TECHNICAL MEMORANDUM

EAST-WEST ROAD CONCEPT UPDATE STUDY

Prepared For:

City of Tampa, Florida

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URS

AECOM

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TABLE OF CONTENTS

Section **Page**

1.0 INTRODUCTION 1-1
1.1 Project Location and Limits 1-1
2.0 PROJECT TRAFFIC FORECASTS 2-1
2.1 Analysis Year 2-1
2.2 Travel Demand Modeling 2-1
Alternative 1 2-1
Alternative 2 2-1
Alternative 3 2-2
Alternative 4 2-2
2.3 Future Year TRAFFIC Volumes 2-2
3.0 FUTURE CONDITIONS TRAFFIC OPERATIONS ANALYSIS 3-1
3.1 Future Build Operations Analysis 3-1
4.0 CONCEPTUAL ROADWAY PLAN 4-1
5.0 PRELIMINARY COST ESTIMATES 5-1
6.0 CONSISTENCY WITH FHWA & FDOT STANDARDS & POLICIES 6-1
7.0 FEASIBILITY REVIEW 7-1
What's Next? 7-4

LIST OF APPENDICES

Appendix A Travel Demand Model & Annual Growth Calculations
Appendix B Design Year (2040) HCS Analyses
Appendix C Concept Plan Sheets
Appendix D Preliminary Cost Estimates

LIST OF TABLES

Table		Page
3-1	Design Year (2040) Levels of Service	3-3
5-1	Preliminary Cost Estimates	5-1

LIST OF FIGURES

Figure		Page
1-1	Project Location	1-1
2-1	Design Year (2040) Annual Average Daily Traffic (AADT)	2-3
2-2	Design Year (2040) Directional Design Hourly Volumes (DDHVs)	2-4
3-1	Design Year (2040) Number of Lanes	3-2
4-1	East-West Road Preferred Alternative	4-2
7-1	Potential Tolling Facilities in North Tampa	7-2

Section 1.0
INTRODUCTION

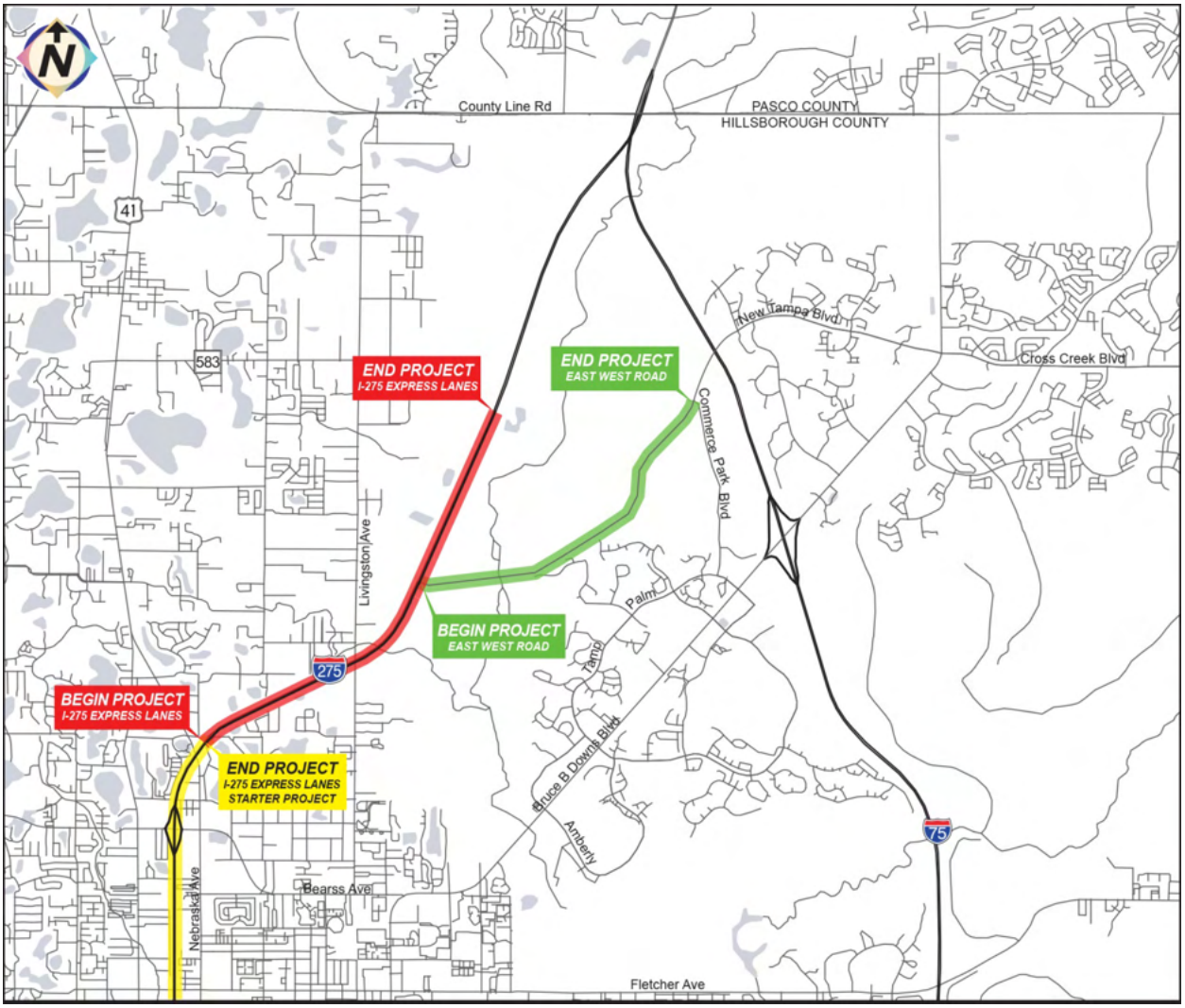
The City of Tampa (City) is conducting a Concept Update Study for a proposed East-West Road, which could operate with express lanes between Commerce Park Boulevard/New Tampa Boulevard and the Starter Projects (Starter Projects) that support the ultimate Tampa Bay Express (TBX) Master Plan on Interstate 275 (I-275), as shown in **Figure 1-1**. The purpose of this *Technical Memorandum* is to document the findings of the feasibility assessment, including future traffic conditions within the study area.

1.1 PROJECT LOCATION AND LIMITS

The East-West Road corridor is proposed to be a four-lane limited access toll facility (two-lanes in each direction) on new alignment in the New Tampa area of northeastern Hillsborough County, Florida. The project includes a proposed connection to a potential I-275 Starter Project between the I-275/Bearss Avenue interchange and the Interstate 75 (I-75)/I-275 junction. Just east of I-275, East-West Road is proposed to transition from four to two lanes (one in each direction) where it continues on the I-275 express lanes ramps to/from the south.

As illustrated on **Figure 1-1**, the project limits of the proposed East-West Road corridor span from the proposed connection to the I-275 Starter Projects to Commerce Park Boulevard/New Tampa Boulevard. In addition, the project includes an extension of the express lanes on I-275 from the northern terminus of the Starter Project to north of the proposed East-West Road connection with I-275.

FIGURE 1-1
PROJECT LOCATION



Section 2.0
PROJECT TRAFFIC FORECASTS

This section describes the travel demand modeling procedure as well as the development of future year Annual Average Daily Traffic (AADT) volumes and Directional Design Hourly Volumes (DDHVs) for the East-West Road corridor.

2.1 ANALYSIS YEAR

A Design Year of 2040 was assumed for the project traffic forecasts and analysis.

2.2 TRAVEL DEMAND MODELING

The 2035 Tampa Bay Regional Planning Model for Managed Lanes (TBRPM-ML) endorsed by the Florida Department of Transportation (FDOT) District Seven Systems Planning Office was used in development of traffic projections for this study. The TBRPM-ML is based on the Florida Standard Urban Transportation Modeling Structure (FSUTMS) and is recognized by the Tampa Bay Area Metropolitan Planning Organizations (MPOs) as an accepted travel demand forecasting tool. The ultimate roadway network used reflects the latest available adopted Cost Affordable Long Range Transportation Plans (LRTPs) for all counties in the region, as well as the I-275 Starter Projects. The model was reviewed to ensure that it accurately reflects the timing of improvements to the surrounding roadway network. In addition, the socioeconomic (SE) data was reviewed to ensure that the latest approved development totals, including those specifically located within the New Tampa area, are represented.

For the a.m. and p.m. peak periods, as well as the off-peak periods, the "variable time of day" tolls from the TBX Master Plan were used. Multiple alternatives were initially modeled for the proposed East-West Road and connection with I-275 to preliminarily evaluate the traffic demand generated in 2035. A brief description of each alternative is as follows:

ALTERNATIVE 1

East-West Road and interchange with express lane (toll) ramps to/from I-275 south. New express lanes join the I-275 Starter Project north of Bearss Avenue. This alternative generates 18,100 vehicles per day (vpd) in 2035 on the East-West Road corridor.

ALTERNATIVE 2

Addition of express lane (toll) ramps to/from I-275 north to the Alternative 1 model. This alternative generates 300 vpd more than Alternative 1 in 2035 on the East-West Road corridor for total of 18,400 vpd.

ALTERNATIVE 3

Addition of express lanes (toll) on I-275 through the East-West Road interchange to south of the I-75/I-275 junction to the Alternative 1 model. This alternative generates 12,600 vpd in 2035 on the new I-275 toll facility north of the East-West Road interchange. The total I-275 toll facility traffic north of Bearss Avenue is 31,700 vpd in 2035.

ALTERNATIVE 4

Addition of express lane (toll) ramps to/from I-275 general use lanes at a location north of Bearss Avenue. This alternative generates 8,500 vpd in 2035 on I-275 with total I-275 toll facility traffic north of Bearss Avenue at 34,800 vpd in 2035. East West Road generates 23,400 vpd and 11,400 vpd on I-275 toll facility north of East West Road.

The traffic projections and conceptual roadway plans for all alternatives were presented to the City of Tampa. Based on the total volume of potential toll traffic projected on the East-West Road facilities in 2035, Alternative 4 was approved by the City Project Manager as the preferred alternative for further analysis.

2.3 FUTURE YEAR TRAFFIC VOLUMES

The Peak Season Weekday Average Daily Traffic (PSWADT) volumes obtained from the 2035 TBRPM-ML model were converted to the respective AADT volumes through multiplication by a factor of 0.95, which is the Model Output Conversion Factor (MOCF) used in the TBX Master Plan. The DDHVs were also obtained from the TBRPM-ML, which is a "time of day" model and provides forecasts for the a.m. and p.m. peak periods. The travel demand model output and the annual growth calculations are documented in **Appendix A**. The AADT volumes and DDHVs for the Design Year (2040) are provided on **Figure 2-1** and **Figure 2-2**.

FIGURE 2-1
DESIGN YEAR (2040) ANNUAL AVERAGE DAILY TRAFFIC (AADT)

