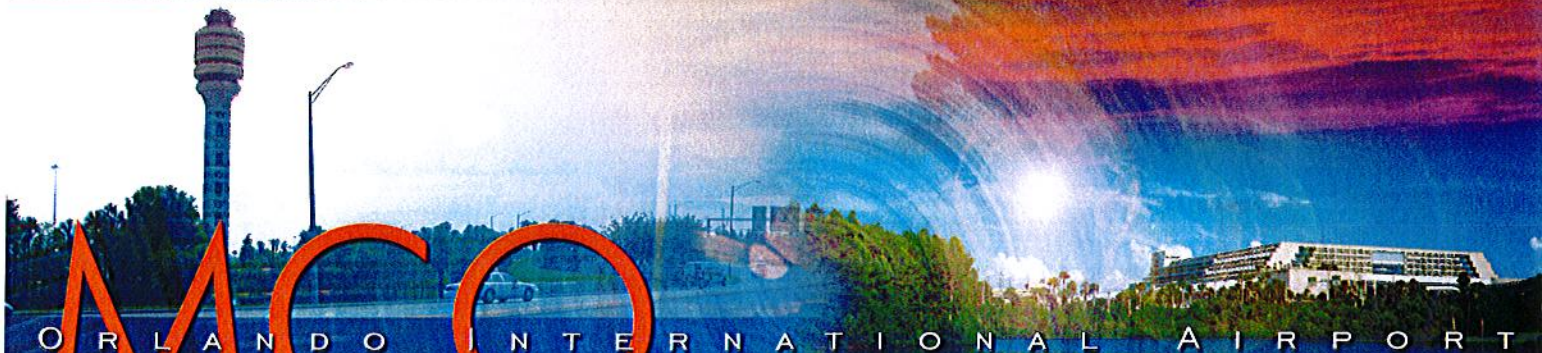


PUBLIC



GREATER ORLANDO AVIATION AUTHORITY



MCO

ORLANDO INTERNATIONAL AIRPORT

Master Plan Update Volume 2

Airfield Plan
Terminal Facilities
Surface Transportation Plan
Building Area Plans
Land Use Plans
Environmental Considerations

2002-2022



August 2004

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MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT

FAA AIP No. 3-120057-5899
FAA AIP No. 3-12-0057-6200
FDOT JPA NO. FM406733

Prepared for:
GREATER ORLANDO AVIATION AUTHORITY

Prepared by:
The URS Team

August 2004

Preface

This Airport Master Plan Update was undertaken by the Greater Orlando Aviation Authority (GOAA) to document the operational capability, enhance safety and security, and identify capital improvements for Orlando International Airport (MCO). This document serves as a management tool to guide future airport development, taking into consideration changes that have occurred in the air transportation industry, the airport, and surrounding communities since completion of the previous Master Plan. In this study, the Airport Master Plan planning period for MCO extends twenty years through FY 2022. Where applicable, analyses have been updated to reflect the new runway and other airport capacity related facility improvements. The previous Airport Master Plan Study was completed in 1995.

This Master Plan Update Study began in 2000. As a result of the events of September 11, 2001 and other aviation industry related issues, the project was delayed until late 2003. Initial sections of the Airport Master Plan Update were written as a snapshot in time. For example, the Fourth Runway (Runway 17L/35R) was not operational when the Demand/Capacity and Facility Requirements analyses were conducted and completed.

Furthermore it would be noted that nearly all the Airport Master Plan Update related technical planning analyses were completed prior to Hurricanes Charley, Frances, and Jeanne impacting the Central Florida region during August and September 2004.

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MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT

SECTION 5.0
AIRFIELD PLAN

Prepared for:
GREATER ORLANDO AVIATION AUTHORITY

Prepared by:
The URS Team

August 2004

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SECTION 5.0

Airfield Plan

5.1 Introduction

The planning of future facilities at Orlando International Airport (MCO) begins with the airfield requirements. This section describes the overall airfield plan along with key existing and future design elements associated with the airfield. The airfield plan examines each runway system and discusses taxiway improvements, airport traffic control tower (ATCT), Aircraft Rescue and Fire Fighting (ARFF) facilities, navigational aids (NAVAIDs), the air operations area (AOA), secure service road system, security fencing, and airspace.

Airfield development and improvement planning was conducted in accordance with Federal Aviation Administration (FAA) design standards and guidelines. The following lists the FAA Advisory Circulars (AC), except for deviations, that have been specifically noted:

- 150/5060-5, Chapter 2 Airport Capacity and Delay
- 150/5070-6A Airport Master Plans
- 150/5300-13, Chapter 7 Airport Design
- 150/5320-6D Airport Pavement Design and Evaluation
- 150/5325-4A Runway Length Requirements for Airport Design
- 150/5340-1H Marking of Paved Area on Airports
- 150/5360-13 Planning and Design Guidelines for Airport Terminal Facilities

5.2 The Airfield and NAVAID Plan

The depiction of MCO's ultimate airfield layout, provided on Figure 5-1, identifies the general physical geometric airfield configuration, centerline-to-centerline separations, safety area setbacks, and other airfield improvements proposed in the plan. Figure 5-2 identifies the NAVAID plan depicting equipment and critical areas. The airfield improvements identified in this Master Plan Update will increase the operational efficiency and overall airfield capacity of the airport. Each runway system and proposed future improvements are discussed in the following paragraphs.

5.2.1 RUNWAY 18L/36R SYSTEM

Runway 18L/36R is one of the original McCoy Air Force Base (AFB) runways constructed in 1953 to support B-47 military aircraft operations. This runway currently serves aircraft having Airport Reference Code (ARC) D-V design characteristics which are capable of operating from the existing 12,004-foot runway.

5.2.1.1 Runway 18L/36R Length

The airfield plan, as illustrated on Figure 5-1, shows the capability of extending Runway 36R to the south. The airfield plan shows extensions to the south occurring in two phases.

The first phase would be a 2,780-foot extension that would coincide and complement the South Terminal Complex development. The extension length of 2,780 feet was established by locating the Runway 36R threshold to best facilitate South Terminal Complex operations. In addition, this threshold location would avoid conflicts with the Terminal Instrument Procedures (TERPS) protection requirements imposed by the future support perimeter parallel taxiway system associated

with the South Terminal Complex development. The Runway 18L threshold location would remain unchanged yielding a runway length of 14,785 feet.

The second phase of the runway extension shown on the airfield plan would include a 1,339-foot extension to the south yielding an ultimate runway length of 16,124 feet. This also assumes that the existing Runway 18L threshold would remain in place. This ultimate runway length of 16,124 feet was shown on the previous Airport Layout Plan (ALP) for planning purposes. This potential ultimate runway length is to remain on the Greater Orlando Aviation Authority's (GOAA) planning documents.

5.2.1.2 Runway 18L/36R Extended Runway Safety Areas

The Runway Safety Area (RSA) extending beyond the approach end of Runway 18L is in non-compliance with current FAA airport design standards. This is due to the proximity of Bear Road, a perimeter fence, an ILS localizer antenna, and equipment shelter which are located within 1,000 feet of the runway end. Based on conclusions presented the OIA *West Airfield (Runways 18L & 18R) Runway Safety Area Study* (February 2003), it is recommended that the Runway 18L threshold be displaced approximately 408 feet south, as shown on Figure 5-3. This action would resolve the non-compliance of the RSA, but would require the use of declared distance criteria.

Declared distances are the distances that the airport owner declares are available and suitable for satisfying the takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements of aircraft. These declared distances must take into consideration the provision of the RSA, runway obstacle-free area, and Runway Protection Zone (RPZ). The Takeoff Run Available (TORA) is the runway length declared available and suitable for the ground run of an aircraft during takeoff. The Takeoff Distance Available (TODA) is the takeoff run available plus the length of any remaining runway and clearway beyond the far end of the takeoff run available. The Landing Distance Available (LDA) is the runway length available and suitable for landing an aircraft. The Accelerate Stop Distance Available (ASDA) is the amount of runway plus stopway declared available and suitable for acceleration and deceleration of an aircraft during an aborted takeoff. Similar modifications to Runway 18R will be required and developed concurrently. The applicable declared distances for Runway 18L/36R are listed in Table 5-1.

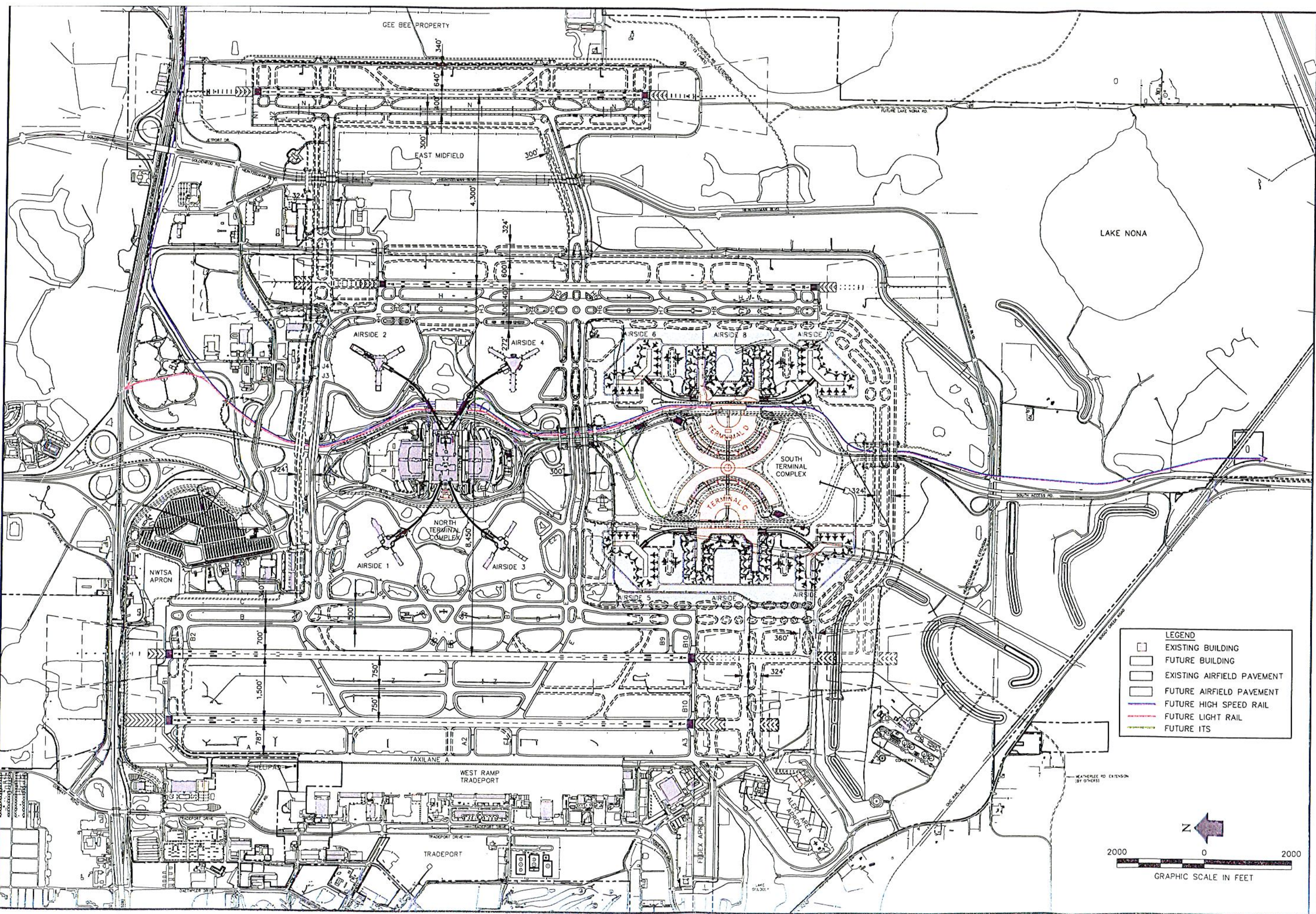
**TABLE 5-1
RUNWAY 18L/36R PARTIAL DECLARED DISTANCES (IN FEET)**

Runway	Takeoff/Run Available	Takeoff Distance Available	Landing Distance Available	Accelerate/Stop Distance Available
18L	12,005	12,005	12,005	12,005
36R	12,005	12,005	11,597	11,597

Source: *West Airfield (Runways 18L & 18R) Runway Safety Area Study, (MCO), AVCON, February 2003.*

No modifications to current FAA design standards are required for Runway 18L/36R using FAA's declared distance criteria. Existing and future runway information is presented in Table 5-2.

I:\PROJECTS\M... PLAN\FINAL EXHIBITS_04\FIG 5-01.DWG 11/10/04 13:59



GEE BEE PROPERTY

EAST MIDFIELD

AIRSIDE 2

AIRSIDE 4

AIRSIDE 6

AIRSIDE 8

AIRSIDE 10

AIRSIDE 1

AIRSIDE 3

AIRSIDE 5

AIRSIDE 7

AIRSIDE 9

NW TSA APRON

TAXILANE A

WEST RAMP TRADEPORT

TRADEPORT

FIDEX APRON

APRON AREA A

LAKE NONA

- LEGEND**
- EXISTING BUILDING
 - FUTURE BUILDING
 - EXISTING AIRFIELD PAVEMENT
 - FUTURE AIRFIELD PAVEMENT
 - FUTURE HIGH SPEED RAIL
 - FUTURE LIGHT RAIL
 - FUTURE ITS



AIRFIELD GEOMETRIC PLAN

FIGURE:
5-1

**TABLE 5-2
RUNWAY 18L/36R INFORMATION**

Item	Runway 18L/36R	
	Existing	Future
Runway Length/Width/Shoulder Width	12,005'/200'/35'	16,124'/200'/40'
Airport Reference Code	D-V	D-VI
Critical Design Aircraft	B-747	A380-800
Effective Gradient (Percent)	0.01	0.02
Percent Wind Coverage (20 kts/23 mph)	99.8%	Same
Runway Pavement	Strength (000 lbs.)	200 DG, 400 DT
	Surface Type/Friction	Concrete/Asphalt/Grooved
Maximum Runway Elevation (above MSL)	96.4'	Same
Runway Lighting	HIRL, CL TDZL - 36R end	Same
Runway Marking	Precision	Same

Source: URS, May 2004.

5.2.1.3 Runway 18L/36R NAVAIDs

Electronic and visual navigational equipment serving Runway 18L/36R are shown on Figure 5-2 and listed in Table 5-3. The following paragraphs provide a more detailed discussion of these systems located in their ultimate configuration.

Runway 18L is currently served by three non-precision instrument approach procedures that are based on VHF omni-directional range (VOR), distance measuring equipment (DME), and Area Navigation (RNAV) Global Positioning System (GPS) technologies that are not exclusive to this runway. The planned upgrade of electronic NAVAIDs that will directly serve Runway 18L include the installation of a Category I (CAT I) Instrument Landing System (ILS) or precision GPS offering cloud ceiling and visibility minimums as low as 200 feet and 1/2 mile, respectively. As part of the future precision instrument approach, a medium-intensity approach lighting system with runway alignment indicator lights (MALSR) would be installed. To further augment the CAT I ILS visibility minimums, touchdown zone lighting (TDZL) is planned that will reduce the visibility minimums from 2,400 feet runway visual range (RVR) to 1,800 feet RVR. At such time that the Runway 18L threshold is displaced or ultimately relocated 300 feet to the south to accommodate the Runway End Safety Area (RESA) improvements, the existing visual approach slope indicator (VASI-6) visual guidance system will be upgraded to a precision approach path indicator (PAPI-4) system.

**TABLE 5-3
RUNWAY 18L/36R INFORMATION, APPROACH AIDS, AND VISIBILITY MINIMUMS**

Runway Ends		Existing		Future	
		18L	36R	18L	36R
End Elevations (MSL)		92.5'	91.1'	Same	89.5'
End Coordinates	Latitude	28°26'54.0028" N	28°24'55.1462" N	Same	28°24'14.3620" N
	Longitude	81°19'20.3023" W	81°19'19.350" W	Same	81°19'18.6000" W
Runway Protection Zone (RPZ)	Length	1,700'	2,500'	2,500'	Same
	Width - Inner/Outer	1,000'/1,425'	1,000'/1,750'	1,000'/1,750'	Same
Approach Lighting		N/A	ALSF-2	MALSR	Same
Runway Touch Down Zone Elevations (MSL)		96'	92'	Same	91'
FAR Part 77 Imaginary Surfaces	Approach Category	Non-Precision	Precision CAT IIIb	Precision CAT I	Same
	Inner Approach Surface Slope	34:1	50:1	50:1	Same
NAVAIDs	Electronic Navigation Aids	N/A	ILS, LOC, MM	ILS, LOC, MM	Same
	Visual Approach Aids	VASI-6	N/A	PAPI-4	PAPI-4
Approach Visibility Minimums (Cloud Ceiling/Visibility)	ILS CAT I	N/A	200'/1/2 MI.	200'/1800' RVR	Same
	ILS CAT II	N/A	100'/1200' RVR	N/A	Same
	ILS CAT IIIb	N/A	0'/600' RVR	N/A	Same
	RNAV/GPS	384'/11/4 MI.	408'/1 MI.	Same	Same
	VOR/DME	444'/11/4 MI.	508'/1/2 MI.	Same	Same
	VOR	444'/1 MI.	N/A	Same	N/A

Source: URS, May 2004.

Runway 36R is currently served by an ILS CAT IIIb system and no planned new approaches are required at this time. When the runway is extended to the south, all NAVAID equipment associated with Runway 35R will be relocated as required.

5.2.2 RUNWAY 18R/36L SYSTEM

Runway 18R/36L is one of McCoy AFB's original runways reconstructed in 1961 to support B-52 aircraft operations. This runway currently serves aircraft having ARC D-V design characteristics which are capable of operating from the existing 12,004-foot runway.

5.2.2.1 Runway 18R/36L Length

The airfield plan, as illustrated on Figure 5-1, shows the potential extension of the runway to an ultimate runway length of 13,504 feet. This would require constructing 1,500 feet of new pavement to the south. This is programmed as a long-term project.

5.2.2.2 Runway 18R/36L Extended Runway Safety Areas

The RSA extending beyond the approach end of Runway 18R is in non-compliance with current FAA airport design standards. This is due to the proximity of Bear Road, a perimeter fence, an ILS localizer antenna, and equipment shelter within 1,000 feet of the runway end. Based on conclusions presented in the OIA *West Airfield (Runways 18L & 18R) Runway Safety Area Study* (February 2003), it is recommended that the Runway 18R threshold be displaced approximately 387 feet south.

This action would resolve the non-compliance of the RSA, but would require the use of declared distance criteria. Similar modifications to Runway 18L will be required and developed concurrently. The applicable declared distances for Runway 18R/36L are listed in Table 5-4.

**TABLE 5-4
RUNWAY 18R/36L PARTIAL DECLARED DISTANCES (IN FEET)**

Runway	Takeoff Run Available	Takeoff Distance Available	Landing Distance Available	Accelerate Stop Distance Available
18R	12,004	12,004	12,004	12,004
36L	12,004	12,004	11,617	11,617

Source: West Airfield (Runways 18L & 18R) Runway Safety Area Study, (MCO), AVCON, February 2003.

Under this proposal, no modifications to design standards using declared distance criteria are required for Runway 18R/36L. Existing and future runway information is presented in Table 5-5.

**TABLE 5-5
RUNWAY 18R/36L INFORMATION**

Item	Runway 18R/36L	
	Existing	Future
Runway Length/Width/Shoulder Width	12,004'/200'/35'	13,504'/200'/40'
Airport Reference Code	D-V	D-VI
Critical Design Aircraft	B-747	A380-800
Effective Gradient (Percent)	0.01	Same
Percent Wind Coverage (20 kts/23 mph)	99.8%	Same
Runway Pavement	Strength (000 lbs.)	200 DG, 400 DT
	Surface Type/Friction	Concrete/Grooved
Maximum Runway Elevation (above MSL)	94.0'	Same
Runway Lighting	HIRL/CL/TDZL	Same
Runway Marking	Precision	Same

Source: URS, May 2004.

5.2.2.3 Runway 18R/36L NAVAIDs

Electronic and visual navigational equipment serving Runway 18R/36L are shown on Figure 5-2 and listed in Table 5-6. The following paragraphs provide a more detailed discussion of these systems located in their ultimate configuration.

Runway 18R is currently served by a CAT I ILS and two non-precision instrument approach procedures that are based on VOR, DME, RNV, and GPS technologies that are not exclusive to this runway. The planned upgrade of NAVAIDs that will directly serve Runway 18R include upgrading the existing CAT I ILS to CAT IIIb capabilities to offer reduced cloud ceiling and visibility minimums as low as 0 feet and 600 feet RVR, respectively. This procedure is under evaluation by FAA.

**TABLE 5-6
RUNWAY 18R/36L INFORMATION, APPROACH AIDS, AND VISIBILITY MINIMUMS**

Runway Ends		Existing		Future	
		18R	36L	18R	36L
End Elevations (MSL)		92.5'	91.2'	Same	Same
End Coordinates	Latitude	28°26'53.8561" N	28°24'55.0089" N	Same	28°24'40.1580" N
	Longitude	81°19'37.1093" W	81°19'35.8333" W	Same	81°19'35.6740" W
Runway Protection Zone (RPZ)	Length	2,500'	1,700'	2,500'	2,500'
	Width - Inner/Outer	1,000'/1,750'	1,000'/1,425'	1,000'/1,750'	1,000'/1,750'
Approach Lighting		MALSR	N/A	ALSF-2	ALSF-2
Runway Touch Down Zone Elevations (MSL)		94'	88'	Same	92'
FAR Part 77 Imaginary Surfaces	Approach Category	Precision CAT I	Non-Precision	Precision CAT IIIb	Precision CAT II/GPS
	Inner Approach Surface Slope	50:1	34:1	Same	50:1
NAVAIDs	Electronic Navigation Aids	ILS, LOC, MM	N/A	Same	ILS, LOC, MM
	Visual Approach Aids	N/A	REIL, VASI-6	PAPI-4	PAPI-4
Approach Visibility Minimums (Cloud Ceiling/ Visibility)	ILS CAT I	200'/1,800' RVR	N/A	Same	N/A
	ILS CAT II	N/A	N/A	N/A	100'/1,200' RVR
	ILS CAT IIIb	N/A	N/A	0'/600' RVR	N/A
	RNAV/GPS	406'/1 MI.	407'/1 1/2 MI.	Same	Same
	VOR/DME	446'/1/2 MI.	507'/1 MI.	Same	Same
	VOR	446'/1/2 MI.	N/A	Same	N/A

Source: URS, May 2004.

Runway 36L is currently served by two non-precision instrument approach procedures that are based on VOR, DME, RNV, and GPS technologies that are not exclusive to this runway. The planned upgrade of NAVAIDs that will directly serve Runway 36L include the installation of a CAT II/GPS ILS or precision GPS to eliminate cloud ceiling minimums while offering visibility minimums as low as 100 feet and 1,200 feet RVR. It is anticipated that when the Runway 36L is extended to the south, the existing VASI-6 visual guidance system serving this runway will be upgraded to a PAPI-4 system.

5.2.3 RUNWAY 17R/35L SYSTEM

Runway 17R/35L is the third runway constructed at MCO and was completed in 1989. This runway currently serves aircraft having ARC D-V design characteristics which are capable of operating from the existing 10,000-foot runway. Runway facility upgrades that would provide ARC D-VI capability are being considered by GOAA at this time.

5.2.3.1 Runway 17R/35L Length

The airfield plan, as illustrated on Figure 5-1, shows the capability of providing an ultimate runway length of 11,500 feet. This would require constructing approximately 1,500 feet of new pavement on the north end. This runway configuration will provide 11,500 feet of full strength pavement, with the entire length available in both directions for all aircraft operations.

5.2.3.2 Runway 17R/35L Extended Runway Safety Areas

A standard RESA, 500 feet wide that extends 1,000 feet beyond both runway ends, is provided.

Under this plan as shown, no modifications to design standards are required for Runway 17R/35L. Considerations by GOAA to upgrade this runway are being evaluated. Existing and future runway information is presented in Table 5-7.

**TABLE 5-7
RUNWAY 17R/35L INFORMATION**

Item	Runway 17R/35L	
	Existing	Future
Runway Length/Width/Shoulder Width	10,000'/150'/35'	11,500'/150'/35'
Airport Reference Code	D-V	D-VI
Critical Design Aircraft	B-747-200	A380-800
Effective Gradient (Percent)	0.04	0.03
Percent Wind Coverage (20 kts/23 mph)	99.8%	Same
Runway Pavement	Strength (000 lbs.)	210 DG, 400 DT
	Surface Type/Friction	Concrete/Grooved
Maximum Runway Elevation (above MSL)	90.2'	Same
Runway Lighting	HIRL/CL/TDZL	Same
Runway Marking	Precision	Same

Source: URS, May 2004.

5.2.3.3 Runway 17R/35L NAVAIDs

Electronic and visual navigational equipment serving Runway 17R/35L are shown on Figure 5-2 and listed in Table 5-8. The following paragraphs provide a more detailed discussion of these NAVAID systems located in their ultimate configuration.

Runway 17R is currently served by a CAT II ILS that offers cloud ceiling and visibility minimums as low as 100 feet and 1,200 feet RVR, respectively. At this time, no enhancements to this ILS are anticipated.

Runway 35L is currently served by a CAT IIIb ILS that has no cloud ceiling minimums and visibility minimums as low as 600 feet RVR. At this time, no enhancements to this ILS are anticipated.

5.2.4 RUNWAY 17L/35R SYSTEM

Runway 17L/35R is a 9,000-foot runway which serves aircraft having ARC D-V design characteristics. This is MCO's Fourth Runway which opened December 25, 2003, and became fully operational March 2004.

5.2.4.1 Runway 17L/35R Length

Runway 17L/35R has a total length of 9,000 feet and is illustrated on Figure 5-1. The entire length is available in both directions for all aircraft operations.

**TABLE 5-8
RUNWAY 17R/35L INFORMATION, APPROACH AIDS, AND VISIBILITY MINIMUMS**

Runway Ends		Existing		Future	
		17R	35L	17R	35L
End Elevations (MSL)		90.2'	86.7'	90.3'	Same
End Coordinates	Latitude	28°26'08.2009" N	28°24'29.1966" N	28°26'23.0520" N	Same
	Longitude	81°17'45.1655" W	81°17'44.1317" W	81°17'45.3210" W	Same
Runway Protection Zone (RPZ)	Length	2,500'	2,500'	Same	Same
	Width - Inner/Outer	1,000'/1,750'	1,000'/1,750'	Same	Same
Approach Lighting		ALSF-2	ALSF-2	Same	Same
Runway Touch Down Zone Elevations (MSL)		90'	88'	Same	Same
FAR Part 77 Imaginary Surfaces	Approach Category	Precision CAT II	Precision CAT IIIb	Same	Same
	Inner Approach Surface Slope	50:1	50:1	Same	Same
NAVAIDs	Electronic Navigation Aids	ILS, LOC, MM	ILS, LOC, MM	Same	Same
	Visual Approach Aids	N/A	PAPI-4	PAPI-4	Same
Approach Visibility Minimums (Cloud Ceiling/Visibility)	ILS CAT I	200'/1/2 MI.	200'/1/2 MI.	Same	Same
	ILS CAT II	100'/1200' RVR	100'/1200' RVR	Same	Same
	ILS CAT IIIb	N/A	0'/600' RVR	N/A	Same
	RNAV/GPS	470'/1 MI.	372'/3/4 MI.	Same	Same
	VOR/DME	N/A	N/A	N/A	N/A
	VOR	N/A	N/A	N/A	N/A

Source: URS, May 2004.

5.2.4.2 Runway 17L/35R Extended Runway Safety Areas

A standard RESA, 500 feet wide that extends 1,000 feet beyond both runway ends, is provided.

Under the plan, no modifications to design standards are required for Runway 17L/35R. Existing and future runway information is presented in Table 5-9.

**TABLE 5-9
RUNWAY 17L/35R INFORMATION**

Item	Runway 17L/35R	
	Existing	Future
Runway Length/Width/Shoulder Width	9,000'/150'/35'	Same
Airport Reference Code	D-V	Same
Critical Design Aircraft	B-747-400	Same
Effective Gradient (Percent)	0.00	Same
Percent Wind Coverage (20 kts/23 mph)	99.8%	Same
Runway Pavement	Strength (000 lbs.)	210 DG, 750 DT
	Surface Type/Friction	Concrete/Grooved
Maximum Runway Elevation (above MSL)	89.7'	Same
Runway Lighting	HIRL, CL, TDZL	Same
Runway Marking	Precision	Same

Source: URS, May 2004.

5.2.4.3 Runway 17L/35R NAVAIDs

Electronic and visual navigational equipment serving Runway 17L/35R are shown on Figure 5-2 and listed in Table 5-10. The following paragraphs provide a more detailed discussion of these NAVAID systems located in their ultimate configuration.

**TABLE 5-10
RUNWAY 17L/35R INFORMATION, APPROACH AIDS, AND VISIBILITY MINIMUMS**

Runway Ends		Existing		Future	
		17L	35R	17L	35R
End Elevations (MSL)		89.7'	89.7'	Same	Same
End Coordinates	Latitude	28°26'37.3071" N	28°25'08.1985" N	Same	Same
	Longitude	81°16'57.2920" W	81°16'56.3785" W	Same	Same
Runway Protection Zone (RPZ)	Length	2,500'	2,500'	Same	Same
	Width - Inner/Outer	1,000'/1,750'	1,000'/1,750'	Same	Same
Approach Lighting		ALSF-2	ALSF-2	Same	Same
Runway Touch Down Zone Elevations (MSL)		90'	90'	Same	Same
FAR Part 77 Imaginary Surfaces	Approach Category	Precision CAT II	Precision CAT II	Precision CAT IIIb	Precision CAT IIIb
	Inner Approach Surface Slope	50:1	50:1	Same	Same
Approach Aids	Electronic Navigation Aids	ILS, LOC, MM	ILS, LOC, MM	Same	Same
	Visual Approach Aids	PAPI-4	PAPI-4	Same	Same
Approach Visibility Minimums (Cloud Ceiling; Visibility)	ILS CAT I	200'/1/2 MI.	200'/1/2 MI.	Same	Same
	ILS CAT II	100'/1200' RVR	100'/1200' RVR	Same	Same
	ILS CAT IIIb	N/A	N/A	0'/600' RVR	0'/600' RVR
	RNAV/GPS	390'/3/4 MI.	450'/1 MI.	Same	Same
	VOR/DME	N/A	N/A	N/A	N/A
	VOR	N/A	N/A	N/A	N/A

Source: URS, May 2004.

The existing precision instrument approach capabilities to both Runway 17L and 35R approaches include a CAT II ILS having capabilities that offer cloud ceiling and visibility minimums as low as 100 feet and 1,200 feet RVR, respectively.

The future NAVAID upgrades to support precision instrument approach capabilities to Runways 17L and 35R include a CAT IIIb ILS having capabilities that would have no cloud ceiling minimums and visibility minimums as low as zero ceiling and 600 feet RVR. The runway is equipped with ALSF-2 centerline lights, TDZL, and HIRL.

5.2.5 SUMMARY OF INSTRUMENT LANDING SYSTEM IMPROVEMENTS

A summary of the planned ILS upgrades is presented in Table 5-11. As shown on Figure 5-2, MCO will ultimately have two CAT IIIb approaches from the north and three CAT IIIb approaches from the south.

**TABLE 5-11
SUMMARY OF ILS IMPROVEMENTS**

Runway	Current Condition	Future Approach Lighting/ ILS Upgrade
18L	Non-Precision	MALSR/CAT I
36R	ALSF-2/CAT IIIb	None
18R	MALSR/CAT I	ALSF-2/CAT IIIb
36L	Non-Precision	ALSF-2/CAT II/GPS
17R	ALSF-2/CAT II	None
35L	ALSF-2/CAT IIIb	None
17L	ALSF-2/CAT II	None/CAT IIIb
36R	ALSF-2/CAT II	None/CAT IIIb

Source: GOAA, May 2004.

5.2.6 HELIPADS

MCO has two designated existing helipads on the airport, as depicted on Figure 5-1. One helipad is located on the Tradeport side on the north end of the West Ramp. The other helipad is located on the Terminal rooftop that is for special use. The terminal-top heliport is only available with prior approval from Airfield Operations. This approval is normally given to Federal, state, and local law enforcement and military operations. There is no plans at this time to add additional helipads on the airport.

5.3 Taxiway System

An essential element of any airport layout is an efficient ground circulation system, connecting the runways with the aviation facilities throughout the airport. To maximize the effectiveness and capacity of the runway system, parallel taxiways supporting a runway through a series of short connector taxiways that have been carefully placed at exit and entry points along the runway have proven most effective. This basic design, based upon major taxiways located parallel to the runways, has been recommended for MCO by FAA, GOAA, MCO ATCT personnel, and airport user groups. Aircraft ground circulation and airport capacity and safety would be enhanced, aircraft delays reduced, and efficient access would be provided to allow the development of adjacent land into highly functional aviation-related land uses. Efficient access to and from aircraft parking aprons would also maximize operational efficiency on the airport.

GOAA staff is developing a Surface Movement Guidance and Control System (SMGCS) plan for MCO. This plan, with completion of airfield lighting and airfield marking improvements, will support low visibility aircraft taxiing operations on the airfield and enhance airport safety.

Based upon these considerations for an overall concept of the taxiway system, the following taxiway improvements were identified for MCO (Table 5-12) and are reflected on Figure 5-1. The following taxiway description sequence does not necessarily reflect an order of priority or precedence.

**TABLE 5-12
SUMMARY OF TAXIWAY IMPROVEMENTS**

Taxiway	Improvement	Justification
Taxiways B, C, E, and G	Upgrade to ADG-VI	New Large Aircraft Service
Taxiway L	Extension	jetBlue Airways Hangar
Taxiway L	Extension South of Comair	Demand Driven
New West Airfield Taxiways	New Taxiways	Capacity Enhancements
New Taxiway K	Future Crossfield Taxiway	Delay Reduction
New Taxiway I	New Taxiway	Improve Aircraft Ground Circulation
Taxiway Y	Extension	Improve Aircraft Ground Circulation
Taxiway E	Extension	Improve Aircraft Ground Circulation
Taxiway M	New Parallel Taxiway	Demand Driven
Taxiway P	New Taxiway - East Side	Demand Driven
Crossfield Taxiway Connectors	New Taxiways	Demand Driven
Taxiway B	Extension	South Terminal Complex
Taxiway C	Extension	South Terminal Complex
Taxiways B11 and B12	New Connector Taxiways	South Terminal Complex
Taxiway A3	Realignment of Taxiway A3	FedEx Apron
Taxiway Z	Extension	Improve Aircraft Ground Movement
Taxiway A	Widening	ADG-VI Upgrade

Source: URS, May 2004.

New Large Aircraft (NLA) Taxiway Improvements

To accommodate the ARC D-VI NLA that are anticipated to operate at MCO by 2008, various taxiway improvements will need to be completed on the east and west airfields, as shown on Figure 5-4. Because much of the pavement on the west airfield is currently designed to Aircraft Design Group (ADG) ADG-VI standards, GOAA has obtained a waiver from FAA that requires only the widening of taxiway shoulders on straight sections for a total pavement width of 180 feet. However, if any existing taxiway is rehabilitated, it would be required to fully meet ADG-VI design standard requirements (200 feet). Any new taxiways would need to be constructed to fully satisfy ADG-VI standards.

As reported in June 2004, it should be noted that recent FAA studies on runway requirements indicate that pavement does not have to be strengthened and taxiways do not have to be widened to accommodate NLA, such as the Airbus A380-800. The agency is conducting tests in Atlantic City on issues such as taxiway centerline deviations, and early results from these tests show that current taxiways and pavement are adequate.

Taxiway L Extension to JetBlue Airways Hangar (North)

Taxiway L, immediately west of the Comair hangar, is to be extended approximately 500 feet to the north. This improved taxiway will link the new JetBlue Airways aircraft maintenance hangar with the existing east airfield pavement system. Commercial aircraft such as the A320 and B757 will utilize this taxiway.

This taxiway extension will provide a link to new aviation-related development with direct and safe access to the airfield. This improved taxiway will initially serve narrow-body commercial aircraft.

Taxiway L Extension South of Comair

Taxiway L is proposed to be extended from Taxiway K (west of the Comair aircraft maintenance hangar) 8,500 feet to the south and would primarily serve as an apron taxilane. This portion of the improved taxiway is to be located between Runway 17R/35L and the Bypass canal. The southern portion of this taxiway will link with Taxiway G 1,300 feet to the west as a taxiway connector.

This taxiway extension is demand driven and will support new aviation-related development in the Midfield/Heintzelman Boulevard area that requires direct access to the airfield. This improved taxiway will accommodate FAA ADG-VI commercial aircraft. The availability of a partial parallel taxiway on the east side of Runway 17R/35L will enhance airfield capacity. The taxiway construction effort will generate short-term employment and its completion will support long-term employment at nearby hangars and other aviation-related development. The taxiway construction effort will generate short-term employment and its completion will support long-term employment at the nearby hangar and training facilities.

New West Airfield Exit Taxiways

Three future high-speed exit taxiway segments with one serving as an exit to two runways will be constructed on the west airfield to reduce runway occupancy times. Two existing taxiway connectors between Runway 18R/36L and the west ramp will also be expanded to minimize runway occupancy times. The high-speed west airfield exit taxiways are shown on Figure 5-5.

Exit taxiways affect airfield capacity because their locations along runways influence runway occupancy times for aircraft. The longer an aircraft remains on a runway, the lower the capacity of the runway. When exit taxiways are properly located, landing aircraft can quickly exit the runway, thereby increasing the runway's capacity.

Dual North Crossfield Taxiway

A future north crossfield connector taxiway (future Taxiway K), as depicted on Figure 5-6, will be constructed in conjunction with the Runway 17R/35L extension project. Runway 17R/35L is to be extended 1,500 feet to the north which would provide a total length of 11,500 feet. Eight buildings located north of the new crossfield connector taxiway would need to be removed or relocated. This future taxiway will be located 324 feet (centerline-to-centerline) north of Taxiway J.

An extension to Taxiways H and J will also be completed in conjunction with this project.

Results from the Airport and Airspace Simulation Model (SIMMOD) analysis, conducted in conjunction with the Airport Master Plan Update's Demand-Capacity and Facility Requirements Analysis, are presented in Section 4.0. This analysis indicated that a second north crossfield taxiway would provide significant delay reduction benefits and assist in the segregation of aircraft operations by FAA MCO Air Traffic Control (ATC) personnel. In addition, a crossfield taxiway between the existing Runways 17R and 17L will provide the ability to operate a mixture of departures and arrivals on the east airfield.

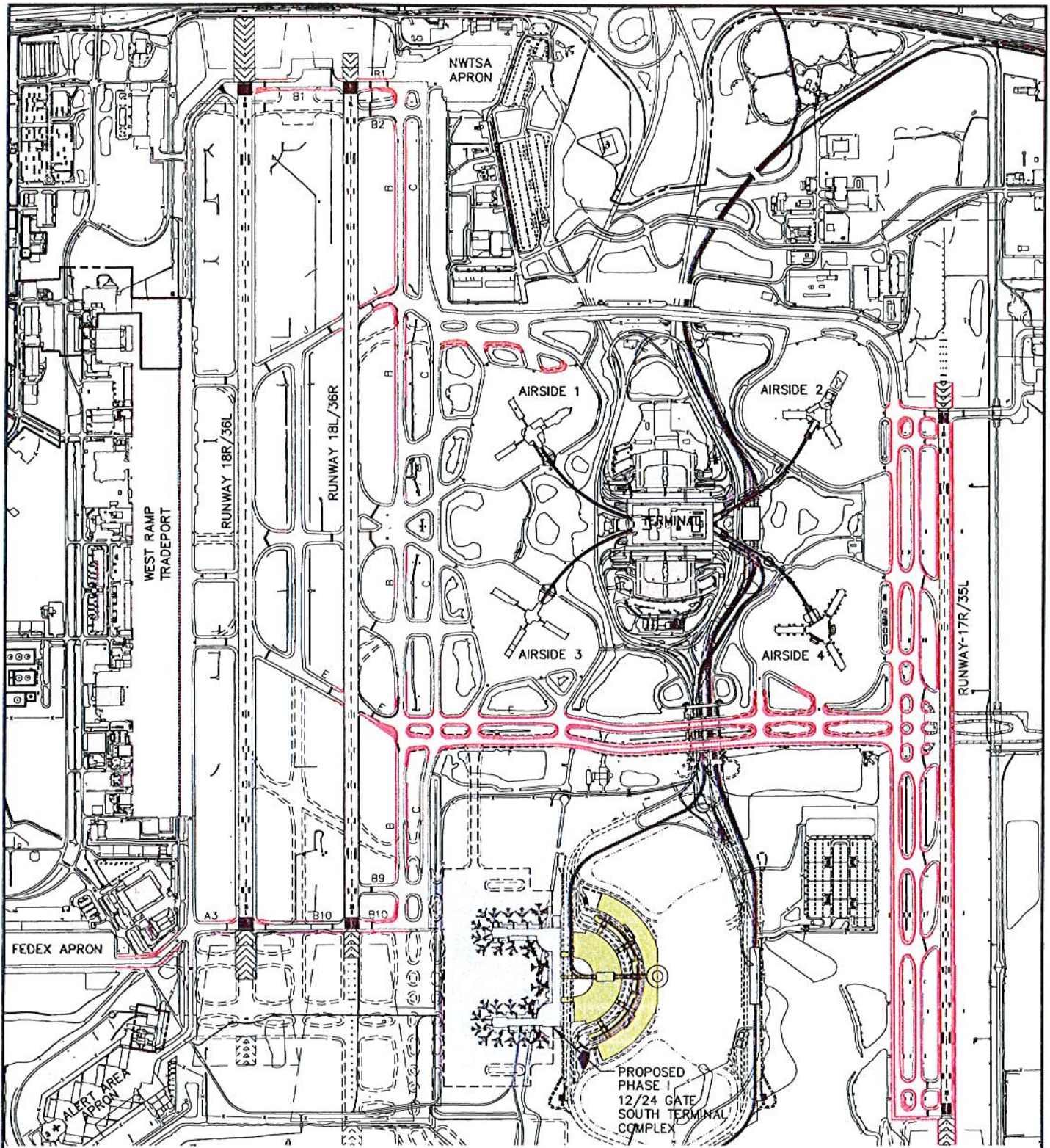
Figure 5-6 shows existing facilities that would need to be removed and/or relocated to accommodate the future north crossfield taxiway. Figure 5-7 details the facility relocation plan associated with the construction of the north crossfield taxiway along with other potential improvements. A reconfigured secure service road is also included in this plan.

Implementation of a dual north crossfield taxiway with the current Runway 17R threshold location will conflict with the TERPS for approaches to Runway 17R. This can be avoided by extending the runway to eliminate the TERPS conflict problem. The proposed runway extension would provide the ability to depart long-haul flights on the east side of the airport, thereby reducing taxi times required for large aircraft to move to the west side for takeoffs.

Airsides 2 and 4 Connector Taxiway

A connector taxiway (future Taxiway I) will be constructed between Airsides 2 and 4 as seen in Figure 5-1.

The construction of a connector taxiway between Airsides 2 and 4 will improve airside operations and more effectively utilize aircraft gates. It is essential that these airsides be connected by a taxiway in order for aircraft and aircraft support equipment to be able to use them as a common apron.



LEGEND

- TAXIWAY/TAXIWAY SHOULDER/
RUNWAY SHOULDER IMPROVEMENTS
- FUTURE SOUTH TERMINAL AIRSIDE (PHASE 1 & 2)
- FUTURE SOUTH TERMINAL LANDSIDE (PHASE 1 & 2)

N

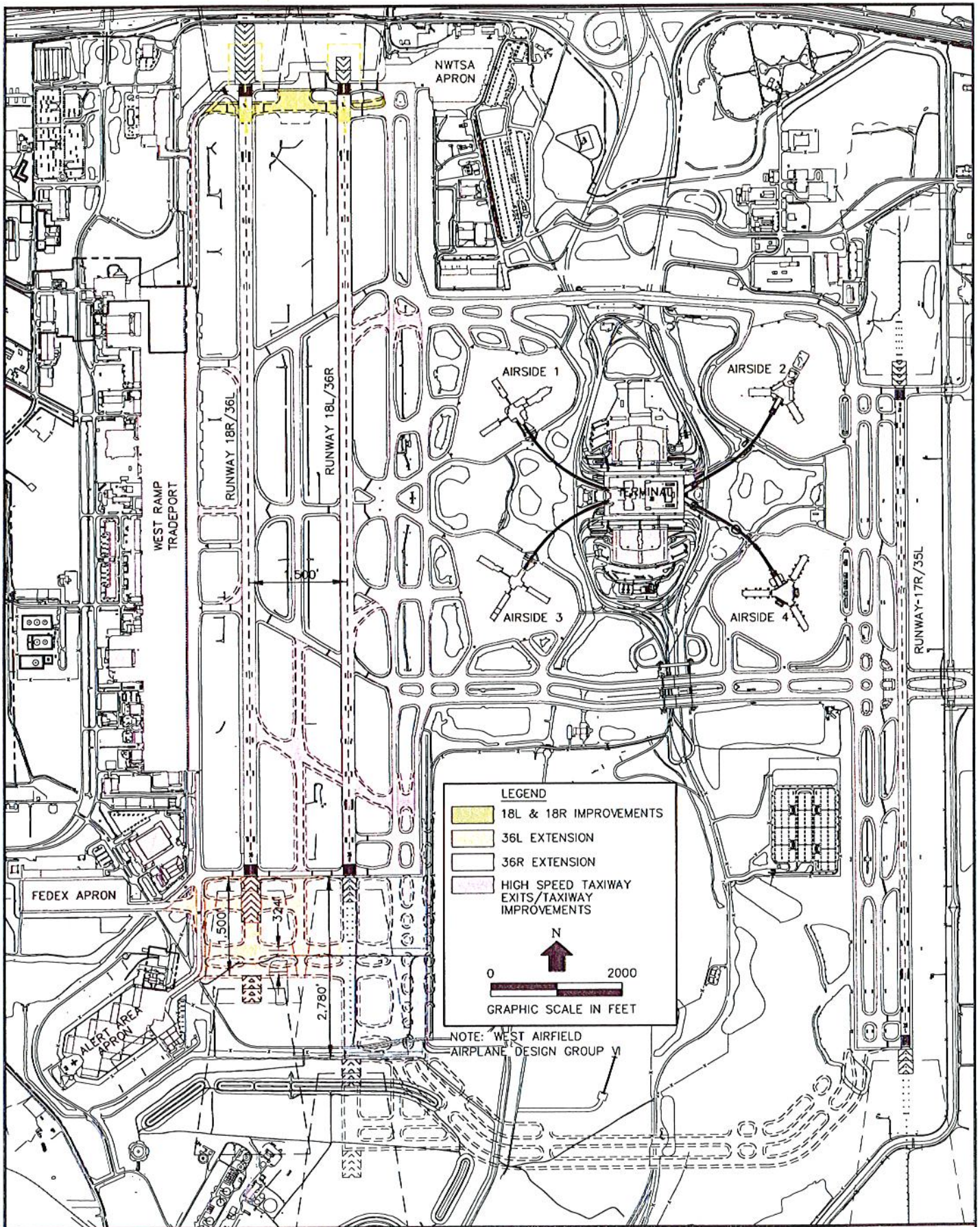
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GRAPHIC SCALE IN FEET

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Master Plan Update

**AIRPLANE DESIGN GROUP V TO VI
IMPROVEMENTS
AIRFIELD PAVEMENT WIDENING**

FIGURE:
5-4

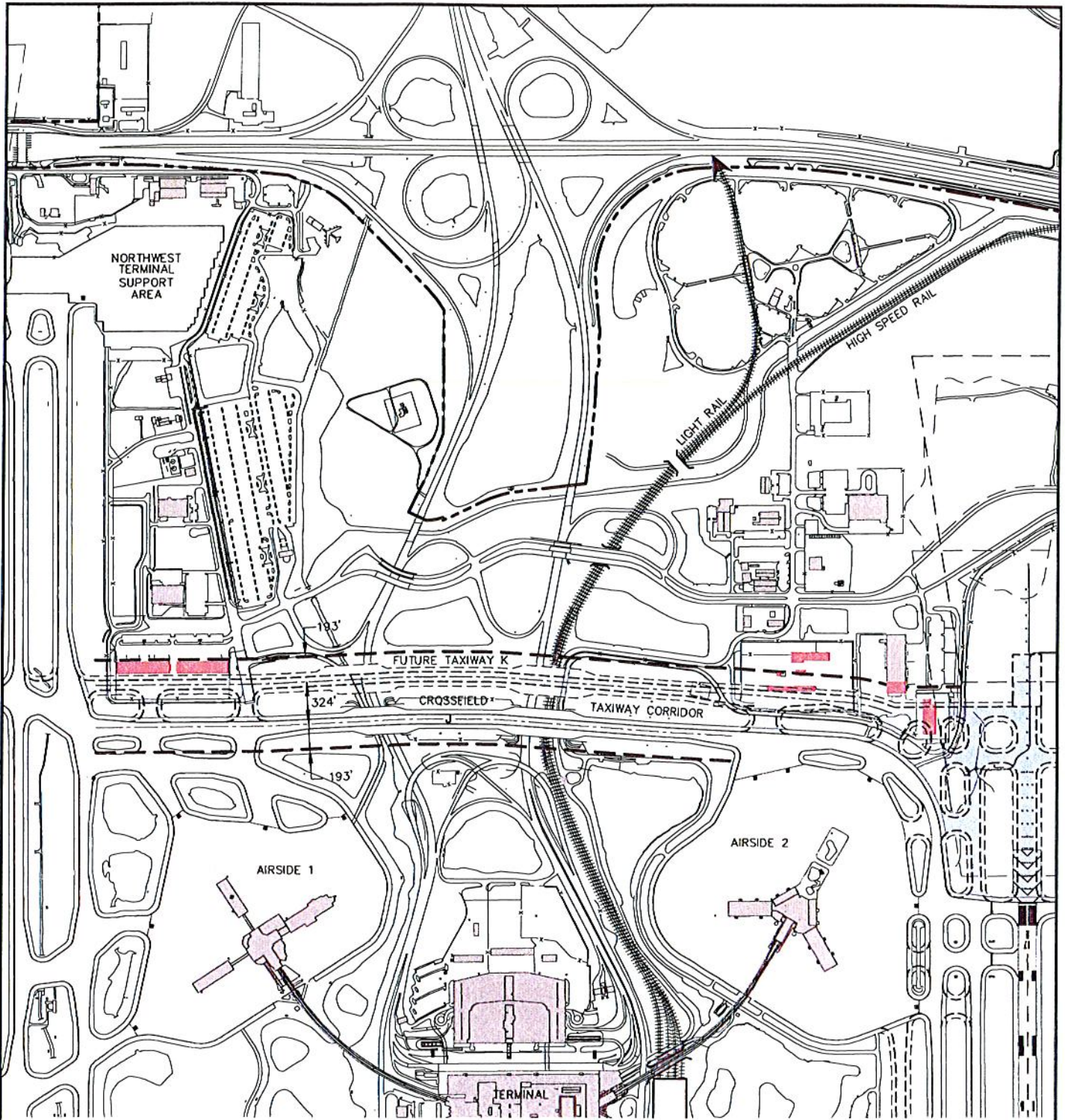


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RUNWAY 18L/36R & 18R/36L AIRFIELD IMPROVEMENTS

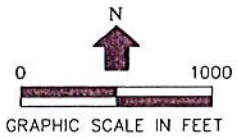
FIGURE:
5-5



LEGEND

- FUTURE RUNWAY 17R EXTENSION
- FUTURE CROSSFIELD TAXIWAY
- EXISTING BUILDINGS TO BE REMOVED/RELOCATED
- CROSSFIELD TAXIWAY CORRIDOR

NOTE: PROPOSED NORTH CROSSFIELD TAXIWAY SEPERATION DISTANCE IS BASED ON AIRPLANE DESIGN GROUP VI CRITERIA.



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DUAL NORTH CROSSFIELD TAXIWAY ALIGNMENT

FIGURE:
5-6

Taxiway Y Extension (to Tradeport West Ramp)

Taxiway Y will be extended from Runway 18R/36L to the Tradeport West Ramp to improve aircraft access between the west airfield and Tradeport West Ramp aviation facility areas. This will provide a complete mid-crossfield taxiway system.

In support of development in the Tradeport West Ramp area, this taxiway extension will allow a more efficient taxiway flow for aircraft utilizing Tradeport facilities and the ingress/egress flow across the west airfield.

Taxiway E Extension (to Taxiway N)

An extension to Taxiway E is to be constructed in conjunction with improvements to Runway 17L/35R and supporting taxiway system.

This taxiway extension will provide a more efficient two-way taxiway flow for aircraft landing and departing on Runway 17R/35L. In addition, the taxiway will reduce circuitous aircraft taxiing and decrease aircraft delay.

Parallel Taxiway M (West Side of Fourth Runway)

Parallel Taxiway M is to be extended to further support Runway 17L/35R. The northern end of Taxiway M is an aircraft holding bay.

As utilization of Runway 17L/35R increases, the demand for improved ground movement will be increased. This parallel taxiway will provide a more efficient and flexible taxiway ground movement for aircraft landing and departing on Runway 17L/35R. This taxiway is planned to be a dual lane taxiway and will allow two-way traffic flow.

Parallel Taxiway (East Side of Fourth Runway (17L/35R)/Airfield Access to Gee Bee Property)

The construction of a parallel taxiway system (future Taxiway P) is planned on the east side of Runway 17L/35R. This future Taxiway P will be constructed at 640 feet runway centerline to taxiway centerline separation which allows for the ILS equipment and ILS critical areas to remain unimpacted.

As the East Tradeport area is developed, an east parallel taxiway to Runway 17R/35L will be required. This taxiway will provide airfield access to the future East Tradeport development area (Gee Bee property).

East Airfield/Crossfield Taxiway Connectors

Midfield taxiway connectors are programmed for the long-term. These improvements include the extension of the north and south midfield crossfield taxiway projects and related taxiways which will be constructed to ADG-VI standards. Site preparation and drainage for these projects were completed during construction of Runway 17L/35R.

Taxiway B Extension

An extension to Taxiway B will be constructed in conjunction with the future extensions to Runway 36R and the development of the South Terminal Complex.

This extension will provide a more efficient taxiway flow for landing and departing aircraft. In addition, the taxiway will reduce circuitous aircraft taxiing and decrease aircraft delay.

Taxiway C Extension

An extension to Taxiway C will be constructed in conjunction with the extensions to Runway 36R and the development of the South Terminal Complex.

This extension will provide a more efficient taxiway flow for landing and departing aircraft. In addition, the taxiway will reduce circuitous aircraft taxiing and decrease aircraft delay.

Taxiway Connectors B11 and B12

Taxiway Connectors B11 and B12 will be constructed in conjunction with the extensions to Runway 36R and support the aircraft taxiway flow movement to the future South Terminal Complex.

These connector taxiways will provide a more efficient taxiway flow from the airside area and Tradeport for aircraft takeoffs on Runway 36R. In addition, these connector taxiways will reduce circuitous aircraft taxiing and decrease aircraft delay.

Taxiway A3 Realignment

A realignment of Taxiway A3 will be constructed in conjunction with the Runway 36L extension to allow the FedEx apron to be expanded to the east.

This realignment will provide a more efficient taxiway flow for landing and departing aircraft utilizing the Tradeport facilities. In addition, the taxiway will reduce circuitous aircraft taxiing and decrease aircraft delay.

Taxiway Z Extension

An extension to Taxiway Z will be constructed in conjunction with the extension to Runway 36L. Taxiway Z is a partially parallel midfield taxiway located between the west airfield runway systems.

This extension will provide a more efficient ground taxiway flow for landing and departing aircraft on Runways 18L/36R and 18R/36L. In addition, the taxiway will reduce circuitous taxiing and decrease aircraft delays.

Taxiway A Widening

The north end of Taxiway A will be upgraded from 50 feet to ADG-VI 100-foot-wide standards and remarked.

5.3.1 APRONS

Currently, there are six primary apron areas at MCO, as listed below:

- The terminal apron which is comprised of Airsides 1, 2, 3, and 4 in the North Terminal Complex area;
- The cargo apron (formerly the old terminal) in the Northwest Terminal Support Area (NWTSA);
- The Tradeport West Ramp apron in the Central Tradeport;
- The former Strategic Air Command Alert Area apron in the South Tradeport;
- The FedEx apron in the South Tradeport; and
- The airline maintenance apron northeast of Runway 17/35.

For the purposes of this Master Plan Update and the organization of this document, discussions on apron alternatives and development are described in their respective building area sections.

5.4 Airport Traffic Control Tower, Aircraft Rescue and Fire Fighting, and Terminal NAVAIDS

5.4.1 AIRPORT TRAFFIC CONTROL TOWER

With the new ATCT in place, all future facilities on the airport are subject to airspace and line of sight evaluations. GOAA staff has developed critical line of sight criteria for the evaluation process. Existing and estimated rooftop controlling elevations have been identified and are shown in the ALP drawing. This information is used by GOAA staff in their in-house airspace conflict evaluation process.

Primary Surface

A surface longitudinally centered on a runway that extends 200 feet beyond either end of the runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The primary surface has a width of 1,000 feet that is uniform throughout its entire length and is based on the use of precision instrument approach procedures that either currently exist or are planned for each end of the runway.

Horizontal Surface

The horizontal surface is a flat plane of imaginary airspace established 150 feet above the airport elevation of 96.4 feet mean sea level (MSL). The perimeter of the horizontal surface is constructed by swinging arcs having radii of 10,000 feet from the center of each end of the primary surface of each runway. Tangents connect the adjacent arcs.

Conical Surface

The conical surface extends upward and outward from the outer limits of the horizontal surface for a horizontal distance of 4,000 feet. The slope of the conical surface is 20:1 as measured in a vertical plane.

Transitional Surface

Transitional surfaces extend outward and upward, at right angles to the runway centerline and runway centerline extended, from the sides of the primary surface and the approach surfaces.

The transitional surfaces extend upward and outward at a slope of 7:1 and extend until they intersect the horizontal or conical surface.

The transitional surfaces for precision instrument runway approach surfaces that project beyond the limits of the conical surface extend a distance of 5,000 feet measured horizontally from the edge of the approach surface at a slope of 7:1.

Precision Instrument Approach Surfaces

The precision instrument approach surfaces for each end of the four MCO runways are longitudinally centered along each extended runway centerline, beginning at the end of the primary surface. The precision instrument approach surface extends outward and upward at a slope of 50:1 for a horizontal distance of 10,000 feet and continues at a slope of 40:1 for an additional 40,000 feet. The surface width is that of the primary surface at the beginning and increases uniformly to a width of 16,000 feet at a distance of 50,000 feet from the end of the primary surface.

5.7.2 THREE-DIMENSIONAL AIRSPACE ANALYSIS PROGRAM

The Three-Dimensional Airspace Analysis Program (3DAAP) is a comprehensive set of personal computer-based tools used for analyzing proposed airport construction projects. Developed jointly by the Florida Department of Transportation (FDOT) and FAA, 3DAAP provides AutoCAD-based analytical planning tools that serve to enhance and expedite the FAA review process of proposed planning or construction projects.

One of the major advantages in using 3DAAP is the airport's ability to analyze FAR Part 77, TERPS, ATCT line-of-sight, and obstruction shadow diagramming for proposed vertical development prior to sending the proposal to FAA for review and coordination. Other tools include evaluation capabilities for potential conflicts with TERPS and FAR Part 77 civil imaginary airspace surfaces, NAVAIDs, line-of-sight, and electronic radar map impacts that may be posed by construction projects on and off the airport. Since its inception, GOAA has utilized the 3DAAP analytical software tools for the planning and FAA review of numerous airport development projects. The ongoing use of these and other state-of-the-art computerized tools has enhanced and expedited the timely development of MCO projects.

5.7.3 DEPICTION OF APPLICABLE FAR PART 77 CIVIL IMAGINARY AIRSPACE SURFACES

Using planned runway lengths, runway end elevations, runway centerline spot elevations, and the prescribed FAR Part 77 criteria for precision instrument runways, the 3DAAP program was used to generate a three-dimensional wire frame AutoCAD model of the applicable FAR Part 77 Civil Imaginary Airspace Surfaces for the four runways at MCO. The MCO civil airspace imaginary surfaces are applicable navigable airspace above and around the airport supporting precision instrument operations to all runway ends.

The FAR Part 77 imaginary airspace surfaces for MCO are depicted in the Airport Layout Plan (ALP) set.

MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT

SECTION 6.0
TERMINAL FACILITIES

Prepared for:
GREATER ORLANDO AVIATION AUTHORITY

Prepared by:
The URS Team

August 2004

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SECTION 6.0

TERMINAL FACILITIES

6.1 INTRODUCTION

The Terminal Area Plan includes the North and South Terminal Complexes which consist of terminal buildings, parking structures, aircraft apron, roadway, and the terminal support areas. For discussion purposes in this Master Plan Update, the terminal area plan is described as: the existing North Terminal Complex, Northwest Terminal Support Area (NWTSA), Northeast Terminal Support Area (NETSA) and the future South Terminal Complex, Southwest Terminal Support Area (SWTSA), and Southeast Terminal Support Area (SETSA). These areas are shown on Figure 6-1.

6.2 NORTH TERMINAL COMPLEX AREA

Existing functional uses in the North Terminal Complex Area include the passenger Terminal A and B Complex, four Airsides, 1, 2, 3, and 4, that presently accommodates 90 active aircraft gate parking positions, ground transportation interface, public parking, rental car ready facilities, and Federal Aviation Administration (FAA) facilities. The North Terminal Complex Area, shown on Figure 6-2, should continue to grow to serve an estimated annual passenger capacity of 40 million annual passengers (MAP) at the airport. The North Terminal Complex served 27.3 MAP in 2003. See Section 7.0, Surface Transportation Plan, for proposed improvements to the North Terminal roadway system.

6.2.1 NORTH TERMINAL MAIN LANDSIDE BUILDING

In the North Landside Terminal, the east and west security checkpoint locations are planned to be expanded. Additional passenger processing-related enhancements include the installation of Common Use Terminal Equipment (CUTE) and Common Use Self Serve (CUSS) equipment. In addition, improvements to the Level 3 departure curbside are proposed.

It is anticipated that the North Terminal Complex will have the capacity to accommodate between 36 and 40 MAP which is now forecast to be within the 2020 timeframe. With new security regulations already in place, modifications are required to satisfy passenger throughput with lower processing times. In order to meet higher passenger volumes as the airline industry returns to pre-September 11th, 2001 levels, compounded by increased passenger levels in the North Terminal, passenger capacity improvements are necessary prior to 2012.

As described previously, security requirements have necessitated expansion to both the east and west security checkpoints in the Main Landside Building. These expansion improvements are anticipated to be completed by 2007, or approximately 35 MAP. Improvements include the addition of two passenger queuing lanes each on both the east and west end. These improvements are sufficient to a 40 MAP level.

Phased terminal loop road improvements would be completed in conjunction with physical improvements to the Landside Terminal. There are a number of road improvements that are discussed in more detail in Section 7.0, Surface Transportation Plan.

Finally, the additional Level 3 canopy improvements at the departure curb will provide weather protection along the enplaning curb fronts.

6.2.1.1 West Side GOAA Staff Office Building

To assist with the consolidation of different departments for GOAA, a new office building is proposed at the west end of the North Terminal Complex building. The site located between the AGT station leading to Airsides 1 and 3 was once the location of the original airport traffic control tower (ATCT) and existing FAA Terminal Radar Approach Control (TRACON) building site for MCO.

The new building would consist of two levels of parking on the lower floors, with three 25,000-square-foot floors above, providing a total of 75,000 square feet of gross office area. Parking access would be from the main terminal loop road. The building would be connected to the Landside Terminal by way of a pedestrian bridge connecting at the fourth level of the Landside Terminal Building. The parking structure would have a central vertical pedestrian service core with ancillary service and mechanical spaces bracketing the core. Handicapped and VIP parking surrounds this core eliminating exposure of crossing vehicular traffic to the individuals who will park there. On the first floor next to the service core is a waste management area and delivery station servicing the building on top of the parking structure. The parking decks are conceived as being level (except for drainage control) with vehicular vertical circulation being carried out by a simple two-lane exterior ramp.

6.2.1.2 West Departure Level/Concession Expansion

Additional areas at the west end of the North Terminal Complex level could be captured to provide additional space for retail concessions by relocating the AGT stations to Airsides 1 and 3 to the west along the existing guideways. This would also allow for the relocation to the west of the passenger security check-in area and associated Transportation Security Administration (TSA) office space. Please refer to Figure 6-3.

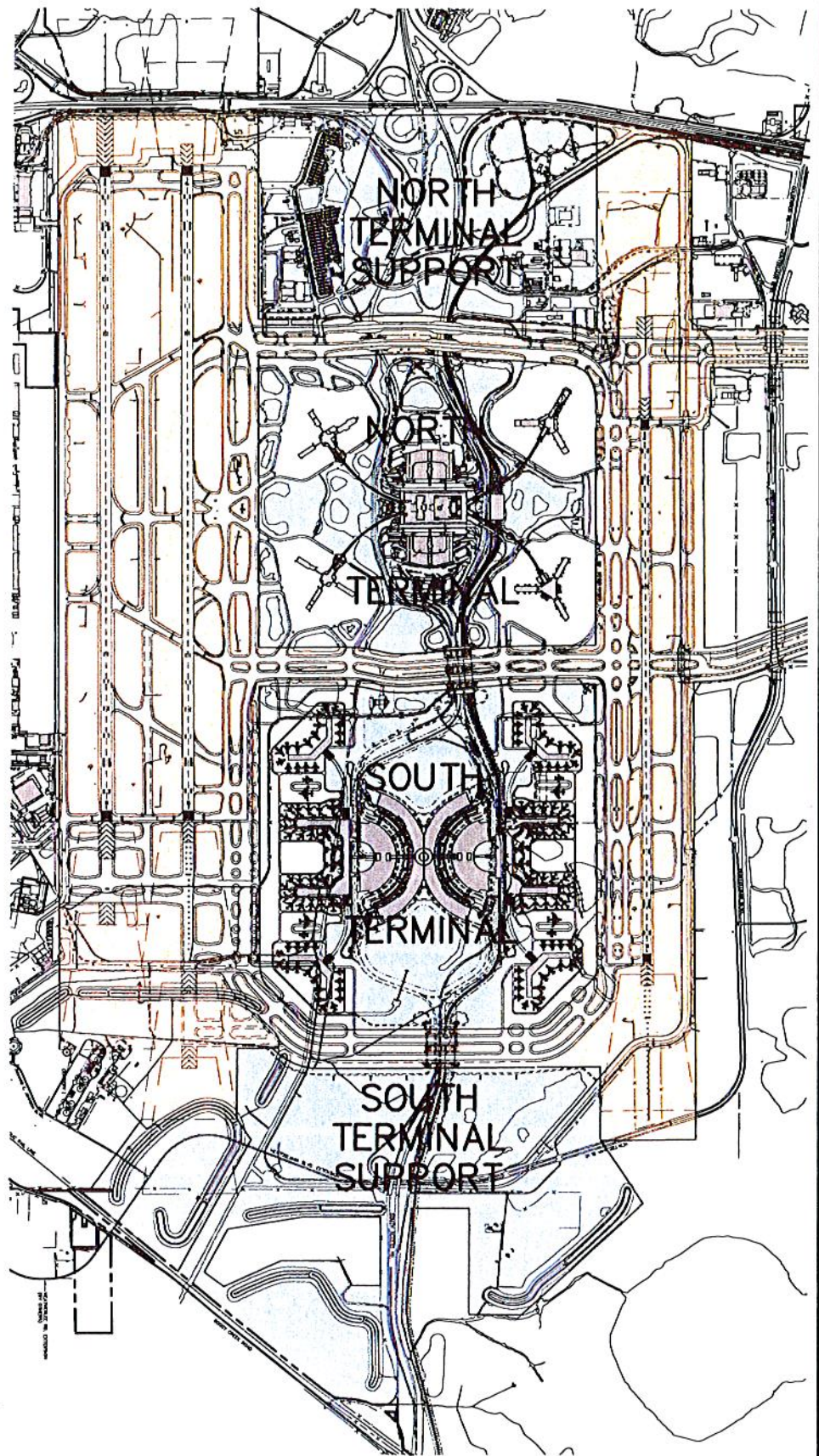
The relocation of these functions would provide additional space in front of the existing duty free shop on the north and the area in front of the offices of the Orlando Police Department on the south as leaseable areas for future retail spaces.

6.2.1.3 North Terminal Intermodal Passenger Terminal

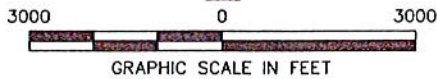
The Intermodal Passenger Terminal (IPT) station at the North Terminal Complex is to be developed to provide for two forms of rail transportation: high-speed rail (HSR) and light rail transit (LRT). The location of the IPT station is located on the east side of the Main North Terminal Complex Landside Building, east of the main loop road. This location is in-line with the existing rail corridor passing through the airport property.

The future station will be comprised of three levels and a sky bridge connecting the IPT station to the North Terminal Complex. The lower level will provide for baggage make-up of bags for passengers arriving and departing on the HSR. Elevators would be specifically allocated for baggage vertical transport via carts directly to the baggage cars at either end of the passenger trains. This level will also tie into the existing tug drives associated with the North Terminal Complex Landside Building for baggage delivery to and from the airlines. A tug drive will also connect the two baggage handling areas to provide additional access and cross circulation.

The second level would be comprised of the passenger platforms. There are two platforms for arriving passengers and two platforms for departing HSR passengers. The arriving and departing platforms would serve trains heading in either direction. The station platforms for the HSR would be separated in the center to provide for two HSR bypass tracks. Both the arriving and departing platforms would provide vertical circulation for the movement of passengers to and from the upper ticketing and baggage claim areas. The departing platform would also provide passengers with seating areas.



- LEGEND**
- AIRFIELD
 - BUILDING AREAS



The second level would also provide a center platform for future LRT. The center platform would serve trains heading in either direction. This platform would also provide vertical circulation to the upper ticketing area.

The third level would be the main transfer level between the IPT station and the North Terminal Complex. At this level, passengers would be provided with services for ticketing and baggage claim. There would be associated ticketing offices and staff space behind the ticket counters as well as a sorting area for baggage. This level would also provide other amenities such as retail concessions, toilet rooms, and general waiting areas for the public. Horizontal circulation would be facilitated by four sets of moving walkways servicing the IPT sky bridge connector and train ticketing areas.

A pedestrian sky bridge connecting the IPT station and the North Terminal Complex would be accessed from the third level and would connect to the North Terminal Complex at the terminal's fourth level. There would be four sets of moving walkways aiding horizontal circulation within the sky bridge itself.

6.2.2 NORTH TERMINAL AIRSIDES

6.2.2.1 Airside 1

Airside 1 is one of the original airside completed in 1981. In the existing Airside 1, the center hub of the building is approximately 44,000 square feet and contains concession areas, public seating, the AGT station, and the transitional space to three holdroom wings. Each of the wings is oriented 90 degrees to one another.

The 25 gates on Airside 1 can accommodate ADG IV and V aircraft. However, it is anticipated that MCO will be served by the new NLA by 2008 (ADG VI). Therefore, aircraft gates 23, 24, and 28 on wing No. 6 will be reconfigured to accommodate one to two ADG VI aircraft (A380-800) as shown in Figure 6-4.

Figure 6-4 also depicts rehabilitation of the central hub which will allow for expanded concession and circulation areas. In addition, the AGT stations, interior finishes and building systems (HVAC, electrical, etc.) will be updated. The rehabilitation program for Airside 2 will be completed in the near term. The aesthetics of this terminal area should be maintained through the continued use of retention ponds/canals and landscaped greenbelts.

6.2.2.2 Airside 2

Airside 2, the most recent airside, opened in 2000. In the existing Airside 2, the hub of the building is approximately 57,000 square feet and contains concession areas, public seating, the AGT station, and transitional space to the two holdroom wings (No. 7 and 9). The two existing holdroom wings are oriented 120 degrees to one another which provides significant flexibility in parking a mix of aircraft sizes.

Within the next five years, construction of the third concourse (wing No. 8) is planned along with expansion of existing wings No. 7 and 9, as shown on Figure 6-5.

At present, Airside 2 has 16 existing gates. However, it is designed to accommodate approximately 32 ADG III aircraft. Airside 2 is primarily used by the Boeing 737, Boeing 717, and A320 aircraft. In addition to the airside expansion, taxiway connectors (H2 and G1) will be constructed.

6.2.2.3 Airside 3

Airside 3 is one of the original airside completed in 1981. In the existing Airside 3, the center hub of the building is approximately 44,000 square feet and contains concession areas, public seating, the

AGT station, and the transitional space to three holdroom wings. Each of the wings is oriented 90 degrees to one another.

Figure 6-6 depicts rehabilitation of the central core hub which will allow for an expanded concession area and public circulation area. In addition, the AGT stations, interior finishes and building systems (HVAC, electrical, etc.) will be updated. The rehabilitation program for Airside 2 will be completed in the near term. The aesthetics of this terminal area should be maintained through the continued use of retention ponds/canals and landscaped greenbelts.

The 25 gates on Airside 3 can accommodate ADG III, IV, and V aircraft. As shown on Figure 6-6, the fleet mix and gate configuration will remain unchanged.

6.2.2.4 Airside 4

Airside 4 was completed and opened in 1990. In the existing Airside 4, the center hub of the building is approximately 57,000 square feet and contains concession areas, public seating, the AGT station, and the transitional space to three holdroom wings. Two holdroom wings (No. 10 and 12) are oriented 120 degrees to one another which provides significant flexibility in parking a mix of aircraft sizes. Airside 4 has a total of 24 gates.

The international gates on wing No. 11 will need to be reconfigured to accommodate two to three A380-800 NLA positions, as shown on Figure 6-7. Figure 6-8 depicts an alternate gate layout to accommodate NLA positions.

6.2.2.5 North Terminal Gate Utilization

In 2003, MCO had 93 active gate positions. Presently in 2004, the actual number of gates totals 90 gates.

As discussed previously in the Demand/Capacity Analysis and Facility Requirements in Section 4.0, gate utilization at MCO varies by airside, based on the operating characteristics by the individual airlines serving that particular airside. Gate utilization is measured by various metrics, such as annual passengers per gate, daily departures per gate, peak hour gate utilization, and daily ramp schedule assessments based on project gate occupancy times. For this assessment, it was determined to evaluate gate usage based on annual passengers per gate as the determining metric to assess gate growth requirements and location of gate development.

Two gate utilization scenarios were developed in spreadsheet format to assess potential gate requirements through the 20-year planning period.

In Table 6-1, actual passengers per gate per airside were evaluated and projected into the future with the assumption that traditional air carriers, referred to today as "Legacy Carriers," would improve their gate management practices with higher passenger throughput per gate. For example, Airside 1 would eventually increase to 325,000 annual passengers per gate in the long-term period as recorded in the past. Airside 3 which only achieved 212,000 annual passengers per gate in 2003, would increase to 325,000 annual passengers per gate in 2020. Airside 2 would continue with high gate utilization with an average of 468,000 annual passengers per gate throughout the planning period as the location of the "Low-Cost Carriers." Airside 4 would increase from its 305,000 annual passengers per gate ratio in 2003 to 350,000 in 2020.

The application of the foregoing ratios yields a 2020 gate requirement of 131 total gates. Assuming 24 gates are available in the South Terminal, 107 gates would be required in the North Terminal versus the 90 available gates in 2004. This evaluation suggests that expansion to Airside 2 would be needed in the near-term planning horizon. Full build out of Airside 2 with 16 new gates would essentially satisfy the gate requirements for the North Terminal.

Table 6-2 depicts a more conservative assessment of gate requirements through the 20-year horizon. Airsides 2 and 4 would generate the same gate utilization as discussed above; however, Airside 3 would be capped at 250,000 annual passengers per gate through the 20-year period, resulting in a 2020 gate requirement of 143 gates. Assuming full development of Airside 2 and 24 gates in the South Terminal, MCO would have a shortfall of 13 gates by 2020, thereby suggesting a potential need for further expansion of the South Terminal beyond 24 gates. Section 6.3.3 portrays phasing plans for the South Terminal for Phases 1 and 2.

**TABLE 6-1
GATE UTILIZATION**

Orlando International Airport														
Assume 3.5% Growth Rate for 2004 to 2020														
CY	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Passengers (x1,000)														
1 Airside 1	9,807	10,221	7,146	7,652	7,099	7,454	7,774	8,078	8,377	8,670	8,973	9,287	10,773	12,292
2 Airside 2	1,373	5,485	6,083	6,961	7,309	7,309	7,623	7,921	8,214	8,501	8,799	9,107	10,564	12,053
3 Airside 3	9,074	9,060	7,511	6,109	5,929	6,225	6,493	6,746	6,996	7,241	7,494	7,757	8,998	10,266
4 Airside 4 (including Comair)	10,316	10,163	8,100	6,803	7,330	7,697	8,027	8,341	8,649	8,952	9,265	9,589	11,124	12,692
5 South Terminal													0	0
Total Passengers (x1,000)	29,197	30,817	28,242	26,647	27,319	28,685	29,918	31,085	32,235	33,364	34,531	35,740	41,458	47,304
Gates														
7 Airside 1	25	25	25	25	25	30	30	31	31	31	31	31	32	33
8 Airside 2	16	16	16	16	16	16	16	17	18	18	19	19	19	23
9 Airside 3	28	28	28	28	28	25	25	26	26	26	26	26	26	28
10 Airside 4 (w/o adjustment for Comair)	24	24	24	24	24	23	24	25	26	27	27	27	28	32
11 South Terminal													12	24
Total Gates	77	93	93	93	93	94	96	98	100	102	104	106	115	131
Signatory Airline Gates					77	77	77	81	82	83	70	72	88	102
Percent Leased Gates					83%	83%	83%	84%	87%	88%	74%	71%	77%	
Ratio - Passengers per Gate (x1,000)														
14 Airside 1	392.3	408.8	285.8	306.1	284.0	250.0	257.0	263.0	270.0	278.0	285.0	293.0	325.0	325.0
15 Airside 2			342.8	380.2	435.1	468.0	468.0	468.0	468.0	468.0	468.0	468.0	468.0	468.0
16 Airside 3	324.1	323.6	268.3	218.2	211.8	250.0	257.0	263.0	270.0	278.0	285.0	293.0	325.0	325.0
17 Airside 4	429.8	423.5	337.5	283.5	305.4	328.0	330.0	332.0	334.0	337.0	339.0	341.0	350.0	350.0
18 South Terminal (Assume Pax > 40M in south)													121.5	304.3

**TABLE 6-2
ALTERNATIVE GATE UTILIZATION**

		Orlando International Airport													
		Assume 3.5% Growth Rate for 2004 to 2020					Assume 3.5% Growth Rate for 2004 to 2020								
CY		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Passengers (x1,000)															
1	Airside 1	9,807	10,221	7,146	7,652	7,099	7,454	7,774	8,078	8,377	8,670	8,973	9,287	10,773	12,292
2	Airside 2		1,373	5,485	6,083	6,961	7,309	7,623	7,921	8,214	8,501	8,799	9,107	10,564	12,053
3	Airside 3	9,074	9,060	7,511	6,109	5,929	6,225	6,493	6,746	6,996	7,241	7,494	7,757	8,998	10,266
4	Airside 4 (including Comair)	10,316	10,163	8,100	6,803	7,330	7,697	8,027	8,341	8,649	8,952	9,265	9,589	11,124	12,692
5	South Terminal													0	0
6	Total Passengers (x1,000)	29,197	30,817	28,242	26,647	27,319	28,685	29,918	31,085	32,235	33,364	34,531	35,740	41,458	47,304
Gates															
7	Airside 1	25	25	25	25	25	30	30	31	31	31	31	32	36	38
8	Airside 2		16	16	16	16	16	16	17	18	18	19	19	23	26
9	Airside 3	28	28	28	28	28	25	26	27	28	29	30	31	36	41
10	Airside 4 (w/o adjustment for Comair)	24	24	24	24	24	23	24	25	26	27	28	29	34	39
11	South Terminal													12	24
12	Total Gates	77	93	93	93	93	94	97	100	103	106	109	111	128	143
13	Signatory Airline Gates					77	77	77	81	82	83	70	72	88	102
	Percent Leased Gates					83%	83%	83%	84%	87%	88%	74%	71%	77%	
Ratio - Passengers per Gate (x1,000)															
14	Airside 1	392.3	408.8	285.8	306.1	284.0	250.0	257.0	263.0	270.0	278.0	285.0	293.0	300.0	325.0
15	Airside 2			342.8	380.2	435.1	468.0	468.0	468.0	468.0	468.0	468.0	468.0	468.0	468.0
16	Airside 3	324.1	323.6	268.3	218.2	211.8	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
17	Airside 4	429.8	423.5	337.5	283.5	305.4	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0
18	South Terminal (Assume Pax > 40M in south)													121.5	304.3

6.2.3 NORTH TERMINAL SUPPORT AREA

The North Terminal Support Area is defined as the area north of the north crossfield taxiway system (Taxiways J and K), south of the Bee Line Expressway (State Road 528), and between the east airfield and Runway 17R/35L. The preferred North Terminal Support Area plan is shown on Figure 6-9. For description purposes, the plan is discussed as the NWTSA and the NETSA.

6.2.3.1 Northwest Terminal Support Area (NWTSA)

The NWTSA is located north of Airside 1 and east of Runway 18L/36R. Existing functional uses in the NWTSA include airline belly cargo, airline catering, ground support equipment (GSE), express package freight, car rental, and waste disposal. Ultimate development in the NWTSA is dependent on completion of the improved Cargo Road linkage between the Tradeport development on the west and the Airport Boulevard entrance and exit roads on the east. Ultimate build out of the area should focus on making the existing aircraft apron at the northern end of the area more efficient by possibly constructing a new express cargo facility. Existing rental car facilities on the west part of this aircraft apron should be relocated in the near term to provide higher and better use of this parcel of property. This northwest corner of the NWTSA is a prime site for aviation-related development, and it should be studied in greater detail before proceeding with development. This site can be accessed from Tradeport Drive from the west and Cargo Road from the east; airfield access and apron proximity are additional attributes.

South of the existing aircraft apron, this area should be reserved for airline-related support functions that include belly cargo, catering, and GSE facilities. GSE includes activities related to tug traffic, waste disposal, recycling and storage, maintenance, and processing of equipment. Included is an existing catering facility (LSG Sky Chefs); this area should be expanded for airline support services given its proximity to the airfield and to the North Terminal Complex.

East of the NWTSA is the existing Blue Satellite Parking Lot with 3,581 (3,310 striped, 271 overflow) parking spaces (including the Near-Term Blue Lot Expansion project). This parking lot is programmed to be expanded on the west side of the Cargo Road extension. The expansion will encompass 33.5 acres and provide 3,100 additional spaces for a total of 6,681 parking spaces. This project is needed to replace capacity that will be lost when the Gold Lot is closed.

The potential relocation by Blue Lot expansion and Cargo Road extension projects in the northeast corner of the support area should be preserved for the community. The full eastern border of the NWTSA should remain a greenbelt to protect the aesthetics of the airport and serve as a natural buffer for passengers traveling on Airport Boulevard.

6.2.3.2 Northeast Terminal Support Area (NETSA)

The NETSA is located north of Airside 2. Existing functional uses in the NETSA include employee parking, airline support (cargo, GSE, catering), public utility, and Greater Orlando Aviation Authority (GOAA) support. Development in the NETSA should focus on services for airport employees and related support for the North Terminal Complex. A large employee parking lot with a possible employee commercial convenience center could be developed as referenced in the 1995 Master Plan. The convenience center concept could include a convenience store, childcare facility, dry cleaner, auto care facility, or other service/convenience facilities that would be utilized by airline and airport tenant employees. The area east of employee parking would continue to be developed for rental car facilities that will capitalize on the transportation access to the support area. South of the proposed employee parking lot is the Orlando Utilities Commission (OUC) electric substation; this location would be maintained as a public utility. South of the OUC site is an area that has existing catering facilities; in the future, the area should be developed with aviation support services, given its proximity to both Cargo Road and to the airfield. To the south of that area is land that should

continue to be developed for airline cargo facilities. The site has direct access to the future north crossfield taxiway (Taxiway "K"), and it will also be served by a new alignment of Cargo Road east. The land currently occupied by GOAA support facilities should remain and be expanded in the future.

As part of the ultimate plan, a rail corridor alignment for both HSR and LRT has been identified and reserved.

6.3 SOUTH TERMINAL COMPLEX AREA

Information presented in the South Terminal Complex section was developed by the South Terminal Complex Design team consisting of KBJ, Turner Associates, and Burns & McDonnell. The South Terminal Complex (ultimate build-out), shown on Figure 6-10, has been planned and programmed to include a second major passenger Landside/Airside Terminal Complex with fully independent support facilities designed for approximately 120 aircraft gates parking positions. The South Terminal Complex would be capable of handling an additional 36 to 40 MAP at the airport. This would include parking for rental car facilities and passenger parking in a centrally located parking structure, with a hotel located above the parking facility. Ticketing, baggage claim, Federal Inspection Services (FIS), airline operations, Greater Orlando Aviation Authority (GOAA) offices, retail concessions, security checkpoint, intermodal transportation system (ITS) stations, and a commercial vehicle plaza would be located in the Landside facility. Swing gate holdrooms, additional retail concessions, sterile corridor, in-transit lounges, baggage make-up area, central plant, truck docks, and automatic guideway transit (AGT) stations would be located in the Airside facility. The complex would also include an intermodal passenger terminal (IPT) station on the east side to serve LRT and HSR.

6.3.1 SOUTH TERMINAL MAIN LANDSIDE BUILDINGS

The Main Landside Terminal would be equally split into an East and West Terminal. Each Landside Terminal would provide support for a 24 swing gate Airside Terminal and two 18-gate Airside Terminals accessed by AGTs. Swing gates are holdrooms in which there is direct access from international aircraft and the sterile corridor that leads to the FIS facility. These gates can serve either domestic or international flights immediately following the other which greatly increases gate utilization where domestic and international peaks do not coincide.

The first level, or commercial drive level, would provide for a below grade tunnel tug drive for baggage claim, truck dock/service areas, and a commercial plaza for buses and vans, airlines operations, a central plant, mechanical and electrical rooms.

The second level, or arrivals/baggage level, would provide for sterile corridor leading international arriving passengers from the gate to the FIS facility. As part of the facilities for international passengers there will also be in-transit lounges at this level. In the Landside, terminal services for domestic baggage claim, rental car, and charter kiosks are provided. This level would lead to the privately owned vehicle (POV) curbside pick-up. The FIS facility will accommodate a 3,000-passengers/hour/Landside Terminal.

The third level, or interstitial level, would provide for the in-line baggage screening system, U.S. Department of Homeland Security staff that includes Immigration and Naturalization Service (INS), U.S. Customs, TSA and GOAA offices, and connections to the parking deck by way of pedestrian bridges.

