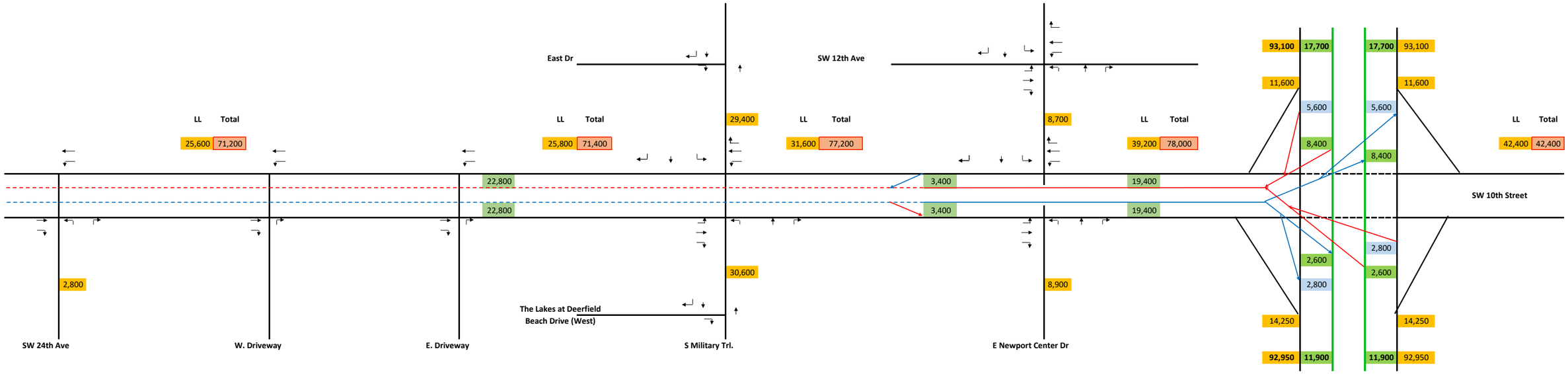
Appendix D



2020 AADT_C2

Appendix I

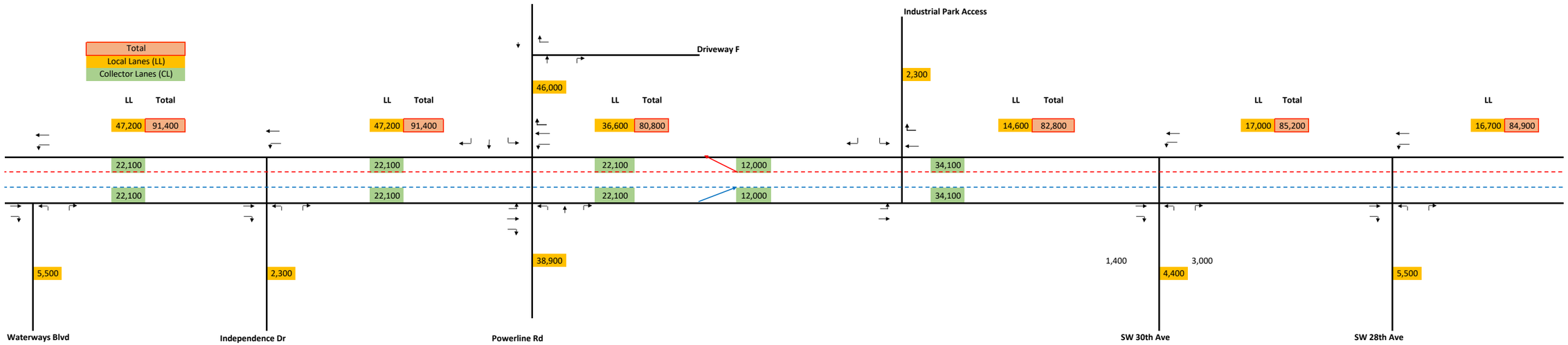
Appendix D



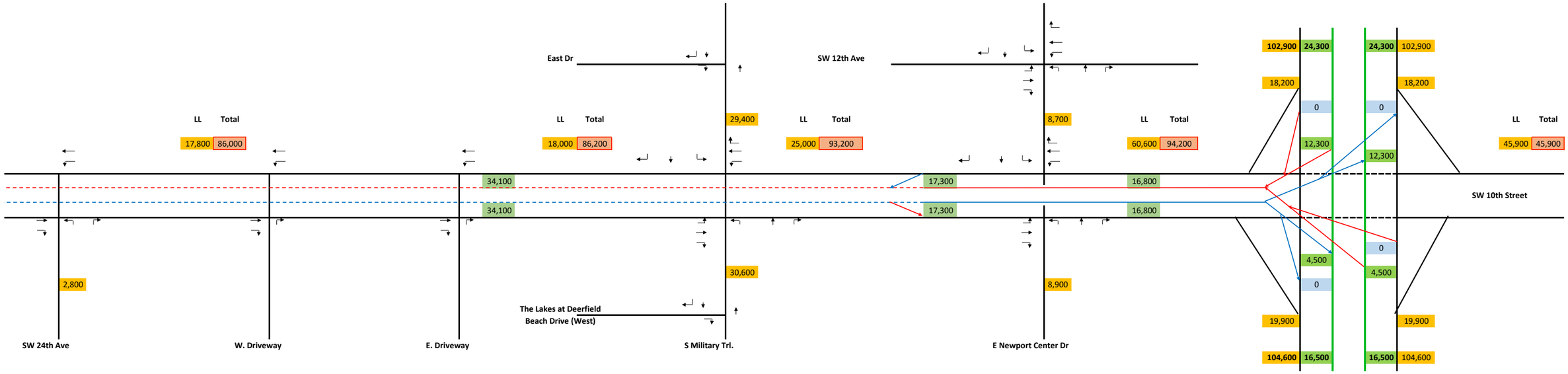
2020 AADT_C2

Appendix I

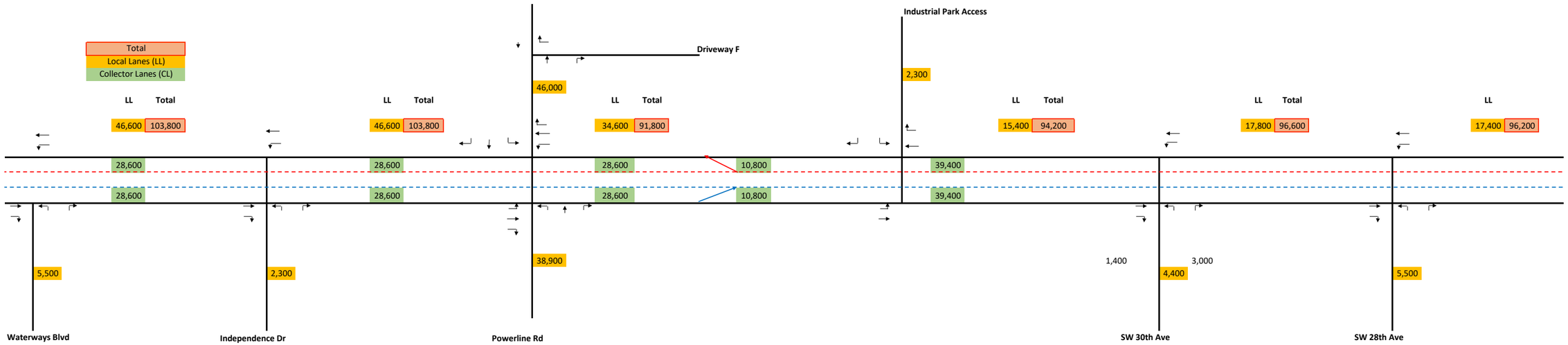
Appendix D


Total
Local Lanes (LL)
Collector Lanes (CL)
LL
Total
47,200
91,400
22,100
22,100
5,500
Waterways Blvd
47,200
91,400
22,100
22,100
2,300
Independence Dr
Driveway F
46,000
36,600
80,800
22,100
22,100
38,900
12,000
12,000
Powerline Rd
Industrial Park Access
2,300
14,600
82,800
34,100
34,100
1,400
3,000
4,400
SW 30th Ave
17,000
85,200
16,700
84,900
5,500
SW 28th Ave

Appendix D


East Dr
SW 12th Ave
LL Total
17,800 86,000
LL Total
18,000 86,200
29,400
LL Total
25,000 93,200
8,700
LL Total
60,600 94,200
LL Total
45,900 45,900
102,900 24,300
24,300 102,900
18,200
18,200
0
0
12,300
12,300
SW 10th Street
34,100
34,100
17,300
17,300
16,800
16,800
0
4,500
4,500
0
2,800
30,600
8,900
19,900
19,900
104,600 16,500
16,500 104,600
The Lakes at Deerfield
Beach Drive (West)
SW 24th Ave
W. Driveway
E. Driveway
S Military Trl.
E Newport Center Dr

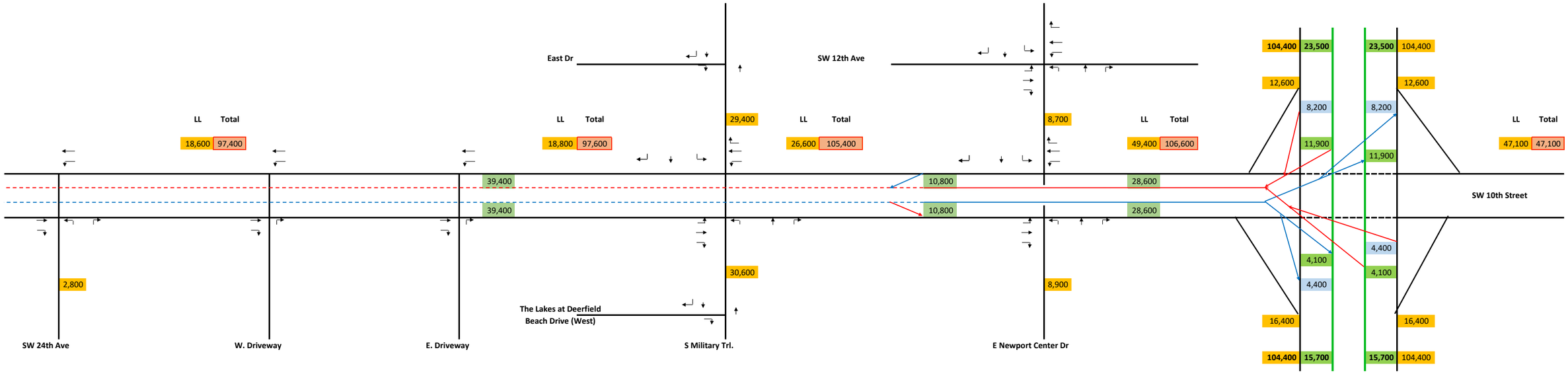
Appendix D



2040 AADT_A2

Appendix I

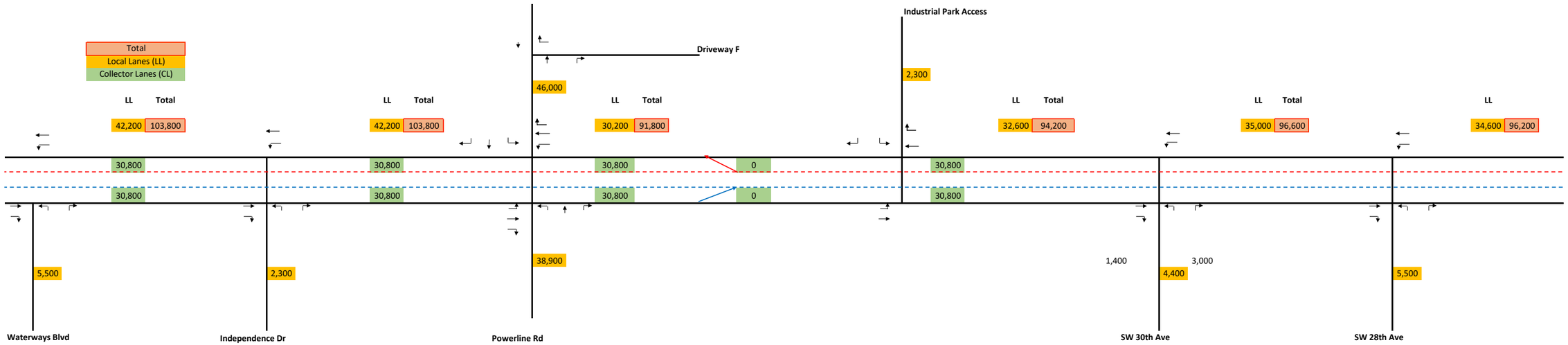
Appendix D



2040 AADT_A2

Appendix I

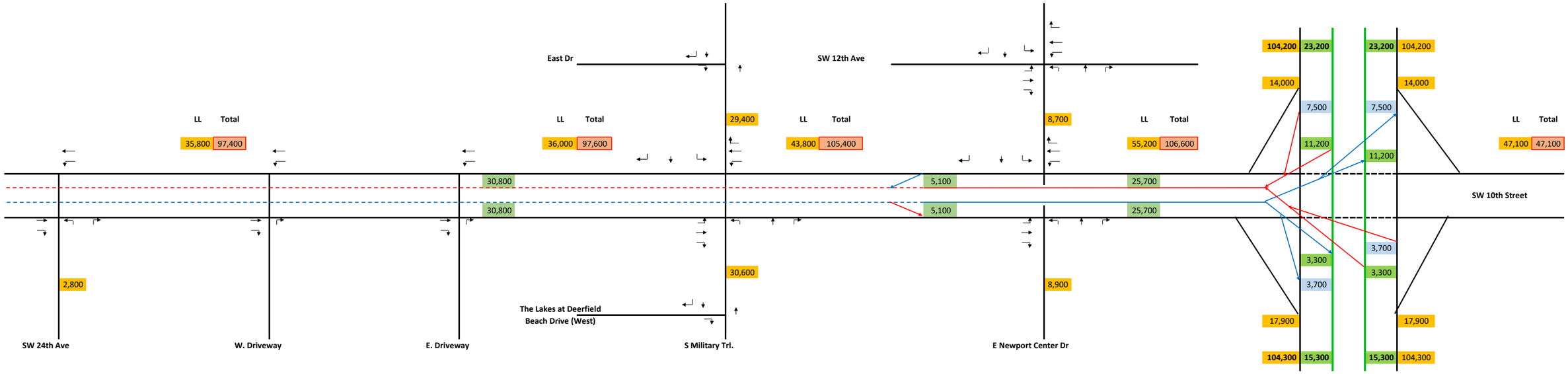
Appendix D



2040 AADT_C2

Appendix I

Appendix D



2040 AADT_C2

Appendix I

APPENDIX I

SW 10th Street at I-95 – Alternatives Analysis Memorandum

AECOM

MEMORANDUM

Date: June 29, 2018

To: Hui Zhao, P.E., FDOT D4
Cesar Martinez, P.E., FDOT D4

From: Pramod Choudhary, P.E., PTOE, AECOM
Andrew Velasquez, P.E., PTOE, AECOM/Florida's Turnpike