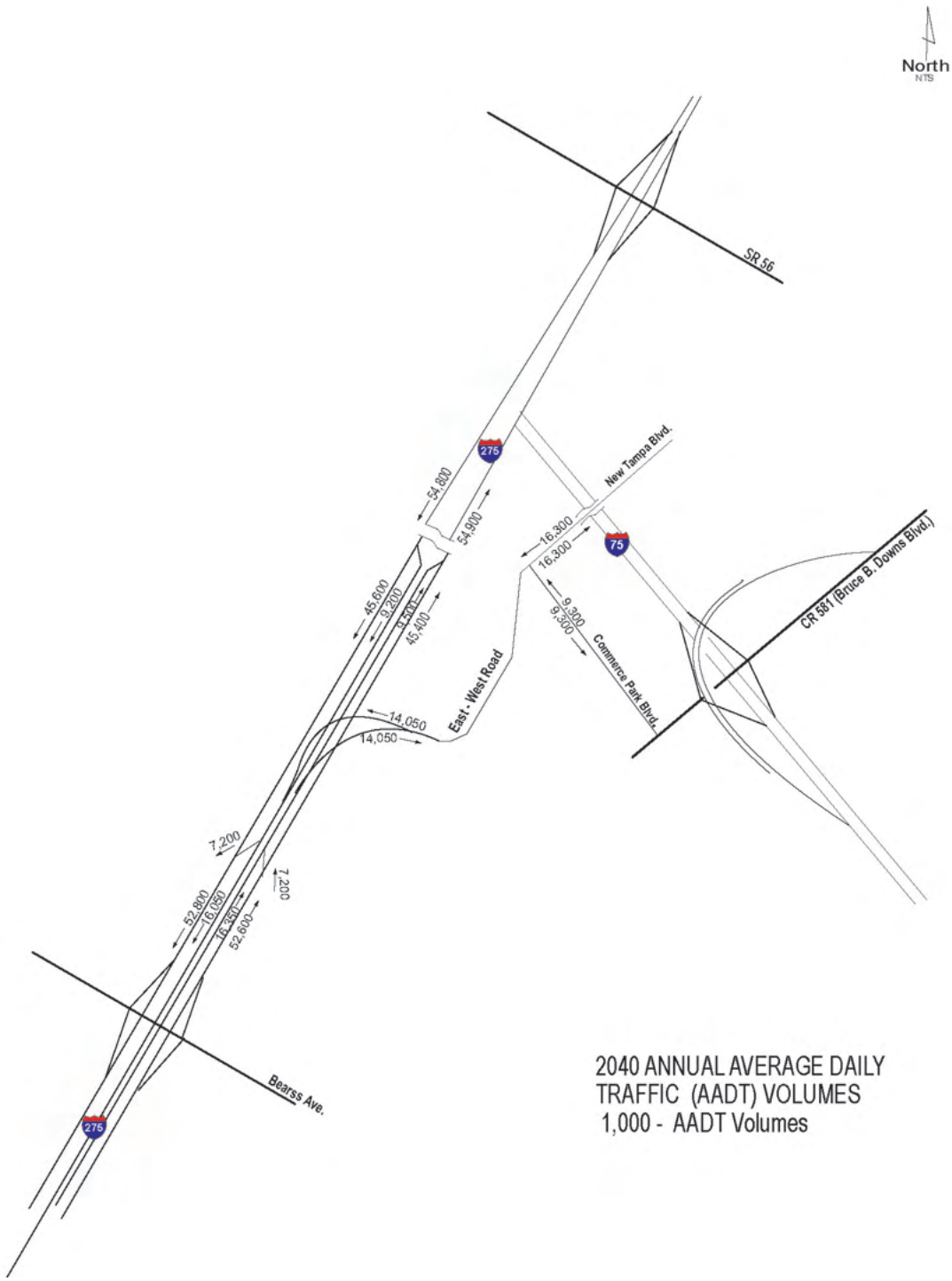
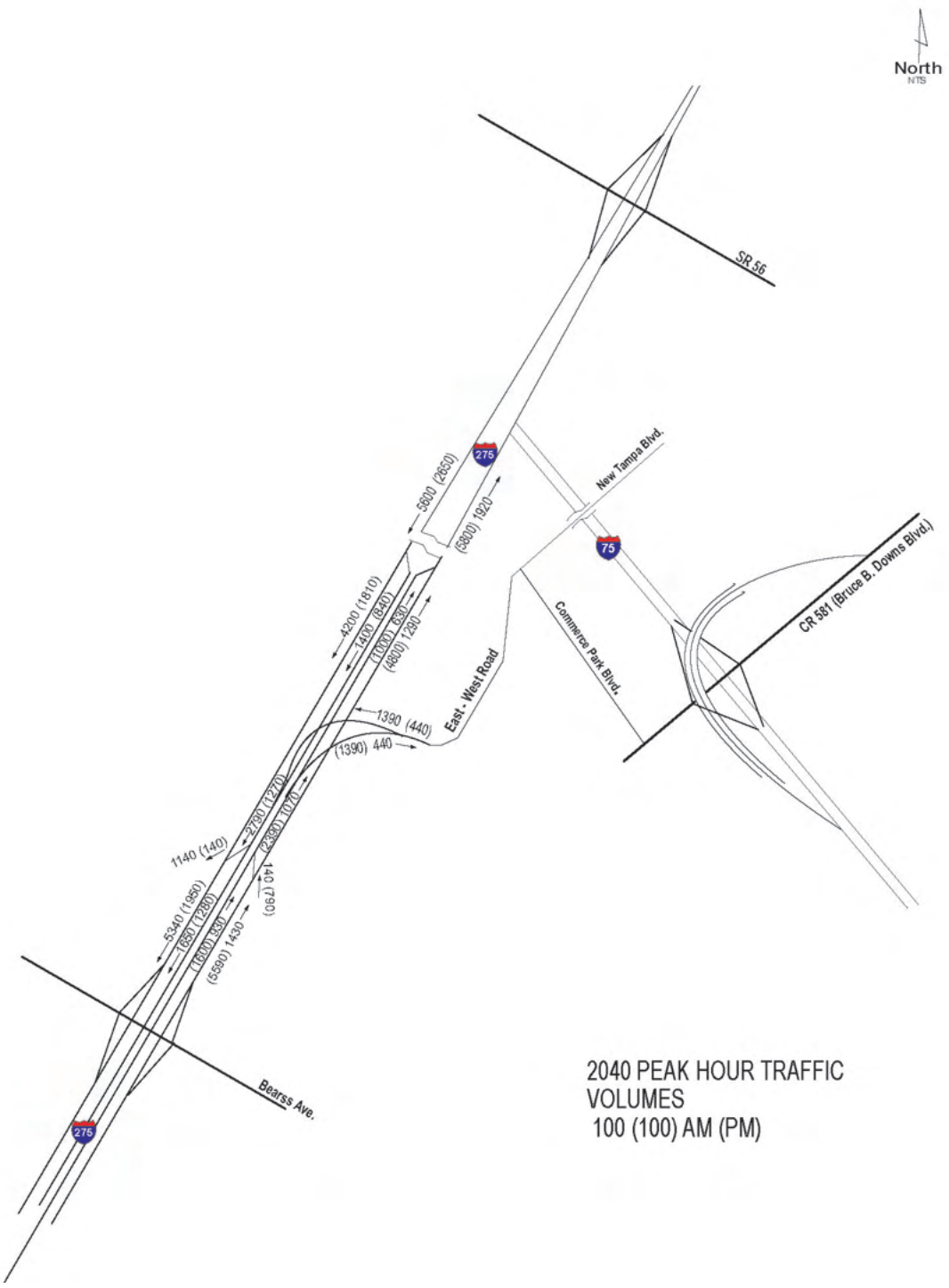


FIGURE 2-2
DESIGN YEAR (2040) DIRECTIONAL DESIGN HOURLY VOLUMES (DDHVS)



Section 3.0
FUTURE CONDITIONS TRAFFIC OPERATIONS ANALYSIS

A future conditions traffic operations analysis was conducted to evaluate the performance of the roadways within the study area. The future conditions analysis was performed using the Highway Capacity Software (HCS) 2010, Version 6.5.

3.1 FUTURE BUILD OPERATIONS ANALYSIS

The number of lanes used in the future analysis of the East-West Road from Commerce Park Boulevard/New Tampa Boulevard and I-275 from Bearss Avenue to the I-75/I-275 junction are provided on **Figure 3-1**. This geometry and the DDHVs provided on Figure 2-2 for the a.m. and p.m. peak period were input into the HCS and the level of service was determined. The levels of service for highways, established by the Transportation Research Board's Levels of Service criteria, range from LOS A through LOS F, where LOS A is the best level of service and LOS F is the worst traffic conditions. The projected levels of service and the associated density in the Design Year (2040) for the East-West Road and the I-275 general use and express lanes are summarized in **Table 3-1**.

In the Design Year (2040), the East-West Road is anticipated to operate at LOS B or better in the a.m. and p.m. peak periods. The proposed express lanes on I-275 are anticipated to operate at LOS D or better with the addition of the East-West Road and interchange. North of the proposed express lane terminus, the general use lanes on I-275 are anticipated to operate at LOS E in the northbound direction during the p.m. peak hour. The Design Year (2040) HCS analyses results are provided in **Appendix B**.

FIGURE 3-1
DESIGN YEAR (2040) NUMBER OF LANES

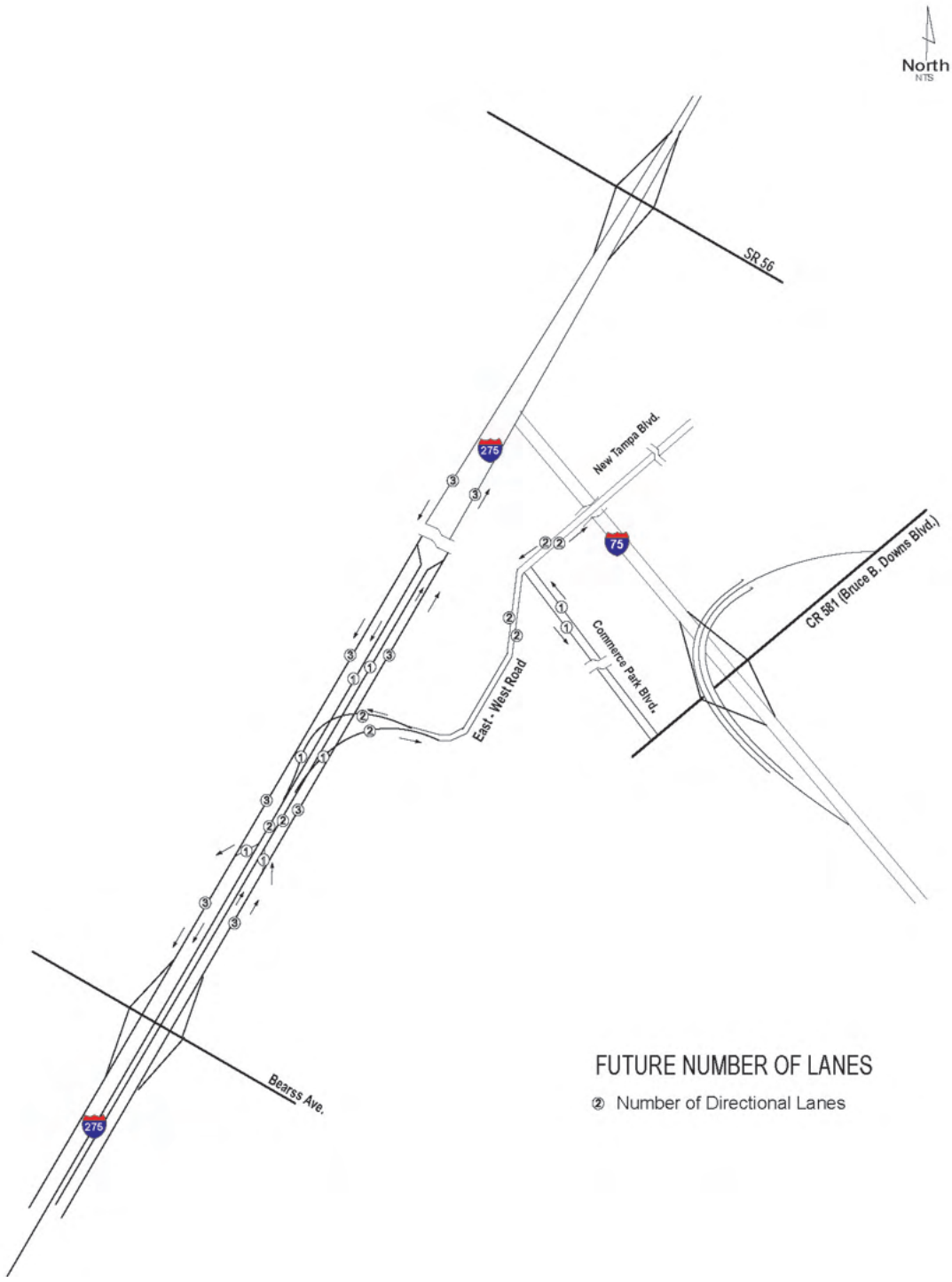


TABLE 3-1
DESIGN YEAR (2040) LEVELS OF SERVICE

Roadway	Location	Direction	AM Peak Hour				PM Peak Hour			
			Mainline		Ramp Merge/Diverge Area		Mainline		Ramp Merge/Diverge Area	
			Density[1]	LOS	Density[1]	LOS	Density[1]	LOS	Density[1]	LOS
East-West Road	I-275 to Commerce Park Blvd./New Tampa Blvd.	Eastbound	4.0	A	-	-	12.6	B	-	-
		Westbound	12.6	B	-	-	4.0	A	-	-
I-275 General Use Lanes	Bearss Ave. to Express Slip Ramp	Northbound	7.5	A	-	-	33.4	D	-	-
	Express Slip Ramp		-	-	8.5	A	-	-	34.7	D
	Express Slip Ramp to Express Terminus		6.8	A	-	-	26.6	D	-	-
	Express Terminus Ramp		-	-	11.2	B	-	-	33.7	D
	Express Terminus to I-75/I-275 Junction		10.1	A	-	-	35.6	E	-	-
	I-75/I-275 Junction to Express Begin	Southbound	33.5	D	-	-	13.9	B	-	-
	Express Begin Ramp		-	-	34.2	D	-	-	17.9	B
	Express Begin to Express Slip Ramp		22.5	C	-	-	9.5	A	-	-
	Express Slip Ramp		-	-	34.4	D	-	-	12.6	B
	Express Slip Ramp to Bearss Ave.		31.1	D	-	-	10.2	A	-	-
I-275 Express Lanes	Bearss Ave. to Express Slip Ramp	Northbound	14.4	B	-	-	26.1	D	-	-
	Express Slip Ramp to East-West Off-Ramp		8.3	A	-	-	18.6	C	-	-
	East-West Off-Ramp to Express Terminus		9.8	A	-	-	15.5	B	-	-
	Express Begin to East-West On-Ramp	Southbound	21.6	C	-	-	13.0	B	-	-
	East-West On-Ramp to Express Slip Ramp		22.0	C	-	-	9.9	A	-	-
	Express Slip Ramp to Bearss Ave.		27.2	D	-	-	20.0	C	-	-

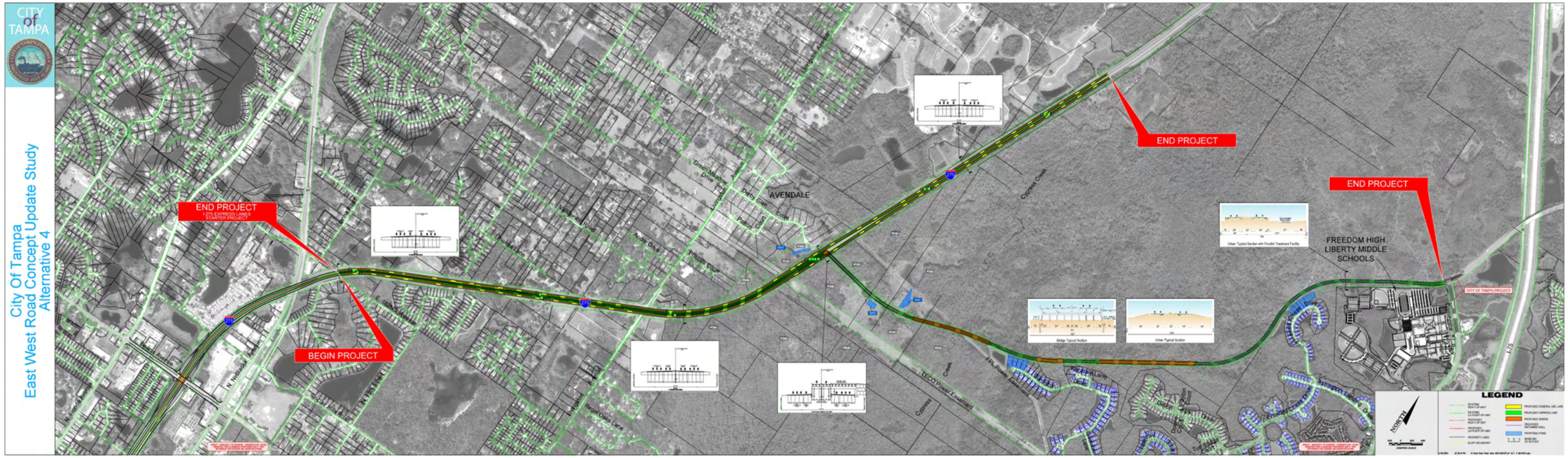
[1] Density = passenger cars per mile per lane

Section 4.0
CONCEPTUAL ROADWAY PLAN

Preliminary engineering criteria used to develop the project are consistent with the requirements of the *Plans Preparation Manual*, FDOT (January 2014) and *A Policy on Geometric Design of Highways and Streets*, AASHTO (2004). In addition, the criteria applied for the I-275 express lanes, and separation of those lanes from the I-275 general use lanes, are consistent with current practices included in the *Draft TBX Master Plan* (January 2015).

Figure 4-1 provides the conceptual roadway plan for the East-West Road preferred alternative. Detailed plan sheets are provided in **Appendix C**.