The fourth level, or departure/ticketing level, would provide for the POV curbside drop-off, the curbside check-in areas, the island ticket counters, retail concessions, and security check points. The fifth level, or ITS level, would provide for an ITS station which connects to the North Terminal Complex central parking structure and the adjacent Landside Terminal.

6.3.1.1 South Terminal Parking Garage

The central parking garage would provide for public parking and rental car facilities, including quick turnaround operations. The first two levels would accommodate rental car operations while the four levels of parking above the rental car facility levels would be for public parking. The rent a car quick turnaround operations centers will consist of washing and cleaning bays with refueling islands. A bulk fuel storage pits will be located adjacent to the garage which serves the refueling islands.

6.3.1.2 South Terminal Intermodal Passenger Terminal

The East Landside Terminal will accommodate an Intermodal Passenger Terminal (IPT) station which will connect to HSR and LRT. The LRT line will terminate at the south IPT station. There is the possibility that a commuter line may be integrated within this facility. Planning for this facility will be coordinated through Florida Department of Transportation (FDOT).

6.3.1.3 South Terminal ITS

The fifth level of the main South Terminal Complex Landside Terminal, would provide for an ITS station which connects to the east side of the North Terminal Complex and the adjacent Landside Terminal. The station will consist of two train lines with a center loading platform for loading both lines and two outboard unloading platforms. This configuration prevents cross-circulation of passengers and greatly enhance passenger flow.

6.3.1.4 South Terminal Hotel

The South Terminal Complex concepts depicts a 600-room hotel to be located above the central auto parking garage. The hotel will have a motor court allowing guests to be picked up at the hotel proper. Connection to the air terminals will be via pedestrian bridges.

6.3.2 SOUTH TERMINAL AIRSIDES

6.3.2.1 Airsides 5, 6, 9, and 10

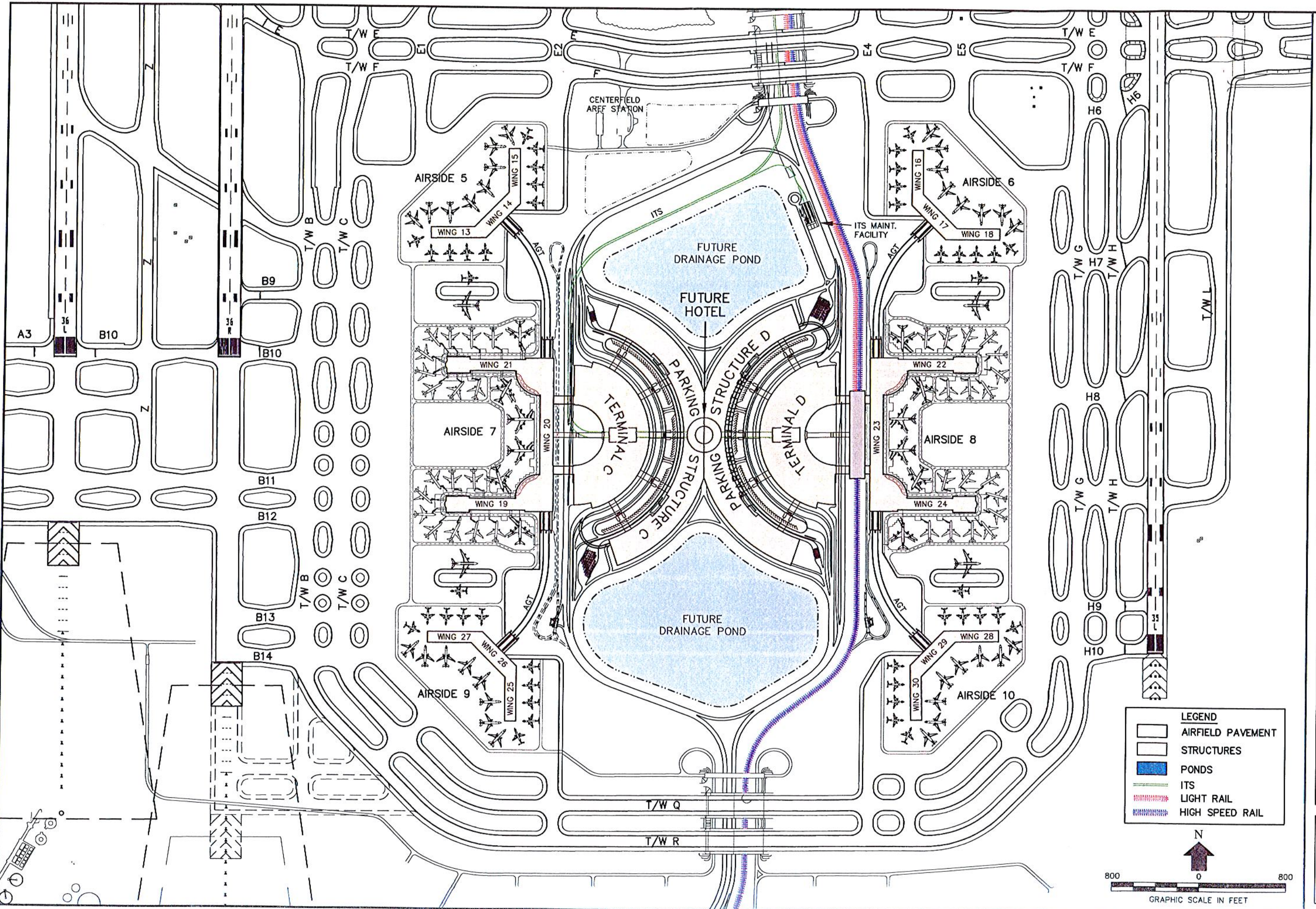
Seventy-two (72) of the 120 gates would be equally arranged at four Remote Airside Terminals accessed by independent AGTs from the main terminal building. Each of the four remote airside terminals, with 18 gates each, would function similar to the existing four airsides in the North Terminal Complex each being approximately 300,000 square feet. They will typically serve Design Group III and IV aircraft with concessions at the nodes.

6.3.2.2 Airsides 7 and 8

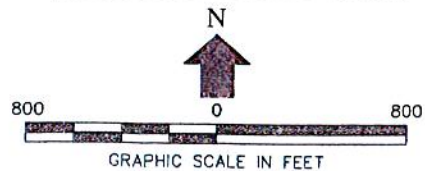
To eliminate double bag handling by international passengers, as in the North Terminal Complex, 48 of the 120 gates would be swing gates which are gates available for either domestic or international arriving passengers. The 48 swing gates would be equally split amongst two Airside Buildings, with 24 swing gates at each airside facility.

First Level - The first floor, or apron level, of the airside facility would provide for baggage make-up, airline operations, a central plant, mechanical and electrical rooms, and a tug drive ramp, leading underground to the Landside Terminal.

T:\PROJECTS\MAS...LAN\FINAL EXHIBITS '04\FIG 6-10.DWG 11/17/04 13:30



LEGEND	
[Symbol: Dashed line]	AIRFIELD PAVEMENT
[Symbol: Solid line]	STRUCTURES
[Symbol: Blue fill]	PONDS
[Symbol: Green line]	ITS
[Symbol: Red dashed line]	LIGHT RAIL
[Symbol: Blue dashed line]	HIGH SPEED RAIL



SOUTH TERMINAL AREA PLAN (ULTIMATE BUILD-OUT - 120 GATES)

FIGURE:
6-10

Second Level - The second, or interstitial level, would provide for a sterile corridor leading international arriving passengers from the gate to the FIS facility, in the Landside Terminal. As part of the facilities for international passengers, there will also be in-transit lounges at this level.

Third Level - The third, or transfer level, will provide for swing gate holdrooms, retail and food and beverage concessions, and the AGT stations leading to the remote airside. This level will also connect, by way of a crossover pedestrian bridge, passage to the Landside Terminal.

Fourth Level - The fourth level will also provide upper level holdrooms for the two innermost gates serving the new Class VI aircraft (aircraft with wingspans between 214 feet to 262 feet 6 inches [65m to 80m], the leading anticipated aircraft in this design group is the Airbus A-380-800 which is a twin passenger deck aircraft).

6.3.3 PHASING OF THE SOUTH TERMINAL COMPLEX

Projected passenger growth at MCO in 2017 would be approximately 47.6 MAP. It is projected that 12 to 24 of the 120 future gates at the South Terminal Complex would be required to accommodate the projected demand. These would be the first 12 to 24 swing gates of Airside 7 adjacent to the West Landside Terminal. Figure 6-11 depicts Phase 1. Figures 6-12 through 6-18 portray the seven levels of the West Landside Terminal in Phase 1.

As discussed previously in Section 6.2.2.5, the South Terminal may require expansion beyond its Phase 1 development of 24 gates at Airside 7. The shortfall of 13 gates could precipitate Phase 2 in the South Terminal prior to 2020. Figure 6-19 portrays Phase 2 with the development of Airside 5 in the northwest quadrant of the South Terminal. Airside 5 provides for 18 gates, sized primarily for Design Group III and IV aircraft.

6.3.4 SOUTH TERMINAL SUPPORT AREA

The South Terminal Support Area is defined as the area south of the future south crossfield taxiway system, north and south of Heintzelman Boulevard, and between the east airfield and Third Runway (17R/35L). The ultimate South Terminal Support Area plan is shown on Figure 6-20. For description purposes, the plan is discussed as the SWTSA and the SETSA.

6.3.4.1 Southwest Terminal Support Area (SWTSA)

The SWTSA is located south of the future Runway 18L/36R runway protection zone (RPZ). Land should be reserved in the north area (south of the future crossfield taxiway) for aviation support services such as airline cargo, catering, and GSE facilities that will be necessary once the South Terminal Complex is operational. These locations are ideal with their proximity to the South Terminal apron via the future south crossfield taxiway underpass. Immediately south of these support areas, land is available for such facilities as rental car facilities and/or commercial-related activities adjacent to Heintzelman Boulevard. In the southwest corner of the SWTSA, a compatible use for the property could be a seasonal surface auto parking lot or staging of vehicles. This lot could serve as a Park and Fly lot or an employee parking lot for the South Terminal Complex. These uses would be practical because of the height restrictions placed on the area by the future RPZs. The remaining land areas adjacent to off-airport property should be reserved as natural buffers for surrounding uses; the canal would be preserved as a part of the airport's overall drainage system. Future HSR corridors have been reserved and may impact the future development of the SWTSA.

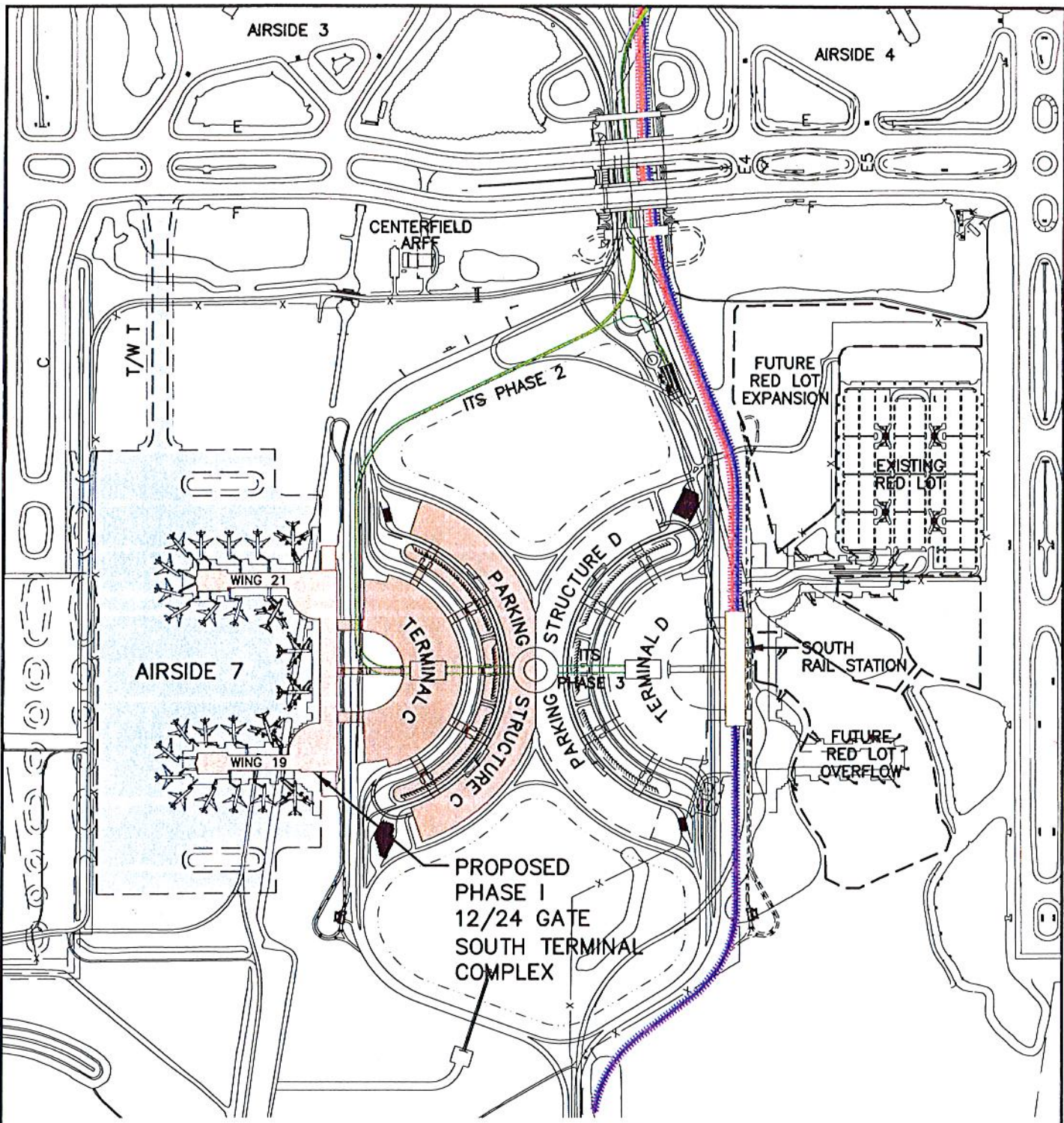
Opportunities for prime development sites will be created by the interchange between South Access Road and Heintzelman Boulevard.

6.3.4.2 Southeast Terminal Support Area (SETSA)

The SETSA is located southeast of the future Runway 18L/36R RPZ. The SETSA is currently undeveloped. The SETSA should be developed with airline cargo, catering, and GSE facilities because of its proximity to the future south crossfield taxiways and the adjacent runways and its access from South Access Road and Heintzelman Boulevard. The site should have natural buffers to maintain the aesthetic quality of the airports' main entrance and exit roads and obscure airline passengers' views of the cargo, catering, and GSE buildings.

In the long-term, a new remote parking lot and/or a future south employee parking lot could be located on the old rapid infiltration basin (RIB) site.

T:\PROJECTS\MASTER PLAN\FINAL EXHIBITS '04\FIG 6-11.DWG 11/10/04 14:38



LEGEND	
	PROPOSED PHASE I APRON
	PROPOSED PHASE I AIRSIDE BUILDING
	PROPOSED PHASE I LANDSIDE BUILDING
	HIGH SPEED RAIL
	LIGHT RAIL
	ITS RAIL

N

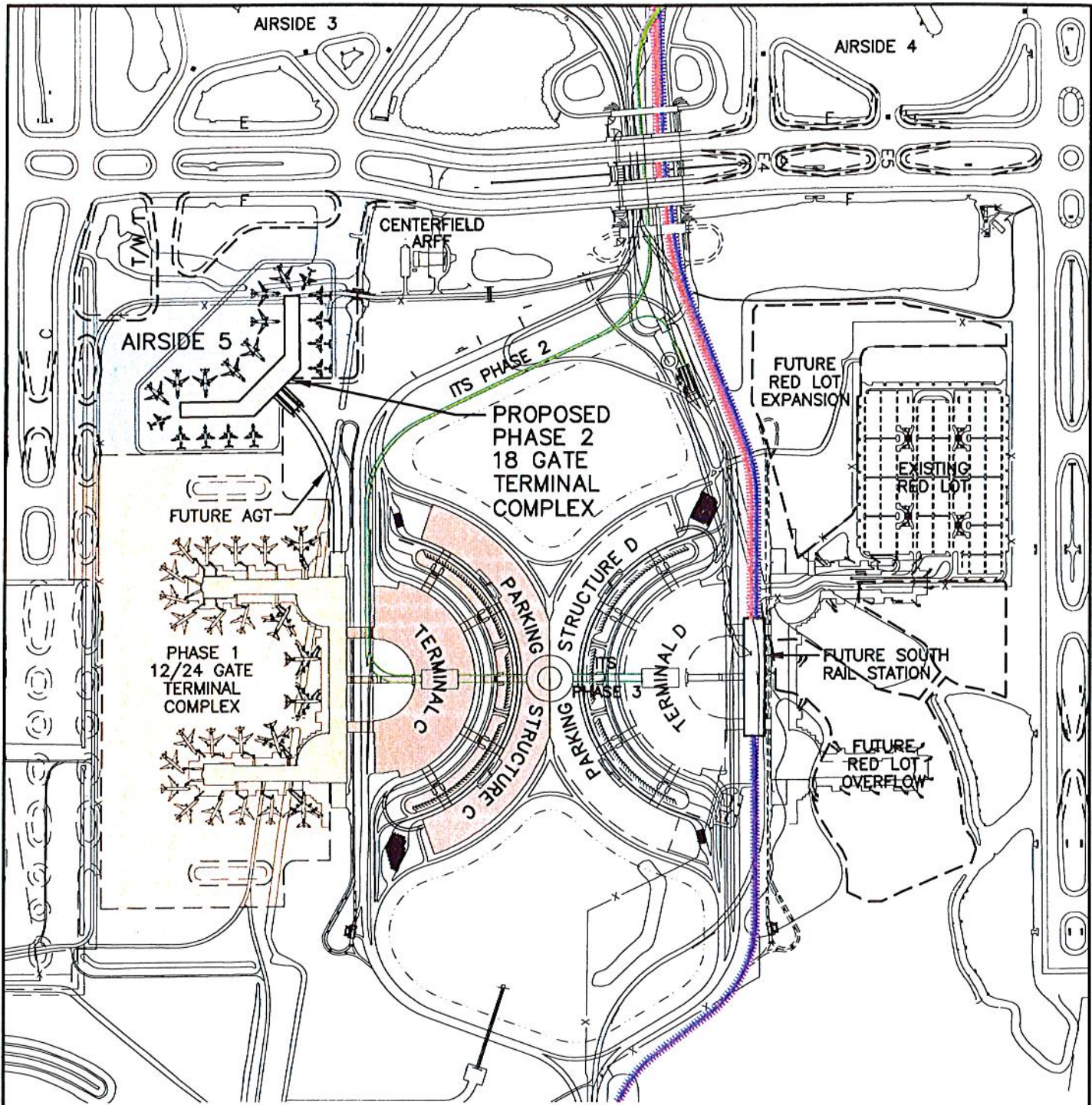
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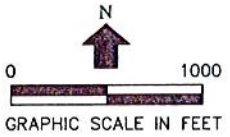
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**12/24 GATE SOUTH TERMINAL
 PHASE 1
 DEVELOPMENT PLAN OPTION**

FIGURE:
 6-11



LEGEND	
[White box]	PROPOSED PHASE 1 APRON
[White box]	PROPOSED PHASE 1 AIRSIDE BUILDING
[Pink box]	PROPOSED PHASE 1 LANDSIDE BUILDING
[White box]	PROPOSED PHASE 2 APRON
[White box]	PROPOSED PHASE 2 AIRSIDE BUILDING
[Blue dashed line]	HIGH SPEED RAIL
[Red dashed line]	LIGHT RAIL
[Green dashed line]	ITS RAIL



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**18 ADDITIONAL GATES
 SOUTH TERMINAL - PHASE 2
 2022 DEVELOPMENT PLAN OPTION**

**FIGURE:
 6-19**

MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT

SECTION 7.0
SURFACE TRANSPORTATION PLAN

Prepared for:
GREATER ORLANDO AVIATION AUTHORITY

Prepared by:
The URS Team

August 2004

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SECTION 7.0

SURFACE TRANSPORTATION PLAN

7.1 INTRODUCTION

The surface transportation network at Orlando International Airport (MCO) is made up of various intermodal facilities that enable the transportation of passengers, goods, and services. The existing surface transportation network includes the roadway system, parking and rental car operations, and transit services. This Surface Transportation Plan documents the analysis of existing and future operating conditions for the various intermodal facilities at MCO. The analyses were conducted to identify current and projected deficiencies and to develop improvement concepts that address those deficiencies and accommodate the future demand on the surface transportation system. The documentation contained within this section describes improvement concepts developed during the MCO Master Plan Update and recommends a Surface Transportation Improvement Program (TIP) based on the evaluation of the improvement concepts.

7.2 ROADWAY SYSTEM

This section documents the analysis of the existing and future roadway operations at MCO and the development of improvement concepts. The existing roadway network was assessed to document the existing access to and from the airport and to evaluate existing traffic operations. Future traffic projections were developed to estimate the travel demand on the future roadway network. The analysis of future conditions identified locations with projected roadway deficiencies. Short-term and ultimate facility improvement concepts were developed to address these deficiencies. The recommendations for the roadway system consist of improvements necessary to address existing deficiencies, accommodate future traffic demand, improve access to the airport, eliminate or reduce cut-through traffic, and to facilitate land development and terminal operations.

7.2.1 EXISTING ROADWAY NETWORK

The existing roadway network serving MCO consists of both airport roadways (located on MCO property) and off-site roadways (located off MCO property). The off-site roadways surrounding the airport provide direct access to the terminals via the airport roadways. The airport roadways consist of terminal access roads, commercial service roads, and secure service roads. Airport roadways total approximately 179 lane miles. The secure roads provide authorized personnel access to secure airport facilities. Future requirements for secure roads are determined by the location of airport facilities and security/safety requirements. This document does not address secure roads. The following sections discuss the airport roadways and off-site roadways that encompass the existing roadway network.

7.2.1.1 Airport Roadways

The existing surface transportation system at MCO is illustrated on Figure 7-1. Passenger access to the terminals is supported by Airport Boulevard, a multi-lane one-way roadway that circles the North Terminal creating a one-way pair between State Road 528 and South Access Road. Southbound Airport Boulevard provides one-way access between the State Road 528/State Road 436/Airport Boulevard interchange (north of the airport) and South Access Road (south of the North Terminal) with connections to Cargo Road, Terminal A, and Terminal B. Northbound Airport Boulevard provides one-way access between South Access Road (south of the North Terminal) and the State Road 528/State Road 436/ Airport Boulevard interchange (north of the airport) with connections to Terminal B, Terminal A, and Cargo Road. Airport Boulevard is shown on Figure 7-2.

Access to commercial and aviation support facilities on airport property is provided through several public service roadways including Tradeport Drive, Bear Road, Cargo Road, and Terminal Service Road (Rent-A-Car Road). These public service roadways primarily provide access for cargo, commercial, and rental car operations. The airport roadways include the following terminal access and commercial service roads.

South Access Road is a two-lane undivided roadway that provides access from Airport Boulevard (south of the existing terminal) to State Road 417 (Central Florida GreeneWay)/Boggy Creek Road interchange south of the airport. South Access Road interchanges with Heintzelman Boulevard south of the existing terminal. The existing South Access Road/Heintzelman Boulevard interchange is shown on Figure 7-3.

Heintzelman Boulevard (open to traffic in 2003) is a four-lane divided roadway that extends south from Goldenrod Road (north of MCO) and runs southwest to its interchange with South Access Road. The existing partial cloverleaf interchange consists of loop ramps to serve the westbound Heintzelman Boulevard to southbound South Access Road and southbound South Access Road to eastbound Heintzelman Boulevard movements. Diagonal ramps provide access for northbound South Access Road to eastbound Heintzelman Boulevard and westbound Heintzelman Boulevard to northbound South Access Road.

Multiple cargo service operations are located along Tradeport Drive and the west ramp. Tradeport Drive is a four-lane divided arterial that provides public access to service facilities located at the west ramp on the west side of the airport. These facilities include FedEx, the U.S. Postal Service (USPS), aviation training offices, and airport support-related facilities. Tradeport Drive begins at an interchange with State Road 528 in the north, intersects with Boggy Creek Road in the southwest quadrant of airport property, and extends to Orange Avenue. The existing North Tradeport Area is shown on Figure 7-4.

Bear Road is a two-lane road that begins at Tradeport Drive and extends to Cargo Road. Bear Road provides access to airport facilities in the North Tradeport area and runs south of and parallel to State Road 528. At the old terminal, Bear Road extends south to intersect with Cargo Road southwest of the Blue Lot.

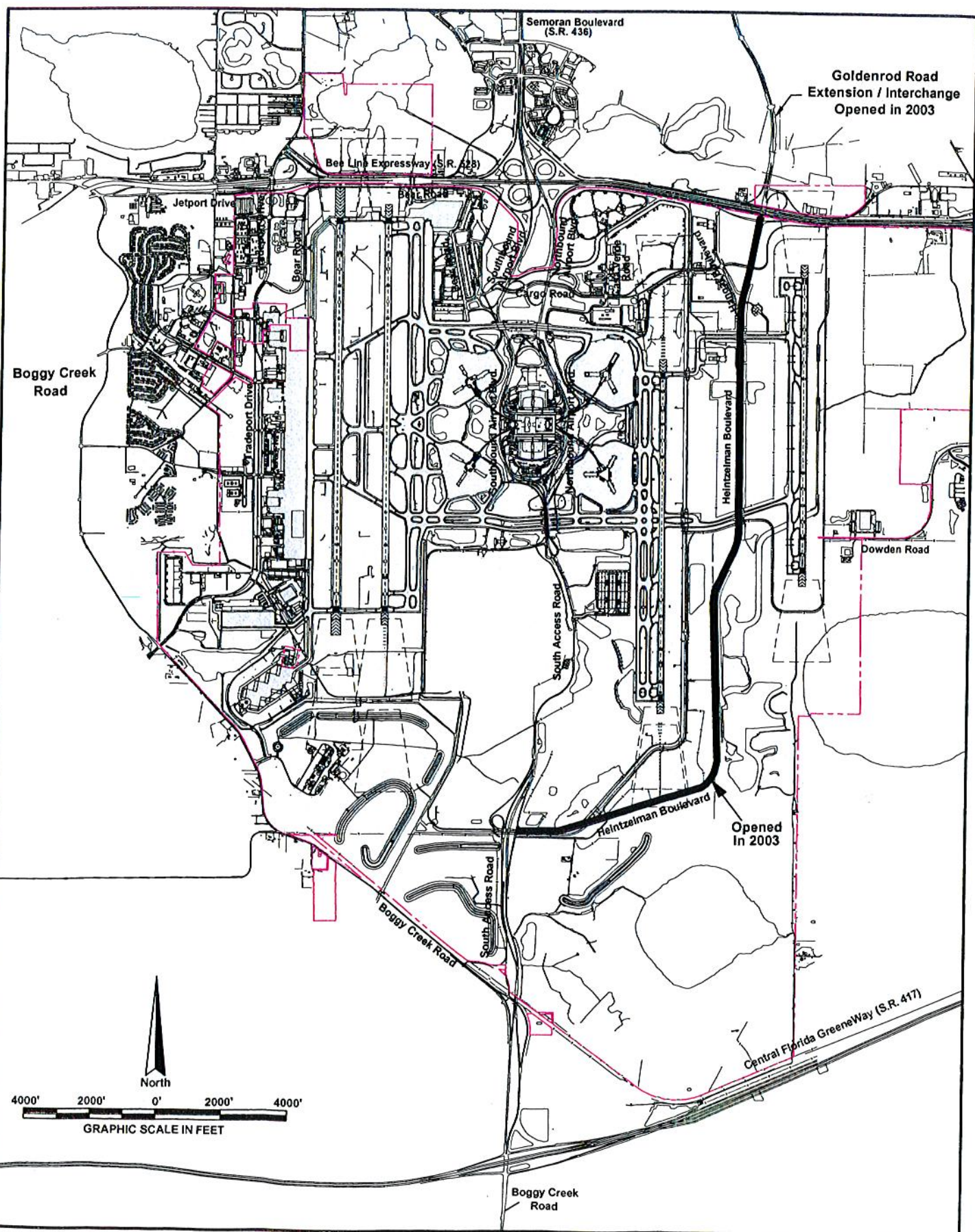
Cargo Road is a four-lane east-west divided roadway that begins at Bear Road south of the Blue Lot and extends east to Goldenrod Road/Heintzelman Boulevard. Cargo Road was widened from two lanes to four lanes in late 2000. It provides access between the northwest and northeast Terminal Support Areas. Cargo Road has intersections with Tradeport Drive, Bear Road, Casa Verde Road, Terminal Service Road, Heintzelman Boulevard, and Goldenrod Road and has a full interchange with northbound and southbound Airport Boulevard.

Casa Verde Road (formerly Greenhouse Road) is a two-lane road that runs in a north-south direction. It begins at Cargo Road and terminates at the Employee Parking Lot. Casa Verde Road provides access to the Employee Parking Lot and other uses in the Northeast Terminal Support Area. The existing Northeast Terminal Support Area is shown on Figure 7-5.

Hangar Boulevard is a two-lane north-south road that begins south of the Bee Line Expressway and terminates north of Taxiway J. It provides access to rental car support facilities and airfield support facilities east of Runway 17R/35L.

Jetport Drive is a two-lane east-west road that runs south of and parallel to State Road 528 from Heintzelman Boulevard to Narcoossee Road. Jetport Drive provides access to the Northeast Terminal Support Area from Narcoossee Road.

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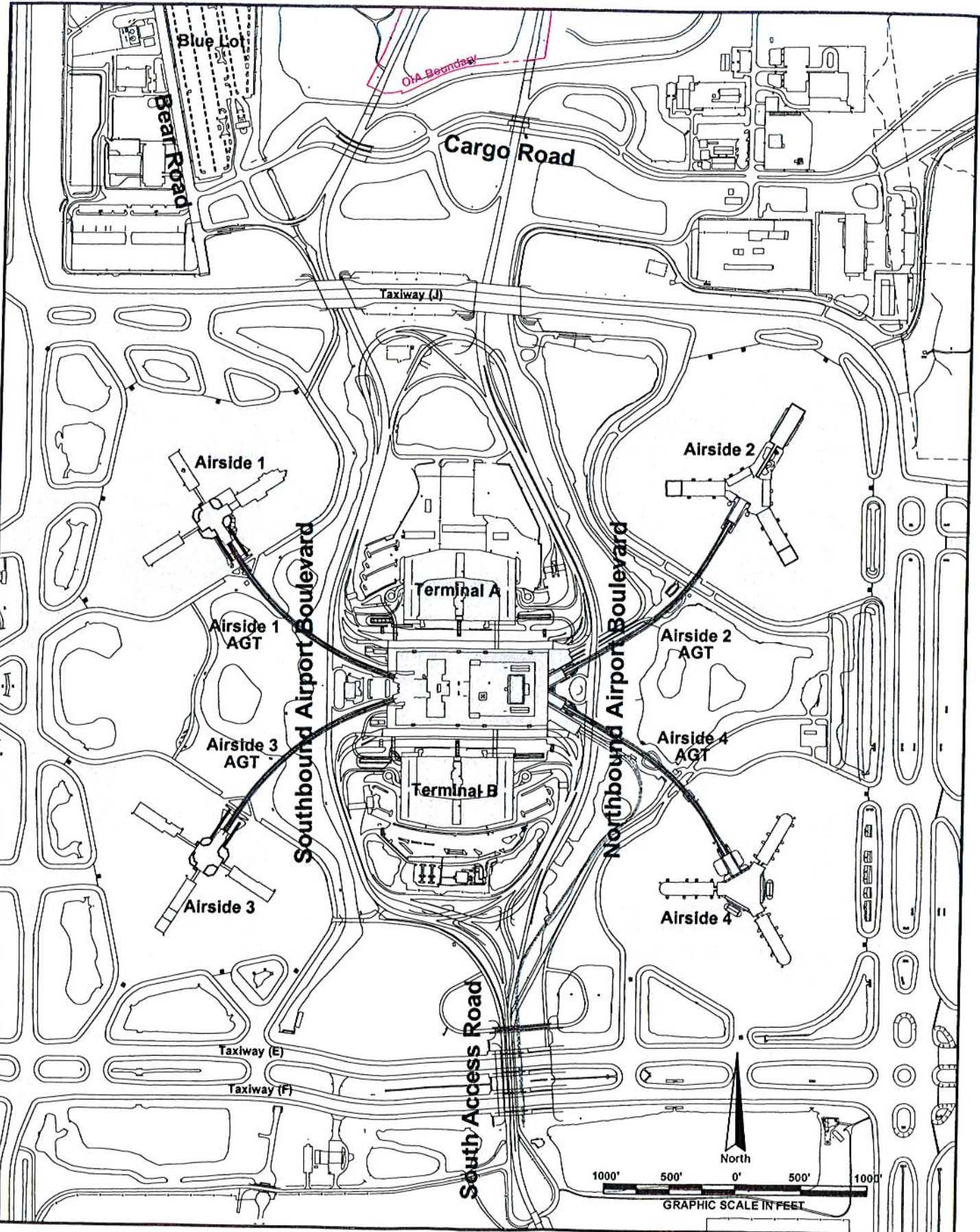
EXISTING (YEAR 2000) AIRPORT ROADWAYS

FIGURE: 7.1

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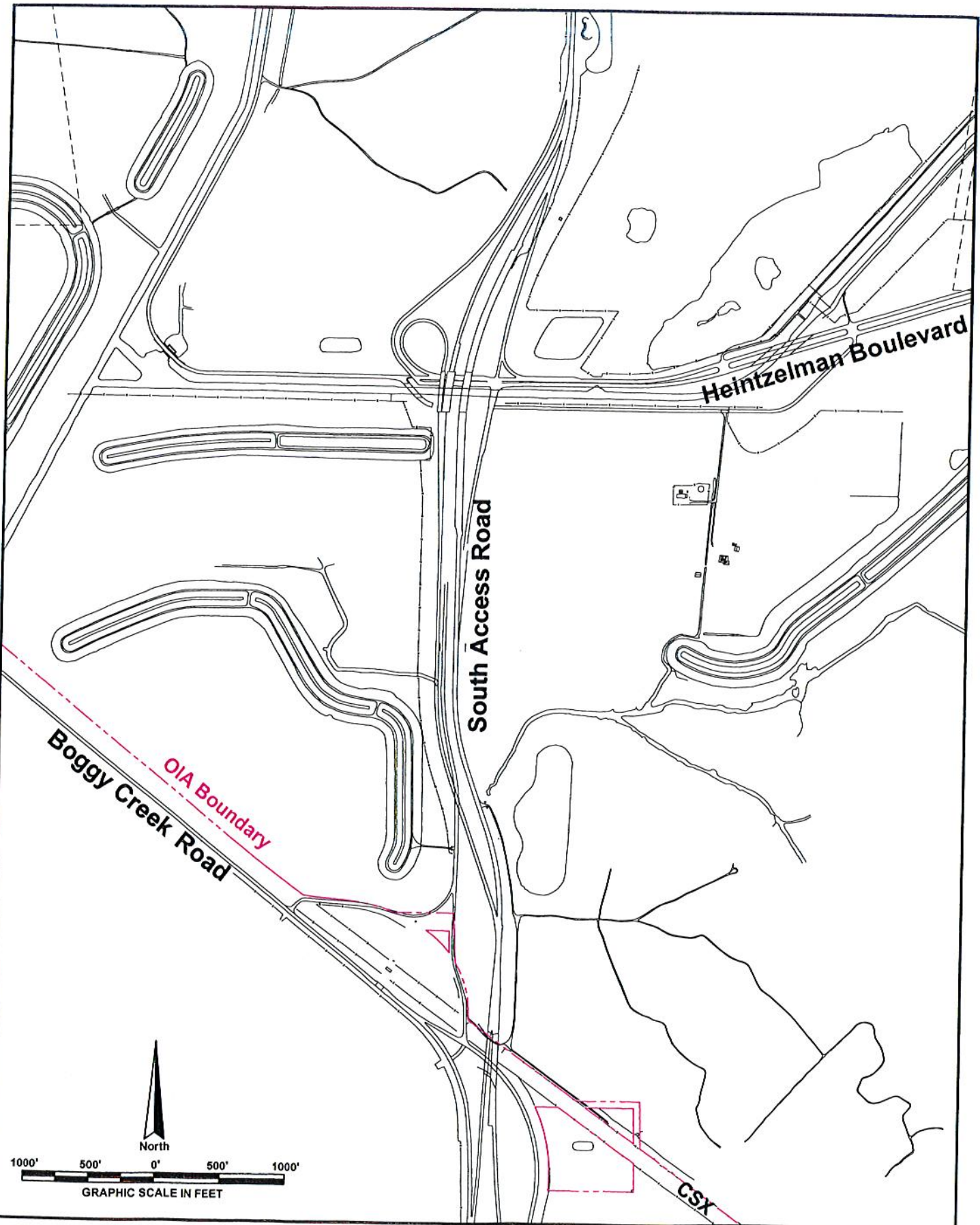
AIRPORT BOULEVARD LOOP

FIGURE:
7.2

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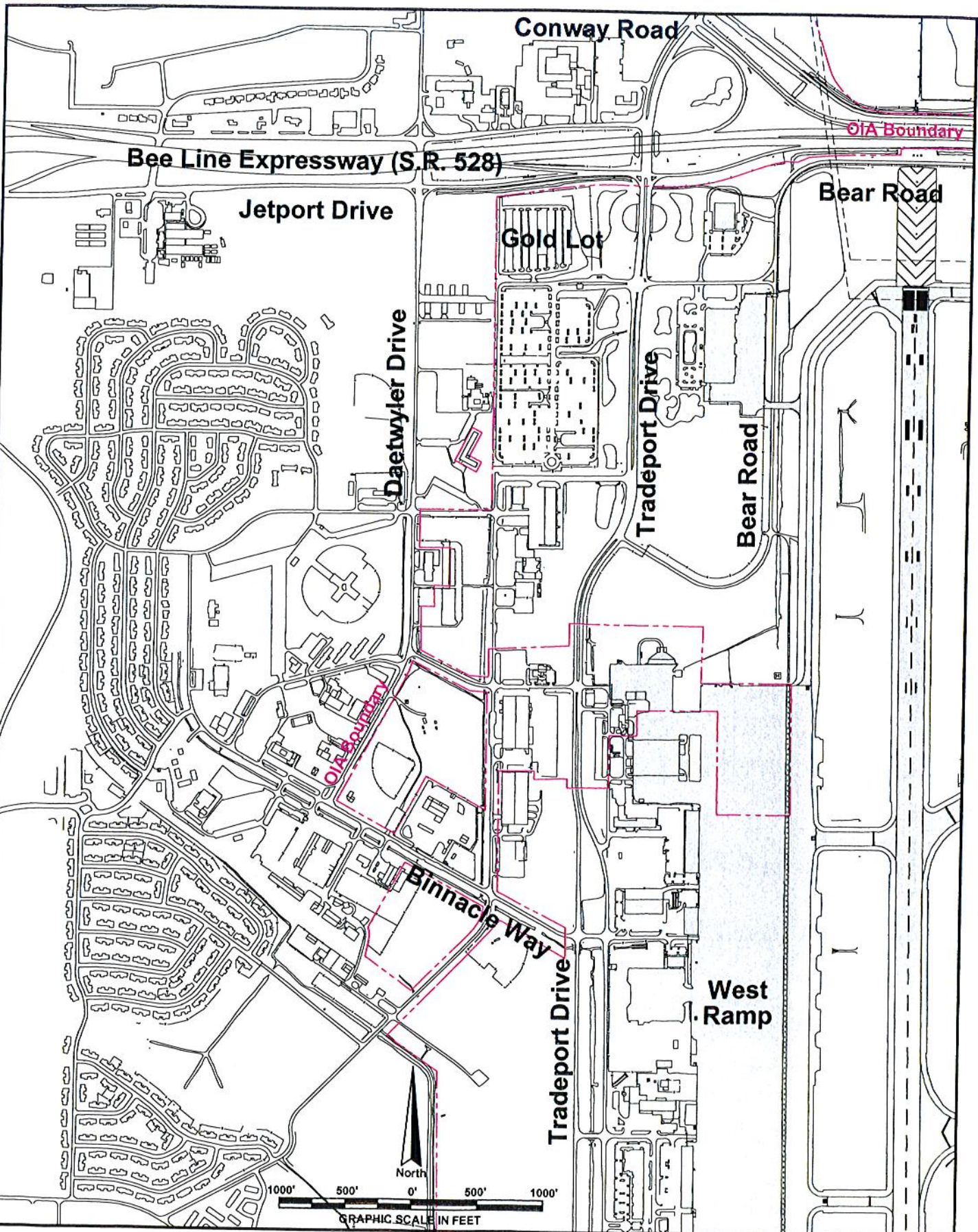


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SOUTH ACCESS ROAD/HEINTZELMAN BOULEVARD INTERCHANGE

FIGURE: 7.3

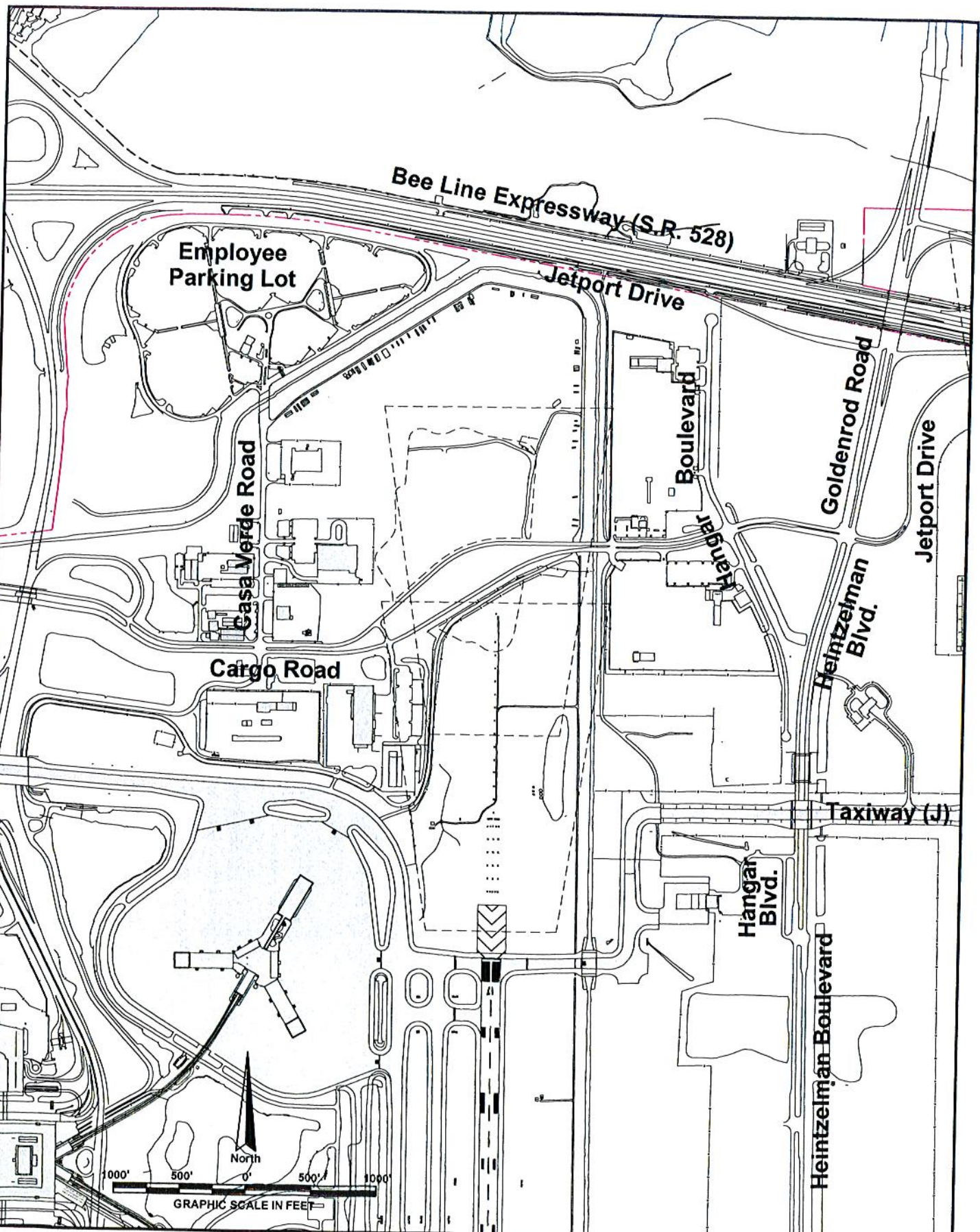


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NORTH TRADEPORT AREA

FIGURE: 7.4

T:\PROJECTS\MASTER_FINAL EXHIBITS '04\FIGURE 7-05.DWG 11/11/2004 10:59 AM



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NORTHEAST TERMINAL SUPPORT AREA

FIGURE:
7.5

Dowden Road is a four-lane divided roadway that begins at the former Harcourt Brace Jovanovich (HBJ) building #1600 and extends to Narcoossee Road. Dowden Road provides access to on-airport facilities.

7.2.1.2 Curbsides

Airport roadways provide access from northbound and southbound Airport Boulevard to curbside facilities at Terminal A and B on either side of the North Terminal. There are four existing curbside facilities at each terminal including:

- Commercial Vehicles (Level 1) - Includes two travel lanes with parking stalls on one side.
- Undesignated (Fourth Curb/Level 1) - Located under terminal; includes two outside lanes for parking and one outer through lane. Level four is temporarily closed for security restrictions.
- Arriving Passengers (Deplaning Level 2) - Includes two lanes for active loading and two through lanes.
- Departing Passengers (Enplaning Level 3) - Includes two lanes for active unloading and two through lanes.

7.2.1.3 Taxi Operations

Taxis and designated vans/shuttles are staged in a surface lot (Taxi Bullpen) south of the Terminal B parking garage. The capacity of the Taxi Bullpen is 170 vehicles. The taxis are processed on the order of arrival. Once the taxi is called, it must exit the lot and proceed to Terminal A or B via the inner loop road. This procedure requires taxis picking up Terminal A departing passengers to make a complete loop around Airport Boulevard. Taxi pick-up was previously located on Level 4 Curbside. Due to security restrictions, taxi pick-up is currently located along the Terminal A and B commercial curbs (Level 1). Taxicab operations are shown on Figure 7-6.

7.2.1.4 Commercial Vehicle/Service Access

These airport roadways are designated exclusively for commercial vehicles and service access. These facilities include Terminal Service Road and the commercial vehicle curbside entrances and exits to Terminals A and B. Terminal Service Road (Rent-A-Car Road) is a two-lane road. It begins at Cargo Road and extends southwest to the North Terminal. It provides access for delivery and service vehicles to the North Terminal as well as for moving rental cars between the North Terminal and rental car support facilities. Existing commercial vehicle/service access roadways are shown on Figure 7-7.

7.2.1.5 Off-Site Roadways

Access to MCO is provided through several off-site roadways, as illustrated on Figure 7-8. These roadways include the following.

State Road 436 (Semoran Boulevard) is a four-lane principal arterial with controlled access that runs in a north-south direction. It connects to Airport Boulevard on the north side of the airport at the State Road 528 interchange. State Road 436 is a primary route to MCO. State Road 436 is maintained by the Florida Department of Transportation (FDOT) and is currently under construction to expand the roadway to six lanes.

State Road 528 (Bee Line Expressway) is a four-lane limited access toll facility that runs in an east-west direction. It borders the north side of the airport and provides direct access to Airport Boulevard via the interchange at State Road 436. State Road 528 is a primary route to MCO and extends from I-4 and the International Drive Activity Center, west of the airport, to Port Canaveral and the east coast

of Florida. The existing State Road 528/State Road 436/Airport Boulevard interchange is a full-access partial cloverleaf interchange. Loop ramps in the northeast, northwest, and southwest quadrants serve the following movements: northbound Airport Boulevard to westbound State Road 528, westbound State Road 528 to southbound Airport Boulevard, and southbound Airport Boulevard to eastbound State Road 528. Diagonal ramps serve the following remaining movements: southbound State Road 436 to westbound State Road 528, westbound State Road 528 to northbound State Road 436, eastbound State Road 528 to northbound State Road 436/southbound Airport Boulevard, and northbound Airport Boulevard to eastbound State Road 528. The existing State Road 528/Airport Boulevard interchange is shown on Figure 7-9. Orlando-Orange County Expressway Authority (OOCEA) is the responsible maintaining agency for State Road 528.

State Road 417 (Central Florida GreeneWay) is a four-lane limited access toll facility that provides a beltway around the eastern side of the Orlando metropolitan area. It runs to the south and east of the airport providing access to MCO via the Boggy Creek Road interchange from the south and State Road 528 from the east. State Road 417 is a primary route to MCO, particularly from the southwest including the Disney World Resort Area. The existing State Road 417/Boggy Creek Road interchange is shown on Figure 7-10. OOCEA is the responsible maintaining agency for State Road 528.

Boggy Creek Road is a two-lane north-south roadway with minor access control. It extends from Osceola County to State Road 528 west of the airport. Access to the airport from Boggy Creek Road is provided at South Access Road on the south side and at Tradeport Drive on the west side. Orange County is the responsible maintaining agency for State Road 528.

Wetherbee Road is a two-lane east-west roadway that extends from Orange Avenue west of the airport to Boggy Creek Road. Wetherbee Road provides access to the terminals and airport facilities via Boggy Creek Road. Orange County is the responsible maintaining agency for State Road 528.

Conway Road is a two-lane north-south roadway that extends from the State Road 528/Tradeport Drive interchange to State Road 408. A portion north of Hoffner Road was widened to four lanes in 2002. The portion south of Hoffner Road is currently under design to be widened to four lanes. Conway Road provides access to the cargo support facilities along Tradeport Drive. The City of Orlando is the responsible maintaining agency for State Road 528.

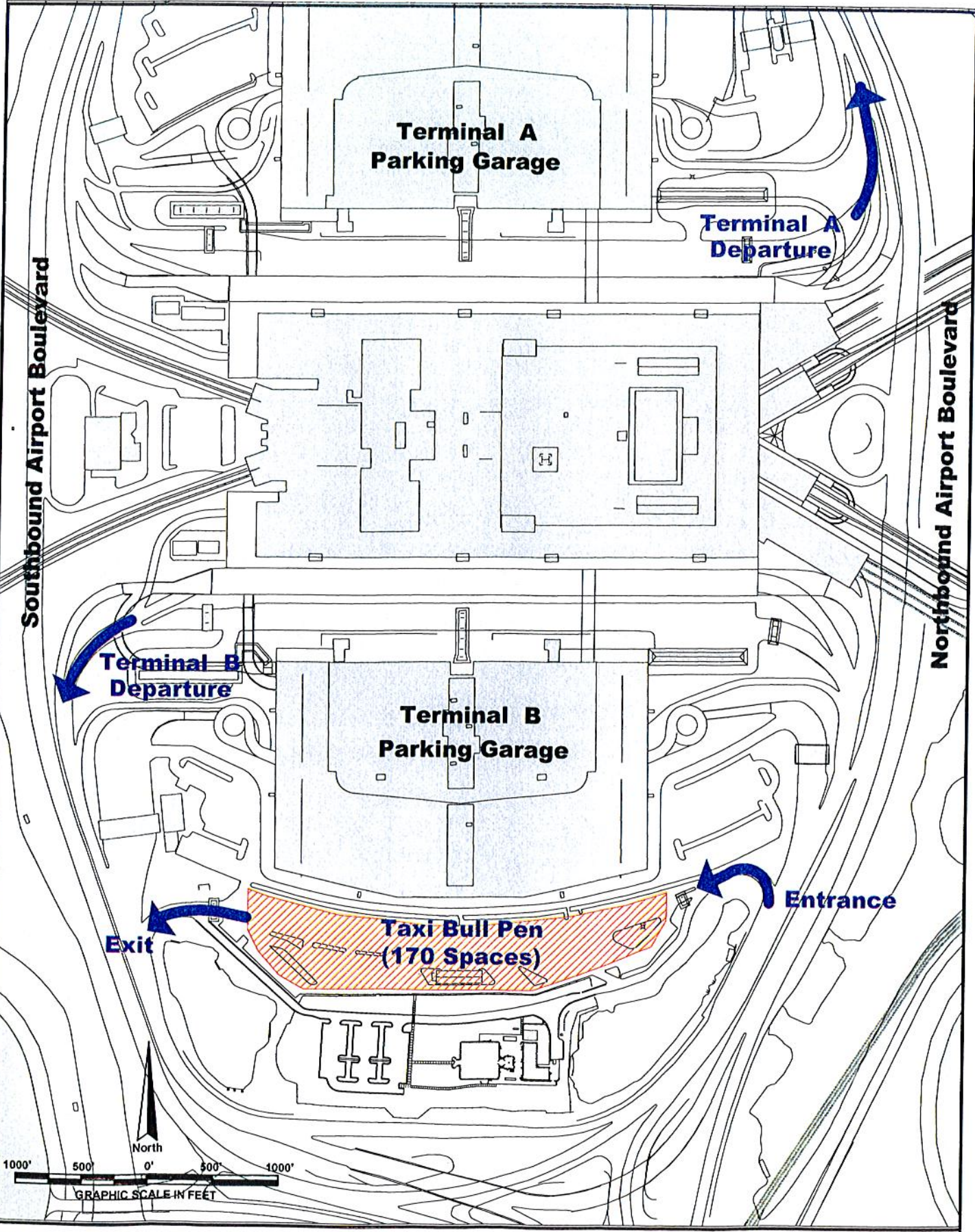
Goldenrod Road is a four-lane divided highway that provides north-south access in Orange County from Aloma Avenue (State Road 426) to Heintzelman Boulevard. The extension of Goldenrod Road from Narcoossee Road (State Road 15) south to Heintzelman Boulevard was completed in March 2003. The Goldenrod Road Extension project included an interchange with State Road 528 just north of the airport.

Narcoossee Road is a two-lane north-south roadway that extends from Osceola County to Goldenrod Road north of State Road 528. It borders the east side of MCO and provides direct access to Jetport Drive adjacent to its interchange with State Road 528.

7.2.2 EXISTING OPERATING CONDITIONS

The existing conditions documented in this section provide a summary of the existing traffic operations on the roadways that provide access to and within MCO. Passenger traffic has decreased significantly due to the September 11, 2001 terrorist attack in the U.S. and the slow-down in the economy. These events have created atypical data for the traffic conditions after the year 2000. To provide an accurate analysis of existing conditions at the airport, the existing operations analysis is based on previously completed evaluations of the existing (year 2000) traffic operations. Therefore, the base year for the documentation of the existing conditions is the year 2000.

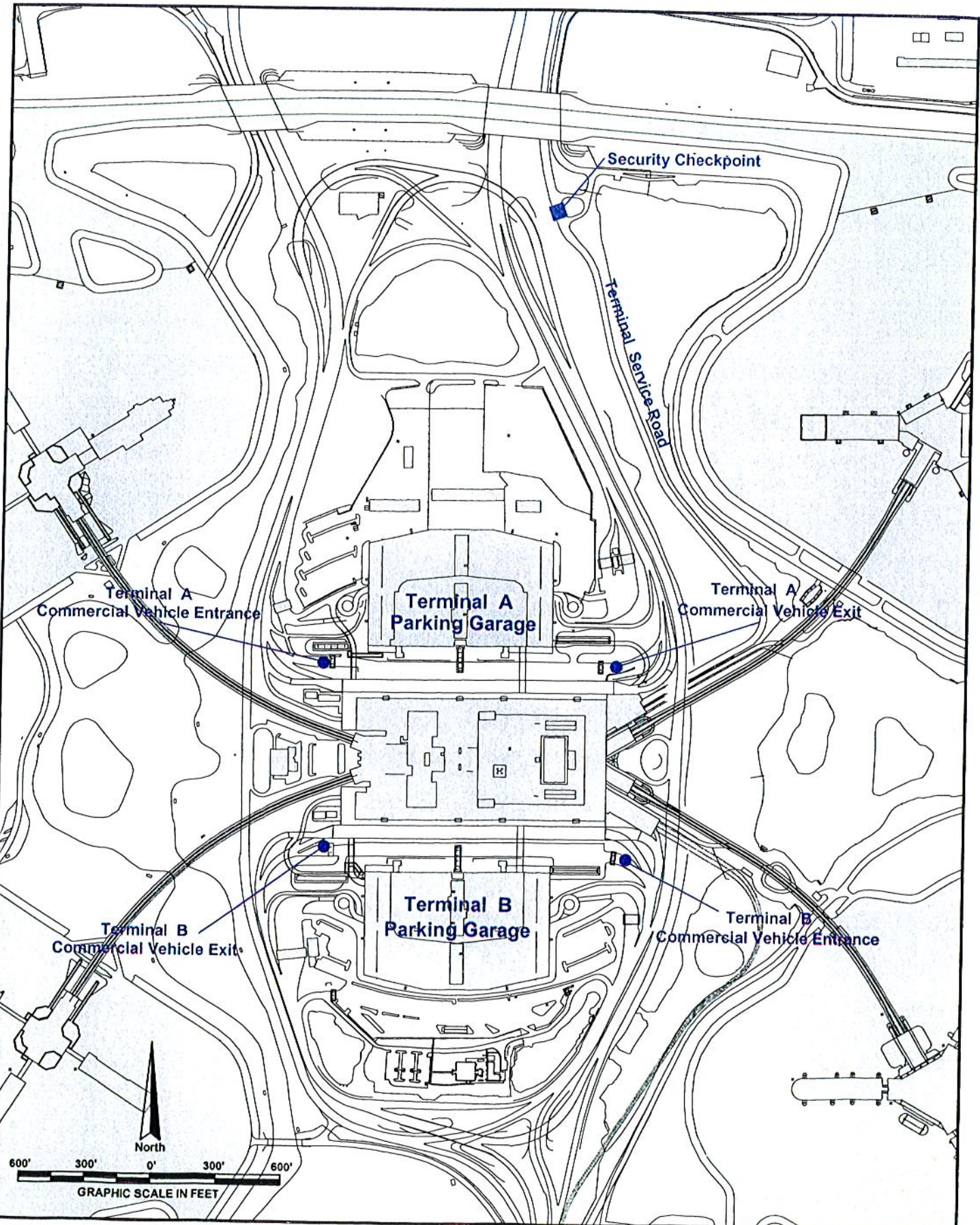
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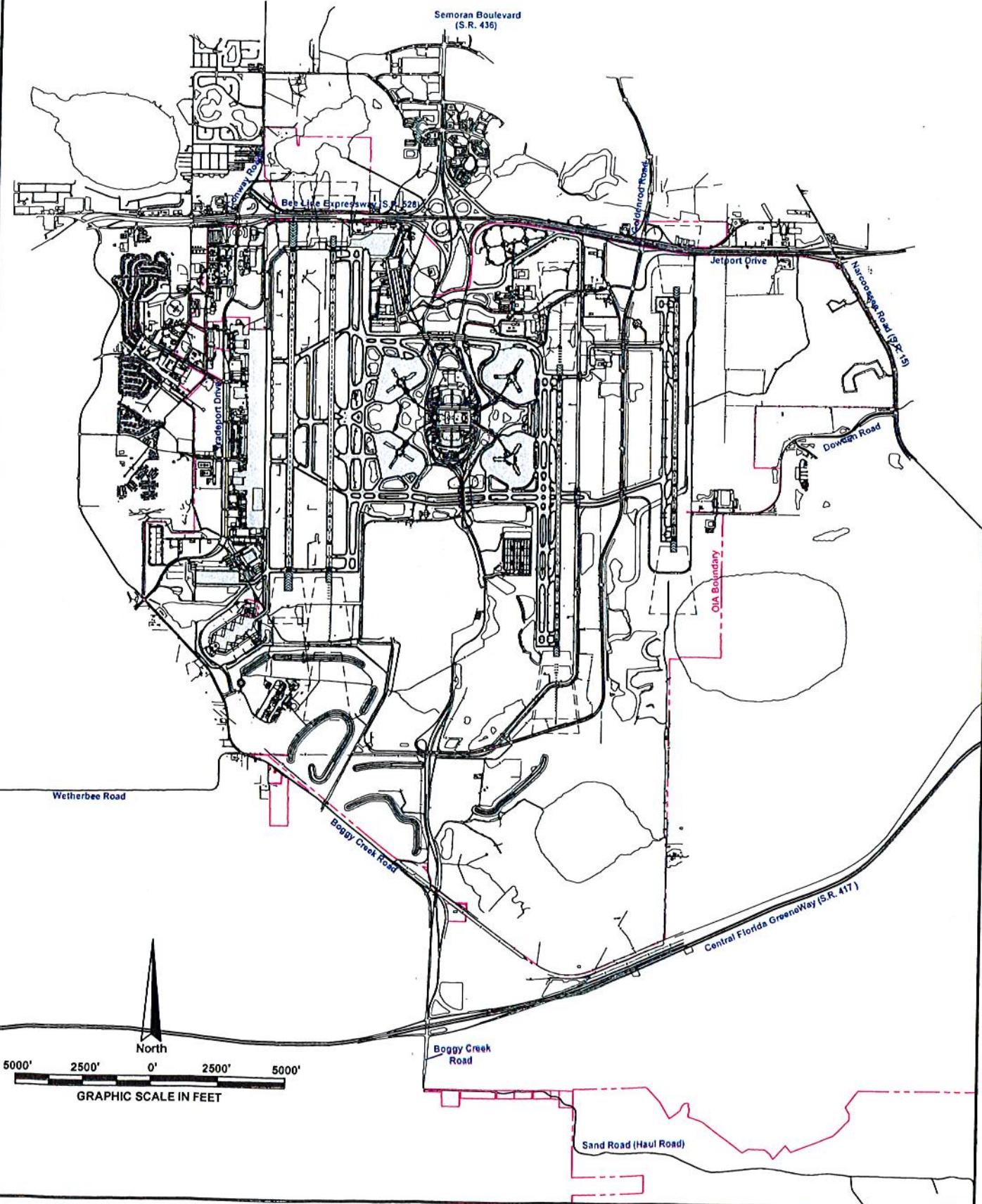
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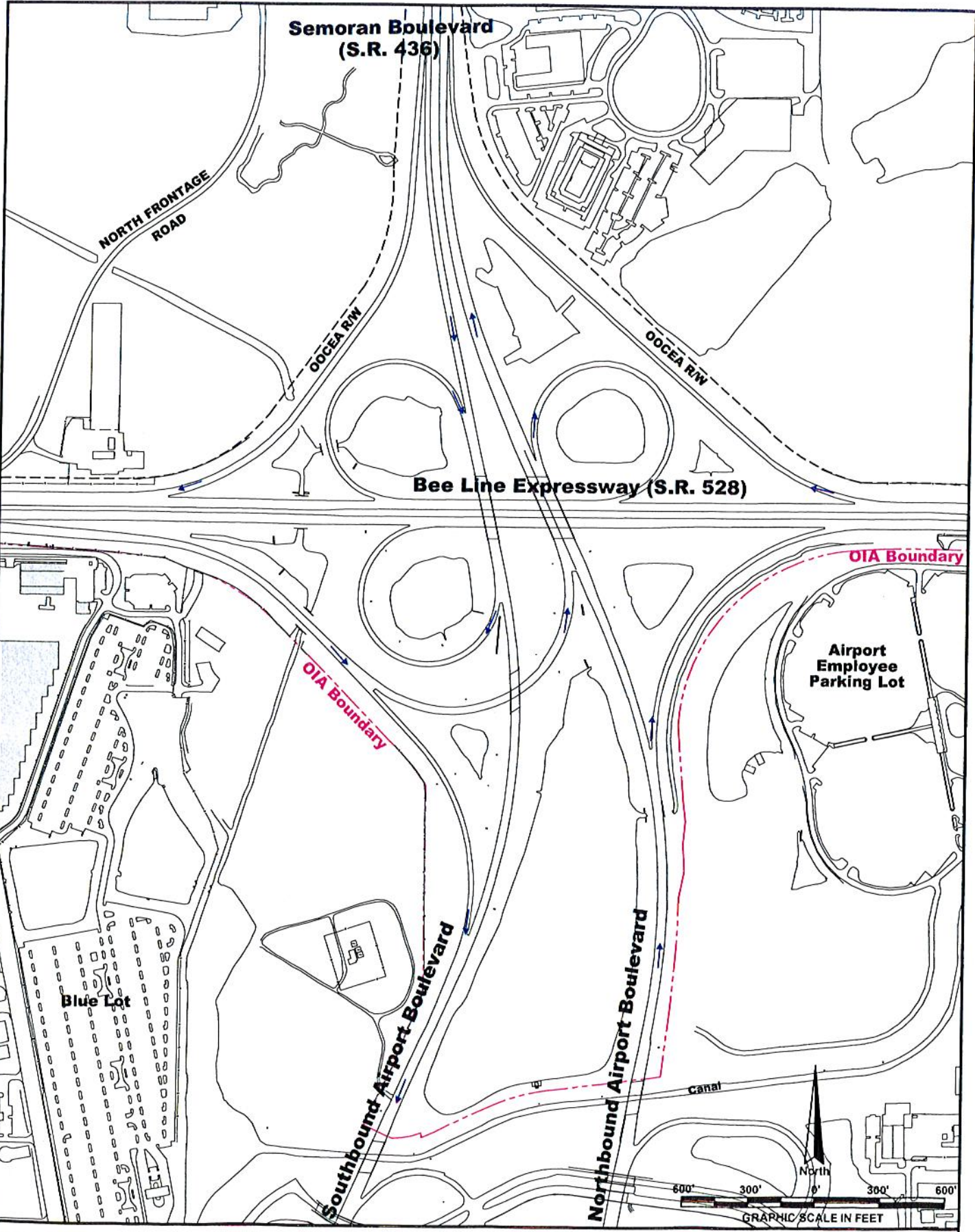



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OFF-SITE ROADWAYS

FIGURE:
7.8

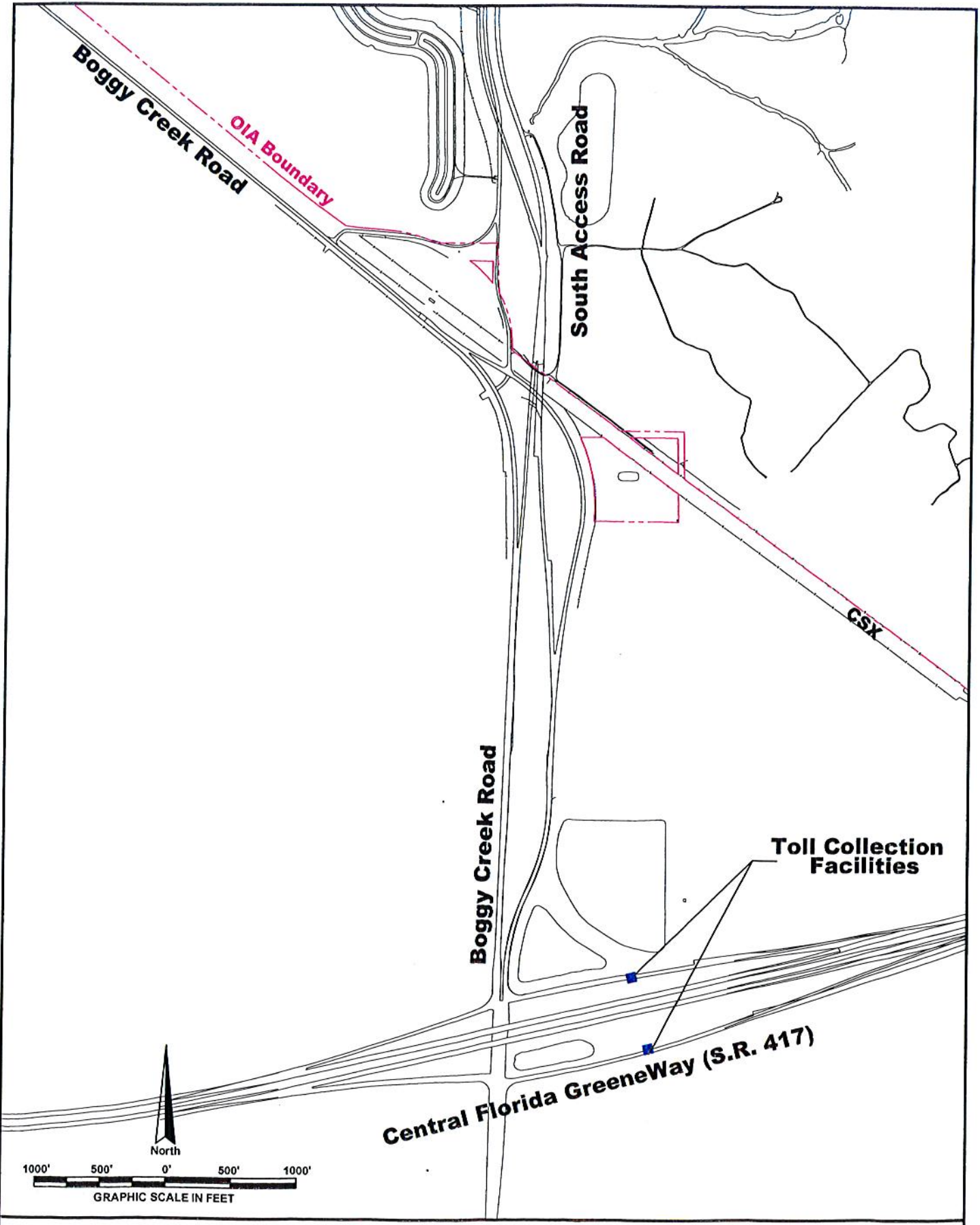
T:\PROJECTS\MASTER PLAN EXHIBITS '04\FIGURE 7-09.DWG 11/11/2004 10:59 AM



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EXISTING SR 528/AIRPORT BOULEVARD INTERCHANGE

FIGURE: 7.9



7.2.2.1 Roadway Operations Analysis

Existing traffic volumes were obtained from the Easter 2000 Traffic Count Program conducted at MCO in April 2000. These traffic volumes were collected during the historical peak period of passenger activity at 78 count stations located on airport roadways and off-site roadways. The traffic count location map included in Appendix H identifies these traffic count stations. Table 7-1 summarizes the traffic count data collected in the study. The table lists the existing a.m., midday, and p.m. peak hour volumes during three analysis periods including:

- AM period - 12:00 a.m. to 10:00 a.m.
- Midday period - 10:00 a.m. to 2:00 p.m.
- PM period - 2:00 p.m. to 12:00 a.m.

**TABLE 7-1 (continued)
EXISTING (YEAR 2000) OPERATIONS ANALYSIS**

**TABLE 7-1
EXISTING (YEAR 2000) OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Max. Service Volume	Peak Hour					
				A.M.		Midday		P.M.	
				Volume	LOS	Volume	LOS	Volume	LOS
1	WB State Road 528 Off-Ramp to SB Airport Blvd.	1	740	522	C	495	C	445	C
2	WB State Road 528 On-Ramp from NB Airport Blvd.	1	740	320	B	572	C	542	C
3A	NB Airport Blvd., N. of Off-Ramp to EB State Road 528	2	2,300	949	B	1,513	C	1,519	C
3B	NB Airport Blvd. Off-Ramp to EB State Road 528	1	740	261	B	414	B	546	C
4A	SB Airport Blvd., N. of Merge with Ramp from EB State Road 528	2	2,300	1,420	C	1,258	B	1,271	B
4B	SB Airport Blvd. On-Ramp from EB State Road 528	1	740	606	C	701	D	657	D
5AE	EB Cargo Rd. W. of Airport Blvd. Ramp R-3	1	760	268	C	268	C	273	C
5AW	WB Cargo Rd. W. of Airport Blvd. Ramp R-3	1	760	269	C	259	C	305	C
5BE	EB Cargo Rd. E. of Airport Blvd. Ramp R-3	1	760	570	D	515	D	443	D
5BW	WB Cargo Rd. E. of Airport Blvd. Ramp R-3	1	760	187	C	233	C	305	C
6	Ramp from SB Airport Blvd. to Cargo Rd. (Ramp R-3)	1	650	491	C	345	B	241	B
7A	Return Ramp to Terminal A from Terminal B	1	650	200	A	313	B	245	B
7B	Return Ramp to Terminal B from Terminal B	1	650	23	A	31	A	27	A
8A	Return Ramp to Terminal B from Terminal A	1	650	106	A	171	A	184	A
8B	Return Ramp to Terminal A from Terminal A	1	650	190	A	308	B	278	B
9A	SB Airport Blvd. to Terminal A	2	2,300	744	A	849	B	816	A
9B	SB Airport Blvd. South of Terminal A Entrance	2	2,300	1,052	B	1,114	B	1,243	B
12A	NB Airport Blvd. from Terminal A	2	2,420	533	A	878	B	840	A
12B	NB Airport Blvd. South of Terminal A Exit	2	2,420	838	A	1,157	B	1,196	B
13	Terminal A Rent-A-Car Service Entrance	1	650	46	A	35	A	39	A
15	Terminal A 4th Curbside Entrance (SB)	1	650	103	A	141	A	141	A
17	Terminal A Parking Garage Exit	1	650	116	A	279	B	312	B
18	Terminal A Rent-A-Car Exit	1	650	158	A	240	B	224	B
19	Terminal A Departures Exit	1	650	460	C	436	C	375	B
21	Terminal A Arrivals Exit	1	650	83	A	192	A	181	A
24	Terminal B Arrivals Exit	1	650	118	A	189	A	268	B
25	Terminal B Departures Exit	1	650	641	D	596	D	498	C
26	Terminal B Rent-A-Car Exit	1	650	184	A	347	B	344	B
27A	Return Ramp to Terminal B from Terminal B	1	650	270	B	369	B	381	B
27B	Exit from Terminal B (Excluding Return Ramp)	2	1,150	863	C	1,134	E	1,317	E
28	Slip Ramp from Terminal B Entrance to NB Airport Blvd.	1	650	72	A	96	A	97	A
30	Terminal B 4th Curbside	1	760	52	C	96	C	92	C

TABLE 7-1 (continued)
EXISTING (YEAR 2000) OPERATIONS ANALYSIS

Station No.	Location	No. of Lanes per Direction	Max. Service Volume	Peak Hour					
				AM		Midday		PM	
				Volume	LOS	Volume	LOS	Volume	LOS
	Entrance (NB)								
31A	SB South Access Rd. from Terminal A	1	650	256	B	349	B	441	C
31B	SB South Access Rd. from Terminal B	1	650	150	A	281	B	256	B
32A	NB South Access Rd. to Terminal A	1	650	349	B	353	B	325	B
32B	NB South Access Rd to Terminal B	1	650	217	A	310	B	260	B
35N	Casa Verde Rd. S. of Employee Parking Lot (NB)	1	760	461	D	390	C	262	C
35S	Casa Verde Rd. S. of Employee Parking Lot (SB)	1	760	140	C	335	C	405	C
36N	Bear Rd. E. of Old Terminal (NB)	1	760	206	C	219	C	296	C
36S	Bear Rd. E. of Old Terminal (SB)	1	760	300	C	234	C	218	C
37E	Bear Rd. E. of Tradeport Dr. (EB)	1	760	315	C	234	C	215	C
37W	Bear Rd. E. of Tradeport Dr. (WB)	1	760	210	C	226	C	319	C
39N	Tradeport Dr. N. of Bear Rd. (NB)	2	1,850	488	B	669	B	863	B
39S	Tradeport Dr. N. of Bear Rd. (SB)	2	1,850	982	B	725	B	705	B
40N	Tradeport Dr. N. of Boggy Creek Rd. (NB)	2	1,850	281	B	257	B	358	B
40S	Tradeport Dr. N. of Boggy Creek Rd. (SB)	2	1,850	320	B	262	B	348	B
41E	Cargo Rd. E. of Casa Verde Rd. (EB)	1 ¹	760	149	C	239	C	223	C
41W	Cargo Rd. E. of Casa Verde Rd. (WB)	1 ¹	760	255	C	226	C	228	C
43N	Daetwyler Dr. S. of Jetport Dr. (NB)	1	760	120	C	141	C	146	C
43S	Daetwyler Dr. S. of Jetport Dr. (SB)	1	760	117	C	154	C	174	C
44E	4th Street W. of Tradeport Dr. (EB)	1	760	58	C	124	C	120	C
44W	4th Street W. of Tradeport Dr. (WB)	1	760	110	C	129	C	102	C
45E	Binnacle Way W. of Tradeport Dr. (EB)	1	760	25	C	28	C	30	C
45W	Binnacle Way W. of Tradeport Dr. (WB)	1	760	19	C	19	C	22	C
46E	Express Street W. of Tradeport Dr. (EB)	1	760	42	C	44	C	52	C
46W	Express Street W. of Tradeport Dr. (WB)	1	760	50	C	39	C	47	C
47	Terminal B Parking Garage Exit	1	650	154	A	247	B	364	C
51	Ramp from Cargo Rd. to SB Airport Blvd (Ramp R-1)	1	650	210	A	286	B	294	B
52	Ramp from Cargo Rd. to NB Airport Blvd (Ramp R-4)	1	650	109	A	236	B	351	B
53	Ramp from NB Airport Blvd. to Cargo Rd. (Ramp R-2)	1	650	204	A	231	B	206	A
54E	Cargo Rd. E. of Airport Blvd. Ramps R-1 & R-4 (EB)	1 ¹	760	426	C	366	C	251	C
54W	Cargo Rd. E. of Airport Blvd. Ramps R-1 & R-4 (WB)	1 ¹	760	378	C	555	D	710	D
55E	Cargo Rd. W. of Rent-A-Car	1 ¹	760	614	D	546	D	420	C

TABLE 7-1 (continued)
EXISTING (YEAR 2000) OPERATIONS ANALYSIS

Station No.	Location	No. of Lanes per Direction	Max. Service Volume	Peak Hour					
				A.M.		Midday		P.M.	
				Volume	LOS	Volume	LOS	Volume	LOS
	Rd. (EB)								
55W	Cargo Rd. W. of Rent-A-Car Rd. (WB)	1 ¹	760	303	C	495	D	665	D
56N	Rent-A-Car Rd. N. of Cargo Rd. (NB)	1	760	58	C	43	C	33	C
56S	Rent A-Car Rd. N. of Cargo Rd. (SB)	1	760	5	C	6	C	20	C
60	State Road 417 WB On-Ramp from Boggy Creek Rd.	1	740	73	A	69	A	106	A
61	State Road 417 WB Off-Ramp to Boggy Creek Rd.	1	590	83	A	58	A	80	A
62	State Road 417 On-Ramp from Boggy Creek Rd.	1	740	218	A	416	B	432	B
63	State Road 417 Off-Ramp to Boggy Creek Rd.	1	590	338	B	461	C	381	C
64	Terminal A Quick Park Ramp	1	650	30	A	40	A	26	A
65	Terminal B Quick Park Ramp	1	650	57	A	57	A	43	A
70E	Boggy Creek Rd. W. of South Access Rd. (EB)	1	880	147	B	184	B	393	B
70W	Boggy Creek Rd. W. of South Access Rd. (WB)	1	880	391	B	183	B	233	B
71N	Boggy Creek Rd. S. of State Road 417 (NB)	1	880	858	D	578	C	575	C
71S	Boggy Creek Rd. S. of State Road 417 (SB)	1	880	473	B	559	B	817	C
92	Terminal B Taxi-Hold Exit	1	650	109	A	190	A	175	A
100E	Post Office Way E. of Tradeport Dr. (EB)	1	760	202	C	167	C	252	C
100W	Post Office Way E. of Tradeport Dr. (WB)	1	760	198	C	167	C	27	C
101E	Post Office Way E. of Post Office (EB)	1	760	36	C	32	C	30	C
101W	Post Office Way E. of Post Office (WB)	1	760	26	C	32	C	35	C
200TOT	Total South Access Rd. N. of State Road 417	1	1,220	890	D	1,169	D	1,361	E
300E	Jetport Dr. E. of Heintzelman Blvd. (EB)	1	760	41	C	123	C	242	C
300W	Jetport Dr. E. of Heintzelman Blvd. (WB)	1	760	269	C	155	C	97	C
500	WB State Road 528 Off-Ramp to NB State Road 436	1	740	429	B	236	A	276	B
600	SB State Road Off-Ramp to WB State Road 528	1	740	532	C	307	B	390	B
700	EB State Road 528 Off-Ramp to NB State Road 436	2	740	203	A	229	A	364	B
800	SB State Road 436 Off-Ramp to EB State Road 528	1	740	185	A	227	A	448	C
900	Ramp from SB Airport Blvd. to Terminal B Entrance	2	2,300	1,012	B	1,151	B	1,124	B

Sources: MCO 2000 Peak Season Daily Traffic Counts, HDR, 2000; URS, 2003.

- 1 Cargo Road widening project from two lanes to four lanes per direction was completed in 2001; year 2000 condition is shown.

The existing peak season traffic volumes were analyzed to determine existing operating conditions. The existing capacity was evaluated by conducting a level of service (LOS) analysis on the existing roadway network with these volumes. The analysis consisted of an evaluation of the roadway segments excluding weaving areas and ramp junctions. The minimum LOS for the roadways is based on criteria documented in the MCO Amended and Restated Development Order. A minimum LOS C for daily volumes and a LOS D for peak hour volumes is considered acceptable by operating conditions for the airport roadway network. The maximum service volume on each roadway segment represents the maximum capacity on each roadway segment to maintain LOS D during the peak hour. The complete documentation of the methodology and procedure used to analyze the existing roadway operations is described in the 2000 Traffic Count Program.

Table 7-1 shows the peak hourly volume at each analyzed location and the corresponding LOS for the airport roadways and off-site roadways. Existing deficiencies on the roadway network are apparent in the locations operating at LOS E or F. Table 7-1 shows two locations operate at an unsatisfactory LOS in the year 2000. These locations are:

- Exit ramp from Terminal B, excluding return ramp to Terminal B, (Station 27B)
- South Access Road (Station 200TOT)

It should be noted that since 2000, traffic volumes at the airport have decreased due to decreased air travel. The exit ramp from Terminal B no longer operates at an unacceptable LOS (year 2003 counts) and is expected to continue to operate at an acceptable LOS through the first forecast scenario (year 2010, 40 million annual passengers [MAP]) due to a change in the maximum service volume adopted for this location. Traffic volumes on South Access Road have also decreased since 2000; however, this roadway still experiences over-capacity conditions during peak travel times.

7.2.2.2 Commercial Vehicle/Service Access Analysis

Table 7-2 lists the results of the capacity analysis for the commercial vehicle/service access roadways for the existing year (2000). The table shows that all of the commercial vehicle/service access roadways are currently operating at acceptable LOS.

**TABLE 7-2
EXISTING (YEAR 2000) COMMERCIAL
VEHICLE/SERVICE ACCESS OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Max. Service Volume	Peak Hour					
				A.M.		Mid Day		P.M.	
				Volume	LOS	Volume	LOS	Volume	LOS
11N	Rent-A-Car Rd. S. of Crossfield Taxiway (NB)	1	760	52	C	59	C	59	C
11S	Rent-A-Car Rd. S. of Crossfield Taxiway (SB)	1	760	43	C	43	C	48	C
20	Terminal A Commercial Vehicle Exit	1	650	141	A	238	B	225	B
23	Terminal B Commercial Vehicle Exit	1	650	110	A	163	A	185	A
33N	Rent-A-Car Rd. S. of Cargo Rd. (NB)	1	760	122	C	160	C	238	C
33S	Rent-A-Car Rd. S. of Cargo Rd. (SB)	1	760	245	C	144	C	125	C

Sources: MCO 2000 Peak Season Daily Traffic counts, HDR, 2000; URS, 2003.

7.2.3 FUTURE TRAFFIC PROJECTIONS

Future traffic projections were estimated to analyze the future operating conditions. Traffic projections were prepared for three future analysis years (2010, 2015 and 2025). The traffic forecasts were conducted utilizing the following enplanement levels for each analysis year:

- Year 2010 - 40 MAP at the North Terminal
- Year 2015 - 45 MAP Total, 35 MAP at the North Terminal, 10 MAP at the South Terminal
- Year 2025 - 60 MAP Total, 35 MAP at the North Terminal, 25 MAP at the South Terminal

The future traffic operations were analyzed for the year 2025 to be consistent with the future regional roadway improvements documented in Metroplan Orlando's 2025 Long Range Transportation Plan (LRTP).

The following summarizes the methodology and procedure used in the development of the future traffic projections. The complete documentation is provided in the Surface Transportation Forecast (HDR) included in Appendix I. Figures 7-11 through 7-16 show the future traffic projections for each of the analysis years.

The traffic forecasts were developed by integrating a subarea model for the airport roadways with a regional model for the off-site roadways. The regional traffic model consisted of the 2000 Orlando Urban Area Transportation Study (OUATS). The OUATS model was used to estimate the distribution of airport traffic in relation to the location of regional population and employment. The subarea model was based on the Subarea Travel Demand Model created for the 1995 MCO Master Plan. This model includes both airport roadways and off-site roadways that allow access to/from MCO. The subarea model provides a more detailed airport roadway network and focuses on internal traffic circulation. Additional data including daily traffic counts, terminal surveys, historical traffic counts, land use information, and employee data were used to generate the subarea traffic model. The subarea model network was validated to reflect year 2000 traffic conditions.

The following land use and surface transportation network assumptions were utilized in the subarea model roadway network for the years 2010 and 2025:

Year 2010

- Projected growth occurs in existing support and employment areas in the north and in the Heintzelman Boulevard/mid-crossfield corridor.
- Roadway network includes all regional existing and programmed roadway improvements in the FDOT Five-Year Work Program (2003) and the Metroplan Orlando TIP Fiscal Years 2002/03 - 2007/08.