Copies: Anson Sonnet, P.E., FDOT D4
Vilma Croft, P.E., HNTB
Lisa Dykstra, P.E., RS&H

Subject: SW 10th Street at I-95 – Alternatives Analysis Memorandum

FPID(s): 436964-1 and 439891-1

State Road: SW 10th Street (S.R. 869)

County: Broward

INTRODUCTION

The purpose of this memorandum is to document the various alternatives that were developed and analyzed for the I-95 and SW 10th Street PD&E Study (FPID 436964-1) and the SW 10th Street Connector PD&E Study (FPID 439891-1). Traffic evaluation was conducted for two different Build Alternatives (a depressed Center Alignment and a depressed Northern Alignment for the proposed managed lanes), with six different managed lanes ingress and egress configurations resulting in a total of twelve (12) Build Alternatives. In addition, 2016 Existing Conditions, 2040 No-Build Conditions, and 2040 Partial Build Conditions were also evaluated.

The fifteen scenarios (existing 2016 conditions, 2040 No-Build conditions, 2040 Partial Build conditions, and twelve 2040 Build Concept conditions) were first analyzed by conducting a Tier 1 volume to capacity ratio analysis of the SW 10th Street local lanes and proposed managed lanes. In addition, the vehicle-miles traveled in the managed lanes during the peak hours for each of the twelve Build Concepts were calculated and compared. Subsequently, a Tier 2 intersection operations analysis was completed for the signalized intersections along SW 10th Street. A Tier 2 freeway analysis of the proposed managed lanes connecting the Sawgrass, Florida's Turnpike and I-95 was also completed. The peak hour traffic operations analysis results were reviewed to screen the twelve Build Concepts for any traffic operations fatal flaws, and the comparison of results was used to identify the most advantageous Build Concepts to be considered further.

Overall, Tier 1 and Tier 2 analyses resulted in the selection of the North Build Alternative 3D-1.3 and the Center Build Alternative 3D-1.3 as the top ranked alternatives. Please refer to the *Traffic Analysis Technical Memorandum* dated May 4, 2018 and prepared by RS&H. VISSIM microsimulation was conducted to further evaluate these two shortlisted alternatives. The North Build Alternative 3D-1.3 was found to provide better operating conditions than the Center Build Alternative. Hence, the North Build Alternative 3D-1.3 was operationally considered as the best Build Alternative and was further refined to improve the overall operations. One of the refinements was to modify the Newport Drive intersection to eliminate the northbound and southbound through and left-turn movements from the intersection and convert the unsignalized intersection of SW 12th Avenue and Newport Drive into a roundabout.

The documentation provided herein includes the lane geometry, traffic volumes, and intersection analysis for the No-Build, Partial Build and Build 3D-1.3 alternatives along SW 10th Street from Military Trail to FAU Research Boulevard. In addition, VISSIM traffic simulation results of the shortlisted alternatives have also been included to help in the determination of the operationally best alternative.

LANE GEOMETRY

Figures 1 through **3** provide the lane geometry for the future year alternatives described below:

No-Build Alternative - This alternative assumes future capacity with the Turnpike Mainline widening, 95 Express Phase 3 Lanes and a portion of the Sawgrass Expressway Widening from Sunrise Boulevard to U.S. 441. No improvements are included along the Sawgrass Expressway from U.S. 441 to Powerline Road and along SW 10th Street. The No-Build includes the intersection improvements under construction at the SW 10th Street/I-95 interchange and Hillsboro Boulevard/I-95 interchange.

Partial Build Alternative - In addition to the No-Build improvements, the Partial-Build alternative assumes:

- Full Interchange at Turnpike Mainline/Sawgrass Expressway/SW 10th Street.
- Direct Connections to northbound and southbound 95 Express.
- Modification to the I-95 interchange ramp terminals to include additional turn lanes and a new westbound to northbound ramp.

This alternative assumes that the 95 Express direct connect ramps will extend west of Military Trail via grade-separated ramps. The full interchange at Turnpike Mainline/Sawgrass Expressway will connect to an at-grade SW 10th Street arterial west of the Powerline Road intersection. SW 10th Street also remains as a four-lane arterial between Powerline Road and Military Trail.

Build SW 10th Street Alternative 3D-1.3 North Alignment and Modified Newport Drive Intersection (North Modified) - In addition to the Partial-Build improvements, the Build alternative includes:

- Four managed lanes (2 in each direction) along SW 10th Street with grade separation at Powerline Road and Military Trail intersections.
- Managed lane ingress and egress ramps on either side of the Military Trail intersection.
- Removal of the northbound and southbound left turns at Newport Drive with additional northbound and southbound right turn lanes.
- Access from eastbound SW 12th Avenue to westbound SW 10th Street managed lanes.
- A Roundabout at the intersection of East Newport Center Drive and West Newport Center Drive.

Through coordination with the SW 10th Street Connector PD&E team, 12 Build Alternatives (3D 1.1 through 1.6 Center and North Alignments) were developed to evaluate the best potential ingress/egress combination along SW 10th Street. Build Alternatives 3D-1.3 Center and 3D-1.3 North alignments reflected the highest ranked ingress/egress combination through the tiered screening process. For simplicity, in comparing the intersection analysis results, Alternative 3D 1.3 North alignment is compared against the Partial and No-Build alternatives.

TRAFFIC FORECASTS

Figures 4 through **6** show the 2040 Directional Design Hour Volumes (DDHVs) for No-Build, Partial Build and Build 3D.1.3 alternatives. The No-Build and Partial Build alternatives were provided in the *Draft SW 10th Street Project Traffic Forecast Memorandum* (PTFM), dated January 2018. The PTFM also included the forecasts for Build Alternative 3-D 1.1. The DDHVs for Build Alternative 3D-1.3 North Modified were developed in coordination with the SW 10th Street Connector PD&E team using output from the Express Lanes Time-of-Day Model and then manually reassigning traffic to accommodate median closures or restricted movements.

NOT TO SCALE

Matchline B

East Dr

SW 12th Ave

869

Hillsboro Blvd (S.R. 810)

SW Natura Park Blvd

SW 10th St

East Driveway

West

E Newport Center Dr

FAU Research Park Blvd

The Lakes at Deerfield Beach Driveway East

Horizon Club Driveway

Sample Rd (S.R. 834)

S Military Trl

- Signal Controlled
- Stop Controlled
- Lane Direction
- Express Lane Ingress
- Express Lane Egress

NOT TO SCALE

Matchline B

East Dr

SW 12th Ave

Hillsboro Blvd (S.R. 810)

SW Natura Park Blvd

SW 10th St

FAU Research Park Blvd

East Driveway

West

The Lakes at Deerfield Beach Driveway East

E Newport Center Dr

Horizon Club Driveway

Sample Rd (S.R. 834)

S Military Trl

- Signal Controlled
- Stop Controlled
- Lane Direction
- Express Lane Ingress
- Express Lane Egress

NOT TO SCALE

Matchline B

East Dr

SW 12th Ave

869

East Driveway

West

E Newport Center Dr

The Lakes at Deerfield Beach Driveway East

Horizon Club Driveway

S Military Trl

Hillsboro Blvd (S.R. 810)

95

SW Natura Park Blvd

SW 10th St

FAU Research Park Blvd

Sample Rd (S.R. 834)

Signal Controlled
Roundabout
Stop Controlled
Lane Direction
Express Lane Ingress
Express Lane Egress

NOT TO SCALE

Matchline B

East Dr

SW 12th Ave

Hillsboro Blvd (S.R. 810)

SW Natura Park Blvd

SW 10th St

FAU Research Park Blvd

East Driveway

West

E Newport Center Dr

The Lakes at Deerfield Beach Driveway East

Horizon Club Driveway

S Military Trl

Sample Rd (S.R. 834)

	Signal Controlled
	Stop Controlled
←	Lane Direction
←	Exp Lane ingress
←	Exp Lane egress
##	Lane Volume

NOT TO SCALE

Matchline B

East Dr

SW 12th Ave

Hillsboro Blvd (S.R. 810)

SW Natura Park Blvd

SW 10th St

FAU Research Park Blvd

East Driveway

West

E Newport Center Dr

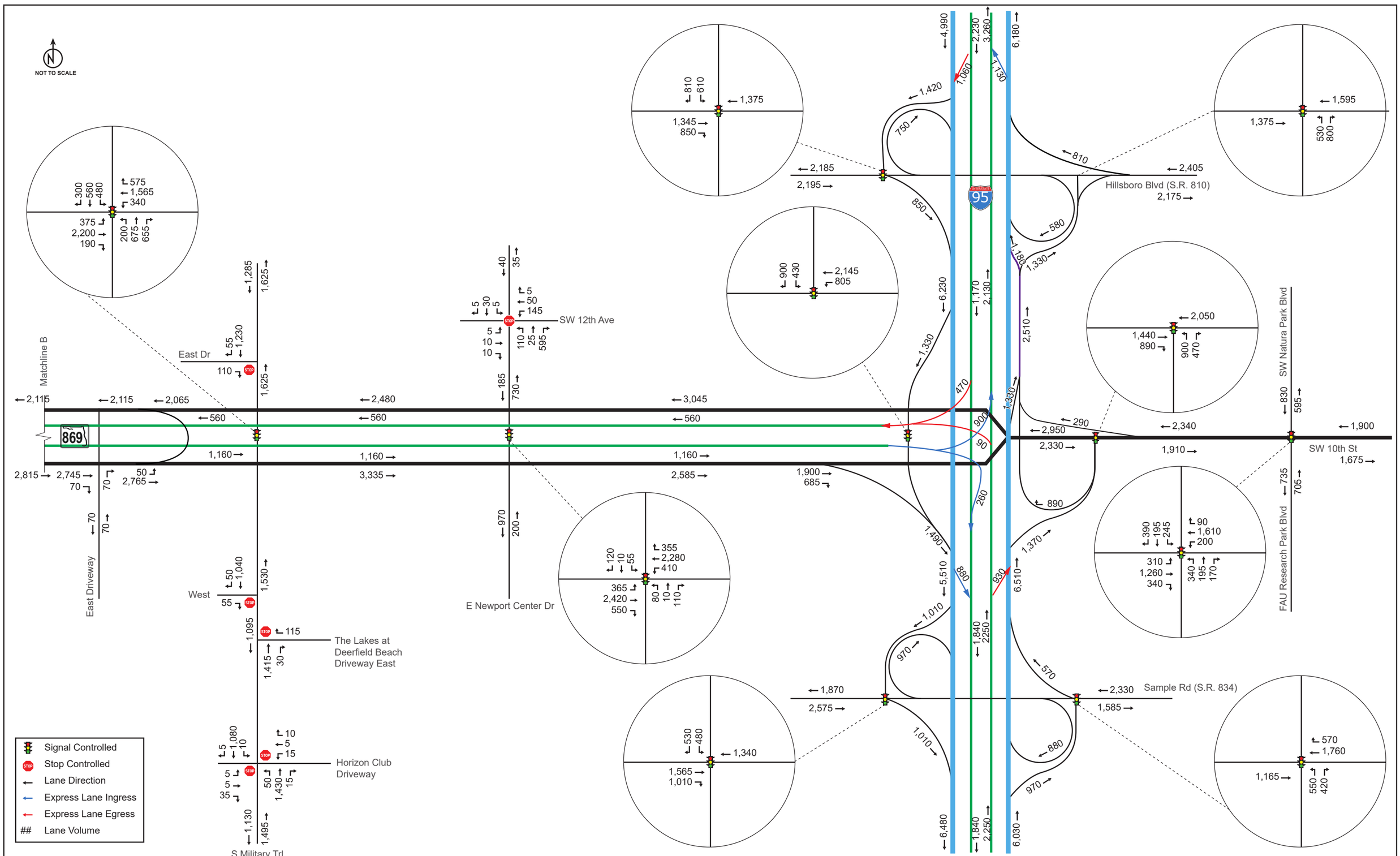
The Lakes at Deerfield Beach Driveway East

Horizon Club Driveway

S Military Trl

Sample Rd (S.R. 834)

	Signal Controlled
STOP	Stop Controlled
←	Lane Direction
←	Exp Lane ingress
←	Exp Lane egress
##	Lane Volume