FIGURE 4-1
EAST-WEST ROAD PREFERRED ALTERNATIVE



Section 5.0
PRELIMINARY COST ESTIMATES

Preliminary estimates were developed for the construction costs associated with the preferred Alternative 4 for the East-West Road, interchange at I-275 and additional express lanes on I-275. These costs include Preliminary Engineering (PE)/Design; Mitigation; Permitting; Change Order Contingency; and Construction, Engineering, and Inspection (CEI). A summary of the conceptual cost estimates is provided in **Table 5-1**. For a detailed breakdown of the cost estimate, refer to **Appendix D**. All East-West Road and associated improvements are in current dollars without escalation to the construction year.

TABLE 5-1
PRELIMINARY COST ESTIMATES

Roadway	Construction Cost Summary						Total Construction Cost
	Construction	PE/Design	CEI	Mitigation	Permitting	Change Order Contingency	
East-West Road & Interchange Ramps	$87,222,000	$10,466,640	$1,569,996	$3,132,570	$62,651	$4,517,729	$106,971,586
I-275 Express Lanes	$41,396,000	$4,967,520	$6,209,400	$0[1]	$827,920	$2,069,800	$55,470,640
						PROJECT TOTAL COST:	**$162,442,226**

[1] All mitigation costs for the project are included in the estimate for the East-West Roadway & Interchange Ramps

Section 6.0
CONSISTENCY WITH FHWA & FDOT STANDARDS & POLICIES

The Federal Highway Administration (FHWA) regulates the addition and modification of access points along the interstate system and, as such, has eight requirements that must be met before a new connection is approved. The following summarizes how the proposed interchange of East-West Road and the Interstate 275 (I-275) Express Lanes will satisfy each requirement.

1 *The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).*

The need for a network of managed/express lanes in the Tampa Bay region has previously been established by FDOT. A traffic analysis of existing conditions conducted as part of the TBX Master Plan established that the existing system (general use lanes on I-275 and the connecting roadway network) operate at or over capacity, even with improvements proposed in Hillsborough and Pasco Counties' LRTP. Further, there is no direct connection to I-275 from the New Tampa area and southern Pasco County.

As such, it has been determined through development of the TBX Master Plan and Hillsborough and Pasco Counties' LRTPs that all reasonable improvements have been explored and will not satisfactorily accommodate the design-year traffic demands served by the proposed East-West Road and interchange.

2 *The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).*

Non-traditional transportation modes such as ramp metering, Travel Demand Management, and Mass Transit were considered as part of Hillsborough and Pasco Counties' LRTP processes and determined to be not sufficient to meet the travel demands that will be addressed by the proposed East-West Road and interchange.

3 *An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp*

intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

As the access requested for the East-West Road is directly to the express lanes of I-275, the project is not anticipated to degrade the levels of service on the general use lanes of the interstate system. The proposed interchange of East-West Road and the I-275 express lanes is expected to relieve congestion and improve traffic operations at several critical locations in the study area, including the I-75/State Road 56 (SR 56) interchange, the CR 581 (Bruce B. Downs Boulevard)/I-75 interchange, and the section of I-75 south of SR 56. Motorists now accessing I-75 at CR 581 (Bruce B. Downs Boulevard) will be provided convenient access to I-275, which has lower traffic volumes and more available capacity than the parallel portion of I-75. Furthermore, the proposed interchange will enhance incident management capabilities by providing additional detour route options and enhance emergency management capabilities by increasing roadway capacity from the Strategic Intermodal System (SIS) and hurricane evaluation routes to the emergency evacuation centers located in the New Tampa area and southern Pasco County.

4 *The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).*

The Build Alternative interchange configuration is proposed to access an extension of the I-275 express lanes via Commerce Park Boulevard/New Tampa Boulevard, which are County roadways. Traffic movements are proposed to/from the express lanes on I-275 south. Note that at this time, there are no plans to extend East-West Road west of I-275.

AASHTO recommends a minimum interchange spacing of 3.0 miles in rural areas and 1.0 mile in urban areas. Further, FDOT recommends a minimum spacing of 2.0 miles for urbanized areas and 3.0 miles for transitioning urbanized areas. The location of the

proposed I-275/East-West Road interchange is approximately 3.0 miles north of the I-275/Bearss Avenue interchange and approximately 5.9 miles south of the I-75/SR 56 interchange. As such, the proposed interchange spacing between adjacent interchanges exceeds design guidelines established by the FHWA and the FDOT.

5 *The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.*

The need for improved access to/from the New Tampa area and southern Pasco County has long been recognized by the Hillsborough and Pasco County MPO and the City of Tampa. The East-West Road is identified as an unfunded need in the Hillsborough County adopted 2035 LRTP and a potential cost feasible project (depending on the adopted investment scenario) in the 2040 LRTP currently being developed. The East-West Road is also proposed to be included on the latest *Future Transportation Network Map* as part of the Hillsborough County Comprehensive Plan Update.

6 *In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).*

The East-West Road and proposed connection to the I-275 express lanes will be incorporated into the TBX Master Plan at the appropriate stage of the project development process.

7 *When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).*

Approved and planned developments in the area have been integrated into the travel demand forecasting for this study. Several planned developments have integrated the proposed roadway into their site plans. In addition, Developments of Regional Impact (DRI) have been approved based upon the assumption that capacity provided by the proposed East-West Road will be available in the near future to mitigate traffic impacts

resulting from those developments. The East-West Road is also proposed to be included on the latest *Future Transportation Network Map* as part of the Hillsborough County Comprehensive Plan Update.

8 *The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).*

A Project Development and Environment (PD&E) Study for the East-West Road and interchange with the I-275 Express Lanes will need to be prepared concurrent with an Interchange Justification Report (IJR). Any environmental impacts for the proposed roadway and interchange will need to be fully evaluated and documented during the PD&E Study following all procedures and requirements of the National Environmental Policy Act (NEPA).

Section 7.0
FEASIBILITY REVIEW

After review of the four potential alternatives, Alternative 4 was approved by the City Project Manager as the preferred alternative for further analysis in this study based on the total volume of potential toll traffic projected on the East-West Road associated facilities. As stated previously in this report, this scenario is projected to generate approximately 28,100 to 32,600 vpd on the East-West Road toll facility and associated I-275 Express Lanes, which warrants the need for a four-lane roadway (two lanes in each direction) on the majority of the East West Road and I-275 corridor. Based on the projected travel demand and number of lanes, the East-West Road is recommended for further evaluation as a potential Public Private Partnership (P3) project. **Figure 7-1** shows the three components of the potential new toll facilities in north Tampa.

As this study focused on the project's feasibility from a traffic demand perspective, an evaluation of potential toll revenues generated by the project will need to be documented in a Preliminary Toll Revenue Study. In addition, an FDOT PD&E/NEPA Study for the East-West Road and interchange with the I-275 express lanes will need to be prepared concurrent with an Interchange Justification Report (IJR). Note that Alternative 4 proposes a new connection to the interstate system and, therefore, constitutes a federal action through the IJR and NEPA process. As such, any environmental impacts for the proposed roadway and interchange will need to be fully evaluated and documented following all procedures and requirements of the NEPA process. The anticipated level of environmental documentation will be an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI).

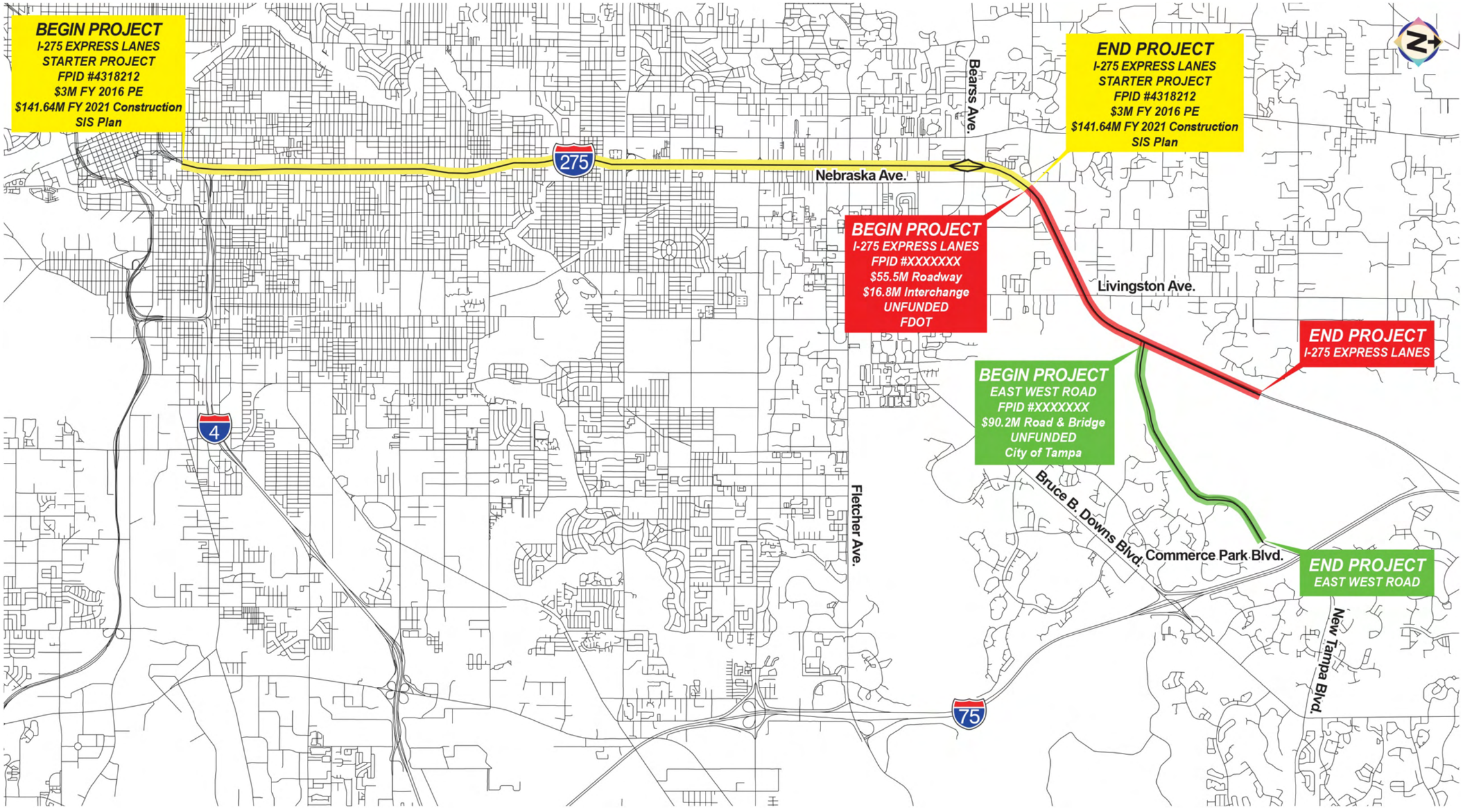
FACTS

- East West Road in Hillsborough Long Range Transportation Plan (Needs)
  - LRTP 2012-2025 Design $6.75M
  - LRTP 2031-2040 Construction $74.89M
  - Revenue Source: Local Sales Tax (if 2016 referendum approved)
- Tampa Bay Express (TBX) I-275 from Jefferson-Orange to North of Bearss Avenue Starter Project in FDOT SIS Plan #4318212
  - FY 2016 PE $3M / FY 2021 Construction $141.64M

POSSIBLE ADVANCE AS P3

- TBX I-275 North FPID #4318212 –Jefferson/Orange Access East Side CBD (Funded)

FIGURE 7-1
POTENTIAL TOLLING FACILITIES IN NORTH TAMPA



- TBX I-275 Extension north of Bearss Ave to East West Road Interchange (Unfunded)

- East West Road Commerce Park Blvd to I-275 TBX (Unfunded)

FLORIDA DOT UNSOLICITED PROPOSAL - FLORIDA STATUTE 334.30

Public-private transportation facilities may advance projects programmed in the

- Adopted Five Year Work Program (FY2015-FY2020 or FY2016-FY2021) or

- Projects increasing transportation capacity and greater than $500 million in the

- 10-year Strategic Intermodal Plan using funds provided by P3s or

- Private entities to be reimbursed from department funds for the project as programmed in the adopted work program.

- Florida DOT Unsolicited Proposal Process:

    - Proposers should begin conceptual discussions with the Project Finance Manager, (Leon Corbett) in the Office of the Comptroller, Project Finance Section to gain an understanding of program basics.

    - If proposal meets basic program requirements, proposers should continue conceptual discussions with the District/Turnpike to determine District/Turnpike interest.

    - If District/Turnpike is interested, the concept should receive executive direction (Secretary/Assistant Secretary/District Secretary) before proceeding further.

    - Central Office will determine if the project involves federal aid and/or is state-funded. District/Turnpike should request a Cash Availability Schedule from Central Office.

    - Proposer submits to the Project Finance Manager an Unsolicited Proposal with $50,000 deposit. Proposal may be a brief concept statement. If acceptable and within Executive Direction, the Department begins 120-day advertisement period.

    - During the advertisement period no evaluation or analysis is performed on the proposal(s).

    - All proposals must be complete and sufficient for evaluation by the end of the advertisement period or will be rejected and returned.

    - At the end of the advertisement period, District/Turnpike and Central Office will evaluate the proposal(s) as may be appropriate and select Best Value Proposal for negotiation.

- If executive direction is to proceed, then award/execute contract with the final selected proposer.

- Project is produced by the District/Turnpike according to the negotiated procurement documents

- East West Road Commerce Park Blvd to I-275 TBX (Unfunded)

  - City/County 1% Sales Tax Initiative 2016 Referendum required ($83.16M)

  - Seek Federal Transit Administration "Premium Transit" funding for "guideway"

  - Potential Tolls on City of Tampa East West Road dedicated to funding – 2040 AADT 28,100

WHAT'S NEXT?

City requests FDOT, Hillsborough County, Tampa Hillsborough Expressway Authority, and MPO to cooperate on funding the East West Road and TBX I-275 north extension to tie East West Road to TBX I-275. Potential funding scenarios to advance the project are:

- Seek FDOT $55.5M SIS funds for new TBX extension from current programmed TBX project #4318212 (does not include #16.8M for East West Road/I-275 interchange)

- Seek FDOT to provide I-275 Interchange ($16.8M) at East West Road as part of TBX extension north from current TBX project #4318212

- City and/or County funding $23.81M "gap" in 2021-2025 ($106.97M – $83.16 = $23.81) assumes 2016 Hillsborough 1% Sales Tax already committed for $83.16M without I-275 interchange

- FDOT/Florida Turnpike Alternative and THEA/P3 Alternative assumes transfer ownership of East West Road from City and becomes part of State Road system

- City of Tampa could reinitiate the LAP agreement with FDOT D7 to fund revised IJR and PD&E using basic information updated from 2009 East West Road shutdown. Possible use of FDOT funding for LAP and subsequent design/build or P3 funding.