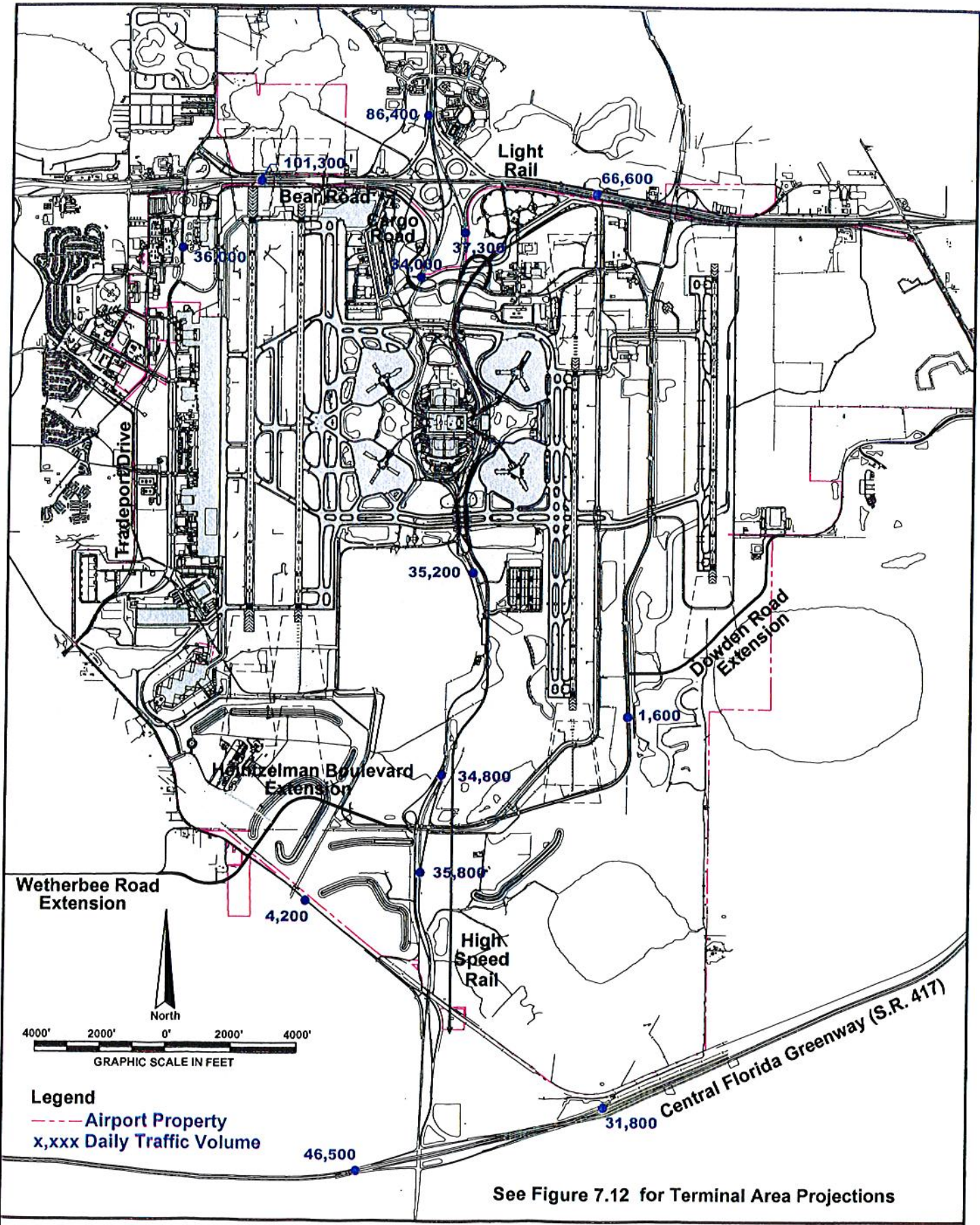
Year 2025

- Projected growth includes the construction of the South Terminal, the development of south terminal support zones, and increased support activity in the mid-crossfield development areas.
- Roadway network includes all regional existing and planned roadway improvements in the Metroplan Orlando LRTP, new airport access on Dowden Road, and the extension of Heintzelman Boulevard to the east.

7.2.4 ANALYSIS OF FUTURE OPERATING CONDITIONS

The future operating conditions were analyzed to identify future deficiencies and develop recommendations for improvements. The evaluation of roadway operations and commercial vehicle/service access consisted of a capacity analysis of the future roadway operations using the traffic forecasts referenced in Section 7.2.3 of this report. The capacity analyses are based on the

T:\PROJECTS\MASTER PLAN\EXHIBITS '04\FIGURE 7-11.DWG 11/11/2004 10:59 AM



Wetherbee Road Extension

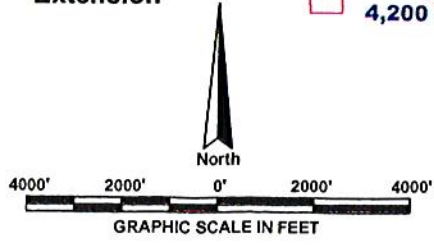
Heintzelman Boulevard Extension

Light Rail

Dowden Road Extension

High Speed Rail

Central Florida Greenway (S.R. 417)



Legend
--- Airport Property
x,xxx Daily Traffic Volume

See Figure 7.12 for Terminal Area Projections

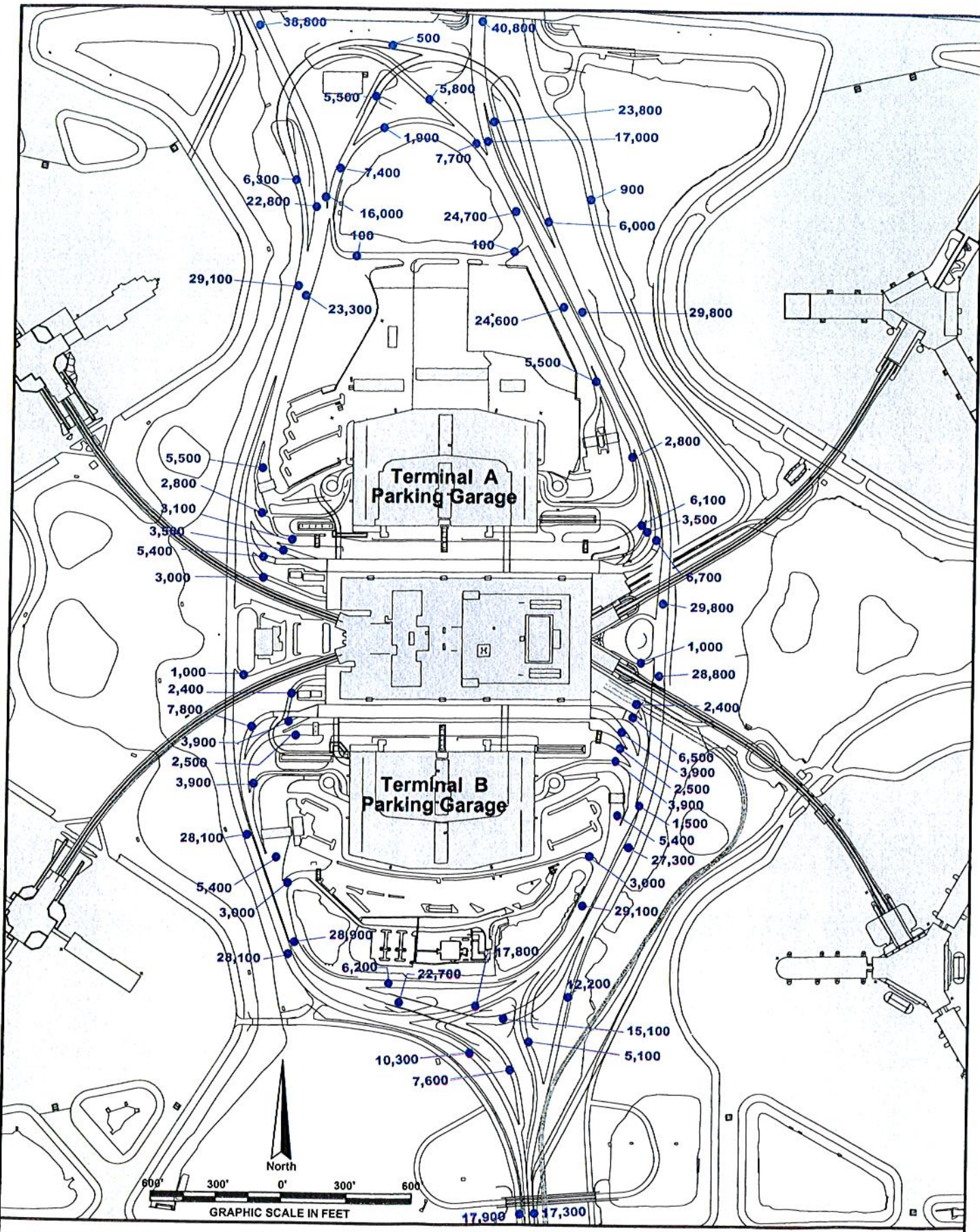
 **GREATER ORLANDO AVIATION AUTHORITY**
Orlando International Airport Master Plan Update

 **URS**

2010 PROJECTED PEAK SEASON REGIONAL AVERAGE DAILY TRAFFIC VOLUMES

FIGURE: 7.11

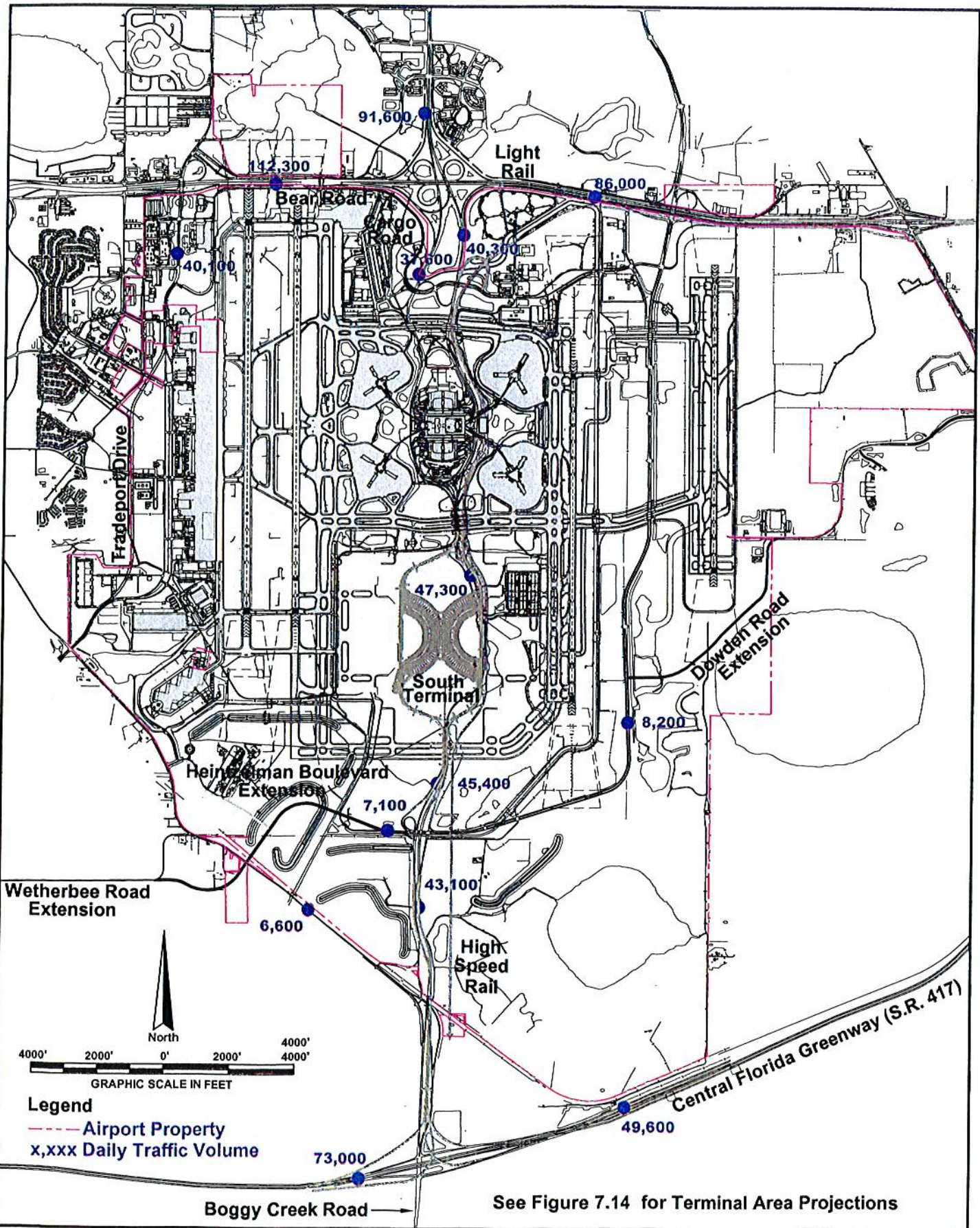
T:\PROJECTS\MASTER PLAN\FINAL EXHIBITS '04\FIGURE 7-12.DWG 11/11/2004 10:59 AM



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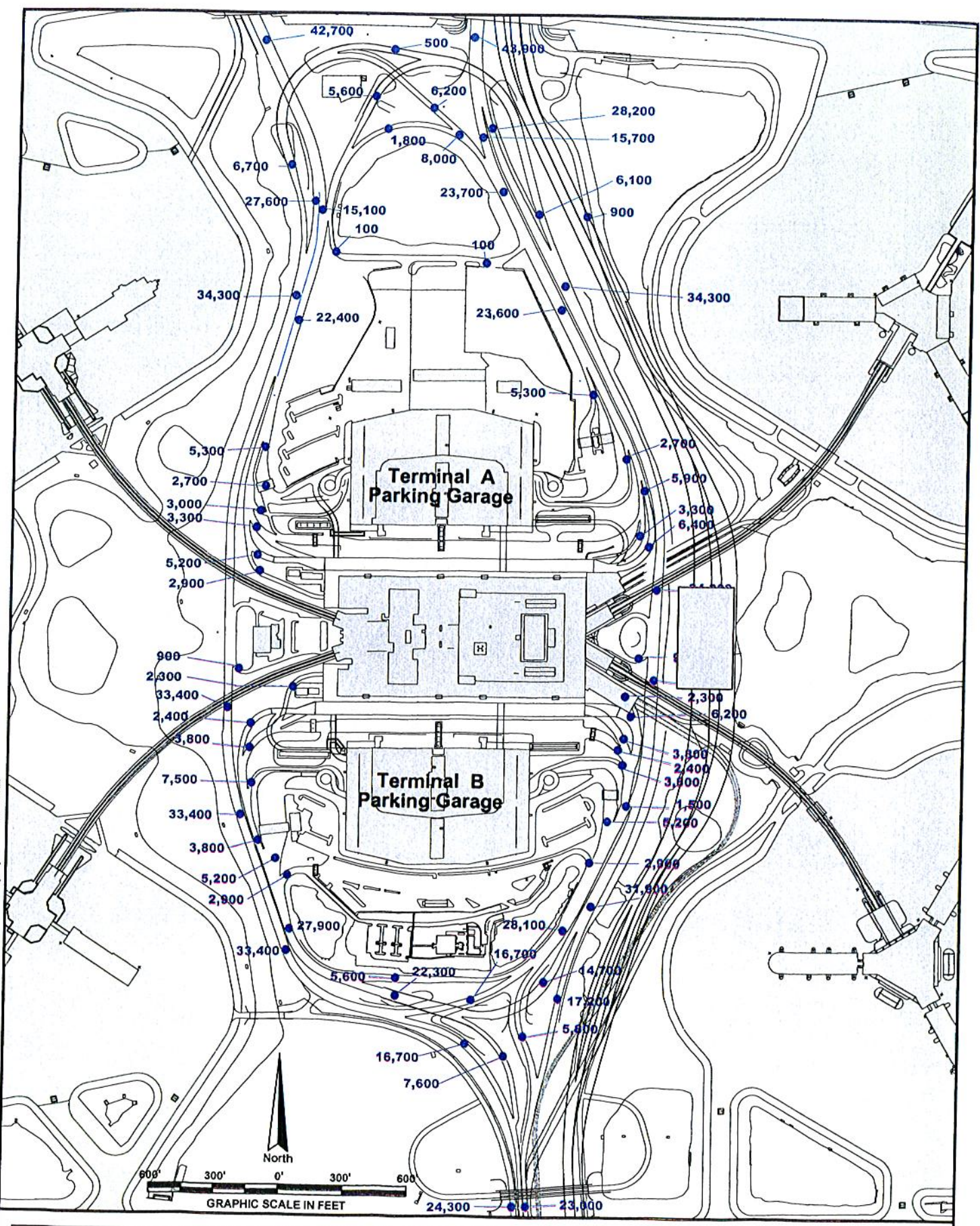
ANAL EXHIBITS '04\FIGURE 7-13.DWG



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 **GREATER ORLANDO AVIATION AUTHORITY**
Orlando International Airport Master Plan Update

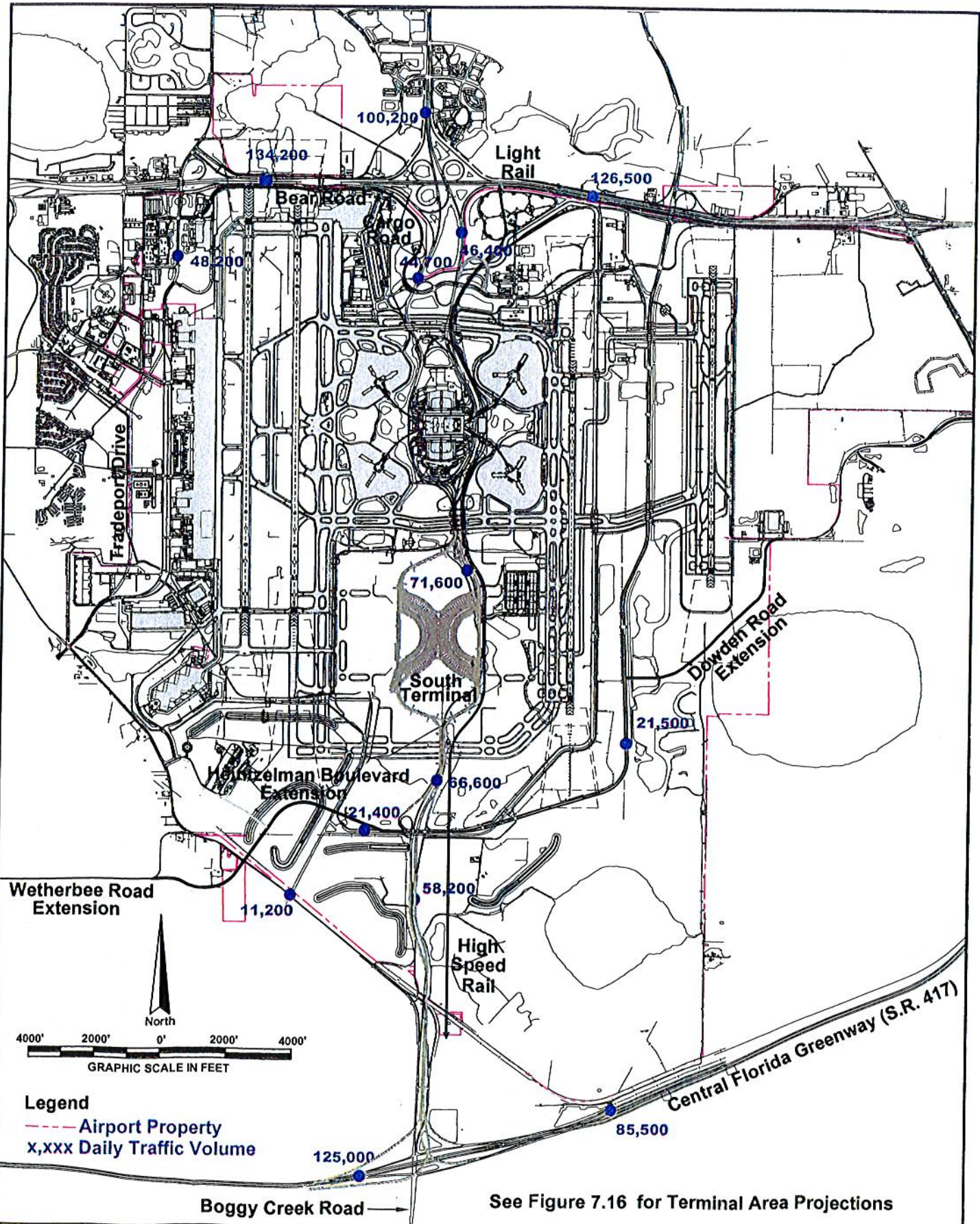
2015 PROJECTED PEAK SEASON AVERAGE DAILY TRAFFIC VOLUMES

FIGURE: 7.14

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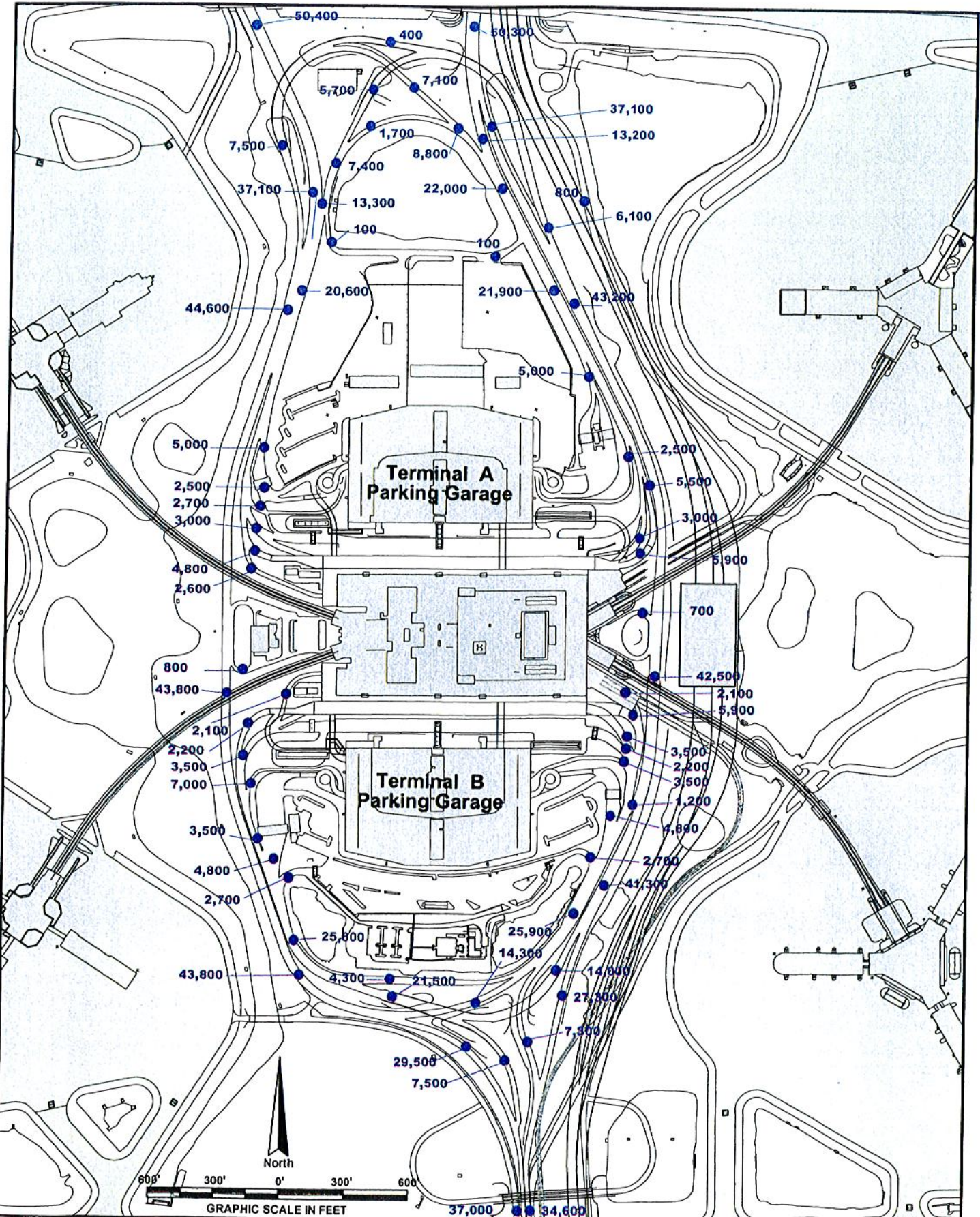
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FINAL EXHIBITS '04 FIGURE 7-16.DWG

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methods outlined in the Highway Capacity Manual, Transportation Research Board, 2000 (2000 HCM). A minimum LOS C for daily volumes and LOS D for peak hour volumes is considered acceptable operating conditions for the airport roadway network based on the criteria documented in the MCO Amended and Restated Development Order. The maximum service volume on each roadway segment represents the maximum capacity on each roadway segment to maintain LOS D during the peak hour. For the purpose of this analysis, several improvements were assumed for the future year roadway networks in 2010, 2015, and 2025. These assumed improvements are listed under each analysis year.

7.2.4.1 Year 2010

The existing operating conditions documented in Section 7.2.2 were based on the existing roadway network in 2000. Several roadway improvements have been completed since 2000. The following existing facilities (2003) are included in the 2010 roadway network:

- Cargo Road - Widened to four lanes between Bear Road and Heintzelman Boulevard
- Heintzelman Boulevard - New construction, four lane divided roadway between Cargo Road and South Access Road
- Heintzelman Boulevard/South Access Road Interchange - New construction
- Goldenrod Road Extension - New construction, four lane divided roadway between Hoffner Road and Cargo Road/Heintzelman Boulevard
- State Road 528/Goldenrod Road Interchange - New construction.

The following improvements are assumed to be in place by 2010:

- Boggy Creek Road (Station 71) - Widened to two lanes per direction from State Road 417 to the Osceola County line
- South Access Road between Airport Boulevard and Boggy Creek Road (Station 200TOT) - Widened to two lanes per direction
- Southbound Airport Boulevard Ramp to southbound South Access Road (Station 31A) - Widened to two lanes
- Northbound South Access Road Ramp to northbound Airport Boulevard (Station 32A) - Widened to two lanes

Airport Roadway Operations Analysis

Table 7-3 lists the results of the capacity analysis for the airport roadways. The table shows that all of the locations are projected to operate at acceptable LOS through 2010.

Off-Site Roadway Operations Analysis

Table 7-4 lists the results of the capacity analysis for the off-site roadways. One location is projected to operate at an unsatisfactory LOS in 2010. This location, shown on Figure 7-17, is Northbound Airport Boulevard, north of off-ramp to eastbound State Road 528 (Station 3A).

Weaving Area Operations Analysis

Table 7-5 shows one location is projected to operate at an unsatisfactory LOS in 2010. This location, shown on Figure 7-17, is Northbound Airport Boulevard between Cargo Road and State Road 528 (Station 3).

Commercial Vehicle/Service Access Operations Analysis

Table 7-6 lists the results of the capacity analysis for the commercial vehicle/service access roadways for 2010. The table shows that all of the commercial vehicle/service access roadways are projected to operate at acceptable LOS through 2010. Therefore, no improvements are recommended for these roadways.

7.2.4.2 Year 2015

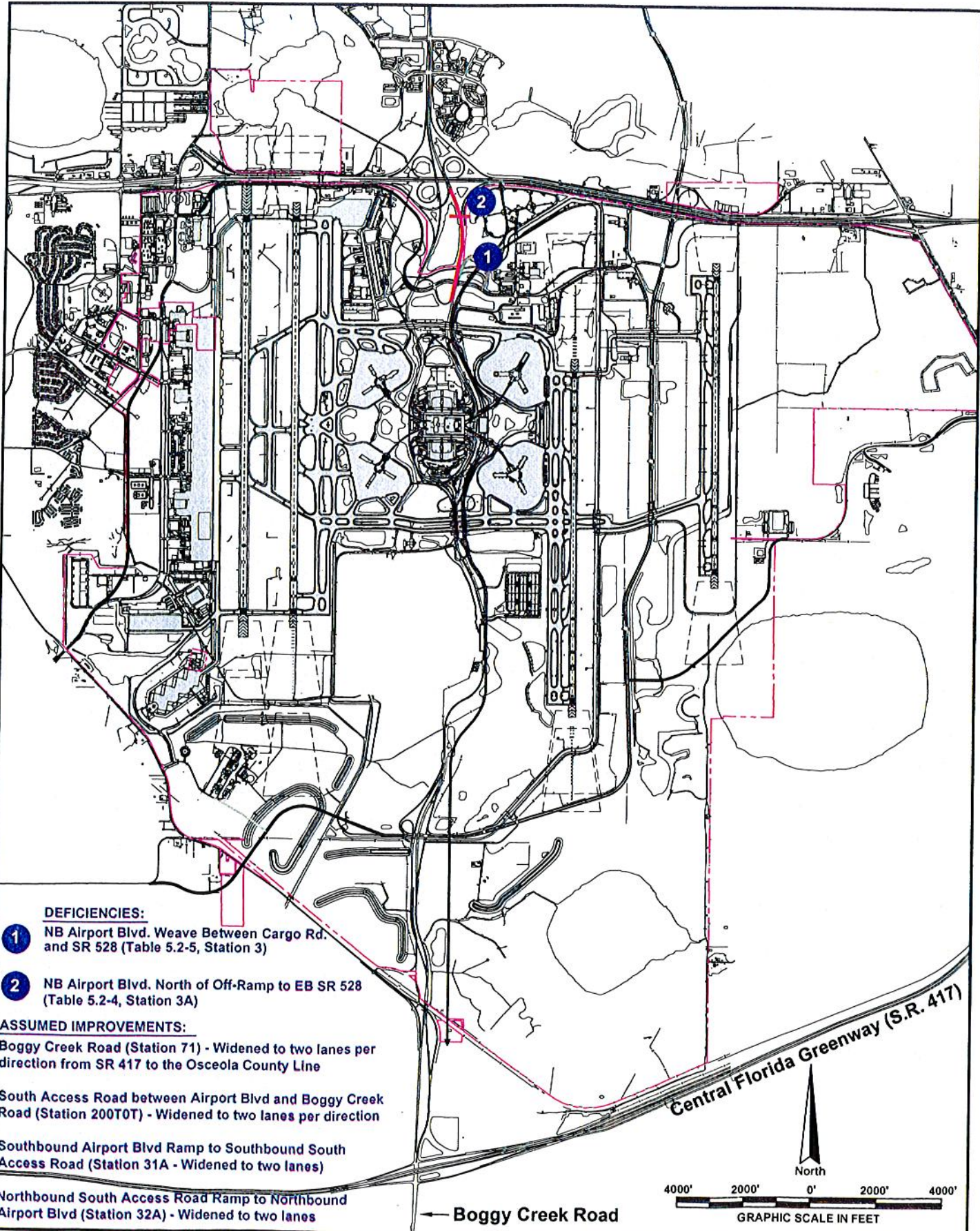
The following improvements are assumed to be in place by 2015:

- State Road 528/State Road 436/Airport Boulevard Interchange - Improve access to MCO by replacing the existing loop ramp from westbound State Road 528 to southbound Airport Boulevard with a new fly-over ramp
- Northbound Airport Boulevard between Cargo Road and State Road 528 (Station 3) - Widened to four lanes
- State Road 417/Boggy Creek Road Interchange improvement - Direct connect ramps between South Access Road and State Road 417, two lanes each
- Boggy Creek Road west of South Access Road (Station 70) - Widened to two lanes

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FINAL EXHIBITS '04 FIGURE 7-17.DWG

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DEFICIENCIES:

- 1** NB Airport Blvd. Weave Between Cargo Rd. and SR 528 (Table 5.2-5, Station 3)
- 2** NB Airport Blvd. North of Off-Ramp to EB SR 528 (Table 5.2-4, Station 3A)

ASSUMED IMPROVEMENTS:

- Boggy Creek Road (Station 71) - Widened to two lanes per direction from SR 417 to the Osceola County Line
- South Access Road between Airport Blvd and Boggy Creek Road (Station 200T0T) - Widened to two lanes per direction
- Southbound Airport Blvd Ramp to Southbound South Access Road (Station 31A) - Widened to two lanes
- Northbound South Access Road Ramp to Northbound Airport Blvd (Station 32A) - Widened to two lanes



2010 ROADWAY DEFICIENCIES

FIGURE:
7.17

**TABLE 7-3
YEAR 2010 AIRPORT ROADWAY OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
5A	Total Cargo Rd. W. of Airport Blvd. Ramp R-3	1	13,100	622	760	D
5B	Total Cargo Rd. E. of Airport Blvd. Ramp R-3	2	17,300	1,074	1,180	D
6	Ramp from SB Airport Blvd. to Cargo Rd. (Ramp R-3)	1	4,200	336	830	B
7A	Return Ramp to Terminal A from B	1	5,500	441	830	B
7B	Return Ramp to Terminal B from B	1	500	40	830	A
7	Total Return Ramp from Terminal B	1	6,000	481	830	B
8A	Return Ramp to Terminal B from A	1	5,800	465	830	B
8B	Return Ramp to Terminal A from A	1	1,900	152	830	A
8	Total Return Ramp from Terminal A	1	7,700	617	830	C
9A	SB Airport Blvd. to Terminal A	2	16,000	1,141	2,300	B
9B	SB Airport Blvd. South of Terminal A Entrance	2	22,800	1,626	2,300	C
9	Total SB Airport Blvd. to Terminals A and B	4	38,800	2,766	4,590	C
12A	NB Airport Blvd. from Terminal A	2	17,000	1,212	2,300	B
12B	NB Airport Blvd. South of Terminal A Exit	2	23,800	1,697	2,300	C
12	NB Airport Blvd. from Terminals A and B	4	40,800	2,909	4,590	C
13	Terminal A Rent-A-Car Service Entrance	1	100	9	830	A
15	Terminal A 4th Curbside Entrance (SB)	1	3,000	240	830	A
17	Terminal A Parking Garage Exit	1	5,500	441	830	B
18	Terminal A Rent-A-Car Exit	1	2,800	224	830	A
19	Terminal A Departures Exit	1	6,700	537	830	B
21	Terminal A Arrivals Exit	1	3,500	280	830	A
24	Terminal B Arrivals Exit	1	3,900	312	830	B
25	Terminal B Departures Exit	1	7,800	625	830	C
26	Terminal B Rent-A-Car Exit	1	3,900	312	830	B
27	Return Ramp to Terminal B from B	1	6,200	497	830	B
27B	Exit from Terminal B (Excluding Return Ramp)	2	22,700	1,818	1,940	D
27	Exit from Terminal B (Total)	3	28,900	2,315	2,770	C
28	Slip Ramp from Terminal B Entrance to NB Airport Blvd.	1	1,500	120	830	A
30	Terminal B 4th Curbside Entrance (NB)	1	2,400	192	830	A
31A	SB South Access Rd. from Terminal A	2 ¹	10,300	825	2,300	B
31B	SB South Access Rd. from Terminal B	1	7,600	609	830	C
31	Total SB South Access Rd.	2	17,900	1,276	2,300	B
32A	NB South Access Rd. to Terminal A	2 ¹	12,200	870	2,300	B
32B	NB South Access Rd to Terminal B	1	5,100	364	830	B
32	Total NB South Access Rd	2	17,300	1,233	2,300	B
35	Casa Verde Rd. S. of Employee Parking Lot	1	14,900	722	760	D
36	Bear Rd. E. of Old Terminal	1	12,800	663	760	D
37	Bear Rd. E. of Tradeport Dr.	1	12,800	636	760	D
39	Tradeport Dr. N. of Bear Rd.	2	36,000	1,784	1,850	D
40	Tradeport Dr. N. of Boggy Creek Rd.	2	12,500	570	1,850	B
41	Cargo Rd. E. of Casa Verde Rd.	2	15,500	718	1,215	C
43	Daetwyler Dr. S. of Jetport Dr.	1	6,800	328	760	C
44	Landstreet W. of Tradeport Dr.	1	9,700	444	760	C
45	Binnacle Way W. of Tradeport Dr.	1	1,600	86	760	C
46	Express St W. of Tradeport Dr.	1	1,300	62	760	C
47	Terminal B Parking Garage Exit	1	5,400	433	830	B
51	Ramp from Cargo Rd. to SB Airport Blvd. (Ramp R-1)	1	9,000	811	830	D

TABLE 7-3 (continued)
YEAR 2010 AIRPORT ROADWAY OPERATIONS ANALYSIS

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max-Service Volume	Peak Hour LOS
52	Ramp from Cargo Rd. to NB Airport Blvd. (Ramp R-4)	1	3,700	333	830	B
53	Ramp from NB Airport Blvd. to Cargo Rd. (Ramp R-2)	1	7,200	513	830	B
54	Total Cargo Rd. E. of Airport Blvd. Ramps R-1 & R-4	2	20,300	1,361	1,850	C
55	Total Cargo Rd. W. of Rent-A-Car Rd.	2	20,500	968	1,850	B
64	Terminal A Quick Park Ramp	1	1,000	80	830	A
65	Terminal B Quick Park Ramp	1	1,900	152	830	A
92	Terminal B Taxi-Hold Exit	1	3,000	270	830	A
100	Post Office Way E. of Tradeport Dr.	1	5,900	280	760	C
101	Post Office Way E. of Post Office	1	5,900	305	760	C
200	South Access Rd., S. of Terminals A & B	2 ¹	35,200	1,474	2,300	C
300	Jetport Dr. E. of Heintzelman Blvd.	1	9,900	479	760	C
900	Ramp from SB Airport Blvd. to Terminal B Entrance	2	17,800	1,426	2,300	C
953	Approach to Terminal A	3	23,300	1,661	2,490	B
954	Departing from Terminal A	4	24,600	1,754	3,130	B
955	Approach to Terminal B	4	29,100	2,075	3,320	B
956	SB Airport Blvd. South of Return Ramp from Terminals	3	29,100	2,075	3,440	C
957	NB Airport Blvd. South of Return Ramp to Terminals	3	29,800	2,125	3,440	C

Sources: HDR Engineering, Inc.; URS, 2003.

1 Assumed improvement by 2010 - widened to two lanes.

**TABLE 7-4
YEAR 2010 OFF-SITE ROADWAY OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
1	WB State Road 528 Off-Ramp to SB Airport Blvd.	1	2,100	150	1,300	A
2	WB State Road 528 On-Ramp from NB Airport Blvd.	1	10,200	727	1,300	C
3A	NB Airport Blvd., N. of Off-Ramp to EB State Road 528	2	33,400	2,381	2,300	E
3B	NB Airport Blvd. Off-Ramp to EB State Road 528	1	3,900	278	1,360	A
3	Total Outbound from Airport North	3	37,300	2,659	3,440	C
4A	SB Airport Blvd., N. of Merge with Ramp from EB State Road 528	2	21,100	1,504	2,300	C
4B	SB Airport Blvd. On-Ramp from EB State Road 528	1	12,900	920	1,360	C
4	Total Inbound to Airport from North	3	34,000	2,424	3,440	C
60	State Road 417 EB On-Ramp from Boggy Creek Rd.	1	3,300	297	1,360	A
61	State Road 417 WB Off-Ramp to Boggy Creek Rd.	1	2,000	180	1,360	A
62	State Road 417 WB On-Ramp from Boggy Creek Rd.	1	2,100	189	1,360	A
63	State Road 417 EB Off-Ramp to Boggy Creek Rd.	1	4,800	432	1,360	A
70	Boggy Creek Rd. W. of South Access Rd.	1	4,200	238	860	C
71	Boggy Creek Rd. S. of State Road 417	2 ¹	26,700	1,422	1,850	C
500	WB State Road 528 Off-Ramp to NB State Road 436	1	9,100	820	1,520	C
600	SB State Road 436 Off-Ramp to WB State Road 528	2	19,800	1,784	2,890	C
700	EB State Road 528 Off-Ramp to NB State Road 436	2	11,100	1,000	2,890	B
800	State Road 436 Off-Ramp to EB State Road 528	1	4,200	382	1,450	A
902	Heintzelman Blvd. E. of South Access Rd.	2	1,600	91	2,300	A
910	South Access Rd. S. of Heintzelman Blvd. Interchange (NB & SB)	2	35,800	1,575	2,300	C
912	SB Boggy Creek Rd. (Slip Ramp) from SB South Access Rd.	1	17,900	1,575	1,600	D
914	NB Boggy Creek Rd. (Slip Ramp) to NB South Access Rd.	1	17,900	1,575	1,600	D
916	SB Boggy Creek Rd. N. of State Road 417	2	20,000	1,813	2,300	D
918	NB Boggy Creek Rd. N. of State Road 417	2	20,000	1,813	2,300	D
932	NB South Access Rd. Off-Ramp to EB Heintzelman Blvd.	1	800	64	830	A
934	NB South Access Rd. On-Ramp from WB Heintzelman Blvd.	1	100	8	830	A
936	SB South Access Rd. Off-Ramp to Heintzelman Blvd.	1	100	8	830	A
938	SB South Access Rd. On-Ramp from WB Heintzelman Blvd.	1	400	32	830	A
940	South Access Rd. N. of Heintzelman Blvd.	2	34,800	1,637	2,300	C

Sources: HDR Engineering, Inc.; URS, 2003.

1 Assumed improvement by 2010 - widened to two lanes per direction.

**TABLE 7-5
YEAR 2010 WEAVING AREA OPERATIONS ANALYSIS**

Station No.	Location	Weave Type	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
3	NB Weave from Cargo Rd. to State Road 528	C	2,400	3	37,300	2,659	F
4	SB Weave from State Road 528 to Cargo Rd.	B	1,400	3	34,000	2,424	D
953	Approach Weave to Terminal A	A	950	3	23,300	1,661	C
9	SB Weave from Cargo Rd. Terminal A/B Split	C	2,100	4	38,800	2,766	C
954	Departing Weave from Terminal A	A	900	4	24,600	1,754	C
12	NB Weave from Terminal A/B Merge to Cargo Rd.	C	1,800	4	40,800	2,909	C
27	Departing Weave from Terminal B	B	600	3	28,900	2,315	C
955	Approach Weave to Terminal B	C	660	4	29,100	2,075	C

Sources: HDR Engineering, Inc.; URS, 2003.

**TABLE 7-6
YEAR 2010 COMMERCIAL VEHICLE/SERVICE ACCESS OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
11	Terminal Service Rd. S. of North Crossfield Taxiway	1	900	35	760	C
20	Terminal A Commercial Vehicles Exit	1	6,100	489	830	B
23	Terminal B Commercial Vehicles Exit	1	2,500	200	830	A
33	Terminal Service Rd. S. of Cargo Rd	1	1,900	123	760	C

Sources: HDR Engineering, Inc.; URS, 2003.

Airport Roadway Operations Analysis

Table 7-7 lists the results of the capacity analysis for the airport roadways. One location is projected to operate at an unsatisfactory LOS in 2015. This location, shown on Figure 7-18, is Tradeport Drive north of Bear Road (Station 39).

Off-Site Roadway Operations Analysis

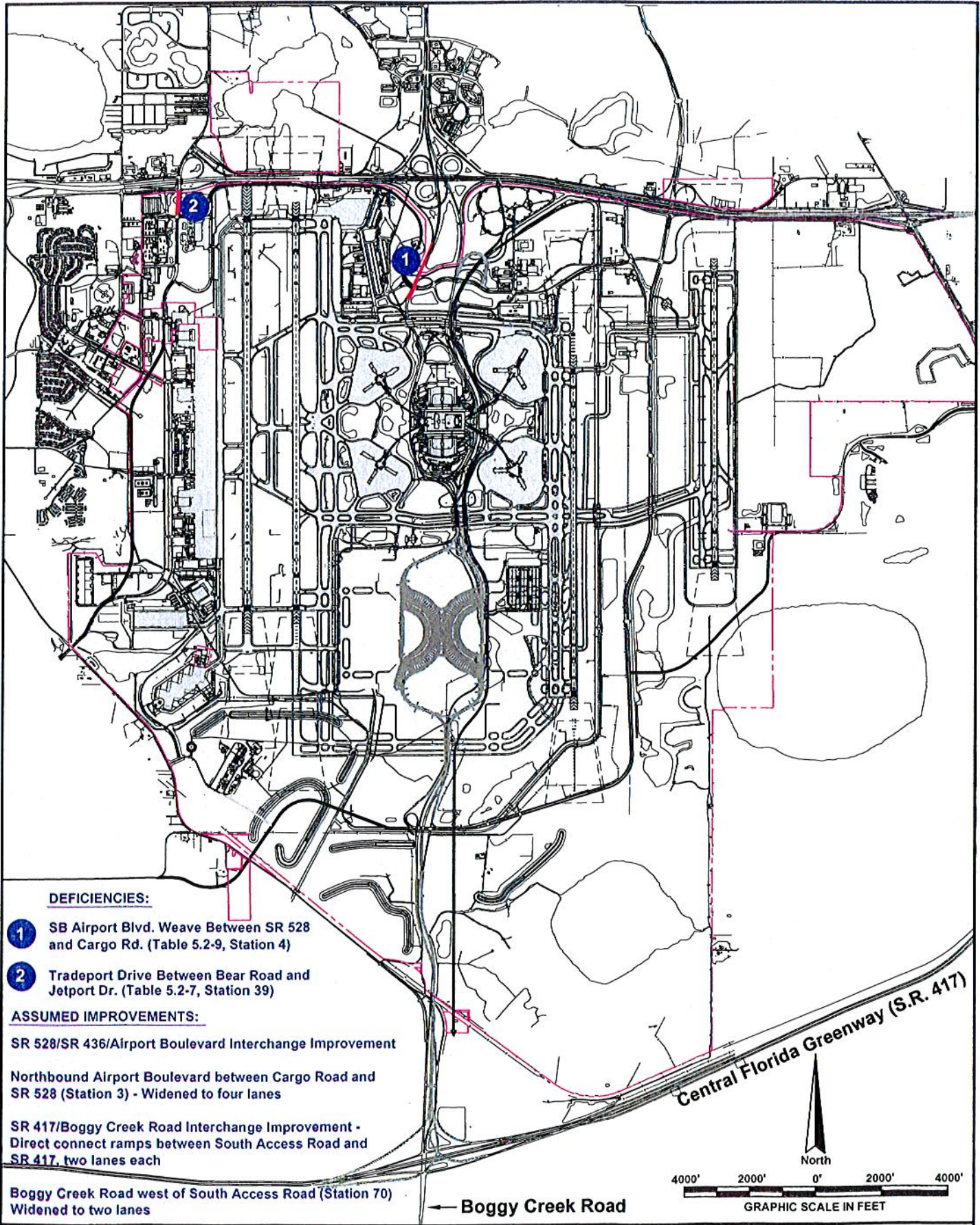
Table 7-8 lists the results of the capacity analysis for the off-site roadways. The table shows that all of the locations are projected to operate at acceptable LOS through 2015.

Weaving Area Operations Analysis

Table 7-9 shows one location is projected to operate at an unsatisfactory LOS in 2015. This location, shown on Figure 7-18, is Southbound Airport Boulevard between State Road 528 and Cargo Road (Station 4).

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T:\PROJECTS\MASTER PLAN\FINAL EXHIBITS\04\FIGURE 7-18.DWG



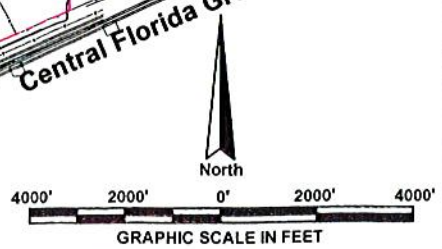
DEFICIENCIES:

- 1** SB Airport Blvd. Weave Between SR 528 and Cargo Rd. (Table 5.2-9, Station 4)
- 2** Tradeport Drive Between Bear Road and Jetport Dr. (Table 5.2-7, Station 39)

ASSUMED IMPROVEMENTS:

- SR 528/SR 436/Airport Boulevard Interchange Improvement
- Northbound Airport Boulevard between Cargo Road and SR 528 (Station 3) - Widened to four lanes
- SR 417/Boggy Creek Road Interchange Improvement - Direct connect ramps between South Access Road and SR 417, two lanes each
- Boggy Creek Road west of South Access Road (Station 70) Widened to two lanes

← Boggy Creek Road



2015 ROADWAY DEFICIENCIES

FIGURE:
7.18

**TABLE 7-7
YEAR 2015 AIRPORT ROADWAY OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
5A	Total Cargo Rd. W. of Airport Blvd. Ramp R-3	1	12,300	584	760	D
5B	Total Cargo Rd. E. of Airport Blvd. Ramp R-3	2	16,100	999	1,180	D
6	Ramp from SB Airport Blvd. to Cargo Rd. (Ramp R-3)	1	3,800	304	830	A
7A	Return Ramp to Terminal A from B	1	5,600	449	830	B
7B	Return Ramp to Terminal B from B	1	500	40	830	A
7	Total Return Ramp from Terminal B	1	6,100	489	830	B
8A	Return Ramp to Terminal B from A	1	6,200	497	830	B
8B	Return Ramp to Terminal A from A	1	1,800	144	830	A
8	Total Return Ramp from Terminal A	1	8,000	641	830	C
9A	SB Airport Blvd. to Terminal A	2	15,100	1,077	2,300	B
9B	SB Airport Blvd. South of Terminal A Entrance	2	27,600	1,968	2,300	D
9	Total SB Airport Blvd. to Terminals A and B	4	42,700	3,045	4,590	C
12A	NB Airport Blvd. from Terminal A	2	15,700	1,119	2,300	B
12B	NB Airport Blvd. South of Terminal A Exit	2	28,200	2,011	2,300	D
12	NB Airport Blvd. from Terminals A and B	4	43,900	3,130	4,590	C
13	Terminal A Rent-A-Car Service Entrance	1	100	9	830	A
15	Terminal A 4th Curbside Entrance (SB)	1	2,900	232	830	A
17	Terminal A Parking Garage Exit	1	5,300	425	830	B
18	Terminal A Rent-A-Car Exit	1	2,700	216	830	A
19	Terminal A Departures Exit	1	6,400	513	830	B
21	Terminal A Arrivals Exit	1	3,300	264	830	A
24	Terminal B Arrivals Exit	1	3,800	304	830	A
25	Terminal B Departures Exit	1	7,500	601	830	C
26	Terminal B Rent-A-Car Exit	1	3,800	304	830	A
27A	Return Ramp to Terminal B from Terminal B	1	5,600	449	830	B
27B	Exit from Terminal B (Excluding Return Ramp)	2	22,300	1,786	1,940	D
27	Exit from Terminal B (Total)	3	27,900	2,235	2,770	C
28	Slip Ramp from Terminal B Entrance to NB Airport Blvd.	1	1,500	120	830	A
30	Terminal B 4th Curbside Entrance (NB)	1	2,300	184	830	A
31A	SB South Access Rd. from Terminal A	2	16,700	1,338	1,940	C
31B	SB South Access Rd. from Terminal B	1	7,600	609	830	C
31	Total SB South Access Rd.	2	24,300	1,733	2,300	C
32A	NB South Access Rd. to Terminal A	2	17,200	1,226	1,940	C
32B	NB South Access Rd. to Terminal B	1	5,800	414	830	B
32	Total NB South Access Rd.	2	23,000	1,640	2,300	C
36	Casa Verde Rd. S. of Employee Parking Lot	1	14,300	693	760	D
36	Bear Rd. E. of Old Terminal	1	12,000	621	760	D
37	Bear Rd. E. of Tradeport Dr.	1	12,100	601	760	D
39	Tradeport Dr. N. of Bear Rd.	2	40,100	1,988	1,850	F
40	Tradeport Dr. N. of Boggy Creek Rd.	2	17,400	794	1,850	B
41	Cargo Rd. E. of Casa Verde Rd.	2	15,700	727	1,215	C
43	Daetwyler Dr. S. of Jetport Dr.	1	9,300	448	760	C
44	Landstreet W. of Tradeport Dr.	1	9,800	449	760	C
45	Binnacle Way W. of Tradeport Dr.	1	2,500	134	760	C
46	Express St W. of Tradeport Dr.	1	1,500	71	760	C
47	Terminal B Parking Garage Exit	1	5,200	417	830	B
51	Ramp from Cargo Rd. to SB Airport Blvd. (Ramp R-1)	1	8,900	802	830	D
52	Ramp from Cargo Rd. to NB Airport Blvd. (Ramp R-4)	1	3,400	306	830	A
53	Ramp from NB Airport Blvd. to Cargo Rd. (Ramp R-2)	1	7,000	499	830	B
54	Total Cargo Rd. E. of Airport Blvd. Ramps R-1 & R-4	2	19,100	1,281	1,850	C
55	Total Cargo Rd. W. of Rent-A-Car Rd.	2	19,200	906	1,850	B
64	Terminal A Quick Park Ramp	1	900	72	830	A

TABLE 7-7 (continued)
YEAR 2015 AIRPORT ROADWAY OPERATIONS ANALYSIS

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
65	Terminal B Quick Park Ramp	1	1,900	152	830	A
92	Terminal B Taxi-Hold Exit	1	2,900	261	830	A
100	Post Office Way E. of Tradeport Dr.	1	6,900	327	760	C
101	Post Office Way E. of Post Office	1	6,900	357	760	C
200	South Access Rd., S. of Terminals A & B	2	47,300	1,980	2,300	D
300	Jetport Dr. E. of Heintzelman Blvd.	1	8,900	431	760	C
900	Ramp from SB Airport Blvd. to Terminal B Entrance	2	16,700	1,338	2,300	B
953	Approach to Terminal A	3	22,400	1,597	2,490	B
954	Departing from Terminal A	4	23,600	1,683	3,130	B
955	Approach to Terminal B	4	28,100	2,004	3,320	B
956	SB Airport Blvd South of Return Ramp from Terminals	3	34,300	2,446	3,440	C
957	NB Airport Blvd South of Return Ramp to Terminals	3	34,300	2,446	3,440	C

Sources: HDR Engineering, Inc.; URS, 2003.

**TABLE 7-8
YEAR 2015 OFF-SITE ROADWAY OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
1	WB State Road 528 Off-Ramp to SB Airport Blvd.	1	3,400	242	1,300	A
2	WB State Road 528 On-Ramp from NB Airport Blvd.	1	10,100	720	1,300	D
3A	NB Airport Blvd., N. of Off-Ramp to EB State Road 528	3 ¹	33,800	2,410	3,440	C
3B	NB Airport Blvd. Off-Ramp to EB State Road 528	1	6,500	463	1,360	B
3	Total Outbound from Airport North	4 ²	40,300	2,873	4,590	C
4A	SB Airport Blvd., N. of Merge with Ramp from EB State Road 528	2	24,400	1,740	2,300	C
4B	SB Airport Blvd. On-Ramp from EB State Road 528	1	13,200	941	1,360	B
4	Total Inbound to Airport from North	3	37,600	2,681	3,440	C
60	State Road 417 EB On-Ramp from Boggy Creek Rd.	1	3,700	333	1,360	A
61	State Road 417 WB Off-Ramp to Boggy Creek Rd.	1	3,000	270	830	A
62	State Road 417 WB On-Ramp from Boggy Creek Rd.	1	5,200	469	1,360	B
63	State Road 417 EB Off-Ramp to Boggy Creek Rd.	1	6,700	604	1,360	B
70	Boggy Creek Rd. W. of South Access Rd.	2 ²	6,600	373	1,850	B
71	Boggy Creek Rd. S. of State Road 417	2	29,100	1,550	1,850	C
500	WB State Road 528 Off-Ramp to NB State Road 436	1	11,600	1,045	1,520	C
600	SB State Road 436 Off-Ramp to WB State Road 528	2	18,600	1,676	2,890	C
700	EB State Road 528 Off-Ramp to NB State Road 436	2	10,700	964	2,890	B
800	State Road 436 Off-Ramp to EB State Road 528	1	5,300	482	1,450	B
902	Heintzelman Blvd. E. of South Access Rd.	2	8,200	464	2,300	A
904	Heintzelman Blvd. W. of South Access Rd.	2	7,100	402	2,300	A
910	South Access Rd. S. of Heintzelman Blvd. Interchange (NB & SB)	2	41,400	2,190	2,300	D
912	SB Boggy Creek Rd. (Slip Ramp) from SB South Access Rd.	1	11,500	1,190	1,600	D
914	NB Boggy Creek Rd. (Slip Ramp) to NB South Access Rd.	1	11,300	1,170	1,600	D
916	SB Boggy Creek Rd. N. of State Road 417	2	14,800	1,563	2,300	C
918	NB Boggy Creek Rd. N. of State Road 417	2	14,600	1,543	2,300	C
926	State Road 417 Connector from SB South Access Rd.	2	9,600	1,000	2,300	B
928	State Road 417 Connector to NB South Access Rd.	2	9,000	940	2,300	B
932	NB South Access Rd. Off-Ramp to EB Heintzelman Blvd.	1	2,500	200	830	A
934	NB South Access Rd. On-Ramp from WB Heintzelman Blvd.	1	3,200	256	830	A
936	SB South Access Rd. Off-Ramp to Heintzelman Blvd.	1	2,200	176	830	A
938	SB South Access Rd. On-Ramp from WB Heintzelman Blvd.	1	800	64	830	A
940	South Access Rd. N. of Heintzelman Blvd.	2	45,400	2,135	2,300	D

Sources: HDR Engineering, Inc.; URS, 2003.

- 1 Assumed improvement by 2015 as part of State Road 528/SR 436/Airport Boulevard interchange modification - widened to three lanes.
- 2 Assumed improvement by 2015 - widened to four lanes.

**TABLE 7-9
YEAR 2015 WEAVING AREA OPERATIONS ANALYSIS**

Station No.	Location	Weave Type	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
3	NB Weave from Cargo Rd. to State Road 528	C	2,400	4	40,300	2,873	C
4	SB Weave from State Road 528 to Cargo Rd.	B	1,400	3	37,600	2,681	E
953	Approach Weave to Terminal A	A	950	3	22,400	1,597	C
9	SB Weave from Cargo Rd. Terminal A/B Split	C	2,100	4	42,700	3,045	C
954	Departing Weave from Terminal A	A	900	4	23,600	1,683	B
12	NB Weave from Terminal A/B Merge to Cargo Rd.	C	1,800	4	43,900	3,130	D
27	Departing Weave from Terminal B	B	600	3	27,900	2,235	C
955	Approach Weave to Terminal B	C	660	4	28,100	2,004	C

Sources: HDR Engineering, Inc.; URS, 2003.

Commercial Vehicle/Service Access Operations Analysis

Table 7-10 lists the results of the capacity analysis for the commercial vehicle/service access roadways for 2015. The table shows that all of the commercial vehicle/service access roadways are projected to operate at acceptable LOS through 2015. Therefore, no improvements are recommended for these roadways.

**TABLE 7-10
YEAR 2015 COMMERCIAL VEHICLE/SERVICE ACCESS OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
11	Terminal Service Rd. S. of North Crossfield Taxiway	1	900	35	760	C
20	Terminal A Commercial Vehicles Exit	1	5,900	473	830	B
23	Terminal B Commercial Vehicles Exit	1	2,400	192	830	A
33	Terminal Service Rd. S. of Cargo Rd.	1	2,100	136	760	C

Sources: HDR Engineering, Inc.; URS, 2003.

7.2.4.3 Year 2025

The following improvements are assumed to be in place by 2025:

- Tradeport Drive between Bear Road and Jetport Drive/State Road 528 (Station 39) - Widened to six lanes,
- South Access Road between Airport Boulevard and Heintzelman Boulevard (Station 940) - Widened to six lanes, and
- Southbound Airport Boulevard between State Road 528 and Cargo Road (Station 4) - Widened to four lanes.

Airport Roadway Operations Analysis

Table 7-11 lists the results of the capacity analysis for the airport roadways. Four locations are projected to operate at an unsatisfactory LOS in 2025. These locations, shown on Figure 7-19, are:

- Southbound Airport Boulevard south of ramp to Terminal A (Station 9B)
- Northbound Airport Boulevard south of ramp from Terminal A (Station 12B)
- Northbound South Access Road ramp to Northbound Airport Boulevard (Station 32A)
- Southbound Airport Boulevard ramp to Southbound South Access Road (Station 31A)

Off-Site Roadway Operations Analysis

Table 7-12 lists the results of the capacity analysis for the off-site roadways. One location is projected to operate at an unsatisfactory LOS in 2025. This location, shown on Figure 7-19, is South Access Road between Heintzelman Boulevard and Boggy Creek Road (Station 910).

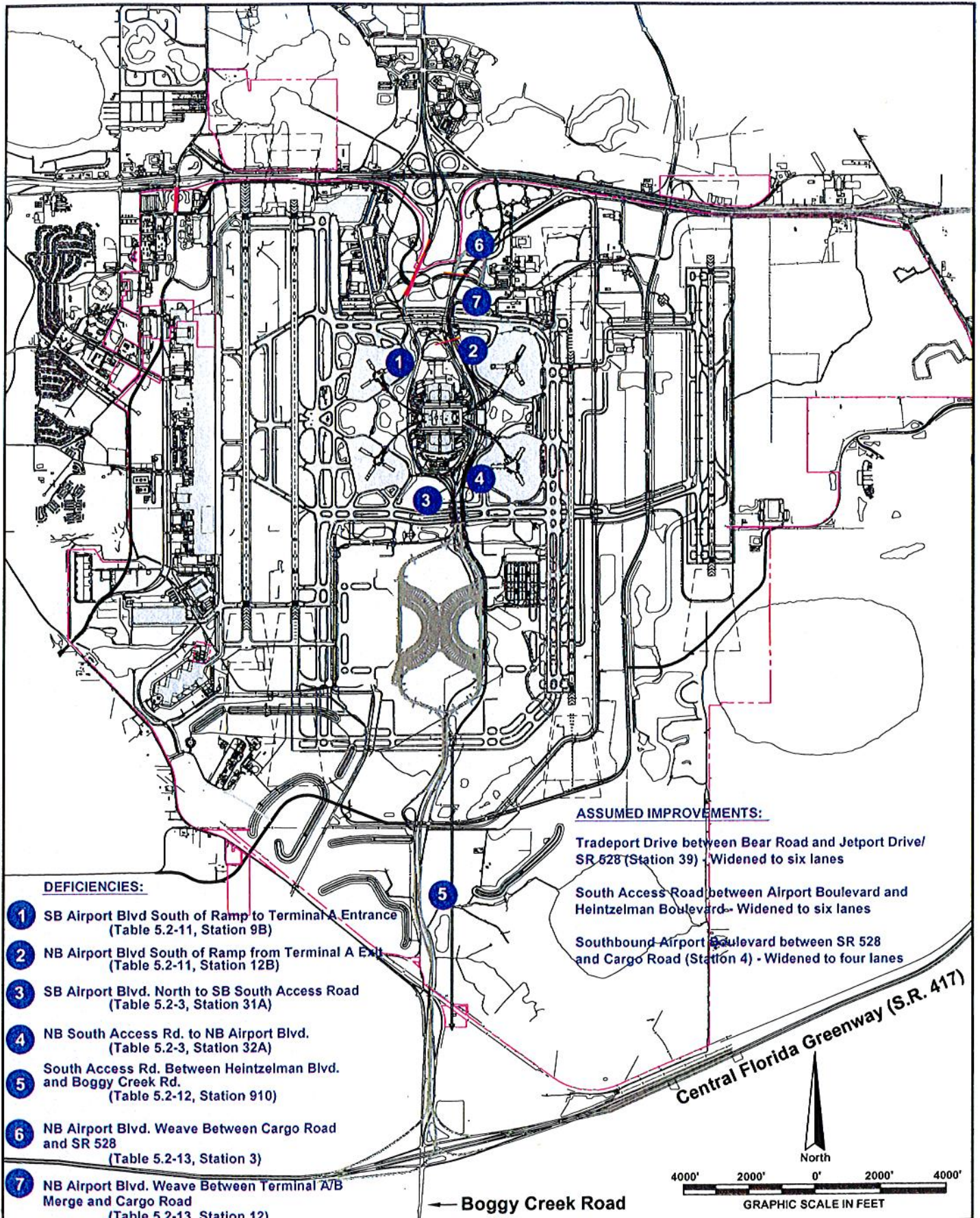
Weaving Area Operations Analysis

Table 7-13 shows two locations are projected to operate at an unsatisfactory LOS in 2025. These locations, shown on Figure 7-19, are:

- Northbound Airport Boulevard weave between Cargo Road and State Road 528 (Station 3), and
- Northbound Airport Boulevard weaves between Terminal A/B merge and Cargo Road (Station 12)

**TABLE 7-11
YEAR 2025 AIRPORT ROADWAY OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes, per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
5A	Total Cargo Rd. W. of Airport Blvd. Ramp R-3	1	10,700	508	760	D
5B	Total Cargo Rd. E. of Airport Blvd. Ramp R-3	2	13,800	857	1,180	C
6	Ramp from SB Airport Blvd. to Cargo Rd. (Ramp R-3)	1	2,900	232	830	A
7A	Return Ramp to Terminal A from Terminal B	1	5,700	457	830	B
7B	Return Ramp to Terminal B from Terminal B	1	400	32	830	A
7	Total Return Ramp from Terminal B	1	6,100	489	830	B
8A	Return Ramp to Terminal B from Terminal A	1	7,100	569	830	C
8B	Return Ramp to Terminal A from Terminal A	1	1,700	136	830	A
8	Total Return Ramp from Terminal A	1	8,800	705	830	C
9A	SB Airport Blvd. to Terminal A	2	13,300	948	2,300	B
9B	SB Airport Blvd. South of Terminal A Entrance	2	37,100	2,645	2,300	E
9	Total SB Airport Blvd. to Terminals A and B	4	50,400	3,594	4,590	C
12A	NB Airport Blvd. from Terminal A	2	13,200	941	2,300	B
12B	NB Airport Blvd. South of Terminal A Exit	2	37,100	2,645	2,300	E
12	NB Airport Blvd. from Terminals A and B	4	50,300	3,586	4,590	C
13	Terminal A Rent-A-Car Service Entrance	1	100	9	830	A
15	Terminal A 4th Curbside Entrance (SB)	1	2,600	208	830	A
17	Terminal A Parking Garage Exit	1	5,000	401	830	B
18	Terminal A Rent-A-Car Exit	1	2,500	200	830	A
19	Terminal A Departures Exit	1	5,900	473	830	B
21	Terminal A Arrivals Exit	1	3,000	240	830	A
24	Terminal B Arrivals Exit	1	3,500	280	830	A
25	Terminal B Departures Exit	1	7,000	561	830	C
26	Terminal B Rent-A-Car Exit	1	3,500	280	830	A
27	Return Ramp to Terminal B from Terminal B	1	4,300	344	830	B
27	Exit from Terminal B (Excluding Return Ramp)	2	21,500	1,722	1,940	D
27	Exit from Terminal B (Total)	3	25,800	2,067	2,770	C
28	Slip Ramp from Terminal B Entrance to NB Airport Blvd.	1	1,200	95	830	A
30	Terminal B 4th Curbside Entrance (NB)	1	2,100	168	830	A
31A	SB South Access Rd. from Terminal A	2	29,500	2,363	1,940	F
31B	SB South Access Rd. from Terminal B	1	7,500	601	830	C
31	Total SB South Access Rd.	3 ¹	37,000	2,638	3,440	C
32A	NB South Access Rd. to Terminal A	2	27,300	1,946	1,940	E
32B	NB South Access Rd. to Terminal B	1	7,300	520	830	B
32	Total NB South Access Rd.	3 ¹	34,600	2,467	3,440	C
35	Casa Verde Rd. S. of Employee Parking Lot	1	13,000	630	760	D
36	Bear Rd. E. of Old Terminal	1	10,300	533	760	D
37	Bear Rd. E. of Tradeport Dr.	1	10,400	517	760	D
39	Tradeport Dr. N. of Bear Rd.	3 ¹	48,200	2,389	2,775	C
40	Tradeport Dr. N. of Boggy Creek Rd.	2	27,300	1,246	1,850	C
41	Cargo Rd. E. of Casa Verde Rd.	2	16,000	741	1,215	C
43	Daetwyler Dr. S. of Jetport Dr.	1	14,400	694	760	D
44	Landstreet W. of Tradeport Dr.	1	9,900	453	760	C
45	Binnacle Way W. of Tradeport Dr.	1	4,200	225	760	C
46	Express St. W. of Tradeport Dr.	1	1,900	90	760	C
47	Terminal B Parking Garage Exit	1	4,800	384	830	B
51	Ramp from Cargo Rd. to SB Airport Blvd. (Ramp R-1)	1	8,600	775	830	D
52	Ramp from Cargo Rd. to NB Airport Blvd. (Ramp R-4)	1	2,800	252	830	A
53	Ramp from NB Airport Blvd. to Cargo Rd. (Ramp R-2)	1	6,700	478	830	B
54	Total Cargo Rd. E. of Airport Blvd. Ramps R-1 & R-4	2	16,600	1,113	1,850	B
55	Total Cargo Rd. W. of Rent-A-Car Rd.	2	16,500	779	1,850	B
64	Terminal A Quick Park Ramp	1	900	72	830	A
65	Terminal B Quick Park Ramp	1	1,700	136	830	A

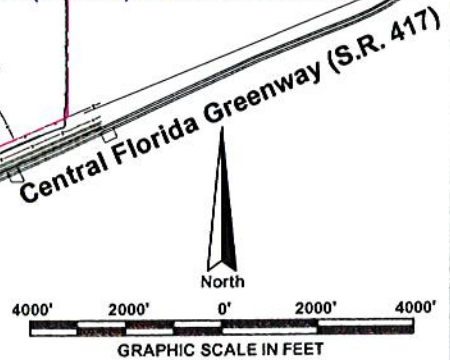


DEFICIENCIES:

- 1 SB Airport Blvd South of Ramp to Terminal A Entrance
(Table 5.2-11, Station 9B)
- 2 NB Airport Blvd South of Ramp from Terminal A Exit
(Table 5.2-11, Station 12B)
- 3 SB Airport Blvd. North to SB South Access Road
(Table 5.2-3, Station 31A)
- 4 NB South Access Rd. to NB Airport Blvd.
(Table 5.2-3, Station 32A)
- 5 South Access Rd. Between Heintzelman Blvd.
and Boggy Creek Rd.
(Table 5.2-12, Station 910)
- 6 NB Airport Blvd. Weave Between Cargo Road
and SR 528
(Table 5.2-13, Station 3)
- 7 NB Airport Blvd. Weave Between Terminal A/B
Merge and Cargo Road
(Table 5.2-13, Station 12)

ASSUMED IMPROVEMENTS:

- Tradeport Drive between Bear Road and Jetport Drive/
SR 528 (Station 39) - Widened to six lanes
- South Access Road between Airport Boulevard and
Heintzelman Boulevard - Widened to six lanes
- Southbound Airport Boulevard between SR 528
and Cargo Road (Station 4) - Widened to four lanes



2025 ROADWAY DEFICIENCIES

FIGURE:
7.19

TABLE 7-11 (continued)
YEAR 2025 AIRPORT ROADWAY OPERATIONS ANALYSIS

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
92	Terminal B Taxi-Hold Exit	1	2,700	243	830	A
100	Post Office Way E. of Tradeport Dr.	1	8,900	422	760	C
101	Post Office Way E. of Post Office	1	8,900	460	760	C
200	South Access Rd., S. of Terminals A & B	3	71,600	2,998	3,440	D
300	Jetport Dr. E. of Heintzelman Blvd.	1	7,000	339	760	C
900	Ramp from SB Airport Blvd. to Terminal B Entrance	2	14,300	1,145	1,580	C
953	Approach to Terminal A	3	20,600	1,469	2,490	B
954	Departing from Terminal A	4	21,900	1,561	3,130	B
955	Approach to Terminal B	4	25,900	1,847	43,320	B
956	SB Airport Blvd South of Return Ramp from Terminals	3	44,600	3,180	3,440	D
957	NB Airport Blvd South of Return Ramp to Terminals	3	43,200	3,080	3,440	D

Sources: HDR Engineering, Inc.; URS, 2003.

1 Assumed improvement by 2025 - widened to three lanes per direction.

**TABLE 7-12
YEAR 2025 OFF-SITE ROADWAY OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
1	WB State Road 528 Off-Ramp to SB Airport Blvd.	1	6,000	428	1,300	A
2	WB State Road 528 On-Ramp from NB Airport Blvd.	1	9,900	706	1,300	C
3A	NB Airport Blvd., N. of Off-Ramp to EB State Road 528	3	34,800	2,481	3,440	C
3B	NB Airport Blvd. Off-Ramp to EB State Road 528	1	11,600	827	1,360	C
3	Total Outbound from Airport North	4	46,400	3,308	4,590	C
4A	SB Airport Blvd., N. of Merge with Ramp from EB State Road 528	2	30,900	2,203	2,300	D
4B	SB Airport Blvd. On-Ramp from EB State Road 528	1	13,800	984	1,360	C
4	Total Inbound to Airport from North	4 ¹	44,700	3,187	4,590	C
60	State Road 417 EB On-Ramp from Boggy Creek Rd.	1	4,400	396	1,360	A
61	State Road 417 WB Off-Ramp to Boggy Creek Rd.	1	5,000	451	1,360	B
62	State Road 417 WB On-Ramp from Boggy Creek Rd.	1	11,400	1,027	1,360	C
63	State Road 417 EB Off-Ramp to Boggy Creek Rd.	1	10,500	946	1,360	C
70	Boggy Creek Rd. W. of South Access Rd.	2	11,300	639	1,850	B
71	Boggy Creek Rd. S. of State Road 417	2	33,900	1,806	1,850	D
500	WB State Road 528 Off-Ramp to NB State Road 436	1	16,600	1,496	1,520	D
600	SB State Road 436 Off-Ramp to WB State Road 528	2	16,300	1,469	2,890	B
700	EB State Road 528 Off-Ramp to NB State Road 436	2	9,700	874	2,890	A
800	State Road 436 Off-Ramp to EB State Road 528	1	7,700	701	1,450	B
902	Heintzelman Blvd. E. of South Access Rd.	2	21,100	1,194	2,300	B
904	Heintzelman Blvd. W. of South Access Rd.	2	21,200	1,199	2,300	B
910	South Access Rd. S. of Heintzelman Blvd. Interchange (NB & SB)	2	58,200	2,561	2,300	F
912	SB Boggy Creek Rd. (Slip Ramp) from SB South Access Rd.	1	16,200	1,397	1,600	D
914	NB Boggy Creek Rd. (Slip Ramp) to NB South Access Rd.	1	15,900	1,371	1,600	D
916	SB Boggy Creek Rd. N. of State Road 417	2	21,900	2,036	2,300	D
918	NB Boggy Creek Rd. N. of State Road 417	2	21,500	2,010	2,300	D
926	State Road 417 Connector from SB South Access Rd.	2	13,500	1,400	2,300	C
928	State Road 417 Connector to NB South Access Rd.	2	12,600	1,307	2,300	B
932	NB South Access Rd. Off-Ramp to EB Heintzelman Blvd.	1	5,900	473	830	B
934	NB South Access Rd. On-Ramp from WB Heintzelman Blvd.	1	9,400	753	830	D
936	SB South Access Rd. Off-Ramp to Heintzelman Blvd.	1	6,400	513	830	B
938	SB South Access Rd. On-Ramp from WB Heintzelman Blvd.	1	1,600	128	830	A
940	South Access Rd. N. of Heintzelman Blvd.	3	66,600	3,133	3,440	D

Sources: HDR Engineering, Inc.; URS, 2003.

1 Assumed improvement by 2025 - widened to four lanes.

**TABLE 7-13
YEAR 2025 WEAVING AREA OPERATION ANALYSIS**

Station No.	Location	Weave Type	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
3	NB Weave from Cargo Rd. to State Road 528	C	4	2,400	46,400	3,308	E
4	SB Weave from State Road 528 to Cargo Rd.	B	4	1,400	44,700	3,187	C
953	Approach Weave to Terminal A	A	3	950	20,600	1,469	B
9	SB Weave from Cargo Rd. Terminal A/B Split	C	4	2,100	50,400	3,594	D
954	Departing Weave from Terminal A	A	4	900	21,900	1,561	B
12	NB Weave from Terminal A/B Merge to Cargo Rd.	C	4	1,800	50,300	3,586	F
27	Departing Weave from Terminal B	B	3	600	25,800	2,067	C
955	Approach Weave to Terminal B	C	4	660	25,900	1,847	C

Sources: HDR Engineering, Inc.; URS, 2003.

Commercial Vehicle/Service Access Operations Analysis

Table 7-14 lists the results of the capacity analysis for the commercial vehicle/service access roadways for 2025. The table shows that all of the commercial vehicle/service access roadways are projected to operate at acceptable LOS through 2025. Therefore, no improvements are recommended for these roadways.

**TABLE 7-14
YEAR 2025 COMMERCIAL VEHICLE/SERVICE ACCESS OPERATIONS ANALYSIS**

Station No.	Location	No. of Lanes per Direction	Daily Volume	Peak Hour Volume	Max. Service Volume	Peak Hour LOS
11	Terminal Service Rd. S. of North Crossfield Taxiway	1	800	31	760	C
20	Terminal A Commercial Vehicles Exit	1	5,500	441	830	B
23	Terminal B Commercial Vehicles Exit	1	2,200	176	830	A
33	Terminal Service Rd. S. of Cargo Rd	1	2,400	155	760	C

Source: HDR Engineering, Inc., and URS, 2003.

7.2.5 SHORT-TERM FACILITY IMPROVEMENT CONCEPTS

Improvement concepts were developed to address both the existing and future deficiencies of the roadway network. These concepts have been identified as either interim or ultimate improvements. The interim improvements primarily consist of modifications to existing facilities and are typically designed to address near-term capacity deficiencies. These can be implemented at a lower cost as compared to the ultimate improvements. This section describes the short-term facility improvement concepts developed and/or evaluated during the MCO Master Plan Update.

7.2.5.1 Interim Widening of South Access Road

This project will widen the existing two-lane undivided roadway to a four-lane divided roadway from Heintzelman Boulevard to Airport Boulevard, a distance of approximately 1.8 miles. It includes widening the existing northbound and southbound ramps between Airport Boulevard and South Access Road. This will require an auxiliary lane along northbound Airport Boulevard between the northbound ramp from South Access Road (Ramp D) and the Intermodal Transportation Systems (ITS) overpass. A project description is documented in Appendix J. The concept for the interim widening of South Access Road is shown on Figure 7-20.

Analysis completed for the 2003 North Terminal Capacity Study, this MCO Master Plan Update, and year 2003 traffic counts indicate this roadway is beginning to experience unsatisfactory operating conditions during peak periods. These unsatisfactory conditions will continue to worsen as activity at the airport increases. This project will improve operating conditions during peak demand periods. The improved roadway is designed to support projected traffic volumes through a passenger demand level of 45 MAP at the North Terminal and support access to MCO from the south until the construction of the South Terminal loop roadway system.

The interim widening of South Access Road is recommended for implementation in the MCO Capital Improvement Plan (CIP). The estimated total project cost is approximately \$10 million.

7.2.5.2 Cargo Road

There are two optional alignments for this recommended improvement. Both options consist of extending Cargo Road from its current terminus west of Airport Boulevard to just east of the old terminal buildings at Bear Road. The options are dependent upon the ultimate configuration of the proposed Blue Lot expansion as well as the Bypass Canal which flows through the Cargo Road extension area. Construction will include a two-lane roadway with sufficient room to expand the road to a four-lane divided roadway as traffic demand warrants.

The demand for this project is driven by two issues: 1) the Northwest Terminal Support Area (NWTSA) is targeted for redevelopment and 2) the current configuration of Cargo Road will reach its operational capacity by 2015. The extension of Cargo Road will support future land use and development in the NWTSA. The extension can be expanded to four lanes to support access to MCO from the northwest.

The alignment for Option 1, shown on Figure 7-21, allows a proposed Blue Lot expansion of approximately 26.9 acres. The alignment for Option 2, shown on Figure 7-22, allows a proposed Blue Lot expansion of approximately 33.5 acres which permits the maximum development of the land between the existing Blue Lot and Airport Boulevard.

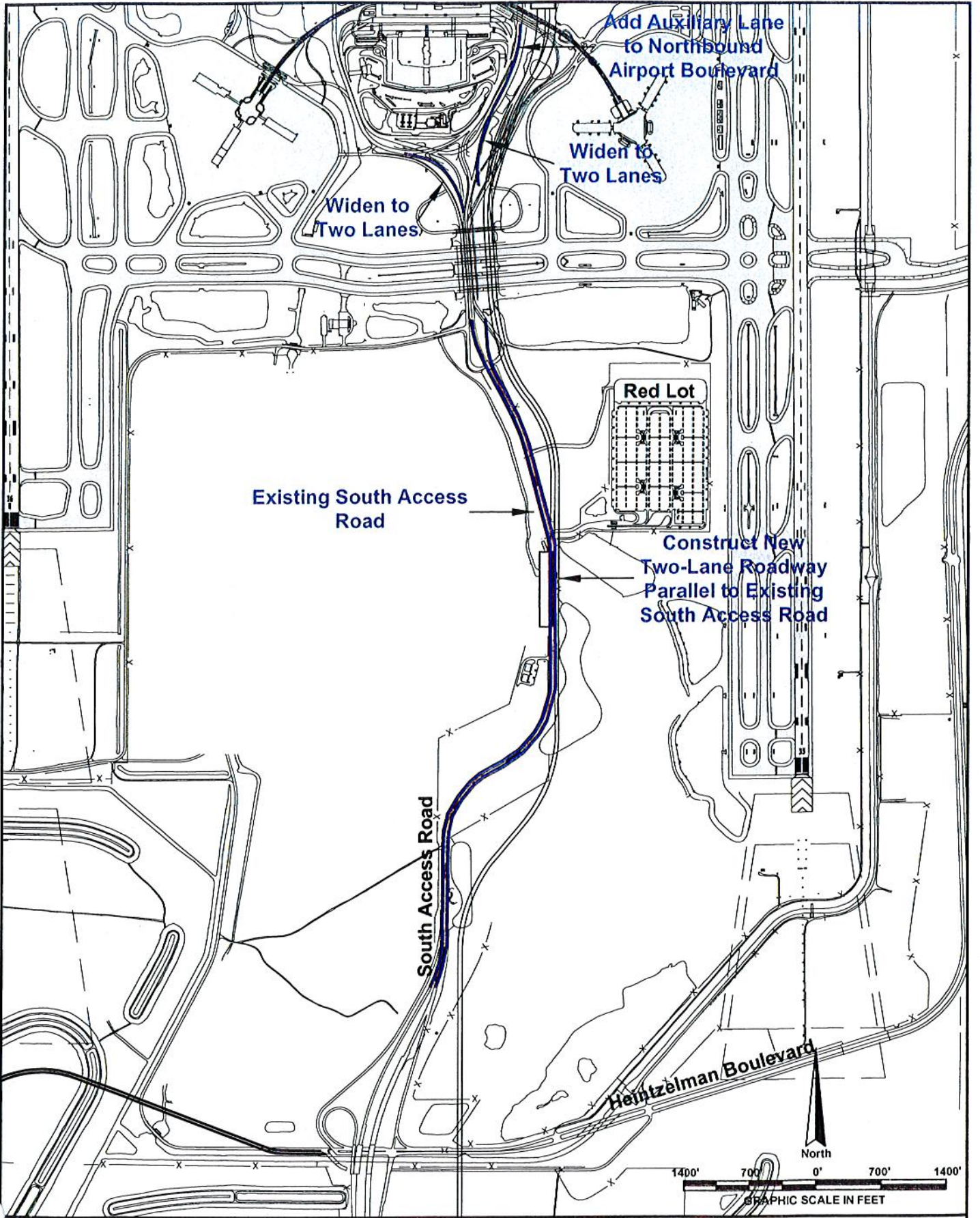
Option 2 is recommended for implementation in the MCO CIP. The estimated project cost is approximately \$6.6 million.

7.2.5.3 Widen North Exit Road (from Cargo Road to State Road 528)

This project will widen existing northbound Airport Boulevard from Cargo Road to State Road 528. Specifically, one lane will be added to the west side of the existing lanes from the on-ramp at Cargo Road north across State Road 528 to State Road 436, an estimated distance of 4,200 feet. Approximately 600 feet of this distance is located on airport property. The portion of the roadway project located off-airport property is owned and maintained by OOCEA and will require coordination with the maintaining agency. The project includes new overhead signing and widening of the existing bridge over the bypass canal, as well as modifications to the bridge over State Road 528. Specific attention must be given to the weave movement from Cargo Road to eastbound State Road 528. The concept for widening northbound Airport Boulevard is shown on Figure 7-23.

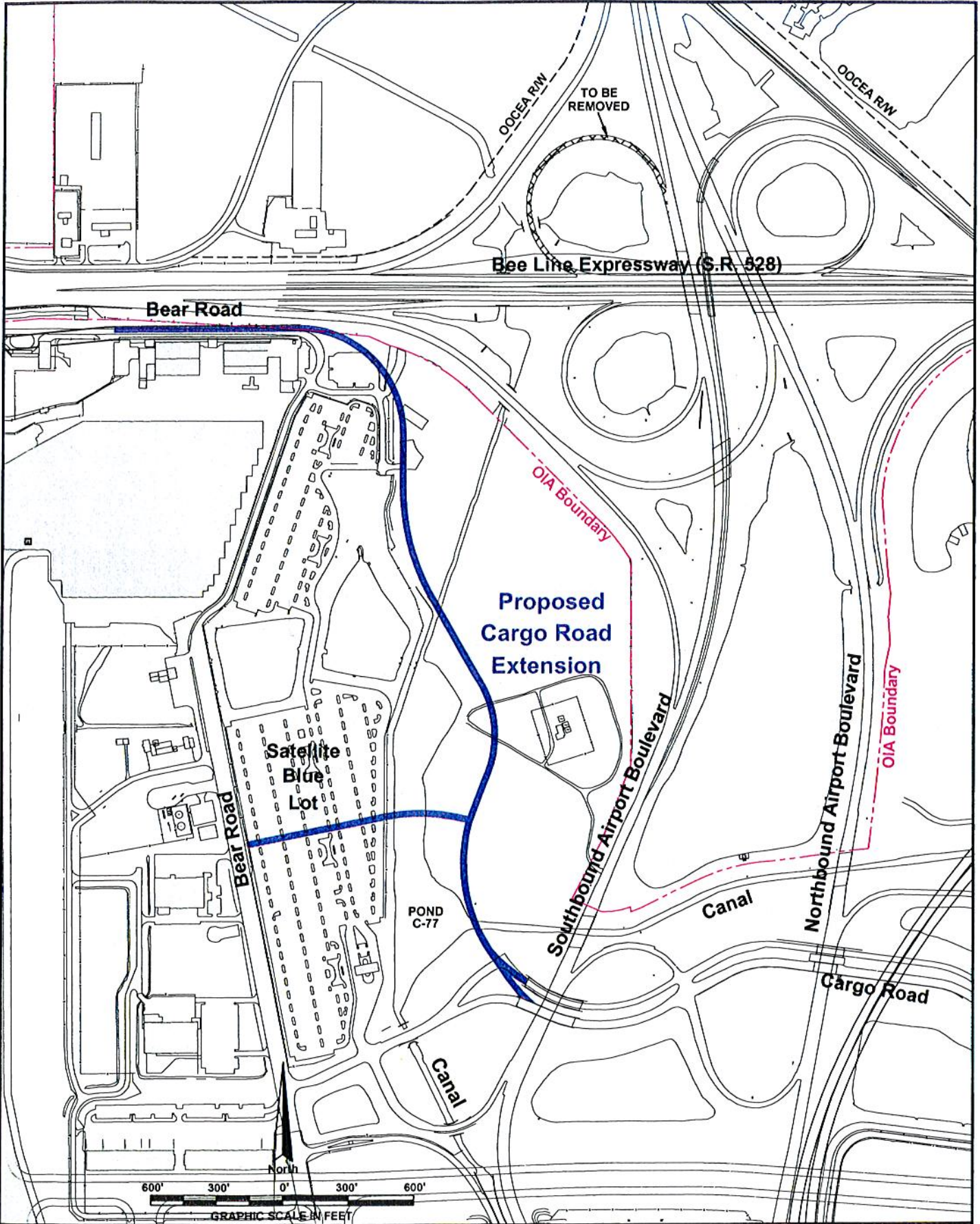
The existing roadway is projected to reach capacity by 2006 based on the analysis of weaving operations. This project will improve traffic operations during peak periods and support projected traffic volumes through 2020.

The widening of northbound Airport Boulevard between Cargo Road and State Road 528 is recommended for implementation in the CIP. The estimated project cost is approximately \$2.96 million.