NOT TO SCALE
Matchline B
East Dr
SW 12th Ave
Hillsboro Blvd (S.R. 810)
SW Natura Park Blvd
SW 10th St
FAU Research Park Blvd
East Driveway
West
E Newport Center Dr
The Lakes at Deerfield Beach Driveway East
Horizon Club Driveway
S Military Trl
Sample Rd (S.R. 834)
95
869
Signal Controlled
Stop Controlled
Lane Direction
Express Lane Ingress
Express Lane Egress
Lane Volume

NOT TO SCALE

Matchline B

East Dr

SW 12th Ave

Hillsboro Blvd (S.R. 810)

SW Natura Park Blvd

SW 10th St

East Driveway

West

E Newport Center Dr

The Lakes at Deerfield Beach Driveway East

Horizon Club Driveway

S Military Trl

Sample Rd (S.R. 834)

FAU Research Park Blvd

Signal Controlled
Stop Controlled
Lane Direction
Express Lane Ingress
Express Lane Egress
Lane Volume

NOT TO SCALE

SW 12th Ave

East Dr

Matchline B

East Driveway

West

The Lakes at Deerfield Beach Driveway East

Horizon Club Driveway

S Military Trl

E Newport Center Dr

Hillsboro Blvd (S.R. 810)

Sample Rd (S.R. 834)

SW 10th St

SW Natura Park Blvd

FAU Research Park Blvd

I-95

869

- Signal Controlled
- Roundabout
- Stop Controlled
- Lane Direction
- Express Lane Ingress
- Express Lane Egress
- ## Lane Volume

NOT TO SCALE

Matchline B

East Dr

SW 12th Ave

East Driveway

West

The Lakes at Deerfield Beach Driveway East

Horizon Club Driveway

S Military Trl

E Newport Center Dr

Hillsboro Blvd (S.R. 810)

Sample Rd (S.R. 834)

SW 10th St

SW Natura Park Blvd

FAU Research Park Blvd

I-95

869

Signal Controlled
Roundabout
Stop Controlled
Lane Direction
Express Lane Ingress
Express Lane Egress
Lane Volume

INTERSECTION ANALYSIS RESULTS

Tables 1 through **3** present the 2040 level of service and control delays (in seconds/vehicle) for the No-Build, Partial Build, and Build 3D1.3 North Alignment (Modified), respectively, for the SW 10th Street intersections from Military Trail to FAU Research Boulevard. The analysis was conducted using Synchro software and reported as Highway Capacity Manual 2000 output, consistent with the SW 10th Street PTFM methodology. The results show the following:

2040 AM Peak Hour

1. The analysis generally shows a progressive improvement (reduction) in overall intersection delays from the No-Build to Partial Build to Build alternatives.
2. At the Military Trail intersection, the Partial Build alternative is expected to reduce the delay by more than 62 seconds/vehicle from the No-Build alternative and the Build alternative would further reduces it by another 34 seconds/vehicle. The Build alternative provides LOS D at this intersection.
3. The Newport Center Drive intersection is expected to operate at LOS D, C and B under the No-Build, Partial Build and Build alternatives, respectively.
4. The I-95 SB Ramp intersection is expected to operate at LOS E, D and D under the No-Build, Partial Build and Build alternatives, respectively. The average vehicle delays between the Partial Build and Build alternatives are comparable.
5. The I-95 NB Ramp intersection is expected to operate at LOS F, C and C under the No-Build, Partial Build and Build alternatives, respectively. The Partial Build and Build alternatives would reduce the overall intersection delays by more than 54 seconds per vehicle when compared with the No-Build alternative. The average vehicle delays between the Partial Build and Build alternatives are comparable.
6. The FAU Research Park Boulevard is expected to operate at LOS D under the No-Build, Partial Build and Build alternatives with comparable delays.

2040 PM Peak Hour

1. The analysis generally shows a progressive improvement (reduction) in overall intersection delays from the No-Build to Partial Build to Build alternatives.
2. At the Military Trail intersection, the Partial Build alternative would reduce the delay by 72 seconds/vehicle from the No-Build alternative and the Build alternative would further reduces it by another 31 seconds/vehicle. The intersection is expected to operate at LOS F, F and D under the No-Build, Partial Build and Build alternatives, respectively.
3. The Newport Center Drive intersection is expected to operate at LOS F, E and C under the No-Build, Partial Build and Build alternatives, respectively. The Partial Build alternative would reduce the delay by 19 seconds/vehicle from the No-Build alternative and the Build alternative would further reduces it by more than 34 seconds/vehicle.
4. The I-95 SB Ramp intersection is expected to operate at LOS D, C and D under the No-Build, Partial Build and Build alternatives, respectively.
5. The I-95 NB Ramp intersection is expected to operate at LOS F, C and C under the No-Build, Partial Build and Build alternatives, respectively. The Partial Build and Build alternatives would reduce the overall intersection delays by more than 124 seconds per vehicle when compared with the No-Build alternative. The average vehicle delays between the Partial Build and Build alternatives are comparable.

6. The FAU Research Park Boulevard is expected to operate at LOS E, E and D under the No-Build, Partial Build and Build alternatives. The Partial Build would reduce the delay by more than 19 seconds per vehicle and the Build alternative would further reduce it by 5 seconds per vehicle.

VISSIM Simulation of the North and Center Build Alternative 3D-1.3

As discussed above, based on the VISSIM traffic simulation of the North and Center Build Alternatives, certain refinements were made to the Build concepts. Therefore, hereinafter, the 3D-1.3 Build Alternatives have been identified as "Base" and "Modified". The modified alternative incorporates the elimination of the northbound and southbound through and left-turn movements from the intersection of SW 10th Street and Newport Drive and the conversion of the currently unsignalized intersection of SW 12th Avenue and Newport Drive into a roundabout.

Evaluation of North Build Alternative Base and Center Build Alternative Base

VISSIM micro-simulation analysis was conducted for the Base condition for North and Center Build Alternatives 3D-1.3. For the Center Base alignment, VISSIM micro-simulation analysis identified significant constraints in the WB direction between Military Trail and the I-95 ramps. The primary reason for the traffic congestion and backup was insufficient intersection throughput capacity at Newport Center Drive and constrained weaving operations accessing the WB express lane ingress. In the North Base alignment, the express lanes are relocated to the north side of SW 10th Street from the center location thereby providing better operating conditions than the Center Base alignment. **Tables 4A** and **4B** summarize the VISSIM network-wide summary. The green highlighting indicates the alternative with better operations. **Figures 7A** and **7B** depict the VISSIM network for the North Base and Center Base alternatives.

Findings

The VISSIM results indicate that in the Build Option 1.3 North Base, there is significant reduction in latent (i.e., unmet) demand and delay in the AM and PM conditions. Based on these traffic operations results the North Build Alternative Base preforms better than the Center Build Alternative Base. Therefore, the Center Build Alternative was eliminated and North Build Alternative Base was advanced further in the PD&E process for additional concept refinements to improve the traffic operations at the Newport Center Drive intersection.

Evaluation of North Build Alternative Base and North Build Alternative Modified

To improve traffic operations and achieve acceptable traffic operations at all study area intersections, the North Build Alternative Base was further refined by eliminating the NB and SB through and left-turn movements at the Newport Center Drive and SW 10th Street intersection. The traffic from the eliminated movements was reassigned via the loop connector which passes under SW 10th Street along the railway line. **Tables 5A** and **5B** summarize the VISSIM network-wide summary. The green highlighting indicates the alternative with better operations. **Figures 8A** and **8B** depict the VISSIM network for the North Modified and Center Modified alternatives.

Findings

The VISSIM results indicate that in the North Build Alternative Modified, there is improvement in delay, speed and travel time in the AM condition. In the PM condition, there is significant reduction in latent (i.e., unmet) demand and delay along with improvement in delay, speed and travel time. Hence, the North Build Alternative Modified was operationally found to be the best alternative for further consideration in the PD&E process.

Table 1A - No-Build 2040 SW 10th Street Signalized Intersection Analysis Results - AM

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
SW 10th Street	South Military Trail	LOS (Delay)	Movement	F (95.2)	E (77.2)	C (32.4)	F (262.5)	F (152.7)	F (105.6)	F (85.6)	F (267.5)	F (452.8)	F (125.7)	E (66.5)	E (59.0)	F (151.2)
			Approach	E (76.8)			F (161.8)			F (317.7)			F (85.6)			
		Volume to Capacity ratio	Movement	0.84	1.07	0.13	1.42	1.12	0.38	0.7	1.41	1.81	1.03	0.75	0.49	
		Queue Length 95th (ft)	Movement	m229	m#1179	m20	#408	#1386	437	173	#912	#1205	#464	463	275	
	East Newport Center Drive	LOS (Delay)	Movement	F (150.1)	B (19.2)		F (448.2)	B (17.3)	A (8.2)	F (84.9)	F (84.9)	F (82.1)	F (84.8)	F (84.4)	F (82.3)	D (53.0)
			Approach	C (30.5)			E (77.5)			F (83.2)			F (83.2)			
		Volume to Capacity ratio	Movement	1.14	0.86		1.76	0.69	0.3	0.44	0.45	0.07	0.4	0.37	0.08	
		Queue Length 95th (ft)	Movement	m#311	m904		#998	840	176	87	89	71	72	72	59	
	I-95 Southbound On-ramp	LOS (Delay)	Movement		E (79.9)	A (0.5)	F (226.8)	A (0.2)								E (57.2)
			Approach	E (60.4)			D (50.4)									
		Volume to Capacity ratio	Movement		0.83	0.48	1.32	0.48								
		Queue Length 95th (ft)	Movement		694	0	#1603	0								
	I-95 Southbound Off-ramp	LOS (Delay)	Movement		A (9.8)			A (7.1)					E (56.3)		A (2.2)	
			Approach	A (9.8)			A (7.1)						B (18.6)			
		Volume to Capacity ratio	Movement		0.68			0.68					0.5		0.66	
		Queue Length 95th (ft)	Movement		706			m125					286		0	
	I-95 Northbound Ramps	LOS (Delay)	Movement		C (22.6)	A (7.4)	F (275.5)	D (41.1)		F (213.6)		F (261.0)				F (81.4)
			Approach	B (14.6)			E (72.1)			F (228.3)						
		Volume to Capacity ratio	Movement		0.65	0.91	1.38	0.81		1.3		1.38				
		Queue Length 95th (ft)	Movement		591	1290	#683	784		#879		#993				
	FAU Research Park Boulevard	LOS (Delay)	Movement	F (126.4)	C (22.9)		C (23.2)	C (25.9)	B (17.3)	F (148.6)	E (58.0)	E (56.3)	E (75.3)	E (65.3)	F (118.8)	D (48.7)
			Approach	D (38.4)			C (25.3)			F (95.8)			F (93.1)			
		Volume to Capacity ratio	Movement	1.09	0.55		0.68	0.61	0.06	1.09	0.27	0.1	0.84	0.64	0.99	
		Queue Length 95th (ft)	Movement	#428	410		124	476	20	#444	117	69	#372	292	#500	

Synchro 9.2.914.6

LOS notes:

HCM 2000 level of service (LOS) and delay results from Synchro

Delay is in sec/veh units

: LOS E reflecting at capacity operations

: LOS F reflecting over capacity operations

Queue notes:

HCM methodology does not report queues, results are from Synchro outputs report

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

*Combined SB ramps intersections delay notes:

The WBT at the I-95 SB on-ramp intersection and EBT at the I-95 SB off-ramp intersection are not used in the calculation of the combined weighted intersection delay.

Table 1B - No-Build 2040 SW 10th Street Signalized Intersection Analysis Results - PM

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
SW 10th Street	South Military Trail	LOS (Delay)	Movement	F (314.4)	E (61.2)	C (23.6)	E (78.7)	F (342.0)	E (55.4)	F (92.2)	E (68.3)	E (61.8)	F (85.3)	F (92.3)	F (96.5)	F (157.2)
			Approach	F (97.7)			F (263.3)			E (70.4)			F (92.5)			
		Volume to Capacity ratio	Movement	1.44	1.01	0.15	0.91	1.63	0.66	0.78	0.8	0.6	0.75	0.99	0.96	
		Queue Length 95th (ft)	Movement	#452	#958	m31	m291	m#2176	m338	#191	507	351	217	#758	#731	
	East Newport Center Drive	LOS (Delay)	Movement	F (83.0)	B (16.6)		F (208.8)	D (51.2)	B (14.8)	F (113.5)	F (115.7)	F (406.9)	E (65.1)	E (65.1)	F (262.3)	F (81.8)
			Approach	B (18.7)			E (57.5)			F (275.4)			F (215.5)			
		Volume to Capacity ratio	Movement	0.73	0.76		1.15	1.02	0.11	0.91	0.92	1.68	0.22	0.23	1.36	
		Queue Length 95th (ft)	Movement	m78	m229		#380	#1358	34	#408	#416	#824	122	123	#727	
	I-95 Southbound On-ramp	LOS (Delay)	Movement		F (88.5)	A (0.5)	F (101.0)	A (0.2)								D (45.3)
			Approach	E (66.3)			C (22.6)									
		Volume to Capacity ratio	Movement		1	0.48	1.03	0.48								
		Queue Length 95th (ft)	Movement		m625	m0	#843	0								
	I-95 Southbound Off-ramp	LOS (Delay)	Movement		B (12.6)			A (9.9)					D (54.0)		A (4.1)	
			Approach	B (12.6)			A (9.9)						B (14.4)			
		Volume to Capacity ratio	Movement		0.66			0.63					0.36		0.79	
		Queue Length 95th (ft)	Movement		m661			m151					205		0	
	I-95 Northbound Ramps	LOS (Delay)	Movement		D (52.5)	A (1.7)	E (75.3)	C (32.6)		F (441.1)		F (501.6)				F (148.4)
			Approach	C (31.5)			D (39.6)			F (460.0)						
		Volume to Capacity ratio	Movement		0.88	0.67	0.81	0.66		1.8		1.92				
		Queue Length 95th (ft)	Movement		818	380	#528	590		#1186		#1305				
	FAU Research Park Boulevard	LOS (Delay)	Movement	D (40.1)	C (29.1)		F (147.0)	C (23.2)	B (17.6)	F (567.3)	E (57.8)	E (56.1)	E (77.2)	F (113.1)	F (136.8)	E (79.2)
			Approach	C (30.4)			D (40.0)			F (321.3)			F (113.6)			
		Volume to Capacity ratio	Movement	0.87	0.72		1.11	0.49	0.09	2.08	0.25	0.09	0.85	0.99	1.05	
		Queue Length 95th (ft)	Movement	#272	601		#417	353	39	#655	107	63	#391	#531	#542	

Synchro 9.2.914.6

LOS notes:

HCM 2000 level of service (LOS) and delay results from Synchro

Delay is in sec/veh units

: LOS E reflecting at capacity operations

: LOS F reflecting over capacity operations

Queue notes:

HCM methodology does not report queues, results are from Synchro outputs report

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

*Combined SB ramps intersections delay notes:

The WBT at the I-95 SB on-ramp intersection and EBT at the I-95 SB off-ramp intersection are not used in the calculation of the combined weighted intersection delay.