APPENDIX A

Travel Demand Model & Annual Growth Calculations

2035 TBPRM-ML Starter Project - June 2014 Network with I-275 4 Express lanes with Slip Ramps between Bearss Ave & East-West Rd
with 2 Express lanes on I-275 north of East-West Interchange
with 4-lane East-West Toll Road
PM Peak Hour= EXPRESS LANE Directional Volumes

Managed Lane Tolls - $0.15/Mile AM & PM Periods
- $0.05/Mile Mid Day & Evening Periods

cube

Licensed to URS

YEAR	SEGMENT NO. 1 I-275 N. of Bearss Ave. Station #10-2001		SEGMENT NO. 2 CR 581 South of I-75 Station #10-5729		SEGMENT NO. 3 CR 581 North of I-75 Station #10-5730		Segment No. 4 Bearss Ave Station # 10-0109		Segment No. 5 Livington Rd South of I-275 Station # 10-5700			TOTAL OF ALL SEGMENTS	
	Counts	Trend	Counts	Trend	Counts	Trend	Counts	Trend				Counts	Trend
1998	26,000	24,400					42,000	39,600					
1999	30,000	26,600					42,500	40,600					
2000	26,000	28,900					42,500	41,600					
2001	24,000	31,100					40,000	42,500					
2002	32,000	33,400					42,000	43,500					
2003	36,000	35,600					42,500	44,500					
2004	37,000	37,900					47,500	45,500					
2005	40,000	40,100					52,500	46,400					
2006	42,000	42,400					53,500	47,400					
2007	55,500	44,600					48,500	48,400					
2008	50,000	46,900	41,000	48,400	48,500	58,100	50,000	49,400	11,900	11,000		201,400	216,200
2009	52,000	49,100	54,000	49,100	67,500	60,100	48,000	50,400	12,000	13,000		233,500	220,400
2010	49000	51,400	53000	49,800	66500	62,200	48,000	51,300	12300	15,000		228,800	224,700
2011	51000	53,600	53000	50,500	66500	64,300	49,000	52,300	13000	17,000		232,500	228,900
2012	51000	55,900	54000	51,200	67500	66,400	49,500	53,300	13000	19,000		235,000	233,200
2013	58500	58,100	46000	52,000	63000	68,400	49,000	54,300	13000	21,100		229,500	237,400
2035		107,500		67,700		114,000		75,800		65,400			330,900
2040		118,800		71,200		124,400		80,700		75,400			352,100
FDOT TREND (2013 - 2040)		3.86%		1.37%		3.03%		1.80%		9.54%			1.79%
TBRPM-MLV24 LINEAR PROJECTION (2006 to 2035)		5.39%		1.10%		1.25%		1.46%					2.31%
AVERAGE GROWTH													2.05%

APPENDIX B

Design Year (2040) HCS Analyses

I-275
2040 AM-PM Peak Hour
HCS Freeway Analysis

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275/NB*
Agency or Company	*URS*	From/To	*Bearss Ave/Express Slip Ramp*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Rd*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1430*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*526*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*7.5*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275/NB*
Agency or Company	*URS*	From/To	*EL Slip Ramp/E-W Terminus*
Date Performed	*10/16/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Rd.*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1290*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/(1+P_T(E_T - 1) + P_R(E_R - 1))$	*0.985*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*474*	pc/h/ln	Design LOS	
S	*70.0*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*6.8*	pc/mi/ln	S	mph
LOS	*A*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275/NB*
Agency or Company	*URS*	From/To	*Slip Ramp/I-75/I-275 Junction*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Rd.*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1920*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*706*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*10.1*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*URS*
Date Performed	*10/6/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I-275/NB Express Lanes*
From/To	*Bearss Ave/E-W Slip Ramp*
Jurisdiction	*Hillsborough County*
Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1860*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1011*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 Express/NB*
Agency or Company	*URS*	From/To	*EW Slip Ramp - E-W Off-Ramp*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Raod*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1070*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*582*	pc/h/ln	Design LOS		
S	*70.0*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	*8.3*	pc/mi/ln	S		mph
LOS	*A*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	I-275/ Express/NB
Agency or Company	URS	From/To	EW Off-Ramp/Express Terminus
Date Performed	10/16/2014	Jurisdiction	Hillsborough County
Analysis Time Period	AM	Analysis Year	2040
Project Description	East-West Road		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	1260	veh/h	Peak-Hour Factor, PHF	0.92
AADT		veh/day	%Trucks and Buses, P_T	0
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/(1+P_T(E_T - 1) + P_R(E_R - 1))$	1.000

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	2		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	685	pc/h/ln	Design LOS		
S	70.0	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	9.8	pc/mi/ln	S		mph
LOS	A		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*URS*
Date Performed	*10/6/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I-275 General Use Ln/SB*
From/To	*Slip Ramp/I-75/I-275*
Jurisdiction	*Hillsborough County*
Analysis Year	*2040*

Project Description *East-West Rd.*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5600*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2059*	pc/h/ln
S	*61.4*	mph
D = v_p / S	*33.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 General Use Ln/SB*
Agency or Company	*URS*	From/To	*Slip Ramp - East-West On/Slip*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4200*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1545*	pc/h/ln	Design LOS	
S	*68.6*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*22.5*	pc/mi/ln	S	mph
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 General Use Ln/SB*
Agency or Company	*URS*	From/To	*E-W On Ramp-Slip Ramp/Bearss*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5340*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1964*	pc/h/ln	Design LOS		
S	*63.2*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	*31.1*	pc/mi/ln	S		mph
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275Express/SB*
Agency or Company	*URS*	From/To	*Beginning of Express/EW On-Ramp*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2800*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1489*	pc/h/ln	Design LOS		
S	*69.0*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	*21.6*	pc/mi/ln	S		mph
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 Express/SB*
Agency or Company	*URS*	From/To	*EW On-Ramp/ EW Slip Ramp*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2790*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1516*	pc/h/ln	Design LOS		
S	*68.8*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	*22.0*	pc/mi/ln	S		mph
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 Express/SB*
Agency or Company	*URS*	From/To	*EW Slip Ramp/Bearss Ave.*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsboroough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3300*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1793*	pc/h/ln	Design LOS	
S	*65.9*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*27.2*	pc/mi/ln	S	mph
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275/NB*
Agency or Company	*URS*	From/To	*Bearss Ave/Express Slip Ramp*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Rd*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5590*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2056*	pc/h/ln
S	*61.5*	mph
D = v_p / S	*33.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	I-275/NB General Use Lanes
Agency or Company	URS	From/To	Express Slip Ramp-E-W Terminus
Date Performed	10/6/2014	Jurisdiction	Hillsborough County
Analysis Time Period	PM	Analysis Year	2040

Project Description East-West Road

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	4800	veh/h	Peak-Hour Factor, PHF	0.92
AADT		veh/day	%Trucks and Buses, P_T	3
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	3	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	70.0	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	70.0	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1765	pc/h/ln
S	66.3	mph
D = v_p / S	26.6	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275/NB*
Agency or Company	*URS*	From/To	*Slip Ramp/I-75/I-275 Junction*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Rd.*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5800*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2133*	pc/h/ln	Design LOS		
S	*59.9*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	*35.6*	pc/mi/ln	S		mph
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*URS*
Date Performed	*10/6/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I-275/NB Express Lanes*
From/To	*Bearss Ave/E-W Slip Ramp*
Jurisdiction	*Hillsborough County*
Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3200*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1739*	pc/h/ln
S	*66.6*	mph
D = v_p / S	*26.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 Express/NB*
Agency or Company	*URS*	From/To	*EW Slip Ramp - E-W Off-Ramp*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description *East-West Raod*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2390*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1299*	pc/h/ln	Design LOS	
S	*69.9*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*18.6*	pc/mi/ln	S	mph
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275/ Express/NB*
Agency or Company	*URS*	From/To	*EW Off-Ramp/Express Terminus*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2000*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1087*	pc/h/ln	Design LOS	
S	*70.0*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*15.5*	pc/mi/ln	S	mph
LOS	*B*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 General Use Ln/SB*
Agency or Company	*URS*	From/To	*Slip Ramp/I-75/I-275*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Rd.*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2650*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*975*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.9*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)		
Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 General Use Ln/SB*
Agency or Company	*URS*	From/To	*Slip Ramp - East-West On/Slip*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1810*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*666*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*9.5*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 General Use Ln/SB*
Agency or Company	*URS*	From/To	*E-W On Ramp-Slip Ramp/Bearss*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1950*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*3*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*717*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*10.2*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275Express/SB*
Agency or Company	*URS*	From/To	*Beginning of Express/EW On-Ram*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1680*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*913*	pc/h/ln	Design LOS v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*70.0*	mph	S		mph
D = v_p / S	*13.0*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*B*		Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 Express/SB*
Agency or Company	*URS*	From/To	*EW On-Ramp/ EW Slip Ramp*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsborough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1270*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*690*	pc/h/ln	Design LOS		
S	*70.0*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	*9.9*	pc/mi/ln	S		mph
LOS	*A*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-275 Express/SB*
Agency or Company	*URS*	From/To	*EW Slip Ramp/Bearss Ave.*
Date Performed	*10/6/2014*	Jurisdiction	*Hillsboroough County*
Analysis Time Period	*PM*	Analysis Year	*2040*

Project Description *East-West Road*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2560*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*0*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*2*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1391*	pc/h/ln	Design LOS	
S	*69.6*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*20.0*	pc/mi/ln	S	mph
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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I-275
2040 AM-PM Peak Hour
HCS Merge-Diverge Analysis

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	URS	Freeway/Dir of Travel	I275/NB
Agency or Company		Junction	Diverge to EL, S. of E-W (1)
Date Performed	9/25/2014	Jurisdiction	Hillsborough County
Analysis Time Period	AM	Analysis Year	2040

Project Description East-West Road

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	700	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	1430	V_D =	veh/h
		Ramp Volume, V_R	140		
		Freeway Free-Flow Speed, S_{FF}	70.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	1430	0.92	Level	3	0	0.985	1.00	1578
Ramp	140	0.92	Level	0	0	1.000	1.00	152
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.714 using Equation (Exhibit 13-7)

V_{12} = 1170 pc/h

V_3 or V_{av34} 408 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1578	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	1426	Exhibit 13-8	7200	No
V_R	152	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1170	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 8.5 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_s = 0.182 (Exhibit 13-12)

S_R = 64.9 mph (Exhibit 13-12)

S_0 = 76.8 mph (Exhibit 13-12)

S = 67.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst		Freeway/Dir of Travel	I-275 Express/NB
Agency or Company	URS	Junction	Express Terminus N. of EW (3)
Date Performed	10/7/2014	Jurisdiction	Hillsborough County
Analysis Time Period	AM	Analysis Year	2040

Project Description East-West Road

Site Information

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 1100	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1290	
	Ramp Volume, V_R: 630	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	1290	0.92	Level	3	0	0.985	1.00	1423
Ramp	630	0.92	Level	0	0	1.000	1.00	685
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.608 using Equation (Exhibit 13-6)

V_{12} = 866 pc/h

V_3 or V_{av34} = 557 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 866 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2108	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1654	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 11.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.220 (Exibit 13-11)

S_R = 63.8 mph (Exhibit 13-11)

S_0 = 70.0 mph (Exhibit 13-11)

S = 65.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	URS	Freeway/Dir of Travel	I275/NB
Agency or Company		Junction	Diverge to EL, S. of E-W Rd (1
Date Performed	9/25/2014	Jurisdiction	Hillsborough County
Analysis Time Period	PM	Analysis Year	2040

Project Description East-West Road

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	500
Freeway Volume, V_F	5590
Ramp Volume, V_R	790
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	55.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5590	0.92	Level	3	0	0.985	1.00	6167
Ramp	790	0.92	Level	0	0	1.000	1.00	859
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.566 using Equation (Exhibit 13-7)
V_{12} = 3865 pc/h
V_3 or V_{av34} 2302 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6167	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	5308	Exhibit 13-8	7200	No
V_R	859	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3865	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 34.7 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.245 (Exhibit 13-12)
S_R = 63.1 mph (Exhibit 13-12)
S_0 = 72.5 mph (Exhibit 13-12)
S = 66.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst		Freeway/Dir of Travel	I-275 General Use/NB
Agency or Company	URS	Junction	Express Terminus N. of EW (3)
Date Performed	10/7/2014	Jurisdiction	Hillsborough County
Analysis Time Period	PM	Analysis Year	2040

Project Description East-West Road

Site Information

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A	1100	☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	4800	V_D =	veh/h
		Ramp Volume, V_R	1000		
		Freeway Free-Flow Speed, S_{FF}	70.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4800	0.92	Level	3	0	0.985	1.00	5296
Ramp	1000	0.92	Level	0	0	1.000	1.00	1087
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.608 using Equation (Exhibit 13-6)

V_{12} = 3222 pc/h

V_3 or V_{av34} 2074 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 3222 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6383	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4695	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 34.7 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.627 (Exibit 13-11)

S_R = 52.5 mph (Exhibit 13-11)

S_0 = 65.7 mph (Exhibit 13-11)

S = 55.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	URS	Freeway/Dir of Travel	I275/SB
Agency or Company		Junction	S. of E-W Rd. on RP fr. EL (6)
Date Performed	9/25/2014	Jurisdiction	Hillsborough County
Analysis Time Period	AM	Analysis Year	2040

Project Description: East-West Road

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A	700	☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	4200	V_D =	veh/h
		Ramp Volume, V_R	1140		
		Freeway Free-Flow Speed, S_{FF}	70.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4200	0.92	Level	3	0	0.985	1.00	4634
Ramp	1140	0.92	Level	0	0	1.000	1.00	1239
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)

L_{EQ} =

P_{FM} = 0.597 using Equation (Exhibit 13-6)

V_{12} = 2767 pc/h

V_3 or V_{av34} 1867 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 2767 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5873	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4338	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 34.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.543 (Exibil 13-11)

S_R = 54.8 mph (Exhibit 13-11)

S_0 = 66.3 mph (Exhibit 13-11)

S = 57.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F \cdot V_R) P_{FD}$ (Equation 13-12 or 13-13)

L_{EQ} =

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst		Freeway/Dir of Travel	I-275/SB
Agency or Company	URS	Junction	I-275 at beginning of Express
Date Performed	10/7/2014	Jurisdiction	Hillsborough County
Analysis Time Period	PM	Analysis Year	2040