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T:\PROJECTS\MASTER PLAN\EXHIBITS '04\FIGURE 7-21.DWG

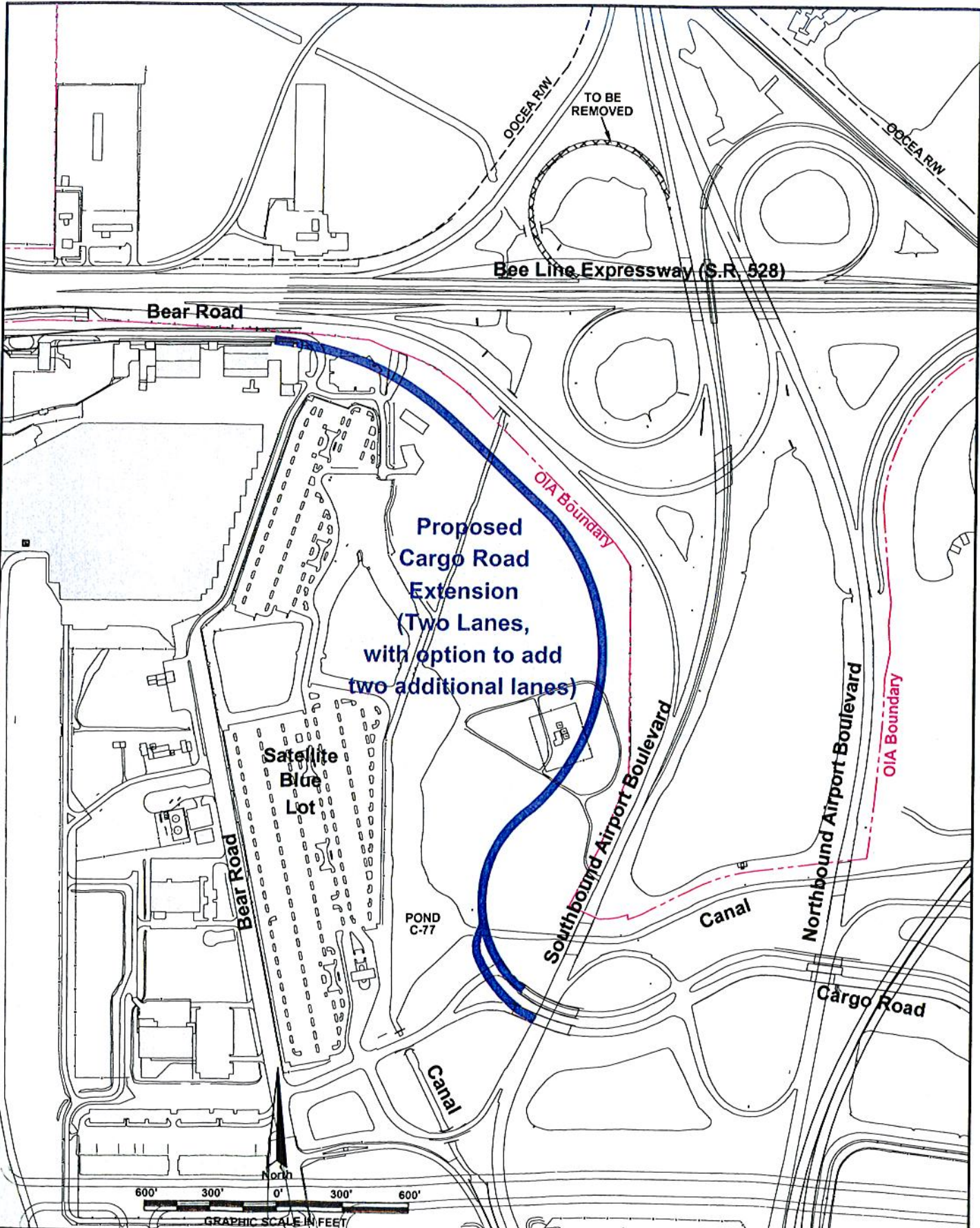


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**CARGO ROAD EXTENSION
 (OPTION 1)**

**FIGURE:
 7.21**

T:\PROJECTS\MASTER PLAN EXHIBITS '04\FIGURE 7-22.DWG 11/11/2004 10:59 AM



TIE INTO SEMORAN BOULEVARD
(S.R. 436) IMPROVEMENTS

PHASE 3

TO BE
REMOVED

Bee Line Expressway (S.R. 528)

Employee
Parking Lot

PHASE 2

PHASE 1

O/A Boundary

Blue Lot

Southbound Airport Boulevard

Northbound Airport Boulevard

Light Rail

High-Speed Rail

Canal

Cargo Road

North



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T:\PROJECTS\MASTER PLAN\FINAL EXHIBITS '04\FIGURE 7-23.DWG



**GREATER ORLANDO
AVIATION AUTHORITY**
Orlando International Airport
Master Plan Update

**SR 528/SR 436
INTERCHANGE IMPROVEMENTS**

**FIGURE:
7.23**

7.2.5.4 Widen North Entrance Road (from Cargo Road to State Road 528)

This project will widen existing southbound Airport Boulevard from State Road 528 to Cargo Road. Specifically, one lane will be added to the right side of the existing lanes from north of the on-ramp from eastbound State Road 528 to the off-ramp to Cargo Road, an estimated distance of 3,200 feet. Approximately 600 feet of this distance is located on airport property. The portion of the roadway project located off-airport property is owned and maintained by OOCEA and will require coordination with the maintaining agency. The project includes new overhead signing, widening of the existing bridge over the Bypass Canal, and reconstruction of approximately 2,100 feet of the existing on-ramp from eastbound State Road 528. The concept for widening southbound Airport Boulevard is shown on Figure 7-23.

The existing roadway is projected to reach capacity by 2014 based on the analysis of weaving operations. This project will improve traffic operations during peak periods and support projected traffic volumes through 2025.

7.2.5.5 Terminal A Exit Weave

This improvement will provide an additional lane for traffic exiting the Terminal A-side parking garage and modify the exit weave to create a more balanced operation. Operational deficiencies have been observed during peak arrival periods following flight delays caused by inclement weather. These deficiencies result in significant queues at the parking plaza that extend back into the garage. The resulting increase in exiting capacity for the garage will reduce the delays for vehicles exiting the parking garage during these peak periods.

Currently, one lane each from the departures exit, the arrivals exit, the rental car exit, and the Terminal A-side parking garage exit all merge to form a four-lane weaving section between the terminal exit and the return ramp to Terminal A and southbound Airport Boulevard. The left-hand lane which originates at the parking garage entrance, ends at the return ramp and three lanes continue north to Airport Boulevard.

This project will modify the rental car exit to connect with the merge area downstream of the parking exit plaza and provide two lanes for the parking garage exit downstream of the exit plaza. The existing return ramp at the north end of the weaving section will be widened to two lanes from the exit gore to the ramp split to Terminal A and southbound Airport Boulevard. The project includes new overhead signing along the Terminal A exit weave. The recommended improvement concept for the Terminal A exit weave is shown on Figure 7-24.

This improvement for the Terminal A exit weave is recommended for implementation in the CIP. The estimated project cost is approximately \$2.3 million.

7.2.5.6 Near-Term Cut-Through Traffic Solutions

Cut-through traffic refers to local traffic using airport roadways for the purpose of accessing off-site roadways. This cut-through traffic substantially increases the traffic volumes on airport roadways including South Access Road and Airport Boulevard. Ultimately, the increase in volumes is projected to impact traffic operations as noted in Section 7.2.4. Several improvement concepts have been developed to address these impacts and significantly reduce the volume of cut-through traffic. These concepts, presented in Section 7.2.6, are considered ultimate improvements and require substantial investments in new facilities. In order to address cut-through traffic in the near-term, some lower cost solutions were considered.

Three near-term options were developed to discourage cut-through traffic. These options include constructing a toll plaza on South Access Road south of Heintzelman Boulevard, constructing toll plazas on the existing slip ramps from Boggy Creek Road to South Access Road, and closing the slip

ramps from Boggy Creek Road to South Access Road. Figures 7-25 through 7-27 illustrate these concepts, respectively. All of these concepts assume that the planned modifications to the State Road 417/Boggy Creek Road interchange discussed in Section 7.2.7.3 are in place.

It is recommended that the Authority pursue the further development of these options should the need to address cut-through traffic in the near-term become apparent. A working paper has been developed that addresses cut-through traffic and provides additional details and an evaluation of these options (Appendix K).

The widening of southbound Airport Boulevard between Cargo Road and State Road 528 is recommended for implementation in the CIP. The estimated project cost is approximately \$4.92 million.

7.2.5.7 Widen and Realign Tradeport Drive

Tradeport Drive serves as a primary access road for cargo and other aviation support functions on the west side of the airport. It has been designated as a Strategic Intermodal System Connector by the State of Florida. The projects listed below meet the criteria set forth in the MCO Amended and Restated Development Order.

a) Widen to Six Lanes from Bear Road to State Road 528

This project will widen the existing four-lane divided roadway to six lanes, three lanes per direction, from Bear Road to State Road 528. Construction will include intersection and signalization improvements at Jetport Drive/eastbound State Road 528 on-ramp and at Bear Road. This improvement is necessary to meet the projected traffic demand in 2012 and will support projected traffic demand through 2025. The concept for widening Tradeport Drive from State Road 528 to Bear Road is shown on Figure 7-28.

The widening of Tradeport Drive from Bear Road to State Road 528 is recommended for implementation in the MCO CIP. The estimated total project cost is approximately \$2 million.

b) Widen Tradeport Drive to Six Lanes from Bear Road to Binnacle Way

In conjunction with the Bee Line Expressway to Bear Road widening project, Tradeport Drive will be widened to six lanes between Bear Road and Binnacle Way. This project will support projected traffic demand through 2025 while also accommodating the movement of cargo and other aviation support functions. The concept for widening Tradeport Drive from Bear Road to Binnacle Way is shown on Figure 7-28.

The widening of Tradeport Drive from Bear Road to Binnacle Way is recommended for implementation in the MCO CIP. The estimated project cost is approximately \$9.18 million.

c) Realign and Widen Tradeport Drive to Six Lanes from Binnacle Way to Boggy Creek Road

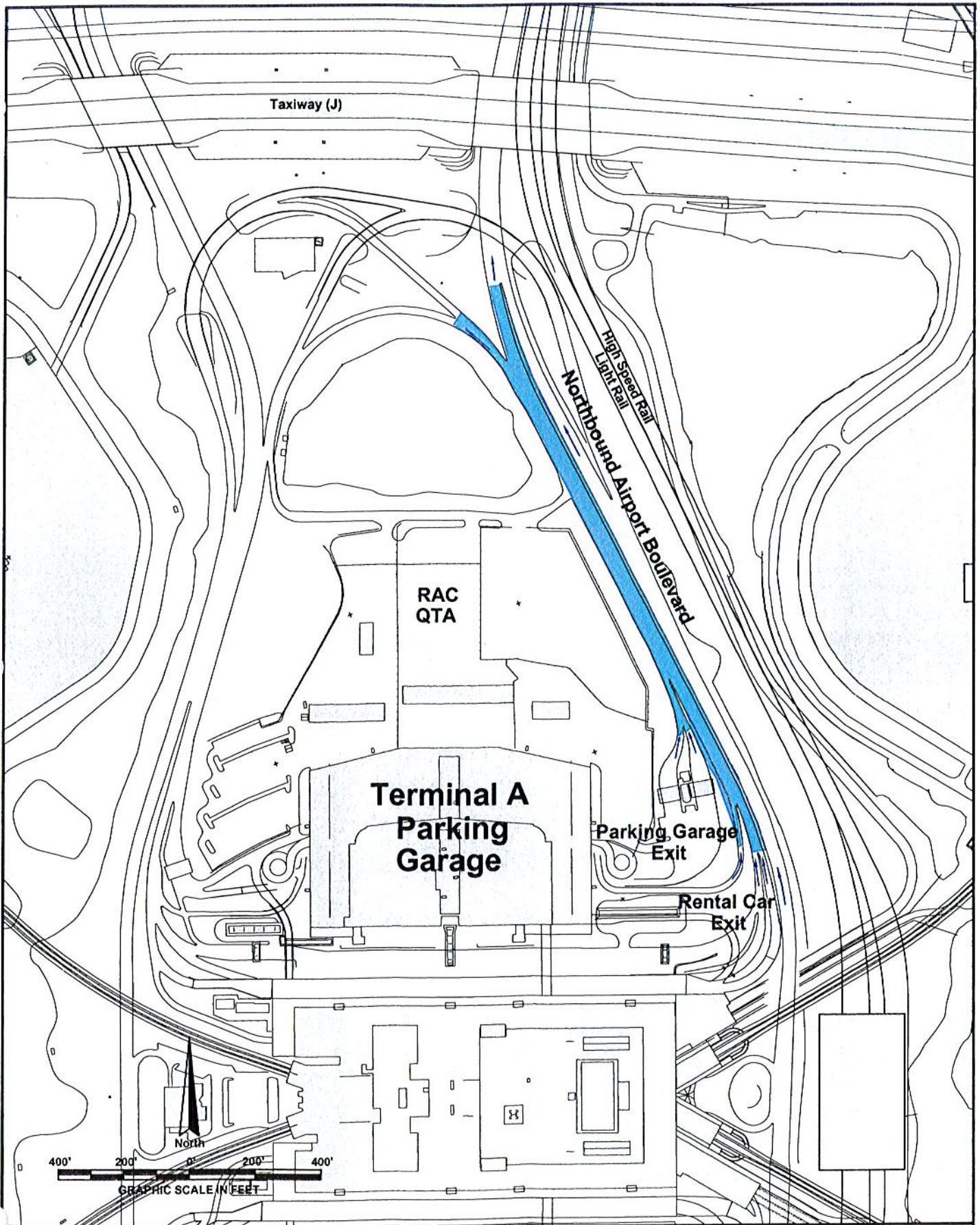
In conjunction with the widening from State Road 528 to Binnacle Way, Tradeport Drive will be widened and realigned from Binnacle Way to Boggy Creek Road. The realignment will shift the existing road to the west to allow for the aviation-related property located along the west ramp to be better utilized, through redevelopment, by creating deeper parcels. The concept for widening and realigning Tradeport Drive from Binnacle Way to Boggy Creek Road is shown on Figure 7-28.

It is envisioned that future development in the Tradeport Drive area will be similar to the recently completed FedEx facility. This project will support projected traffic demand through 2025 while also accommodating the movement of cargo and other aviation support functions. This project is recommended for implementation in the CIP. The estimated project cost is approximately \$52 million.

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T:\PROJECTS\MASTER PLAN EXHIBITS '04\FIGURE 7-24.DWG

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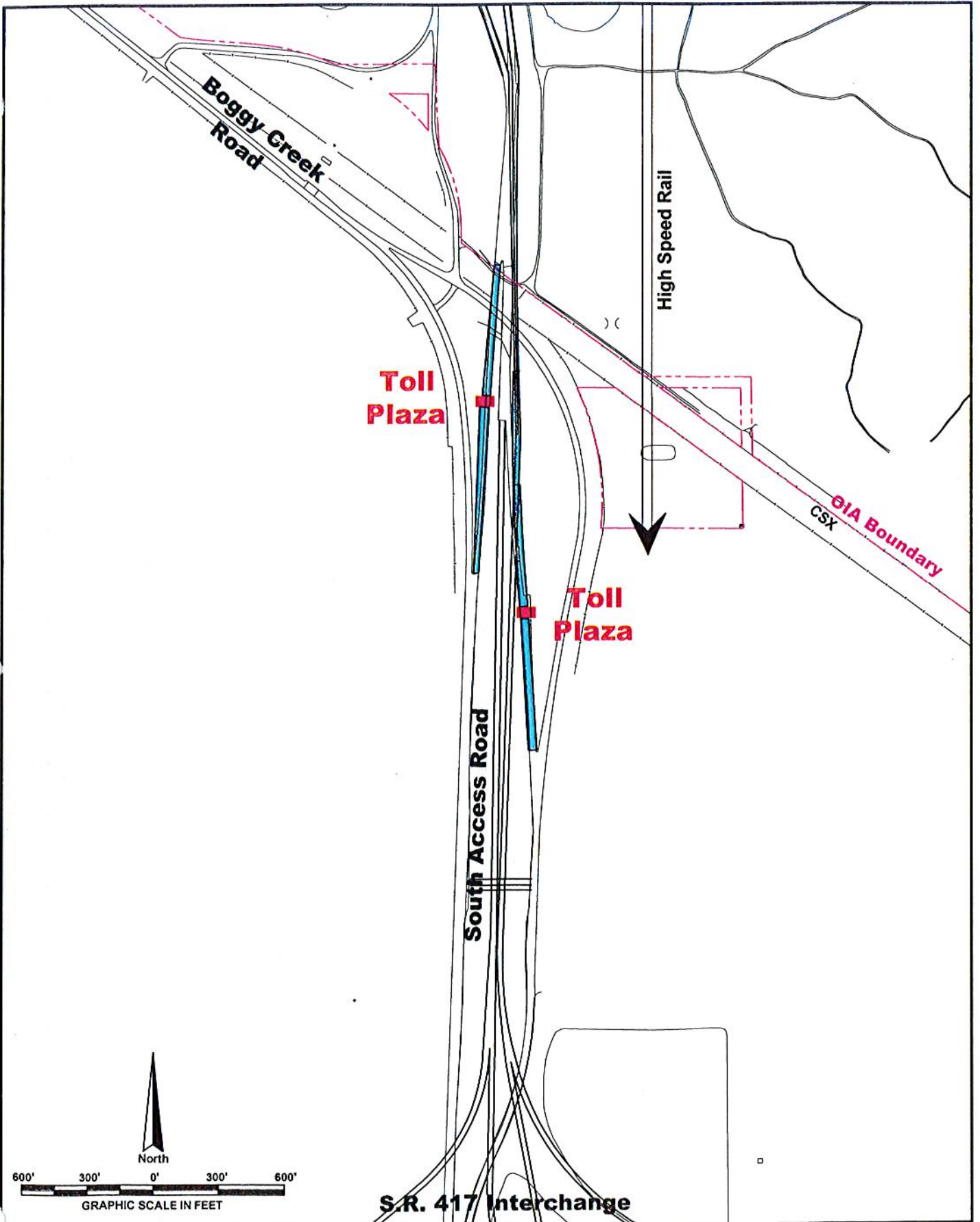


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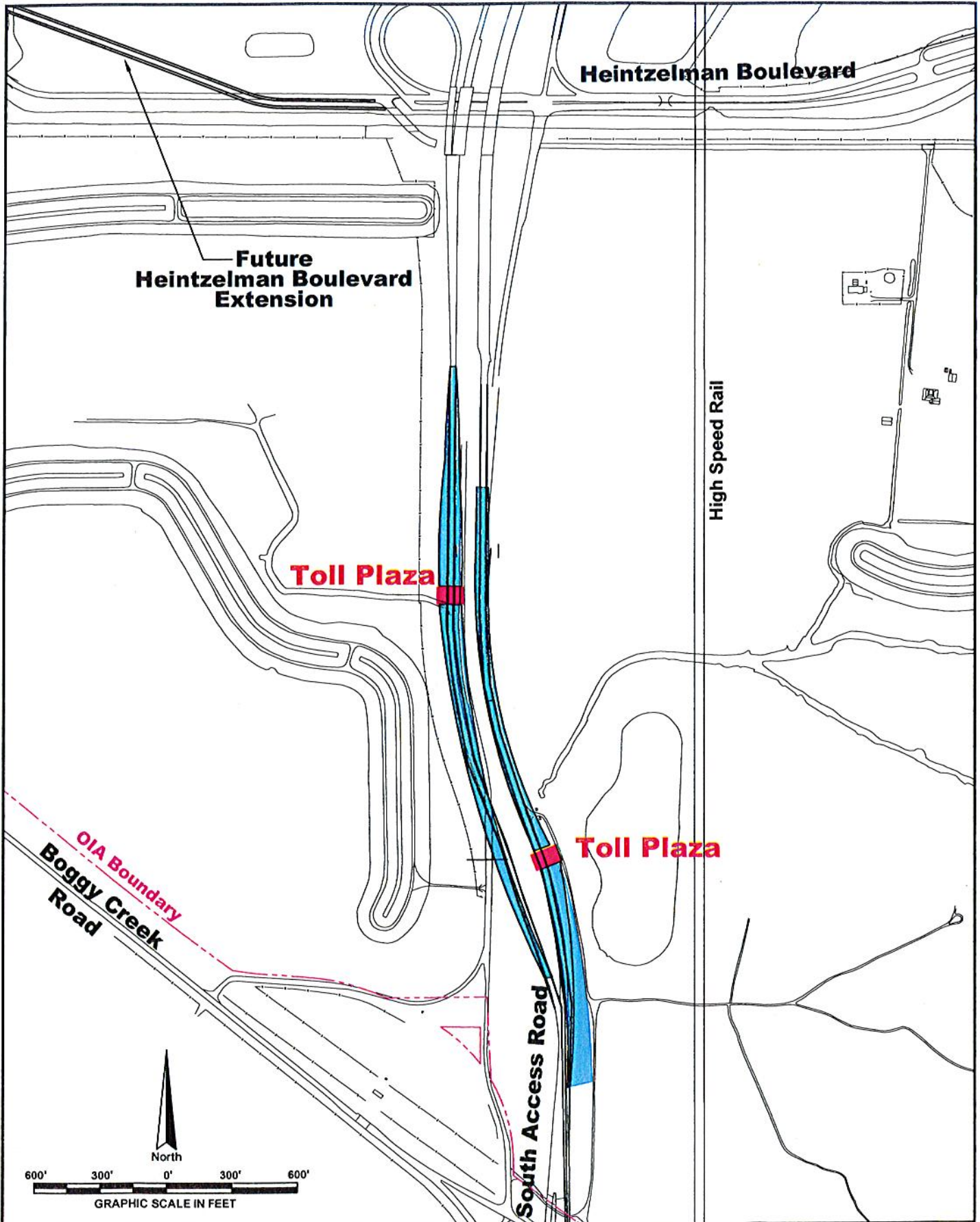


TERMINAL A EXIT WEAVE

FIGURE:
7.24

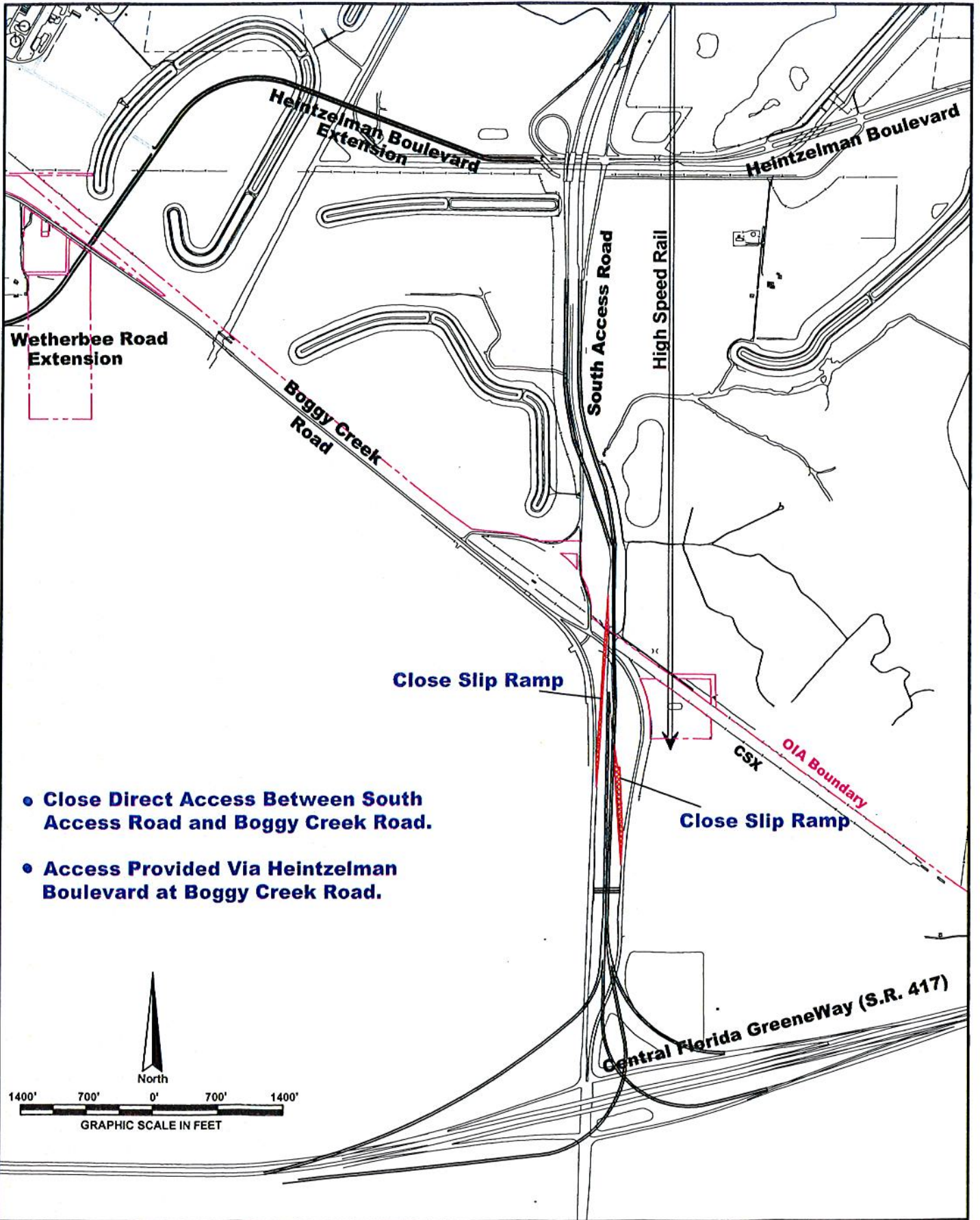


T:\PROJECTS\MASTER PLAN\FINAL EXHIBITS '04\FIGURE 7-26.DWG 11/11/2004 10:59 AM

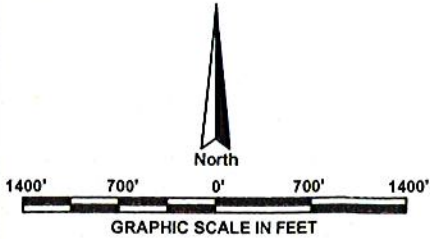


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T:\PROJECTS\MASTER PLAN\FINAL EXHIBITS '04\FIGURE 7-27.DWG



- **Close Direct Access Between South Access Road and Boggy Creek Road.**
- **Access Provided Via Heintzelman Boulevard at Boggy Creek Road.**



Orlando International Airport
Master Plan Update

NEAR-TERM CUT-THROUGH TRAFFIC SOLUTION OPTION 3

FIGURE: 7.27

7.2.5.8 Bear Road

This project will widen Bear Road between Tradeport Drive and the old terminal buildings, including a realignment of Bear Road near the existing flight safety facility. This improvement is necessary to facilitate a better flow of traffic along the northern perimeter of the airport to support aviation-related development. Specific attention should be given to the planned improvements to Runway 18/36 as well as the future widening of the Bee Line Expressway (State Road 528).

The concept for widening Bear Road is shown on Figure 7-29 and is recommended for implementation in the MCO CIP. The estimated total project cost is approximately \$8.1 million.

7.2.6 ULTIMATE FACILITY IMPROVEMENT CONCEPTS

The ultimate (year 2025) roadway operations analysis identified several locations with projected deficiencies. These locations include:

- Southbound Airport Boulevard from the Terminal A/B split to the on-ramp from the north return loop
- Northbound Airport Boulevard from the off-ramp to the north return loop to the Terminal A/B merge
- Northbound Airport Boulevard from the off-ramp to Terminal B to the on-ramp from Terminal B
- Southbound Airport Boulevard from the off-ramp to Terminal B to the on-ramp from Terminal B
- Northbound Airport Boulevard from Cargo Road to State Road 528 (weaving section)
- Northbound Airport Boulevard from the Terminal A/B merge to Cargo Road (weaving section)
- South Access Road from Boggy Creek Road to Heintzelman Boulevard including the slip ramps between South Access Road and Boggy Creek Road

All of these locations, with the exception of South Access Road, are part of the Airport Boulevard circulation system. Cut-through traffic is projected to comprise 34,000 daily trips on airport roadways by 2025 and contributes significantly to the total traffic volume on Airport Boulevard. A reduction in the cut-through traffic on airport roadways will help alleviate congested locations and improve future operating conditions on northbound and southbound Airport Boulevard.

Several concepts have been developed to address the deficiencies identified along Airport Boulevard. Three of these concepts were developed to accommodate the cut-through traffic by providing sufficient capacity to meet the total demand. These concepts include widening Airport Boulevard, providing a bypass roadway, and modifying the north Airport Boulevard exit road. The modification of the north Airport Boulevard exit road is needed with either the option to widen Airport Boulevard or the bypass roadway option and includes modifications to the State Road 528/Airport Boulevard interchange.

Two of these concepts were developed to reduce or eliminate cut-through traffic. These concepts include a braided roadway system and a toll system. The braided roadway provides a physical restriction to cut-through traffic while the toll system relies on the disincentive for cut-through traffic to pay an additional toll to pass through MCO.

7.2.6.1 Widen Airport Boulevard

This concept involves widening Airport Boulevard to support the projected traffic demand through 2025. Segments with projected operating deficiencies would be expanded to support the forecast demand. Auxiliary lanes would be added to adjacent segments to provide lane balance for smoother merging and diverging operations. The concept for this improvement is illustrated on Figure 7-30.

This improvement concept will satisfy the basic capacity needs to meet projected traffic demand through 60 MAP along Airport Boulevard. However, construction of this improvement concept is limited by existing infrastructure and may not be feasible due to conflicts with the location of existing Automated Guideway Transit (AGT) columns. Also, this improvement concept will not address the deficient weaving operations projected for the northbound Airport Boulevard segments between the Terminal A/B split and Cargo Road and between Cargo Road and State Road 528. These weaving segments will require interchange ramp modifications at Cargo Road and at State Road 528 to address the projected deficiencies.

7.2.6.2 Bypass Roadway

This concept separates cut-through traffic (traffic not accessing Terminals A or B or the hotel) from Airport Boulevard by providing a bypass roadway system. The bypass roadway concept includes the construction of new roadways parallel to northbound and southbound Airport Boulevard. The southbound bypass road begins (diverging from southbound Airport Boulevard just north of the Terminals A/B split) just south of the north crossfield taxiway and terminates just north of the mid-crossfield Taxiways E and F (at the on-ramp from Terminal B to South Access Road). The northbound bypass road begins just north of the mid-crossfield taxiway (at the off-ramp from South Access Road to Terminal B) and continues to just south of the north crossfield taxiway where it merges with northbound Airport Boulevard (north of the Terminal A/B merge). The bypass roadway concept is illustrated on Figure 7-31.

The existing on-ramp to southbound Airport Boulevard (from the north return loop) is replaced with a ramp that connects to southbound Airport Boulevard and the new southbound bypass roadway. The existing connection from southbound Airport Boulevard to South Access Road is closed. Southbound traffic heading to South Access Road and the South Terminal is signed to the bypass roadway. Northbound South Access Road terminates at the split between the ramp to Terminal B and the northbound bypass road. Traffic heading north is signed to the bypass road. A slip ramp from the northbound bypass road to northbound Airport Boulevard is provided for access to the hotel and Terminal A.

The bypass roadway crosses under the AGTs through the opening between the support columns adjacent to Airport Boulevard and avoids conflicts with these columns. However, the northbound bypass road impacts the proposed light rail corridor just south of the north crossfield Taxiway J. This concept also impacts the existing piers of the north crossfield taxiway and will require reconstruction and expansion of the existing taxiway bridge.

7.2.6.3 North Airport Boulevard Exit Road/State Road 528 Interchange Modification

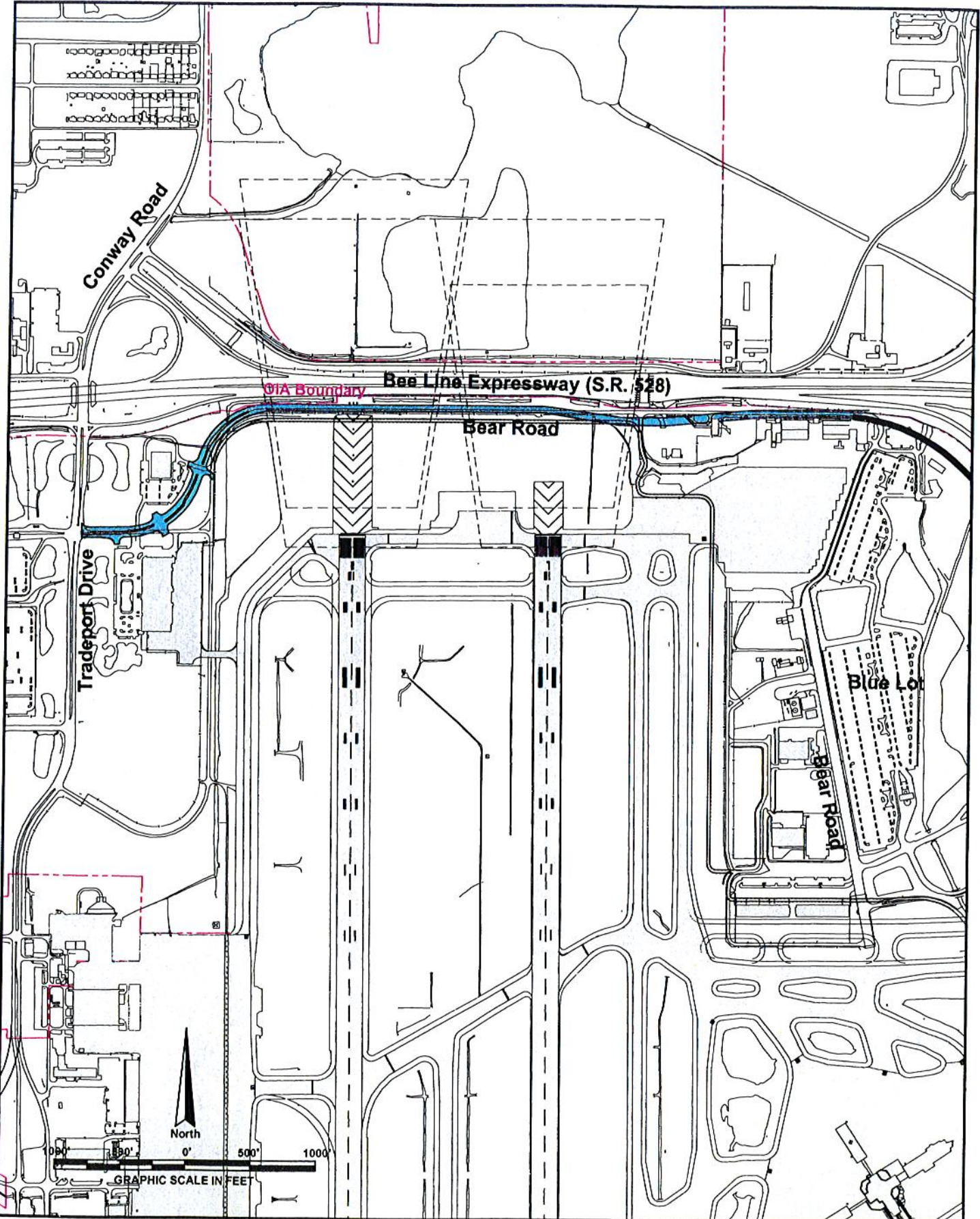
This concept was developed to address the projected deficiencies in the weaving segment of northbound Airport Boulevard between Cargo Road and State Road 528. It provides a single exit for State Road 528 from Airport Boulevard and provides a separate exit from Cargo Road to State Road 528. This concept eliminates the weave on Airport Boulevard north of Cargo Road and is projected to significantly improve operations along this segment.

Specifically, a collector-distributor (CD) road is constructed parallel to and east of Airport Boulevard beginning just north of Cargo Road. A separate ramp is constructed between Cargo Road, east of Airport Boulevard, and the CD road. The existing interchange ramps in the northeast and southeast quadrants are reconstructed to connect to the CD road. All traffic exiting Airport Boulevard to State Road 528 is directed to the CD road. Traffic exiting Cargo Road that is bound for State Road 528 is directed to the CD road directly from Cargo Road. This improvement concept is illustrated on Figure 7-32.

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FINAL EXHIBITS '04\FIGURE 7-23.DWG

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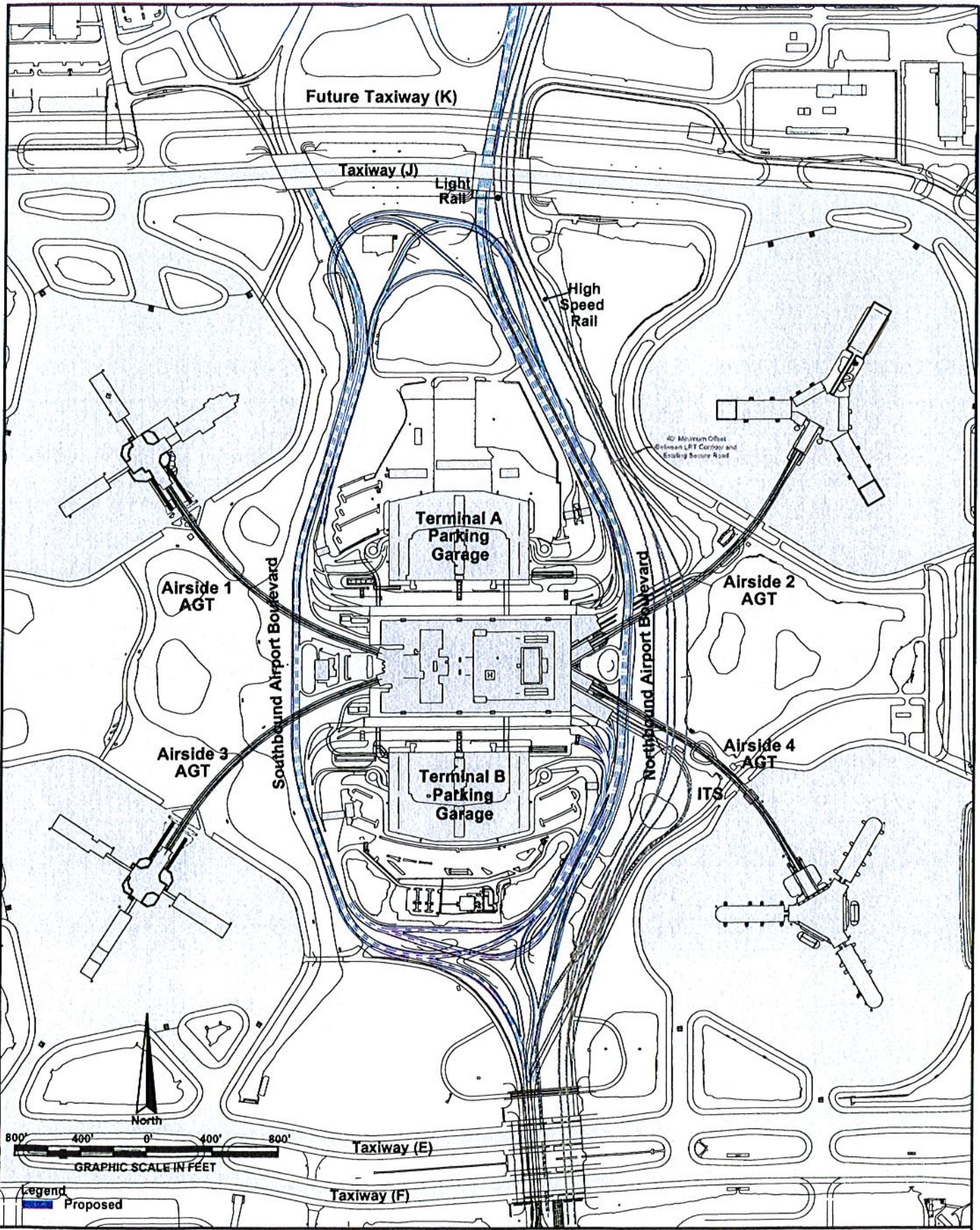
BEAR ROAD WIDENING

FIGURE:
7.29

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FINAL EXHIBITS '04 FIGURE 7-30.DWG

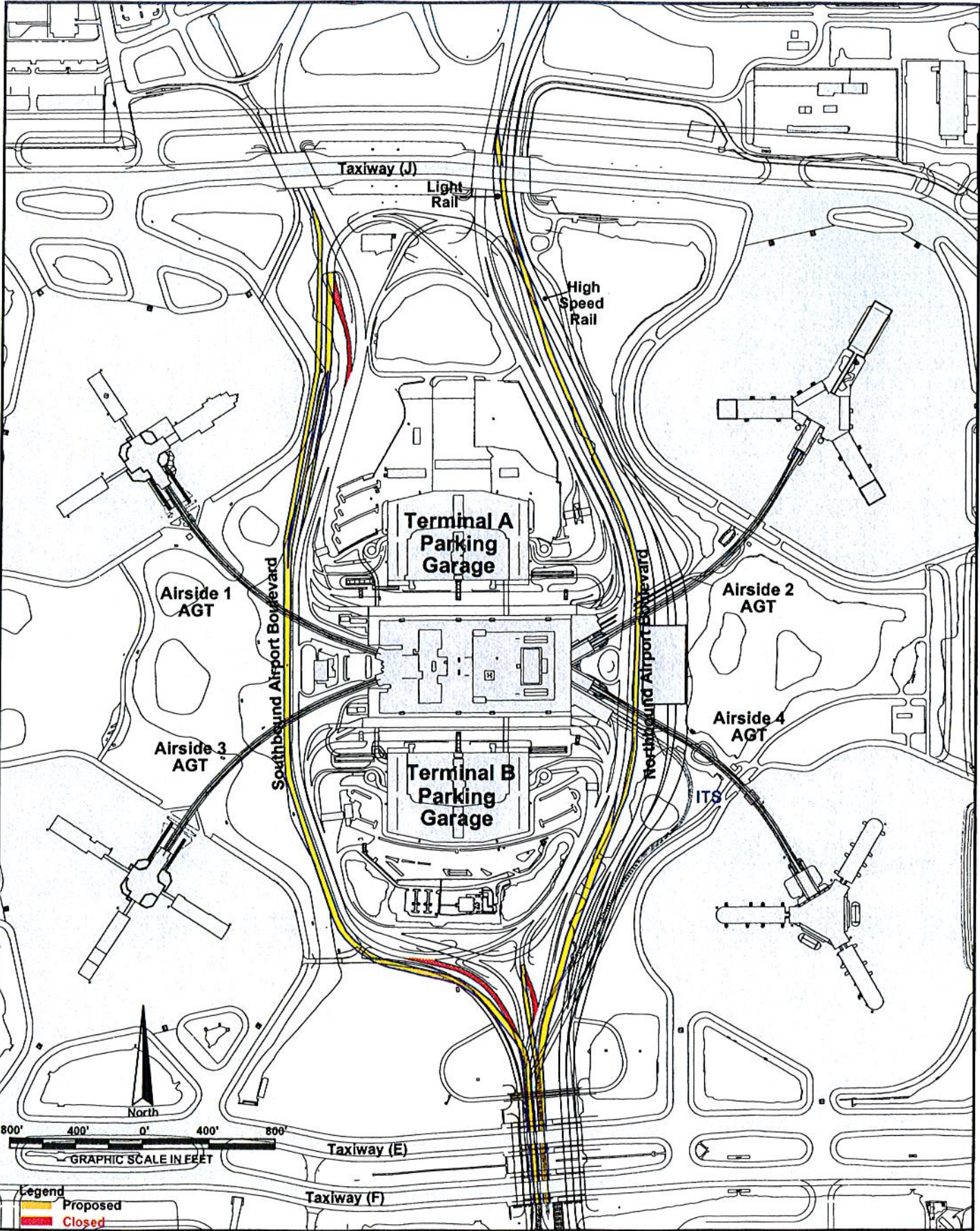
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FINAL EXHIBITS 04 FIGURE 7-31.DWG

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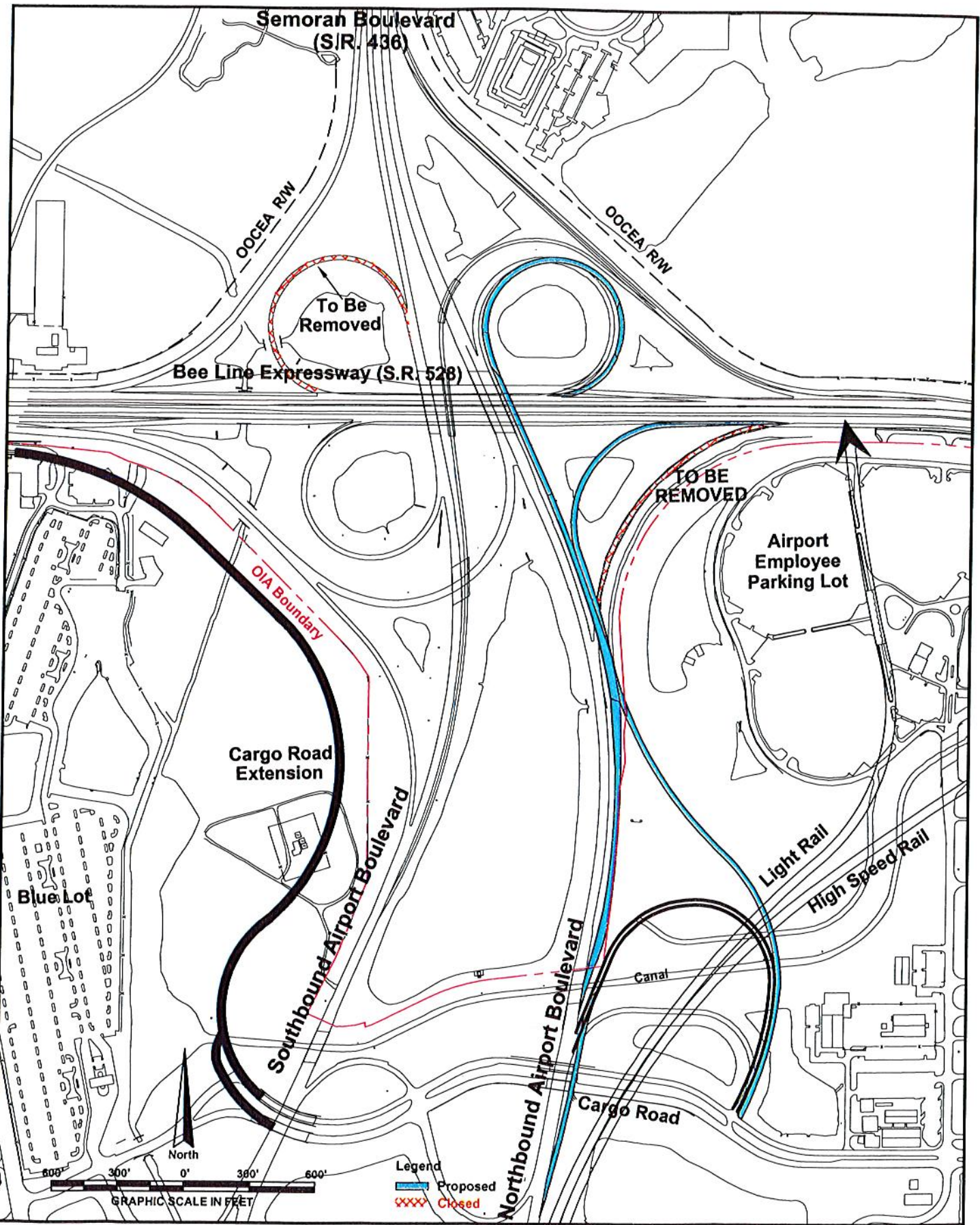


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BYPASS ROADWAY CONCEPT

FIGURE:
7.31

T:\PROJECTS\MAS -\FINAL EXHIBITS '04\FIGURE 7-32.DWG 11/11/2004 10:59 AM



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NORTH EXIT RD/ SR 528 INTERCHANGE MODIFICATIONS

FIGURE: 7.32

7.2.6.4 Braided Roadway

The braided roadway concept consists of a dual roadway system around the North and South Terminals that physically separates inbound and outbound traffic. This concept prevents cut-through traffic from using the loop roads around the terminals without passing through the curbsides. It includes the construction of three new roadways: one southbound and two northbound all parallel to existing Airport Boulevard around the North Terminal. The proposed loop road system around the South Terminal is modified to include an outer loop road. The braided roadway concept for the North Terminal and the South Terminal is illustrated on Figures 7-33 and 7-34, respectively.

The new southbound roadway at the North Terminal begins at the existing north return ramp to Terminal B and continues south of the mid-crossfield taxiway to the outer loop road for the South Terminal. This roadway supports all traffic leaving the North Terminal including Terminal A, Terminal B, and the Hyatt Hotel and exiting to the south.

One of the new northbound roadways begins south of the mid-crossfield taxiway at the inner loop road for the South Terminal and extends to the existing return ramp to Terminal A/B. This roadway provides access to the North Terminal, including the Hyatt Hotel, from the south entrance. Terminal B traffic uses the existing direct ramp on the north side of the mid-crossfield taxiway. Terminal A traffic follows the same path as today with the exception that it uses the new roadway. Hyatt Hotel traffic must make a complete loop around the North Terminal.

The other new northbound roadway begins south of the mid-crossfield taxiways at the South Terminal outer loop road. It continues north, parallel to Airport Boulevard, and terminates at Airport Boulevard north of the north return ramp to Terminal B. This new roadway supports traffic leaving the South Terminal and exiting to the north.

The existing ramps from northbound South Access Road to northbound Airport Boulevard and southbound Airport Boulevard to South Access Road are removed. The existing slip ramp from Terminal B to northbound Airport Boulevard and the existing direct ramp from Terminal B to South Access Road are closed. A new flyover ramp from southbound Airport Boulevard to northbound Airport Boulevard is provided to maintain access from north of MCO to the Hyatt Hotel. Traffic leaving Terminal B to the south exit must make a complete loop around the North Terminal.

7.2.6.5 Toll System

The toll system concept utilizes tolls to discourage cut-through traffic. Two options (Option 1 and Option 2) were developed for this concept, as discussed below. Both options utilize the same tolling locations, as illustrated on Figures 7-35 and 7-36, respectively.

Option 1 - Maintain Revenue Collection at the Parking Exits (Figure 7-35)

Under this option, the revenue collection for the parking operations is maintained at the individual parking areas. To accommodate the tolling of the through movements on Airport Boulevard, toll plazas are required at the following locations:

- Southbound Airport Boulevard between State Road 528 and Cargo Road,
- Northbound Airport Boulevard between Cargo Road and State Road 528,
- On-Ramp from Cargo Road to southbound Airport Boulevard,
- Off-Ramp from northbound Airport Boulevard to Cargo Road,
- Southbound Airport Boulevard north of Heintzelman Boulevard, and
- Northbound Airport Boulevard north of Heintzelman Boulevard.

Under this scenario, the payment for parking occurs at the existing exits. The new toll plazas would be used to collect tolls only from vehicles traversing the airport property. The toll plazas are required on the Cargo Road ramps to capture vehicles entering the airport property via Cargo Road and exiting to the south and entering the airport from the south and exiting on Cargo Road. Vehicles making movements to/from the airport property would be able to pass through the toll plazas at no charge. Therefore, the tolling system would need to accommodate the following movements at no charge to the user:

- Entering the airport from the north or south, dropping passengers at the curbside, and moving into either the Red or Blue Lot
- Leaving the Red or Blue Lots, picking up passengers at the North or South Terminal, and exiting the airport property
- Exiting the parking garages after payment and exiting the airport
- Exiting the rental car area after pick-up and exiting the airport

Each of these movements can be accommodated by providing the driver with a ticket when exiting the parking area/rental car pick-up area. That ticket is then used to provide free passage through the toll plaza when exiting from the airport property. In addition, the entrances to the parking areas could accept the ticket the drivers obtained upon entering the airport property. The only exception to this is for drivers that would enter the airport, drop passengers at the departure curb, and then proceed to the Blue Lot. These drivers would be required to traverse the northbound off-ramp to Cargo Road and would use their entering ticket. Therefore, they would need to be allowed entry into the Blue Lot without a ticket.

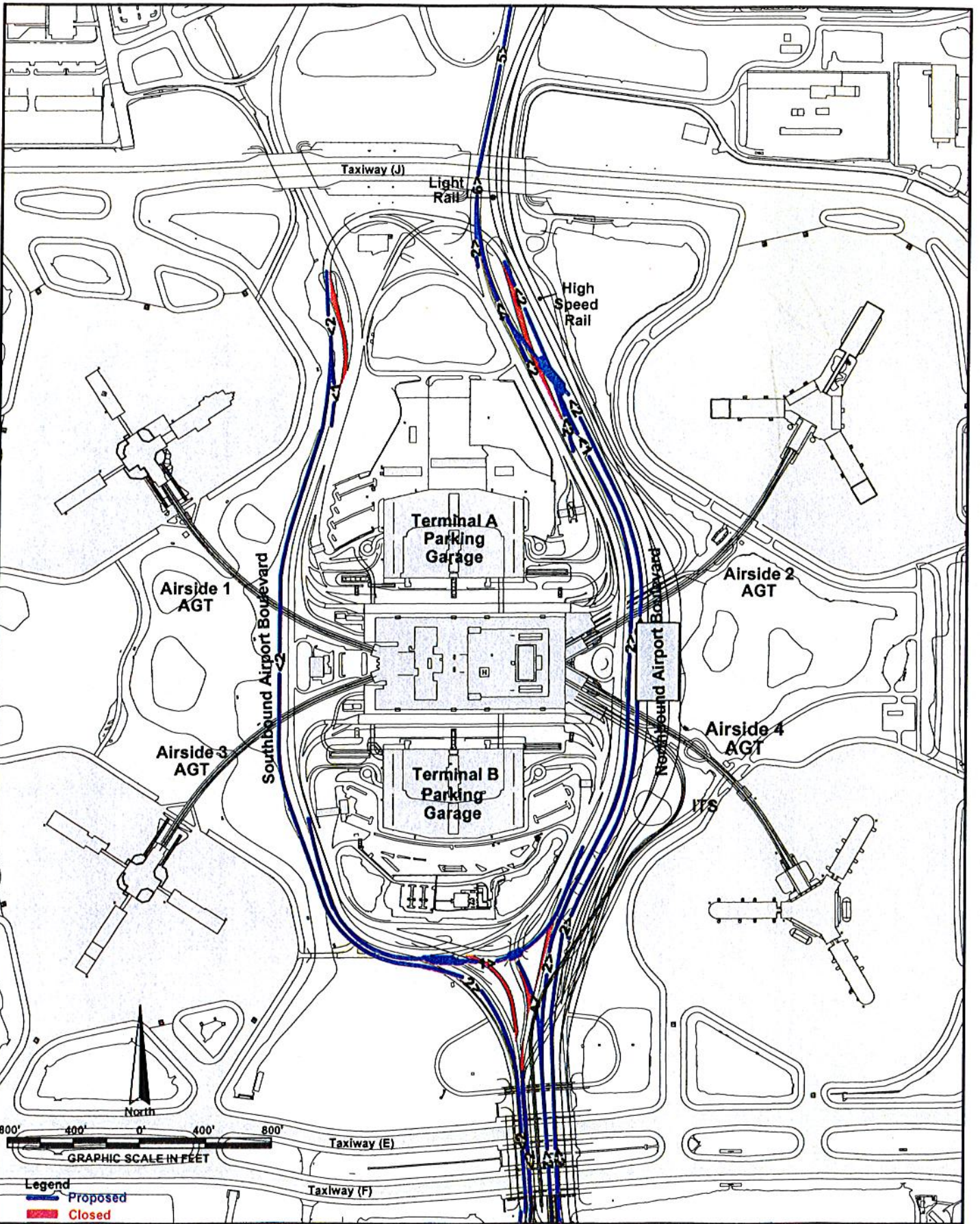
The disadvantage of this option is that two revenue systems are required: one for parking and one for the roadway system. The advantage of this option is that the roadway toll plazas will be relatively free-flow for those patrons entering/exiting the airport property.

Option 2 - Collecting All Revenue at the Main Toll Plazas (Figure 7-36)

Under this option, the revenue collection for the parking operations is accommodated at the toll plazas. To accommodate the tolling of the through movements on Airport Boulevard as well as the collection of parking fees, toll plazas are required at the following locations:

- Southbound Airport Boulevard between State Road 528 and Cargo Road
- Northbound Airport Boulevard between Cargo Road and State Road 528
- On-Ramp from Cargo Road to southbound Airport Boulevard
- Off-Ramp from northbound Airport Boulevard to Cargo Road
- Southbound Airport Boulevard north of Heintzelman Boulevard
- Northbound Airport Boulevard north of Heintzelman Boulevard

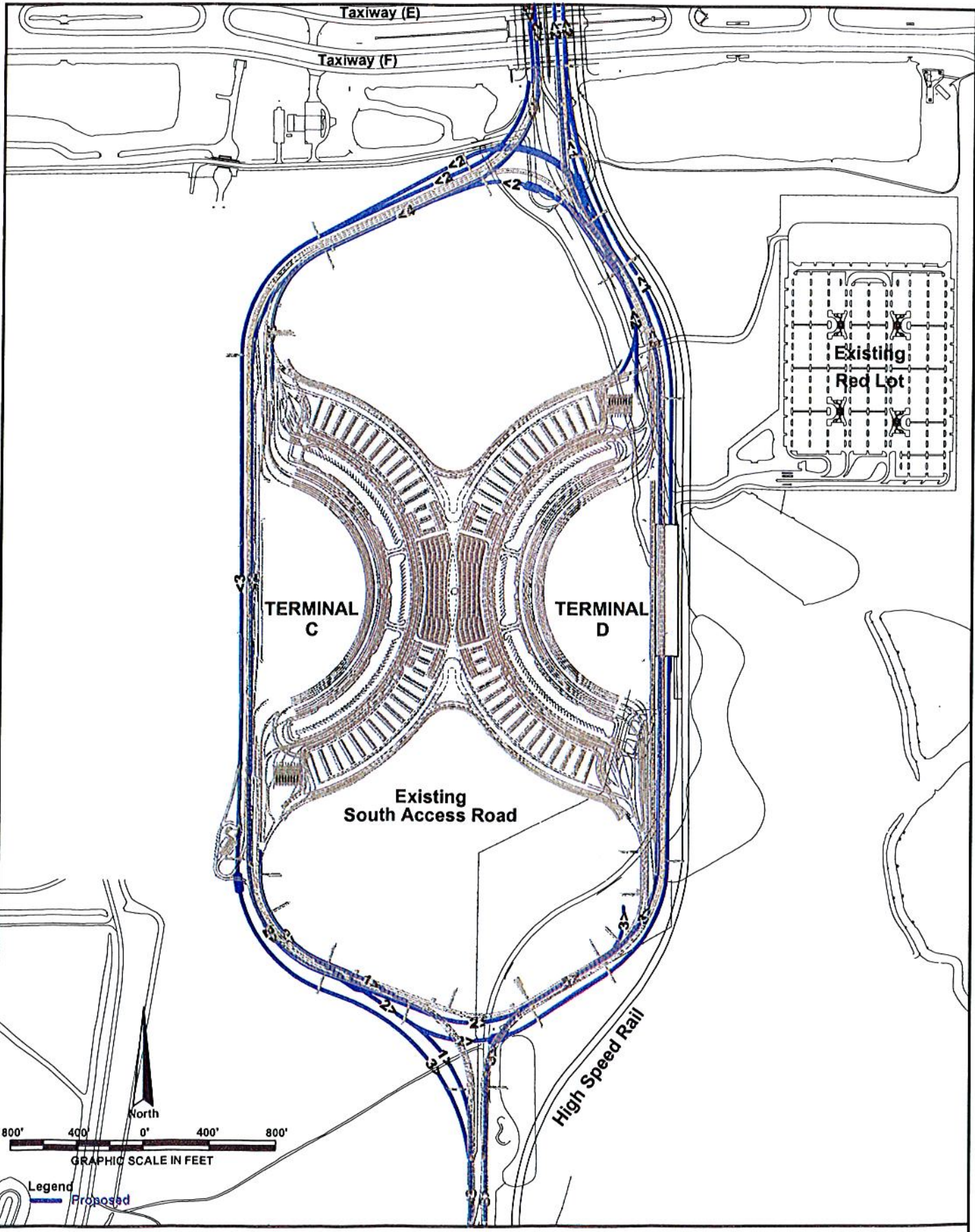
Under this scenario, the payment for parking occurs at the toll plazas. Tolls would also be collected from those traversing the airport property. As with Option 1, toll plazas are required on the Cargo Road ramps to capture those entering the airport property via Cargo Road and exiting to the south and those entering the airport from the south and exiting on Cargo Road. All users would be charged the toll when passing north or south through the airport. The system would need to accommodate the following movements free of charge:



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M:\FINAL EXHIBITS '04\FIGURE 7-34.DWG

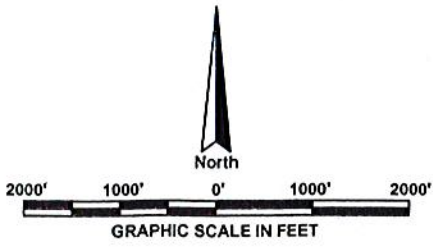
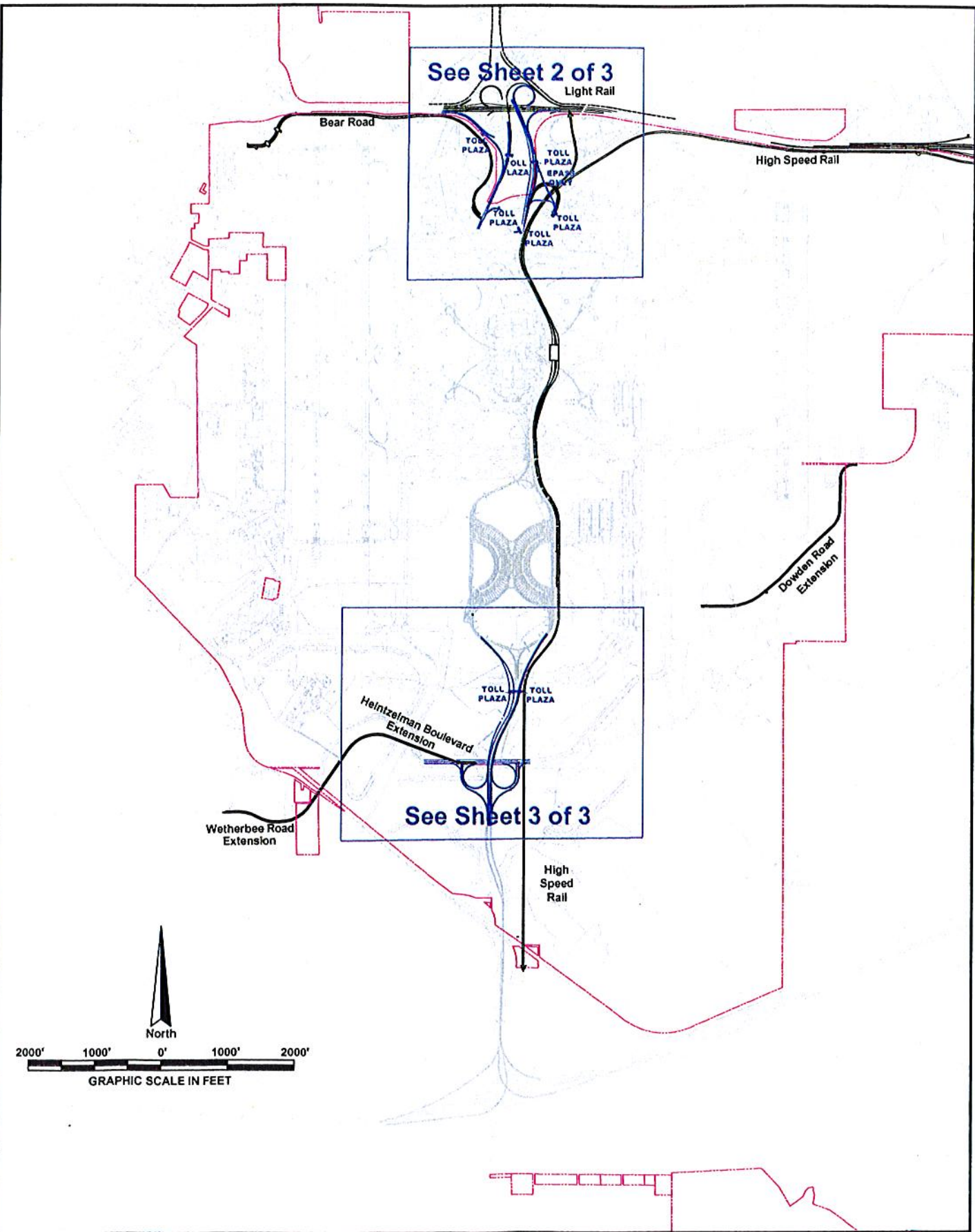
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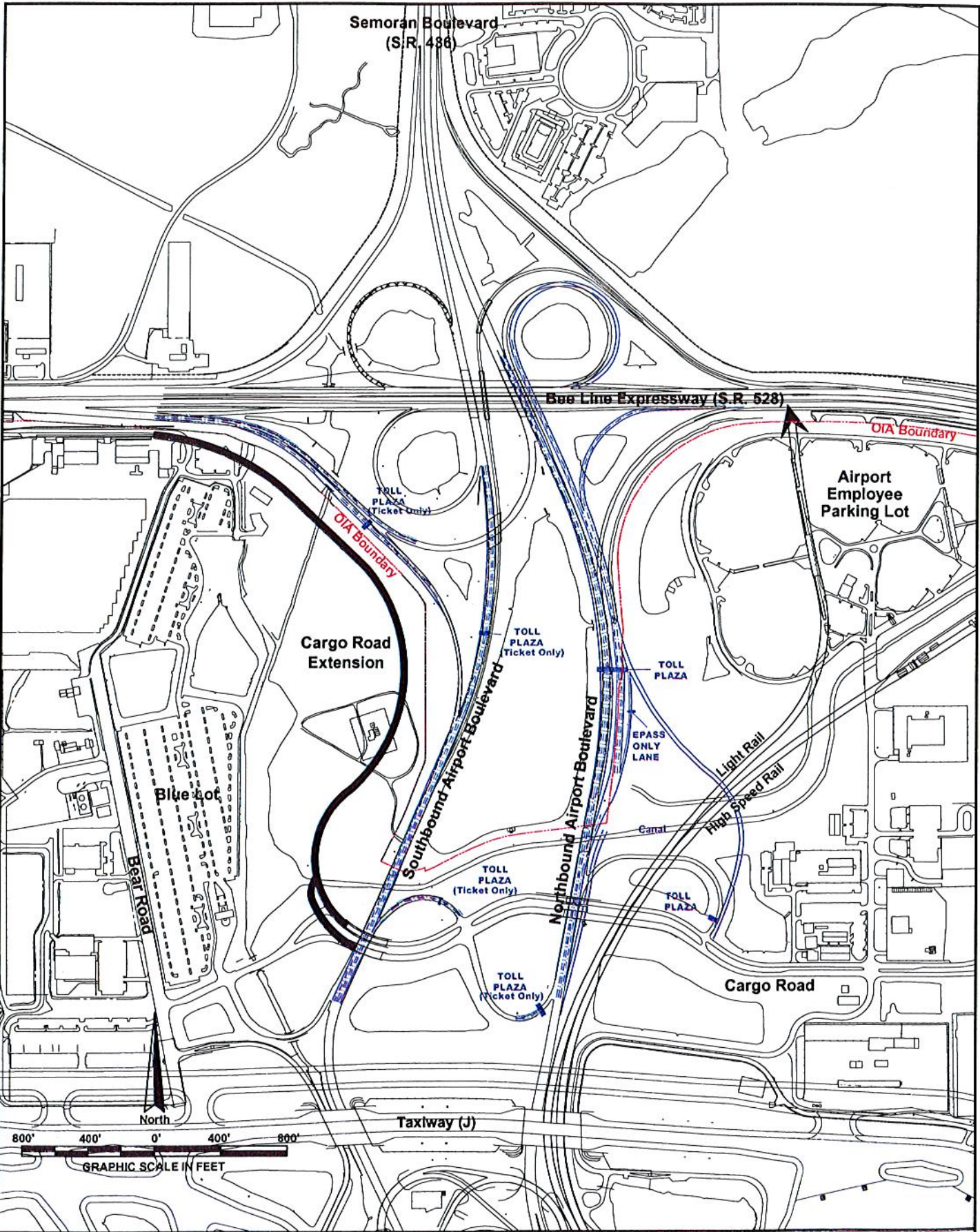
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BRAIDED ROADWAY CONCEPT (SOUTH TERMINAL)

FIGURE: 7.34



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AN\FINAL EXHIBITS '04\FIGURE 7-35-2.DWG
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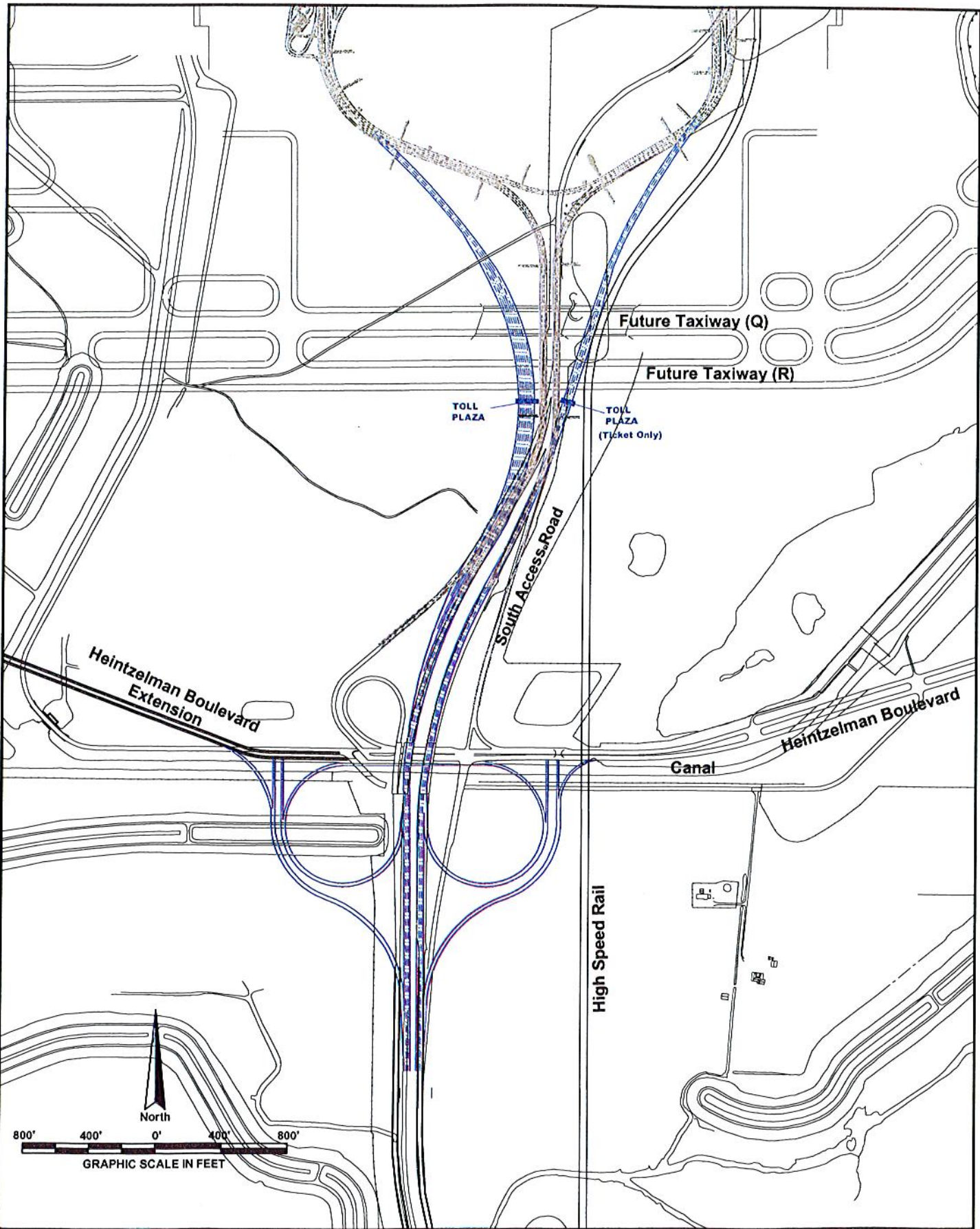
TOLL SYSTEM CONCEPT OPTION 1

FIGURE:
7.35
Sheet 2 of 3

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J:\FINAL EXHIBITS '04\FIGURE 7-35-3.DWG

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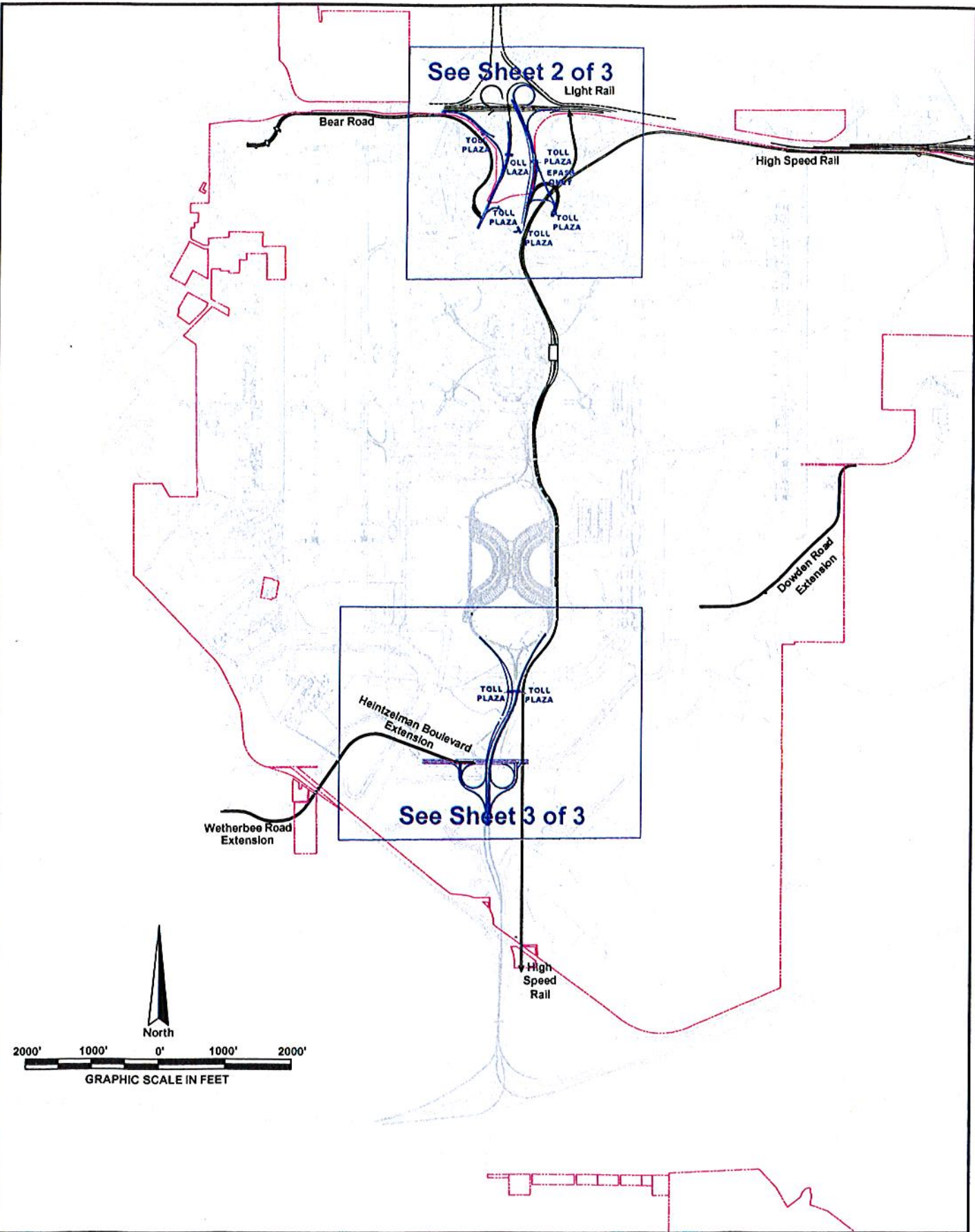
**TOLL SYSTEM CONCEPT
OPTION 1**

**FIGURE:
7.35
Sheet 3 of 3**

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AN\FINAL EXHIBITS '04\FIGURE 7-36-1.DWG

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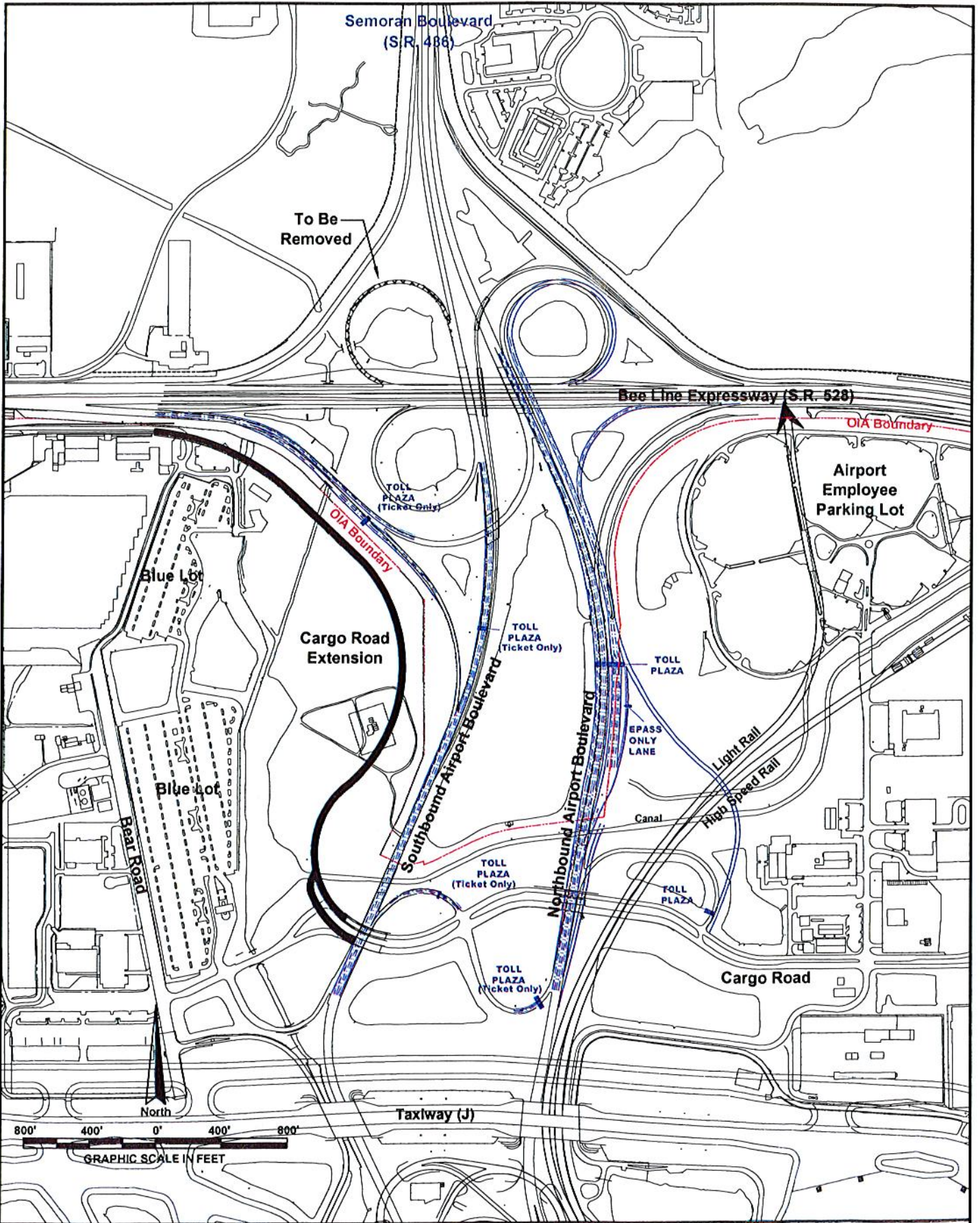
TOLL SYSTEM CONCEPT OPTION 2

FIGURE:
7.36
Sheet 1 of 3

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AN\FINAL EXHIBITS\04\FIGURE 7-36-2.DWG

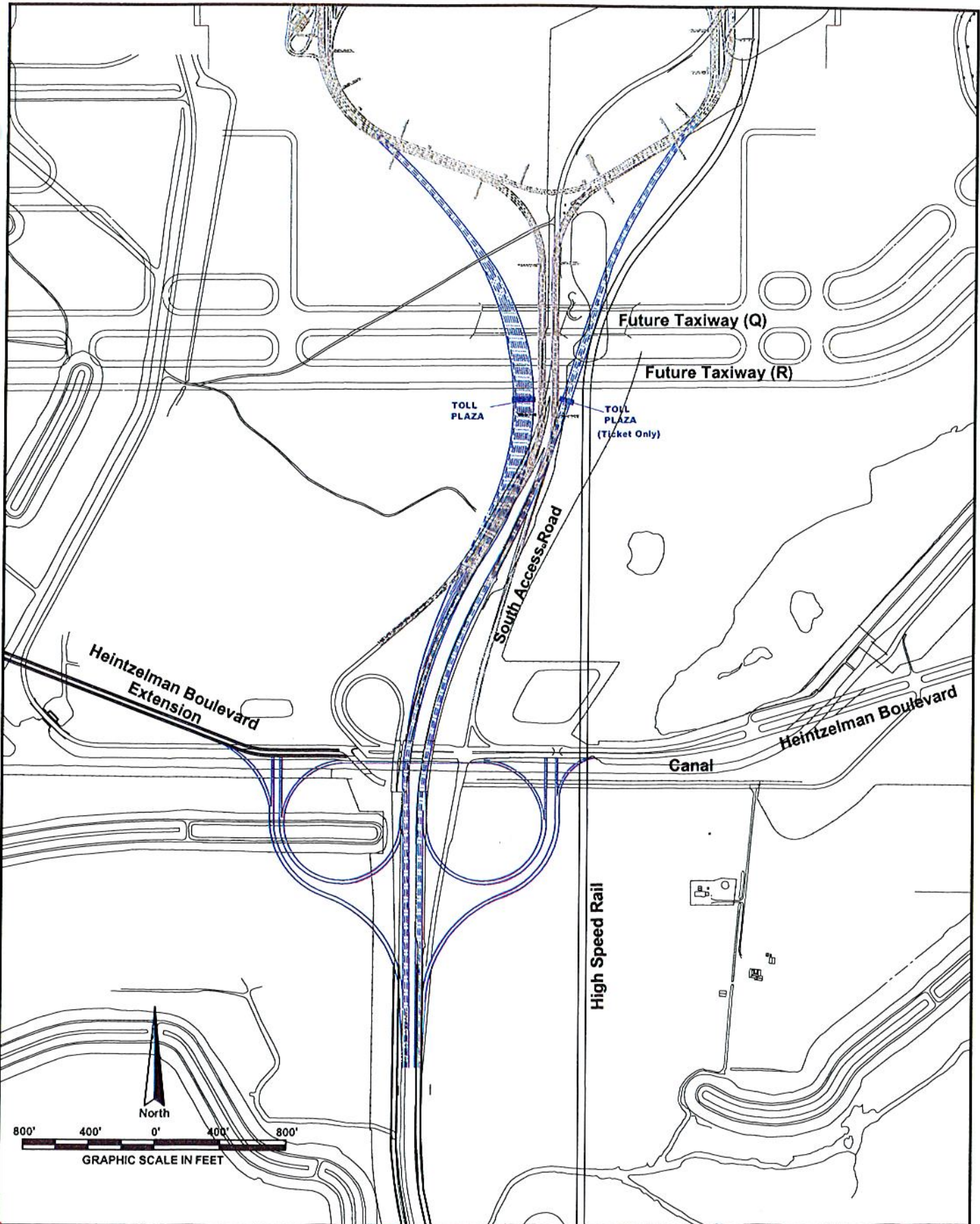
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AN\FINAL EXHIBITS '04\FIGURE 7-36-3.DWG

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**TOLL SYSTEM CONCEPT
OPTION 2**

FIGURE:
7.36
Sheet 3 of 3

- Entering the airport from the north, traversing the terminal to drop-off or pick-up passengers, and exiting the airport property to the north
- Entering the airport from the south, traversing the terminal to drop-off or pick-up passengers, and exiting the airport property to the south
- Exiting the rental car pick-up then exiting the airport property

The revenue control system would be based on the time the vehicles passed through the entering toll plaza until they passed through the exiting toll plaza. Revenue control could be maintained by having access to the rental car return area controlled by the ticket obtained on entry and a ticket to pass through the exiting toll plaza provided at rental car pick-up (similar to the system used at Dallas-Fort Worth International Airport [DFW]). One movement that will require special consideration is vehicles entering from the north, dropping passengers at the terminal, and continuing to the Blue Lot. These vehicles would use their entering ticket at the northbound Airport Boulevard off-ramp to Cargo Road and not have a ticket to enter the Blue Lot. Similarly, vehicles entering from the south, dropping passengers at the terminal, and continuing north to the Blue Lot would appear to be through movements to the toll system.

The disadvantage to this system is that the toll plazas would need to have more lanes than Option 1 to accommodate the longer transaction times associated with payment for parking. More lanes would be required to minimize delays to users. The major advantage of this option is that there is one revenue control system.

Barrier Toll Alternative

Following the development of Options 1 and 2, a variation of these options was developed. This alternative consists of a barrier system of toll plazas that covers all entry points in to the terminal areas of the airport. The layout of the location of these toll plazas is illustrated on Figure 7-37. This alternative layout can be utilized with either Toll Option 1 or 2.

7.2.6.6 South Access Road

South Access Road between Boggy Creek Road and Heintzelman Boulevard is projected to be over capacity by 2025. This facility will require widening to six lanes (three lanes in each direction) to satisfy the forecast demand. Figure 7-38 illustrates this concept improvement.

7.2.6.7 Recommendation

It is recommended that the Authority continue to monitor the level of cut-through traffic on MCO roadways through the use of origin and destination (O&D) studies. A minimum of a five-year cycle should be utilized to continually evaluate the impact of cut-through traffic on roadway operations. A working paper has been developed that details the evaluation cut-through traffic solutions. The braided roadway concept provides the best means of physically restricting access to cut-through traffic. Therefore, it is further recommended that the Authority provide the means to implement the braided roadway concept at a later date should the need to restrict cut-through traffic become a priority. All roadway, terminal, or airfield projects should be planned and designed so as not to preclude the construction of the braided roadway concept.

7.2.7 ACCESS IMPROVEMENTS

Additional improvements are planned for airport roadways and off-site roadways to improve access to MCO. This section describes these improvements.