Table 2A - Partial-Build 2040 - SW 10th Street Signalized Intersection Analysis Results - AM

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
SW 10th Street	South Military Trail	LOS (Delay)	Movement	**E (70.6)**	**F (105.7)**	B (11.4)	**E (56.0)**	C (30.6)	A (2.0)	**F (84.1)**	**F (190.5)**	**F (153.1)**	**F (174.5)**	**E (75.9)**	**E (62.9)**	**F (88.7)**
			Approach	**F (94.4)**			C (27.4)			**F (160.6)**			**F (108.3)**			
		Volume to Capacity ratio	Movement	0.8	1.14	0.18	0.62	0.77	0.64	0.69	1.23	1.17	1.17	0.83	0.43	
		Queue Length 95th (ft)	Movement	m168	m637	m23	m247	460	7	#193	#695	#856	#500	438	213	
	East Newport Center Drive	LOS (Delay)	Movement	**E (65.3)**	B (10.1)		**E (79.0)**	B (18.3)	A (3.2)	**F (84.9)**	**F (82.1)**	**F (81.9)**	**F (96.1)**	**F (82.3)**	**F (80.4)**	C (23.9)
			Approach	B (16.1)			C (24.7)			**F (83.1)**			**F (85.3)**			
		Volume to Capacity ratio	Movement	0.69	0.83		0.82	0.8	0.25	0.52	0.12	0.08	0.65	0.31	0.07	
		Queue Length 95th (ft)	Movement	m210	m305		m312	m741	m2	85	37	72	122	87	30	
	I-95 Southbound Ramps	LOS (Delay)	Movement		**E (65.5)**	A (0.5)	**F (91.3)**	A (6.1)					D (45.8)		**F (92.1)**	D (45.5)
			Approach	D (48.7)			C (28.8)						**E (77.1)**			
		Volume to Capacity ratio	Movement		0.98	0.46	0.86	0.75					0.39		1.01	
		Queue Length 95th (ft)	Movement		#658	0	m411	m143					265		#816	
	I-95 Northbound Ramps	LOS (Delay)	Movement		A (0.6)	A (0.2)		B (10.2)	A (0.1)	**F (96.0)**		**E (71.2)**				C (23.2)
			Approach	A (0.4)			A (9.0)			**F (87.5)**						
		Volume to Capacity ratio	Movement		0.41	0.34		0.39	0.19	0.98		0.71				
		Queue Length 95th (ft)	Movement		m9	m11		235	m0	#496		300				
	FAU Research Park Boulevard	LOS (Delay)	Movement	**E (63.5)**	C (20.1)	B (20.0)	**F (102.3)**	D (46.7)	C (29.6)	**E (79.7)**	**E (59.0)**	**E (56.9)**	**E (59.9)**	**E (77.4)**	**F (106.6)**	D (50.5)
			Approach	C (27.1)			D (51.7)			**E (68.5)**			**F (86.0)**			
		Volume to Capacity ratio	Movement	0.86	0.66	0.24	0.88	0.79	0.06	0.95	0.28	0.12	0.69	0.7	0.91	
		Queue Length 95th (ft)	Movement	#275	278	57	#392	763	15	#481	147	68	306	325	#427	

Synchro 9.2.914.6

LOS notes:

HCM 2000 level of service (LOS) and delay results from Synchro

Delay is in sec/veh units

: LOS E reflecting at capacity operations

: LOS F reflecting over capacity operations

Queue notes:

HCM methodology does not report queues, results are from Synchro outputs report

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 2B- Partial-Build 2040 - SW 10th Street Signalized Intersection Analysis Results - PM

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
SW 10th Street	South Military Trail	LOS (Delay)	Movement	**F (157.0)**	**E (65.6)**	B (14.7)	**F (101.4)**	**F (87.9)**	C (21.3)	**F (161.6)**	**E (78.6)**	D (49.8)	**E (77.5)**	**E (63.7)**	**F (183.9)**	**F (85.3)**
			Approach	**E (75.1)**			**E (78.7)**			**F (86.9)**			**F (108.7)**			
		Volume to Capacity ratio	Movement	1.14	1.03	0.19	1.06	1.1	0.59	1.08	0.83	0.57	0.79	0.81	1.23	
		Queue Length 95th (ft)	Movement	m#268	m798	m49	m#338	m#1052	m185	#290	407	407	#372	568	#1078	
	East Newport Center Drive	LOS (Delay)	Movement	**F (82.3)**	C (22.8)		**F (130.8)**	**E (62.3)**	A (6.5)	**E (68.6)**	**E (58.1)**	**F (182.4)**	**E (65.8)**	**F (185.0)**	**F (92.8)**	**E (62.9)**
			Approach	C (25.0)			**E (63.2)**			**F (127.2)**			**F (124.0)**			
		Volume to Capacity ratio	Movement	0.9	0.97		0.88	1.06	0.09	0.67	0.04	1.18	0.52	1.16	0.84	
		Queue Length 95th (ft)	Movement	m#69	m541		m#131	#1229	m12	329	40	#768	252	#598	#400	
	I-95 Southbound Ramps	LOS (Delay)	Movement		C (27.3)	A (0.4)	**E (55.5)**	B (19.1)					D (53.8)		**F (88.5)**	C (32.2)
			Approach	C (20.4)			C (29.7)						**E (77.7)**			
		Volume to Capacity ratio	Movement		0.94	0.54	0.81	0.57					0.35		0.96	
		Queue Length 95th (ft)	Movement		m580	m9	m296	622					206		#614	
	I-95 Northbound Ramps	LOS (Delay)	Movement		A (0.3)	A (0.2)		A (5.4)	A (0.2)	**F (81.6)**		**F (92.3)**				C (23.4)
			Approach	A (0.3)			A (4.6)			**F (86.2)**						
		Volume to Capacity ratio	Movement		0.44	0.39		0.33	0.21	0.91		0.95				
		Queue Length 95th (ft)	Movement		m6	m46		m115	m0	#464		#478				
	FAU Research Park Boulevard	LOS (Delay)	Movement	**F (89.9)**	D (40.7)	B (19.6)	**F (114.8)**	D (42.5)	C (31.2)	**F (117.7)**	**E (61.0)**	**E (59.1)**	D (54.1)	**F (118.7)**	**F (88.4)**	**E (59.9)**
			Approach	D (44.5)			D (54.1)			**F (84.8)**			**F (88.7)**			
		Volume to Capacity ratio	Movement	0.78	0.97	0.28	0.98	0.66	0.12	1.03	0.28	0.14	0.64	0.98	0.83	
		Queue Length 95th (ft)	Movement	m219	m#790	m80	#601	560	76	#563	152	80	341	#605	#450	

Synchro 9.2.914.6

LOS notes:

HCM 2000 level of service (LOS) and delay results from Synchro

Delay is in sec/veh units

: LOS E reflecting at capacity operations

: LOS F reflecting over capacity operations

Queue notes:

HCM methodology does not report queues, results are from Synchro outputs report

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 3A - Build 3D-1.3 2040 - North Alignment - SW 10th Street Signalized Intersection Analysis Results - AM (Modified)

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
SW 10th Street	South Military Trail	LOS (Delay)	Movement	F (89.6)	E (56.4)	A (4.6)	C (29.2)	D (50.3)	B (11.1)	E (67.3)	F (100.8)	C (25.6)	F (109.1)	E (73.3)	A (0.3)	D (54.8)
			Approach	E (60.1)			D (37.5)			E (63.4)			E (69.5)			
		Volume to Capacity ratio	Movement	0.94	0.56	0.09	0.26	0.92	0.54	0.34	0.99	0.71	0.98	0.79	0.21	
		Queue Length 95th (ft)	Movement	m#290	m161	m6	110	765	120	151	#597	343	#455	397	0	
	East Newport Center Drive	LOS (Delay)	Movement	F (81.1)	A (9.9)		E (64.2)	A (6.0)	A (4.1)			E (59.1)			E (69.7)	B (18.5)
			Approach	B (18.6)			B (13.9)			E (59.1)			E (69.7)			
		Volume to Capacity ratio	Movement	0.78	0.62		0.65	0.62	0.37			0.18			0.3	
		Queue Length 95th (ft)	Movement	m258	m566		m308	m452	m93			79			79	
	I-95 Southbound Ramps	LOS (Delay)	Movement		E (65.2)	A (0.7)	E (73.7)	B (16.1)					D (36.8)		F (89.2)	D (46.5)
			Approach	D (47.0)			C (31.4)						E (75.0)			
		Volume to Capacity ratio	Movement		0.94	0.43	0.84	0.85					0.31		1.03	
		Queue Length 95th (ft)	Movement		#558	0	m479	m438					226		#980	
	I-95 Northbound Ramps	LOS (Delay)	Movement		A (0.9)	A (0.1)		A (8.6)	A (0.2)	F (106.5)		E (69.6)				C (27.0)
			Approach	A (0.6)			A (7.5)			F (94.4)						
		Volume to Capacity ratio	Movement		0.39	0.29		0.36	0.19	1.02		0.69				
		Queue Length 95th (ft)	Movement		m9	m31		110	m0	#547		298				
	FAU Research Park Boulevard	LOS (Delay)	Movement	E (69.4)	C (26.6)	C (31.5)	F (86.2)	D (44.1)	C (30.2)	E (69.7)	E (55.8)	D (54.0)	E (60.4)	E (76.8)	F (103.2)	D (51.6)
			Approach	C (34.0)			D (48.4)			E (62.1)			F (84.3)			
		Volume to Capacity ratio	Movement	0.8	0.54	0.22	0.72	0.71	0.07	0.91	0.25	0.12	0.7	0.7	0.9	
		Queue Length 95th (ft)	Movement	205	280	71	187	683	21	#444	138	64	285	324	390	

Synchro 9.2.914.6

LOS notes:

HCM 2000 level of service (LOS) and delay results from Synchro

Delay is in sec/veh units

: LOS E reflecting at capacity operations

: LOS F reflecting over capacity operations

Queue notes:

HCM methodology does not report queues, results are from Synchro outputs report

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 3B - Build 3D-1.3 2040 - North Alignment - SW 10th Street Signalized Intersection Analysis Results - PM (Modified)

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
SW 10th Street	South Military Trail	LOS (Delay)	Movement	**F (98.4)**	**E (70.3)**	**E (63.8)**	D (39.2)	D (45.5)	C (27.2)	**F (94.7)**	**E (75.8)**	C (24.3)	**E (79.0)**	**E (74.4)**	A (0.8)	D (54.0)
			Approach	**E (79.7)**			D (39.1)			**E (64.2)**			D (51.5)			
		Volume to Capacity ratio	Movement	0.84	0.58	0.26	0.48	0.82	0.62	0.85	0.84	0.41	0.81	0.91	0.42	
		Queue Length 95th (ft)	Movement	m#272	m236	m128	289	687	377	#264	453	266	#370	633	0	
	East Newport Center Drive	LOS (Delay)	Movement	D (36.1)	A (7.2)		**E (63.2)**	C (20.3)	A (8.5)			**F (81.7)**			**E (70.8)**	C (28.5)
			Approach	A (8.3)			C (21.9)			**F (81.7)**			**E (70.8)**			
		Volume to Capacity ratio	Movement	0.09	0.55		0.19	0.77	0.09			0.88			0.92	
		Queue Length 95th (ft)	Movement	m65	445		m87	m664	m10			369			450	
	I-95 Southbound Ramps	LOS (Delay)	Movement		**E (57.1)**	A (1.6)	**E (72.9)**	B (13.1)					D (45.2)		**F (84.1)**	D (42.9)
			Approach	D (39.6)			C (32.4)						**E (73.9)**			
		Volume to Capacity ratio	Movement		0.93	0.63	0.87	0.56					0.28		0.98	
		Queue Length 95th (ft)	Movement		646	633	355	265					188		#750	
	I-95 Northbound Ramps	LOS (Delay)	Movement		A (6.9)	A (0.2)		A (3.8)	A (0.2)	**E (70.9)**		**F (112.0)**				C (24.3)
			Approach	A (3.7)			A (3.2)			**F (91.6)**						
		Volume to Capacity ratio	Movement		0.4	0.42		0.32	0.21	0.73		1.02				
		Queue Length 95th (ft)	Movement		m139	m163		71	m0	330		#505				
	FAU Research Park Boulevard	LOS (Delay)	Movement	**F (91.0)**	C (32.2)	C (31.7)	**F (86.1)**	D (49.4)	D (36.0)	**E (79.9)**	D (53.3)	D (52.4)	D (51.6)	**F (90.3)**	**E (72.9)**	D (54.9)
			Approach	D (41.4)			**E (55.5)**			**E (64.4)**			**E (72.4)**			
		Volume to Capacity ratio	Movement	0.79	0.75	0.23	0.82	0.71	0.11	0.92	0.22	0.15	0.66	0.89	0.72	
		Queue Length 95th (ft)	Movement	m212	m514	m94	285	616	66	#481	133	71	316	501	359	