Project Description East-West Road

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	700	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	2650	V_D =	veh/h
		Ramp Volume, V_R	840		
		Freeway Free-Flow Speed, S_{FF}	70.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2650	0.92	Level	3	0	0.985	1.00	2924
Ramp	840	0.92	Level	0	0	1.000	1.00	913
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.645 using Equation (Exhibit 13-7)

V_{12} = 2210 pc/h

V_3 or V_{av34} 714 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2924	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2011	Exhibit 13-8	7200	No
V_R	913	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2210	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 17.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.250 (Exhibit 13-12)

S_R = 63.0 mph (Exhibit 13-12)

S_0 = 76.8 mph (Exhibit 13-12)

S = 65.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	URS	Freeway/Dir of Travel	I275/SB
Agency or Company		Junction	S. of E-W Rd. on RP fr. EL (6)
Date Performed	9/25/2014	Jurisdiction	Hillsborough County
Analysis Time Period	PM	Analysis Year	2040

Project Description East-West Road

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A	700	☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	ft
V_U =	veh/h	Freeway Volume, V_F	1810	V_D =	veh/h
		Ramp Volume, V_R	140		
		Freeway Free-Flow Speed, S_{FF}	70.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1810	0.92	Level	3	0	0.985	1.00	1997
Ramp	140	0.92	Level	0	0	1.000	1.00	152
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.597 using Equation (Exhibit 13-6)

V_{12} = 1192 pc/h

V_3 or V_{av34} 805 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1192 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2149	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1487	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.6 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.261 (Exibit 13-11)

S_R = 62.7 mph (Exhibit 13-11)

S_0 = 69.4 mph (Exhibit 13-11)

S = 64.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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East-West Road

2040 AM-PM Peak Hour

HCS Multi-Lane Analysis

MULTILANE HIGHWAYS WORKSHEET(Direction 1)

General Information

Analyst	
Agency or Company	URS
Date Performed	10/7/2014
Analysis Time Period	AM

Site Information

Highway/Direction to Travel	East-West Road
From/To	I-275/Commerce Pk Blvd
Jurisdiction	City of Tampa
Analysis Year	2040

Project Description East-West Road

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	440	Peak-Hour Factor, PHF	0.92
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearance, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	Divided
FFS (measured)	
Base Free-Flow Speed, BFFS	60.0

Calc Speed Adj and FFS

f_{LW} (mi/h)	0.0
f_{LC} (mi/h)	0.0
f_A (mi/h)	0.0
f_M (mi/h)	0.0
FFS (mi/h)	60.0

Operations

Operational (LOS)

Flow Rate, v_p (pc/h/ln)	239
Speed, S (mi/h)	60.0
D (pc/mi/ln)	4.0
LOS	A

Design

Design (N)

Required Number of Lanes, N	
Flow Rate, v_p (pc/h)	
Max Service Flow Rate (pc/h/ln)	
Design LOS	

Bicycle Level of Service

MULTILANE HIGHWAYS WORKSHEET(Direction 2)

General Information

Analyst	
Agency or Company	URS
Date Performed	10/7/2014
Analysis Time Period	AM

Site Information

Highway/Direction to Travel	East-West Road
From/To	I-275/Commerce Pk Blvd
Jurisdiction	City of Tampa
Analysis Year	2040

Project Description East-West Road

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1390	Peak-Hour Factor, PHF	0.92
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearance, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	Divided
FFS (measured)	
Base Free-Flow Speed, BFFS	60.0

Calc Speed Adj and FFS

f_{LW} (mi/h)	0.0
f_{LC} (mi/h)	0.0
f_A (mi/h)	0.0
f_M (mi/h)	0.0
FFS (mi/h)	60.0

Operations

Operational (LOS)

Flow Rate, v_p (pc/h/ln)	755
Speed, S (mi/h)	60.0
D (pc/mi/ln)	12.6
LOS	B

Design

Design (N)

Required Number of Lanes, N	
Flow Rate, v_p (pc/h)	
Max Service Flow Rate (pc/h/ln)	
Design LOS	

Bicycle Level of Service

MULTILANE HIGHWAYS WORKSHEET(Direction 1)

General Information		Site Information	
Analyst		Highway/Direction to Travel	East-West Road
Agency or Company	URS	From/To	I-275/Commerce Pk Blvd
Date Performed	10/7/2014	Jurisdiction	City of Tampa
Analysis Time Period	PM	Analysis Year	2040

Project Description East-West Road

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1390	Peak-Hour Factor, PHF	0.92
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	60.0
Base Free-Flow Speed, BFFS	60.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	755	Required Number of Lanes, N	
Speed, S (mi/h)	60.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	12.6	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

MULTILANE HIGHWAYS WORKSHEET(Direction 2)

General Information

Analyst	
Agency or Company	URS
Date Performed	10/7/2014
Analysis Time Period	PM

Site Information

Highway/Direction to Travel	East-West Road
From/To	I-275/Commerce Pk Blvd
Jurisdiction	City of Tampa
Analysis Year	2040

Project Description East-West Road

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	440	Peak-Hour Factor, PHF	0.92
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearance, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	Divided
FFS (measured)	
Base Free-Flow Speed, BFFS	60.0

Calc Speed Adj and FFS

f_{LW} (mi/h)	0.0
f_{LC} (mi/h)	0.0
f_A (mi/h)	0.0
f_M (mi/h)	0.0
FFS (mi/h)	60.0

Operations

Operational (LOS)

Flow Rate, v_p (pc/h/ln)	239
Speed, S (mi/h)	60.0
D (pc/mi/ln)	4.0
LOS	A

Design

Design (N)

Required Number of Lanes, N

Flow Rate, v_p (pc/h)

Max Service Flow Rate (pc/h/ln)

Design LOS

Bicycle Level of Service

APPENDIX C

Concept Plan Sheets

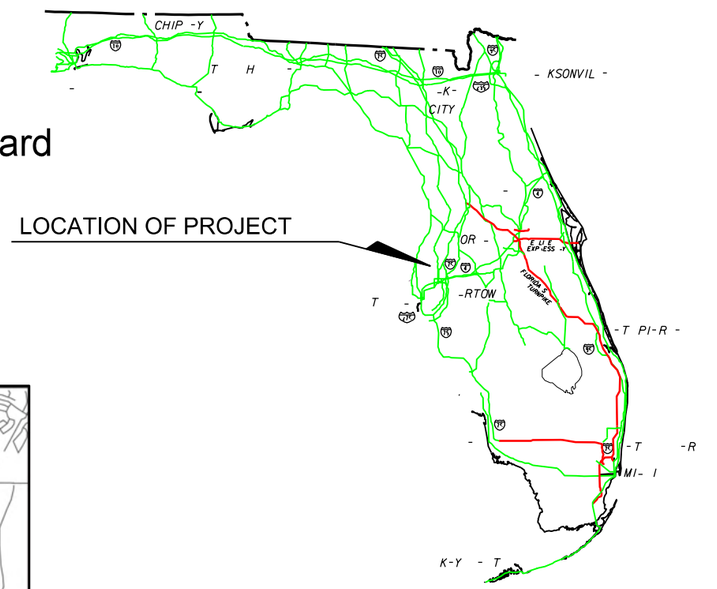
ity Of Tampa

Eas -

From I- levard/New Tampa Boulevard

ALTERNATIVE 4

PREPARED BY
URS CORPORATION SOUTHERN

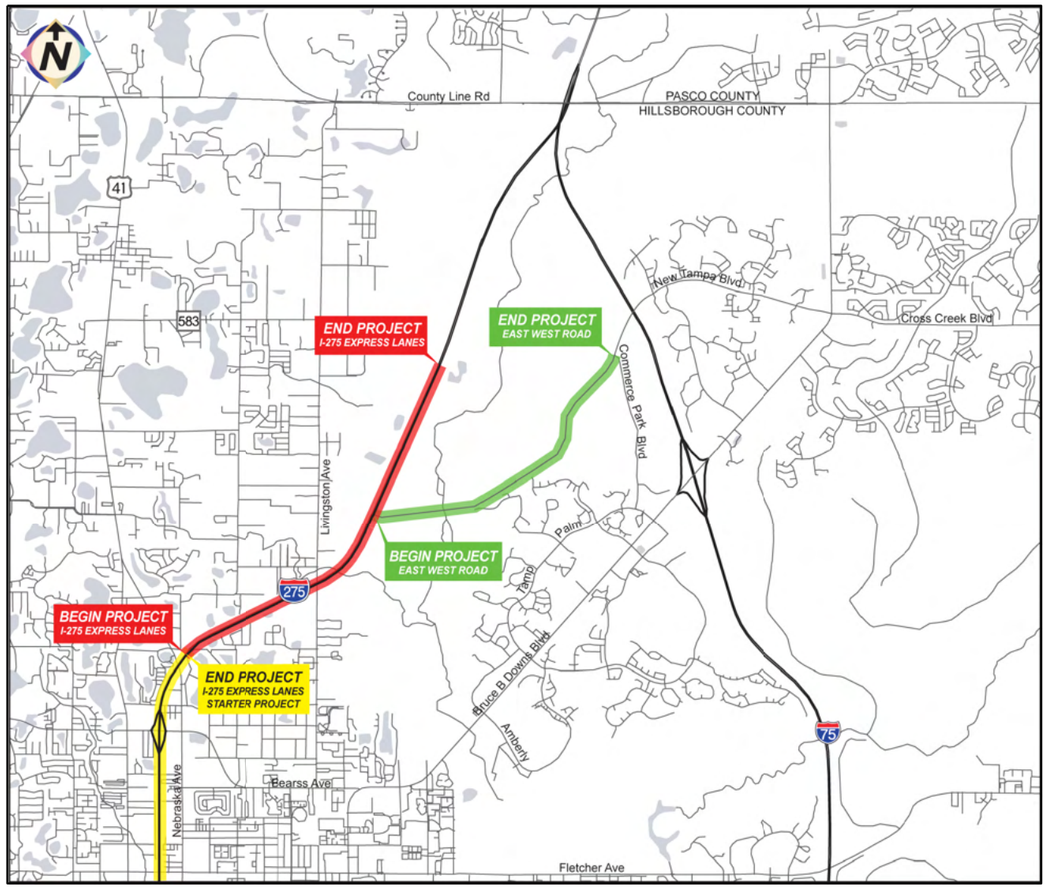


LOCATION OF PROJECT

INDEX OF PLANS

SHEET N .	SHEET DESCRIPTION
I	COVER SHEET
II	LEGEND/SHEET LAYOUT
-	PLANS

Aerial Photography Date: 2011



PROJECT LOCATION MAP

DRAF - ING PURPOSES ONLY

URS Corpora ion Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 3360 -

CON - T P -
- I -R - \- RD: - iul A. Sc l mid, F. No.

P.- 50091

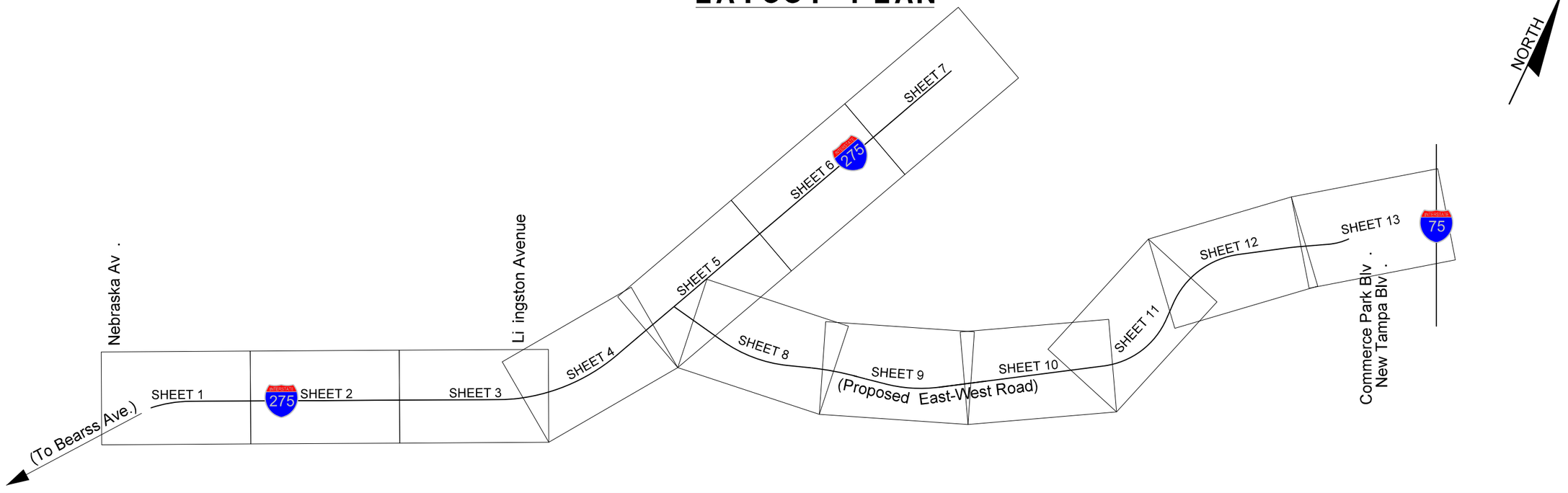
LEGEND

- EXISTING RIGH -
- EXISTING L/A RIGH -
- PROPOSED RIGH -
- PROPOSED L/A RIGH -
- PROPERTY LINES
- GENERAL USE LANES
- EXPRESS LANES
- BRIDGE

- 3 NUMBER OF GENERAL USE LANES
- 1 NUMBER OF EXPRESS LANES
- PROPOSED GRAVITY / RETAINING WALL
- ELAPP BOUNDARY
- PARK BOUNDARY
- WETLAND BOUNDARY
- POND

PON -

LAYOUT PLAN



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Paul id, .

CITY OF TAMPA
EAST-WEST ROAD CONCEPT UPDATE STUDY
FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

SHEET NO.
II

$USER$ $DATE$ $TIME$ $FILE$

NORTH

100 0 100 200

GRAPHIC SCALE

Hayes Rd.

Hanna Road

Nebraska Ave.