7.2.7.1 Heintzelman Boulevard Extension

This project consists of extending the existing four-lane divided roadway from its current terminus, at South Access Road, west to intersect with Boggy Creek Road at Wetherbee Road. Ultimate construction includes a four-lane divided urban roadway with a length of approximately 1.2 miles. Phase I of the project will include a two-lane extension from South Access Road to Wiley Drive. This project will support the development of the South Terminal Complex, provide improved east/west access for aviation-related development, and support projected traffic through 2025. The alignment for the Heintzelman Boulevard Extension is shown on Figure 7-39.

The Heintzelman Boulevard Extension is recommended for implementation in the MCO CIP. The estimated total project cost is approximately \$10.2 million.

7.2.7.2 Dowden Road Extension

This project consists of extending the existing roadway from its current terminus at the former HBJ building #1400 to intersect with Heintzelman Boulevard south of Runway 17L/35R. Ultimate construction includes a four-lane divided urban roadway with a length of approximately 1.9 miles. Phase I of the project will include a two-lane extension from the current terminus to Heintzelman Boulevard. The alignment for the Dowden Road Extension is shown on Figure 7-40.

Demand for this project is driven by the development of the South Terminal Complex and Heintzelman Boulevard corridor. This roadway improvement will provide additional east-west access from Narcoossee Road (State Road 15) to Heintzelman Boulevard and support projected traffic through 2025. It should be noted that the existing Dowden Road will connect with the planned Alafaya Trail extension of Narcoossee Road. The Alafaya Trail extension will provide additional airport access to the eastern Orlando urban area.

The Dowden Road Extension is recommended for implementation in the MCO CIP. The estimated total project cost is approximately \$26.5 million.

7.2.7.3 State Road 417/Boggy Creek Road Interchange Modification

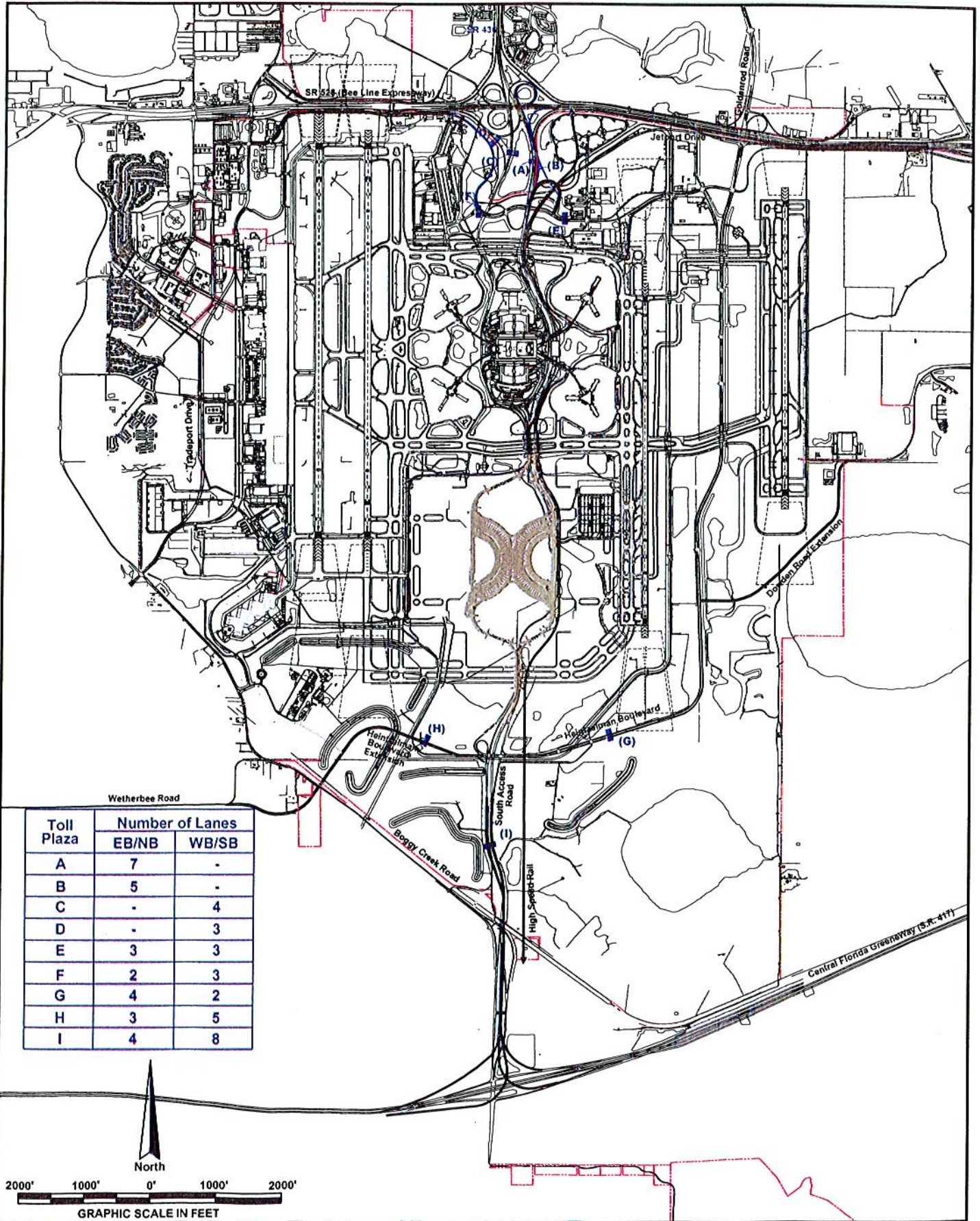
The existing State Road 417/Boggy Creek Road interchange was constructed to allow an interchange modification for a future systems interchange. The preliminary concept (shown on Figure 7-41) maintains the existing diamond interchange between State Road 417 and Boggy Creek Road and adds new direct ramps between State Road 417 and South Access Road. A four-lane divided connector road will be constructed between the new direct ramps and the existing terminus of South Access Road within the existing median of Boggy Creek Road. The existing slip ramps between Boggy Creek Road and South Access Road provide local access to MCO. This interchange modification is needed to support projected traffic demand by 2015. It is recommended that the Authority pursue the construction of this project at the earliest opportunity.

7.2.7.4 State Road 528/State Road 436/Airport Boulevard Interchange Modification

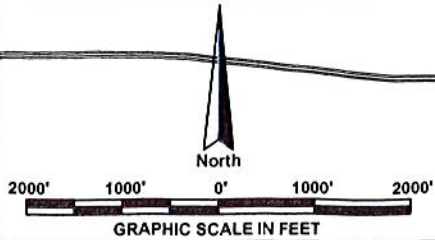
This project consists of replacing the existing loop ramp from westbound State Road 528 to southbound Airport Boulevard with a new fly-over ramp to improve access to MCO. The preliminary concept consists of a new ramp extending from the existing westbound State Road 528 to the northbound State Road 436 ramp and tying in to southbound Airport Boulevard north of the eastbound State Road 528 to southbound Airport Boulevard ramp.

7.2.7.5 Wetherbee Road

Wetherbee Road is a two-lane east-west roadway that originates west of the airport at Orange Avenue and extends to Boggy Creek Road. The easternmost segment of the existing roadway (near Boggy Creek Road) is planned to be realigned and widened to four lanes by a private developer. Widening



Toll Plaza	Number of Lanes	
	EB/NB	WB/SB
A	7	-
B	5	-
C	-	4
D	-	3
E	3	3
F	2	3
G	4	2
H	3	5
I	4	8

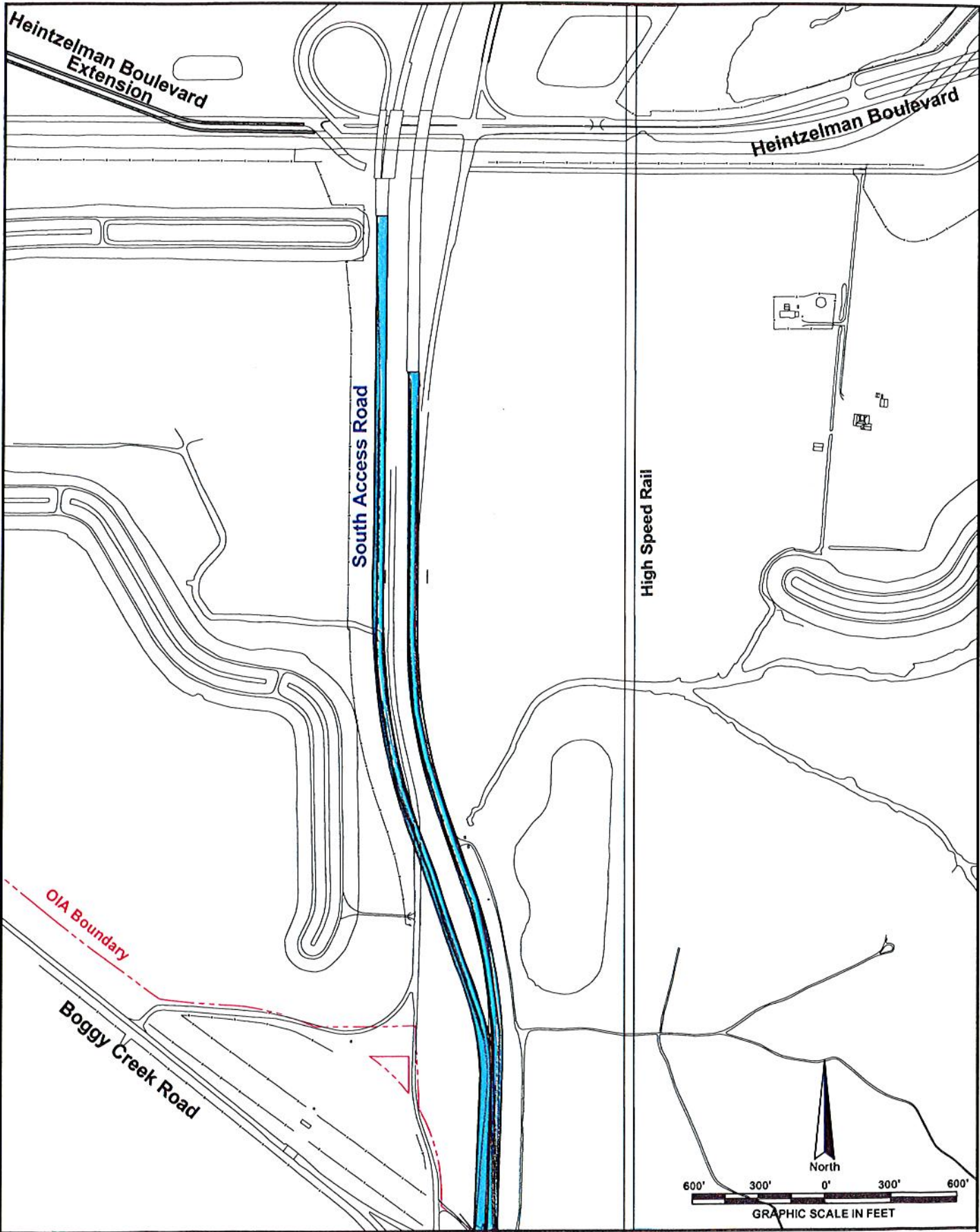


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**BARRIER TOLL ALTERNATIVE
 OPTION 3**

**FIGURE:
 7.37**

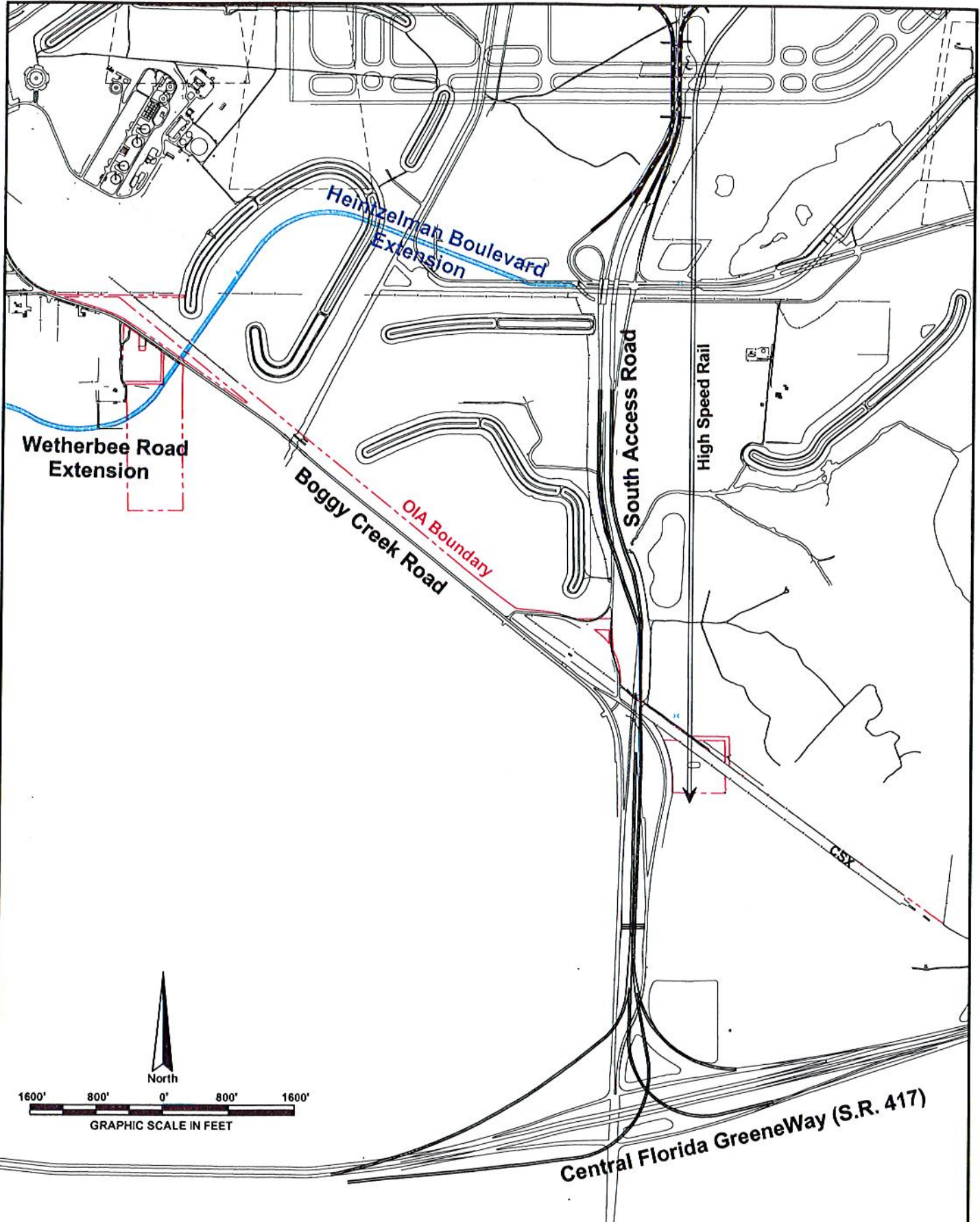
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ULTIMATE SOUTH ACCESS ROAD WIDENING

FIGURE:
7.38



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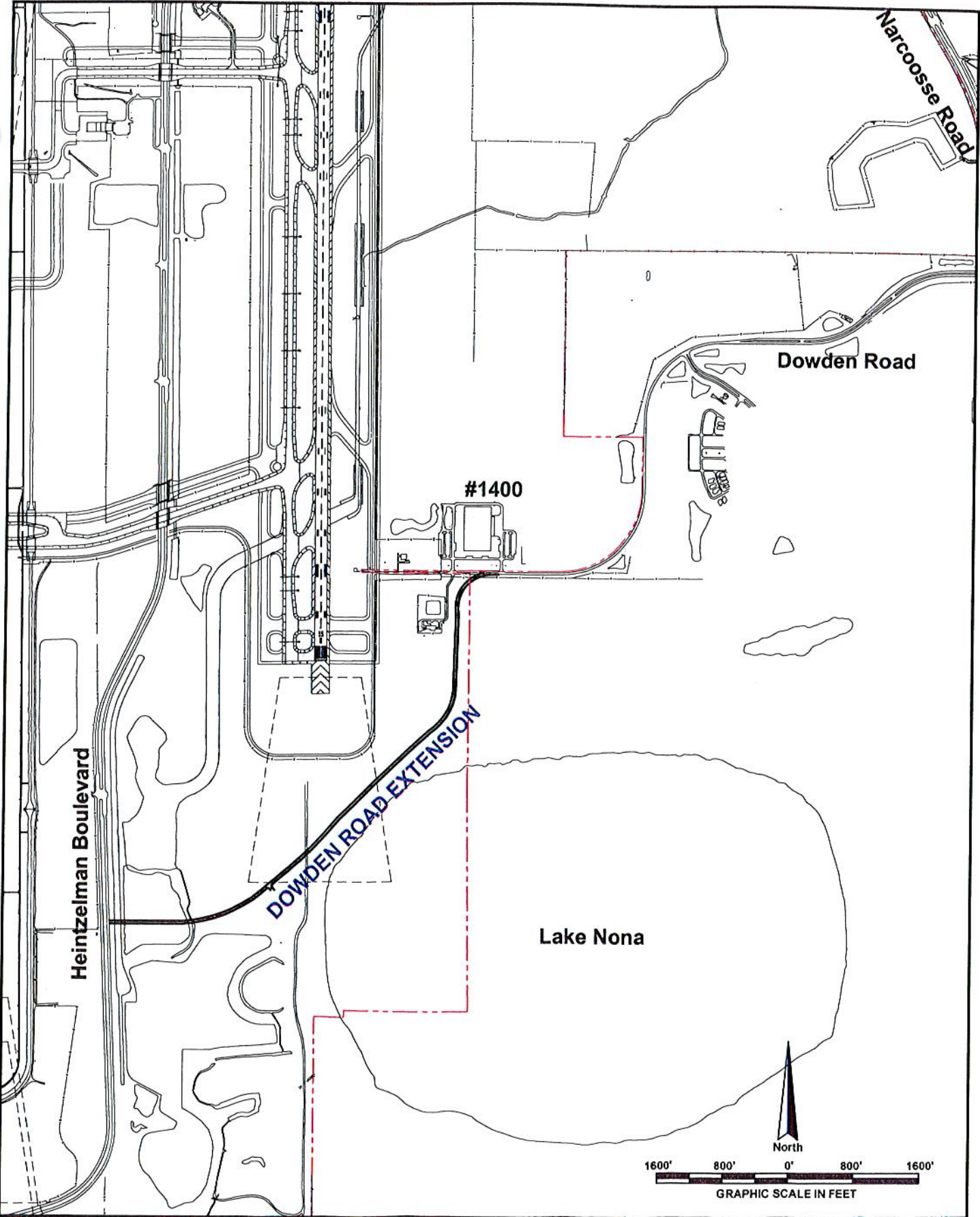
HEINTZELMAN BOULEVARD EXTENSION

FIGURE:
7.39

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PLAN FINAL EXHIBITS '04\FIGURE 7-40.DWG

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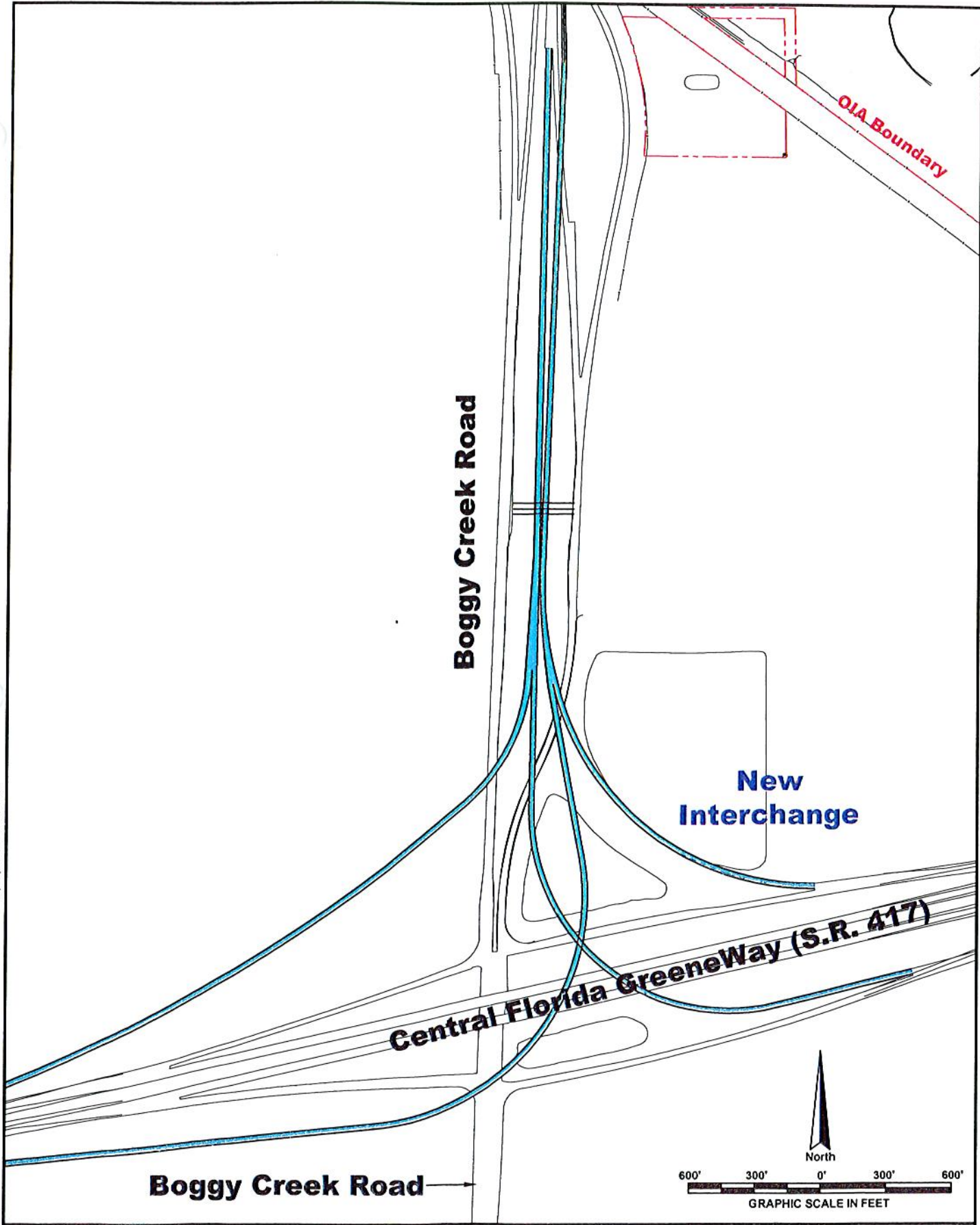



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DOWDEN ROAD EXTENSION

FIGURE:
 7.40

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SR 417/BOGGY CREEK ROAD INTERCHANGE IMPROVEMENTS

**FIGURE:
7.41**

Wetherbee Road to four lanes west of this section will improve access from the west to the south side of the airport. Orange County is the responsible agency and has not programmed funding for this project.

7.2.8 CURBSIDES

Curbside studies have been initiated to evaluate operations on the existing curbs and develop strategies to improve operations and maximize capacity. These studies include the commercial curb, arrival curb, and departure curb. A related study has also been undertaken to evaluate the Fourth Curb which is temporarily closed. This study will identify potential uses for this area.

In addition to the curbside studies noted above, a separate planning effort is currently evaluating concepts to provide a direct access from Airport Boulevard to Airsides 1 and 3. This access would be for commercial vehicles only and allow departing passengers with pre-checked luggage or carry-on luggage only to bypass the Landside Terminal. The preliminary concept for the Airsides 1 and 3 commercial curb is shown on Figure 7-42. All of these ongoing efforts will be documented separately.

7.3 Rail Corridors

Proposed rail transit facilities serving MCO include high-speed rail (HSR) and light rail transit (LRT). Both projects are currently in the planning stages and the preliminary alignments are subject to change during the ongoing National Environmental Policy Act (NEPA) process. As part of this MCO Master Plan Update, the study team reviewed the available information on both HSR and LRT to evaluate critical rail crossing locations and identify potential impacts to existing facilities and constraints to future facility expansions.

HSR is proposed to provide initial service between Tampa and Orlando. A Project Development and Environment (PD&E) study was initiated for this segment in 2002 by the Florida High Speed Rail Authority. This study initially considered two main routes in the Orlando area. On October 27, 2003, the Florida High Speed Rail Authority decided that the preferred route for HSR would be along State Road 417 (Central Florida GreeneWay). This route will result in an alignment that will enter MCO from the south along the east side of South Access Road. The HSR PD&E study is only evaluating preliminary alignments up to the proposed South Terminal. However, it is expected that HSR will ultimately extend north through the airport property and exit to the east along the south side of State Road 528.

FDOT initiated a PD&E study for a LRT segment between International Drive and MCO in November 2003. No alignments have been developed to date; however, it is expected that the alignments will be located north of State Road 528 in the vicinity of MCO. The alignment will cross over State Road 436 with a station located within the Lee Vista Center. LRT would then enter MCO from north of State Road 528 on the east side of State Road 436. Initially, LRT will extend to the North Terminal. When the South Terminal is constructed, LRT could be extended to provide service directly to the South Terminal.

Potential alignments within airport property for both HSR and LRT were developed. These alignments are illustrated on Figure 7-43. They are based on information provided to the study team from the Florida High Speed Rail Authority, FDOT, LYNX, and Greater Orlando Aviation Authority (GOAA). Both alignments are located along the east side of the North and South Terminals. This supports current plans by GOAA to locate rail stations on the east side of either terminal.

The following subsections describe the alignments and identify potential impacts and constraints to facility expansions. It should be noted that these alignments are conceptual only. Corridors have been established to evaluate potential impacts and future facility expansion plans.

7.3.1 HIGH SPEED RAIL

7.3.1.1 Required Envelope

The envelope requirements (horizontal and vertical) for HSR were obtained from the High Speed Rail Authority. A complete list of design criteria published by the Florida High Speed Rail Authority is included in Appendix M. The minimum clear width is 44 feet for two tracks. The minimum vertical clearance is 20 feet.

7.3.1.2 Potential Alignment

An initial alignment from State Road 417 to the South Terminal was obtained from the HSR PD&E study. This alignment was based on a concept for the South Terminal provided to the HSR study team in late 2002. Recent changes to the South Terminal concept required modification of the alignment from Heintzelman Boulevard to the South Terminal. These modifications will be coordinated with the Florida High Speed Rail Authority so that the necessary revisions can be made to the preliminary engineering and NEPA documentation for the HSR study. The modified alignment is illustrated on Figure 7-44.

Between the North and South Terminals, an alignment was developed that utilized the rail envelope being provided by the expansion of the mid-crossfield Taxiways E and F. This alignment is consistent with the alignment identified in the Intermodal Passenger Terminal Study completed in 1999. This segment is illustrated on Figures 7-44 and 7-45.

North of the North Terminal, HSR is expected to exit MCO to the northeast on the south side of State Road 528, although no alignment has been identified by the Florida High Speed Rail Authority. An alignment was developed that would minimize impacts to existing facilities and maximize the potential for future facilities expansion. Between the North Terminal station and the north crossfield taxiways, the alignment roughly parallels northbound Airport Boulevard and crosses under the taxiway bridge at the existing rail envelope. This segment is illustrated on Figure 7-45.

North of the taxiway, the alignment curves to the northeast and parallels the drainage canal, along the south side of the canal, up to State Road 528. As illustrated on Figure 7-46, the crossing of Cargo Road will require reconstruction of Cargo Road over HSR and a realignment of the northbound exit from northbound Airport Boulevard to Cargo Road. This realignment of the exit ramp is necessary to provide sufficient distance from the exit gore to raise the elevation of the ramp to cross over HSR.

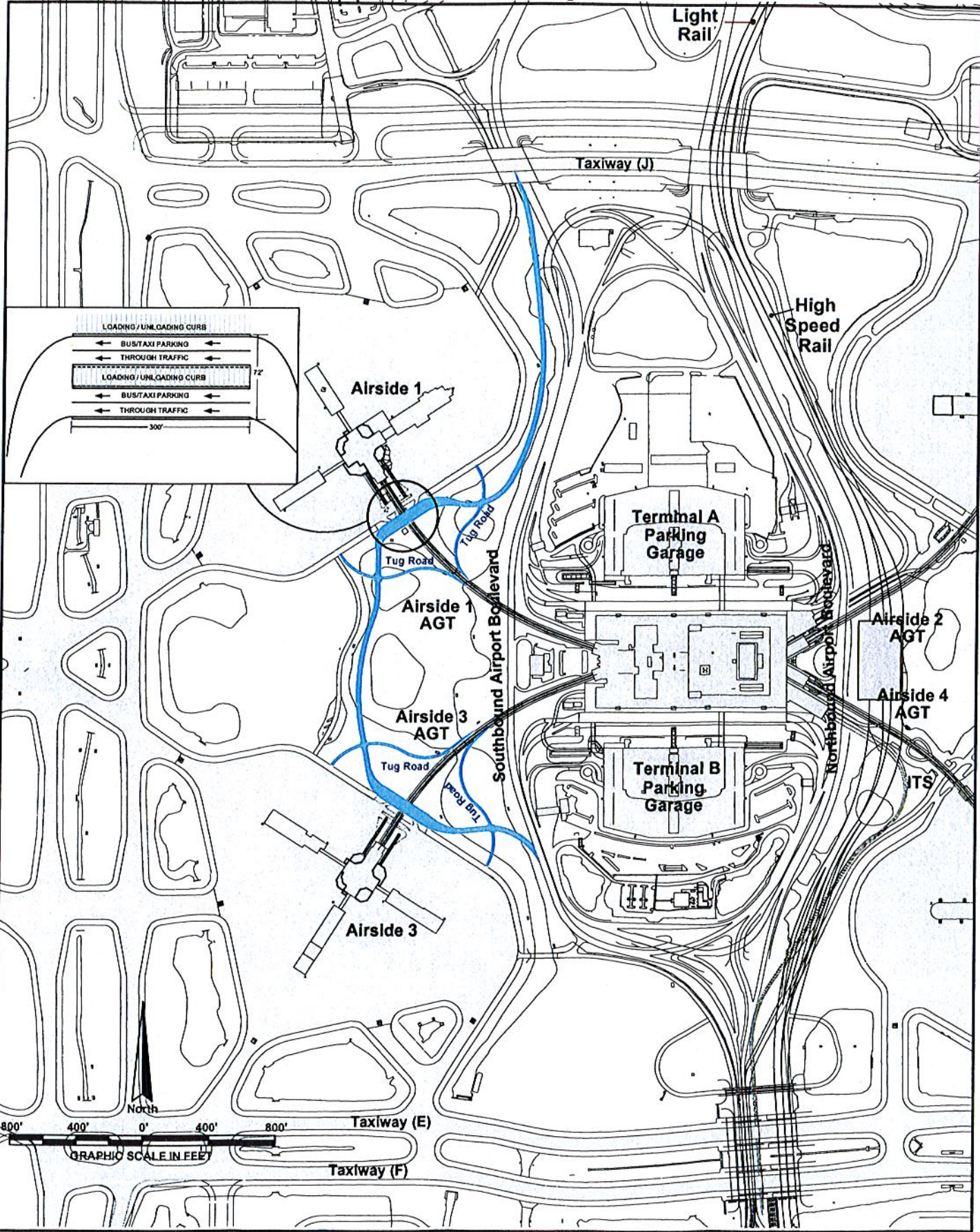
The alignment curves to the east at State Road 528 running parallel and south of State Road 528. At the Goldenrod Road Extension interchange, the alignment follows the existing ramps to/from eastbound State Road 528 and crosses under the Goldenrod Road Extension, as illustrated on Figure 7-47. This will require relocation of the ramps between their existing location and the State Road 528 mainline. An underpass will need to be constructed for HSR underneath Goldenrod Road. Preliminary investigation indicates that the existing vertical alignment of Goldenrod Road is sufficiently elevated to provide the required vertical clearance for HSR.

East of Goldenrod Road, the HSR alignment continues east, parallel and south of State Road 528. At Narcoossee Road, the alignment stays south of the interchange ramps and crosses over Narcoossee Road before continuing east along the south side of State Road 528. The rail crossing at Narcoossee Road is illustrated on Figure 7-48.

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LAN\FINAL EXHIBITS '04\FIGURE 7-42.DWG

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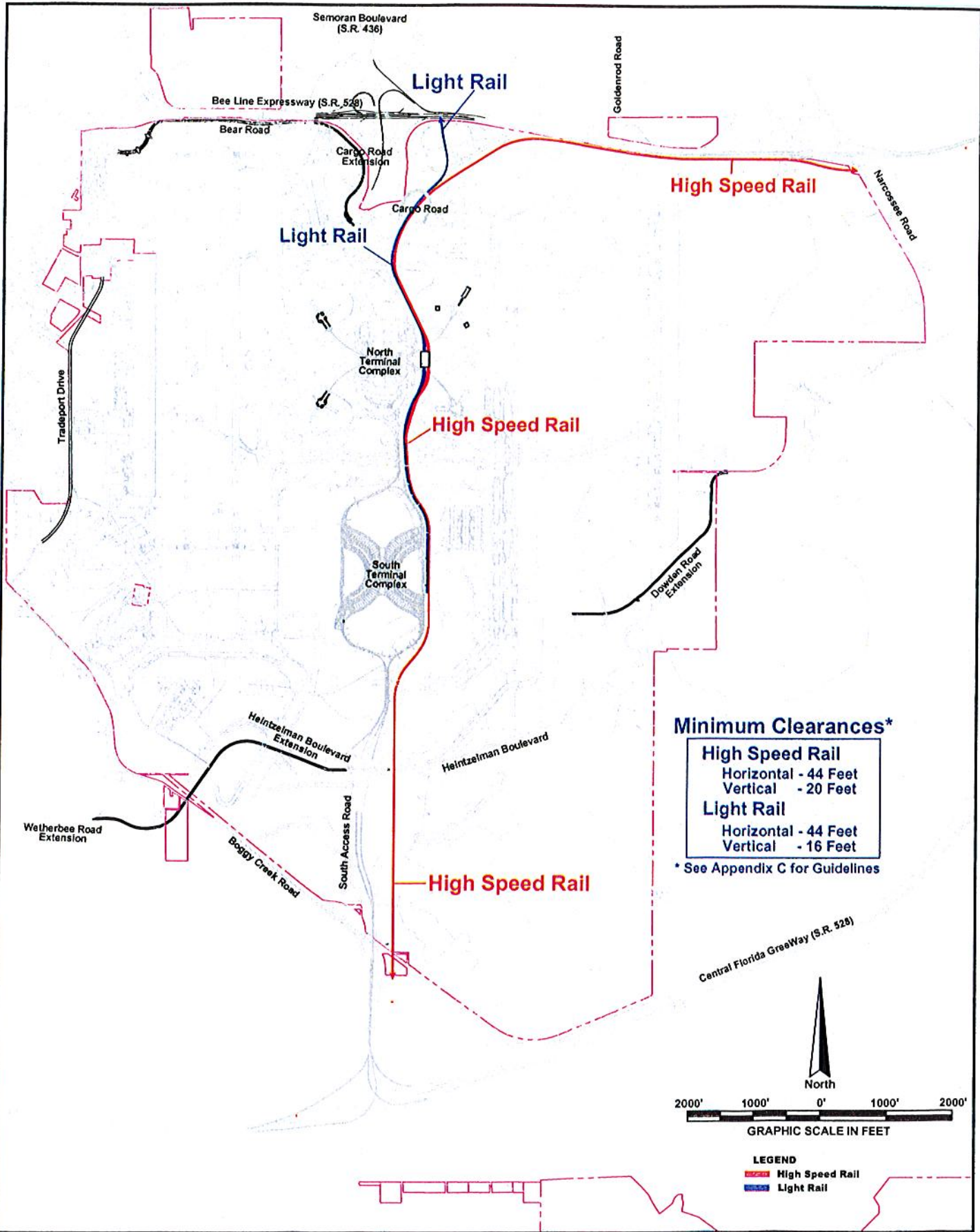
AIRSIDE 1 & 3 COMMERCIAL CURB

FIGURE:
7.42

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J:\FINAL EXHIBITS '04\FIGURE 7-43.DWG

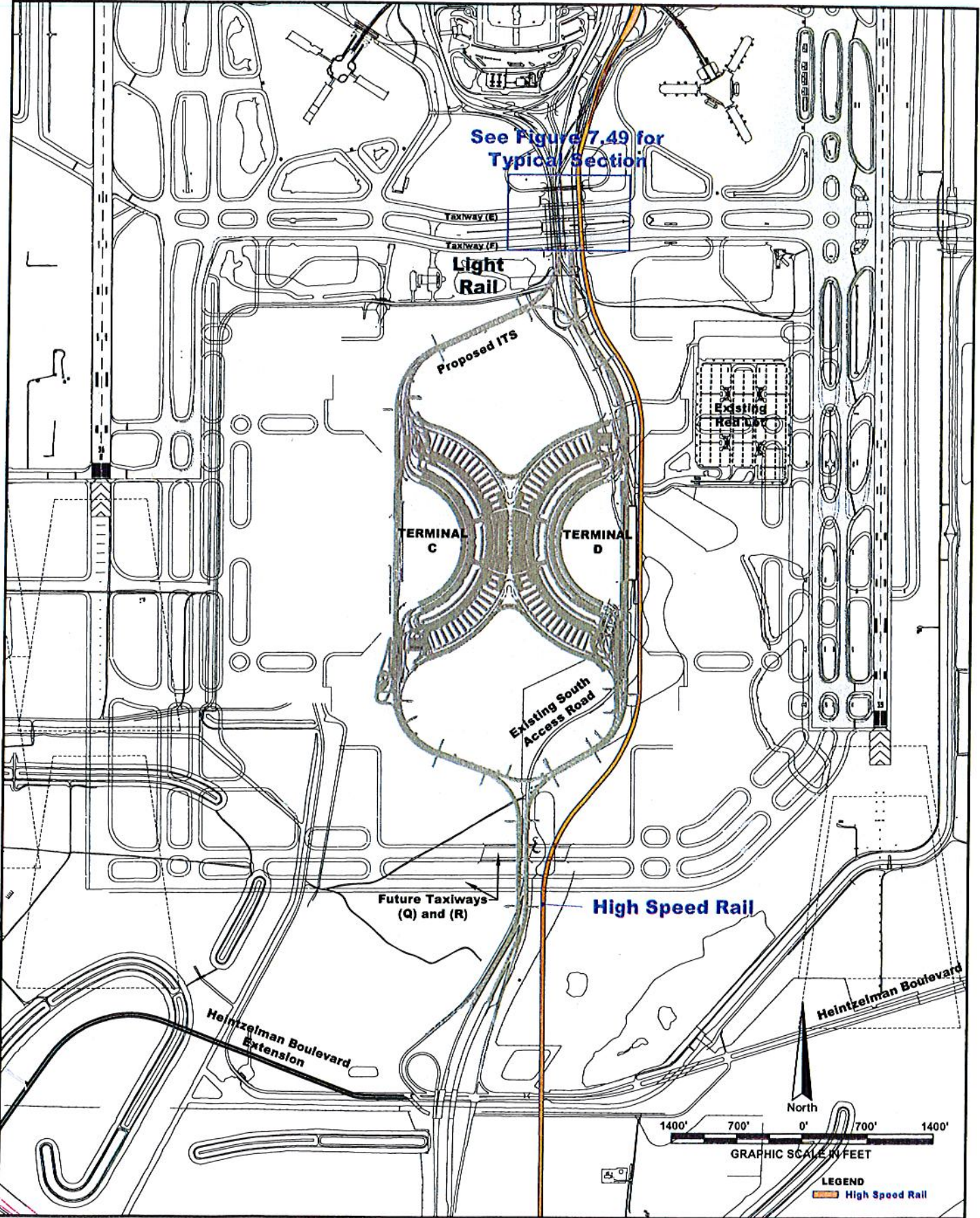
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POTENTIAL HIGH SPEED RAIL CORRIDOR AT SOUTH TERMINAL

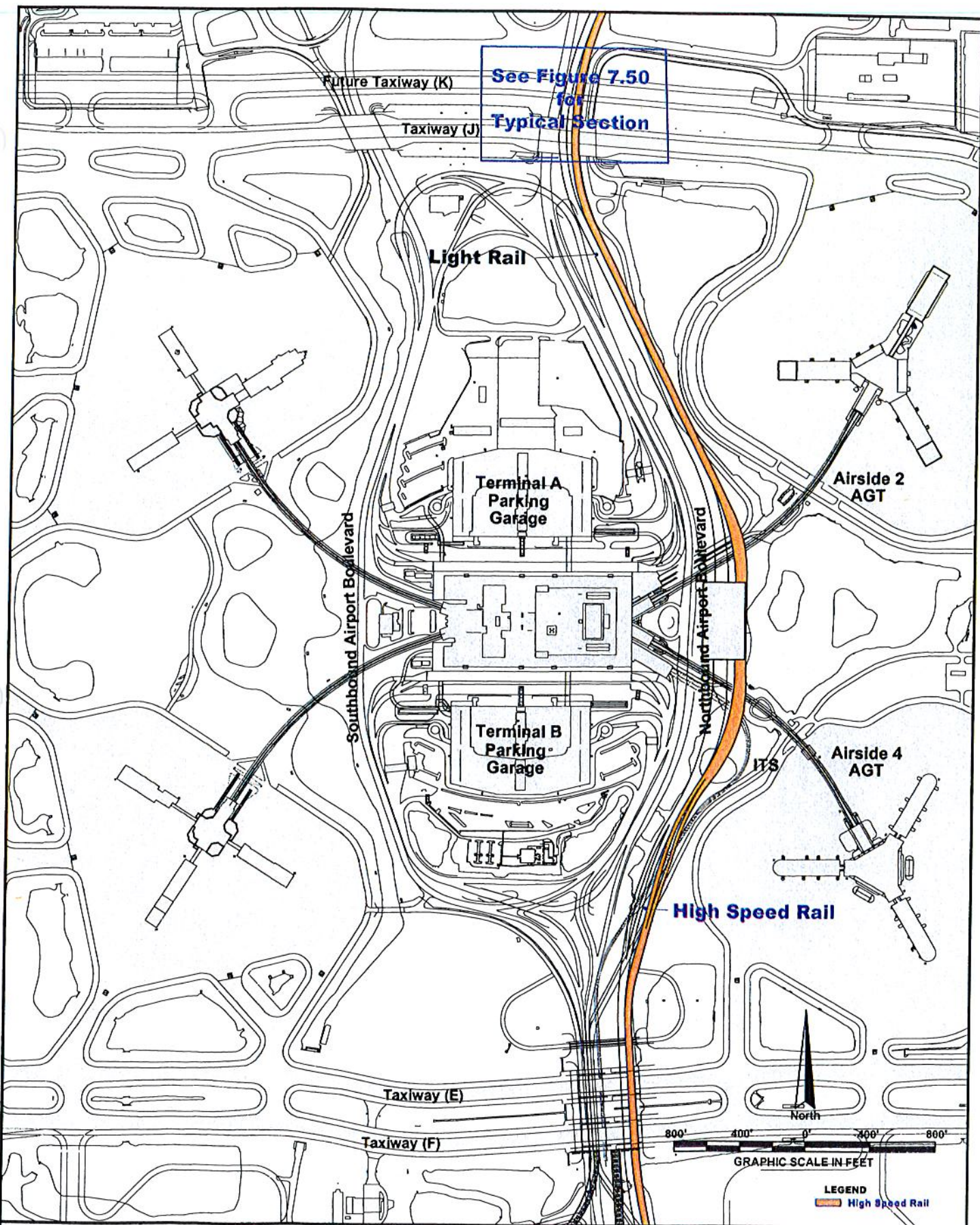
FIGURE: 7.44

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LAN\FINAL EXHIBITS '04\FIGURE 7-45.DWG

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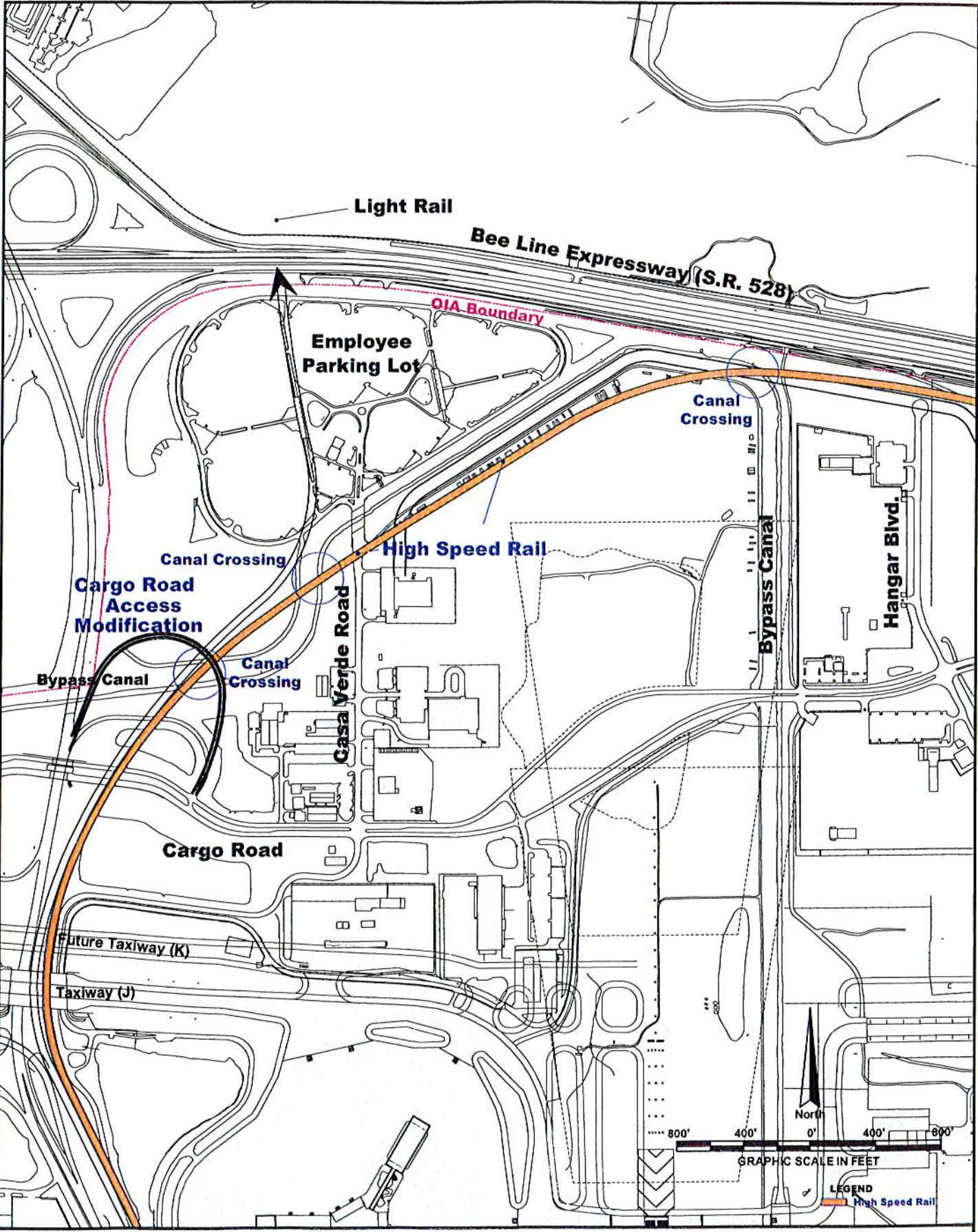
See Figure 7.50
for
Typical Section



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AN\PRJAL EXHIBITS '04\FIGURE 7-46.DWG

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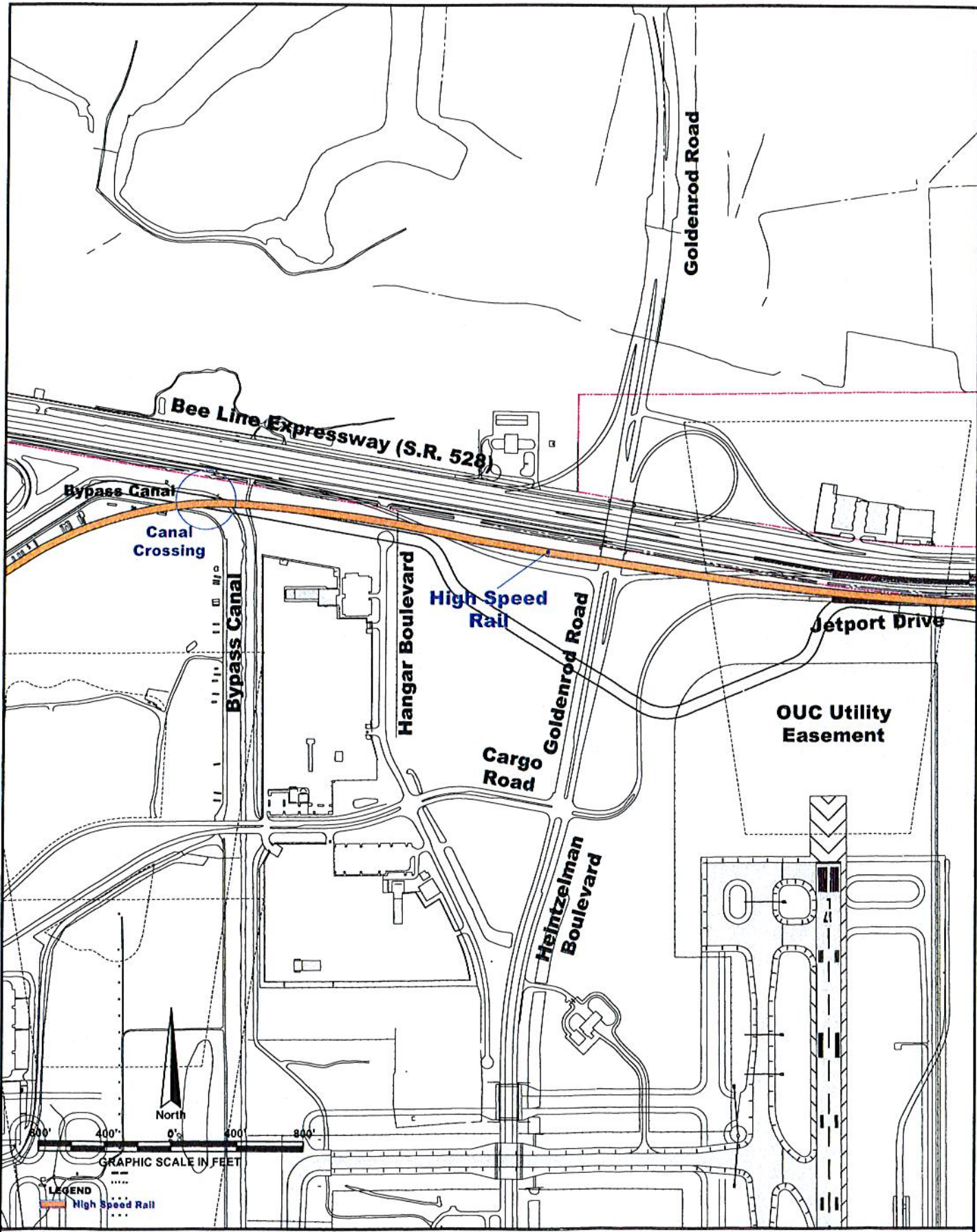
**POTENTIAL HIGH SPEED RAIL
 CORRIDOR BETWEEN AIRPORT
 AND SR 528**

**FIGURE:
 7.46**

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T:\PROJECTS\MAST_FINAL EXHIBITS '04\FIGURE 7-47.DWG

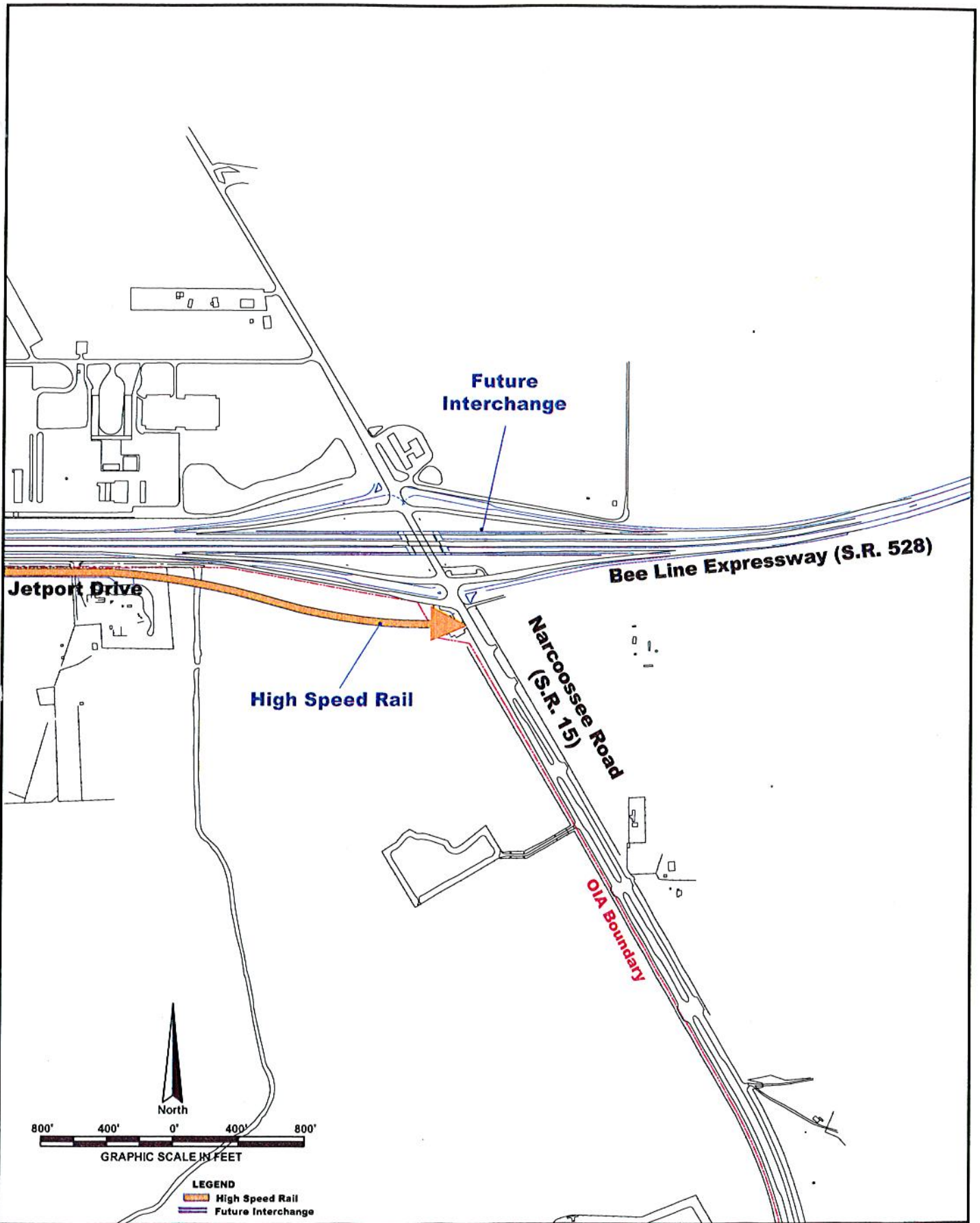
T:\PROJECTS\MAST_FINAL EXHIBITS '04\FIGURE 7-47.DWG




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**POTENTIAL HIGH SPEED RAIL
 CORRIDOR AT SR 528/GOLDENROD
 ROAD INTERCHANGE**

FIGURE:
 7.47



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POTENTIAL HIGH SPEED RAIL CORRIDOR AT SR 528/NARCOOSSEE ROAD INTERCHANGE

FIGURE: 7.48

HSR will cross the Bypass Canal at three locations, as shown on Figure 7-46. These crossings are not considered critical locations.

7.3.1.3 Evaluation of Critical Crossings

The proposed alignment for HSR was reviewed to identify critical rail crossing locations of major facilities on airport property. Each location is listed below along with a brief evaluation and any improvements needed to accommodate HSR:

- Heintzelman Boulevard at South Access Road - Heintzelman Boulevard is at grade. HSR is proposed to cross over Heintzelman Boulevard. **No impacts are expected at this rail crossing location.**
- Mid-Crossfield Taxiways E and F - A review of the design plans for the ongoing expansion of the taxiway bridge indicates that the expanded bridge will accommodate the minimum HSR envelope. **No impacts are expected at this rail crossing location.** Figure 7-49 illustrates the proposed typical section for the taxiway bridge and identifies the location designated for HSR.
- AGTs for Airsides 2 and 4 - A review of the AGTs for Airsides 2 and 4 indicate that the existing structures can accommodate the minimum HSR envelope. **No impacts are expected at these rail crossing locations.**
- North Crossfield Taxiways J and Future K - A review of the design plans for the recent expansion of the taxiway bridge indicates that the existing bridge will accommodate the minimum HSR envelope. **No impacts are expected at this rail crossing location.** Figure 7-50 illustrates the typical section for the taxiway bridge and identifies the location designated for HSR.
- Cargo Road - **Cargo Road will require reconstruction to provide the minimum rail envelope.** This includes the exit ramp from northbound Airport Boulevard. Figure 7-46 illustrates the realignment of the Cargo Road exit ramp. Both Cargo Road and the exit ramp will cross over HSR. The planning efforts for Cargo Road identified a bridge elevation that would accommodate rail envelopes for LRT, HSR, and commuter rail (see Appendix M. There are currently no plans to provide commuter rail service to MCO. **Reconstruction of the Cargo Road bridge should only be designed to accommodate HSR and LRT.**
- Goldenrod Road at State Road 528 - The existing profile of Goldenrod Road over State Road 528 was designed to accommodate HSR. The high point of the profile is located at the ramp terminal intersection on Goldenrod Road for the eastbound State Road 528 ramps. **These ramps will have to be realigned closer to State Road 528 to allow HSR to cross under Goldenrod Road at the high point of the existing profile.**

7.3.1.4 Other Potential Impacts

Other facilities that will be indirectly impacted by HSR are listed below followed by improvements needed to mitigate the impact:

- Red Satellite Parking Lot - The existing lot is located between South Access Road and the Third Runway (17R/35L) just south of the mid-crossfield taxiways. HSR will sever the road connecting the parking lot and South Access Road. **If it is determined that the lot needs to remain open, a bridge will have to be constructed over HSR to maintain access.** Figure 7-44 illustrates one concept for this grade-separated connection. When the South Terminal is constructed, the loop road system could be designed to provide a grade separated crossing over the proposed HSR alignment.
- Employee Parking Lot - The existing lot is located at the north end of Casa Verde Road along the north side of the drainage canal in the northeast terminal support area. HSR will sever Casa Verde Road just south of the existing lot. **A bridge will be required over HSR to keep the existing**

employee lot accessible. The option to expand the employee lot southeast of the existing lot will also require access over the north canal and HSR. This access can be provided either by constructing a bridge over HSR between the two lots or providing a separate at-grade connection to Casa Verde Road south of the HSR crossing.

7.3.2 LIGHT RAIL TRANSIT

7.3.2.1 Required Envelope

The envelope requirements (horizontal and vertical) for LRT were obtained from LYNX. A complete list of design criteria is included in Appendix N. The minimum clear width is 44 feet for two tracks. The minimum vertical clearance is 16 feet.

7.3.2.2 Potential Alignment

The LRT study is in the early stages and has not yet identified an alignment into MCO. Previous LRT studies have identified several potential alignments from both the northwest and the southwest. The current study is anticipated to focus its efforts on an alignment that enters MCO from the north, to the east of State Road 436, circulate through the airport, and exit to the north. To identify potential impacts to existing MCO facilities and constraints to future facility expansions, a potential alignment within the airport property was developed.

Beginning at the South Terminal station, the LRT alignment heads north parallel to and west of the HSR alignment. It crosses under the mid-crossfield taxiway that utilizes the rail envelope that is being provided by the expansion of the taxiway bridge. The alignment continues north adjacent to the HSR alignment into the North Terminal station. This segment is illustrated on Figures 7-51 and 7-52.

Leaving the North Terminal station, the LRT alignment continues adjacent to the HSR alignment crossing under the north crossfield taxiway, Cargo Road, and the realigned northbound Airport Boulevard exit ramp to Cargo Road. The reconstruction of Cargo Road and the northbound exit ramp to accommodate HSR that is described in Section 7.3.1 will also accommodate LRT. This segment is illustrated on Figures 7-52 and 7-53.

The LRT alignment splits from the HSR alignment after crossing under the northbound exit ramp to Cargo Road. The alignment heads to the north across the existing employee parking lot and crosses over State Road 528 just east of the State Road 436/Airport Boulevard interchange. The vertical alignment rises after splitting from the HSR alignment resulting in an elevated section across the employee lot. This elevation of the tracks is necessary to cross over State Road 528 and will reduce impacts to the employee lot. This segment is illustrated on Figure 7-53.

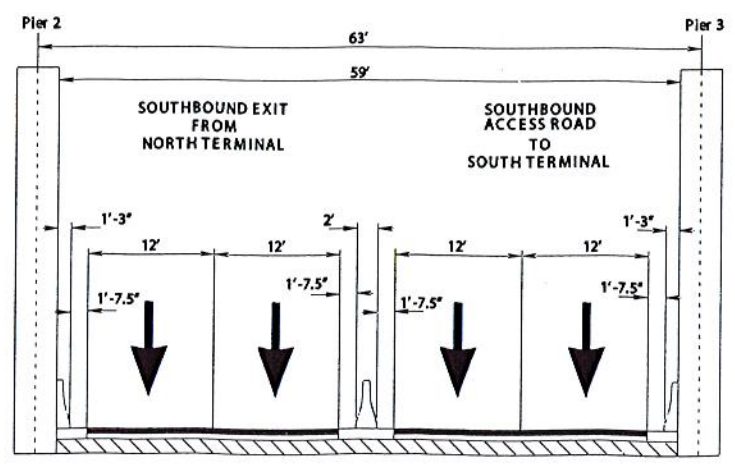
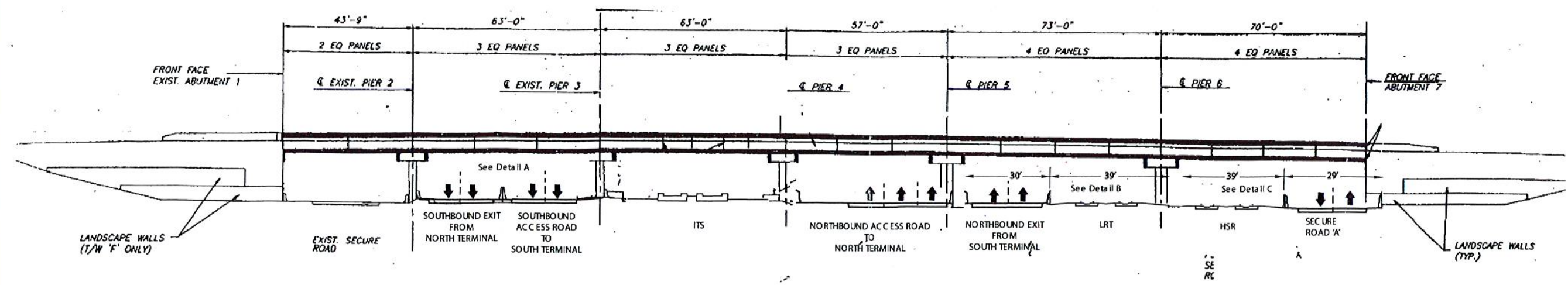
7.3.2.3 Evaluation of Critical Crossings

The proposed alignment for LRT was reviewed to identify critical rail crossing locations of major facilities on airport property. Each location is listed below along with a brief evaluation and any improvements needed to accommodate LRT:

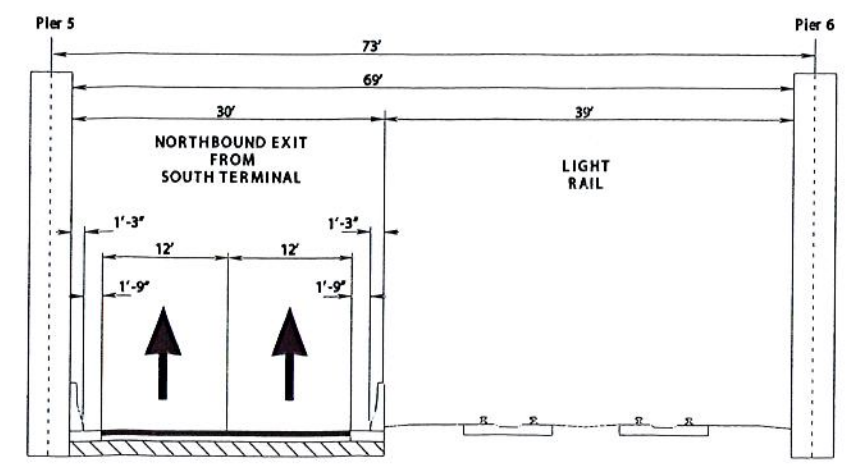
- Mid-Crossfield Taxiways E and F - A review of the design plans for the ongoing expansion of the taxiway bridge indicates that the expanded bridge will accommodate the minimum LRT envelope. **No impacts are expected at this rail crossing location.** Figure 7-49 illustrates the proposed typical section for the taxiway bridge and identifies the location designated for LRT.
- AGTs for Airsides 2 and 4 - A review of the AGTs for Airsides 2 and 4 indicate that the existing structures can accommodate the minimum LRT envelope. **No impacts are expected at these rail crossing locations.**

FIGURE:
7.49

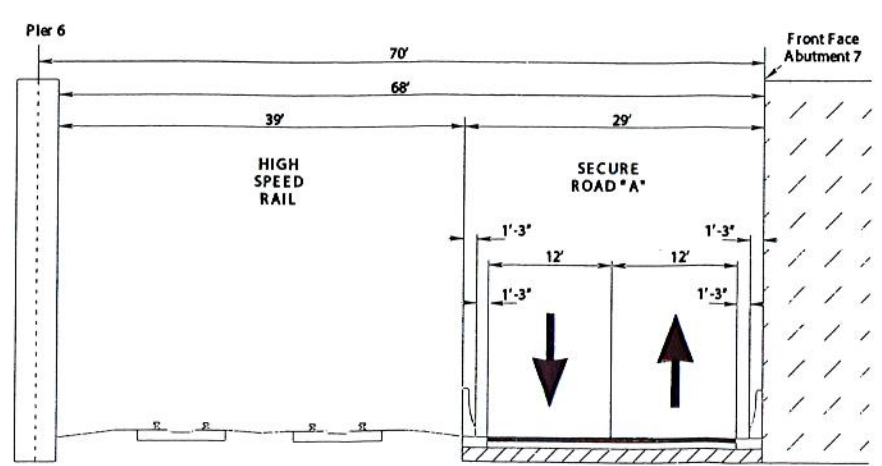
MID-CROSSFIELD TAXIWAY BRIDGES
(TAXIWAYS "E" & "F")



DETAIL A



DETAIL B



DETAIL C

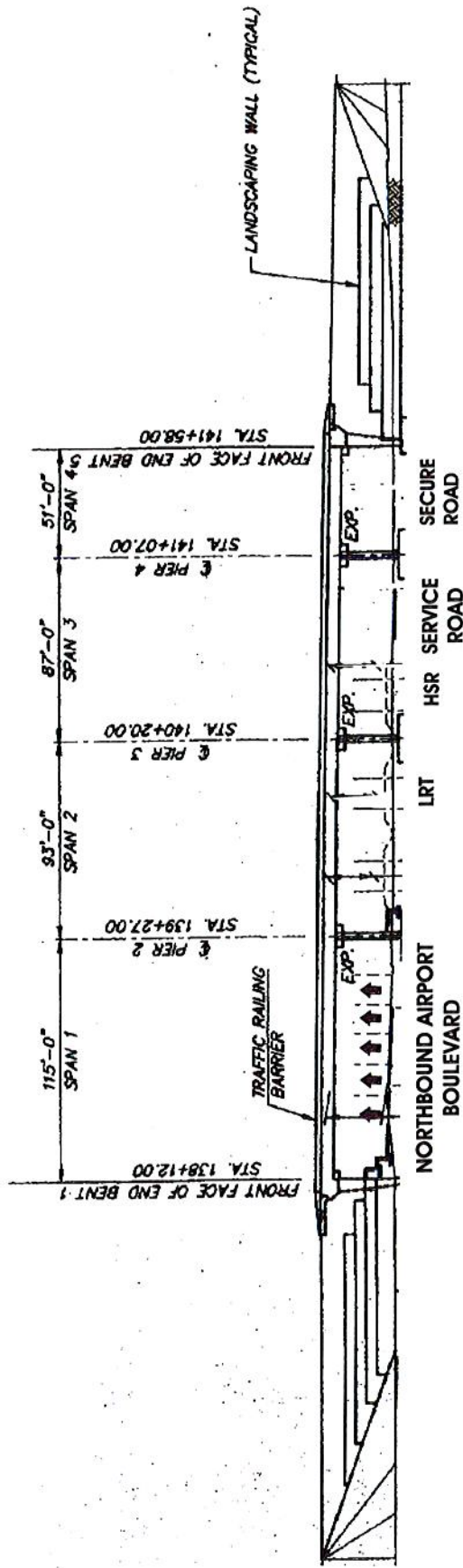
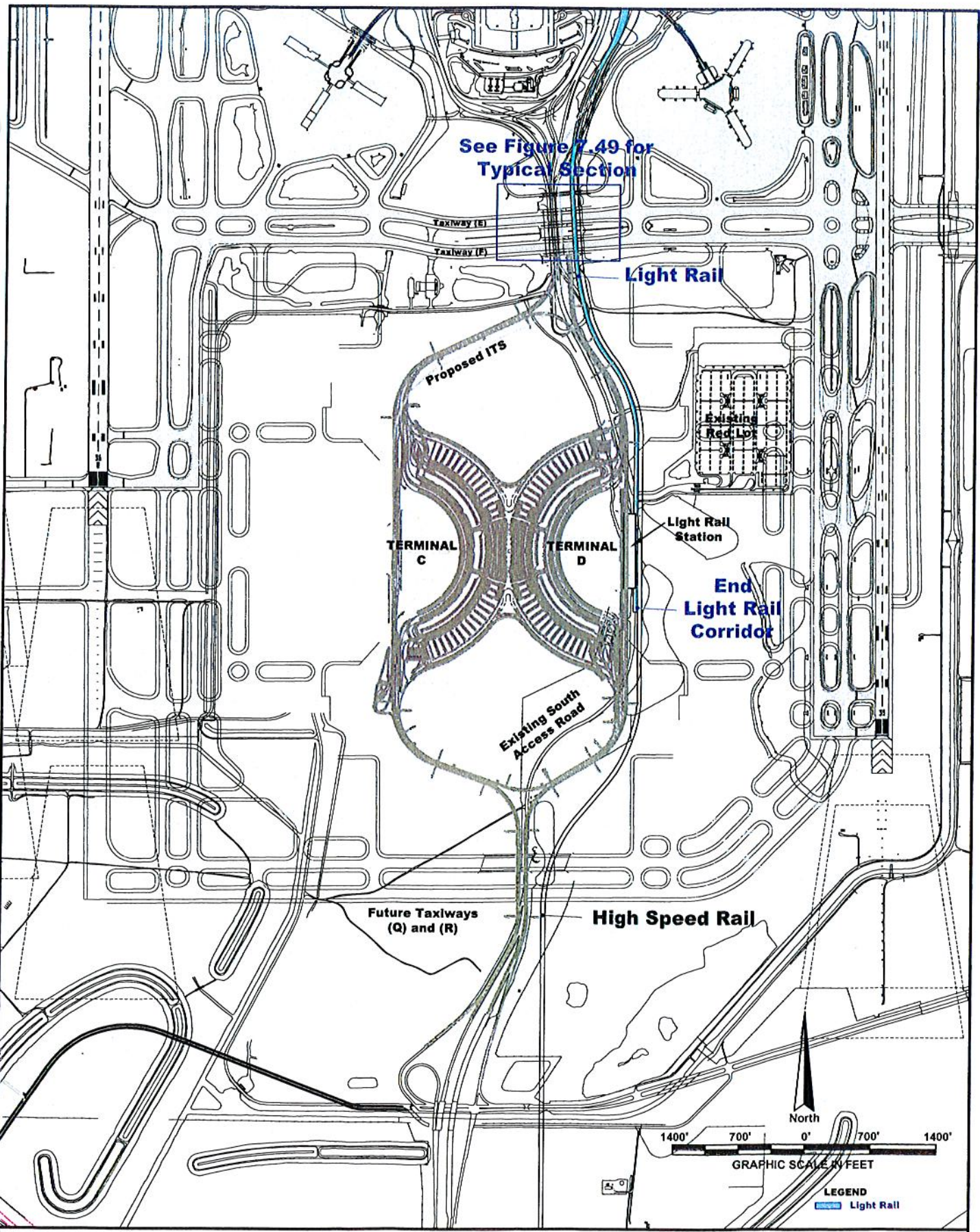


FIGURE:
7.50

NORTH-CROSSFIELD TAXIWAY EAST

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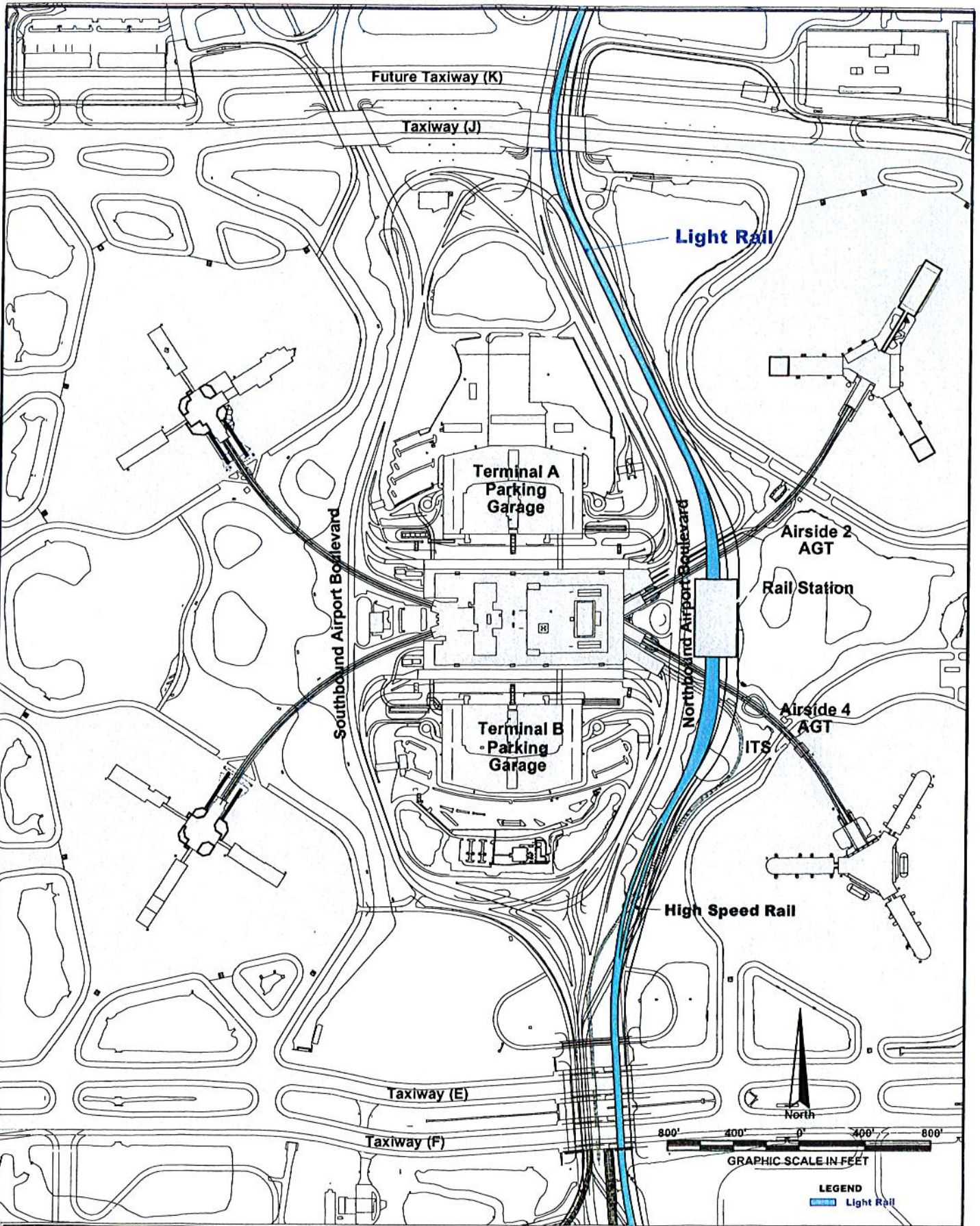
POTENTIAL LIGHT RAIL CORRIDOR AT SOUTH TERMINAL

FIGURE: 7.51

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FINAL EXHIBITS '04\FIGURE 7-52.DWG

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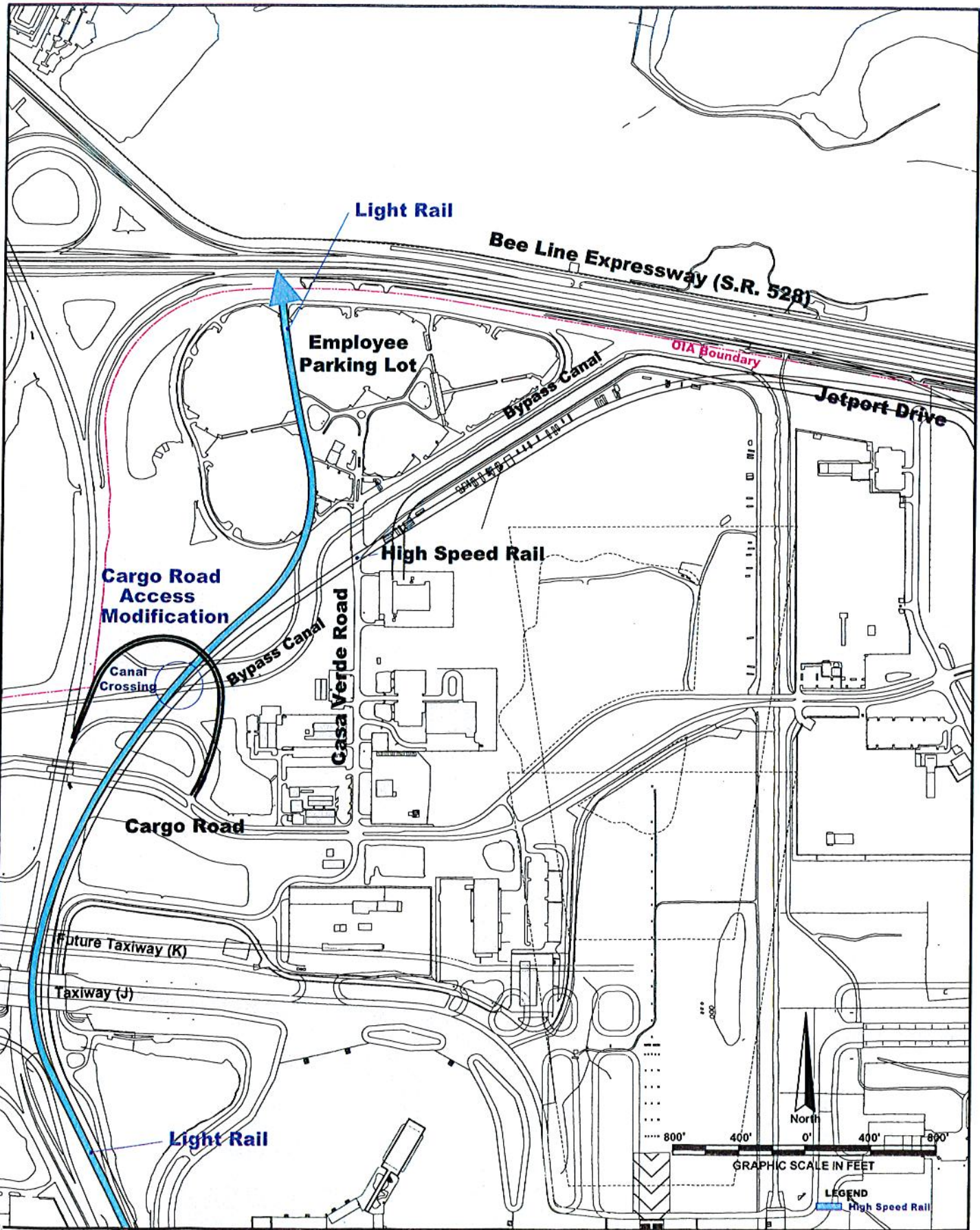
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POTENTIAL LIGHT RAIL CORRIDOR AT NORTH TERMINAL

FIGURE:
7.52

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- North Crossfield Taxiways J and Future K - A review of the design plans for the recent expansion of the taxiway bridge indicates that the existing bridge will accommodate the minimum LRT envelope. **No impacts are expected at this rail crossing location.** Figure 7-50 illustrates the typical section for the taxiway bridge and identifies the location designated for LRT.
- Cargo Road - **Cargo Road will require reconstruction to provide the minimum rail envelope.** This includes the exit ramp from northbound Airport Boulevard. Figure 7-53 illustrates the realignment of the Cargo Road exit ramp. Both Cargo Road and the exit ramp will cross over HSR and LRT. The planning efforts for Cargo Road identified a bridge elevation that would accommodate rail envelopes for LRT, HSR, and commuter rail (see Appendix J). There are currently no plans to provide commuter rail service to MCO. **Reconstruction of the Cargo Road bridge should only be designed to accommodate HSR and LRT.**
- State Road 528 - East of State Road 436, State Road 528 is at-grade. It is recommended that LRT cross over State Road 528 at this location. **No crossing(s) at bypass canal impacts are expected at this rail crossing location.**

7.3.2.4 Other Potential Impacts

The proposed LRT alignment will impact the eastern portion of the proposed southwest expansion of the existing employee lot. Figure 7-53 illustrates the segment isolated by the LRT alignment. LRT will be at-grade just north of the relocated Cargo Road exit ramp. After crossing under the ramp, the profile begins an ascent to cross over the existing employee lot. The loss of the area in the eastern portion can be mitigated with an expansion to the north between the existing lot and northbound Airport Boulevard.

7.4 Parking and Rental Car Operations

Existing parking and rental car operations at MCO occur at existing public parking, employee parking, and rental car facilities. Available data for existing conditions was utilized to identify existing deficiencies and to project future parking demand and rental car requirements. Facility requirements were established to support the projected demand for parking and rental car operations. This section documents the existing and future demand for parking and rental car operations and the recommended facility improvements.

7.4.1 EXISTING FACILITIES

7.4.1.1 Public Parking

Public parking is available for both short-term and long-term parking occupancy. Short-term parking is available in the North Terminal parking garages. The Terminal A garage, the Terminal B garage, and the terminal top levels at the North Terminal provide a total of 9,577 parking spaces for short-term parking including 204 spaces in a surface lot adjacent to the Terminal B garage.

Long-term parking is provided in three satellite lots located on airport property. The Blue Lot is located in the NWTSA just north of Cargo Road. The Blue Lot is open daily to provide long-term parking for airport passengers. The Gold Lot is located on the west side of Tradeport Drive at Bear Road. The Red Lot is located south of the mid-crossfield taxiway on the east side of South Access Road. The Gold and Red Lots are utilized for peak periods such as holidays when the Blue Lot is full. Shuttle service is provided from these lots to the terminal. The existing capacities for the satellite lots are:

- Blue Lot (open year round) - 3,373 spaces (3,102 striped, 271 overflow)
- Gold Lot (open seasonally) - 3,100 spaces (2,093 striped, 1,007 overflow)
- Red Lot (open seasonally) - 4,253 spaces (3,113 striped, 1,140 overflow)

The Near-Term Blue Lot Expansion project was recently completed and provided additional satellite parking for peak parking periods. The project consisted of replacing a portion of the existing bus staging area on the west side of the Blue Lot to accommodate 208 additional parking spaces. These additional striped spaces were assumed to be complete for the analysis of existing conditions. This improvement increased the existing capacity of the Blue Lot to 3,581 spaces (3,310 striped, 271 overflow) and total satellite parking to 10,934 spaces.

7.4.1.2 Airport Employee Parking

Employee parking is provided in a lot located on the north end of Casa Verde Road in the Northeast Terminal Support Area (NETSA). This lot has a capacity of 4,500 parking spaces. Shuttle service is provided between the employee lot and the terminal. Some employees have access to public parking at the terminal.

7.4.1.3 Rental Car Operations

MCO hosts one of the largest rental car markets in the world. Approximately 44 percent of departing passengers utilize rental cars to access the airport (*Orlando Airport, February 2003 Departing Passenger Survey, Final Report Draft*). The large rental car market and the associated operations have a significant impact on the transportation network. Rental car facilities, including rental car locations and maintenance facilities, are located on airport property and at external locations. The following sections describe the rental car operations at MCO.

Rental Car Ready/Return Spaces

The airport provides several on-site rental car companies with ready/return parking spaces at the terminal. The ready/return spaces are located in the Terminal A and B parking garages on Levels 1 and 2. There are a total of 3,865 ready/return spaces with 3,818 of these spaces under contract. Table 7-15 lists the number and location of ready/return spaces and the rental car agencies leasing the spaces.

**TABLE 7-15
EXISTING READY/RETURN SPACES**

Company	Terminal A Level 1	Terminal B Level 1	Terminal A Level 2	Terminal B Level 2	Total
Dollar	300	487	---	---	787
Budget	302	---	---	499	801
Alamo/National (Vanguard)	---	533	556	---	1,089
Avis	---	---	502	545	1,047
L&M	---	---	37	57	94
Total Leased	602	1,020	1,095	1,101	3,818
Unleased	0	22	9	16	47
Total	602	1,042	1,104	1,117	3,865

Source: Existing Ready/Return Spaces, GOAA, 2003.

Several other rental car companies provide service to airport passengers through external locations. These companies maintain shuttles to provide customer transportation between the airport and the rental car agencies. These shuttles have designated parking spaces on Level 1 curbsides in both Terminals A and B.

Quick Turn Around Facilities

The rental car companies that maintain operations on airport property have Quick Turn Around (QTA) maintenance facilities to service the rental cars. Three QTA facilities are located at the North Terminal north of the Terminal A parking garage. Additional QTA facilities are located along Terminal Service Road. The existing QTA facilities are shown on Figure 7-54.

7.4.2 FUTURE DEMAND PROJECTIONS

7.4.2.1 Public Parking

Occupancy data were obtained for the period from January 2000 through July 2003. The data available for calendar year 2000 are inconsistent and contain several anomalies. Some adjustments to the data were attempted, but the results are not reliable. The data for calendar year 2001 appear to be in good condition; however, a significant decrease in air travel occurred during the remainder of the year after September 11, 2001. Therefore, the occupancy data for 2001 is not considered suitable for forecasting future parking demand. The data for calendar year 2002 is in relatively good condition. Although these data represent parking occupancy during a recovery period for the industry, it is the best available data at this time. Figure 7-55 illustrates the peak parking demand at MCO from January through December of 2002.