Synchro 9.2.914.6

LOS notes:

HCM 2000 level of service (LOS) and delay results from Synchro

Delay is in sec/veh units

: LOS E reflecting at capacity operations

: LOS F reflecting over capacity operations

Queue notes:

HCM methodology does not report queues, results are from Synchro outputs report

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 4A: 2040 AM Peak Period VISSIM Network-wide Summary

Alternative (2040 AM Peak Period)	Average		Total			Latent	
	Delay (sec/veh)	Speed (mph)	Travel Time (veh-hrs)	Delay (veh-hrs)	Vehicles Processed	Delay (veh-hrs)	Demand (veh)
Build Option 1.3 Center Base	395	25	3,879	1,627	44,437	2,461	3,327
Build Option 1.3 North Base	327	27	3,717	1,393	45,936	6	8

= Favorable alternative for the referenced measure of effectiveness

Table 4B: 2040 PM Peak Period VISSIM Network-wide Summary

Alternative (2040 PM Peak Period)	Average		Total			Latent	
	Delay (sec/veh)	Speed (mph)	Travel Time (veh-hrs)	Delay (veh-hrs)	Vehicles Processed	Delay (veh-hrs)	Demand (veh)
Build Option 1.3 Center Base	1,035	15	6,803	4,566	47,763	3,982	5,904
Build Option 1.3 North Base	428	24	4,388	1,935	48,814	1,018	1,392

= Favorable alternative for the referenced measure of effectiveness

Table 5A: 2040 AM Peak Period VISSIM Network-wide Summary

Alternative (2040 AM Peak Period)	Average		Total			Latent	
	Delay (sec/veh)	Speed (mph)	Travel Time (veh-hrs)	Delay (veh-hrs)	Vehicles Processed	Delay (veh-hrs)	Demand (veh)
Build Option 1.3 North Base	327	27	3,717	1,393	45,936	6	8
Build Option 1.3 North Modified	255	29	3,414	1,078	45,670	1	1

= Favorable alternative for the referenced measure of effectiveness

Table 5B: 2040 PM Peak Period VISSIM Network-wide Summary

Alternative (2040 PM Peak Period)	Average		Total			Latent	
	Delay (sec/veh)	Speed (mph)	Travel Time (veh-hrs)	Delay (veh-hrs)	Vehicles Processed	Delay (veh-hrs)	Demand (veh)
Build Option 1.3 North Base	428	24	4,388	1,935	48,814	1,018	1,392
Build Option 1.3 North Modified	293	27	3,830	1,326	48,911	154	243

= Favorable alternative for the referenced measure of effectiveness

Figure 7A: Build Option 3D-1.3 North Base

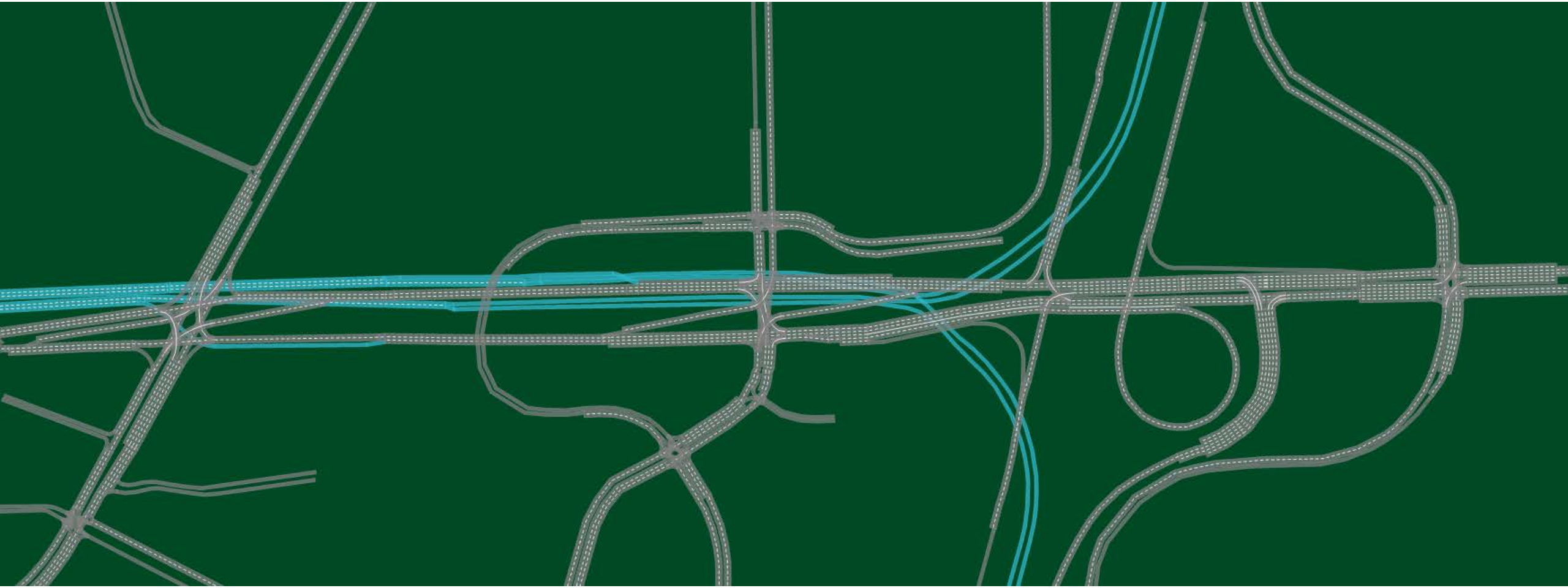


Figure 7B: Build Option 3D-1.3 Center Base

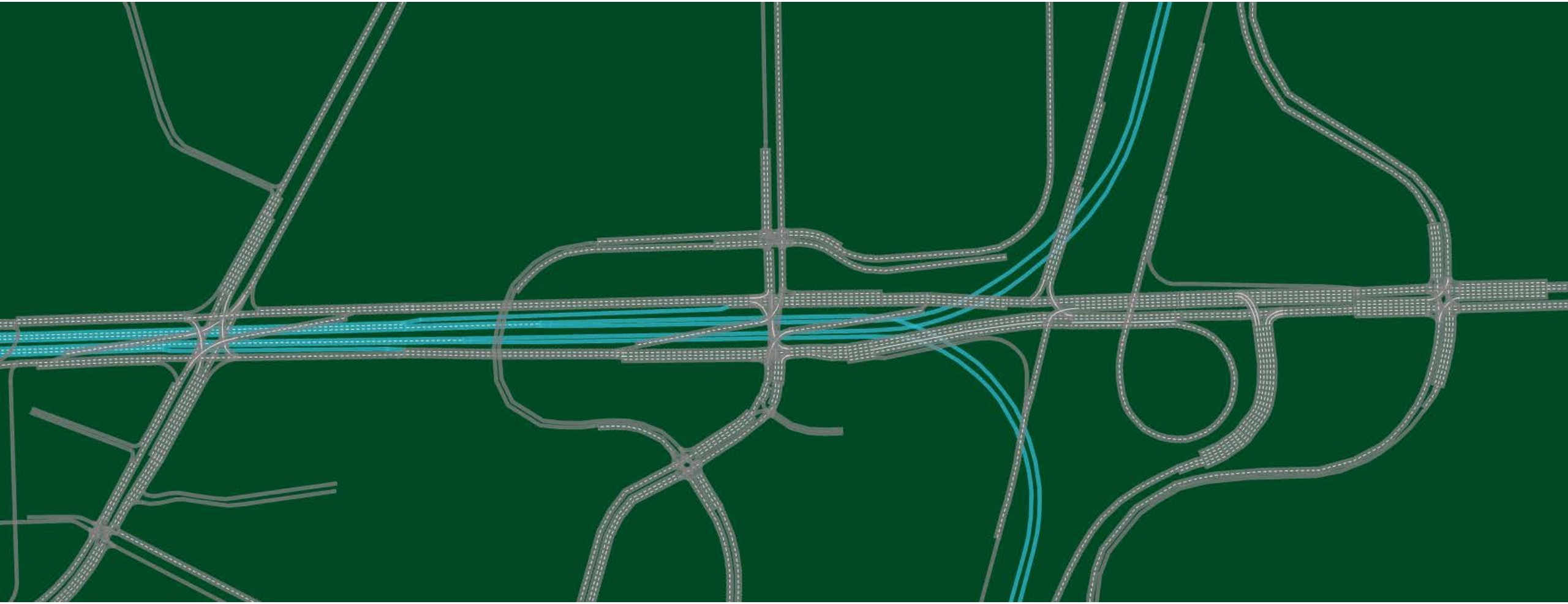


Figure 8A: Build Option 3D-1.3 North Modified

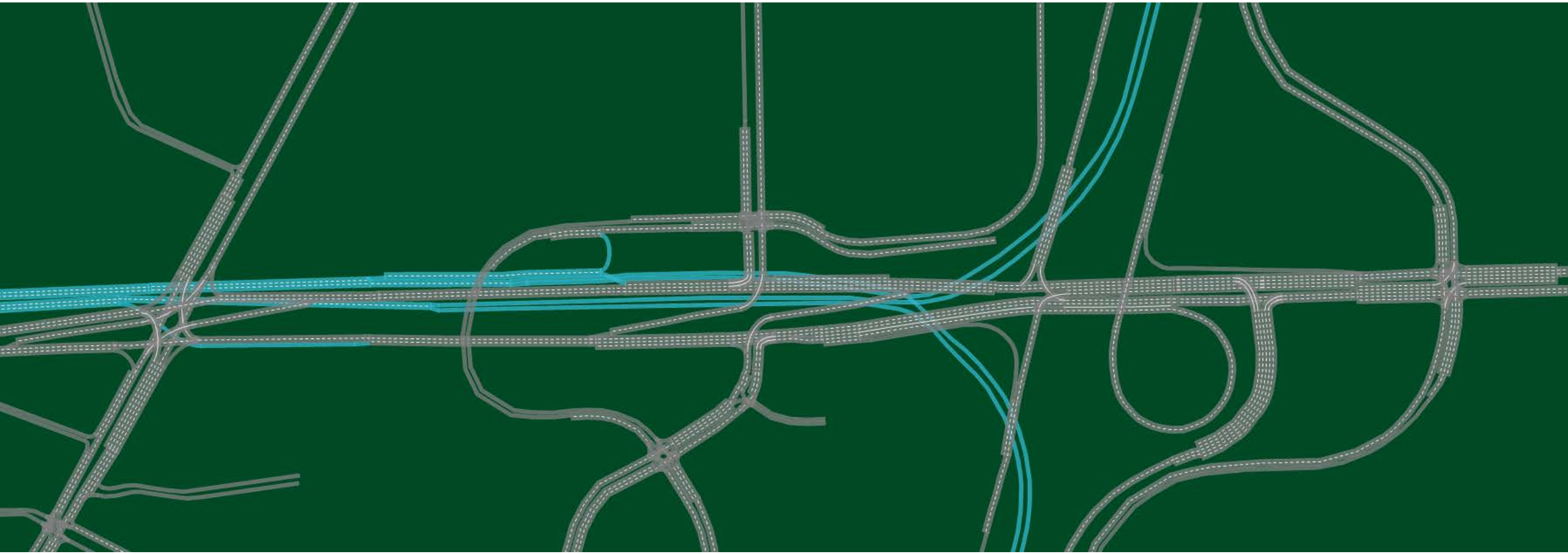
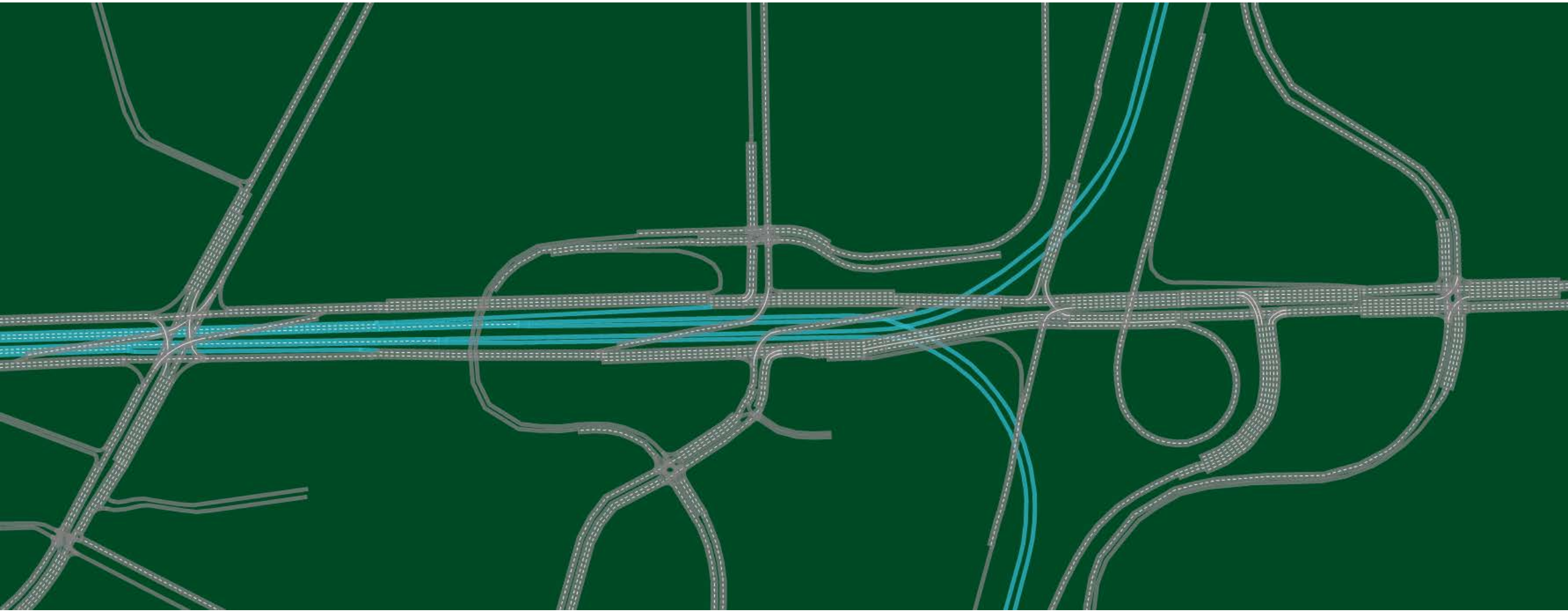