END PROJECT
I-275 EXPRESS LANES
STARTER PROJECT

INTERSTATE 275

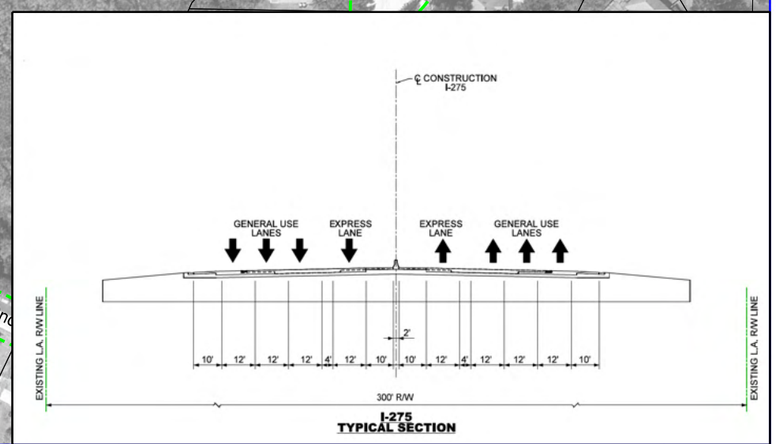
3 1 1 3

BEGIN PROJECT
I-275 EXPRESS LANES

W. Lake Burrell Dr.

E. Lake Burrell Dr.

E. 162nd



I-275
TYPICAL SECTION

REVISIONS			
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URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
C.A. No. 00000002
Paul A. Schmid, P.E. No. 50091

CITY OF TAMPA
EAST-WEST ROAD CONCEPT UPDATE STUDY

FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

SHEET NO. 1

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Provincetown Cir.

September Dr.

Pierma Lane

NORTH

100 0 100 200

GRAPHIC SCALE

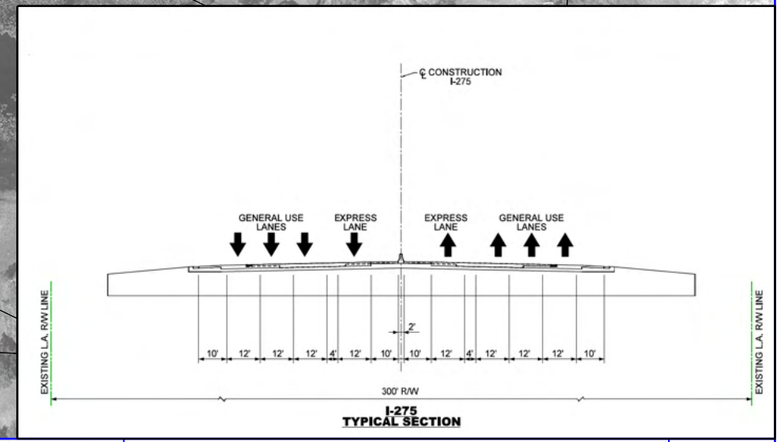
INTERSTATE 275

3 2 2 3

Swenson Terrace

Barrineau Pl.

McMrea Dr.



I-275
TYPICAL SECTION

REVISIONS

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CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

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CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

SHEET NO. 3

Priscilla Court

NORTH

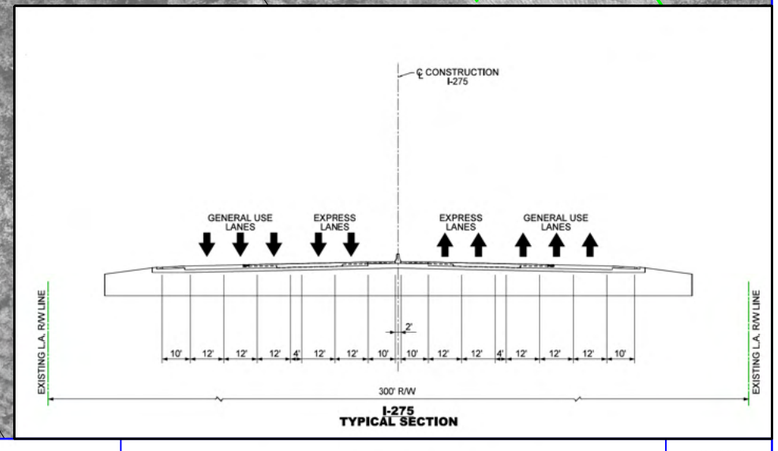
100 0 100 200

GRAPHIC SCALE

PON -

INTERSTATE 275

TECO Power Easement



I-275
TYPICAL SECTION

REVISIONS			
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ALTERNATIVE 4

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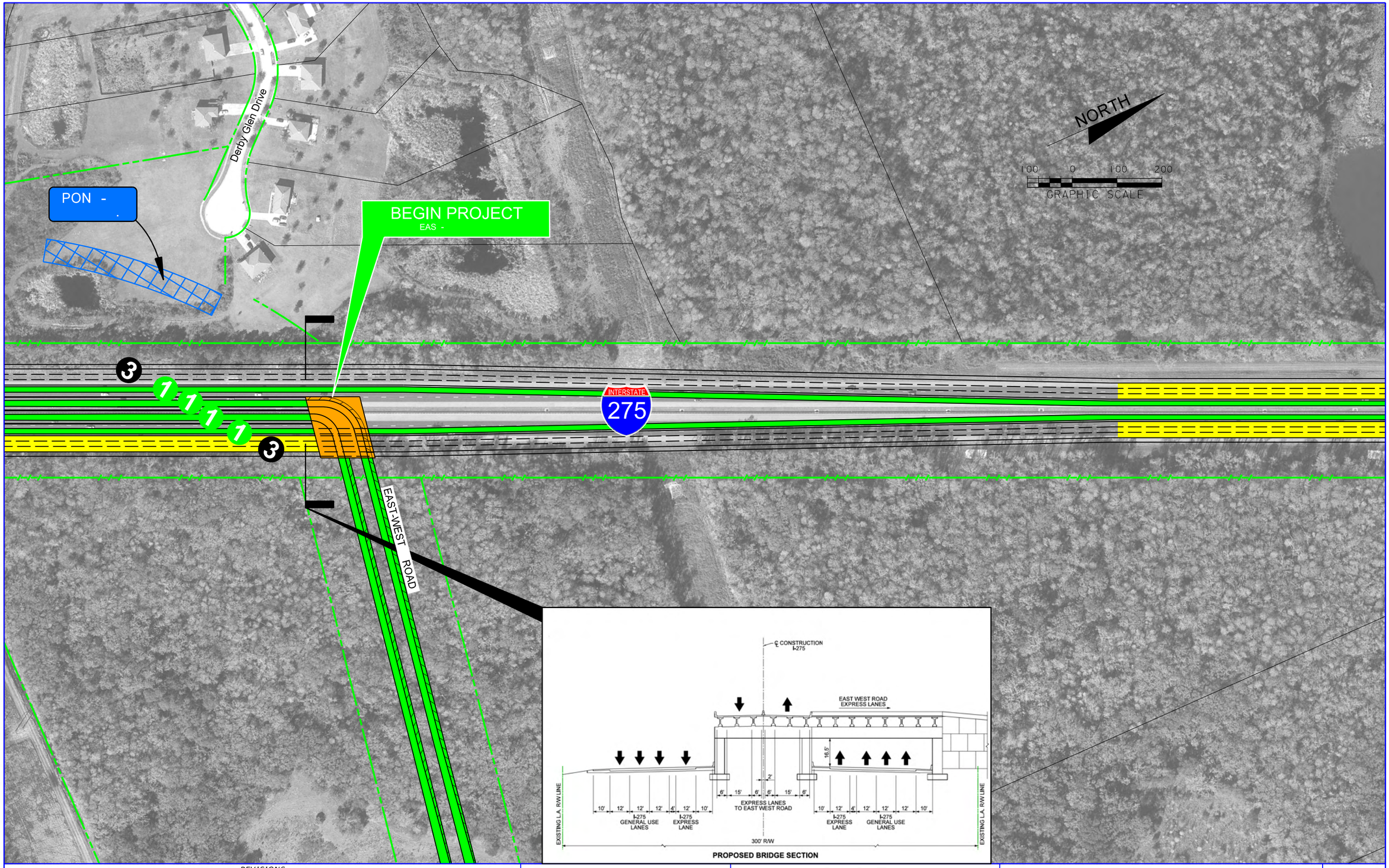

PROPOSED BRIDGE SECTION

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CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

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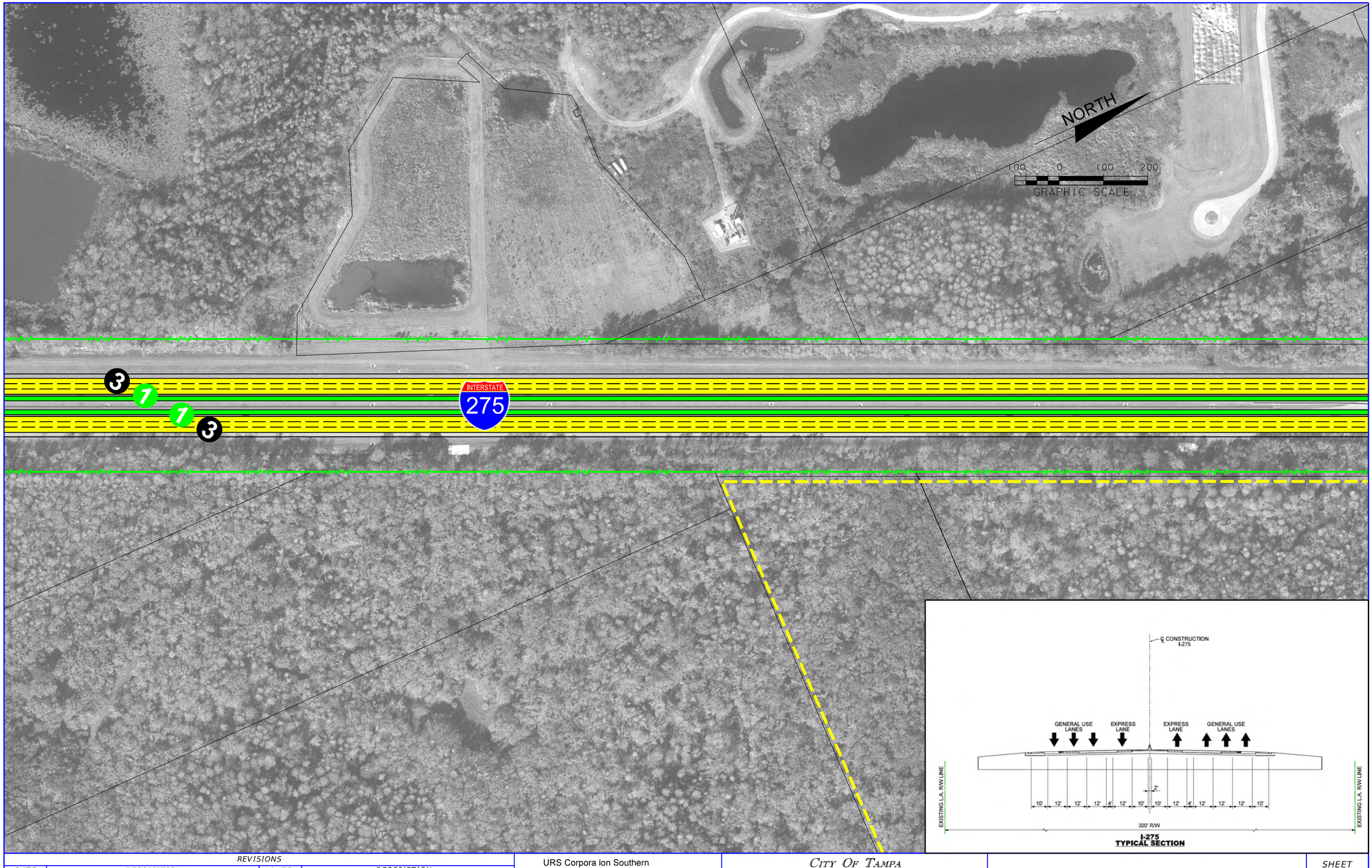

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EAST-WEST ROAD CONCEPT UPDATE STUDY
FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

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FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

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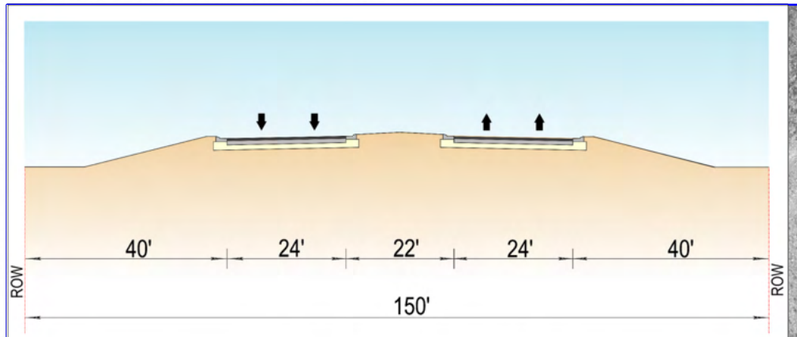


Urban Typical Section

NORTH

100 0 100 200

GRAPHIC SCALE

POND-2

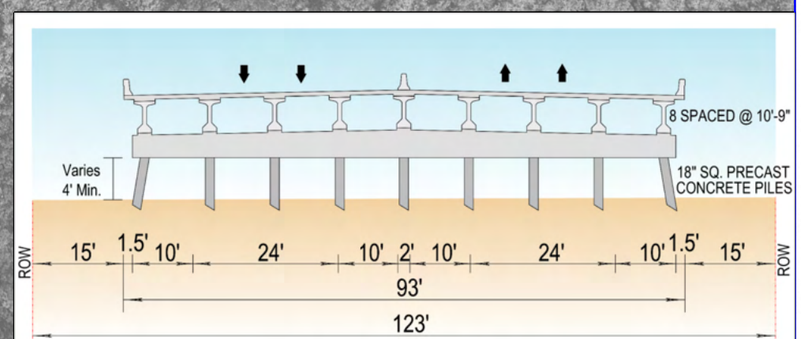
Creek

FPL Power Easement

EAS -

PON -

TECO Power Easement



Bridge Typical Section

REVISIONS

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Tampa, FL 3360 -
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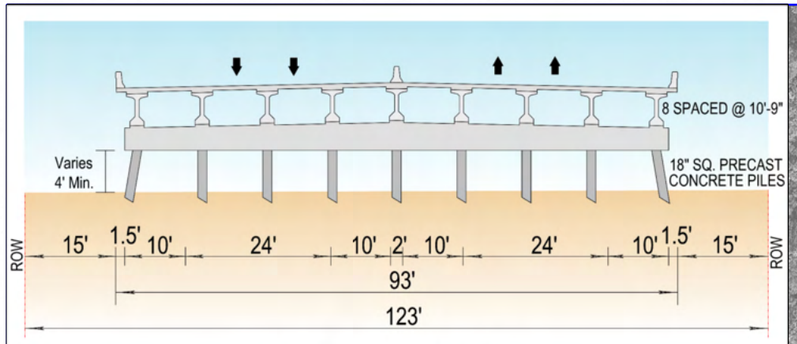
CITY OF TAMPA
EAST-WEST ROAD CONCEPT UPDATE STUDY