The peak parking demand in 2002 occurred in December with 6,851 vehicles parked at the terminal and 8,554 vehicles parked in the satellite lots for a total of 15,405 vehicles. At 26.7 MAP in 2002, the calculated ratio is approximately 577 spaces per MAP. Using this ratio results in a peak parking demand forecast of 23,080 parking spaces for 40 MAP including 10,280 spaces located at the terminal.

Without consistent occupancy data to rely upon for establishing the ratio between the peak parking demand and air passenger traffic, two alternative approaches were used. The results of each approach were compared to results obtained from using the ratio calculated based on the 2002 occupancy data.

The first approach assumed that the peak parking demand in 2000 was equal to the existing capacity of striped spaces. The ratio between the peak demand (existing capacity) and the passenger volume for 2000 (30.8 MAP) is approximately 594 spaces per MAP. Using this ratio for projecting future parking demand results in a peak demand of 23,760 parking spaces for 40 MAP including 12,480 spaces at the terminal.

The second approach uses the projections developed by Leigh Fisher Associates documented in the *Parking Planning Book, 1997*. This study projected a peak demand for 19,956 parking spaces, including 9,910 terminal spaces, for 19.9 million enplanements (approximately 39.8 MAP). The resulting ratio is approximately 501 spaces per MAP. Using this ratio results in a peak demand of 20,040 parking spaces for 40 MAP including 9,960 spaces at the terminal.

The resulting peak parking demand forecasts for 40 MAP for each approach are summarized below:

	Terminal Spaces	Total Spaces
2002 Occupancy	10,280	23,080
2000 Capacity	12,480	23,760
Leigh Fisher	9,960	20,040

The results of the first two approaches are similar indicating that a peak parking demand forecast for 40 MAP of between 23,080 and 23,760 spaces is appropriate. A demand projection of 23,600 parking spaces for 40 MAP was subsequently agreed to at a parking coordination meeting with

GOAA staff held on October 2, 2003. This equates to a peak parking demand to a MAP ratio of 590 spaces per MAP.

The projected terminal peak parking demand results using the 2002 occupancy data and the Leigh Fisher projections are similar. The projected demand using the existing capacity as the basis for the ratio is significantly higher. Several reasons are suggested for the apparent drop in the proportion of terminal parking demand relative to total parking demand:

- Increase in maximum daily terminal parking rates from \$12 per day to \$15 per day,
- Improvement in satellite shuttle service,
- Location of the Blue Lot with easy access, and
- Increase in the proportion of budget conscious travelers.

In consideration of these apparent changes in parking preferences, it is recommended that the forecast for peak terminal parking demand be based on the ratio developed using the 2002 occupancy and air passenger traffic data.

Conclusion

The forecast peak parking demands recommended for each air passenger traffic scenario are listed as follows:

- North Terminal at 40 MAP
 - Projected demand: 23,600 spaces (10,300 spaces at the terminal)
- North Terminal at 35 MAP, South Terminal at 10 MAP
 - Projected demand: 26,550 spaces (9,000 spaces at the North Terminal, 2,600 spaces at the South Terminal)
- North Terminal at 35 MAP, South Terminal at 25 MAP
 - Projected demand: 35,400 spaces (9,000 spaces at the North Terminal, 6,500 spaces at the South Terminal)

Figure 7-56 illustrates the projected growth in peak parking demand versus the projected growth in air travel. The projected demand was combined with a 10 percent reserve capacity to develop recommended facility requirements for public parking. These new facility requirements assume the existing total parking capacity of 20,511 spaces (9,577 terminal parking spaces and 10,934 satellite parking spaces) is maintained and the reserve capacity is located in satellite parking. The future parking space requirements are recommended as follows:

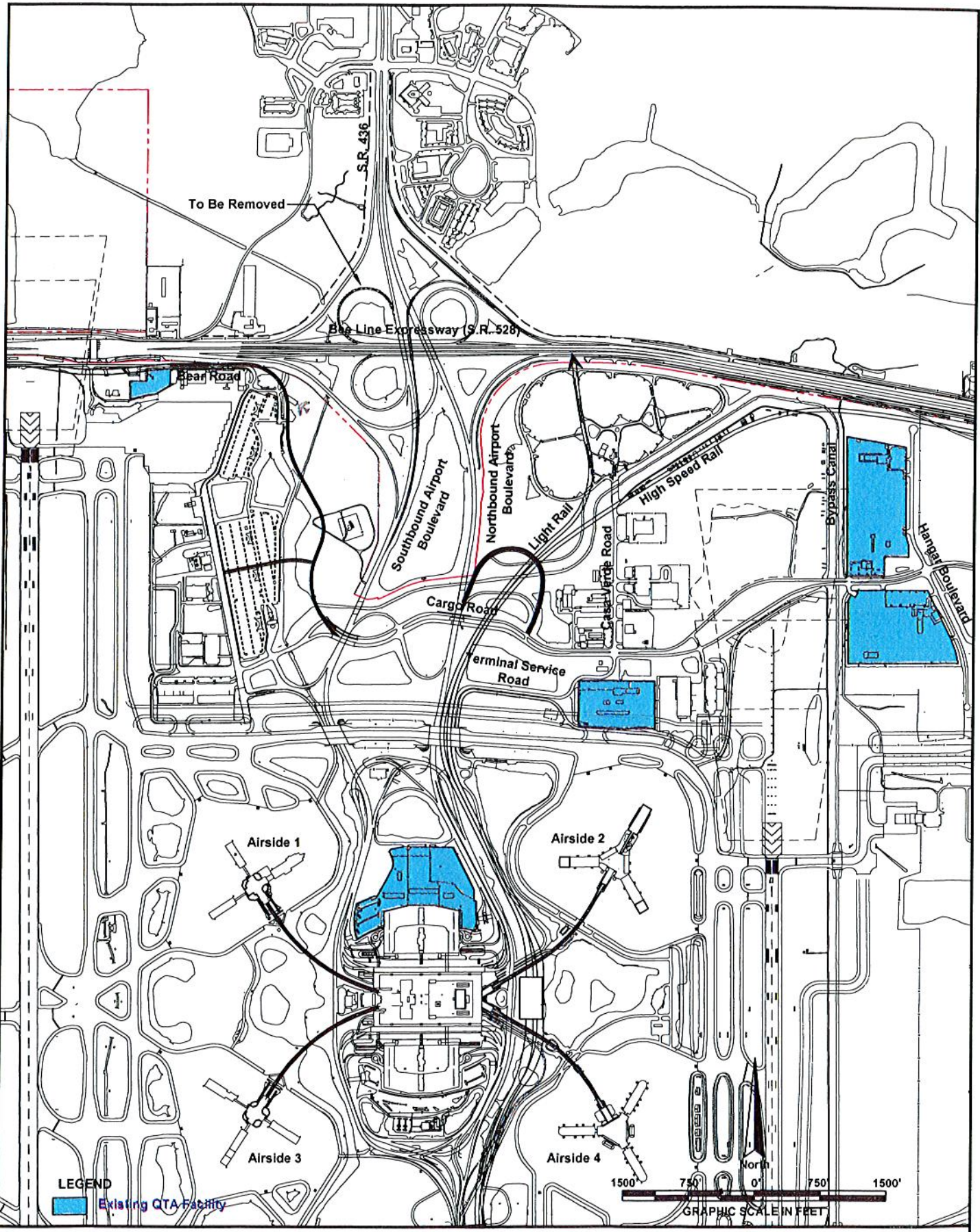
- North Terminal at 40 MAP
 - Total demand: 25,960 spaces (5,449 additional spaces - 723 terminal spaces and 4,726 satellite parking spaces)
- North Terminal at 35 MAP, South Terminal at 10 MAP
 - Total demand: 29,205 spaces (8,694 additional spaces - 2,600 spaces at the South Terminal and 6,094 satellite parking spaces)
- North Terminal at 35 MAP, South Terminal at 25 MAP
 - Total demand: 38,940 spaces (18,429 additional spaces - 6,500 spaces at the South Terminal and 11,929 satellite parking spaces)

Section 7.4.3.1 documents potential improvements that were identified to increase existing terminal and satellite parking capacity.

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EXISTING QTA FACILITIES

FIGURE:
7.54

Figure 7.55 - Existing (2002) Peak Parking Occupancy

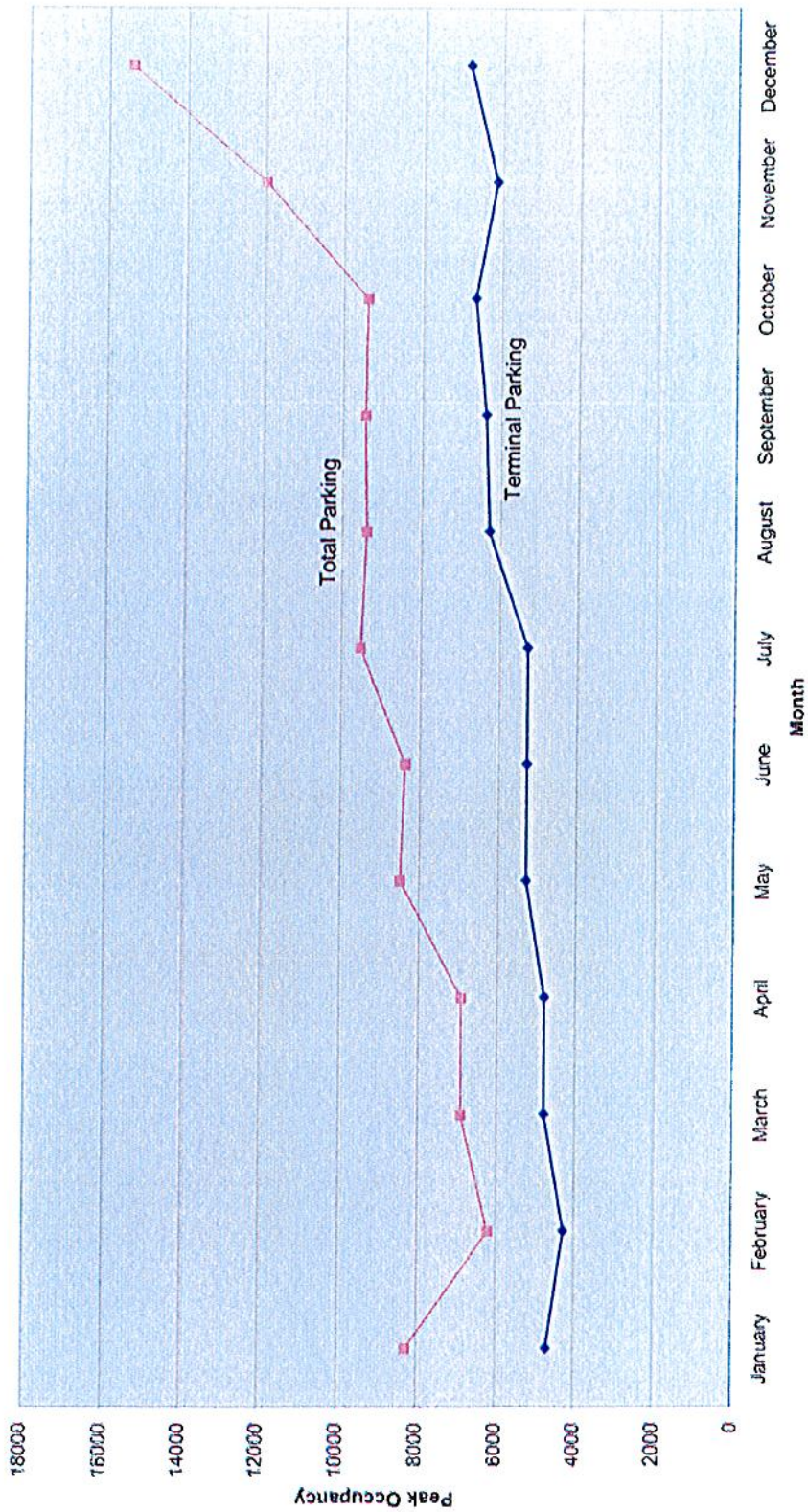
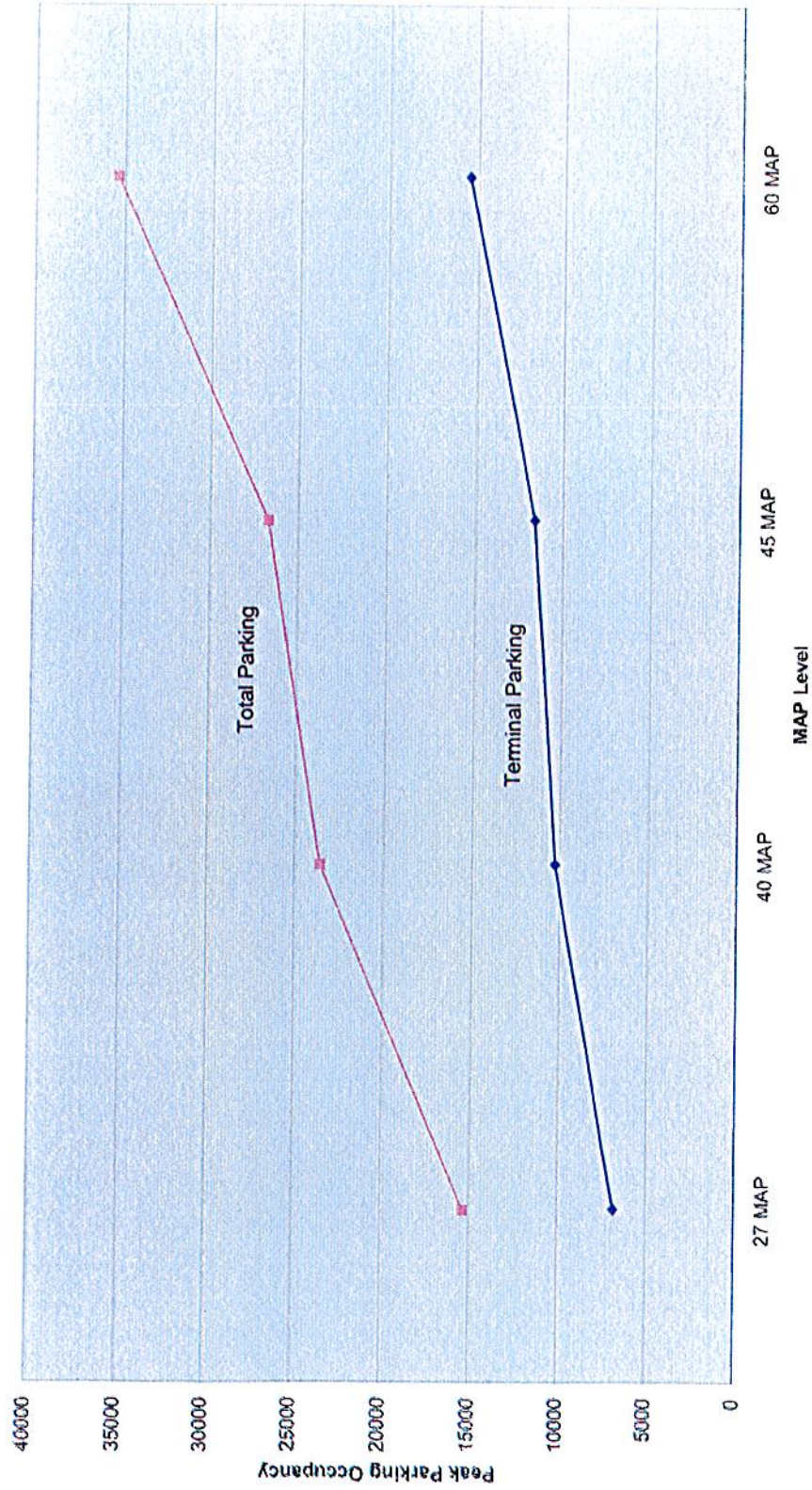


Figure 7.56 Projected Peak Parking Demand



7.4.2.2 Employee Parking

Occupancy data were not available to develop a ratio for employee peak parking occupancy and air passenger traffic volumes. However, vehicle traffic counts were taken for Casa Verde Road just south of the employee entrance in 2000 and 2003. These traffic counts indicate that peak occupancy occurs during weekdays between 11:00 a.m. and 2:00 p.m.

Using the 2000 traffic counts to estimate occupancy, it appears that the peak occupancy for the employee lot was near the capacity of 4,500 vehicles in 2000 with an annual air passenger traffic volume of 30.8 MAP. However, using the 2003 traffic counts, with a lower annual air passenger traffic volume of 27.0 MAP, suggests that the current peak occupancy may be still near capacity and that the ratio of peak employee parking demand to MAP has increased. This may be the result of an increase in the number of security staff at the terminal. It is recommended that an occupancy count be taken during the weekday peak period between 11:00 a.m. and 2:00 p.m. to more accurately identify the current peak occupancy for employee parking.

Conclusion

Using the 2000 peak occupancy to million annual passenger ratio, the forecast peak parking demands for the employee lot are as follows:

- North Terminal at 40 MAP
 - Demand: 5,900 spaces
- North Terminal at 35 MAP, South Terminal at 10 MAP
 - Demand: 6,600 spaces
- North Terminal at 35 MAP, South Terminal at 25 MAP
 - Demand: 8,800 spaces

Figure 7-57 illustrates the projected growth in peak parking demand for employees. The projected demand results in the following future space requirements assuming the existing capacity of 4,500 spaces is maintained:

- North Terminal at 40 MAP
 - 1,400 additional spaces
- North Terminal at 35 MAP, South Terminal at 10 MAP
 - 2,100 additional spaces
- North Terminal at 35 MAP, South Terminal at 25 MAP
 - 4,300 additional spaces

Section 7.4.3.2 documents potential improvements that were identified to increase existing employee parking capacity.

7.4.2.3 Rental Car Operations

Rental Car Ready/Return Spaces

Data on the number of cars rented versus the number of annual air passengers were not readily available. These data are not collected by MCO and rental car companies do not publish data on the number of transactions completed each year. The only data available includes the total number of existing ready/return spaces (3,865 spaces), the number ready/return spaces currently leased (3,818 spaces), and the number of additional spaces requested by both on-site and off-site rental car

companies. Therefore, estimates for future demand for ready/return spaces were developed using three different approaches. Each approach was used to establish a demand for ready/return spaces at a passenger forecast level of 40 MAP. For passenger forecast levels beyond 40 MAP, it was assumed that the ratio established between the annual volume of passengers and the demand for ready/return spaces at 40 MAP remained constant through 60 MAP. This methodology produced three forecast scenarios (low, intermediate, and high) for each passenger forecast level.

The low and high scenarios assume that the number of spaces recently requested by rental car companies and the number of spaces currently leased will satisfy the projected demand for 40 MAP. Requests for additional ready/return spaces by companies already located on-site total 723 spaces. The companies making these requests included Alamo/National (Vanguard), Budget, and L&M. Companies located off-site were surveyed by GOAA Planning staff to determine how many spaces they would be interested in leasing if given an opportunity to come on-site. Off-airport companies indicating an interest in coming on-site included Thrifty, Enterprise, and Hertz. The total of their potential requests for ready/return spaces totaled 1,704 spaces.

Assuming these requests represent total increases in demand through the 40 MAP level, the demand level for 40 MAP ranges from a low of 4,541 to a high of 6,245 ready/return spaces. The low demand forecast is based on the assumption that the number of spaces currently leased plus requests from on-site rental car companies for 723 additional spaces will satisfy the demand for 40 MAP. The high demand forecast for 40 MAP is the combination of the low demand forecast plus requests from off-site rental car companies (totaling 1,704 spaces) that have indicated an interest to relocate on-site in recent surveys conducted by GOAA Planning staff.

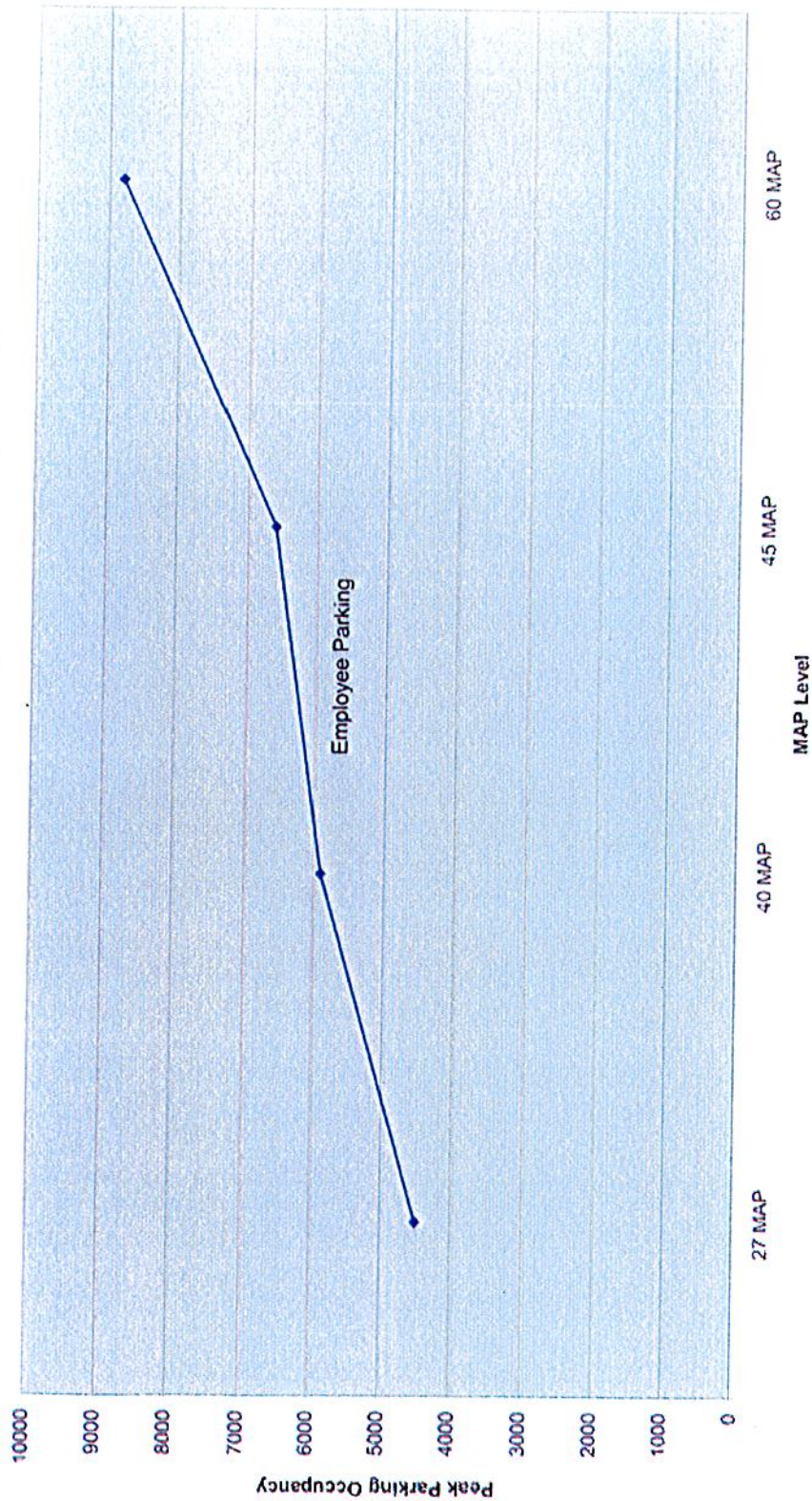
An intermediate forecast demand for 40 MAP was developed by assuming that the number of spaces leased in 2000 satisfied the demand in 2000. The number of spaces leased in 2000 is equal to the number of spaces currently leased (3,818). The passenger volume in 2000 was 30.8 MAP. Using the ratio of the number of spaces leased to the volume of passengers in 2000, the demand for ready/return spaces at 40 MAP is forecast to be 4,960 spaces.

Conclusion

The 45 MAP and 60 MAP demand forecasts for each scenario were extrapolated utilizing the rental car ratios established at 40 MAP. The low, intermediate, and high range demand forecasts for the number of ready/return spaces required for each passenger forecast level are listed below:

- North Terminal at 40 MAP
 - Low demand: 4,541 spaces
 - Intermediate demand: 4,960 spaces
 - High demand: 6,245 spaces
- North Terminal at 35 MAP, South Terminal at 10 MAP
 - Low demand: 5,110 spaces (3,975 spaces at the North Terminal, 1,135 spaces at the South Terminal)
 - Intermediate demand: 5,580 spaces (4,340 spaces at the North Terminal, 1,240 spaces at the South Terminal)
 - High demand: 7,030 spaces (5,470 spaces at the North Terminal, 1,560 spaces at the South Terminal)
- North Terminal at 35 MAP, South Terminal at 25 MAP
 - Low demand: 6,810 spaces (3,975 spaces at the North Terminal, 2,835 spaces at the South Terminal)

Figure 7.57 Projected Employee Peak Parking Demand



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PROJECTED EMPLOYEE PEAK PARKING DEMAND

FIGURE:
7.57

- Intermediate demand: 7,440 spaces (4,340 spaces at the North Terminal, 3,100 spaces at the South Terminal)
- High demand: 9,370 spaces (5,470 spaces at the North Terminal, 3,900 spaces at the South Terminal)

Section 7.4.3.3 documents potential improvements that were identified to provide additional rental car ready/return spaces.

7.4.3 DEVELOPMENT OF PARKING ALTERNATIVES

Several improvements have been identified to increase the existing capacities for public parking, employee parking, and rental car operations.

7.4.3.1 Public Parking

Terminal Parking

There are two potential concepts to expand the existing parking garage to provide additional public parking and rental car parking capacity.

Concept 1 involves the expansion of the existing parking garage structure by completing Level 6 on both the Terminal A and Terminal B garages. This expansion will provide up to 1,400 additional spaces. However, the existing structure was not designed to accommodate the additional structural load associated with a sixth level. The existing columns and infrastructure will need to be analyzed further to determine if this is a viable option.

Concept 2 includes the construction of winglets on both the Terminal A and Terminal B garages for Levels 3 through 6. This expansion will provide up to 1,600 additional spaces depending upon the configuration of the winglets and the number of levels constructed. The existing parking garage structure was designed to accommodate expansion of the Terminal A garage to the north and the Terminal B garage to the south for the existing levels. Potential construction conflicts include the displacement of existing ground level land uses and the possible reconstruction of the existing slip ramp from departures. The construction of a Level 6 winglet would require the completion of Level 6 as described in Concept 1.

Satellite Parking

Several concepts have been analyzed that involve providing additional satellite parking to accommodate parking capacity. These concepts include expanding the existing Blue Lot, expanding the existing Red Lot, and constructing a new satellite lot.

Two options were identified to expand the existing Blue Lot. This expansion is necessary to meet the parking demand for 31 MAP and may be necessary earlier if the Gold Lot is closed for future land development. Both of the options include the proposed realignment of Cargo Road to connect with Bear Road east of the existing Blue Lot. The configuration of the parking lots varies depending on the two options for the Cargo Road realignment (as described in Section 7.2.5.1). Both of the options for the Blue Lot expansion maintain the greenbelt buffer along Airport Boulevard and the State Road 528 interchange and require the relocation of the existing canal.

Option 1 for the Blue Lot expansion is based on the construction of the Cargo Road Extension - Option 1. This roadway alignment borders the existing Blue Lot to the east and will require the expansion of the Blue Lot to occur on the opposite side of the proposed roadway. The proposed Blue Lot expansion (Option 1) will encompass 26.9 acres and provide 2,300 additional parking spaces. The proposed Blue Lot Expansion (Option 1) is shown on Figure 7-58.

Option 2 for the Blue Lot expansion is based on the construction of the Cargo Road Extension - Option 2. This roadway alignment will allow the expansion of the existing Blue Lot to the east. The proposed alignment for Cargo Road will border the east side of the new lot. The proposed Blue Lot expansion (Option 2) will encompass 33.5 acres and provide 3,100 additional parking spaces. The proposed Blue Lot Expansion (Option 2) is shown on Figure 7-59.

Three phases were developed to expand the existing Red Lot to provide additional parking capacity. Phase A consists of a 42.0-acre expansion of the existing Red Lot to the north and west that will provide 3,850 parking spaces. Phase A provides 3,465 additional satellite parking spaces and displaces approximately 385 overflow spaces at the existing Red Lot. Phase B consists of a 15.3-acre expansion of the existing Red Lot that will provide 1,220 additional parking spaces. Phase C consists of a 26.2-acre expansion south of the proposed taxi hold area that will provide 2,400 additional parking spaces. The proposed taxi hold area will encompass 5.5 acres and provide 550 spaces for taxi staging. The three combined phases will expand the existing Red Lot by 7,085 spaces. The concept for the Red Lot expansion is shown on Figure 7-60. Potential construction conflicts include possible wetland impacts and HSR impacts. The proposed alignment for HSR will require a grade-separated access over to the Red Lot.

An alternative to expanding the Red Lot is to construct a new satellite lot in the Southwest Terminal Support Area (SWTSA). This location would prevent conflict with the proposed HSR alignment. The distance to the North Terminal is a disadvantage to this location.

7.4.3.2 Employee Parking

There are several expansion options to provide additional employee parking capacity. These options include expanding the existing lot to the southwest or southeast of the existing lot or south of the existing terminal.

The existing lot can be expanded to the southwest to provide 1,800 additional striped spaces. The lot size is limited due to the proximity of northbound Airport Boulevard and State Road 528. This expansion option is shown on Figure 7-61. Potential construction conflicts include wetland impacts and potential rail impacts.

Another option is to construct a new lot southeast of the existing employee lot across the existing canal. The proposed southeast expansion, shown on Figure 7-61, will encompass 37.5 acres and provide 3,000 additional parking spaces. This option will require the construction of a bridge over the existing canal between the two lots. Potential rail impacts may limit the size of this lot.

A third option is to construct a new lot in the SWTSA or Southeast Terminal Support Area (SETSA) to avoid rail impacts. This option would allow the lot to be built to accommodate the employee parking demand. The distance to the North Terminal is a disadvantage to this location. Additional employee parking to support the future South Terminal will be identified during the design of the South Terminal Complex.

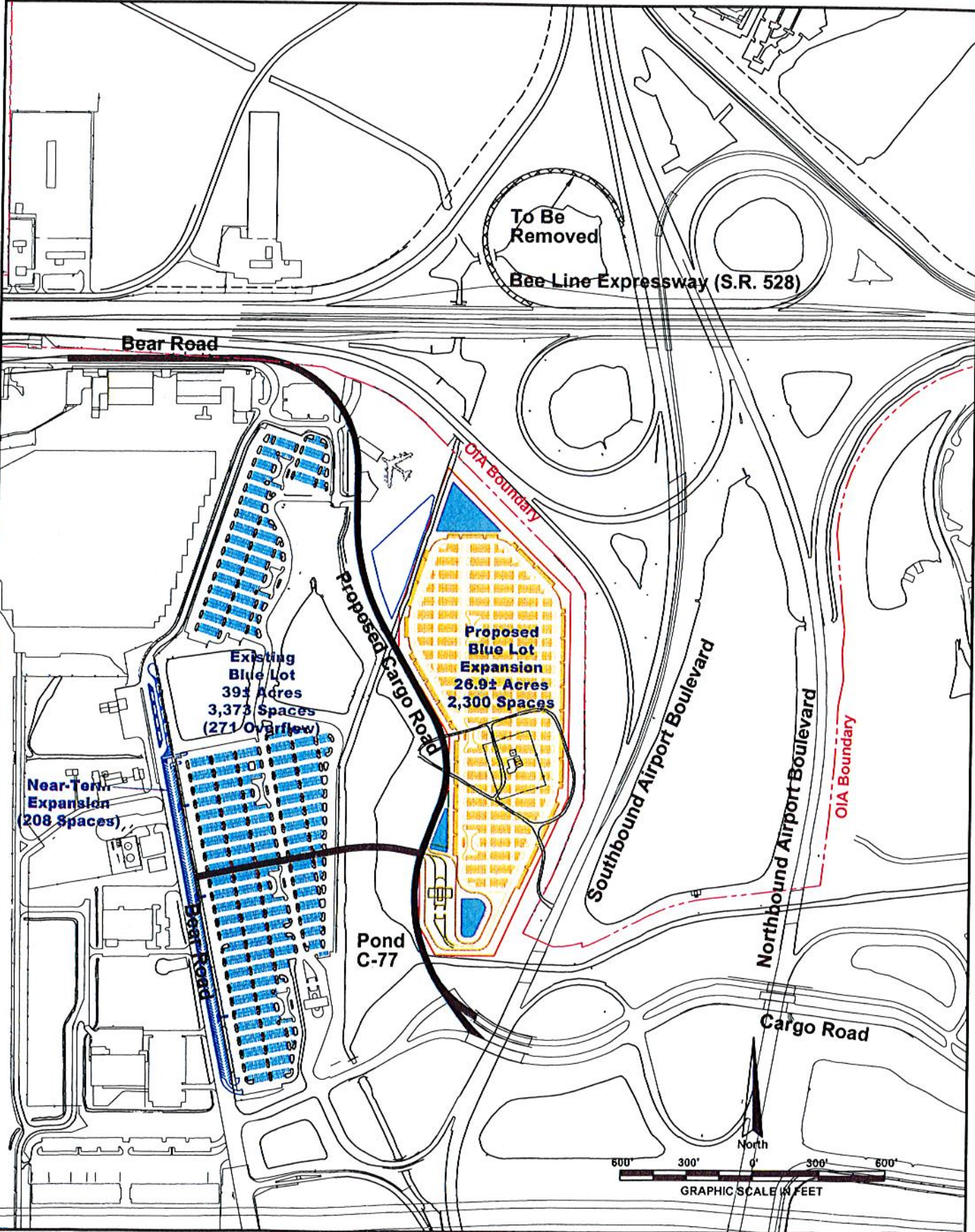
7.4.3.3 Rental Car Operations

The analysis of future demand for rental car operations documented in Section 7.4.2.3 showed a ready/return space demand ranging from 4,541 spaces to 6,245 spaces for 40 MAP at the North Terminal. The existing capacity is 3,865 spaces resulting in an additional requirement of between 676 and 2,380 ready/return spaces. There are two options available to provide additional ready/return spaces to address the projected demand. The first option consists of converting Level 3 of both the existing Terminal A and B garages from public parking to ready/return spaces. This option would provide up to 2,270 additional ready/return spaces at the North Terminal. The disadvantage of this option is the loss of 2,270 public parking spaces. Implementing this option would result in the

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LAN\FINAL EXHIBITS '04\FIGURE 7-58.DWG

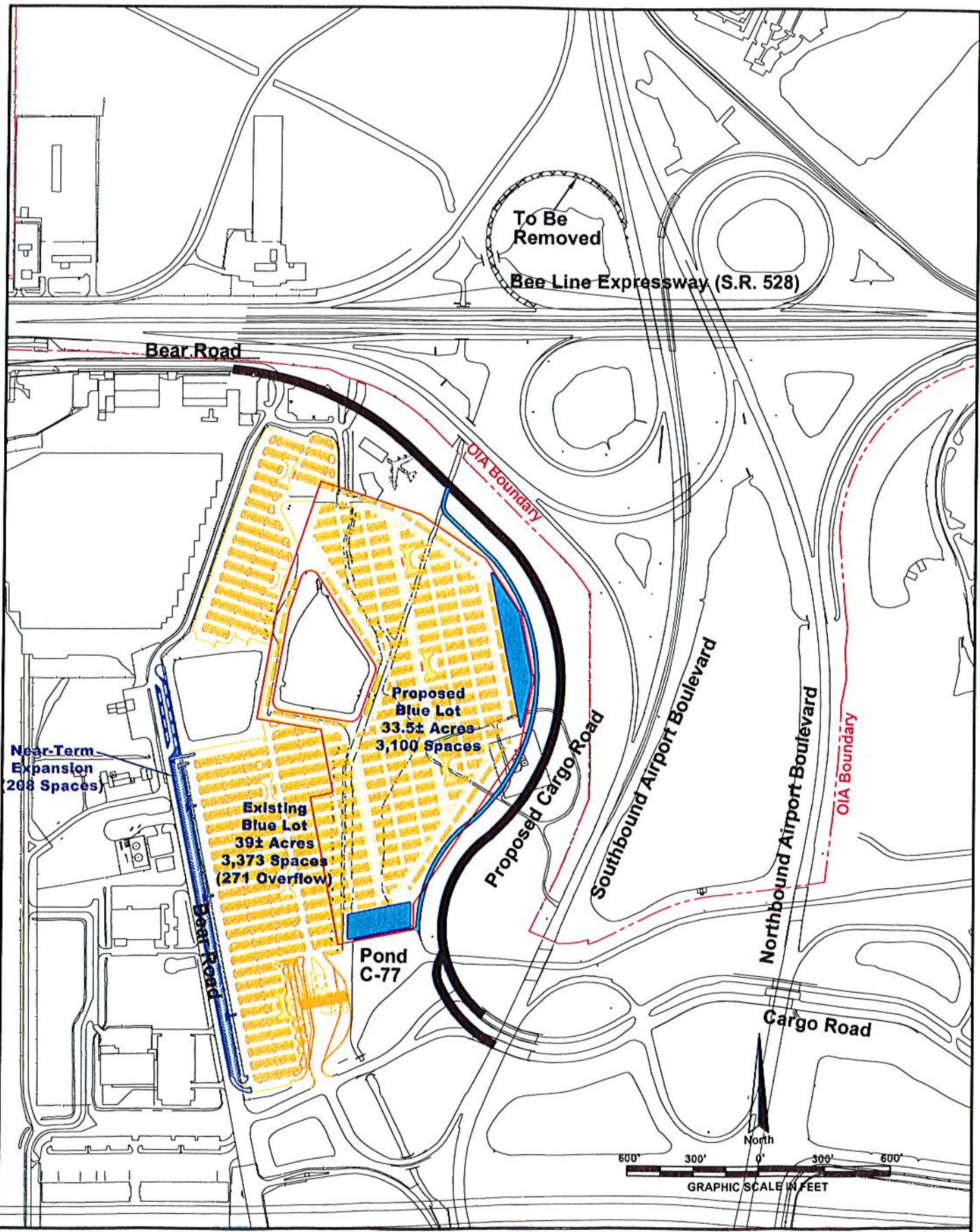
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LAN\FINAL EXHIBITS '04\FIGURE 7-59.DWG

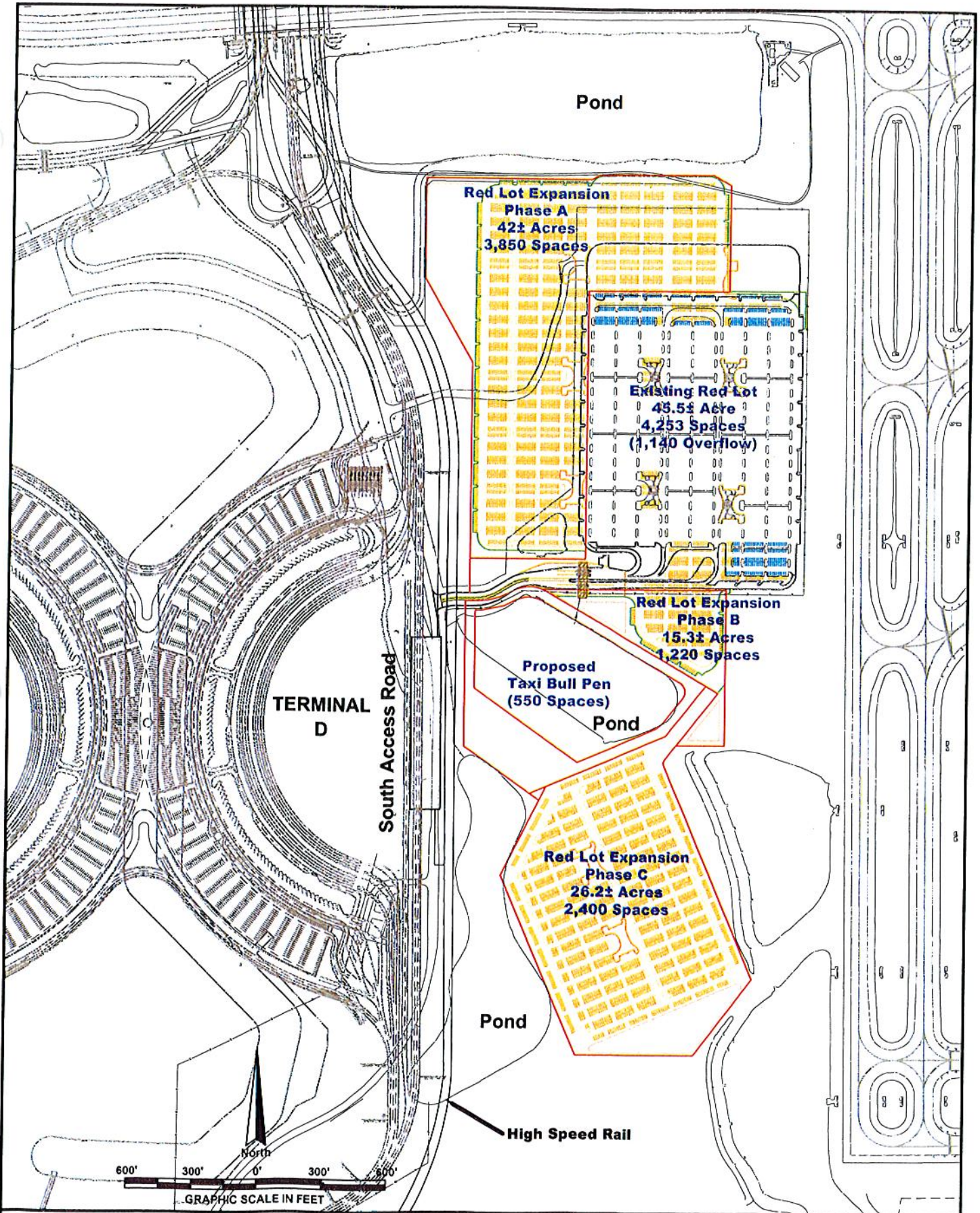
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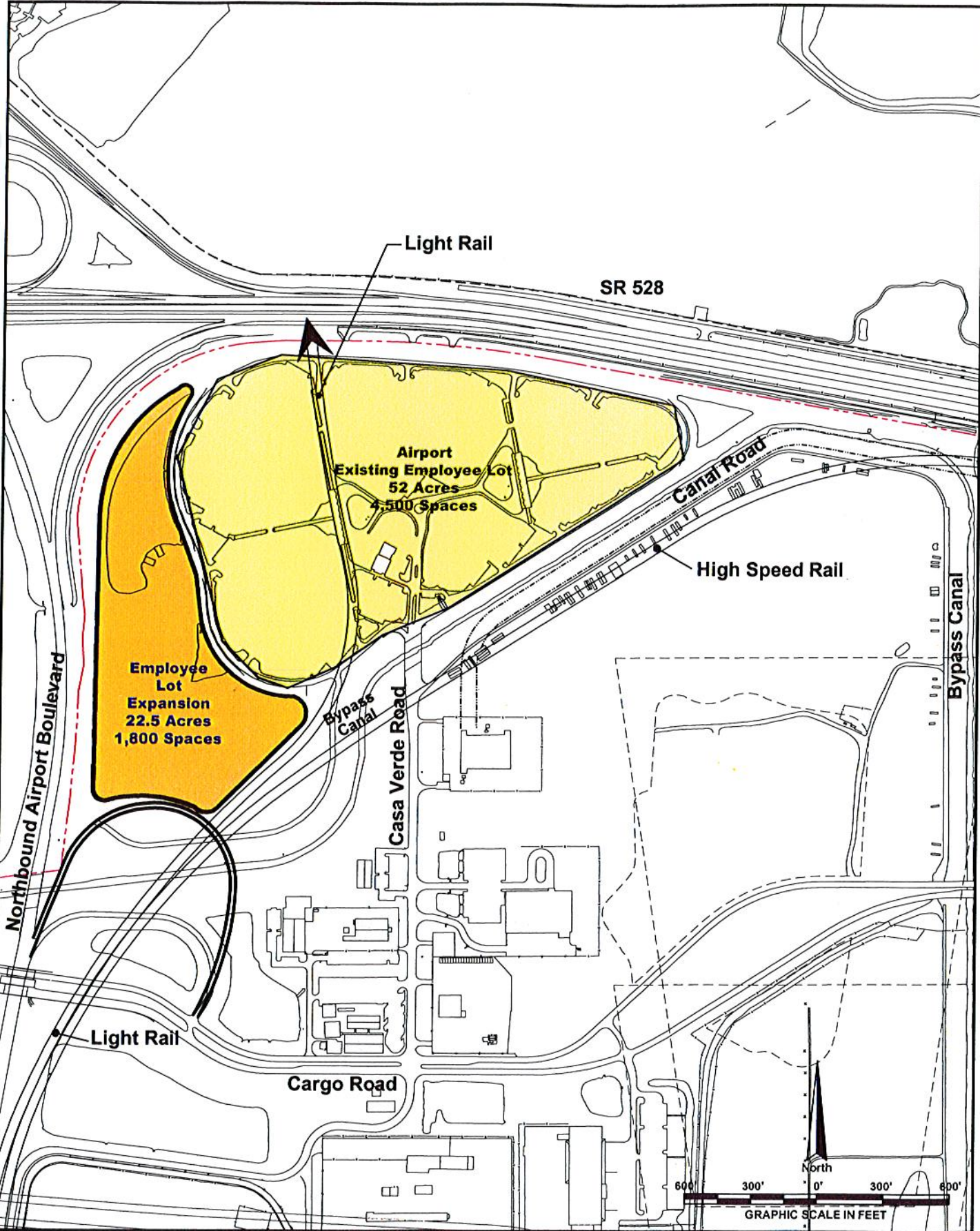
RED LOT EXPANSION - PHASING

FIGURE:
7.60

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PLAN\FINAL EXHIBITS '04\FIGURE 7-61.DWG

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**EMPLOYEE LOT EXPANSION OPTIONS
 WITH POTENTIAL RAIL CORIDORS**

**FIGURE:
 7.61**

terminal public parking demand exceeding existing garage capacity as early as 28 MAP. The second option consists of constructing winglets (as identified in the *Parking Planning Book*) on both the Terminal A and B garages for Levels 1 and 2. This option would provide up to 800 additional ready/return spaces at the North Terminal. The disadvantage of this option is the displacement of existing ground level uses where the winglets are proposed.

7.4.4 POTENTIAL IMPACTS

Issues that may affect the future availability of existing terminal and satellite parking include the following:

- The taxi hold bullpen is currently located at the North Terminal south of the Terminal B parking garage. A concept has been developed to relocate this staging area to the existing Red Lot which may displace approximately 500 spaces.
- Gold Lot - The overflow portion and the entire Gold Lot are anticipated to be closed within the next 10 years due to changes in surrounding land uses. Closing the Gold Lot will require replacement of a total of 3,100 spaces, including 2,093 striped spaces and 1,007 overflow spaces. The overflow portion may be closed prior to or with the striped spaces of the Gold Lot.
- Red Lot - The preliminary proposed alignment of HSR along the east side of South Access Road will sever the existing access between South Access Road and the Red Lot. A bridge over the HSR corridor would be required to maintain access to the Red Lot.

7.4.5 EVALUATION OF ALTERNATIVES

A two-part decision tree has been developed to illustrate the options identified to address capacity requirements through 40 MAP and the potential issues that may impact existing capacity. The first part of the decision tree addresses the parking garages at the North Terminal. This graphic identifies several alternatives developed from the options identified above for increasing public parking and ready/return capacity. Once the appropriate decisions identified on this graphic have been made, the adjusted capacity, if any, of the North Terminal parking garages can be determined. This capacity becomes an input to the second part of the decision tree which identifies alternatives for increasing total public parking capacity. The parking decision tree is shown on Figure 7-62.

Several possible capacity adjustments to the North Terminal garages are possible. This results in several possible inputs to the second part of the decision tree. The example provided illustrates one possible outcome. In this example, it was determined no expansion of the existing garage would take place and the third level of the parking garage would be converted to ready/return spaces. This results in a capacity reduction of 2,270 public parking spaces at the terminal and an adjusted capacity of 7,307 public parking spaces. This loss of capacity is accounted for in the computation of required new public parking spaces provided in the upper left-hand side of the second part of the decision tree. From that point, there are still four decisions that must be made to identify the improvements needed to accommodate the forecast demand through 40 MAP.

7.5 Surface Transportation Improvement Program

The improvements listed in each subsection that follows are recommended for inclusion into the Surface Transportation Improvement Program. These improvement projects are recommended based on the results of the analyses of existing and projected traffic conditions and the evaluations of concept alternatives. The recommended Surface Transportation Improvement Program will support passenger demand levels through 60 MAP which is assumed to occur by 2025.

7.5.1 YEAR 2010

The improvements listed below are recommended prior to 2010. These improvements are necessary to satisfy the projected demand requirements through 40 MAP.

7.5.1.1 Roadway

- South Access Road (Phase 1) - Widen from two lanes to four lanes (two lanes per direction) from Heintzelman Boulevard to Airport Boulevard north of the mid-crossfield taxiway,
- Northbound Airport Boulevard - Widen from three lanes to four lanes between Cargo Road and State Road 528,
- Southbound Airport Boulevard - Widen from three lanes to four lanes between State Road 528 and Cargo Road, and
- Terminal A Exit Weave - Reconfiguration of merging area of the parking garage exit, realignment of rental car exit to merge with parking garage exit, and reconfiguration of downstream diverge area.

7.5.1.2 Parking

- Expand Blue Lot Satellite Parking - Add 3,100 additional spaces,
- Expand the Red Lot Satellite Parking Phase A - Provides 3,465 additional spaces, and
- Expand Employee Parking Lot - Add 1,800 striped spaces.

7.5.2 YEAR 2015

The improvements listed below are recommended to be in place by 2015. These improvements are necessary to satisfy the projected demand requirements through 45 MAP. It is assumed that the South Terminal will be open by 2015 and that the loop road system for the South Terminal will be included with its construction.

7.5.2.1 Roadway

- Tradeport Drive North of Bear Road - Widen from four lanes to six lanes (three lanes per direction),
- State Road 417/Boggy Creek Road Interchange - Interchange modification to a full access interchange,
- Airside Commercial Curb - Construct roadway access directly to Airsides 1 and 3,
- Dowden Road Extension - Extend the existing four-lane divided roadway from its current terminus at the HBJ building to intersect with Heintzelman Boulevard,
- Heintzelman Boulevard Extension - Extend the existing four-lane divided roadway from its current terminus at its interchange with South Access Road west to intersect with Boggy Creek Road at Wetherbee Road, and
- Wetherbee Road - Widen from two lanes to four lanes (two per direction) from Boggy Creek Road west to Orange Avenue; widening the segment near Boggy Creek Road is planned as a land development project.

7.5.2.2 Parking

- Expand Employee Parking Lot - Add 700 striped spaces.

7.5.3 YEAR 2025

The improvements listed below are recommended to be in place by 2025. These improvements are necessary to satisfy the projected demand requirements through 60 MAP.

PUBLIC PARKING ALTERNATIVES

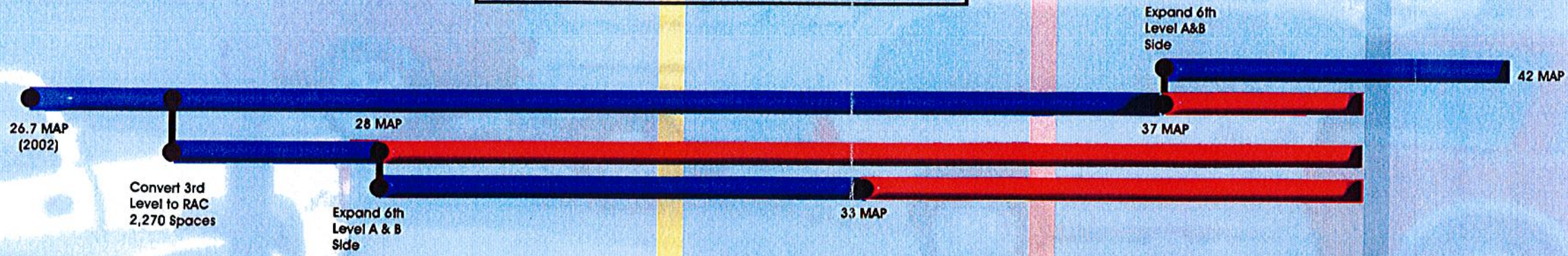
FIGURE:
7.62

TERMINAL PARKING

Existing Terminal Capacity
 9,577 Public Spaces=37 MAP
 3,865 RAC Spaces
 (3,818 Leased, 47 Unleased)
 2002 Peak Occupancy - 6,851 Spaces

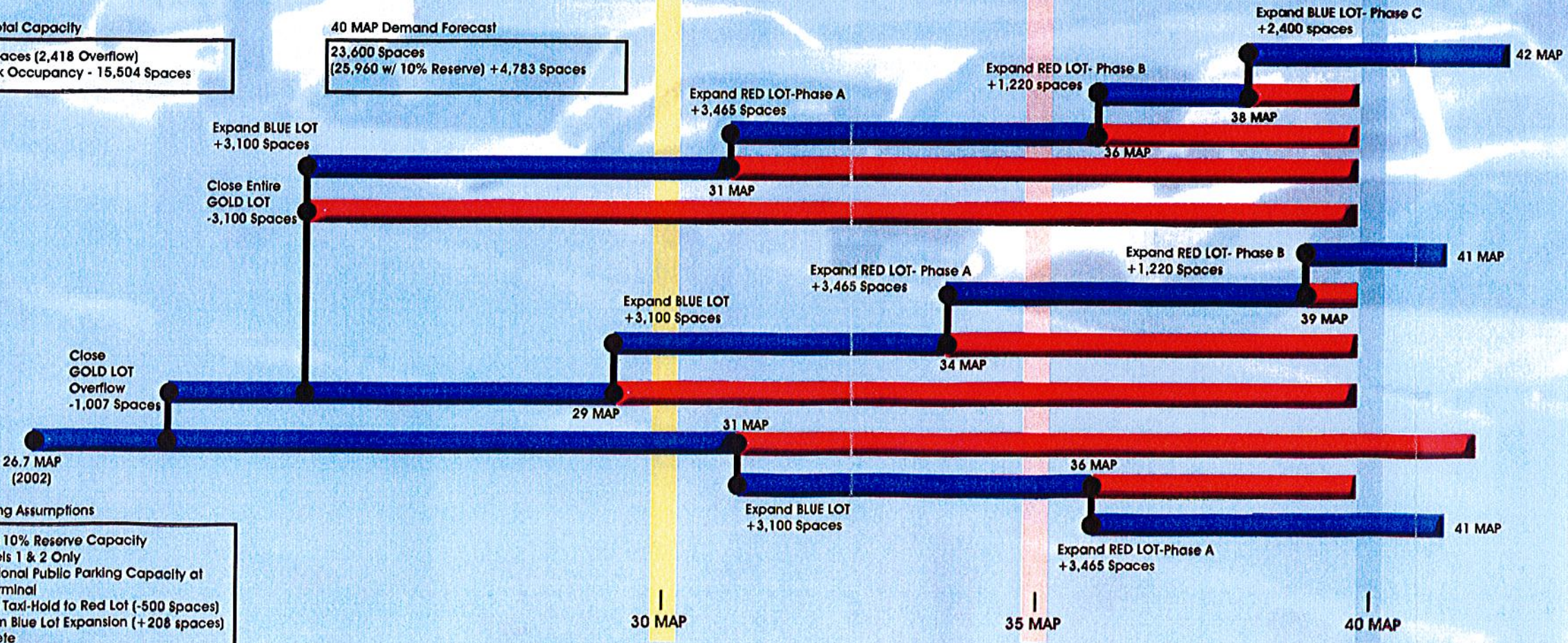
40 MAP Demand Forecast
 10,300 Public Spaces + 723 Public Spaces
 6,245 RAC Spaces (High) +2,380 RAC Spaces
 4,960 RAC Spaces (Mid) +1,095 RAC Spaces
 4,541 RAC Spaces (Low) + 676 RAC Spaces
 On-Site Request: 723 - ANC (543), Budget (120), L&M (60)
 Off-Site Request: 1,704 - Thrifty (330), Enterprise (325), Hertz (1,049)

LEGEND
 Demand < Capacity
 Demand > Capacity



Existing Total Capacity
 20,511 Spaces (2,418 Overflow)
 2002 Peak Occupancy - 15,504 Spaces

40 MAP Demand Forecast
 23,600 Spaces
 (25,960 w/ 10% Reserve) +4,783 Spaces



Total Parking Assumptions

- Maintain 10% Reserve Capacity
- RAC-Levels 1 & 2 Only
- No additional Public Parking Capacity at North Terminal
- Relocate Taxi-Hold to Red Lot (-500 Spaces)
- Near Term Blue Lot Expansion (+208 spaces) is complete
- Current Demand to Passenger Ratio Remains Constant for all Forecasts

PUBLIC PARKING ALTERNATIVES

7.5.3.1 Roadway

- Braided Roadway Concept A-1 - New construction. Separate inbound and outbound traffic movements to reduce cut-through traffic.
- South Access Road - Widen to six lanes (three per direction) from Boggy Creek Road to Heintzelman Boulevard.

7.5.3.2 Parking

- Construct New Satellite Lot - New lot with 3,500 striped spaces and 1,500 overflow spaces located in the SWTSA.
- Expand Employee Parking Lot - Add 2,200 striped spaces.

MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT

SECTION 8.0
BUILDING AREA PLANS

Prepared for:
GREATER ORLANDO AVIATION AUTHORITY

Prepared by:
The URS Team

August 2004



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SECTION 8.0

BUILDING AREA PLANS

8.1 Introduction

The building area plans delineate the proposed development of the North and South Terminal Support Areas, Tradeport West Ramp, Midfield/Heintzelman Boulevard, and East Airfield/Gee Bee Areas. In addition to satisfying the facility requirements established in Section 4.0, the building area plans reflect flexibility/expandability in each sector for Orlando International Airport (MCO) to favorably respond to foreseen, as well as unforeseen, future travel demands. The following paragraphs discuss these facilities by sector in greater detail.

8.2 Tradeport Area

The Tradeport Area is defined as the area of approximately 1,150 acres west of the Runway 18/36 airfield system. Tradeport development supports MCO and offers an opportunity to serve businesses that utilize aviation-related property. The role of the Tradeport properties is revenue generation to promote economic development for the diversification of airport revenue with an emphasis on aviation-related facilities. The maximization of airside property for activities dependent upon airside access is a primary objective, combined with a mixed use of commercial, office, and warehouse.

The preferred Tradeport development plan is shown on four figures. The first pair of figures, Figures 8-1 and 8-2, identifies the ultimate Tradeport land use plan. The second pair of figures, Figures 8-3 and 8-4, illustrates a conceptual layout of the Tradeport Area if totally built out. The Tradeport is the original site and facility support area of the previous McCoy Air Force Base (AFB). This Master Plan Update identifies an idea for redeveloping this old, established AFB area into new aviation-related opportunities by increasing the aviation apron frontage area. The idea, as shown in the concept plan, is to create modular development opportunities that would be driven and implemented by market demands. The air cargo and heavy aircraft maintenance industries are prime candidates for taking advantage of the west airfield's Airplane Design Group (ADG) VI category compatibility and the ability to attract new large aircraft (NLA).

For description and discussion purposes, the Tradeport Area is divided in three zones: North Tradeport, Central Tradeport, and South Tradeport.

8.2.1 NORTH TRADEPORT AREA

The North Tradeport is located on the west side of Runway 18R/36L. Due to the high value and exposure of this land, the North Tradeport contains areas identified and reserved for future non-aviation commercial expansion and/or related development. Existing functional land uses in the North Tradeport Area include Flight Safety International, the new Cessna Citation Maintenance Service Center, a public satellite parking (Gold Lot), environmental, and retention. The land east of Tradeport Drive and south of Bear Road would continue to be developed as aviation-related. The North Tradeport Area has great potential for commercial development to serve both on- and off-airport users. The northeast and northwest quadrants of this area should include office/commercial development uses. Use of the existing Remote Parking Gold Lot should be reevaluated to maximize revenue-generating capabilities. Two areas in the southwest quadrant of the North Tradeport Area should also be reserved for office/commercial development. The site adjacent to Tradeport Drive, which surrounds the existing Orange County School Board property, may be used as a

warehousing/distribution center. The prime office/commercial sites for development in this area include the areas east and west of the Tradeport Drive entrance features adjacent to Bear Road.

8.2.2 CENTRAL TRADEPORT AREA

The Central Tradeport is located on the west side of Runway 18R/36L. Existing functional land uses in the Central Tradeport Area include aviation industrial, cargo and distribution, office, aviation fuel farm, general aviation FBO facilities, corporate aviation hangars, a Foreign Trade Zone (FTZ), and environmental.

Future development in the Central Tradeport Area should focus on concentrating and infilling existing uses. The large aircraft hangar (407) should remain as an aviation industrial use at the north end of this area. Cargo facilities should be built at greater densities that can be served by the west ramp. The west airfield Aircraft Rescue and Fire Fighting (ARFF) station is located just south of the intermodal freight/cargo area. The area around this ARFF facility should be reserved for aviation-related industrial functions.

The main aviation fuel farm west of Tradeport Drive would remain at this site and additional area should be reserved for future fuel farm expansion. The existing fuel farm site has a direct connection to the pipeline that transports fuel from the Port of Tampa to MCO. With the development of the Gee Bee property, additional demand for aviation fuel will be generated on the east side of the airport from the existing fuel farm. Existing infrastructure and storage tank investment make relocating the fuel farm unattractive and not economically viable. Future aviation-related development on the east side could justify the construction of a fuel farm on that side of the airport and the possibility of a pipeline connection to Port Canaveral further supports this potential fuel farm site.

Immediately south of the aviation industrial area, there is potential for additional general aviation facilities and fixed base operator (FBO) operations. The existing FTZ facility (Building 437) is programmed to be removed, and if the market dictates, there may be justification for a new FTZ to be defined at another site on the airport in the future. At the southern end of the Central Tradeport Area and east of Tradeport Drive, corporate aircraft hangars would eventually be relocated and the site would be developed at greater densities to produce aviation-related industrial revenues from the property.

8.2.3 SOUTH TRADEPORT AREA

The South Tradeport is located on the west side of Runway 18R/36L. Existing functional uses in the South Tradeport Area, including the alert area, are the FedEx cargo sorting facility, U.S. Postal Service (USPS) facilities, warehouse/distribution facilities, aviation industrial (AirTran Airways maintenance hangar), storage facility, drainage retention ponds, U.S. Army Reserve facility, and public utility.

Future development in the South Tradeport Area should capitalize on the airfield proximity to Taxiway A and the existing old U.S. Air Force alert apron. Future cargo facility expansion should be developed to the immediate south and on the site of the existing USPS facility. In addition, the alert area apron should be expanded to increase its attractiveness as an aircraft parking area. Aviation industrial uses and maintenance facilities would surround the alert apron. Lake Gillooly would be maintained as a drainage retention site for the Tradeport and a natural buffer providing a transition between the airport's land uses and those uses adjacent to the south side of Boggy Creek Road.

Office/commercial/warehouse development areas would replace the existing bunker area, providing potential trip capture likely to be needed for future DRI approvals.

The City of Orlando's Conserv I water treatment facility is anticipated to remain on airport property through the period covered by this Master Plan Update. The area between Conserv I and the alert apron has been reserved for a new regional USPS facility.

8.3 Midfield/Heintzelman Boulevard Area

The Midfield/Heintzelman Boulevard Area is defined as the area between the Third (17R/35L) and Fourth (17L/35R) Runways or east of the Runway 17R/35L airfield system. The proposed midfield development plan is shown on two figures. Figure 8-5 identifies the ultimate midfield area land use plan and Figure 8-6 illustrates a conceptual layout of this area when totally built out.

For description and discussion purposes, the midfield area is divided in three zones: north midfield, central midfield, and south midfield.

8.3.1 NORTH MIDFIELD AREA

Existing functional uses in the north midfield area include rental car facilities, proposed jetBlue Airways facilities, City sewer lift station, and an Orlando Utilities Commission electric transfer station.

Future development in the north midfield area should include additional rental car facilities and non-aviation commercial development. The proximity of this land to both the Goldenrod Road/Bee Line Expressway interchange establishes this area as prime revenue-generating property.

The plan calls for future commercial development to be reserved in the area of the Heintzelman Boulevard/East Cargo Road intersection. This commercial development would promote trip capture and compatible land uses that serve the user population group and their needs. Although a portion of the rental car facilities may extend into the area under a future RPZ, parking areas are compatible in the vicinity of RPZs given height limitations on development.

8.3.2 CENTRAL MIDFIELD AREA

The existing functional land use in the central midfield area is an aircraft maintenance hangar (Delta Connection/Comair).

Future development in the central midfield area should include additional airline maintenance hangars (up to ADG-VI size) and aviation support facilities to the west of Heintzelman Boulevard. These maintenance hangar/facilities would have direct access to the north and mid-crossfield taxiways via an apron taxiway connecting the north and south midfield taxiways.

Airline and maintenance support facilities should be developed in the east quadrant of the central midfield area adjacent to Heintzelman Boulevard. East of this public access roadway, there is potential for aviation-related areas such as air freight express facilities. All areas in the central midfield area are prime aviation-related areas for revenue generating and opportunities, which should be market-driven.

8.3.3 SOUTH MIDFIELD AREA

The south midfield area is presently undeveloped. Adjacent to this site and to the south, there is potential for development of aviation-related facilities that could have airfield access if a new partial parallel taxiway is constructed east of Runway 17R/35L. Most of this area is being used for drainage retention for Runway 17L/35R and the potential Gee Bee property development.

A natural buffer is planned in the southeast corner of this area. This buffer, along with the drainage retention areas, will maintain compatibility with the Lake Nona residential development. Land is reserved for potential market-driven development east of Heintzelman Boulevard.

8.4 Gee Bee Property

The Gee Bee property is identified as the area east of Runway 17L/35R. A majority of the 1,050-acre Gee Bee property is presently undeveloped with the exception of a former printing warehouse near the southern border of the property. This Gee Bee property is being reserved for future large-scale, market-driven development opportunities.

Large-scale development can promote jobs and economic opportunities for the metropolitan Orlando community. The site is designated for aviation-related development, which includes manufacturing and support. This area is adjacent to the airfield, covers a large contiguous area, and is serviced by a potential frontage road system off of Narcoossee Road, just south of the Narcoossee Road/Bee Line Expressway interchange.

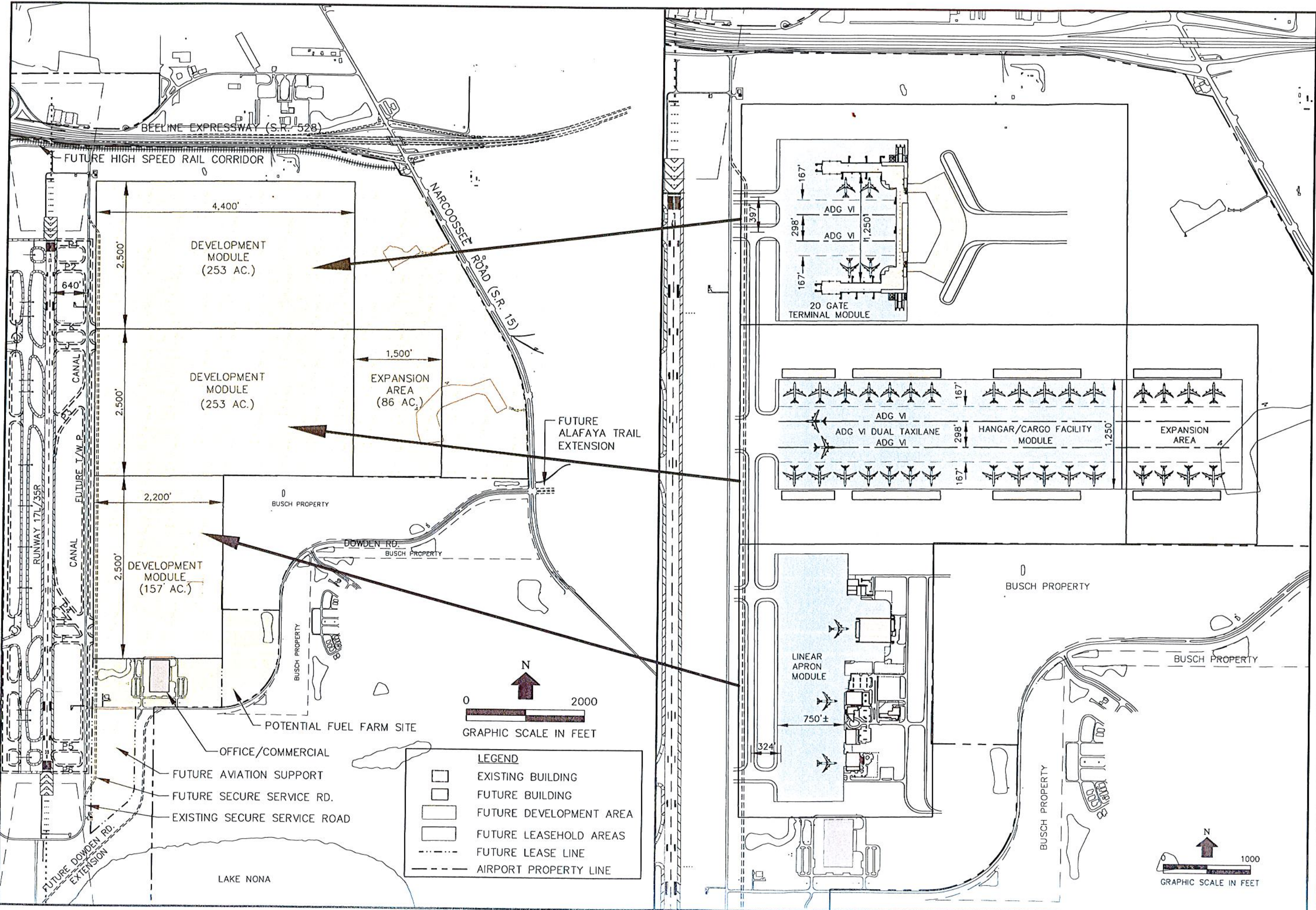
Figures 8-7 and 8-8 show the area and the modular templates that illustrates potential development options. Aviation-related development is shown for the entire quadrant of the site. This use could include an aircraft manufacturing facility and associated companies that provide services such as avionics service and repair, upholstery for passenger air carrier/seats, landing gear manufacturers, and other air carrier-associated equipment. Other development possibilities may include aviation-related manufacturing support services, aircraft preparation, and engine run-up testing facilities, etc.

Preserving the easternmost wetland areas may have merit because the permitting agencies are likely to require a high replacement ratio if the Gee Bee property were developed and mitigated. There is great potential along the wetland areas for a buffer/greenbelt for the Orlando community. The greenbelt would serve as a natural buffer between the wetland and future development along the eastern border of the site. Future retention areas will depend on final design for development of the property.

8.5 Poitras Property

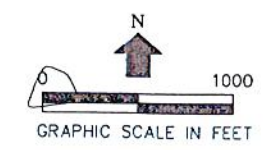
The approximately 1,900-acre Poitras property, as presented on Figure 8-9, is located approximately 1.5 miles southeast of the airport and south of the greenway. This property was originally purchased for use as a borrow pit to provide earthwork for previous expansion projects at MCO. Currently, the property is a mitigated conservation area. The Poitras property use agreement expires in 2008. In the future, the airport could sell this property and use the funds generated from the sale for Gee Bee infrastructure .

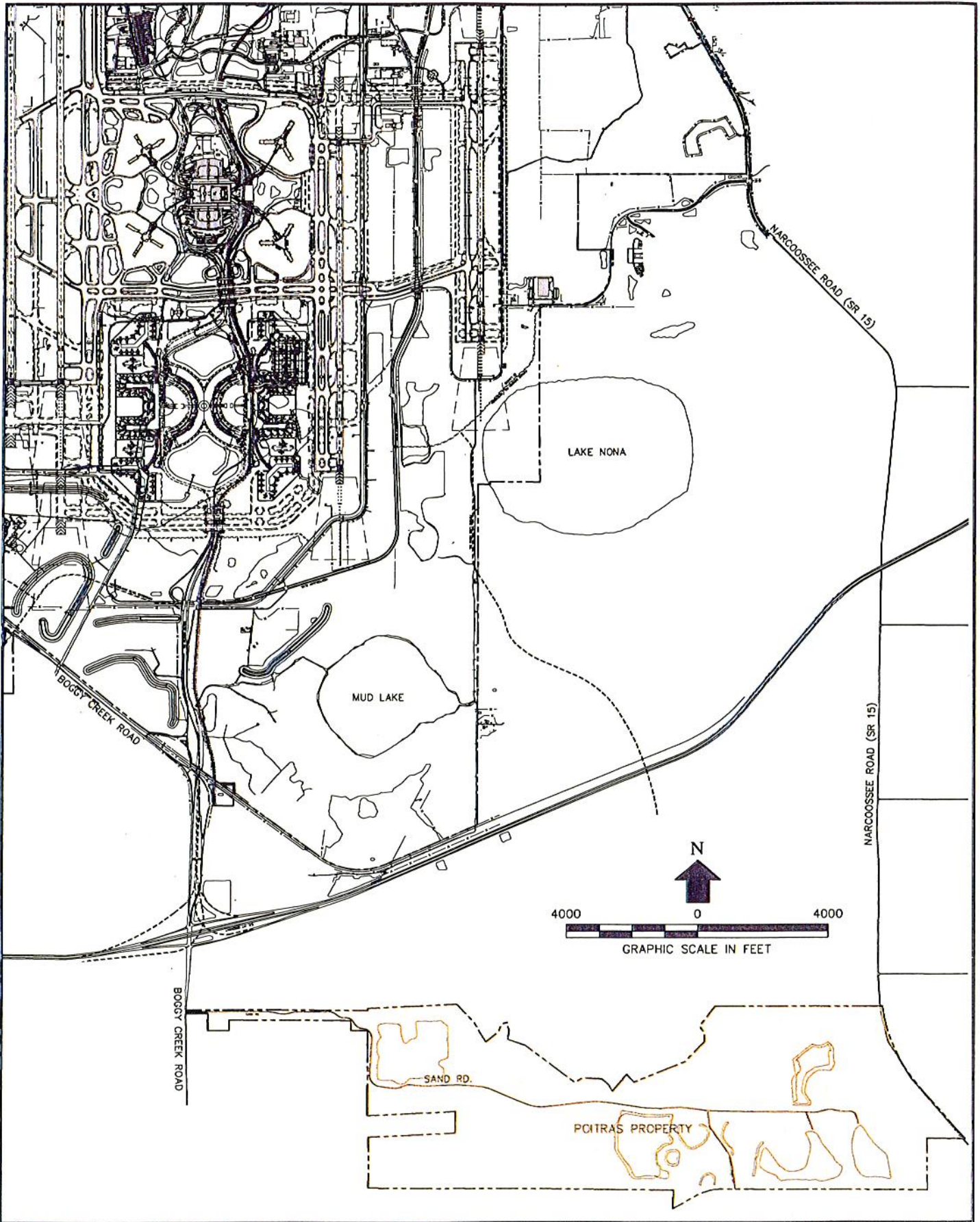
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**EAST MIDFIELD DEVELOPMENT AREA (GEE BEE PROPERTY)
MODULE CONCEPTUAL PLAN - OPTION 2**

**FIGURE:
8-8**





**GREATER ORLANDO
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POITRAS PROPERTY

FIGURE:
8-9

MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT

SECTION 9.0
LAND USE PLAN

Prepared for:
GREATER ORLANDO AVIATION AUTHORITY

Prepared by:
The URS Team

August 2004

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Section 9.0

Land Use Plan

9.1 Introduction

An essential ingredient to the efficient operation of an airport is the organization of the various functions that occur on the airport into manageable units or land uses. Orlando International Airport (MCO) currently consists of approximately 13,300 acres. All airport property is shown belonging to a land use category.

Figure 9-1 shows the ultimate land use plan. This figure presents the existing developed land by land use classification as well as the undeveloped land identified in the ultimate land use plan, which is depicted as aviation support or non-aviation commercial.

Table 9-1 presents a comparison of the existing on-airport land use and the ultimate on-airport land use acreage.

**TABLE 9-1
ULTIMATE ON-AIRPORT LAND USE SUMMARY**

Airport Land Use	Ultimate (Total) (acres)
Airfield	3,251
Passenger Terminal Complexes	1,456
Aviation Support	2,702
Airline Support Areas	---
Cargo Area	---
Aviation Industrial	---
Aviation-Related (General Aviation)	---
Operations (ATCT/ARFF/GOAA)	38
Ground Transportation (Parking/Rental Car Facilities)	405
Non-Aviation Commercial	181
U.S. Military/Government/Public Agency	76
Fuel Farm/Utilities	82
Conservation/Mitigation/Buffer Zone/Miscellaneous	2,354
Lakes/Retention Ponds/Canals/Drainage	925
Undeveloped	N/A
Poitras Property	1,857
Miscellaneous Roadway Right-of-Way	211
Total Assigned Land	13,538

Source: Compiled by URS, June 2004.

As shown on Table 9-1, the aviation support category is a generalized aviation-related category that allows the Greater Orlando Aviation Authority (GOAA) the flexibility of developing future land based on a market-driven opportunity (i.e., cargo, industrial aviation, aircraft maintenance, general aviation, etc.). The total ultimate aviation support land available for development is approximately 2,700 acres. The other development opportunity is non-aviation commercial. The area reserved for future non-aviation commercial development is 181 acres.

The Poitras property is an approximately 1,900-acre outparcel located approximately 3 miles south the airport. For the purposes of this Master Plan Update, the Poitras property is given its own identity in the land use classification category. As stated by GOAA, future plans for this property are unidentified at this time.

9.2 Land Use Classifications

Categories of on-airport land use for regulatory purposes are set forth as follows:

- Airfield
- Passenger Terminal Complexes
- Aviation Support
 - Airline Support Areas
 - Cargo Area
 - Aviation Industrial
 - Aviation-Related (General Aviation)
- Operations (airport traffic control tower [ATCT], Aircraft Rescue and Fire Fighting [ARFF] facilities, GOAA)
- Ground Transportation (Parking/Rental Car Facilities)
- Non-Aviation Commercial
- Military/U.S. Government/Public Agency
- Fuel Farm/Utilities
- Conservation/Mitigation/Buffer Zone/Miscellaneous
- Lakes/Retention Ponds/Canals/Drainage
- Undeveloped
- Poitras Property
- Miscellaneous Roadway Right-of-Way

The following paragraphs define each of these categories and describe where on the airport property these land uses are located. The ultimate land use plan for MCO is presented on Figure 9-1.

9.2.1 AIRFIELD

This category includes land used as the airport operations area (AOA), which includes the runway/taxiway pavements, runway/taxiway safety areas, navigational aids (NAVAIDS), and their related critical clearance areas as defined by the Federal Aviation Administration (FAA).

Also shown within the designated airfield/airside land use area are the runway protection zones (RPZs). The RPZs are trapezoid-shaped areas located off the ends of each runway in which the heights of structures or natural obstructions are limited as required by Federal Aviation Regulation (FAR) Part 77.

9.2.2 PASSENGER TERMINAL COMPLEXES

This designation encompasses all the facilities needed to serve the airline passenger, which includes the passenger landside terminal structures, airside structures, automated guideway transit (AGT), aircraft apron areas adjacent to the airside buildings, public auto parking, landside commercial and ground transportation (rental car/taxi/limo/bus areas), and the terminal loop roadway system.

Two areas are identified and designated for passenger terminal complex facilities. The ultimate land use plan reserves sufficient acreage for the future long-term terminal building/apron/auto parking and access road along the existing flight line frontage. As shown on the existing land use plan, the passenger terminal complexes' land use category currently comprises 692 acres. With the addition of

the South Terminal Complex, it is anticipated that this category will comprise 1,456 acres on the ultimate land use plan.

9.2.3 AVIATION SUPPORT

The aviation support land use category is comprised of airline support areas, cargo, aviation industrial, and aviation-related land uses. Existing acreages have been identified for each of these land use categories. Future aviation support has been grouped into one land use category and comprises 2,702 total acres.

9.2.3.1 Airline Support Areas

This category includes support facilities associated with terminal complex airline activities. This land needs to be in close proximity to the passenger terminal complex with direct access to the airside. Uses include catering, airline ground support equipment (GSE), and airline cargo. The airline support areas land use category currently comprises 81 acres. This land use category is grouped into the aviation support category on the ultimate land use plan.

As shown on the ultimate land use plan, the following two areas are designated as airline support facility locations:

- North Terminal Support (northwest and northeast sectors)
- Future South Terminal Support (southwest and southeast sectors)

9.2.3.2 Cargo Area

This category includes land used for air cargo-related businesses. For the purposes of this Master Plan Update, there are seven basic air cargo market groups to be considered for MCO: domestic airline cargo, international airline cargo, domestic air express, international air express, domestic air freight (all cargo aircraft), international air freight (all cargo aircraft), and freight forwarding. This cargo market category has been grouped with the domestic airline and international airline cargo operating out of the airline support areas, as previously discussed in Section 9.2.3.1. As shown on the ultimate land use plan, an area located in the Central Tradeport airside area is currently used and has been designated for major cargo expansion. All other segments of cargo in the ultimate plan are to operate in the South Tradeport Area, Central Tradeport Area, Northwest Terminal Support Area (NWTSA), or in the future, in the east side Central Midfield or the Gee Bee property on the east side of the airport. These areas are to include leasable building facilities appropriate for air freight-related businesses, aircraft aprons, service courts, truck courts, and employee/customer parking. The cargo area land use category currently comprises 267 acres. This land use category is combined with the aviation support category on the ultimate land use plan.

9.2.3.3 Aviation Industrial

This land use classification, by definition, is reserved for aviation-related uses involving the manufacturing, maintenance, overhaul, and repair (MRO) and testing of aircraft equipment products, parts, and/or systems. The area required includes necessary space for hangars, offices, maintenance shops, and storage of parts for air carrier aircraft. Several areas have been identified for future potential aviation industrial use on the airport. As shown on the existing land use plan, these areas are located in the Alert Area, Tradeport, and East Midfield sectors. The aviation industrial land use category currently comprises 237 acres. This land use category is grouped into the aviation support category on the ultimate land use plan.

9.2.3.4 Aviation-Related

This land use classification reserves strategic locations for future major aviation-related development that is dependent on aircraft ramp and airfield proximity. For the purposes of this Master Plan Update, this category was created to provide greater flexibility than a standard (i.e., cargo/maintenance) designation in accommodating large-scale projects driven by market demand and special land and transportation access requirements. Development in these areas might include an intermodal cargo hub, aircraft manufacturing facility, or an express package/mail hub. The aviation-related designation does not preclude any of these potential tenants from consideration for use of the land. There are several areas reserved for future long-term aviation-related development on airport property.

This land use category is grouped into the aviation support category on the ultimate land use plan. The one sub-category, general aviation, is described as follows.

General Aviation - All general aviation activities for MCO are grouped under this land use designation. This includes both general aviation commercial activities (Fixed Base Operators [FBOs]) and general aviation non-commercial activities (aircraft storage hangars). The general aviation land use category currently comprises 50 acres. This land use category is grouped into the aviation support category on the ultimate land use plan.

The commercial aviation function, by definition, consists of FBOs and aircraft services. These activities involve the sale of aviation services for a profit to the general public, including maintenance, storing, and servicing of aircraft; sale of aircraft; sale of aircraft parts and accessories; sale of aircraft fuel, lubricants, and propellants; and operation of non-scheduled and charter transportation.

The non-commercial aviation function, by definition, consists of those activities involving the facilities for storage and service of aircraft for an individual, private organization, or corporation solely for its own benefit. For the purposes of this Master Plan Update, general aviation is included in the future aviation-related categories on the ultimate land use plan.

9.2.4 OPERATIONS

This category includes land used for the operation and maintenance of the airport. These operation support areas include: ATCT, ARFF, and GOAA maintenance and technical support facilities. As shown on the existing land use plan, the operations land use category currently comprises 36 acres. It is anticipated that this category will comprise 38 acres on the ultimate land use plan.

9.2.5 GROUND TRANSPORTATION (PARKING/RENTAL CAR FACILITIES)

This category includes land used for parking and storage of public and commercial passenger vehicles. This would include the three terminal public parking structures, remote public satellite parking lots (Blue, Red, and Gold), rental car facilities, and taxi/bus stopping areas. As shown on the existing land use plan, the ground transportation land use category currently comprises 244 acres. It is anticipated that this category will comprise 405 acres on the ultimate land use plan.

9.2.6 NON-AVIATION COMMERCIAL

This land use category includes, by general definition, the non-aviation industrial uses that are not directly related to aviation and do not require airside access but are subject to the development and performance standards established for the airport as a whole. As shown on the existing land use plan, 76 acres have currently been designated for non-aviation commercial uses. It is anticipated that this category will comprise 181 acres on the ultimate land use plan.

MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT

SECTION 10.0
ENVIRONMENTAL CONSIDERATIONS

Prepared for:
GREATER ORLANDO AVIATION AUTHORITY

Prepared by:
The URS Team

August 2004

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SECTION 10.0

ENVIRONMENTAL CONSIDERATIONS

10.1 Introduction

This section provides a brief overview of the environmental review requirements associated with the Orlando International Airport (MCO) development actions proposed in this Master Plan Update and a general discussion of environmental conditions and potential consequences relative to the proposed improvements. It should be noted that a detailed discussion and evaluation of potential impacts is beyond the scope of these environmental considerations and is normally addressed in a Categorical Exclusion (CE)/Environmental Assessment (EA)/Environmental Impact Statement (EIS). If required, additional studies will be prepared as needed prior to Federal Aviation Administration (FAA) approval of each proposed project.

10.1.1 ENVIRONMENTAL EVALUATION OF AIRPORT PROJECTS

10.1.1.1 *Consideration of Environmental Impacts*

All airport improvement projects that are considered "Federal actions," or otherwise involve Federal funding or approvals, must be examined from an environmental standpoint in order to comply with the National Environmental Policy Act of 1969 (NEPA). Guidance for the FAA's consideration of environmental impacts is provided in FAA Order 5050.4A, *Airport Environmental Handbook* and FAA Order 1050.1D, *Policies and Procedures for Considering Environmental Impacts*. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires Federal agencies make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and native American tribes. Other Federal and state regulations are also integral to the process of considering potential environmental impacts generated by airport development.

For any proposed Federal action, an initial environmental determination that considers the type of action and its potential effect upon the environment is performed. The result of the determination is the selection of one of the following three environmental processes:

- **Categorical Exclusion** - A proposed action may be considered categorically excluded if it typically does not result in significant environmental impacts and for which an EA or EIS is not specifically required. A CE may require brief documentation of the project's description and environmental impact potential to support its processing as a CE.
- **Environmental Assessment** - An EA is prepared for proposed actions with expected minor or uncertain environmental impact potential. An EA requires analysis and documentation similar to an EIS, but with somewhat less detail and coordination. Depending upon whether certain environmental thresholds of significance are exceeded or not, an EA will either lead to a Finding of No Significant Impact (FONSI) or a requirement for the preparation of an EIS.
- **Environmental Impact Statement** - An EIS is prepared for major Federal actions, which are expected or known to have the potential for significant environmental impacts. An EIS involves thorough evaluation and documentation of a proposed action's purpose and need, alternatives, affected environment, and environmental consequences. The study requires coordination with involved Federal, state, and local agencies and the public.