Figure 8B: Build Option 3D-1.3 Center Modified



Roundabout vs. Stop Controlled Intersection Analysis (SW 12th Avenue & Newport Center Drive)

The intersection of SW 12th Avenue and Newport Center Drive is currently a two-way stop controlled intersection with the NB and SB approaches as free movements and EB and WB movements as Stop controlled. In future years, it is projected that the truck activity at this intersection would increase causing potential safety concerns. Therefore, to mitigate any potential traffic operational safety concerns, a signal and a roundabout option were considered for this intersection. However, the signal warrant analysis was not satisfied for the intersection due to low traffic volume so the signal option was eliminated and a roundabout option was considered for traffic operational analysis comparison with the Stop controlled intersection.

Tables 6A and **6B** summarize the VISSIM analysis results for roundabout and Stop controlled intersection conditions. The VISSIM analysis indicates that the traffic operational analysis is very similar between roundabout and Stop controlled intersection. However, a roundabout has significant safety benefits over a Stop controlled intersection. According to FHWA – Technical Summary on Roundabouts, numerous studies have shown significant safety improvements at intersections converted from conventional forms to roundabouts. The physical shape of roundabouts eliminate crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the most severe of those conflict points. The most comprehensive and recent study showed overall reductions of 35 percent in total crashes and 76 percent in injury crashes. Severe, incapacitating injuries and fatalities are rare, with one study reporting 89-percent reduction in these types of crashes and another reporting 100-percent reduction in fatalities. Therefore, a roundabout is recommended at the intersection of SW 12th Avenue and Newport Center Drive.

North Build Alternative 3D-1.3 Modified – Evaluation of Eastbound Express Lane Egress Merge Conditions

Due to the proximity of the eastbound express lane egress to the Newport Center Drive intersection and the I-95 southbound ramp intersection, significant weaving and lane changes are induced in the eastbound direction. In order to provide the best operating conditions, the eastbound express lane egress was evaluated using VISSIM traffic simulation for the following merge conditions:

- Inside Egress Merge (see **Figure 9**)
- Outside Egress Merge (See **Figure 10**)
- Both Inside and Outside Egress Merge (See **Figure 11**)

Table 7 summarizes the results of the VISSIM analysis of the express lane egress merge conditions. The analysis shows that a combination of both inside and outside merge would provide the best operating conditions in the eastbound direction. **Figure 12** depicts the both inside and outside egress merge conditions with a roundabout at the intersection of Newport Center Drive and SW 12th Avenue.

Table 6A: 2040 AM Design Hour VISSIM Intersection Summary

Approach (AM Design Hour)	Movement	Roundabout			Stop Controlled		
		Queue Length Maximum (ft)	Demand Processed (Veh)	Delay (sec/veh)	Queue Length Maximum (ft)	Demand Processed (Veh)	Delay (sec/veh)
Northbound	U-Turn	0	0	0.0	0	0	0.0
	Left	55	24	10.3	36	25	1.8
	Through	55	30	8.3	0	31	0.1
	Right	55	6	7.3	9	6	0.7
Southbound	U-Turn	0	0	0.0	0	0	0.0
	Left	298	491	5.7	208	491	3.4
	Through	298	335	6.2	108	335	2.4
	Right	298	24	7.0	108	24	1.8
Eastbound	U-Turn	0	0	0.0	0	0	0.0
	Left	189	82	12.0	118	82	12.5
	Through	189	76	11.8	121	77	9.8
	Right	189	75	12.3	122	75	12.0
Westbound	U-Turn	0	0	0.0	0	0	0.0
	Left	39	4	2.9	73	4	11.5
	Through	39	66	2.2	89	66	14.0
	Right	39	32	1.6	89	32	5.6
Overall			**1,246**	**6.9**		**1,247**	**5.2**

Table 6B: 2040 PM Design Hour VISSIM Intersection Summary

Approach (AM Design Hour)	Movement	Roundabout			Stop Controlled		
		Queue Length Maximum (ft)	Demand Processed (Veh)	Delay (sec/veh)	Queue Length Maximum (ft)	Queue Length Maximum (ft)	Demand Processed (Veh)
Northbound	U-Turn	0	0	0.0	0	0	0.0
	Left	120	169	5.4	68	169	2.5
	Through	120	263	4.4	0	264	0.2
	Right	120	10	4.1	31	10	0.5
Southbound	U-Turn	0	0	0.0	0	0	0.0
	Left	127	94	12.6	84	93	3.8
	Through	127	54	13.7	0	54	1.9
	Right	127	28	15.6	0	28	2.8
Eastbound	U-Turn	0	0	0.0	0	0	0.0
	Left	80	176	3.5	126	175	13.7
	Through	80	9	4.4	128	9	7.3
	Right	80	9	4.0	130	9	10.5
Westbound	U-Turn	0	0	0.0	0	0	0.0
	Left	293	9	14.6	325	9	15.6
	Through	293	382	14.1	337	384	28.3
	Right	293	97	5.6	337	97	7.6
Overall			**1,300**	**8.6**		**1,300**	**11.8**