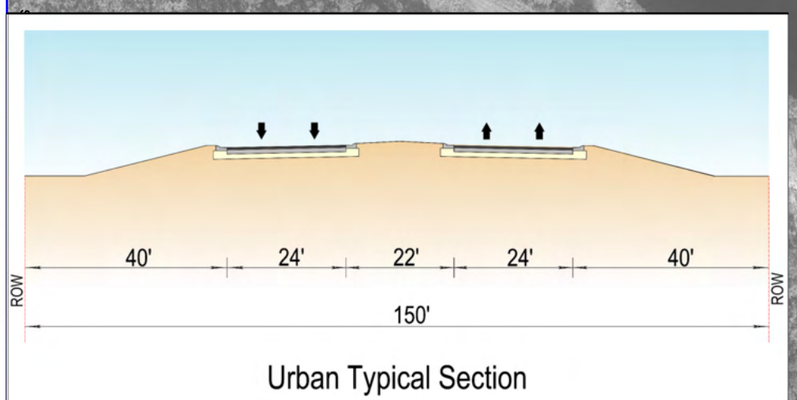
FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

SHEET NO. 8



Bridge Typical Section



Urban Typical Section

NORTH

100 0 100 200

GRAPHIC SCALE

Creek

EAST-WEST ROAD

PON -

Burniston Drive

FPL Power Easement

Waydale Lane

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
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CITY OF TAMPA
EAST-WEST ROAD CONCEPT UPDATE STUDY

FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
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ALTERNATIVE 4

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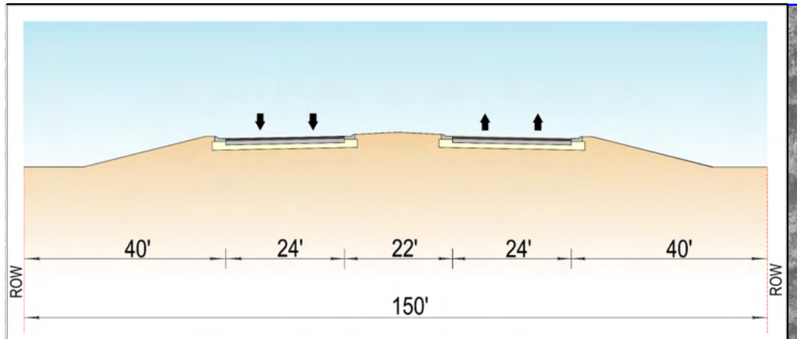


Urban Typical Section

NORTH

100 0 100 200

GRAPHIC SCALE

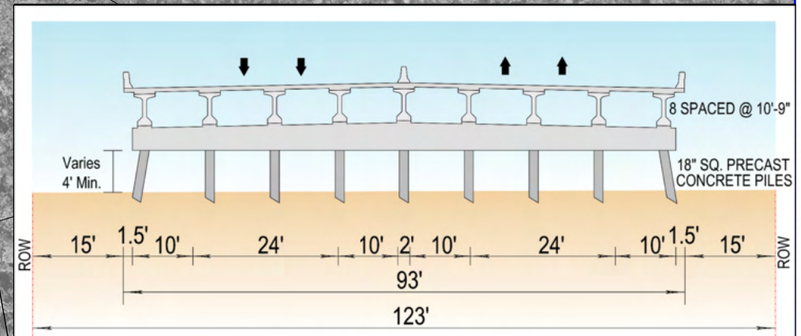
EAST-WEST ROAD

Burniston Drive

Sambourne Ln.

Devon Park Drive

Dobson Ct.



Bridge Typical Section

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
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Tampa, FL 3360 -
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CITY OF TAMPA
EAST-WEST ROAD CONCEPT UPDATE STUDY
FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

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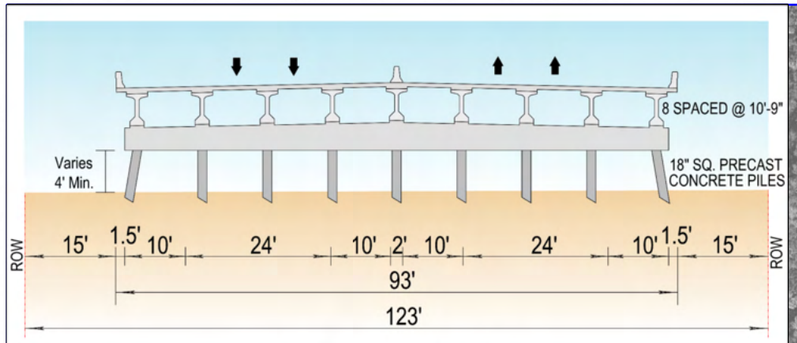
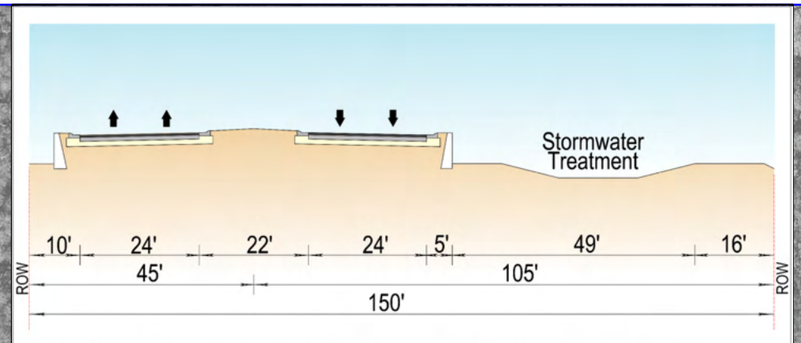
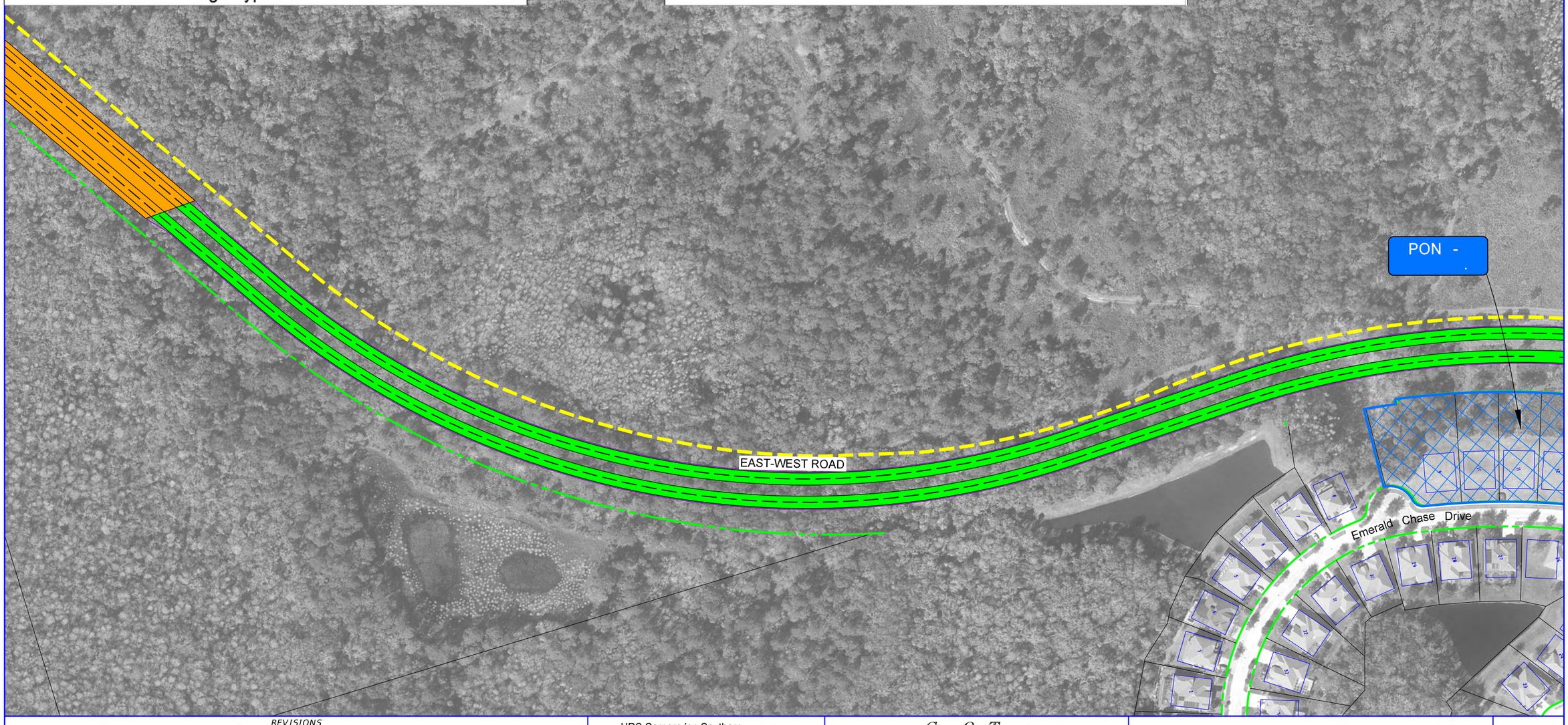


Bridge Typical Section



Urban Typical Section with Parallel Treatment Facility



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CITY OF TAMPA
EAST-WEST ROAD CONCEPT UPDATE STUDY
FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

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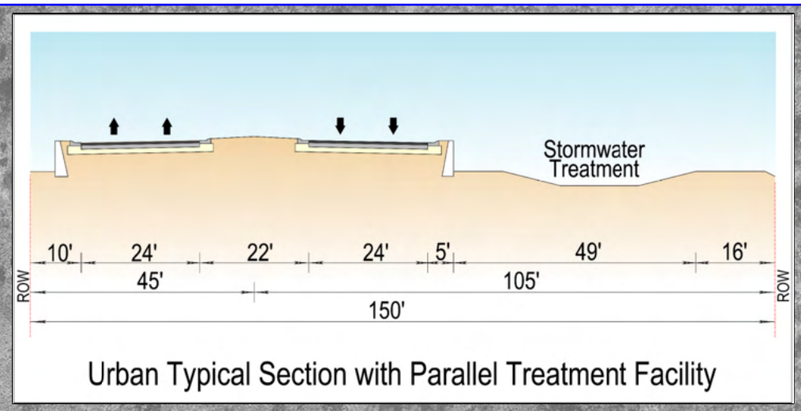
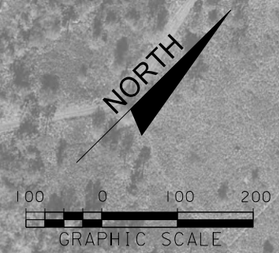


Urban Typical Section with Parallel Treatment Facility



PON -

EAST-WEST ROAD

Emerald Chase Drive

Emerald Chase Drive

FREEDOM HIGH
LIBERTY MIDDLE
SCHOOLS

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
	DRAF - GRAPHIC FOR PLANNING PURPOSES ONL . INTENDED FOR DESIGN OR CONSTRUCTIO .		

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City Of Tampa
East-West Road Concept Update Study
From I-275 to Commerce Park Boulevard/New Tampa Boulevard
City of Tampa, Florida

ALTERNATIVE 4

SHEET NO. 12

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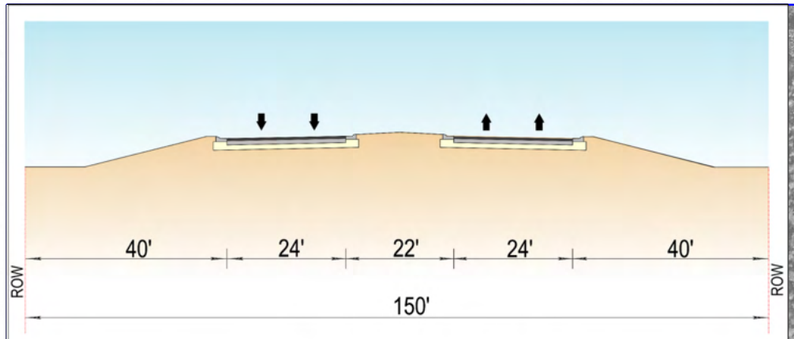

Urban Typical Section

NORTH

100 0 100 200

GRAPHIC SCALE

INTERSTATE 275

END PROJECT
EAS -

EAST-WEST ROAD

Commerce Park Blvd.

CITY OF TAMPA PROJECT

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
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Paul id, .

CITY OF TAMPA
EAST-WEST ROAD CONCEPT UPDATE STUDY

FROM I-275 TO COMMERCE PARK BOULEVARD/NEW TAMPA BOULEVARD
CITY OF TAMPA, FLORIDA

ALTERNATIVE 4

SHEET NO. 13

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APPENDIX D

Preliminary Cost Estimates

URS CORPORATION
EAST WEST ROAD
ALTERNATE 4 (4 LANES)
Preliminary Cost Estimate
March 10, 2015

DESCRIPTION	Alternative 4 Directional Toll Option
EAST-WEST ROAD (Urban 4 Lane Divided)	**$73,537,000**
Roadway	$23,834,831
Bridges	$49,702,169
RAMPS	**$13,685,000**
Roadway	$9,828,188
Bridges	$3,856,812
CONSTRUCTION TOTAL	**$87,222,000**
Design Fees (12.0%)	$10,466,640
CE&I Fees (15.0%)	$1,569,996
Mitigation	$3,132,570
Permitting (2.0%)	$62,651
Change Order Contingency (5.0%)	$4,517,729
4 LANE PROJECT DEVELOPMENT TOTAL	**$106,971,586**
EXPRESS LANES (NB & SB) ON I-275	**$41,396,000**
Roadway	$41,396,000
CONSTRUCTION TOTAL	**$41,396,000**
Design Fees (12.0%)	$4,967,520
CE&I Fees (15.0%)	$6,209,400
Mitigation (All mitigation incl. above)	$0
Permitting (2.0%)	$827,920
Change Order Contingency (5.0%)	$2,069,800
I-275 EXPRESS LANES DEVELOPMENT TOTAL	**$55,470,640**
PROJECT TOTAL COST	**$162,442,226**

NOTES:

1. Costs for all other bridges are based on average span AASHTO girder
2. Costs do not include Right of Way acquisition.
3. Costs do not include legal or administrative costs.
4. Costs include a gantry type open road toll collection facility.
5. All mitigation costs are included in the initial 4 Lane project.
6. All costs are present day cost.