10.1.1.2 Development of Regional Impact

In Florida, a Development of Regional Impact (DRI) study is required when a project, because of its character, magnitude, or location, would have a substantial effect on the health, safety, or welfare of citizens in more than one county. The state has established thresholds to determine when a development is subject to the DRI review process. The determination to prepare a DRI is made by the Florida Department of Community Affairs (DCA).

In general, any proposed change to a previously approved development that creates a reasonable likelihood of additional regional impact, or any type of regional impact created by the change not previously reviewed by the regional planning agency, shall constitute a substantial deviation and shall cause the development to be subject to further review. For airports, a new runway, a new terminal facility, a 25 percent lengthening of an existing runway, or a 25 percent increase in the number of gates of an existing terminal (if the increase adds at least three additional gates) will trigger the DRI review process (Florida Statutes 2002). MCO has a consolidated DRI dated June 14, 1999. Previously approved DRIs that relate to MCO incorporated into the consolidated DRI include: the South Terminal Complex DRI (development order approved by the Orlando City Council on November 2, 1998); the Fourth Runway DRI (development order approved by the City Council on September 17, 1990; first amendment approved on August 23, 1993; second amendment approved on January 8, 1996; third amendment approved on October 5, 1998; and fourth amendment approved on January 25, 1999); the Terminal Expansion/Third Runway DRI (development order approved by the City Council on April 2, 1984; first amendment approved on September 10, 1984; second amendment approved on July 20, 1992; and third amendment approved on July 14, 1997); the Orlando Tradeport DRI (development order approved by the City Council on July 29, 1985); the New Terminal DRI (development order approved by the Orange County Commission on February 28, 1978, and property later annexed into the City); and the Lake Nona DRI (development order approved by the City Council on November 28, 1994).

10.2 Existing Conditions

For the purposes of describing the existing conditions, two study areas were developed. For environmental considerations that deal with broad, indirect issues, a Generalized Study Area (GSA) was used to describe existing features. The GSA includes a large geographic area and was established based within the vicinity of the existing DNL 65 dBA noise contour. The MCO property boundary was established as the Detailed Study Area (DSA) for environmental considerations that deal with more specific, direct issues such as wetlands, floodplains, protected species, and biotic communities. More specifically, the DSA includes areas of potential disturbance for each master plan development project.

10.2.1 AIRCRAFT NOISE

A variety of noise metrics are used to assess airport noise impacts in different ways. Noise metrics are used to describe individual noise events (such as a single operation of an aircraft taking off overhead) or groups of events (such as the cumulative effect of numerous aircraft operations, the collection of which creates a general noise environment or overall exposure level). The most frequently used metric at general aviation airports is the Day-Night Average Sound Level (DNL).

Day-Night Average Sound Level - The DNL represents noise as it occurs over a 24-hour period. It is the same as a 24-hour equivalent sound level (L_{eq}), with one important exception: DNL treats nighttime noise differently from daytime noise. The equivalent sound level is the log of the average value of the sound exposure during a stated time period. It is often used to describe sounds with respect to their potential for interfering with human activity. In calculating DNL, it is assumed that the A-weighted levels occurring at night (10:00 p.m. to 7:00 a.m.) are 10 decibels (dB) louder than

they really are. This penalty is applied to account for greater sensitivity to nighttime noise and because events at night are often perceived to be more intrusive.

Existing Noise Condition - A Federal Aviation Regulation (FAR) Part 150 Noise Compatibility Study for MCO was completed and approved by the FAA in 2001. In this planning analysis, existing and future noise conditions were examined. The *Orlando International Airport FAR Part 150 Noise Exposure Maps and Compatibility Plan* (March 2001) was used to evaluate the existing aircraft noise conditions (1999) at MCO. Noise exposure levels resulting from 1999 operations are depicted as DNL contours in Figure 10-1. The figure depicts noise exposure contours of DNL 65 dB, 70 dB, and 75 dB. DNL contours are a graphical representation of how the noise from aircraft operations is distributed over the surrounding area on an average day of a given year.

The DNL 65 dBA contour extends approximately 11,000 feet north of the Bee Line Expressway (State Road 528) off of the Runway 18/36 system and about 3,000 feet north of the expressway off of the Runway 17/35 system. To the south, the contours off the Runway 18/36 system extend south of Boggy Creek Road and remain on MCO property south of the Runway 17/35 system.

The existing conditions 1999 DNL 65 dBA noise contour encompasses an area of approximately 5,124 acres of land. Of this, 4,533 acres remain on MCO property and 571 acres are located off-airport property. Residential property located within the DNL 65 dBA contour is approximately 127 acres. This includes residences along Wetherbee Road located southwest of MCO. North of MCO, residential areas within the DNL 65 dBA are located just north of Judge Road, and most of a mobile home park along Hoffner Avenue, east of Conway Road.

Population within the existing DNL 65 dBA includes approximately 270 people. No population is within the DNL 70 dBA and greater contours.

With the exception of residential land use in the vicinity of Hoffner Avenue and Conway Road and a number of residences south-southwest of Runway 18R/36L, the majority of existing land use is compatible with the noise exposure.

The Part 150 Noise Compatibility Study also analyzed long-range DNL contours at MCO for the year 2020. The DNL 70 dBA remains mostly on airport property, but does extend north of the Bee Line Expressway due to the location of the runway thresholds being immediately south of the Expressway. The DNL 65 dBA contour extends north of Hoffner Avenue to the north and the vicinity of the Central Florida GreeneWay to the south.

10.2.2 LAND USE

MCO is located in southern Orange County entirely within the corporate boundary of the City of Orlando. MCO is situated in southeastern Orlando approximately 10 miles south-southeast of the City of Orlando Central Business District. Primary access to MCO is via Semoran Boulevard (State Road 436) from the north, the Bee Line Expressway from the east and west, and Boggy Creek Road and the Central Florida GreeneWay (State Road 417) from the south. There are also three other parcels owned by the Greater Orlando Aviation Authority (GOAA). Two parcels north of the Bee Line Expressway are classified as conservation/mitigation/buffer and non-aviation commercial and Poitras is classified as conservation/ mitigation/buffer.

Land use to the north includes the large multi-use Lee Vista Center, which includes a mix of office, hotel, and industrial development. To the east is another large planned development, Lake Nona, with residential areas developing due east of MCO and commercial and industrial to the southeast. Very little development has occurred south of MCO, although there are scattered residences situated in a rural setting. Along the west side of the airport is the Orlando Tradeport. West of the Tradeport

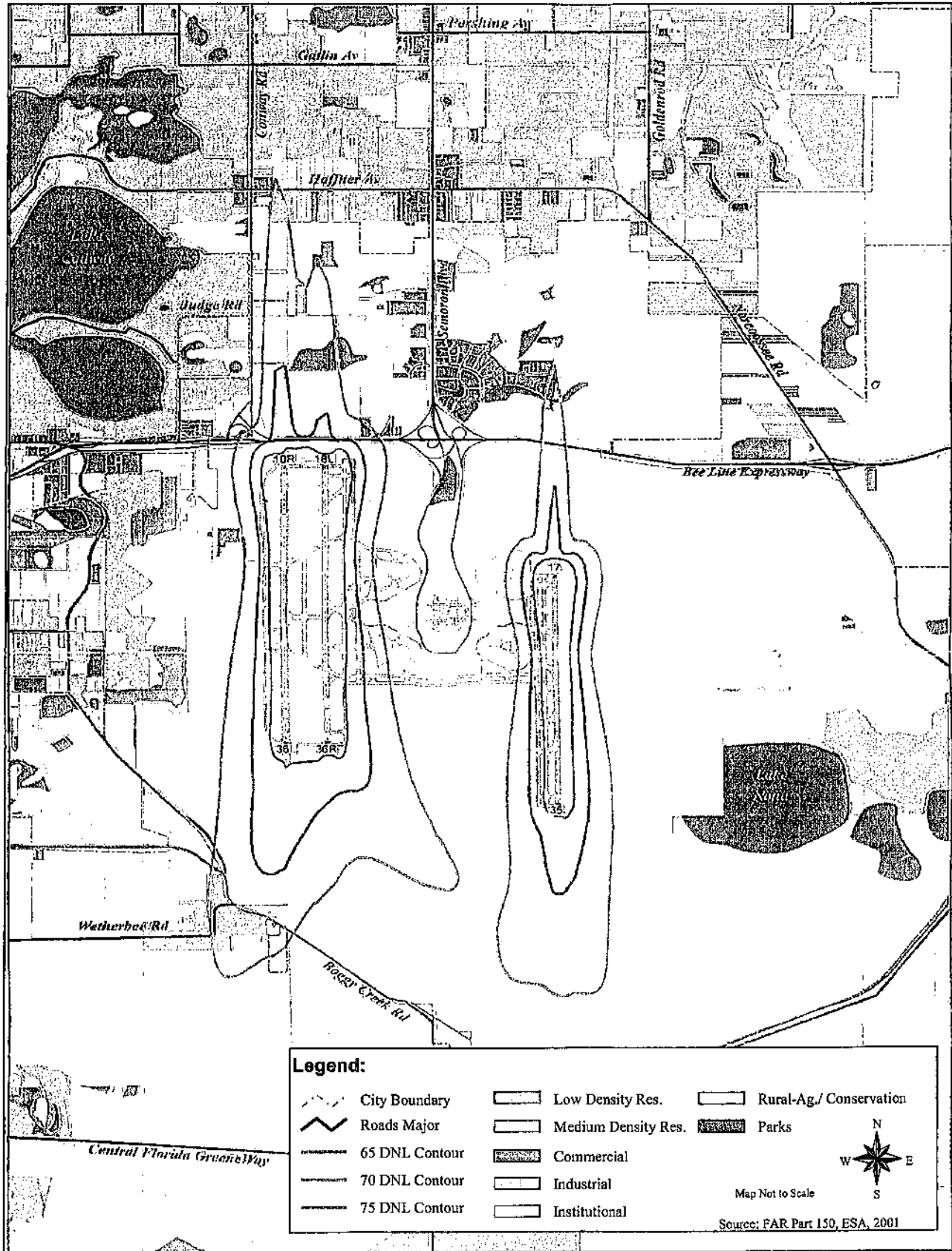
is the former U.S. Naval Training Center Annex, which is being redeveloped for mixed use. To the northwest is the City of Belle Isle, a small, developed residential community.

One school, the Shenandoah Elementary School, is located approximately 2.5 miles north of MCO and is aligned with Runway 18R/36L approach and departure paths. In addition, north of this runway are two churches, the St. Mary's Missionary Baptist and Southview Baptist.

The FAA has adopted guidelines regarding the compatibility of land uses with various noise levels measured using the DNL metric. These guidelines are listed in Table 10-1.

The development of these guidelines was intended to establish a consistent process for estimating noise compatibility and for considering Federal funding for implementation of noise compatibility programs. These guidelines also aid those local jurisdictions that have not established land use guidelines with respect to airports and surrounding lands. The FAR Part 150 land use compatibility guidelines (Appendix O) are consistent with land use compatibility guidelines developed by other Federal agencies such as the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Housing and Urban Development (HUD).

It should be noted that the FAR Part 150 land use compatibility guidelines shown in Table 10-1 do not constitute a Federal determination that a specific land use is acceptable or unacceptable under Federal, state, or local laws. The responsibility for determining acceptable land uses rests with the local authorities through its zoning laws and ordinances.



**GREATER ORLANDO
AVIATION AUTHORITY**
Orlando International Airport
Master Plan Update

1999 NOISE EXPOSURE CONTOURS

FIGURE:
10-1

**TABLE 10-1
FAA LAND USE COMPATIBILITY GUIDELINES**

	Yearly Day-Night Average Sound Level (DNL)					
	Below 65 Decibels	65-70 Decibels	70-75 Decibels	75-80 Decibels	80-85 Decibels	Over 85 Decibels
<u>Residential</u>						
Residential (Other than mobile homes & transient lodges)	Y	N	N	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient Lodging	Y	N	N	N	N	N
<u>Public Use</u>						
Schools	Y	N	N	N	N	N
Hospitals, Nursing Homes	Y	25	30	N	N	N
Churches, Auditoriums, Concert Halls	Y	25	30	N	N	N
Governmental Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y ²	Y ³	Y ⁴	Y ⁴
Parking	Y	Y	Y ²	Y ³	Y ⁴	N
<u>Commercial Use</u>						
Offices, Business & Professional	Y	Y	25	30	N	N
Wholesale & Retail Building Materials, Hardware & Farm Equipment	Y	Y	Y ²	Y ³	Y ⁴	N
Retail Trade - General	Y	Y	25	30	N	N
Utilities	Y	Y	Y ²	Y ³	Y ⁴	N
Communications	Y	Y	25	30	N	N
<u>Manufacturing & Production</u>						
Manufacturing, General	Y	Y	Y ²	Y ³	Y ⁴	N
Photographic and Optical	Y	Y	25	30	N	N
Agriculture (Except Livestock) & Forestry	Y	Y ⁶	Y ⁷	Y ⁸	Y ⁸	Y ⁸
Livestock Farming & Breeding	Y	Y ⁶	Y ⁷	N	N	N
Mining & Fishing, Resource Production & Extraction	Y	Y	Y	Y	Y	Y
<u>Recreational</u>						
Outdoor Sports Arenas, Spectator Sports	Y	Y ⁵	Y ⁵	N	N	N
Outdoor Music Shells, Amphitheaters	Y	N	N	N	N	N
Nature Exhibits & Zoos	Y	Y	N	N	N	N
Amusement, Parks, Resorts, Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables, Water Recreation	Y	Y	25	30	N	N

TABLE 10-1 (continued)

FAA Land Use Compatibility Guidelines

NOTE: The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties remains with the local authorities. FAA determinations under Part 150 are not intended to substitute Federally determined land use for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

KEY TO TABLE:

- SLUCM Standard Land Use Coding Manual.
- Y (Yes) Land Use and related structures are compatible without restrictions.
- N (No) Land Use and related structures are not compatible and should be prohibited.
- NLR Noise Level Reduction (outdoor to indoor) are to be achieved through incorporation of noise attenuation into the design and construction of structure.
- 25,30, or 35 Land use and related structures are generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated in design and construction of structure.

¹ Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

² Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of the buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

³ Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of the buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.


⁴ Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of the buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

⁵ Land use compatible provided special sound reinforcement systems are installed.

⁶ Residential buildings require an NLR of 25 dB.

⁷ Residential buildings require an NLR of 30 dB.

⁸ Residential buildings not permitted.

 Non-compatible land use.

Source: 14 CFR FAR Part 150, Appendix A, Table 1 (28 December 1995).

10.2.3 SOCIAL SETTING

In 2000, it was estimated that Orange County had a total population of 896,344. According to the 2000 Census, there were 361,349 housing units within Orange County. Orange County has an average household size of 2.61 persons and an average family size of 3.14 persons. The racial composition of Orange County reveals the white population comprises approximately 69 percent of the county's total population, the African American population 18 percent, and the Asian population 3.4 percent. In addition, according to the U.S. Census, all listed races include persons of Hispanic origin. There are 168,361 Hispanics living in Orange County.

Orange County has 253,630 persons younger than 19 years old (approximately 28 percent of the county's population). The city's population has approximately 10 percent of people age 65 and over. Twenty-six percent of the county's adults age 25 and over have a bachelor's degree or higher. Eighteen percent of the adults age 25 or over in Orange County did not complete high school (U.S. Census, 2000).

The City of Orlando has a total population of 185,951. According to the 2000 Census, there were 80,883 housing units within the City of Orlando. Orlando has an average household size of 2.25 persons and an average family size of 2.97 persons. The racial composition of the City of Orlando reveals the white population comprises approximately 61 percent of the city's total population, the African American population 27 percent, and the Asian population 2.7 percent. In addition, according to the U.S. Census, all listed races include persons of Hispanic origin. There are 185,951 Hispanics living in the City of Orlando (U.S. Census, 2000).

The City of Orlando has 45,217 persons younger than 19 years old (approximately 24 percent of the city's population). The city has approximately 11 percent of people age 65 and over. In addition, Orlando has a lower percentage of residents ages 25 to 34 than Orange County. Twenty-eight percent of the city's adults age 25 and over have a bachelor's degree or higher as compared to 26 percent for the county. Twelve percent of the adults age 25 or over in the city did not complete high school (U.S. Census, 2000).

10.2.4 SOCIOECONOMICS

10.2.4.1 Orange County and the City of Orlando

According to the 2000 Census, Orange County has a civilian labor force of approximately 693,426 persons. The data concludes the county has a 3.4 percent unemployment rate. This is below both the national and Florida averages of 6.5 and 5.6 percent, respectively. The top three industries are tourism, high tech, and manufacturing. The City of Orlando has a civilian labor force of approximately 148,702 persons and an unemployment rate of 3.4 percent.

Economic data for Orange County indicates the arts, entertainment, recreation, accommodation, and food services classifications employed the most persons with approximately 82,026, while agriculture, forestry, fishing and hunting, and mining employed the least with 2,369. Other top industries include education; health and social services (64,356); retail trade (54,069), and professional, scientific, management, and administrative (51,511). Orange County's top private employers are Lockheed Martin, AT&T, Walt Disney World, and Florida Hospital. Economic data for the City of Orlando indicates the arts, entertainment, recreation, accommodation, and food services classifications also employed the most persons with approximately 19,561 (20 percent of the total labor force), while agriculture, forestry, fishing and hunting, and mining employed the least with 370 (0.4 percent of the total labor force).

The median household income in Orange County is \$41,311 and the median family income is \$47,159. Orlando's median household income is approximately \$35,732 and the median family income is \$40,648. Thirteen percent of the City of Orlando's families are classified as being below the poverty level as compared to approximately 9 percent of the county's families (U.S. Census, 2000).

10.2.4.2 Orlando International Airport

In 2003, MCO served more than 27 million passengers annually and accommodated nearly 800 arrivals and departures daily. MCO is the 15th largest airport in the country and 17th largest port of entry for international visitors in the continental U.S.

Nearly 213,000 tons of cargo was shipped through MCO in 2003. International cargo has grown by more than 300 percent in the last decade, while domestic cargo has grown 34.9 percent.

MCO's Foreign Trade Zone #42 provides a significant economic advantage by permitting imported goods to be stored or processed without being subject to import duty. The 205-acre zone is part of the Orlando Tradeport, a 1,400-acre air cargo park that includes one of the nation's largest inspection

stations and perishable centers run by the U.S. Department of Agriculture (Metro Orlando Economic Development Commission, 2003).

10.2.5 AIR QUALITY

This section contains a brief discussion of existing air quality conditions in the Orlando area and includes summary descriptions of airport-related emissions sources and other relevant air quality topics associated with NEPA.

10.2.5.1 Existing Conditions

Regional Climate - Orlando is located in the central section of the Florida peninsula, surrounded by many lakes. The average land elevation above sea level is 113 feet and the climate is generally characterized as subtropical with high humidity.

The average minimum temperature in January is 50 degrees Fahrenheit (°F), while the average maximum temperature in July is 92°F. Based on the past 40 years of climate data, 106 days per year average greater than 90°F. However, summer temperatures above 95°F are rather rare, as are temperatures below freezing. Frozen precipitation in the form of snowflakes, snow pellets, or sleet is also rare. However, hail is occasionally reported during thunderstorms.

The average annual rainfall is approximately 48 inches with over 26 inches falling during the rainy season, which extends from June through September. During this period, scattered afternoon thunderstorms are almost a daily occurrence.

Air Quality Regulations - The EPA and Florida Department of Environmental Protection (FDEP) share regulatory authority over air quality in Orlando, which includes MCO.

Under the Federal Clean Air Act (CAA), EPA has established National Ambient Air Quality Standards (NAAQS) to protect public health, the environment, and the quality of life from the detrimental effects of air pollution (see Table 10-2). The standards have been set for the following criteria pollutants: carbon monoxide (CO), lead (Pb), oxides of nitrogen (NO_x), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), and sulfur dioxide (SO₂).

**TABLE 10-2
NATIONAL AMBIENT AIR QUALITY STANDARDS**

Pollutant	Averaging Time	Standard		Type of Standard
		ppm ^e	µg/m ³	
Carbon monoxide (CO)	1 hour	35 ^b	40,000	Primary
	8 hours	9 ^b	10,000	Primary
Lead (Pb)	Quarterly	-	1.5 ^c	Primary & Secondary
Nitrogen Dioxide (NO ₂)	Annual	0.05 ^c	100	Primary & Secondary
Ozone (O ₃)	1 hour	0.12 ^b	235	Primary & Secondary
	8 hours	0.08 ^d	157	Primary & Secondary
Particulate Matter with a diameter ≤ 10 µm (PM ₁₀) with a diameter ≤ 2.5 µm (PM _{2.5})	24 hours	-	150 ^g	Primary & Secondary
	Annual	-	50 ^f	Primary & Secondary
	24 hours	-	65 ^g	Primary & Secondary
	Annual	-	15 ^f	Primary & Secondary
Sulfur Oxides (SO _x)	3 hours	0.50 ^b	1300	Secondary
	24 hours	0.14 ^b	365	Primary
	Annual	0.03 ^c	80	Primary

Source: EPA, 2002.

- a) Primary standards are set to protect public health. Secondary standards are designed to protect public welfare.
- b) This average is not to be exceeded more than once per year.
- c) This average is not to be exceeded.
- d) The average of the annual 4th highest daily 8-hour maximum over a 3-year period is not to exceed this level.
- e) The 3-year average of the annual 99th percentile for each monitor within an area is not to exceed this level.
- f) The 3-year average of the annual arithmetic mean is less than or equal to the standard.
- g) The 3-year average of the annual 98th percentile is less than or equal to the standard.

ppm = parts per million.

µg/m³ = micrograms per cubic meter.

Attainment/Non-Attainment Status - In accordance with the CAA Amendments of 1977, all areas within the State of Florida are designated with respect to the NAAQS as attainment, non-attainment, or maintenance. According to EPA criteria, an area with air quality better than the NAAQS is designated as attainment, an area with air quality worse than the NAAQS is designated as non-attainment, and an area that is in transition back to attainment is designated as attainment/maintenance. Orlando is designated attainment for all criteria pollutants, including the new PM_{2.5} and 8-hour O₃ standards, based on historical air monitoring data.

Air Monitoring - FDEP operates several outdoor ambient air monitoring sites in the Orlando area. Two of these sites are within 8 miles of the airport and measure O₃ and PM₁₀. Table 10-3 provides a summary of the monitoring data collected at these sites during 2002. As shown, all the monitoring data for these criteria pollutants in the area are within the NAAQS.

**TABLE 10-3
2002 AIR MONITORING DATA - ORLANDO, FLORIDA**

Monitoring Station Location	Distance and Direction from MCO	Pollutants Monitored	Averaging Time	Maximum Recorded Concentration	NAAQS ^a	Design Values Above NAAQS (Y/N) ^b
7055 Winegard Rd.	3.9 miles, Northwest	O ₃	1-hour	0.11 ppm	0.12 ppm	No
			8-hour	0.08 ppm	0.08 ppm	No
2401 W 33rd St.	7.6 miles, Northwest	PM ₁₀	24-hour	41 µg/m ³	150 µg/m ³	No
			Annual	23 µg/m ³	50 µg/m ³	No

Source: EPA Air Quality System (AQS), 2003.

^a NAAQS (National Ambient Air Quality Standards) established by the U.S. EPA.

^b Design Values are compared to the NAAQS and determined to be above the standard (Yes) or below the standard (No).

O₃ = ozone.

PM₁₀ = inhalable particulates less than 10 microns in diameter.

ppm = parts per million.

µg/m³ = micrograms per cubic meter.

10.2.5.2 Sources of Air Emissions

In general terms, the primary sources of air emissions at air carrier airports such as MCO are aircraft, ground support equipment (GSE), and motor vehicles. Other sources include fuel storage facilities, a small variety of stationary sources (e.g., emergency electrical generation), and construction activities.

10.2.6 WATER RESOURCES

10.2.6.1 Surface Water

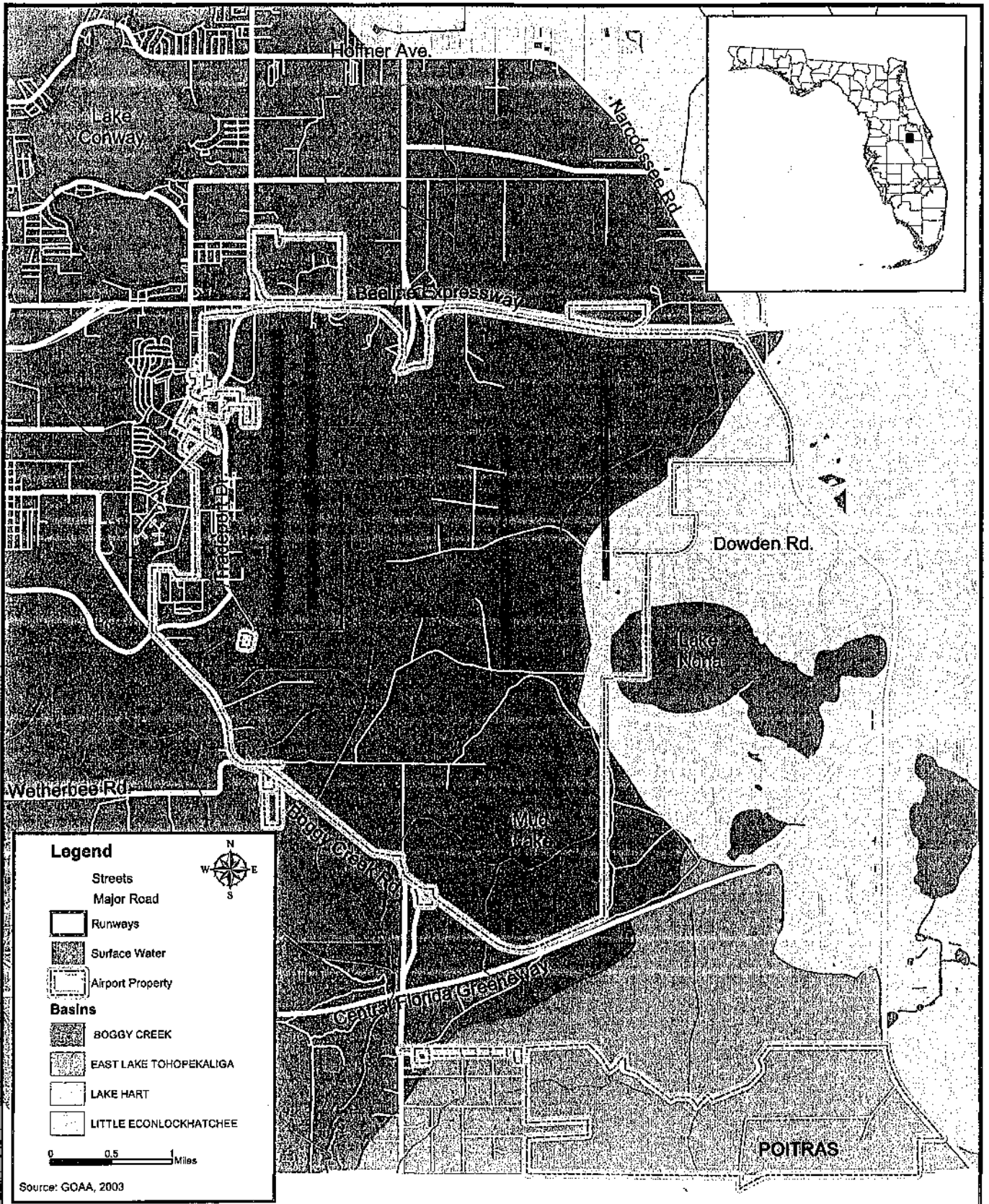
MCO lies within the Atlantic Coastal Plain Physiographic Province. The terrain is flat and contains many low-lying depressions. MCO is within the Boggy Creek Drainage Basin, which contains the Boggy Creek River (see Figure 10-2) and is a sub-basin of the Kissimmee River headwaters. Boggy Creek begins north of MCO and flows south into Lake Tohopekaliga.

The airport is drained by the channelized East Branch Boggy Creek, remnant Mare Prairie Slough, and Bull Slough. All three flow south into Boggy Creek Swamp located south of MCO. The flow then continues generally southeastward via the Kissimmee River towards Lake Okeechobee. Additional surface water features at MCO include Lake Nona, Mud Lake, and scattered wet detention ponds.

All surface waters on MCO property are designated by the state as Class III Waters. Water quality in these waters must be maintained and has been monitored monthly at locations throughout MCO property. Orange County Environmental Protection Division (EPD) samples 25 lake sites and 4 stream sites in the Boggy Creek basin on a quarterly basis.

10.2.6.2 Groundwater

The hydrogeology of the Orange County area can be characterized using three general units, or "groups" of sedimentary material. The lowermost unit is a soft, chalky limestone referred to as the Ocala Group. This material is porous and is one of the units comprising the upper Floridian aquifer. The Ocala Group is overlain by a thick, relatively continuous sequence of interbedded dolomites, clays, sandy clays, and clayey sands collectively referred to as the Hawthorn Group. The materials in the Hawthorn Group possess inherently low permeability, which allows them to function as a "cap" or confining layer on the Ocala Group. Above the Hawthorn Group is a thick stratum (typically more



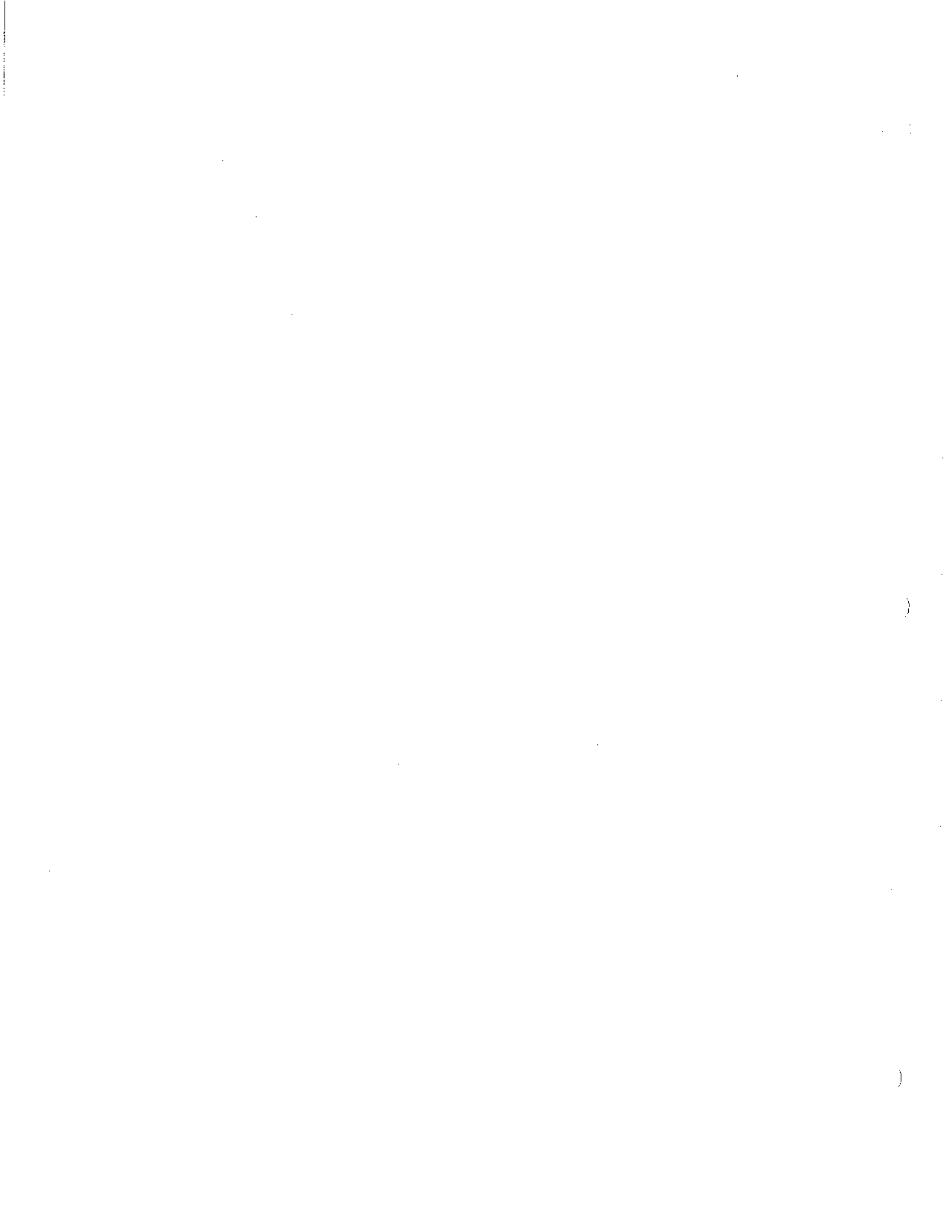
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GREATER ORLANDO AVIATION AUTHORITY

 Orlando International Airport
 Master Plan Update

DRAINAGE BASIN MAP

FIGURE:
 10-2



than 30 feet) of undifferentiated sands containing varying amounts of silt. These sands are porous and contain sufficient water to form a surficial aquifer. Because of the presence of the Hawthorn Group in central Florida, flow from the surficial aquifer to the Floridian aquifer is very limited and there is relatively low recharge in the general area.

The quality of the groundwater is variable, depending on the source. Water from the surficial aquifer is typically acidic and contains substantial amounts of dissolved solids and colloidal organic material. It is generally used only for irrigation. Water from the Floridian aquifer varies in quality, depending on the chemical composition of the aquifer. It may be soft or hard, depending on the carbonate content, and the amount of dissolved iron may be high.

Stormwater Drainage System - MCO contains a number of drainage structures and an extensive water management system that is continually updated as additional development projects are constructed. The significant features of the system are the perimeter flood control and drainage system of the B-8 bypass canal, levee system, retention/detention areas, weirs, and gates. Other drainage features include Bull Slough and remnant Mare Prairie Slough. With the majority of the water management system already in place, there is little potential for flooding problems on MCO property.

The surface water management system for future MCO development, as well as all previous developments, has been designed to meet or exceed the drainage criteria established by the South Florida Water Management District (SFWMD) and the FDEP. These design criteria include requirements for providing physical treatment for water quality protection and restrictions on off-site discharge rates. The agencies require post-development discharges for the 25-year/24-hour design storm frequency not to exceed pre-development conditions.

According to FAA Order 5050.4A, FAA requires sufficient description of design, mitigation measures, and construction controls applicable to the proposal to demonstrate that state water quality standards and any Federal, state, and local permit requirements can be met.

As required by SFWMD, water quality treatment for 2.5 inches times the percentage of impervious coverage is to be provided in wet detention ponds. Individual development tracts where hazardous materials may enter the surface water management system are required to provide 0.5-inch of dry pre-treatment prior to connecting to the master system.

All basins discharge into the existing master stormwater system where a water quality monitoring currently occurs. Retention ponds, conveyance systems, and silt fences are constructed and installed prior to any impervious surfaces being constructed.

MCO contributes data to the State of Florida Statewide Airport Stormwater Study. This study is a multi-year cooperative effort by FDOT, FAA, FDEP, and the State of Florida Water Management Districts to characterize airport airside stormwater. Results will be used to develop an Airport Stormwater Quality and Quantity Best Management Practices (BMP) Manual for airports in the State of Florida.

Water Supply - Orange County's source of drinking water is the Floridian aquifer. Potable water at MCO is provided by the Orlando Utilities Commission (OUC). The OUC maintains and operates the internal supply system at the airport. MCO uses approximately 342,826,000 gallons of water per year (an average of approximately 939,000 gallons per day). Non-potable water is used for landscape irrigation and is a supplement to the potable supply used for fighting fires. This non-potable water is obtained from airport ponds.

10.2.7 DEPARTMENT OF TRANSPORTATION SECTION 4(F) AND DEPARTMENT OF INTERIOR SECTION 6(F) RESOURCES

Section 4(f), Title 49 U.S. Code, provides protection for special properties, including publicly owned parks, recreation areas, wildlife and waterfowl refuges, or any significant historic sites. Protection also applies to cultural resource sites on, or eligible for, inclusion on the National Register of Historic Places (NRHP) (36 Code of Federal Regulations (CFR), Section 60.4). Section 4(f) prevents the approval of a proposed Federal action that requires the use of these special properties unless no feasible and prudent alternative exists and the project includes all possible planning to minimize harm to the resource resulting from such use. There are no Section 4(f) resources on MCO property or within the GSA.

The Land and Water Conservation Fund (LWCF) provides monies to Federal, state, and local governments to acquire land, water, and conservation easements on land and water for the benefit of all Americans. Lands are purchased from willing sellers at fair-market value or through partial or outright donations of property. Landowners can also sell or donate easements on their property that restrict commercial development while keeping the land in private ownership. The *Land and Water Conservation Fund Act of 1965*, as amended, and 16 U.S. Code, Section 460/-6(f)3, more commonly referred to as Section 6(f), requires all properties receiving LWCF assistance for planning, acquisition, or development be perpetually maintained for public outdoor recreation use. The act requires, in part, that: "No property acquired or developed with assistance under this section shall, without approval of the Secretary of the Interior, be converted to other than public outdoor recreation uses." There are no sites within the airport property or within the GSA identified as Section 6(f) resources.

10.2.8 HISTORIC AND ARCHAEOLOGICAL RESOURCES

10.2.8.1 Compliance with Section 106 of the National Historic Preservation Act

Historic and archaeological resources listed or eligible for listing in the NRHP, which may be affected by an undertaking by a Federal agency, are protected by Federal law, primarily the *National Historic Preservation Act of 1966* (NHPA), as amended, and its implementing regulations, 36 CFR 800 (June 1999). These laws and regulations are invoked by the involvement of Federal funding, licensing, or permitting. Under the authority of Section 106 of the NHPA, the FAA, prior to the approval of an airport layout plan (ALP) and issuance of a grant for and funding of an undertaking - specifically, a proposed airport improvement - must take into account the potential effects the undertaking may have on properties listed in or eligible for listing in the NRHP.

10.2.8.2 Historic Architectural Resources Area of Potential Effect

To determine the effect an undertaking may have on properties listed or eligible for listing in the NRHP, an Area of Potential Effect (APE) must be identified. The APE is the geographic area within which an undertaking may directly or indirectly cause changes in the characteristics of historic properties making them eligible for the NRHP (36 CFR 800.16(d)). Such changes may include physical destruction, damage, or alteration of a property; change of the character of the property(s) use or of physical features within its setting that contribute to its historic significance; and introduction of visual, atmospheric, or audible elements that diminish the integrity of the property(s) significant historic features (36 CFR 800.5(a)(2)). Based on these factors, the APE associated with historic architectural resources for the proposed developments at MCO includes the limits of disturbance associated with these improvements and those historic resources within the airport's existing DNL 65 dBA contour.

The DNL is a scientifically modeled level of sound that has been shown to be directly linked to human beings and "annoyance level." Location outside the 65 DNL is considered compatible with land uses that include residential, educational, religious, medical, and outdoor recreational (FAA FAR Part 150, Appendix O, Table 1). In this section, the use of the 65 DNL contour to define an APE for historic architectural resources is based on accepted FAA land use compatibility guidelines.

10.2.8.3 Archaeological Resources Area of Potential Effect

An archaeological resource is any prehistoric or historic district, site, building, structure, or object that occurs in an archaeological context and is 50 years old or older. The APE for archaeological resources is defined as all locations associated with the proposed undertaking resulting in the alteration and disturbance of surface and subsurface soils that contain or have the potential to contain archaeological sites. Therefore, the APE regarding archaeological resources includes the limits of ground disturbance associated with each development, and lies within the historic architectural resources APE described previously.

10.2.8.4 Historic Architectural and Archaeological Investigations

A historic architectural resource is any historic district, site, building, or structure that is 50 years old or older and is generally located above ground. The resource data presented in this Environmental Considerations section represents a compilation of site file data for previously recorded historic architectural and archaeological resources located within the APE for the project. This information was obtained from files maintained by the Florida Department of State, Division of Historical Resources (Florida Master Site File), and a search of the National Register Information System database maintained by the U.S. Department of the Interior, National Park Service.

Results of this investigation identified no previously inventoried standing resource more than 50 years old located within the APE for historic architectural resources. According to the Florida Department of State, Division of Historic Resources, no previously recorded archaeological sites have been identified in the archaeological resources APE.

10.2.9 BIOTIC COMMUNITIES

A biotic community is an assemblage of plants, animals, and their habitats within a given area. In describing biotic communities, this Environmental Considerations section focuses on descriptions of land use/vegetative cover and wildlife within MCO property based on the Florida Land Use, Cover, and Forms Classification System (FLUCFCS) developed by the FDOT. The following biotic communities are found within the DSA.

Improved Pastures (FLUCFCS Code 211) - This category is composed of land that has been cleared, tilled, reseeded with specific grass types, and periodically improved with brush control and fertilizer application. Water ponds, troughs, feed bunkers and, in some cases, cow trails are evident.

Citrus Groves (FLUCFCS Code 221) - This land cover category characterizes those areas currently active in the production of a variety of citrus, such as orange, grapefruit, and tangerines.

Herbaceous (Dry Prairie) (FLUCFCS Code 310) - This category includes upland prairie grasses that occur on non-hydric soils but may be occasionally inundated by water. These grasslands are generally treeless with a variety of vegetation types dominated by grasses, sedges, rushes, and other herbs including wiregrasses with some saw palmetto present.

Old Field (FLUCFCS Code 311) - This land cover addresses a range of herbaceous vegetation communities, which evolved subsequent to site disturbance of former land management practices.

Palmetto Prairie (FLUCFCS Code 321) - These are areas in which saw palmetto is the most dominant vegetation. Common associates of saw palmetto in this cover type are fetterbush, tar flower, gallberry, wiregrass, and brown grasses. This cover type is usually found on seldom flooded dry sand areas. These treeless areas are often similar to the pine flatwoods but without the presence of pine trees.

Shrub and Brushland (FLUCFCS Code 329) - These areas include those communities that demonstrate a wide range of species, little evidence of species dominance, and apparent disturbance. These areas have been historically managed as improved pasture; however, ending of management practices has fostered the colonization of old field, non-native, and native plant species.

Pine Flatwoods (FLUCFCS Code 411) - These forests are quite common throughout much of northern and central Florida. The pine flatwoods class is dominated by slash pine, longleaf pine, or both and less frequently, pond pine. The common flatwoods understory species include saw palmetto, wax myrtle, gallberry, and a wide variety of herbs and brush.

Pine - Mesic Oak (FLUCFCS Code 414) - On moister sites, slash, longleaf, and loblolly pine grow in strong association with a wide variety of mesic oaks and other hardwood species. Southern red oak, water oak, white oak, and laurel oak, in addition to hickories, sweetgum, and dogwood commonly grow alongside these pine species under mesic conditions. Gallberry, wax myrtle, and saw palmetto are among the common understory species.

Other Pines (FLUCFCS Code 419) - This land cover addresses those areas containing a canopy of slash pine and low ground cover species.

Live Oak (FLUCFCS Code 427) - This forest community is one in which live oak is either pure or predominant. The principal associates of this cover type include sweetgum, magnolia, holly, and laurel oak. This community is common along the upper banks of Florida's lakes and streams.

Hardwood-Conifer Mixed (FLUCFCS Code 434) - This classification is reserved for those forested areas in which neither upland conifers nor hardwoods achieve 66 percent crown canopy dominance. Such areas may reflect a community in transition from a pine-dominated community to a shade-tolerant, hardwood-dominant system. These areas may also have resulted from a typical pine dominated community selectively harvested in the past and which is currently yielding to normal succession.

Mixed Hardwood (FLUCFCS Code 438) - This is a hardwood community in which no single species or species group appears to achieve a 66 percent dominance of the canopy. This class of hardwoods includes any combination of large and small hardwood tree species, none of which can be identified as dominating the canopy.

Other Hardwoods (FLUCFCS Code 439) - This land cover typically defines those communities composed of a wide variety of hardwood species in which no single species achieves dominance. Canopy species identified within this land cover include live oak and laurel oak, with occasional water oak in the subcanopy.

Coniferous Plantations (FLUCFCS Code 441) - These are almost exclusively pine forests artificially generated by planting seedling stock or seeds. These stands are characterized by high numbers of trees per acre and their uniform appearance. Although row patterns often stand out, this is not always the case, especially where stands are as a result of aerial seeding. When established on hydric soils, this can be a wetland cover.

Streams and Waterways (FLUCFCS Code 510) - This category includes rivers, creeks, canals, and other linear water bodies. Where the water course is interrupted by a control structure, the impounded water area is placed in the Reservoirs category (FLUCFCS Code 530).

Lakes (Larger than 100 Acres) (FLUCFCS Code 522) - The Lakes category includes extensive inland water bodies, excluding reservoirs. Islands within lakes too small to delineate are included in the water area. The delineation of a lake is based on the size of the water body at the time the data was acquired. Mud Lake is a 234-acre freshwater lake located in the southeastern portion of MCO property.

Reservoirs (FLUCFCS Code 530) - Reservoirs are artificial impoundments of water. They are used for irrigation, flood control, municipal and rural water supplies, recreation, and hydro-electric power generation. Dams, levees, other water control structures, or the excavation itself usually will be evident to aid in the identification. FLUCFCS Code 533 includes reservoirs larger than 10 acres, while FLUCFCS Code 534 includes reservoirs less than 10 acres.

Bay Swamps (FLUCFCS Code 611) - This category is composed of dominant trees such as loblolly bay, sweetbay magnolia, and swamp bay, with slash pine and loblolly pine as an associated component at times. Large gallberry, fetterbush, wax myrtle, and titi are included in the understory vegetation.

Inland Ponds and Sloughs (FLUCFCS Code 616) - These communities are associated with depressions and drainage areas not associated with streams or lakes. One or a combination of the following species will generally be predominant: pond cypress, swamp tupelo, water tupelo, titi or willows, Carolina ash, and pond apple.

Mixed Wetland Hardwoods (FLUCFCS Code 617) - This category is reserved for those wetland hardwood communities that are composed of a large variety of hardwood species tolerant of hydric conditions yet exhibit a poorly defined mixture of species.

Willow and Elderberry (FLUCFCS Code 618) - In this community, willow is the pure or predominant species. In some areas of Florida such as in Paynes Prairie State Preserve, elderberry is the primary associate species.

Cypress (FLUCFCS Code 621) - This community is composed of pond cypress or bald cypress, which is either pure or predominant. In the case of pond cypress, common associates are swamp tupelo, slash pine, and black titi. In the case of bald cypress, common associates are water tupelo, swamp cottonwood, red maple, American elm, pumpkin ash, Carolina ash, overcup oak, and water hickory. Bald cypress may be associated with laurel oak, sweetgum, and sweetbay on less moist sites.

Hydric Pine Flatwoods (FLUCFCS Code 625) - This community consists of forest with a sparse to moderate canopy of slash pine. The understory is grasses, wiregrass, and forbs and, at times, sparse saw palmetto.

Wetland Forested Mixed (FLUCFCS Code 630) - This category includes mixed wetlands forest communities in which neither hardwoods nor conifers achieve a 66 percent dominance of the crown canopy composition.

Wetland Shrub (FLUCFCS Code 631) - This community is associated with topographic depressions and poorly drained soil. Associated species include pond cypress, swamp tupelo, willows, and other low scrub with no dominate species.

Freshwater Marshes (FLUCFCS Code 641) - The communities included in this category are characterized by having one or more of the following species predominate: sawgrass, cattail,

arrowhead, maidencane, buttonbush, cordgrass, giant Cutgrass, switchgrass, bulrush, needlerush, common Reed, and arrowroot.

Wet Prairies (FLUCFCS Code 643) - This classification is composed predominately of grassy vegetation on hydric soils and is usually distinguished from marshes by having less water and shorter herbage. These communities are predominated by one or more of the following species: sawgrass, maidencane, cordgrasses, spike rushes, beach rushes, St. Johns wort, spiderlily, swamplily, yellow-eyed grass, and whitetop sedge.

Treeless Hydric Savanna (FLUCFCS Code 646) - This category is typically dominated by wiregrass or cutthroat grass along with wetland plant associates.

Disturbed Land (FLUCFCS Code 740) - Disturbed Lands are those areas that have been changed due primarily to human activities other than mining. In Florida, these areas may be rather extensive and often appear outside of urban areas.

Airport (FLUCFCS Code 811) - Airport facilities include runways, intervening land, terminals, service buildings, navigational aids, fuel storage, parking lots, and a limited buffer zone and fall within the Transportation category.

Roads and Highways (FLUCFCS Code 814) - Highways include areas used for interchanges, limited access rights-of-way, and service facilities. The center median, pavement, and sizable buffer zone are included even if exact boundaries cannot be detected.

Canals and Locks (FLUCFCS Code 816) - This land cover characterizes the embankments along the perimeter of the existing manmade canals and the vehicular access adjacent to those areas.

Sewage Treatment (FLUCFCS Code 834) - This category is associated with the classification of any area or facility employed in sewage treatment operations. This land cover type includes sewage treatment plants as well as the rapid infiltration basins (RIBs).

10.2.10 THREATENED AND ENDANGERED SPECIES

Florida Natural Area Inventory (FNAI) is a comprehensive database of the biological resources of Florida, which includes more than 28,000 element occurrences of rare plants and animals and high-quality natural communities.

For this Environmental Considerations section, data from the FNAI database was requested for a listing of the potential for occurrences of endangered or rare plants and animals within the vicinity of MCO. The FNAI did not report any element of occurrence of threatened and endangered species within MCO property (Appendix P).

10.2.11 WETLANDS

The U.S. Army Corps of Engineers (USACE) defines wetlands as:

“Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

– (33 CFR 320-330)

The USACE uses three characteristics of wetlands when making wetland determinations: vegetation, soil, and hydrology. Unless an area has been altered or is a rare natural situation, indicators of all

three wetland characteristics must be present during some portion of the growing season for an area to be a wetland. Figure 10-3 shows USACE wetlands on MCO property.

The FDEP defines wetlands as:

“Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, mangrove swamps and other similar areas.”
– (Chapter 62-340, FAC)

Extensive wetland studies have occurred on MCO property including airport supported project areas (20-year build-out areas). These studies have included agency jurisdictional determinations (Federal and state), wetland evaluations, impact assessments, wetland impact permitting, mitigation design and permitting, and continual agency coordination. Existing wetlands on MCO property include forested, marsh, borrow pit, and surface water management types.

On-site mitigation efforts at MCO began in 1979 with the construction of the Third Airside Terminal (Airside 4) and the By-Pass Canal. In the mid to late 1980s and early 1990s, on-site mitigation was permitted for the south crossfield taxiway/Runway 17R/35L, Airside 4, and East Terminal Complex/Midfield/Fourth Runway (17L/35R) projects, respectively.

In the mid-1990s, GOAA began purchasing off-site mitigation lands in the vicinity of the Walt Disney Wilderness Preserve. This area supports a high diversity of ecological community types and endemic plant and animal species. Its vast contiguous wetland system provides critical habitat and potential corridor connections for the movement of wildlife between biological areas.

A binding wetland jurisdictional determination was obtained from the USACE in November 1994 for a majority of the wetland systems on MCO property.

Also in the 1990s, GOAA coordinated with all of the permitting agencies and concerned conservation groups to resolve existing permit compliance issues and to obtain a 25-year build-out permit for MCO. The Third (17R/35L) and Fourth Runway (17L/35R) state permits were modified on December 9, 1993, to allow mitigation for wetland impacts to be permitted off-site. Off-site mitigation for wetland impacts from the Fourth Runway and Midfield Area projects was approved by the FAA in the Addendum to the Fourth Runway FONSI. Finally, the state Comprehensive Conceptual Permit (CCP) issued by SFWMD on April 10, 1997, required that mitigation for wetland impacts be provided off-site.

10.2.12 FLOODPLAINS

Executive Order 11988, *Floodplain Management*, defines floodplains as the “lowland and relatively flat areas adjoining inland and coastal waters, including flood prone areas of offshore islands, including at a minimum, those that are subject to a 1 percent or greater chance of flooding in any given year” (i.e., area inundated by a 100-year flood). The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP) based on maps showing floodplains and hazard areas. Up-to-date maps allow risk premium rates and floodplain management requirements to be based on current data. The 100-year flood (1 percent annual chance) has been adopted by FEMA as the base flood for floodplain management purposes.

Floodplain

Zone	Description
A	Special flood hazard areas inundated by the 100-year flood determined by approximate methods; no base flood elevations are shown or flood hazard factors determined.
AE	Special flood hazard areas inundated by the 100-year flood, with base flood elevations shown.
X	Areas between the special flood hazard areas and the limits of the 500-year flood; or certain areas subject to 100-year flooding with average depths less than 1 foot or where the contributing drainage area is less than 1 square mile; or areas protected by levees from the base flood.

According to FEMA, Flood Insurance Rate Maps (FIRM), there are Zone A, AE, and X floodplains located within the airport property (FEMA FIRM Panels 12095C0430, 12095C0435, 12095C0440, 12095C0445, 2000). The floodplains are primarily associated with East Branch Boggy Creek (see Figure 10-4).

GOAA is currently revising the FEMA floodplain map for MCO. This effort is anticipated to be completed in 2005.

10.2.13 COASTAL ZONE MANAGEMENT/COASTAL BARRIERS

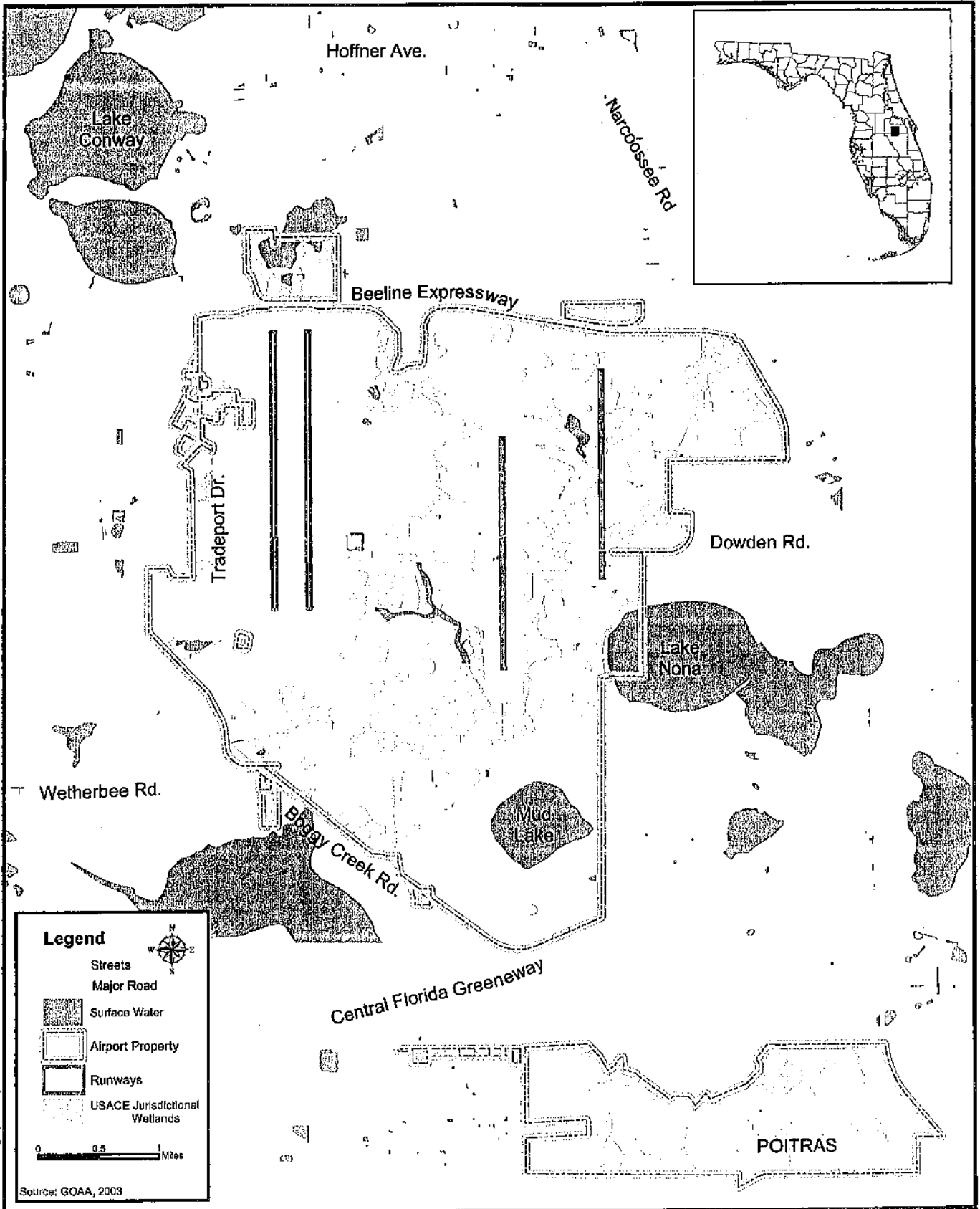
The Florida Coastal Management Program (FCMP) consists of a network of statutes administered by 11 state agencies and 4 of the 5 water management districts. The FCMP is designed to ensure the prudent use and protection of the state's coastal resources. Under provisions of the *Federal Coastal Zone Management Act of 1972*, any Federal activity having the potential to impact Florida's coastal resources is reviewed for consistency with the FCMP. The geography of Florida is such that the entire state is considered to be within the coastal zone and, therefore, subject to oversight by the FCMP.

10.2.14 WILD AND SCENIC RIVERS

The *Wild and Scenic Rivers Act of 1968* provides for the protection and preservation of certain rivers and their immediate environment that possess outstandingly remarkable recreational, geologic, fish and wildlife, historic, cultural, and other similar values. The Act restricts development within 1,000 feet of rivers designated as "wild and scenic." According to the National Wild and Scenic River System, there are no wild and scenic rivers on airport property.

10.2.15 FARMLANDS

Significant soil types can be classified as either prime or unique farmlands or farmlands of statewide importance or of local significance. Prime farmlands are those farmlands whose value derives from their general advantages as croplands due to soil and water conditions. These soils are best suited for producing food, feed, fiber, forage, and oilseed crops. They have favorable growing seasons and receive sufficient quantities of moisture to produce high yields on average of 8 out of every 10 years. Unique farmlands are those whose value derives from their particular advantages for growing specialty crops such as tree fruits and certain vegetables. State or locally significant farmlands are those farmlands, other than prime or unique farmlands, used for the production of food, feed, fiber, forage, or oilseed crops, as determined by the appropriate state or unit of local government agency or agencies and determined by the Secretary that it should be considered as farmlands (*Farmland Protection Policy Act*).



Legend

- Streets
- Major Road
- Surface Water
- Airport Property
- Runways
- USACE Jurisdictional Wetlands

0 0.5 1 Miles

Source: GOAA, 2003



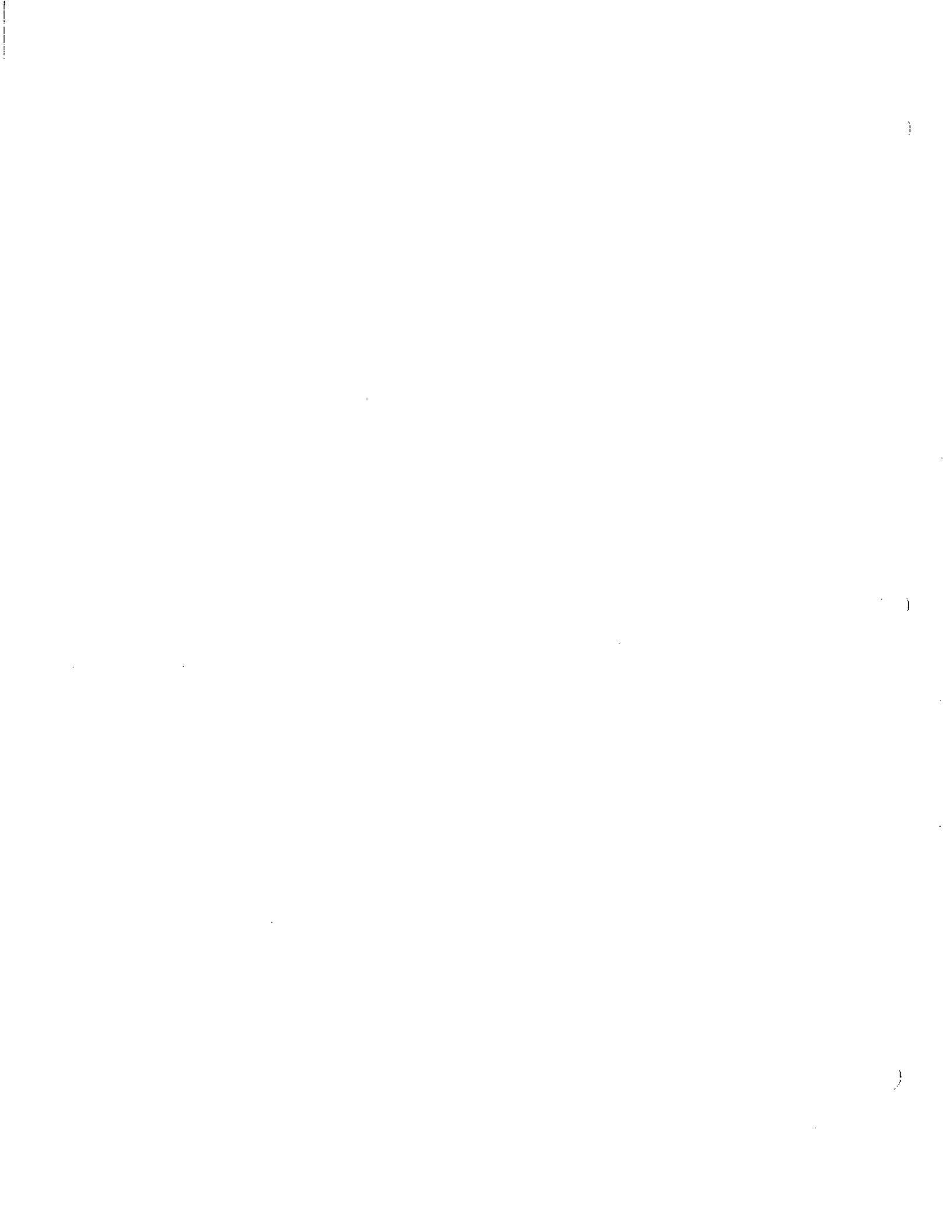
GREATER ORLANDO AVIATION AUTHORITY

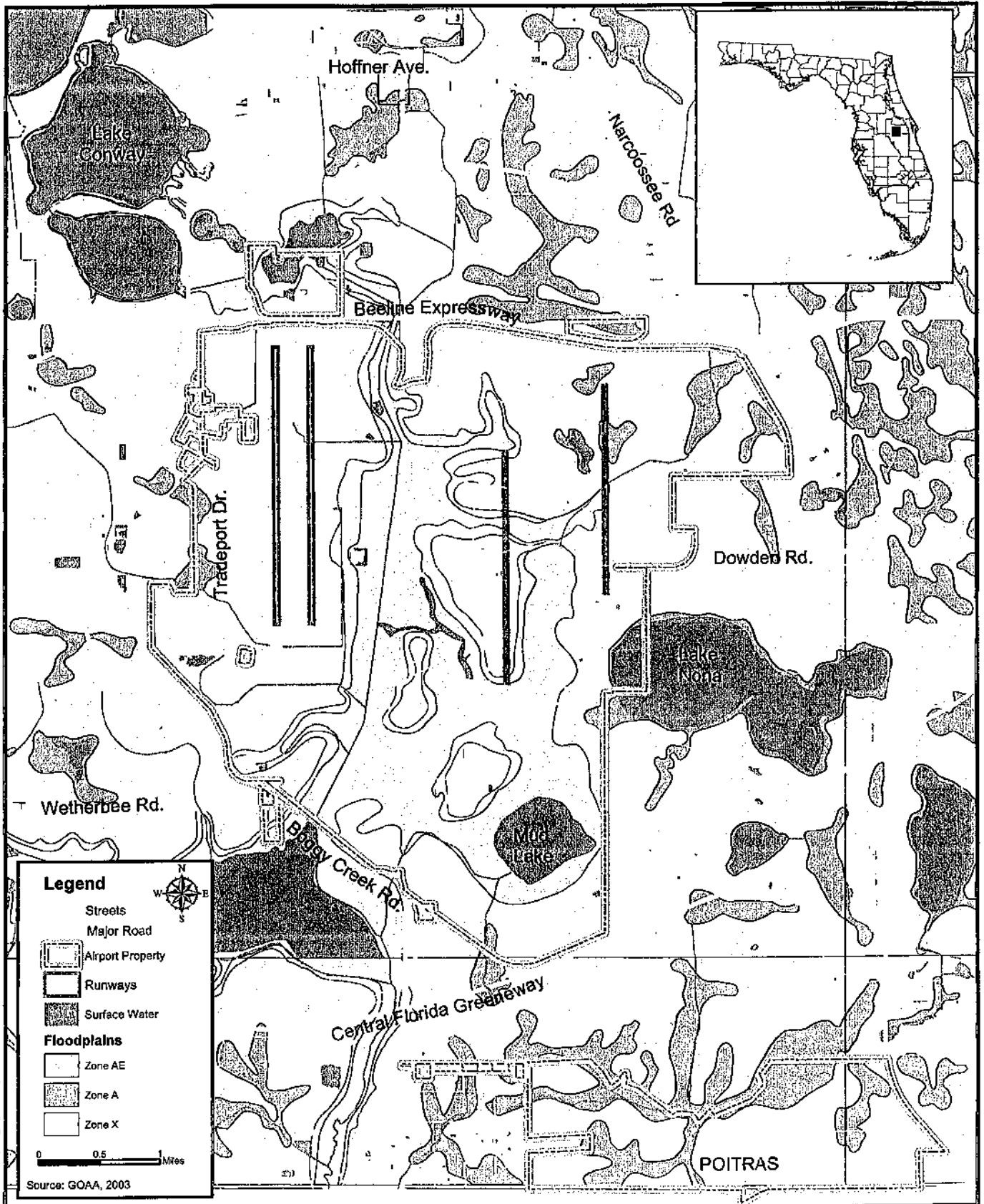
Orlando International Airport
Master Plan Update

WETLAND MAP

FIGURE:
10-3

H:\projects\11\20060501_01003_01\Map\Map\Wetlands_Map.mxd May 2004





GREATER ORLANDO AVIATION AUTHORITY



Orlando International Airport Master Plan Update

FLOODPLAIN MAP

FIGURE: 10-4



According to the *Farmland Protection Policy Act of 1981* (FPPA), Federal agencies are directed to use development criteria to identify and take into account the adverse effects of Federal programs on the preservation of farmland (FAA Order 5050.4A).

Urban or built-up land, water areas, and areas without adequate irrigation water available are not considered prime farmland. In addition, as defined by the FPPA (FPPA, 7 CFR Section 658.2(a):

“Prime farmland committed to urban development includes all such land that has been designated for commercial or industrial use or residential use that is not intended at the same time to protect farmland in a: (1) zoning code or ordinance adopted by a state or unit of local government, or (2) a comprehensive land use plan which has expressly been either adopted or reviewed in its entirety by the unit of local government in whose jurisdiction it is operative within 10 years preceding implementation of the particular Federal project.”

Based on the correspondence with the Natural Resources Conservation Service (NRCS), no prime farmland or unique or state significant soil types are located on MCO property.

10.2.16 ENERGY SUPPLY AND NATURAL RESOURCES

The OUC supplies MCO with electrical power, while Peoples Gas supplies natural gas fuel to MCO. MCO is a major utility consumer in Orange County, using approximately 167,993,141 kilowatt (kWh) hours per year of electricity (460,225 kWh per day). There are no known natural resources on MCO property.

10.2.17 LIGHT EMISSIONS

MCO lighting provides for the safe and secure movement of pedestrians and vehicles. Airport facilities are illuminated by various types of lighting, which can emanate from any on the following:

- Airfield and visual navigational aids lighting,
- Terminal and apron lighting, and
- Surface transportation lighting.

10.2.17.1 Airfield and Visual Navigational Aids Lighting

MCO possesses four parallel north-south oriented runways with Runway 18R/36L equipped with High Intensity Runway Edge Lights (HIRLs), Touchdown Zone Lighting (TDZL), Centerline Lighting (CL), Medium Intensity Approach Lighting System (MALSR), and a Visual Approach Slope Indicator (VASI). Runway 18L/36R is equipped with HIRLs, CL, TDZL, High Intensity Approach Light System with Sequenced Flashing Lights in a Category II (CAT II) configuration (ALSF-2), and VASI. Runway 17R/35L is equipped with HIRLs, CL, TDZL, a Precision Approach Path Indicator (PAPI) system, and ALSF-2. Runway 17L/35R is equipped with HIRLs, CL, PAPI, and ALSF-2.

HIRLs are high intensity lights installed the full length of the runway and parallel to the edge of usable pavement. HIRLs are the highest intensity runway edge lights that can be installed on a runway.

TDZL consists of two rows of transverse light bars located symmetrically about the runway centerline. Each light bar consists of three unidirectional lights facing the landing threshold. The rows of light bars extend to a distance of 3,000 feet, or one-half the runway length for runways less than 6,000 feet. The spacing between bars is 100 feet.

An airport beacon is located on the west side of the airport between U.S. Customs and air cargo facilities. The airport beacon is used to aid pilots in locating the airport using a rotating green and white light.

CL consists of in-ground light fixtures along the runway centerline at 500-foot intervals, offset either 2 feet to the left or right of the runway markings. The color of the lights is white, except the last 3,000 feet. From 3,000 feet to 1,000 feet, the color code alternates between red and white. The last 1,000 feet of the runway includes red lights only.

A PAPI system is a stanchion-mounted, directional, high intensity, upward angled, two-color light system producing a bicolor split beam. A PAPI system provides visual descent guidance information during the approach to a runway. This system provides a visual glide path that allows for safe obstruction clearance from the start of descent to the threshold.

A MALSR is a stanchion-mounted, unidirectional, medium intensity white approach light system, extending from the runway end, angled upward along the approach path of the runway.

An ALSF-2 is a unidirectional, high intensity stanchion-mounted approached light system that starts 1,000 feet from the threshold and sequentially flashes white lights along the angle of approach. The threshold lights of an ALSF-2 have green filters. These lights flash in sequence towards the threshold at the rate of twice per second.

A VASI consists of upwardly angled light units, located on a line perpendicular to the runway centerline. Bars are typically located on the left side of the runway. The centerline of the inboard light units in each bar is located 50 feet from the runway edge. The distance between the two bars is 16.5 feet.

10.2.17.2 Terminals and Aprons Lighting

Each terminal and associated apron area is illuminated for passengers, aircraft, and GSE. Lighting for these areas is focused on those areas where aircraft movement occurs.

10.2.17.3 Surface Transportation Lighting

Airport Boulevard, Bear Road, Tradeport Drive, Heintzelman Boulevard, South Access Road, and Cargo Road provide the majority of roadway access throughout MCO property. These roadways are illuminated by streetlights providing for a safe thoroughfare.

10.2.17.4 Light Sensitive Areas Surrounding MCO

Light sensitive areas typically include single-family and multi-family residential areas. MCO is not adjacent to these types of land uses and, therefore, are not emitting significant light emission on light sensitive areas.

10.2.18 SOLID WASTE

The City of Orlando, Solid Waste Management Bureau is responsible for transporting municipal solid waste from MCO. Orange County Solid Waste Division is responsible for solid waste disposal in Orange County. It operates a 5,000-acre landfill and two transfer stations.

The Orange County Landfill provides storage of municipal solid waste disposal and has a life expectancy of 20 to 30 years. Located on Young Pine Road, the landfill is a Class 1 landfill used primarily to bury material that cannot be burned such as construction debris, special wastes, and other waste by-products. Class 1 landfills receive general, non-hazardous household, commercial, industrial, and agricultural waste. The Solid Waste Division receives nearly one million tons of garbage and over 25,000 tons of recyclables annually.

According to FAA AC 150/5200-33, *Hazardous Wildlife Attractants on or Near Airports*, waste disposal sites have the potential to attract birds and are considered incompatible if located within 10,000 feet (1.9 statute miles) of any runway end used or planned to be used by turbine-powered aircraft or located within a 5-mile radius of a runway that attracts or sustains hazardous bird movements into or across the runways and/or approach and departure patterns of aircraft. The Orange County Landfill is located approximately 6 miles northeast of the closest MCO runway and does not attract or sustain hazardous bird movements into or across MCO runways and/or approach and departure patterns of aircraft.

10.2.19 HAZARDOUS MATERIALS

Presently, hazardous materials (including hazardous wastes, environmental contamination, and other regulated materials such as fuel) are not specifically included among the environmental categories identified in FAA Order 5050.4A. However, because the potential disruption of sites containing hazardous materials or environmental contamination can impact soil, surface water, groundwater, and air quality, this section provides an overview of the areas of environmental concern located within the airport property.

This section is not meant to serve as a formal Environmental Site Assessment or an environmental compliance audit of MCO or its environs. No sampling or testing of environmental media (e.g., soils, surface water, groundwater, building materials) was conducted.

The existing fuel storage facilities are located in two separate areas of the airport. The largest facility (34 acres) serves the North Terminal Complex and is located west of Tradeport Drive. A portion of the site is undeveloped and reserved for future development. A smaller facility supports the airport's Fixed Base Operators (FBOs) and is located in the Northwest Terminal Support Area (NWTSA) west of Bear Road.

Six 1,000-gallon per minute (gpm) hydrant pumps and filter sets transfer fuel to the North Terminal Complex. Two 14-inch transmission pipes transfer Jet-A fuel to the existing North Terminal Complex hydrant systems. The 14-inch pipes reduce to 12 inches as they branch off to all airside at MCO. The dual 12-inch lines branch off at each airside making a single 12-inch hydrant loop around the airside.

10.3 Potential Environmental Impacts

The facilities requirements program developed in the master planning process identified the following short to near term (5- to 10-year) physical planning improvements to meet the long-term aviation needs for the Orlando area.

The potential environmental impacts resulting from the construction and operation of the Master Plan Update improvements are presented in this section. Each improvement proposed to be developed from 2005 to 2015 was reviewed for potential impacts to environmental categories outlined in FAA Order 5050.4A, *Airport Environmental Handbook*. Environmental categories not impacted by the improvements are not discussed. Table 10-4 summarizes potential environmental impacts associated with each Master Plan Update improvement.

10.3.1 TERMINAL PROJECTS

10.3.1.1 Airsides 1 and 3 Rehabilitation

The center hub of the Airside 1 building is programmed for expansion to accommodate an expanded Federal Inspection System (FIS) facility, concession and circulation areas. In addition, the gates could be reconfigured to accommodate new large aircraft (NLA) anticipated to operate at the airport by 2008.

The center hub of the Airside 3 building is programmed for concession and circulation expansion to accommodate future passenger demand. However, the existing fleet mix and gate configuration would remain. The rehabilitation of Airsides 1 and 3 at MCO has the potential for construction impacts. These construction impacts could include increased noise from construction operations, temporary increase in water turbidity, temporary increase in air emissions, and disposal and management of solid wastes.

The proposed action could be processed as a CE since it should not result in significant environmental impacts. Modifications to Airsides 1 and 3 would not increase the number of gates of an existing terminal and would not trigger the DRI review process.

10.3.1.2 Airside 2 Expansion

Within the next 5 years, construction of a third concourse located at Airside 2 (wing No. 8) and expansion of the existing wing Nos. 7 and 9 are programmed to accommodate additional aircraft gates. Airside 2 could accommodate 32 Airplane Design Group (ADG) III aircraft.

Expansion of Airside 2 and the additional aircraft gates at MCO have the potential to increase aircraft noise, impact air quality in the vicinity of MCO, and impact hazardous materials (underground fueling line). In addition, construction impacts, as described previously, would occur.

Airside 2 expansion could be processed as a CE since it should not result in significant environmental impacts. Airside 2 expansion would include 32 additional gates at MCO; however, this addition does not exceed the DRI threshold of 25 percent and, therefore, would not trigger the DRI review process.

TABLE 10-4

SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE 5- TO 10-YEAR MASTER PLAN UPDATE IMPROVEMENTS

	FAA Order 5050.4A Environmental Impact Categories																			
	Noise	Land Use	social/ Environmental Justice	Induced Socioeconomics	Air Quality	Water Resources	Section 4(f)/(g)	Historic/Archaeological	Biotic Communities and Endangered Species	Wetlands	Floodplains	CZMP/CB	Wild and Scenic Rivers	Farmland	Energy Supply/ Natural Resources	Light Emissions	Solid Waste	Hazardous Materials	Construction	
Not applicable - FAA Finding of No Significant Impact determined																				
MPU Project																				
Airside 1 and 3 Rehabilitation																				
Airside 2 Expansion																				
Airside 4 Modifications																				
South Terminal Complex																				
Runway 18L and 18R RSA Improvements																				
New West Airfield High Speed Exit Taxiways																				
Dual North Crossfield Taxiway "K"																				
Runway 17R Extension																				
Airside 2 and 4 Connector Taxiway "I"																				
Taxiway Y Extension - Tradeport West Ramp																				
Taxiway L Extension (North to JetBlue Airways Facility and South of Comair)																				
Taxiway C Extension																				
Not applicable - FAA Finding of No Significant Impact determined																				
Interim Widening of South Access Road																				
Bear Rd. Extension - Tradeport Dr. to Cargo Rd.																				
Widen and Realign Tradeport Drive																				
Extension of Cargo Road																				
East Airfield Secure Service Road Extension																				
Heintzelman Boulevard Extension to Wetherbee/Boggy Creek Roads																				
Expand Employee Parking Lot																				
Close Gold Lot, Expand Blue and Red Lots by 2,000 to 5,000 Parking Spaces																				
Rail																				
South Tradeport Drainage Improvements																				
Demolition of Existing Facilities																				

Source: URS, 2004.

■ Potential impacts.

Notes: CZMP/CB = Coastal Zone Management Program/Coastal Barrier.

10.3.1.3 Airside 4 Modifications

The international gates located on wing No. 11 of Airside 4 would be reconfigured to accommodate 2 to 3 A380-800 aircraft, which is an NLA, anticipated to operate at the airport by 2008.

The reconfiguration of Airside 4 to accommodate larger aircraft at MCO has the potential to result in construction impacts, as described previously.

Airside 4 modifications could be processed as a CE since it should not result in significant environmental impacts. Airside 4 modifications would not increase the number of gates and, therefore, would not trigger the DRI review process.

10.3.1.4 South Terminal Complex

Phase I of the South Terminal Complex could consist of a 12- to 24-gate terminal, linking the North Terminal Complex to the South Terminal Complex by an Intermodal Transit System (ITS). This would require constructing approximately 208,000 square yards of taxiway and apron pavement in support of the new South Terminal Complex Phase I project.

FAA has reviewed this project for NEPA compliance. On August 4, 1998, FAA issued a FONSI for the South Terminal Complex Final EA. Additional environmental analysis and NEPA documentation associated with this project is not required.

10.3.2 AIRFIELD PROJECTS

10.3.2.1 Runways 18L and 18R Runway Safety Area Improvements

Currently, both Runways 18L and 18R have Runway Safety Areas (RSAs) that do not satisfy the FAA required 1,000-foot length beyond the north end of each respective runway. The RSA for Runway 18L extends approximately 910 feet and the RSA for Runway 18R extends approximately 922 feet. As such, displacement of both runway thresholds to the south along with airfield lighting, signage, and marking improvements would rectify both non-standard RSA conditions.

Runways 18L and 18R RSA improvements could be processed as a CE since they would not result in significant environmental impacts. In addition, a DRI would not be required as part of this project.

10.3.2.2 New West Airfield High Speed Exit Taxiways

Three new west airfield high-speed exit taxiways and pavement fillet widening to two existing runway exit taxiways would be constructed to decrease runway occupancy times. These exit taxiways would accommodate ADG-VI aircraft.

New west airfield high-speed taxiways have the potential to increase water runoff due to increased impervious surfaces. This additional runoff has the potential to impact the water quality at MCO. In addition, decreased runway occupancy times may impact air quality conditions as well. Construction impacts, as described previously, would also occur.

These taxiway improvements could be processed as a CE since they would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

10.3.2.3 Dual North Crossfield Taxiway

The north crossfield taxiway (future Taxiway "F") links the east and west airport operating areas. The north crossfield taxiway is planned to be a dual lane (ADG-VI) taxiway and would allow two-way traffic to move between the east and west sides of the airfield.

The dual north crossfield taxiway has the potential to increase water runoff due to increased impervious surfaces. This additional runoff has the potential to impact the water quality at MCO. Taxiway lighting would create a minor increase in electrical power at MCO. Short-term construction impacts, as described previously, would also occur.

The dual north crossfield taxiway could be processed as a CE since it would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

10.3.2.4 Runway 17R/35L Extension

Runway 17R/35L is planned to be extended 1,500 feet to the north. Associated taxiways and navigational aids (NAVAIDS) are included in this extension program.

Extension of Runway 17R/35L has the potential to increase aircraft noise, impact air quality and biotic communities, and increase water runoff due to additional impervious surfaces. This additional runoff has the potential to impact the water quality at MCO. Construction impacts, as described previously, would also occur.

The runway extension may require an EA since it has the potential to result in environmental impacts. The proposed extension would not increase the runway length by 25 percent; therefore, the DRI review process would not be triggered.

10.3.2.5 Airsides 2 and 4 Connector Taxiway

A connector taxiway between Airsides 2 and 4 would be constructed to improve aircraft circulation on the east side of the airport and between the two airsides. This taxiway extension would be approximately 1,300 feet long and 75 feet wide with 35-foot shoulders (ADG-V).

The Airsides 2 and 4 connector taxiway has the potential to increase water runoff due to increased impervious surfaces. This additional runoff has the potential to impact the water quality at MCO. Taxiway lighting would create a minor increase in electrical power at MCO. Short-term construction impacts, as described previously, would also occur.

The Airsides 2 and 4 connector taxiway could be processed as a CE since it would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

10.3.2.6 Taxiway Y Extension - Tradeport West Ramp

An extension of Taxiway Y would be constructed to improve the ingress and egress of aircraft onto the Tradeport west ramp. This taxiway extension would be approximately 600 feet long and 100 feet wide with 40-foot shoulders (ADG-VI).

Extension of Taxiway Y to the Tradeport west ramp has the potential to increase water runoff due to increased impervious surfaces. This additional runoff has the potential to impact the water quality at MCO. Taxiway lighting would create a minor increase in electrical power at MCO. Construction impacts, as described previously, would also occur.

The Taxiway Y extension could be processed as a CE since it would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

10.3.2.7 Taxiway L Extension (North to jetBlue Airways Facility and South of Comair)

Taxiway L is to be extended approximately 500 feet to the north. The taxiway extension will link the new jetBlue Airways aircraft maintenance hangar with the existing east airfield. Taxiway L is also

proposed to be extended 8,500 feet to the south. This extension would be located west of the bypass canal and will link with Taxiway G approximately 1,300 feet to the west as a taxiway connector.

The extension of Taxiway L has the potential to increase water runoff due to increased impervious surfaces. This additional runoff has the potential to impact the water quality at MCO. Taxiway lighting would create a minor increase in electrical power at MCO. Construction impacts, as described previously, would also occur.

The extension of Taxiway L could be processed as a CE since it would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

10.3.2.8 Taxiway C Extension

The extension of Taxiway C will be completed in conjunction with the proposed Runway 36R extension project. From Taxiway C10, Taxiway C will be extended approximately 2,790 feet to the south.

The extension of Taxiway C has the potential to increase water runoff due to increased impervious surfaces as well as impact water quality. Taxiway lighting would create a minor increase in electrical power and construction impacts, as described previously, would also occur.

The extension of Taxiway C could be processed as a CE since it would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

10.3.3 ROADWAY, RAIL, AND PARKING PROJECTS

10.3.3.1 Interim Widening of South Access Road

The South Access Road is proposed to be widened from a two-lane undivided to a four-lane divided roadway. The widening is proposed to take place along the existing alignment. The project begins at Heintzelman Boulevard and continues north to the tie-in with Airport Boulevard, just north of the mid-crossfield taxiway.

The South Access Road has been reviewed by FAA for NEPA compliance. It is assumed FAA issued a FONSI for the project. Additional environmental analysis and NEPA documentation associated with this project is not required.

10.3.3.2 Bear Road Extension - Tradeport Drive to Cargo Road

A west extension of Bear Road, between the existing Tradeport Drive and Daetwyler Road, is programmed to provide access to the planned non-aviation commercial development on the site of the existing remote parking Gold Lot and adjacent property. This extension would allow improved vehicular circulation to the future non-aviation commercial development in that area.

The Bear Road extension has the potential to increase surface transportation noise and impact air quality and water resources in the vicinity of the extended roadway. In addition, construction impacts, as described previously, would occur.

The extension of Bear Road could be processed as a CE since it would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

10.3.3.3 Widen and Realign Tradeport Drive

As part of the long-range aviation development and roadway improvement plan, the existing four-lane Tradeport Drive would be widened to six lanes and realigned to the west adjacent to the airport

10.3.4.2 Demolition of Existing Facilities

A variety of on-airport property buildings are proposed for demolition. These include the old U.S. Navy commissary warehouse, a two-story building on FAA parcel #5 at the Tradeport, the U.S. Postal Service (USPS) facility, and buildings 607 and 608 of the old terminal.

The demolition of existing facilities has the potential to increase the production of solid waste in the form of construction debris. Construction debris associated with this project has the potential to impact local landfills. In addition, construction impacts, as described previously, would occur.

The demolition of existing facilities could be processed as a CE since it would not result in significant environmental impacts. In addition, a DRI would not be required as part of this proposed project.