Figure 9: Build Option 3D-1.3 North Modified Inside Merge

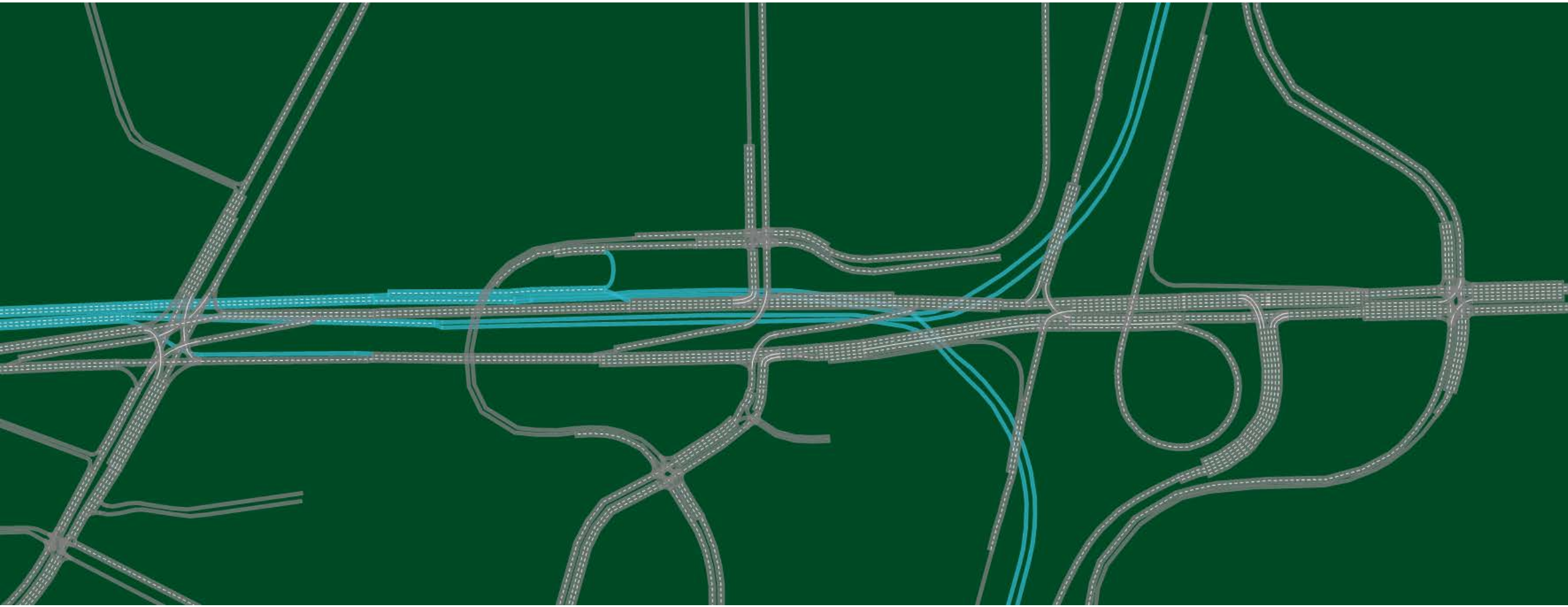


Figure 10: Build Option 3D-1.3 North Modified Outside Merge

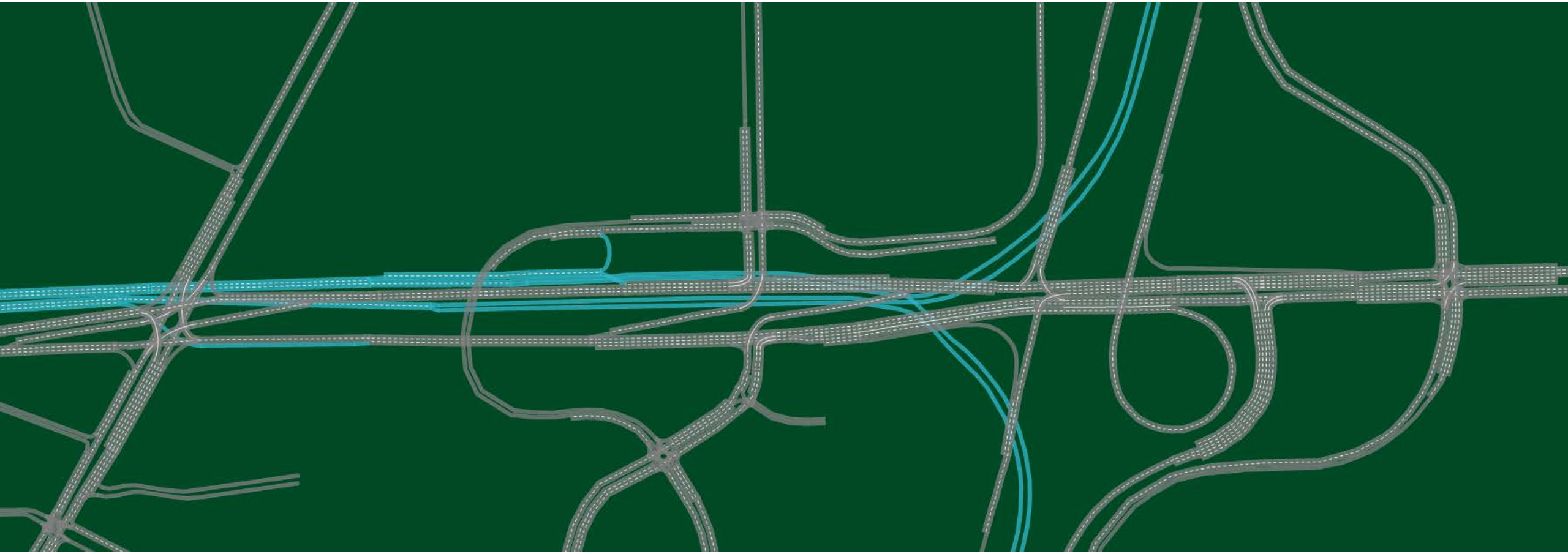


Figure 11: Build Option 3D-1.3 North Modified Both Side Merge

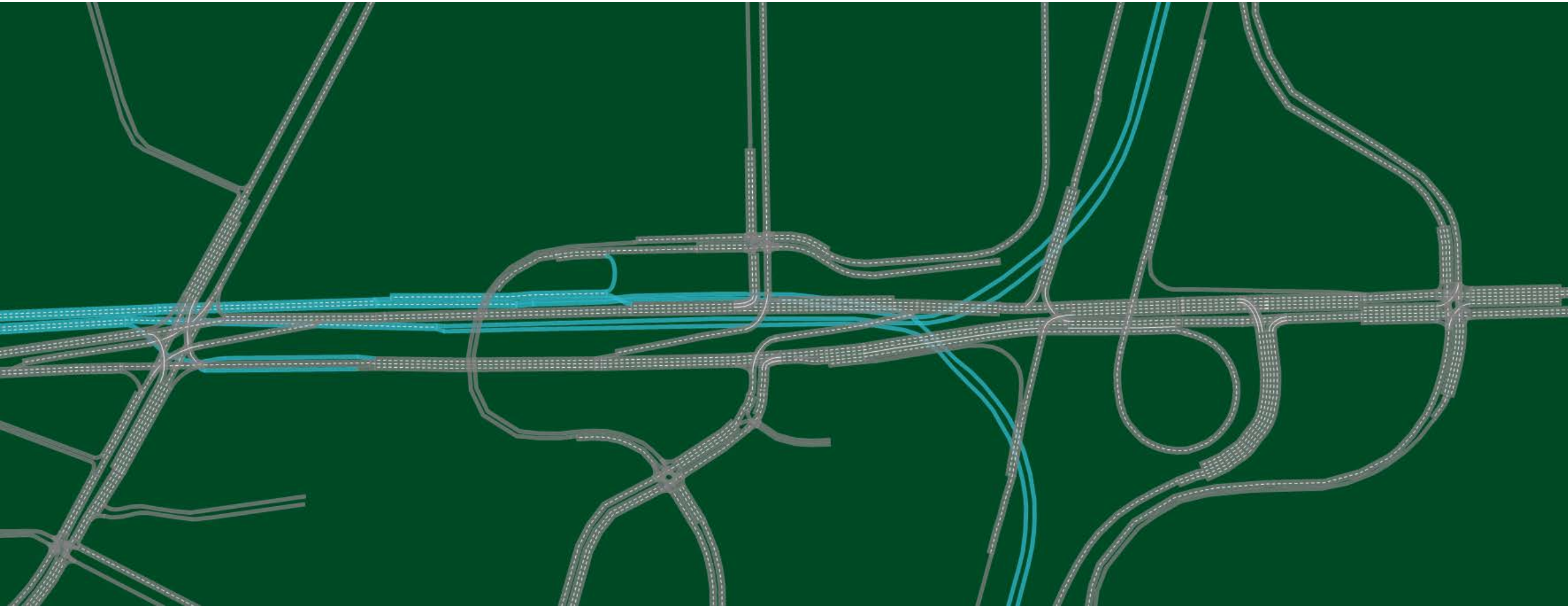


Table 7: North Build Alternative 3D-1.3 Modified - Express Lane Alignment
Vehicle-Hours Comparison: Inside Egress Merge vs. Outside Egress Merge vs. Both Side Egress Merge

Concepts	2040 (Delay in vehicle-hours)		
	AM	PM	Total
Inside Egress Merge	1,096	1,546	2,642
Outside Egress Merge	1,078	1,529	2,606
Both Sides Egress merge	1,083	1,406	2,489

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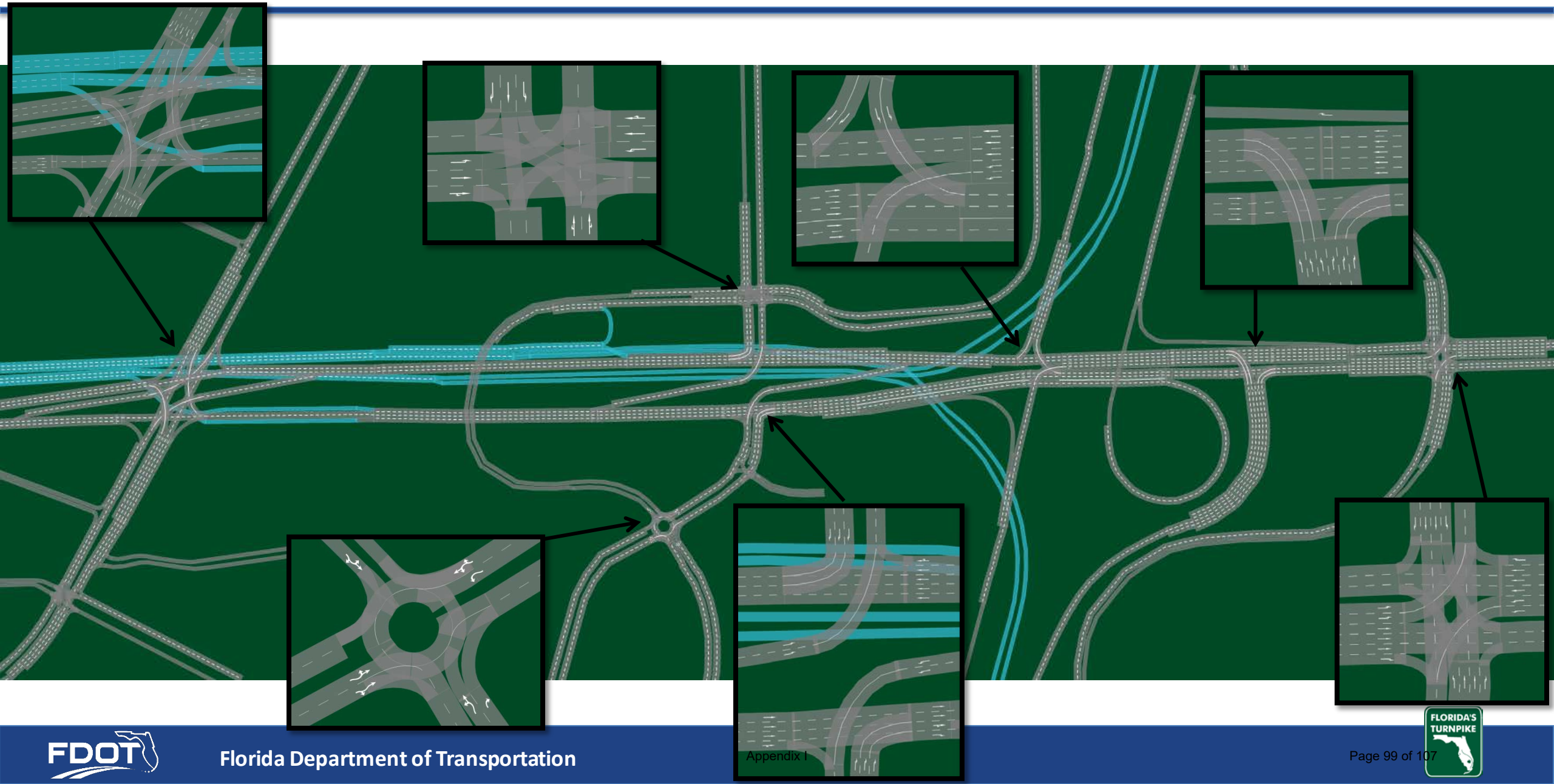
Figure 12: Build Option 3D-1.3 North Modified Both Side Merge With Roundabout



North Build Alternative 3D-1.3 Modified – Comparison of Weaving Volumes and Minimum Number of Lane Changes for the Eastbound Express Lane Egress Merge Conditions

In addition to the VISSIM analysis discussed above, the eastbound egress merge conditions were also evaluated for weaving volumes and the number of lane changes that would occur due to the different egress merge conditions in the eastbound direction. The origin and destination volumes for both the General Purpose (GP) lane and Express Lane (EL) were determined. Based on the location of the EL egress, the weaving volumes between the GP lane and the EL traffic were estimated. In addition, the number of lane changes that the vehicles from both the GP lane and the EL will have to make in order to reach their destinations was estimated. **Table 8** provides a comparison of the weaving volumes and minimum number of lane changes for the different express egress merge conditions. As shown in green highlighting, both sides egress merge would provide the best operating conditions. With both sides egress merge, the express lane traffic can reach their destinations without any weaving and lane changes, and the GP lane traffic would experience the least weaving and the least number of vehicles having to make lane changes to reach their destinations. **Figures 13** through **15** show the origin and destination traffic from both the GP and the Express lanes for the inside merge, outside merge, and both sides merge conditions, respectively.

Table 8: North Build Alternative 3D-1.3 Modified - Express Lane Alignment
Weaving Volumes and Minimum Lane Changes Comparison: Inside Egress Merge vs. Outside Egress Merge vs. Both Side Egress Merge

Concepts	AM Peak Hour				PM Peak Hour			
	From GP Lane		From Express Lane		From GP Lane		From Express Lane	
	Weaving %	Minimum Lane Changes (vph)	Weaving %	Minimum Lane Changes (vph)	Weaving %	Minimum Lane Changes (vph)	Weaving %	Minimum Lane Changes (vph)
Inside Egress Merge	26%	356	54%	2,052	26%	300	61%	2,093
Outside Egress Merge	73%	1,269	38%	870	77%	1,167	41%	611
Both Sides Egress Merge	20%	267	0%	0	4%	48	0%	0

North Build Alternative 3D-1.3 Modified – User Benefit Calculation for the Eastbound Express Lane Egress Merge Conditions

A user benefit calculation was conducted for the different express egress merge conditions for design year 2040. Cumulative benefits for the three merge conditions in 2018 dollars were determined based on the benefits for each year from opening year 2020 to design year 2040. **Table 9** summarizes the user benefits in dollars between the three merge conditions.

Table 9: North Build Alternative 3D-1.3 Modified - Express Lane Alignment
User Benefit in Dollars

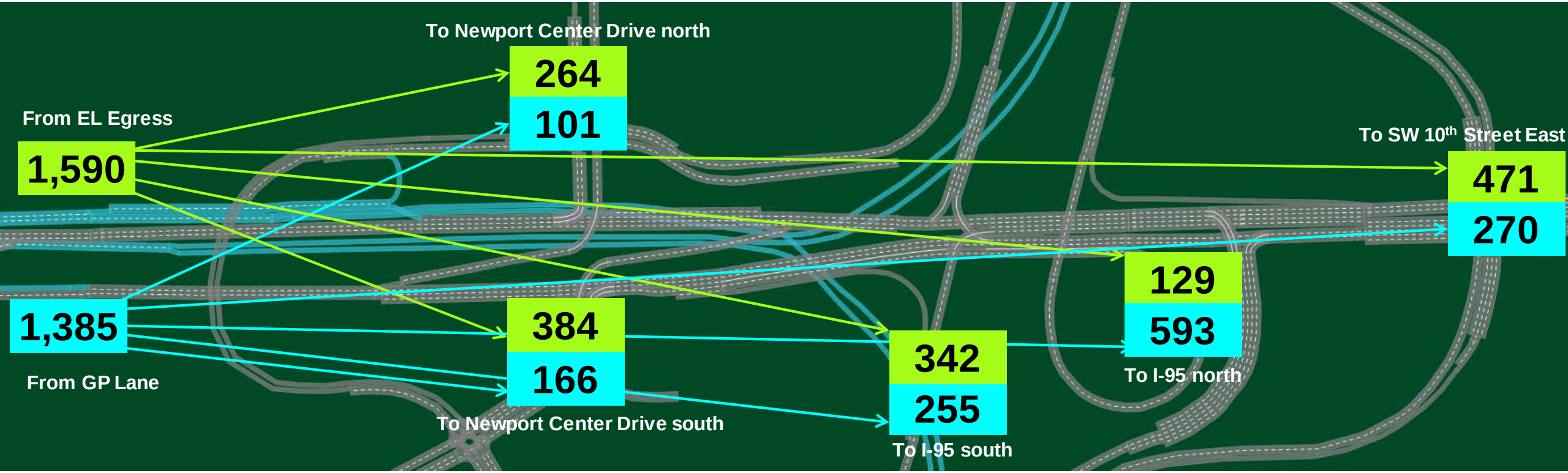
Present Day Benefit in Dollars (2018)	Outside Egress Merge Minus Inside Egress Merge	Both Sides Egress Merge Minus Inside Egress Merge	Both Sides Egress Merge Minus Outside Egress Merge
Cumulative Benefit Difference	$1,513,100	$6,441,200	$4,927,500

The maximum benefit will be realized by both sides egress followed by outside egress and then inside egress. When compared with the inside egress, the outside egress provides approximately $1.5 million in additional cumulative benefits. The both sides egress provides approximately $6.4 million and $4.9 million in additional benefits compared to the inside egress and outside egress, respectively. It can therefore be concluded from Table 9 that for as long as the cost of adding the inside merge to the outside merge remains within $4.9 million, the benefits will outweigh the cost, otherwise it will be better to maintain the outside only option.

CONCLUSION

As documented in the *Traffic Analysis Technical Memorandum* dated May 4, 2018 and prepared by RS&H, Tier 1 and Tier 2 analyses resulted in the selection of the North Build Alternative 3D-1.3 and the Center Build Alternative 3D-1.3 as the two most suitable alternatives. VISSIM micro simulation resulted in the selection of the North Build Alternative 3D-1.3 as the operationally best Build Alternative. This alternative was further refined to eliminate the northbound and southbound through and left-turn movements from the SW 10th Street and Newport Center Drive intersection and convert the unsignalized intersection of SW 12th Avenue and Newport Center Drive into a roundabout. Additionally, three different express lane egress merge conditions were evaluated for weaving volumes, number of lane changes, and vehicle hours of delay. A combination of both the inside and outside express lane egress merge condition was found to provide the best operating conditions. The both sides egress merge condition also provided the maximum cumulative benefit when compared to the inside only and the outside only merge conditions.