City of Tampa - East / West Road Concept Update
PD&E Study
Alternative 4 - Urban 4 Lane
Construction Cost Estimate

URS Corporation / GLF

DESCRIPTION		QUANTITY	UNIT	U.P.	COST
ROADWAY					**$17,128,929**
CLEARING & GRUBBING		29.44	ac	$25,000.00	$736,000
EROSION CONTROL		1.619	mi	$29,257.26	$47,371
REGULAR EXCAVATION		24,618	cy	$4.97	$122,351
EMBANKMENT (BORROW)(BANK MEAS.)		182,685	cy	$16.00	$2,922,960
POND CONSTRUCTION	1 acres each	4.00	each	$153,331.30	$613,325
STORM DRAINAGE SYSTEM	NDU	1.62	miles	$1,217,678.46	$1,971,578
TYPE B STABILIZATION		49,071	sy	$3.79	$185,979
ROADWAY BASE - OPTIONAL BASE, BASE GROUP 11		46,545	sy	$22.31	$1,038,419
ROADWAY ASPHALT - SUPERPAVE ASPHALTIC CONC, TRAFFIC D (4 inches)		10,135.0	tons	$104.47	$1,058,803
SHOULDER BASE -			sy		
SHOULDER ASPHALT- (inches)			tons		
ASPHALT CONCRETE FRICTION COURSE, INC BIT, FC-5, PG 76-22, PMA		1,959.0	tons	$132.53	$259,626
MILLING / OVERLAY			sy		
CONCRETE CURB & GUTTER, TYPE E		17,098	lf	$21.33	$364,700
CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK			sy	$33.06	
MISCELLANEOUS ASPHALT PAVEMENT			tons	$168.54	
SHOULDER GUTTER- CONCRETE			lf	$19.41	
PERFORMANCE TURF	10% Sod	94,039	sy	$0.62	$58,304
SIGNS (Post & Misc.)		1.62	Miles	$7,155.00	$11,585
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, WHITE, SKIP, 6",		3.000	N.M.	$2,032.25	$6,097
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6		6.000	N.M.	$4,633.02	$27,798
RETRO-REFLECTIVE PAVEMENT MARKERS		396	ea	$3.75	$1,485
TRUSS SIGNS - None			ea		
		1	ea		
LIGHTING	Conventional (Average Pole Spacing)	43	ea	$10,050.66	$432,178
TRAFFIC SIGNALS (Model 1)	None				
TRAFFIC SIGNALS (Model 2)	None				
TRAFFIC SIGNALS (Model 3)	None				
Extra Items					
CONCRETE CLASS NS, GRAVITY WALL		2768	C.Y.	$548.80	$1,519,078
RETAINING WALL SYSTEM, PERMANANT, EXCLUDING BARRIER		37564	S.F.	$34.24	$1,286,191
CONCRETE TRAFFIC RAILING BARRIER, WITH JUNCTION SLAB, 42" F SHAPE		2400	L.F.	$278.66	$668,784
MEDIAN CONCRETE BARRIER WALL		1200	L.F.	$195.74	$234,888
ITS/Tolling		1	EA	$3,500,000.00	$3,500,000
OVERHEAD STATIC SIGN STRUCTURE, F&I, CANTILEVER, 41-50 FT		1	EA	$61,425.50	$61,426

STRUCTURES					**$35,718,620**
APPROACH SLAB CONCRETE		639	cy	$379.51	$242,590
APPROACH SLAB REINFORCING		134,236	lbs	$1.12	$150,345
EW West Bridge	PRESTR CONC GIRDER (SIMPLE SPAN)	133,920.00	sf	$103.50	$13,860,720
EW Middle Bridge	PRESTR CONC GIRDER (SIMPLE SPAN)	44,640.00	sf	$103.50	$4,620,240
EW East Bridge	PRESTR CONC GIRDER (SIMPLE SPAN)	162,750.00	sf	$103.50	$16,844,625

SUBTOTAL		**$52,847,449**
MOT	10.0%	$5,284,745
Mobilization	10.0%	$5,813,219
SUBTOTAL		**$63,945,413**
Contingency	15.0%	$9,591,812
CONSTRUCTION TOTAL (Rounded)		**$73,537,000**

City of Tampa - East / West Road Concept Update
PD&E Study
Alt 4 I-275 to EW XPRS Interchange w/S Ramps
Construction Cost Estimate

URS Corporation / GLF

DESCRIPTION		QUANTITY	UNIT	U.P.	COST
ROADWAY					**$7,063,109**
CLEARING & GRUBBING		7.29	ac	$25,000.00	$182,250
EROSION CONTROL		0.251	mi	$30,699.38	$7,698
REGULAR EXCAVATION		3,813	cy	$4.97	$18,949
EMBANKMENT (BORROW)(BANK MEAS.)		146,134	cy	$16.00	$2,338,144
POND CONSTRUCTION	1 acres each	4.00	each	$153,331.30	$613,325
STORM DRAINAGE SYSTEM	NDR	0.25	miles	$287,234.36	$72,026
TYPE B STABILIZATION		27,313	sy	$3.79	$103,516
ROADWAY BASE - OPTIONAL BASE, BASE GROUP 11		19,272	sy	$22.31	$429,958
ROADWAY ASPHALT - SUPERPAVE ASPHALTIC CONC, TRAFFIC D (4 inches)		4,224.0	tons	$104.47	$441,281
SHOULDER BASE - OPTIONAL BASE, BASE GROUP 07		5,864.0	sy	$41.78	$245,834
SHOULDER ASPHALT- SUPERPAVE ASPHALTIC CONC, TRAFFIC C (4 inches)		1,294.0	tons	$95.15	$123,124
ASPHALT CONCRETE FRICTION COURSE, INC BIT, FC-5, PG 76-22, PMA		801.0	tons	$132.53	$106,157
MILLING / OVERLAY			sy		
CONCRETE CURB & GUTTER, TYPE E		2,648	lf	$21.33	$56,482
CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK			sy	$33.06	
MISCELLANEOUS ASPHALT PAVEMENT			tons	$168.54	
SHOULDER GUTTER- CONCRETE			lf	$19.41	
PERFORMANCE TURF	10% Sod	9,856	sy	$0.62	$6,111
SIGNS (Post & Misc.)		0.25	Miles	$8,109.00	$2,033
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, WHITE, SKIP, 6".		1.000	N.M.	$2,032.25	$2,032
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6		2.000	N.M.	$4,633.02	$9,266
RETRO-REFLECTIVE PAVEMENT MARKERS		132	ea	$3.75	$495
TRUSS SIGNS - None			ea		
CANTILEVER SIGNS - None			ea		
LIGHTING	Conventional (Average Pole Spacing)	7	ea	$10,050.66	$70,355
TRAFFIC SIGNALS (Model 1)	None				
TRAFFIC SIGNALS (Model 2)	None				
TRAFFIC SIGNALS (Model 3)	None				
Extra Items					
RETAINING WALL SYSTEM, PERMANANT, EXCLUDING BARRIER		36952	S.F.	$34.24	$1,265,236
CONCRETE TRAFFIC RAILING BARRIER, WITH JUNCTION SLAB, 42" F SHAPE		2400	L.F.	$278.66	$668,784
MEDIAN CONCRETE BARRIER WALL		1324	L.F.	$195.74	$259,160
SHOULDER CONCRETE BARRIER WALL, RIGID RETAINING		300	L.F.	$136.31	$40,893

STRUCTURES					**$2,771,730**
APPROACH SLAB CONCRETE		312	cy	$379.51	$118,252
APPROACH SLAB REINFORCING		65,434	lbs	$1.12	$73,286
I-275 / EW Interchange	PRESTR CONC GIRDER (SIMPLE SPAN)	16,864.00	sf	$153.00	$2,580,192

SUBTOTAL		**$9,834,840**
MOT	10.0%	$983,484
Mobilization	10.0%	$1,081,832
SUBTOTAL		**$11,900,156**
Contingency	15.0%	$1,785,023
CONSTRUCTION TOTAL (Rounded)		**$13,685,000**

City of Tampa - East / West Road Concept Update
PD&E Study
Alt 4 I-275 From Interchange 4 Lanes Roadway (South)
Construction Cost Estimate

URS Corporation / GLF

DESCRIPTION		QUANTITY	UNIT	U.P.	COST
ROADWAY					**$17,116,467**
CLEARING & GRUBBING		29.38	ac	$25,000.00	$734,500
EROSION CONTROL		1.496	mi	$24,388.98	$36,491
REGULAR EXCAVATION		22,749	cy	$4.97	$113,063
EMBANKMENT (BORROW)(BANK MEAS.)		157,195	cy	$16.00	$2,515,120
POND CONSTRUCTION	1 acres each	4.00	each	$153,331.30	$613,325
STORM DRAINAGE SYSTEM	WDR	1.50	miles	$143,887.42	$215,286
TYPE B STABILIZATION		123,468	sy	$3.79	$467,944
ROADWAY BASE - OPTIONAL BASE, BASE GROUP 11		71,100	sy	$22.31	$1,586,241
ROADWAY ASPHALT - SUPERPAVE ASPHALTIC CONC, TRAFFIC D (4 inches)		15,545.0	tons	$104.47	$1,623,986
SHOULDER BASE - OPTIONAL BASE, BASE GROUP 07		35,111.0	sy	$41.78	$1,466,938
SHOULDER ASPHALT- SUPERPAVE ASPHALTIC CONC, TRAFFIC C (4 inches)		7,724.0	tons	$95.15	$734,939
ASPHALT CONCRETE FRICTION COURSE, INC BIT, FC-5, PG 76-22, PMA		2,969.0	tons	$132.53	$393,482
MILLING / OVERLAY	- Mill 2.5" - Overlay 2.5"	42,133	sy	$9.81	$413,298
CONCRETE CURB & GUTTER, TYPE E		15,800	lf	$21.33	$337,014
CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK			sy	$33.06	
MISCELLANEOUS ASPHALT PAVEMENT			tons	$168.54	
SHOULDER GUTTER- CONCRETE		15,800	lf	$19.41	$306,678
PERFORMANCE TURF	10% Sod	30,722	sy	$0.62	$19,048
SIGNS (Post & Misc.)		1.50	Miles	$13,356.00	$19,983
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, WHITE, SKIP, 6",		6.000	N.M.	$2,032.25	$12,194
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6		12.000	N.M.	$4,633.02	$55,596
RETRO-REFLECTIVE PAVEMENT MARKERS		792	ea	$3.75	$2,970
TRUSS SIGNS - None			ea		
CANTILEVER SIGNS - None			ea		
LIGHTING	Conventional (Average Pole Spacing)	40	ea	$10,050.66	$402,026
TRAFFIC SIGNALS (Model 1)	None				
TRAFFIC SIGNALS (Model 2)	None				
TRAFFIC SIGNALS (Model 3)	None				
Extra Items					
MEDIAN CONCRETE BARRIER WALL		7900	L.F.	$195.74	$1,546,346
ITS/Tolling		1	EA	$3,500,000.00	$3,500,000

STRUCTURES			
APPROACH SLAB CONCRETE	cy	$379.51	
APPROACH SLAB REINFORCING	lbs	$1.12	

SUBTOTAL		**$17,116,467**
MOT	10.0%	$1,711,647
Mobilization	10.0%	$1,882,811
SUBTOTAL		**$20,710,926**
Contingency	15.0%	$3,106,639
CONSTRUCTION TOTAL (Rounded)		**$23,818,000**

City of Tampa - East / West Road Concept Update
PD&E Study
Alt 4 I-275 From Interchange 2 Lanes Roadway (North)
Construction Cost Estimate

URS Corporation / GLF

DESCRIPTION		QUANTITY	UNIT	U.P.	COST
ROADWAY					**$12,632,566**
CLEARING & GRUBBING		22.31	ac	$25,000.00	$557,750
EROSION CONTROL		1.136	mi	$24,388.98	$27,715
REGULAR EXCAVATION		17,278	cy	$4.97	$85,871
EMBANKMENT (BORROW)(BANK MEAS.)		98,389	cy	$16.00	$1,574,224
POND CONSTRUCTION	1 acres each	4.00	each	$153,331.30	$613,325
STORM DRAINAGE SYSTEM	WDR	1.14	miles	$143,887.42	$163,508
TYPE B STABILIZATION		75,333	sy	$3.79	$285,512
ROADWAY BASE - OPTIONAL BASE, BASE GROUP 11		38,000	sy	$22.31	$847,780
ROADWAY ASPHALT - SUPERPAVE ASPHALTIC CONC, TRAFFIC D (4 inches)		8,287.0	tons	$104.47	$865,743
SHOULDER BASE - OPTIONAL BASE, BASE GROUP 07		26,667.0	sy	$41.78	$1,114,147
SHOULDER ASPHALT- SUPERPAVE ASPHALTIC CONC, TRAFFIC C (4 inches)		5,867.0	tons	$95.15	$558,245
ASPHALT CONCRETE FRICTION COURSE, INC BIT, FC-5, PG 76-22, PMA		1,595.0	tons	$132.53	$211,385
MILLING / OVERLAY	- Mill 2.5" - Overlay 2.5"	32,000	sy	$9.81	$313,900
			lf		
CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK			sy	$33.06	
MISCELLANEOUS ASPHALT PAVEMENT			tons	$168.54	
SHOULDER GUTTER- CONCRETE		12,000	lf	$19.41	$232,920
PERFORMANCE TURF	10% Sod	41,333	sy	$0.62	$25,626
SIGNS (Post & Misc.)		1.14	Miles	$13,356.00	$15,177
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, WHITE, SKIP, 6",		24.000	N.M.	$2,032.25	$48,774
THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6		9.000	N.M.	$4,633.02	$41,697
RETRO-REFLECTIVE PAVEMENT MARKERS		3,168	ea	$3.75	$11,880
TRUSS SIGNS - None			ea		
CANTILEVER SIGNS - None			ea		
LIGHTING	Conventional (Average Pole Spacing)	30	ea	$10,050.66	$301,520
TRAFFIC SIGNALS (Model 1)	None				
TRAFFIC SIGNALS (Model 2)	None				
TRAFFIC SIGNALS (Model 3)	None				
Extra Items					
MEDIAN CONCRETE BARRIER WALL		6000	L.F.	$195.74	$1,174,440
ITS/Tolling		1	EA	$3,500,000.00	$3,500,000
OVERHEAD STATIC SIGN STRUCTURE, F&I, CANTILEVER, 41-50 FT		1	EA	$61,425.50	$61,426

STRUCTURES			
APPROACH SLAB CONCRETE	cy	$379.51	
APPROACH SLAB REINFORCING	lbs	$1.12	

SUBTOTAL		**$12,632,566**
MOT	10.0%	$1,263,257
Mobilization	10.0%	$1,389,582
SUBTOTAL		**$16,285,405**
Contingency	15.0%	$2,292,811
CONSTRUCTION TOTAL (Rounded)		**$17,578,000**