Figure 13A: 2040 AM Build Condition – Inside Merge EB Weaving



54 percent express lane traffic weaving, and 2,052 vph minimum lane changes to reach destination

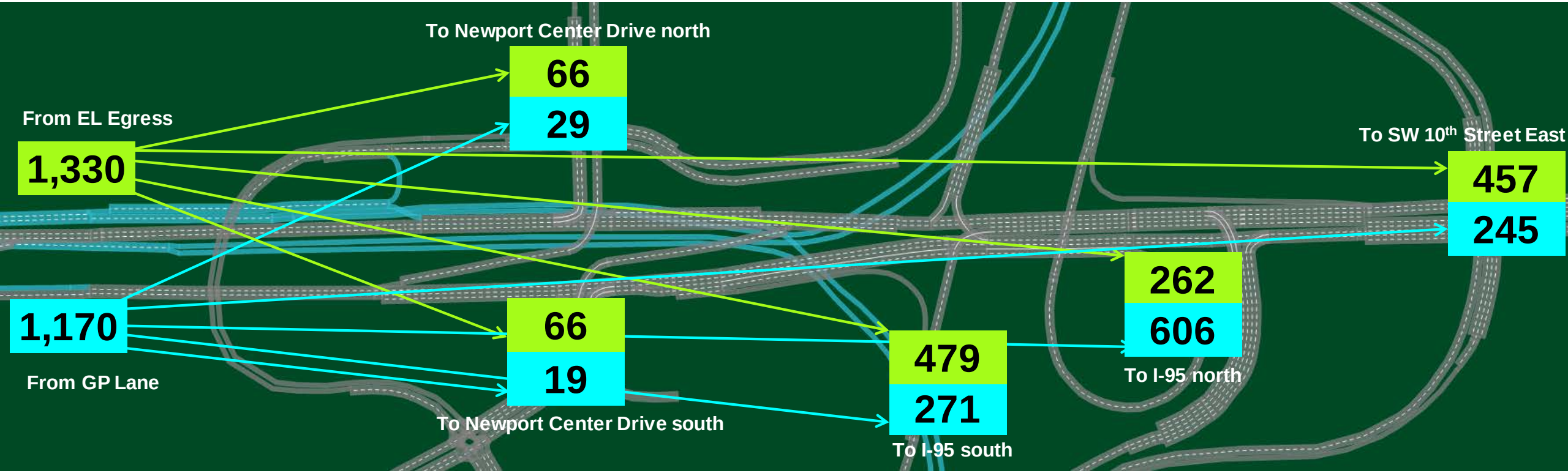
26 percent general-purpose lane traffic weaving, and 356 vph minimum lane changes to reach destination

EL

GP

Traffic volumes in vehicles per hour (vph)

Figure 13B: 2040 PM Build Condition – Inside Merge EB Weaving



EL

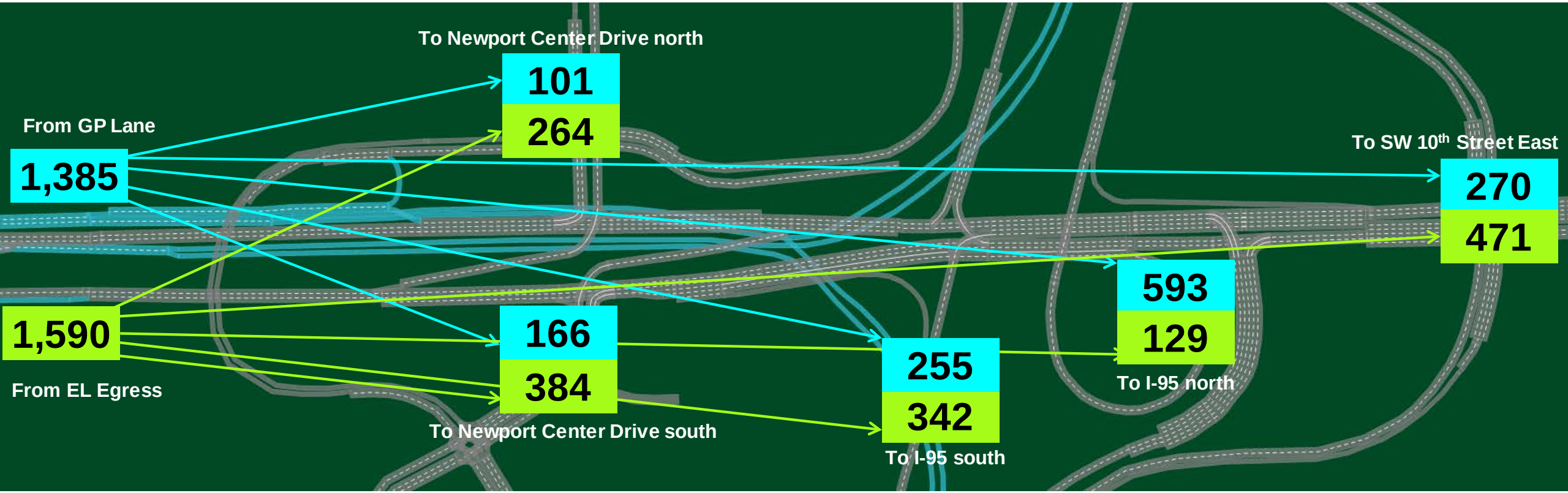
GP

Traffic volumes in vehicles per hour (vph)

61 percent express lane traffic weaving, and 2,093 vph minimum lane changes to reach destination

26 percent general-purpose lane traffic weaving, and 300 vph minimum lane changes to reach destination

Figure 14A: 2040 AM Build Condition – Outside Merge EB Weaving



38 percent express lane traffic weaving, and 870 vph minimum lane changes to reach destination

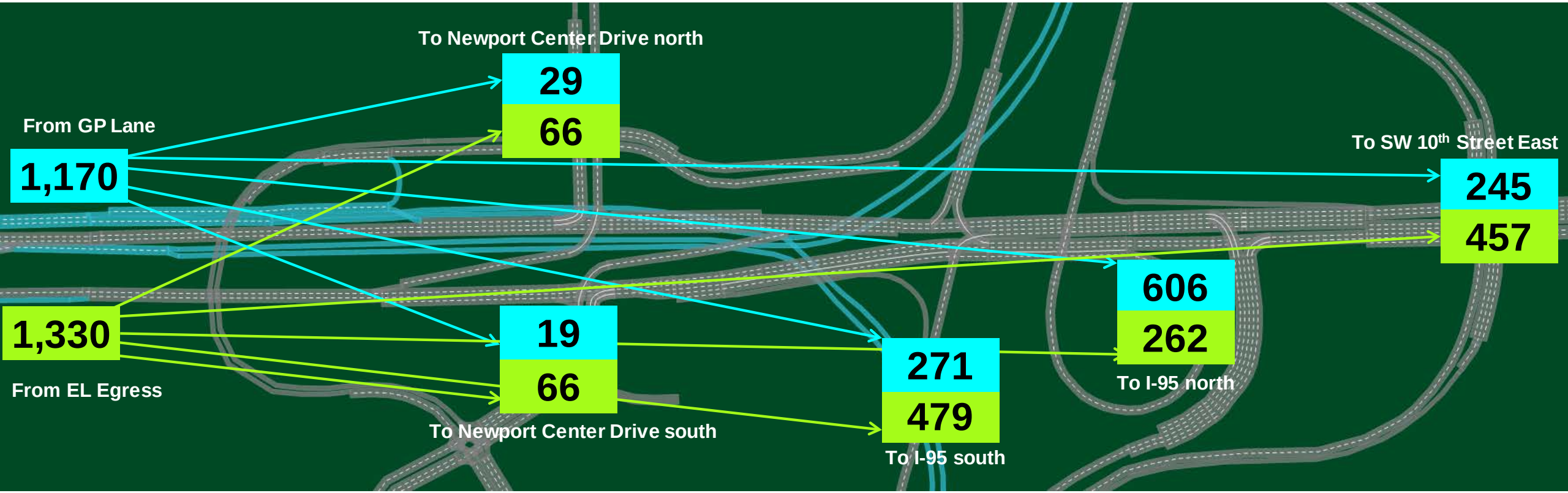
73 percent general-purpose lane traffic weaving, and 1,269 vph minimum lane changes to reach destination

EL

GP

Traffic volumes in vehicles per hour (vph)

Figure 14B: 2040 PM Build Condition – Outside Merge EB Weaving



41 percent express lane traffic weaving, and 611 vph minimum lane changes to reach destination

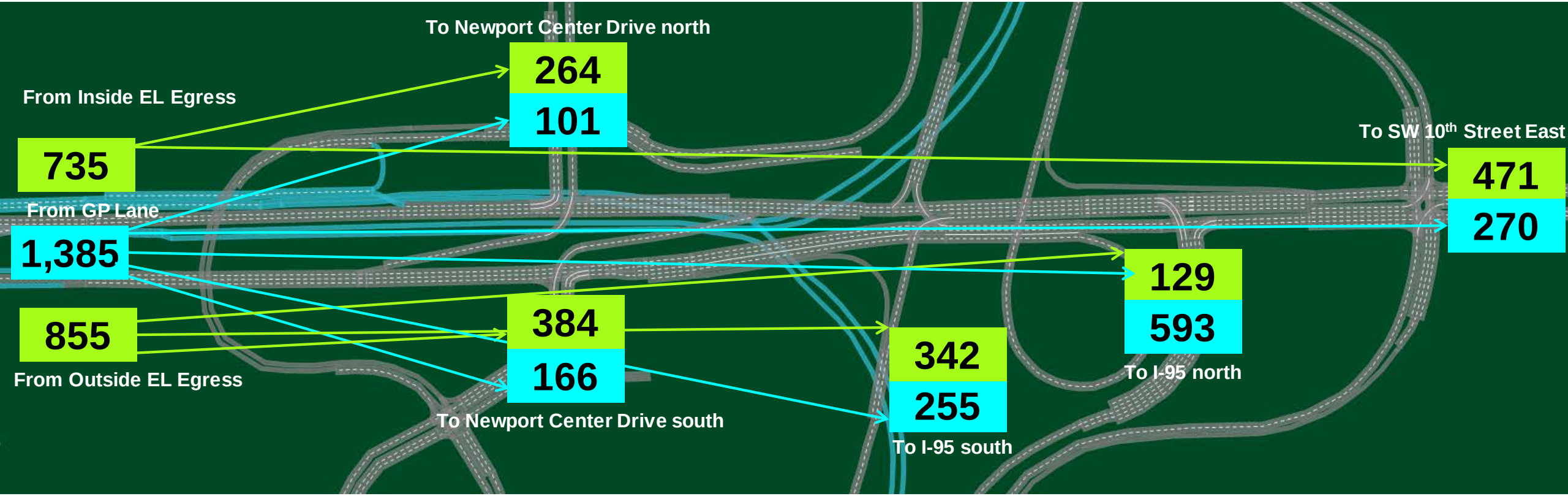
77 percent general-purpose lane traffic weaving, and 1,167 vph minimum lane changes to reach destination

EL

GP

Traffic volumes in vehicles per hour (vph)

Figure 15A: 2040 AM Build Condition – Both Side Merge EB Weaving



0 percent express lane traffic weaving, and
0 vph minimum lane changes to reach destination

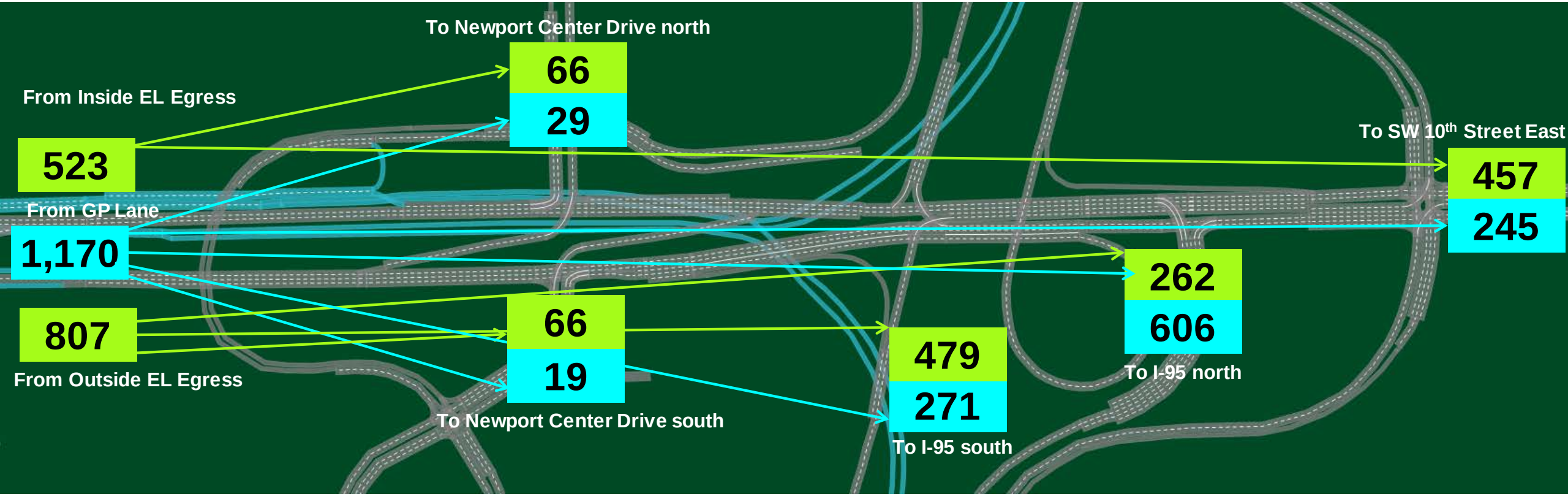
20 percent general-purpose lane traffic weaving, and
267 vph minimum lane changes to reach destination

EL

GP

Traffic volumes in vehicles per hour (vph)

Figure 15B: 2040 PM Build Condition – Both Side Merge EB Weaving



0 percent express lane traffic weaving, and
0 vph minimum lane changes to reach destination

4 percent general-purpose lane traffic weaving, and
48 vph minimum lane changes to reach destination

EL

GP

Traffic volumes in vehicles per hour (vph)