APPENDICES – VOLUME 2

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**

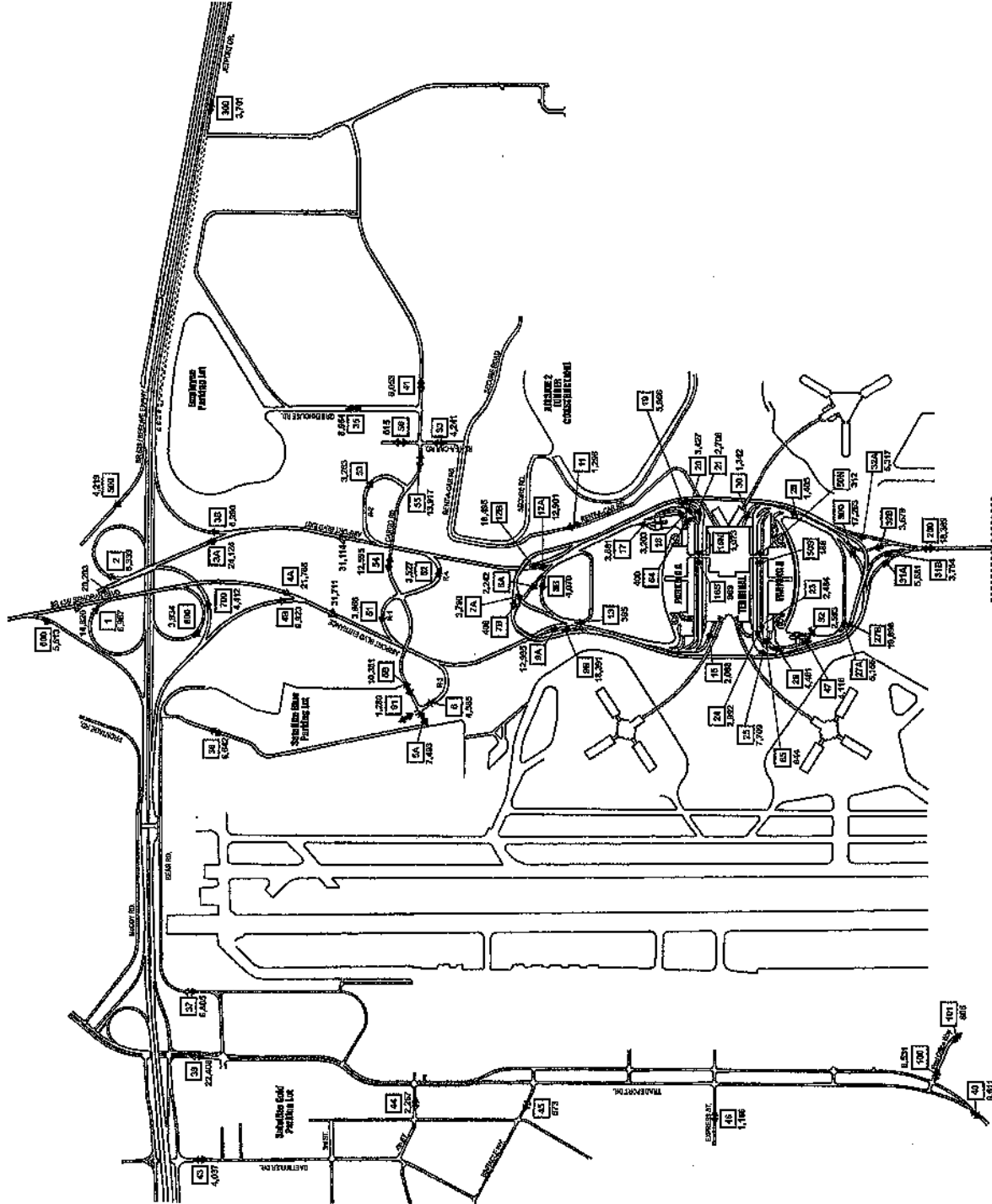
APPENDIX H

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**

ORLANDO INTERNATIONAL AIRPORT

2000 Peak Season Average Daily Traffic Volumes and Count Locations

Easter 2000
(April 16 to April 29)



- Legend**
- Station Locations & Direction of Traffic Flows
 - Combined Stations
 - Average Daily Traffic Volumes
 - Road Closure



Figure 1.

ORLANDO INTERNATIONAL AIRPORT

2000 Peak Season Average Daily Traffic Volumes and Count Locations

Easter 2000
(April 16 to April 29)

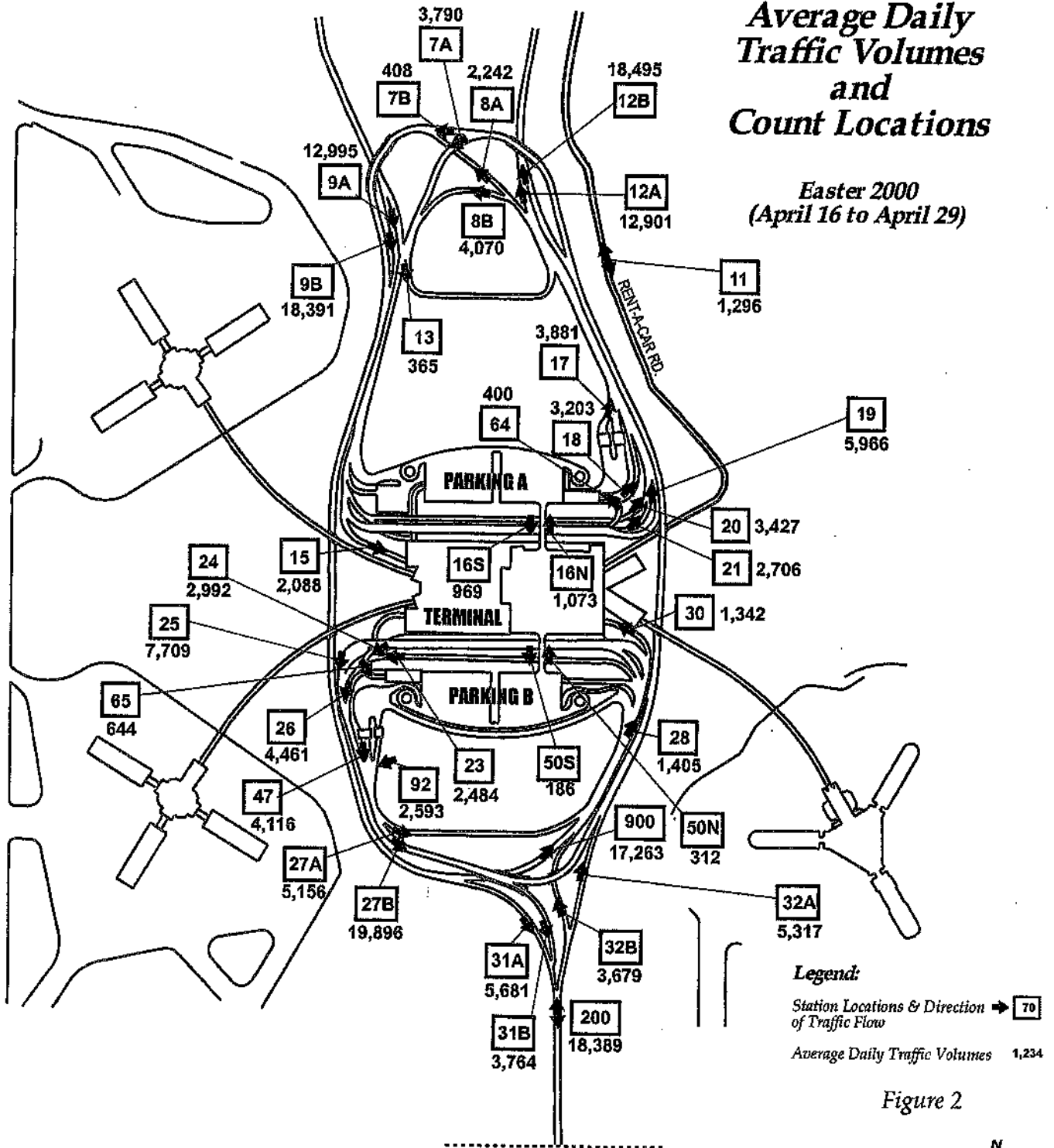


Figure 2



ORLANDO INTERNATIONAL AIRPORT

2000 Peak Season Average Daily Traffic Volumes and Count Locations

Easter 2000
(April 16 to April 29)

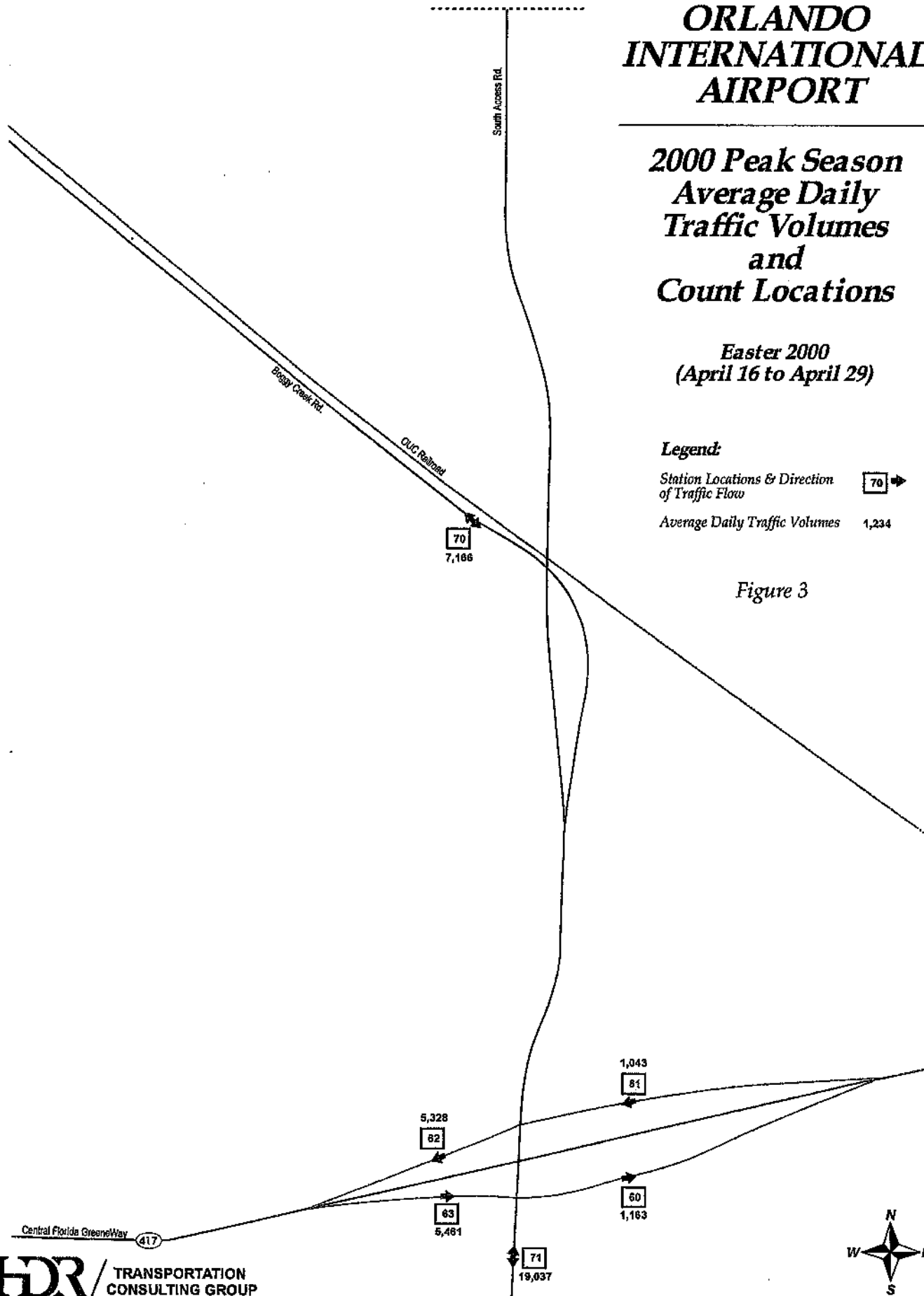
Legend:

Station Locations & Direction
of Traffic Flow



Average Daily Traffic Volumes 1,234

Figure 3





APPENDIX I

AIRPORT MASTER PLAN UPDATE ORLANDO INTERNATIONAL AIRPORT

OIA Master Plan Update

Surface Transportation Forecast

Prepared by:

ONE COMPANY | *Many Solutions*[®]



315 East Robinson Street, Suite 400
Orlando, Florida 32801

September 2003

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SURFACE TRANSPORTATION FORECAST

Introduction

Traffic projections are provided for three future forecast years identified for analysis: 2010, 2015, and 2025. These forecast years correspond to the following million annual passenger (MAP) levels assumed for the OIA Master Plan:

- Year 2010 – 40 MAP, all at the North Terminal
- Year 2015 – 45 MAP, 35 MAP at the North Terminal, 10 MAP at the South Terminal
- Year 2025 – 60 MAP, 35 MAP at the North Terminal, 25 MAP at the South Terminal

The ground transportation forecast relies upon existing data sources and several assumptions regarding the trip making characteristics of the airport. The data sources, assumptions, and methods used in the development of the traffic forecasts are summarized in the traffic methodology.

Traffic Methodology

Several methods were considered for conducting the traffic forecast at OIA, including regional travel demand models, regression methods, and sub-area modeling. While no one single method met all of the necessary requirements, each contributed to the selected method. The pros and cons of each of the candidate approaches are briefly described with the key useful features summarized.

Regional Travel Demand Model

Previous traffic studies of OIA have made use of the Orlando Urban Area Transportation Study (OUATS) regional traffic model to estimate future traffic at OIA. The regional model is generally adequate for estimating the distribution of airport traffic in relation to the location of regional population and employment. However, this model lacks any detail concerning the internal airport roadway system and is limited in terms of airport trip purposes that it is able to replicate. Recent advances with the OUATS model were accomplished by the FDOT in the year 2000 model validation. The 2000 OUATS model includes 3 new trip purposes to reflect airport trips for Airport Tourist, Airport Resident and Airport External trips. The primary benefits of the added trip purposes is the ability to specify the number of OIA passenger trips separately from all other airport traffic and the ability to distribute traffic based upon passenger related destinations (i.e. Passengers to Hotels, Passengers to Residences, and Passengers to External Stations which are areas outside of the geography of the model). The advantages of three unique passenger distributions are transparent to this study because the effect is not realized until airport trips are studied far beyond the airport boundary limits.

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Nonetheless, the improvements to trip generation control and passenger distribution allow trip estimating to be more precise and passenger traffic routing appears to follow a more natural path (routes) than observed in previous models.

The current 2000 OUATS validated model uses an internal roadway network that prohibits the cut-through traffic north-south along Airport Boulevard. Eliminating or reducing cut-through traffic at OIA is a desirable long-term goal for maintaining traffic flow, but is not a true representation of the current condition. It is estimated that cut-through traffic at OIA is approximately 8% on a daily basis (higher in commuter peak periods) based upon the *Orlando International Airport 1998 Cut-through Traffic & Curbside Drop-off/Pick-up Analysis, Easter 1998*. One objective of the Master Plan Update ground transportation analysis is to study how cut-through traffic impacts the airport's roadway system and to assess how cut-through traffic will be affected by new access connections to the surrounding regional roadway system. Therefore, any use of the regional model will require revalidating the network to enable cut-through traffic together with corresponding decreases in airport trip generation to validate traffic counts at the cordon line.

Benefit comparison of using Regional Travel Demand Model for traffic forecasting.

PRO	CON
<ul style="list-style-type: none">Model is consistent with process and tool used by the MPO and FDOT for regional transportation planningIncludes unique trip purposes to reflect the FDOT 1999 Tourist Travel Characteristics SurveyIncludes nested logit mode choice model to test multi-modal services to the airport (although would not address High Speed Rail)Airport traffic distribution is responsive to access connections and regional land use changes	<ul style="list-style-type: none">Model does not reflect cut-through traffic, therefore, airport trip generation is currently incorrectSimplified representation of the airport roadway network does not provide ability to forecast for internal roadwaysModel trip purposes do not include internal circulationTraffic assignment is not sensitive to way-finding signageCharter bus and shuttle van operations are not distinguished from private auto trafficPark and ride and remote employee parking is not reflected in the model

OIA Subarea Travel Demand Model

To estimate future traffic on the OIA roadway system a Subarea Travel Demand Model was created for the 1995 OIA Master Plan. Unlike the regional travel demand model, geographic coverage of the subarea model only includes the airport roadways, Tradeport Drive and the public roadways that define the boundaries of the airport such as SR 528 and Narcoossee Road. The OIA Subarea Model is a sketch planning tool that estimates travel on the roadway networks through a four step process that converts passenger enplanements and employment forecasts to ground vehicle traffic projections. The four fundamental steps are trip generation, trip distribution, mode split and traffic assignment, similar to the regional model. The subarea model was developed to address the shortcomings of the regional model in terms of roadway network detail and in forecasting specific on-airport ground vehicle traffic.

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One of the benefits of the subarea model is the ability to produce traffic assignments for the detailed network. The traffic zone structure of the subarea model represents each parking lot, curb level, and land use on the airport separately. This level of detail, while cumbersome to manage, enables the model to replicate the interaction that occurs within the airport (for example, trips are included to reflect vehicles dropping a person at the curb and then driving to park in the terminal parking garage).

The subarea model relies heavily on the regional model for determining the distribution of trips to external access roadways, cut-through traffic volumes, and mode split for public transportation. For these reasons, the use of the subarea model requires a parallel investment in updating the regional model to generate these data inputs.

PRO	CON
<ul style="list-style-type: none">▪ Model provides detailed estimation of airport traffic for all airport trip purposes▪ Can be used to forecast weave volumes▪ Internal circulation can be accommodated as well as fixed route shuttle service within the airport (park and ride or employee shuttle)▪ Useful for testing land use or traffic operations alternatives	<ul style="list-style-type: none">▪ Model does not respond to access changes without input from the regional model▪ Mode split occurs in the trip generation step (based upon predetermined percentages) rather than after distribution using a choice model▪ Key input assumptions are dependent upon the output of the regional model. Structure requires maintaining two independent models for forecasting

Regression Analysis (Trends)

Regression analysis of historic traffic data is often used to estimate future traffic when traffic growth is generally consistent and is not influenced heavily by external or competing influences. For example, trends are not useful for determining future traffic when a new parallel roadway is constructed because the traffic diversion will alter the trend. In addition, trend analysis cannot be used to forecast traffic on a new roadway facility where historic data does not exist. Trends can be used on a limited basis where conditions are well known and conditions are not expected to change for the forecast year.

PRO	CON
<ul style="list-style-type: none">▪ OIA has a good historical record of traffic data of at least 10 years▪ Trends are the fastest, straight forward approach for traffic forecasting	<ul style="list-style-type: none">▪ Trend analysis is not sensitive to any operational changes, new roadways or land uses at the airport▪ Does not reflect the impact of increased transit service to the airport or any other significant changes in mode split▪ Would not provide an estimation of cut-through traffic on airport roadways

Selected Methodology

In consideration of the pros and cons of each of the approaches evaluated, the preferred method for developing airport traffic forecasts was to integrate the subarea model into the regional model. This was accomplished by duplicating the subarea model traffic zone structure within the regional model, dividing the airport traffic into two groups, one with trip purposes to be handled by the regional model (External Traffic) and the other to be handled by trip tables generated by the subarea model (Internal Traffic).

The procedures followed in the development of the model include:

- **Network Coding and Development Program**

This process entails generating a graphical representation of the subarea highway network using nodes and links including attribute data of unconstrained speed, number of lanes, and capacity for each link in the network. The geography of the model is divided into traffic zones, each representing a particular land use or traffic generating function of the airport. There are 13 traffic zones represented in the subarea model in order to replicate individual functions separately. For example, there are 44 zones at the North Terminal to represent RAC, parking, departure curb, arrival curb and commercial curb for each side of the terminal.

- **Trip Generation**

This procedure estimates the number of trips from each traffic analysis zone based on the number of passengers, number of employees, type of land use and its intensity. Trip purposes are separated into those handled by the regional model and those handled by the subarea model. The regional model produces trip generation for 12 trip purposes as follows:

Trip Purpose 1	Home Based Work
Trip Purpose 2	Home Based Shopping
Trip Purpose 3	Home Based Social Recreation
Trip Purpose 4	Home Based Other
Trip Purpose 5	Non-Home Based
Trip Purpose 6	Light Truck
Trip Purpose 7	Heavy Truck
Trip Purpose 8	Taxi
Trip Purpose 9	Internal External
Trip Purpose 10	Airport Tourist Trips
Trip Purpose 11	Airport Resident
Trip Purpose 12	Airport External

As previously discussed, purposes 10-12 for Airport Tourist, Airport Resident and Airport External trips were added to the model based upon the results of the 1999 Non-Home Base survey work by the FDOT.

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The subarea model handles five separate trip purposes to generate a trip table of traffic interaction that occurs between airport traffic zones.

Subarea Trip Purpose 1	On-site Rental Cars
Subarea Trip Purpose 2	Maintenance/Service
Subarea Trip Purpose 3	Internal Employee Circulation
Subarea Trip Purpose 4	Internal Passenger Circulation
Subarea Trip Purpose 5	Internal Shuttle Circulation

Trips associated with the ITS circulator to LRT or High Speed Rail at the future South Terminal are not modeled but are held aside in the model for future use.

- **Trip Distribution**

This procedure matches trip origins to their destination with respect to established zonal attraction. Unique traffic distributions are developed for each of the 9 regional model trip purposes and the 5 subarea trip purposes. The regional model distribution uses a gravity based formula for developing the distribution (except for airport purposes 10, 11, and 12 which use a probability distribution developed as part of the FDOT 2000 OUATS validation). The distribution of subarea trip purposes is defined by linking trip pairs between the internal uses specified as a model input rather than output. Traffic recirculation around the terminal is established by creating zonal pairs within the terminal that must use the one-way loop road to complete the trip.

- **Modal Split**

This procedure estimates the portion of trip-making population that is estimated to use alternative transportation modes subcategorized into private auto, rental car, taxi, parking shuttle, rental car shuttle, charter bus, city bus and LRT. Mode split of the regional model trip purposes are calculated by the standard nested logit model which occurs after trip distribution. Mode choice of the subarea trip purposes are calculated at the trip generation step.

- **Trip Assignment**

In the trip assignment process, the trip path is determined based on the minimum time path between the origins and destinations. A pre-loaded path assignment is included in this process for subarea trip purposes to account for fixed route shuttle bus operations, such as employee shuttles from remote parking to the terminals.

- **Model Validation**

This iterative procedure replicates existing (2000) counts and produces a set of parameters that will be used by the model for future year roadway projections.

Assumptions

As stated previously, many assumptions were required in place of actual data in generating a traffic model to replicate the daily ground access vehicle operations. Key assumptions incorporated into the model validation step are summarized here and should be verified when future data is made available:

Data Resources

Resources used for gathering data include the 1995 OIA Master Plan, the 1990, 1992, 1996 and 2000 Terminal Surveys, the 2000 Peak Season Daily Traffic Counts, Easter 2000 (April 16th – April 29th), 2000 Employee TDM Survey, GOAA website, and the Terminal Programs Report. The known data include the following:

- CY 2000 Daily Traffic = 96,300 ADT – *OIA Average Busy Day Peak Season Annual Traffic Counts (April 16th – April 29th, 2000)*;
- CY 2000 Annual Passengers = 30,823,509 – *GOAA Historical and Forecast Traffic, Orlando International Airport (website)*;
- Connecting Passengers = 6% - *2000 Terminal Survey*;
- Number of Employees (2000) = 12,000 estimated – *2000 Employee TDM Survey*;
- Peak Month Factor = 8.9%; - ratio of April 2000 to CY 2000 enplaned + deplaned passengers;
- Average Day Factor = 28.37 – *Estimate from April 2000 traffic counts*;
- Passenger Market Distribution = 28.7% Orlando Residents; 7.0% Florida Residents; 57.3% Florida Visitors (U.S. Residents); 7.1% Florida Visitors (International Residents) – *average of 1990, 1992 and 1996 Terminal Surveys (International adjusted based upon 2/04/98 meeting between HDR and ZHA)*;
- Percent of trips by trip purpose (business, personal, visitor) for each market – *average of 1990, 1992 and 1996 Terminal Surveys*
- Mode Split – percent of persons (passengers and employees) traveling to or from the airport by each specific type of transportation available – *average of 1990, 1992 and 1996 Terminal Surveys*; (Mode Split Adjustment for Charter Bus: 1. Meeting at ZHA on 2/4/98 - suggested that Charter Bus vehicle trips should be approximately 390 with passenger occupancy of 15). 2. HDR decreased shuttle van (and hotel van for Florida residents) mode split for Florida, U.S., and International Residents to increase Charter Bus)
- Average Vehicle Occupancies – number of air passengers or employees per vehicle for each specific mode of transportation – *OIA Master Plan, 1995*, employee private auto-occupancy adjusted from *2000 Employee TDM Survey*.

Trip Generation Assumptions

- Approximately 73% of all airport employees present on an average day (*2000 Employee TDM Survey*);
- 90% of all employees make two work trips per day, and 10% of all employees make four work trips per day, giving an average of 2.2 trips per day for employees;
- Modified average vehicle occupancy of private car for air passengers is 0.9; modified average taxi occupancy for air passengers is 0.85;

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- A third component of traffic at the airport (other than air passengers and employees) is a combination of service, cargo, and cut-through traffic;
- The cut-line traffic count minus air passenger trips and employee trips equals the number of service/cargo/cut-through trips;
- A ratio of air passenger trips to service/cargo/cut-through trips can be established in order to project the number of service related trips forward for future analyses (calculated to be 5.48).

Calculations

- Number of 2000 daily person trips: 110,200 air passenger trips and 19,300 employee trips;
- Number of daily vehicle trips: 62,300 air passenger ADT (64.7%); 17,400 employee ADT (18.1%); 16,600 service/cargo/cut-through ADT (17.2%);

The following section explains the resources and assumptions for determining trip generation for 2010, 2015 and 2025.

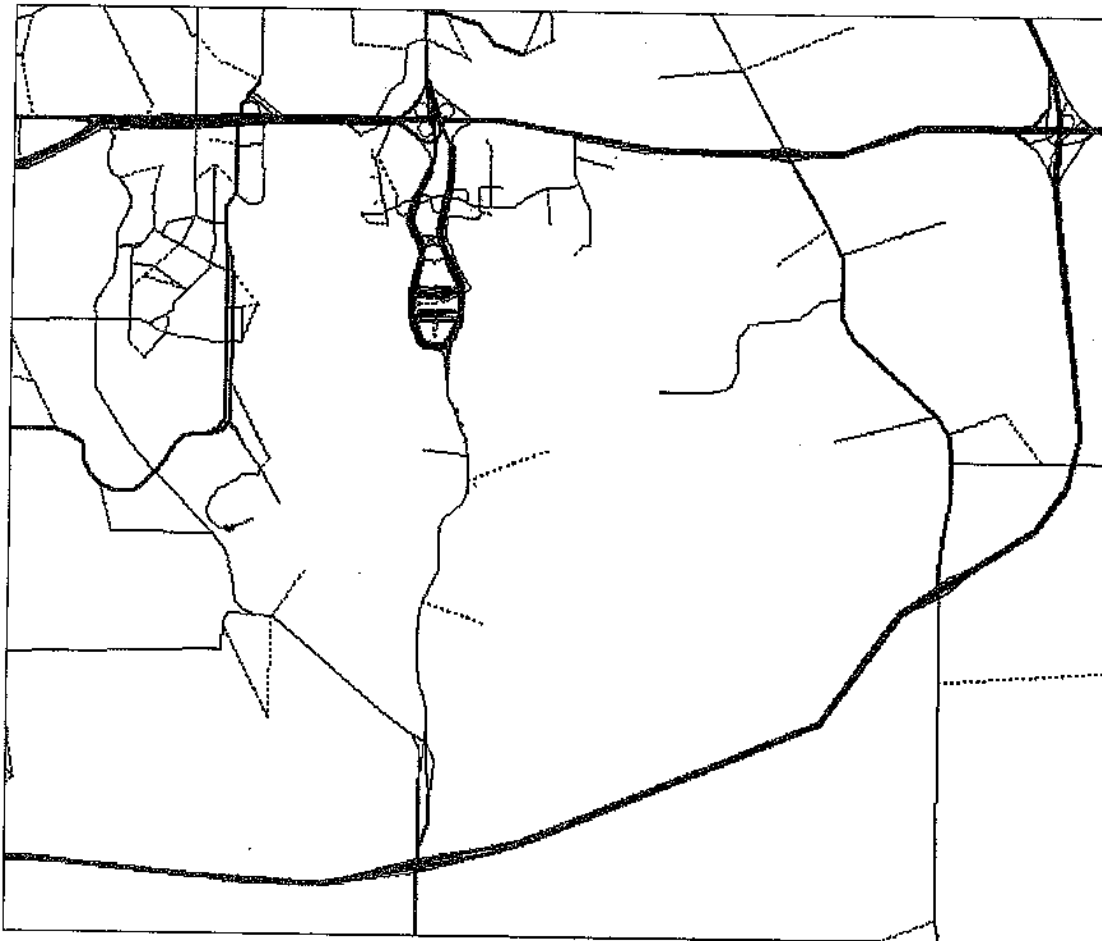
Data Resources

- Year 2010 – 40 MAP, all at the North Terminal
- Year 2015 – 45 MAP, 35 MAP at the North Terminal, 10 MAP at the South Terminal
- Year 2025 – 60 MAP. 35 MAP at the North Terminal, 25 MAP at the South Terminal
- Connecting passengers = 6% - *2000 Terminal Survey*;
- Passenger market distribution, percent trips by trip purpose, and mode splits modified to reflect the results from the *LYNX Airport Corridor MIS, September 1996*;
- Number of employees at the North Terminal (35 MAP) = 13,600, (40 MAP) = 15,600
- Number of employees at the South Terminal (10 MAP) = 3,900, (25 MAP) = 9,700

Year 2000 Model Validation

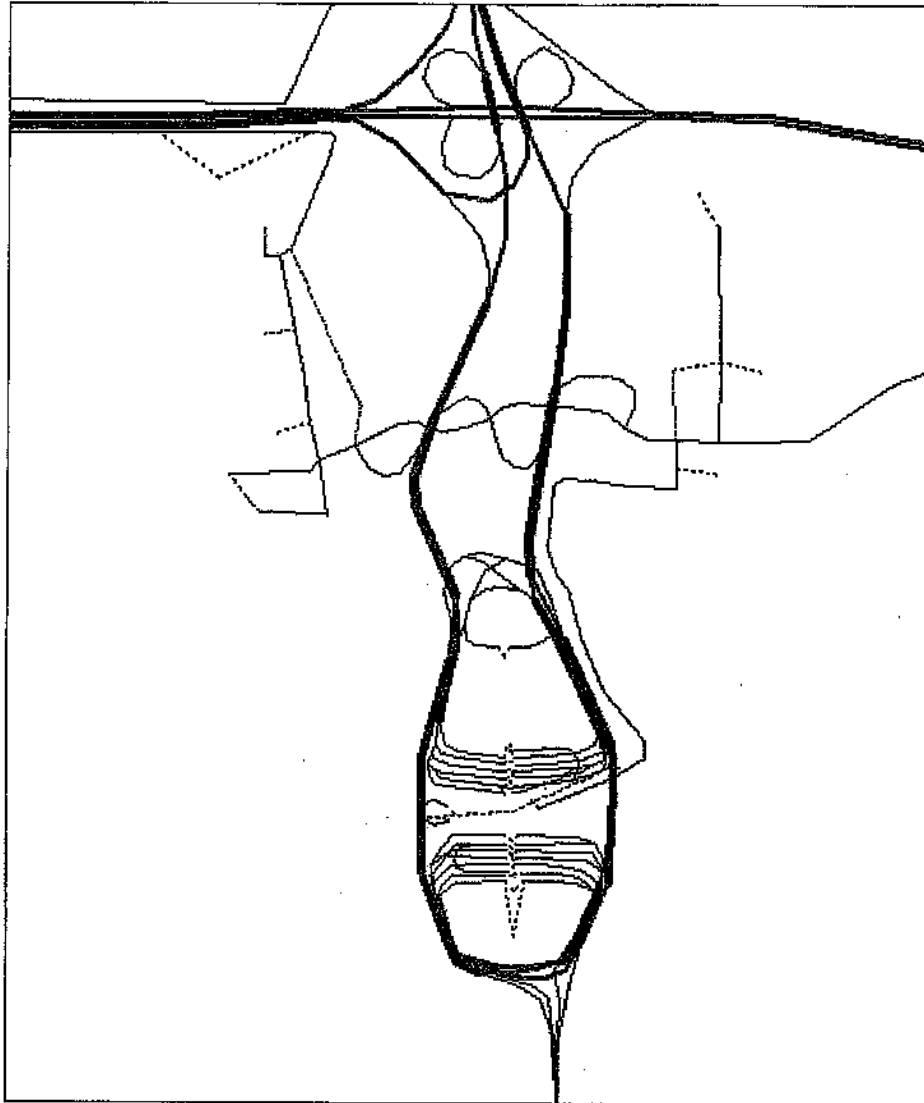
The OIA Master Plan forecasting effort included the creation of and validation of the OIA subarea to reflect year 2000 conditions. For purposes of this study, the subarea includes all on-site airport roadways, Tradeport Drive and the public roadways that define the boundaries of the airport such as SR 528 and Narcoossee Road as shown below in Figure 1. It should be noted that the existing Heintzelman Boulevard and Goldenrod Road interchange were under construction and were not open to traffic for year 2000 and therefore are not included in the model validation.

**Figure 1
OIA Subarea Model Coverage**



The existing roadway network for the OIA subarea was coded from aerial photography provided by GOAA by setting the aerial into the same projection as the regional model and registering the aerial into the background of the model highway network. This source was used to create the internal roadway network in all areas except the landside terminal roadway ramps. The terminal building provides vehicular access at three levels and for 4 distinct curbs, i.e. Departure, Arrival, Commercial, and 4th Curb (Taxi/Shuttle). In order to produce readable model output, these layered curbs are represented in the model 2-dimensionally. The representations of the airport terminal roadways are shown in Figure 2.

Figure 2
Airport Terminal Roadway Model Network



The regional traffic analysis zone structure was further refined to support the detailed network representation within the OIA subarea. Existing employment data from the Year 2000 regional model was further subdivided into the internal traffic analysis zones based upon the location of actual land uses in each zone. Special trip purposes developed for the regional model were retained and applied to the terminal zones, on-site remote parking zones and off-site park and fly zones in order to replicate the physical location where passenger vehicle trips access the airport. Year 2000 was selected as the analysis year for the development and validation of the subarea model that used the traffic counts collected in the *Year 2000 OIA Easter Traffic Count Program*. The refined zonal structure for the OIA subarea is defined in Figure 3. Existing land use (socio-economic and trip generation) data used as inputs to the subarea traffic zones are summarized in **Appendix A**.

Figure 3
OIA Subarea Model Zonal Network



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Additional trip purposes were added to the model to reflect traffic recirculation patterns that occur on the terminal area roadway system for taxi, shuttle van, and bus trips. Recirculation trips were also included to reflect the pattern of vehicles trips between the arrival/departure curbs and the parking garages and trips that circle the arrival curb due to the strict "no wait" enforcement at these curb areas.

The results of the year 2000 daily model assignment as compared to the year 2000 Peak Season Daily Traffic Counts are summarized in Table 1.

**Table 1
Year 2000 Model Volume to Count Comparison by Location**

STATION NUMBER	LOCATION DESCRIPTION	2000 ADT	NT=30M ST= -- 2000 Model
1	WB SR 528 OFF-RAMP TO SB AIRPORT BLVD	6,967	6,400
2	WB SR 528 ON-RAMP FROM NB AIRPORT BLVD	8,333	9,700
5A	TOTAL CARGO RD WEST OF AIRPORT BLVD RAMP R-3	7,493	9,100
5B	TOTAL CARGO RD EAST OF AIRPORT BLVD RAMP R-3	10,381	11,400
6	RAMP FROM SB AIRPORT BLVD TO CARGO RD (RAMP R-3)	4,585	3,500
7A	RETURN RAMP TO TERMINAL A FROM B	3,790	3,700
7B	RETURN RAMP TO TERMINAL B FROM B	408	400
8A	RETURN RAMP TO TERMINAL B FROM A	2,242	3,600
8B	RETURN RAMP TO TERMINAL A FROM A	4,070	1,500
9A	SB AIRPORT BLVD TO TERMINAL A	12,995	12,900
9B	SB AIRPORT BLVD TO TERMINAL B	18,391	17,600
11TOT	TOTAL RENT-A-CAR RD SOUTH OF CROSSFIELD TAXIWAY	1,296	1,300
12A	NB AIRPORT BLVD FROM TERMINAL A	12,901	14,000
12B	NB AIRPORT BLVD FROM TERMINAL B	18,495	17,400
13	TERMINAL A RENT-A-CAR SERVICE ENTRANCE	365	200
15	TERMINAL A 4TH CURBSIDE ENTRANCE (SB)	2,088	2,300
17	TERMINAL A PARKING GARAGE EXIT	3,881	4,300
18	TERMINAL A RENT-A-CAR EXIT	3,203	2,200
19	TERMINAL A DEPARTURES EXIT	5,966	5,900
20	TERMINAL A COMMERCIAL VEHICLES EXIT	3,427	4,600
21	TERMINAL A ARRIVALS EXIT	2,706	2,700
23	TERMINAL B COMMERCIAL VEHICLES EXIT	2,484	3,800
24	TERMINAL B ARRIVALS EXIT	2,992	3,000
25	TERMINAL B DEPARTURES EXIT	7,709	8,100
26	TERMINAL B RENT-A-CAR EXIT	4,461	3,100
27A	RETURN RAMP TO TERMINAL B FROM B	5,156	4,400
27B	EXIT FROM TERMINAL B	19,896	18,900
28	SLIP RAMP FROM TERM B ENTRANCE TO NB AIRPORT BLVD	1,405	1,200
30	TERMINAL B 4TH CURBSIDE ENTRANCE (NB)	1,342	1,800
31A	SB SOUTH ACCESS RD FROM TERMINAL A	5,681	6,100
31B	SB SOUTH ACCESS RD FROM TERMINAL B	3,764	4,600
32A	NB SOUTH ACCESS RD TO TERMINAL A	5,317	6,100
32B	NB SOUTH ACCESS RD TO TERMINAL B	3,679	3,400

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Table 1 (Continued)
Year 2000 Model Volume to Count Comparison by Location

STATION NUMBER	LOCATION DESCRIPTION	2000 ADT	NT=30M ST= -- 2000 Model
33TOT	TOTAL RENT-A-CAR RD SOUTH OF CARGO RD	4,241	2,200
35TOT	TOTAL GREENHOUSE RD SOUTH OF EMPLOYEE PARKING LOT	8,964	11,600
38TOT	TOTAL BEAR RD EAST OF OLD TERMINAL	6,642	9,000
39TOT	TOTAL TRADEPORT DR NORTH OF BEAR RD	22,408	21,900
40TOT	TOTAL TRADEPORT DR NORTH OF BOGGY CREEK RD	9,611	9,000
41TOT	TOTAL CARGO RD EAST OF GREENHOUSE RD	6,053	3,800
43TOT	TOTAL DAETWYLER DR SOUTH OF JETPORT DR	4,037	3,400
44TOT	TOTAL 4TH ST WEST OF TRADEPORT DR	2,267	3,500
45TOT	TOTAL BINNACLE WAY WEST OF TRADEPORT DR	673	1,000
46TOT	TOTAL EXPRESS ST WEST OF TRADEPORT DR	1,166	400
47	TERMINAL B PARKING GARAGE EXIT	4,116	4,300
51	RAMP FROM CARGO RD TO SB AIRPORT BLVD (RAMP R-1)	3,968	4,400
52	RAMP FROM CARGO RD TO NB AIRPORT BLVD (RAMP R-4)	3,527	3,600
53	RAMP FROM NB AIRPORT BLVD TO CARGO RD (RAMP R-2)	3,263	2,600
55TOT	TOTAL CARGO RD WEST OF RENT-A-CAR RD	13,917	11,600
60	SR 417 EB ON-RAMP FROM BOGGY CREEK RD	1,163	800
61	SR 417 WB OFF-RAMP TO BOGGY CREEK RD	1,043	700
62	SR 417 WB ON-RAMP FROM BOGGY CREEK RD	5,328	4,500
63	SR 417 EB OFF-RAMP TO BOGGY CREEK RD	5,461	3,300
70TOT	TOTAL BOGGY CREEK RD WEST OF SOUTH ACCESS RD	7,166	3,200
71TOT	TOTAL BOGGY CREEK RD SOUTH OF SR 417	19,037	17,800
92	TERMINAL B TAXI-HOLD EXIT	2,593	2,300
100E	POST OFFICE WAY EAST OF TRADEPORT DR (EB)	3,192	1,200
100W	POST OFFICE WAY EAST OF TRADEPORT DR (WB)	16,057	1,200
101TOT	TOTAL POST OFFICE WAY EAST OF POST OFFICE	806	2,300
500	WB SR 528 OFF-RAMP TO NB SR 436	4,219	3,400
600	SB SR 436 OFF-RAMP TO WB SR 528	5,613	10,300
700	EB SR 528 OFF-RAMP TO NB SR 436	4,412	5,800
800	SB SR 436 OFF-RAMP TO EB SR 528	3,834	2,500
900	RAMP FROM SB AIRPORT BLVD TO TERMINAL B ENTRANCE	17,263	14,700

The model was also validated to achieve the proper generation of trips entering and exiting the airport on a daily basis. This calculation uses the cordon line to measure the flow of vehicles entering and exiting and is compared with actual year 2000 cordon line traffic counts in Table 2. The traffic count location comparison is derived from traffic count locations monitored in the *Year 2000 Easter Traffic Count Program*.

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Table 2
Year 2000 Model Cordon Line Volume to Count Comparison

STATION NUMBER	LOCATION DESCRIPTION	2000 ADT	2000 Model
3A	NB AIRPORT BLVD	24,100	26,700
3B	EB SR 528 ON-RAMP FROM NB AIRPORT BLVD	6,990	5,800
3TOT	TOTAL OUTBOUND FROM AIRPORT TO NORTH	31,090	32,500
4A	SB AIRPORT BLVD	21,790	19,400
4B	EB SR 528 OFF-RAMP TO SB AIRPORT BLVD	9,900	10,300
4TOT	TOTAL INBOUND TO AIRPORT FROM NORTH	31,690	29,700
37TOT	TOTAL BEAR RD EAST OF TRADEPORT DR	6,800	9,000
200TOT	TOTAL SOUTH ACCESS RD	18,400	20,100
300TOT	TOTAL JETPORT DR EAST OF HANGAR BLVD	3,700	3,200
3 + 4 + 37 + 200 + 300	OIA CORDON LINE	91,680	94,500

In addition, the year 2000 subarea model network was modified to allow for cut-through traffic movements that are known to occur on the OIA airport roadway system. This network modification differs from the regional model validation, which attempted to control the number of trips occurring on airport roadways by severing the north-south network within the terminal area. This connection was re-established in the subarea model and calibrated to reflect the daily percentage of cut-through traffic estimated in the 1998 *Cut-Through Traffic Survey*.

As shown in Tables 1 and 2, the subarea model achieves a high degree of accuracy for total vehicle trips entering and exiting the airport (including cut-through vehicles) and replicates the travel patterns occurring on all internal roadways. High variations in traffic projections vs. traffic counts were noted to have occurred in locations where the trip "purpose" does not follow the logic assumed for the 12 regional trip purposes or 5 subarea trip purposes - for example, system redundancy ramps for "lost" or misdirected vehicles show a high percent difference in volume to count comparisons.

Year 2010 Traffic Forecast

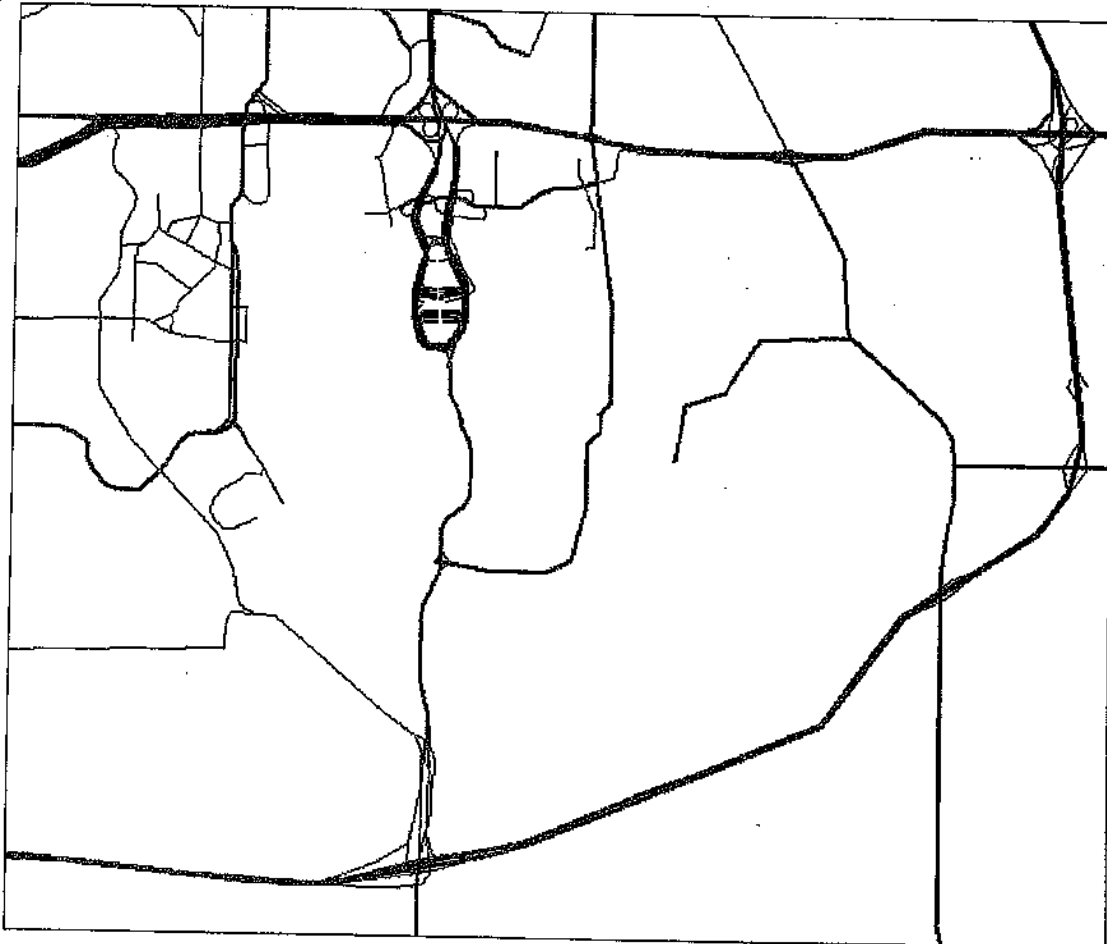
Year 2010 Land Use Assumptions

Land use and trip generation assumptions for the OIA subarea model traffic zones are summarized in Appendix B. The South Terminal is not assumed in the year 2010 forecast and supporting land uses to the future South Terminal are not included. Employment and support activity growth for the 40 MAP projections are assumed to occur in existing support and employment areas in the north and in the Mid-Field corridor.

Year 2010 Surface Transportation Network Assumptions

The year 2010 subarea model roadway network is shown in Figure 4. The 2010 roadway network includes all regional existing and committed roadway improvements currently contained in the FDOT Five Year Work Program (Year 2003) and the METROPLAN ORLANDO TIP FY 2002/03 – FY 2007/08.

**Figure 4
Year 2010 Subarea Highway Network**



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Daily traffic volumes for year 2010 for each of the segment locations on the OIA internal roadway network are provided in Table 3.

**Table 3
Year 2010 OIA Roadway Traffic Forecast**

STATION NUMBER	LOCATION DESCRIPTION	NT=40M ST= -- 2010 Model
1	WB SR 528 OFF-RAMP TO SB AIRPORT BLVD	2,100
2	WB SR 528 ON-RAMP FROM NB AIRPORT BLVD	10,200
5A	TOTAL CARGO RD WEST OF AIRPORT BLVD RAMP R-3	13,100
5B	TOTAL CARGO RD EAST OF AIRPORT BLVD RAMP R-3	17,300
6	RAMP FROM SB AIRPORT BLVD TO CARGO RD (RAMP R-3)	4,200
7A	RETURN RAMP TO TERMINAL A FROM B	5,500
7B	RETURN RAMP TO TERMINAL B FROM B	500
8A	RETURN RAMP TO TERMINAL B FROM A	5,800
8B	RETURN RAMP TO TERMINAL A FROM A	1,900
9A	SB AIRPORT BLVD TO TERMINAL A	16,000
9B	SB AIRPORT BLVD TO TERMINAL B	22,800
11TOT	TOTAL RENT-A-CAR RD SOUTH OF CROSSFIELD TAXIWAY	900
12A	NB AIRPORT BLVD FROM TERMINAL A	17,000
12B	NB AIRPORT BLVD FROM TERMINAL B	23,800
13	TERMINAL A RENT-A-CAR SERVICE ENTRANCE	100
15	TERMINAL A 4TH CURBSIDE ENTRANCE (SB)	2,900
17	TERMINAL A PARKING GARAGE EXIT	5,500
18	TERMINAL A RENT-A-CAR EXIT	2,800
19	TERMINAL A DEPARTURES EXIT	6,700
20	TERMINAL A COMMERCIAL VEHICLES EXIT	9,500
21	TERMINAL A ARRIVALS EXIT	3,500
23	TERMINAL B COMMERCIAL VEHICLES EXIT	2,500
24	TERMINAL B ARRIVALS EXIT	3,900
25	TERMINAL B DEPARTURES EXIT	8,000
26	TERMINAL B RENT-A-CAR EXIT	3,900
27A	RETURN RAMP TO TERMINAL B FROM B	6,200
27B	EXIT FROM TERMINAL B	28,900
28	SLIP RAMP FROM TERM B ENTRANCE TO NB AIRPORT BLVD	1,500
30	TERMINAL B 4TH CURBSIDE ENTRANCE (NB)	2,400
31A	SB SOUTH ACCESS RD FROM TERMINAL A	10,300
31B	SB SOUTH ACCESS RD FROM TERMINAL B	7,600
32A	NB SOUTH ACCESS RD TO TERMINAL A	12,200
32B	NB SOUTH ACCESS RD TO TERMINAL B	5,100
33TOT	TOTAL RENT-A-CAR RD SOUTH OF CARGO RD	1,900
35TOT	TOTAL GREENHOUSE RD SOUTH OF EMPLOYEE PARKING LOT	14,900
36TOT	TOTAL BEAR RD EAST OF OLD TERMINAL	12,800
39TOT	TOTAL TRADEPORT DR NORTH OF BEAR RD	36,000
40TOT	TOTAL TRADEPORT DR NORTH OF BOGGY CREEK RD	12,500
41TOT	TOTAL CARGO RD EAST OF GREENHOUSE RD	15,500

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**Table 3 (Continued)
Year 2010 OIA Roadway Traffic Forecast**

STATION NUMBER	LOCATION DESCRIPTION	NT=40M ST= -- 2010 Model
43TOT	TOTAL DAETWYLER DR SOUTH OF JETPORT DR	6,800
44TOT	TOTAL 4TH ST WEST OF TRADEPORT DR	9,700
45TOT	TOTAL BINNACLE WAY WEST OF TRADEPORT DR	1,600
46TOT	TOTAL EXPRESS ST WEST OF TRADEPORT DR	1,300
47	TERMINAL B PARKING GARAGE EXIT	5,400
51	RAMP FROM CARGO RD TO SB AIRPORT BLVD (RAMP R-1)	9,000
52	RAMP FROM CARGO RD TO NB AIRPORT BLVD (RAMP R-4)	3,700
53	RAMP FROM NB AIRPORT BLVD TO CARGO RD (RAMP R-2)	7,200
55TOT	TOTAL CARGO RD WEST OF RENT-A-CAR RD	20,500
60	SR 417 EB ON-RAMP FROM BOGGY CREEK RD	3,300
61	SR 417 WB OFF-RAMP TO BOGGY CREEK RD	2,000
62	SR 417 WB ON-RAMP FROM BOGGY CREEK RD	2,100
63	SR 417 EB OFF-RAMP TO BOGGY CREEK RD	4,800
70TOT	TOTAL BOGGY CREEK RD WEST OF SOUTH ACCESS RD	2,200
71TOT	TOTAL BOGGY CREEK RD SOUTH OF SR 417	26,700
92	TERMINAL B TAXI-HOLD EXIT	3,000
100E	POST OFFICE WAY EAST OF TRADEPORT DR (EB)	2,500
100W	POST OFFICE WAY EAST OF TRADEPORT DR (WB)	3,400
101TOT	TOTAL POST OFFICE WAY EAST OF POST OFFICE	5,900
500	WB SR 528 OFF-RAMP TO NB SR 436	9,100
600	SB SR 436 OFF-RAMP TO WB SR 528	19,800
700	EB SR 528 OFF-RAMP TO NB SR 436	11,200
800	SB SR 436 OFF-RAMP TO EB SR 528	4,100
900	RAMP FROM SB AIRPORT BLVD TO TERMINAL B ENTRANCE	17,800

Year 2025 Traffic Forecast

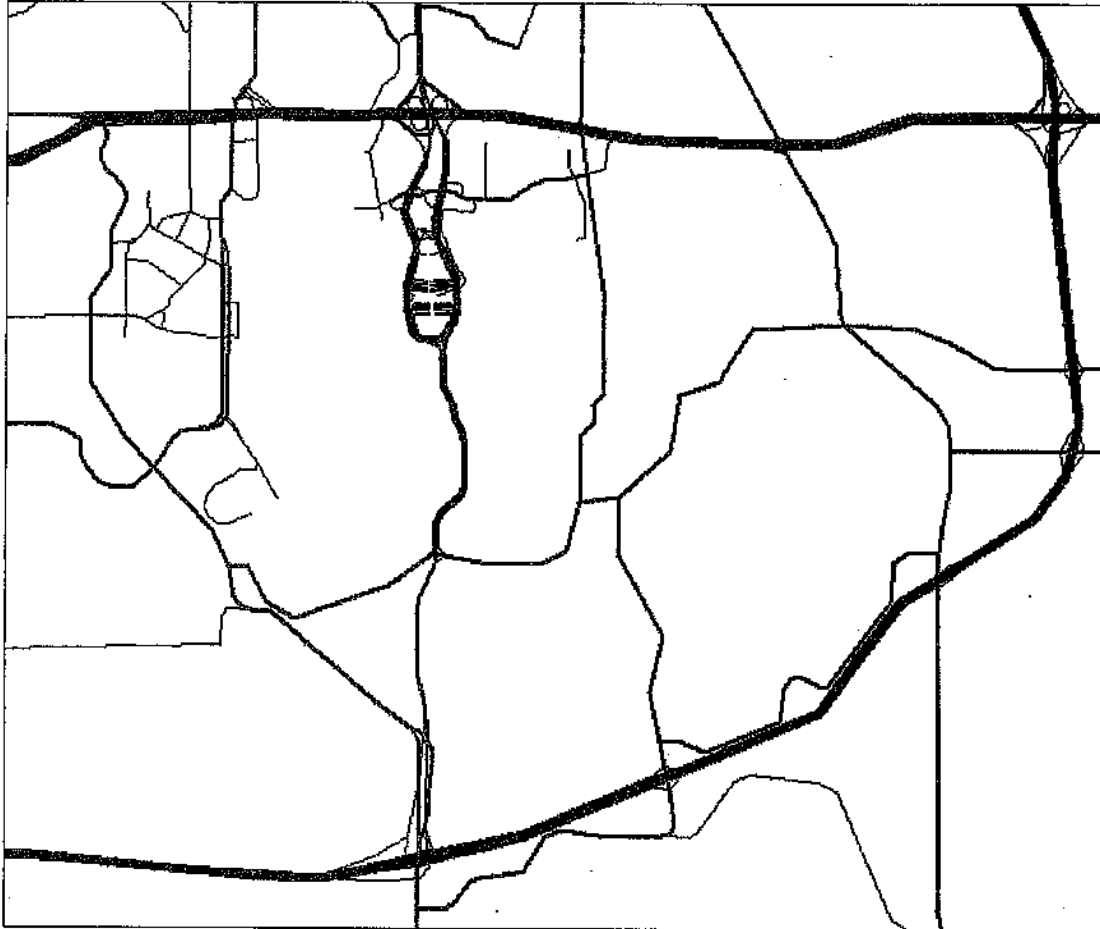
Year 2025 Land Use Assumptions

Land use and trip generation assumptions for the OIA subarea model traffic zones are summarized in Appendix C. The year 2025 forecast assumes 35 MAP in the North Terminal and support areas and 25 MAP in the South Terminal and support areas. These assumptions include locating south terminal employee parking in the southeast terminal support zones with increased support activity in the mid-field development areas.

Year 2025 Surface Transportation Network Assumptions

The year 2025 subarea model roadway network is shown in Figure 5. The 2025 network includes all regional roadway improvements anticipated in the METROPLAN ORLANDO Year 2025 Long Range Transportation Plan (anticipated for adoption October 2003). On the airport internal roadway network, year 2025 includes new airport access roadways at

Figure 5
Year 2025 Subarea Highway Network



Orlando International Airport Master Plan Update

Dowden Road on the west with a new north-south roadway connection from Dowden Road to the Lake Nona area to the south and the extension of Heintzelman Boulevard on the east.

Daily traffic volumes for year 2025 for each of the segment locations on the OIA internal roadway network are provided in Table 4.

**Table 4
Year 2025 OIA Roadway Traffic Forecast**

STATION NUMBER	LOCATION DESCRIPTION	NT=35M ST=20M 2025 Model
1	WB SR 528 OFF-RAMP TO SB AIRPORT BLVD	6,000
2	WB SR 528 ON-RAMP FROM NB AIRPORT BLVD	9,900
5A	TOTAL CARGO RD WEST OF AIRPORT BLVD RAMP R-3	10,700
5B	TOTAL CARGO RD EAST OF AIRPORT BLVD RAMP R-3	13,800
6	RAMP FROM SB AIRPORT BLVD TO CARGO RD (RAMP R-3)	2,900
7A	RETURN RAMP TO TERMINAL A FROM B	5,700
7B	RETURN RAMP TO TERMINAL B FROM B	400
8A	RETURN RAMP TO TERMINAL B FROM A	7,000
8B	RETURN RAMP TO TERMINAL A FROM A	1,700
9A	SB AIRPORT BLVD TO TERMINAL A	13,300
9B	SB AIRPORT BLVD TO TERMINAL B	37,100
11TOT	TOTAL RENT-A-CAR RD SOUTH OF CROSSFIELD TAXIWAY	800
12A	NB AIRPORT BLVD FROM TERMINAL A	13,200
12B	NB AIRPORT BLVD FROM TERMINAL B	37,100
13	TERMINAL A RENT-A-CAR SERVICE ENTRANCE	100
15	TERMINAL A 4TH CURBSIDE ENTRANCE (SB)	2,600
17	TERMINAL A PARKING GARAGE EXIT	5,000
18	TERMINAL A RENT-A-CAR EXIT	2,500
19	TERMINAL A DEPARTURES EXIT	5,900
20	TERMINAL A COMMERCIAL VEHICLES EXIT	8,500
21	TERMINAL A ARRIVALS EXIT	3,000
23	TERMINAL B COMMERCIAL VEHICLES EXIT	2,200
24	TERMINAL B ARRIVALS EXIT	3,500
25	TERMINAL B DEPARTURES EXIT	7,100
26	TERMINAL B RENT-A-CAR EXIT	3,500
27A	RETURN RAMP TO TERMINAL B FROM B	4,300
27B	EXIT FROM TERMINAL B	25,800
28	SLIP RAMP FROM TERM B ENTRANCE TO NB AIRPORT BLVD	1,200
30	TERMINAL B 4TH CURBSIDE ENTRANCE (NB)	2,100
31A	SB SOUTH ACCESS RD FROM TERMINAL A	29,500
31B	SB SOUTH ACCESS RD FROM TERMINAL B	7,500
32A	NB SOUTH ACCESS RD TO TERMINAL A	27,300
32B	NB SOUTH ACCESS RD TO TERMINAL B	7,300
33TOT	TOTAL RENT-A-CAR RD SOUTH OF CARGO RD	2,400
35TOT	TOTAL GREENHOUSE RD SOUTH OF EMPLOYEE PARKING LOT	13,000

Orlando International Airport Master Plan Update

**Table 4 (Continued)
Year 2025 OIA Roadway Traffic Forecast**

STATION NUMBER	LOCATION DESCRIPTION	NT=35M ST=20M 2025 Model
36TOT	TOTAL BEAR RD EAST OF OLD TERMINAL	10,300
39TOT	TOTAL TRADEPORT DR NORTH OF BEAR RD	48,200
40TOT	TOTAL TRADEPORT DR NORTH OF BOGGY CREEK RD	27,300
41TOT	TOTAL CARGO RD EAST OF GREENHOUSE RD	16,000
43TOT	TOTAL DAETWYLER DR SOUTH OF JETPORT DR	14,400
44TOT	TOTAL 4TH ST WEST OF TRADEPORT DR	9,900
45TOT	TOTAL BINNACLE WAY WEST OF TRADEPORT DR	4,200
46TOT	TOTAL EXPRESS ST WEST OF TRADEPORT DR	1,900
47	TERMINAL B PARKING GARAGE EXIT	4,800
51	RAMP FROM CARGO RD TO SB AIRPORT BLVD (RAMP R-1)	8,600
52	RAMP FROM CARGO RD TO NB AIRPORT BLVD (RAMP R-4)	2,800
53	RAMP FROM NB AIRPORT BLVD TO CARGO RD (RAMP R-2)	6,700
55TOT	TOTAL CARGO RD WEST OF RENT-A-CAR RD	16,500
60	SR 417 EB ON-RAMP FROM BOGGY CREEK RD	4,400
61	SR 417 WB OFF-RAMP TO BOGGY CREEK RD	5,000
62	SR 417 WB ON-RAMP FROM BOGGY CREEK RD	11,400
63	SR 417 EB OFF-RAMP TO BOGGY CREEK RD	10,500
70TOT	TOTAL BOGGY CREEK RD WEST OF SOUTH ACCESS RD	6,300
71TOT	TOTAL BOGGY CREEK RD SOUTH OF SR 417	33,900
92	TERMINAL B TAXI-HOLD EXIT	2,700
100E	POST OFFICE WAY EAST OF TRADEPORT DR (EB)	3,700
100W	POST OFFICE WAY EAST OF TRADEPORT DR (WB)	5,200
101TOT	TOTAL POST OFFICE WAY EAST OF POST OFFICE	8,900
500	WB SR 528 OFF-RAMP TO NB SR 436	16,600
600	SB SR 436 OFF-RAMP TO WB SR 528	16,300
700	EB SR 528 OFF-RAMP TO NB SR 436	9,700
800	SB SR 436 OFF-RAMP TO EB SR 528	7,700
900	RAMP FROM SB AIRPORT BLVD TO TERMINAL B ENTRANCE	14,300

Orlando International Airport Master Plan Update

Year 2015 Interpolation Forecast

For planning and project phasing purposes, a year 2015 traffic forecast was prepared by interpolating the results of the year 2010 and year 2025 traffic models. This information is provided in Table 5.

**Table 5
Year 2015 OIA Roadway Traffic Forecast**

STATION NUMBER	LOCATION DESCRIPTION	NT=35M ST=10M 2015 Interpolation
1	WB SR 528 OFF-RAMP TO SB AIRPORT BLVD	3,400
2	WB SR 528 ON-RAMP FROM NB AIRPORT BLVD	10,100
5A	TOTAL CARGO RD WEST OF AIRPORT BLVD RAMP R-3	12,300
5B	TOTAL CARGO RD EAST OF AIRPORT BLVD RAMP R-3	16,133
6	RAMP FROM SB AIRPORT BLVD TO CARGO RD (RAMP R-3)	3,767
7A	RETURN RAMP TO TERMINAL A FROM B	5,567
7B	RETURN RAMP TO TERMINAL B FROM B	467
8A	RETURN RAMP TO TERMINAL B FROM A	6,200
8B	RETURN RAMP TO TERMINAL A FROM A	1,833
9A	SB AIRPORT BLVD TO TERMINAL A	15,100
9B	SB AIRPORT BLVD TO TERMINAL B	27,567
11TOT	TOTAL RENT-A-CAR RD SOUTH OF CROSSFIELD TAXIWAY	867
12A	NB AIRPORT BLVD FROM TERMINAL A	15,733
12B	NB AIRPORT BLVD FROM TERMINAL B	28,233
13	TERMINAL A RENT-A-CAR SERVICE ENTRANCE	100
15	TERMINAL A 4TH CURBSIDE ENTRANCE (SB)	2,800
17	TERMINAL A PARKING GARAGE EXIT	5,333
18	TERMINAL A RENT-A-CAR EXIT	2,700
19	TERMINAL A DEPARTURES EXIT	6,433
20	TERMINAL A COMMERCIAL VEHICLES EXIT	9,167
21	TERMINAL A ARRIVALS EXIT	3,333
23	TERMINAL B COMMERCIAL VEHICLES EXIT	2,400
24	TERMINAL B ARRIVALS EXIT	3,767
25	TERMINAL B DEPARTURES EXIT	7,700
26	TERMINAL B RENT-A-CAR EXIT	3,767
27A	RETURN RAMP TO TERMINAL B FROM B	5,567
27B	EXIT FROM TERMINAL B	27,867
28	SLIP RAMP FROM TERM B ENTRANCE TO NB AIRPORT BLVD	1,400
30	TERMINAL B 4TH CURBSIDE ENTRANCE (NB)	2,300
31A	SB SOUTH ACCESS RD FROM TERMINAL A	16,700
31B	SB SOUTH ACCESS RD FROM TERMINAL B	7,567
32A	NB SOUTH ACCESS RD TO TERMINAL A	17,233
32B	NB SOUTH ACCESS RD TO TERMINAL B	5,833
33TOT	TOTAL RENT-A-CAR RD SOUTH OF CARGO RD	2,067
35TOT	TOTAL GREENHOUSE RD SOUTH OF EMPLOYEE PARKING LOT	14,267

Orlando International Airport Master Plan Update

**Table 5 (Continued)
Year 2015 OIA Roadway Traffic Forecast**

STATION NUMBER	LOCATION DESCRIPTION	NT=35M ST=10M 2015 Interpolation
38TOT	TOTAL BEAR RD EAST OF OLD TERMINAL	11,967
39TOT	TOTAL TRADEPORT DR NORTH OF BEAR RD	40,067
40TOT	TOTAL TRADEPORT DR NORTH OF BOGGY CREEK RD	17,433
41TOT	TOTAL CARGO RD EAST OF GREENHOUSE RD	15,667
43TOT	TOTAL DAETWYLER DR SOUTH OF JETPORT DR	9,333
44TOT	TOTAL 4TH ST WEST OF TRADEPORT DR	9,767
45TOT	TOTAL BINNACLE WAY WEST OF TRADEPORT DR	2,467
46TOT	TOTAL EXPRESS ST WEST OF TRADEPORT DR	1,500
47	TERMINAL B PARKING GARAGE EXIT	5,200
51	RAMP FROM CARGO RD TO SB AIRPORT BLVD (RAMP R-1)	8,867
52	RAMP FROM CARGO RD TO NB AIRPORT BLVD (RAMP R-4)	3,400
53	RAMP FROM NB AIRPORT BLVD TO CARGO RD (RAMP R-2)	7,033
55TOT	TOTAL CARGO RD WEST OF RENT-A-CAR RD	19,167
60	SR 417 EB ON-RAMP FROM BOGGY CREEK RD	3,667
61	SR 417 WB OFF-RAMP TO BOGGY CREEK RD	3,000
62	SR 417 WB ON-RAMP FROM BOGGY CREEK RD	5,200
63	SR 417 EB OFF-RAMP TO BOGGY CREEK RD	6,700
70TOT	TOTAL BOGGY CREEK RD WEST OF SOUTH ACCESS RD	3,567
71TOT	TOTAL BOGGY CREEK RD SOUTH OF SR 417	29,100
92	TERMINAL B TAXI-HOLD EXIT	2,900
100E	POST OFFICE WAY EAST OF TRADEPORT DR (EB)	2,900
100W	POST OFFICE WAY EAST OF TRADEPORT DR (WB)	4,000
101TOT	TOTAL POST OFFICE WAY EAST OF POST OFFICE	6,900
500	WB SR 528 OFF-RAMP TO NB SR 436	11,600
600	SB SR 436 OFF-RAMP TO WB SR 528	18,633
700	EB SR 528 OFF-RAMP TO NB SR 436	10,700
800	SB SR 436 OFF-RAMP TO EB SR 528	5,300
900	RAMP FROM SB AIRPORT BLVD TO TERMINAL B ENTRANCE	16,633

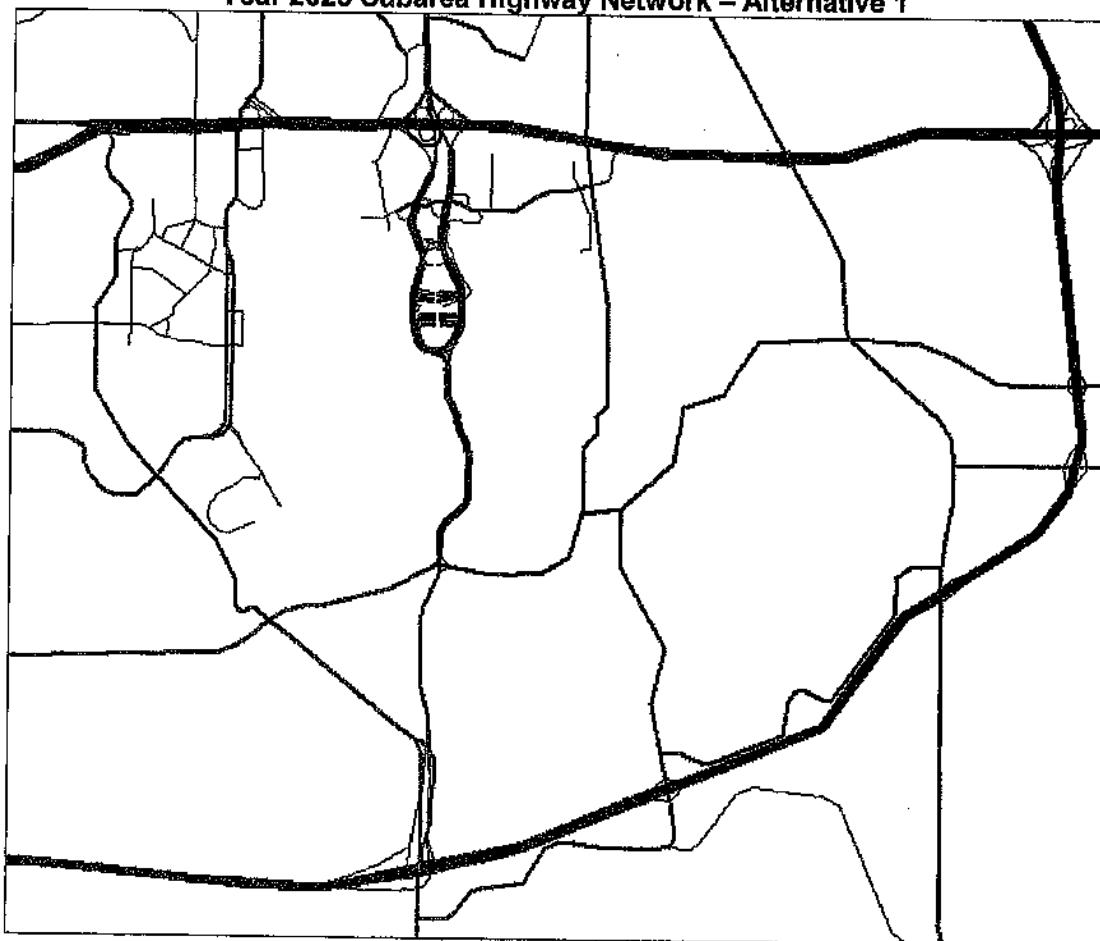
Year 2025 Network Alternatives Analysis

The objective of the initial network alternatives analysis is to evaluate the resulting traffic impacts that occur on internal airport roadways by the connection of new external access roadways. These new roadways include the Heintzelman Boulevard extension to Boggy Creek Road and the Dowden Road Connection to Heintzelman Boulevard.

Alternative 1

Alternative 1 reflects year 2025 modifications to update the network for alignment changes at Heintzelman Boulevard and Boggy Creek Road, the Wetherbee Road 4-lane improvement and realignment, and the closing of Jetport Drive access to Narcoossee Road that currently runs south along the Beeline Expressway. Figure 6 reflects the network changes for Alternative 1.

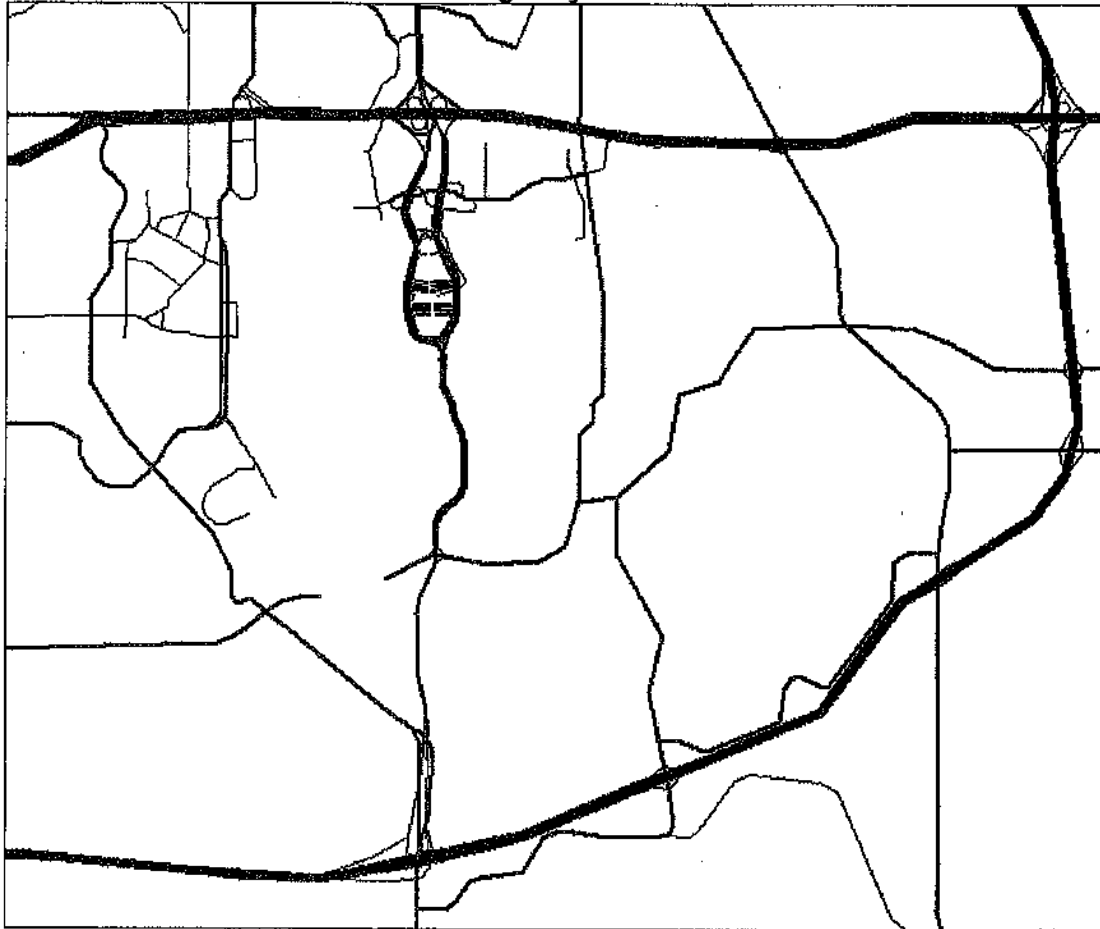
**Figure 6
Year 2025 Subarea Highway Network – Alternative 1**



Alternative 2

Alternative 2 reflects year 2025 modifications to test the impact of disconnecting Heintzelman Boulevard at Boggy Creek Road while the Dowden Road Connection Remains in place. Figure 7 reflects the network changes for Alternative 2.

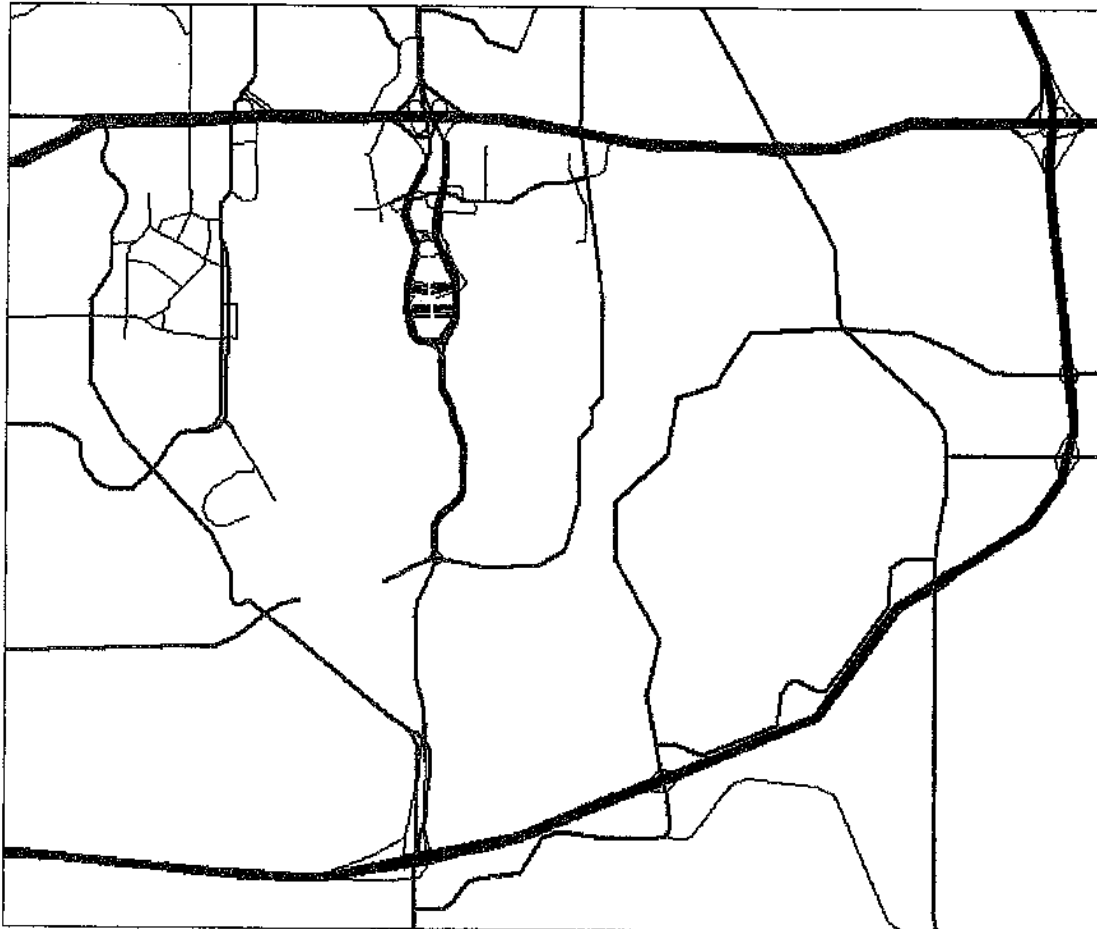
**Figure 7
Year 2025 Subarea Highway Network – Alternative 2**



Alternative 3

Alternative 3 reflects year 2025 modifications to test the impact of disconnecting Dowden Road at Heintzelman Boulevard while the Heintzelman Boulevard Extension to Boggy Creek Road remains in place. Figure 8 reflects the network changes for Alternative 3.

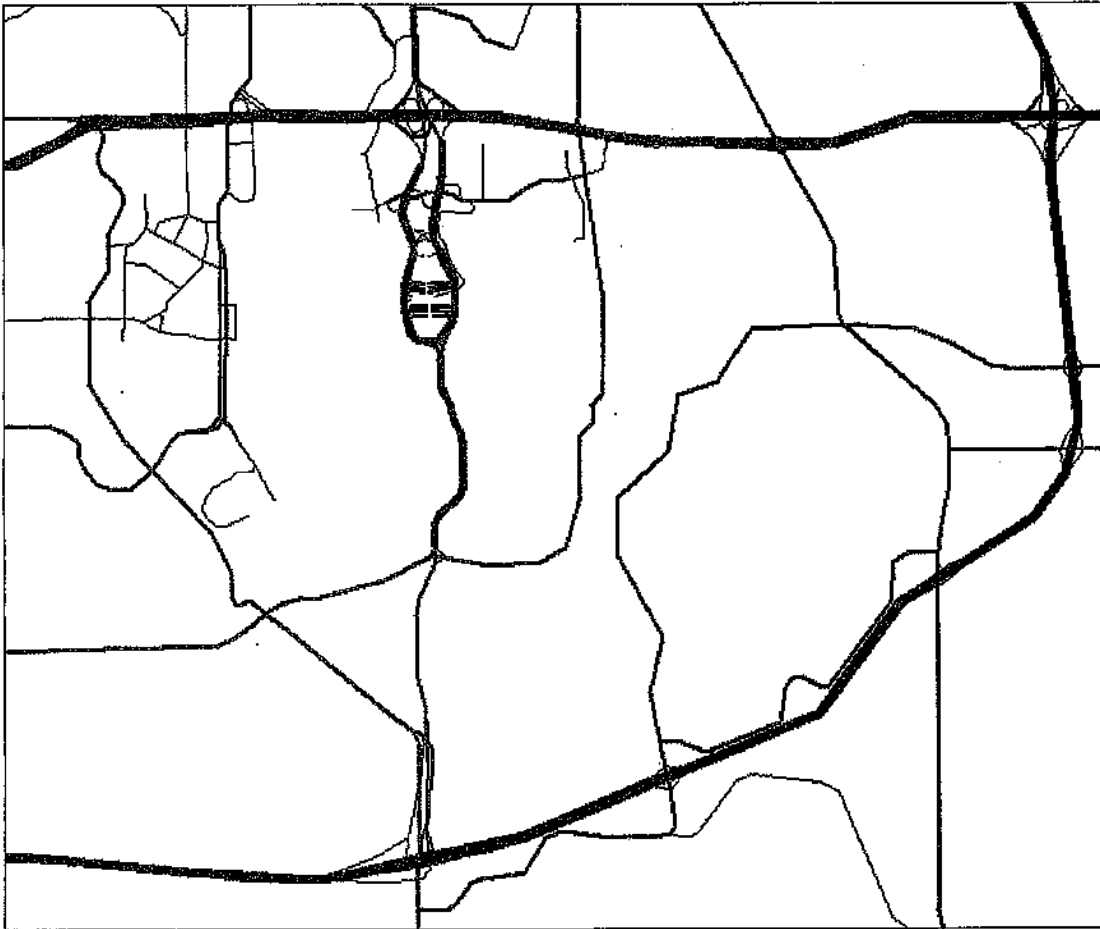
**Figure 8
Year 2025 Subarea Highway Network – Alternative 3**



Alternative 4

Alternative 4 reflects year 2025 modifications to test the impact of disconnecting both Dowden Road and the Heintzelman Boulevard Extension at Boggy Creek Road. Figure 9 reflects the network changes for Alternative 4.

**Figure 9
Year 2025 Subarea Highway Network – Alternative 4**



APPENDIX J

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**

**Project Scope
for
Interim Widening of South Access Road
at
Orlando International Airport**

Purpose: The purpose of this project is to increase the capacity of South Access Road between Heintzelman Boulevard and the Mid-Crossfield Taxiway by widening the existing two lane facility to four lanes.

Need: South Access Road is at or near capacity based on the Level of Service requirements as described in the OIA Amended and Restated Development Order and should be widened to facilitate the movement of passengers to the terminal facility.

Project Description:

South Access Road is proposed to be widened from a two lane undivided roadway to four lane divided roadway between Heintzelman Boulevard and the Mid-Crossfield Taxiway. The design will minimize the cost of new roadway construction by using existing South Access Road for the southbound direction. The project also includes widening the existing northbound and southbound ramps between Airport Boulevard and South Access Road. This will require an auxiliary lane along northbound Airport Boulevard between the northbound ramp from South Access Road (Ramp D) and the ITS overpass.

Other options that were considered for this project include: 1) Build Phase One of the Braided Roadway on the east side of the South Terminal; 2) Build portions of the braided roadway along the east side of the South Terminal using as much of existing South Access Road as feasible; and 3) Build the west half of the South Terminal Loop Road with return ramps connected to South Access Road. Descriptions of these options and an evaluation of these options are included in the appendix to this scope.

A conceptual design has been developed for this project. This concept is illustrated in Figure One. It should be noted that this concept is only a graphical representation of a proposed roadway improvement and is not based on a survey.

This project will require design survey, preliminary engineering, final design plans and construction. Environmental permits, flood plain storage compensation and storm water management and treatment areas may also be required as determined during the preliminary and final design efforts.

Estimated Construction Cost:

The estimated construction cost for this project is \$10,100,000.00. This is a planning level estimate of construction costs only. Actual costs may vary. It is based on a concept

sketch with limited information on existing conditions and no field survey data. This estimate includes costs for contingencies, CEI, design, administration and legal fees. Supporting details assumed for this estimate, including estimated quantities and unit prices, are included in the appendix to this scope.

Specific project elements include the following:

1. Construct a new two lane roadway parallel to existing South Access Road from the Mid-Crossfield Taxiway to the Heintzelman Boulevard Interchange. Estimated construction cost: \$6,236,000.00.
 - Match the pavement of existing northbound and southbound South Access Road approximately 300 feet south of Taxiway Bridge F.
 - Match the pavement of existing northbound and southbound South Access Road approximately 1800 feet north of Heintzelman Boulevard.
2. Mill and Resurface Existing South Access Road. Estimated construction cost: \$380,000.00.
3. Widen the ramp between South Access Road and northbound Airport Boulevard (Ramp D) from one-lane to two-lanes. Estimated construction cost: \$336,000.00.
 - Add approximately six feet of pavement to the outside of the ramp.
 - Reconstruct the curb and gutter and re-stripe this ramp as a two-lane ramp.
4. Add an auxiliary lane on northbound Airport Boulevard between the ramp from South Access Road (Ramp D) and the ITS overpass. Estimated construction cost: \$352,000.00.
 - Add 12 feet of pavement to the outside of northbound Airport Boulevard between Ramp D and the ITS overpass.
 - Reconstruct the curb and gutter and re-stripe this segment to add one lane.
 - The auxiliary lane shall terminate prior to the ITS overpass with a taper length of 300 feet.
5. Widen the ramp between southbound Airport Boulevard and South Access Road (Ramp A) from one-lane to two-lanes. Estimated construction cost: \$310,000.00.
 - Add approximately six feet of pavement to the outside of the ramp.
 - Reconstruct the curb and gutter and re-stripe this ramp as a two-lane ramp.

- Re-stripe the existing gore at southbound Airport Boulevard to Terminal B and South Access Road. See Detail A on Figure One for striping concept.

Design requirements:

1. The typical section for the new northbound section of South Access Road should match the typical section for existing South Access Road. A typical section for the proposed concept is illustrated in Figure Two.
2. All airline, way finding and regulatory signs will be replaced.
3. The median width should be a minimum of 22 feet measured between the inside edges of travel for the northbound and southbound directions.
4. The minimum design speed shall be 40 mph.

Note: The design requirements shall be reviewed during preliminary engineering and may be modified. Other design elements and criteria shall be established during the preliminary engineering phase.

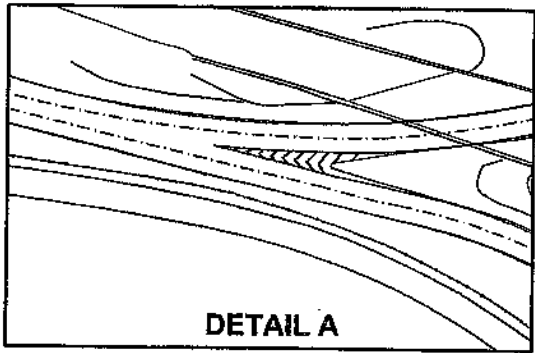
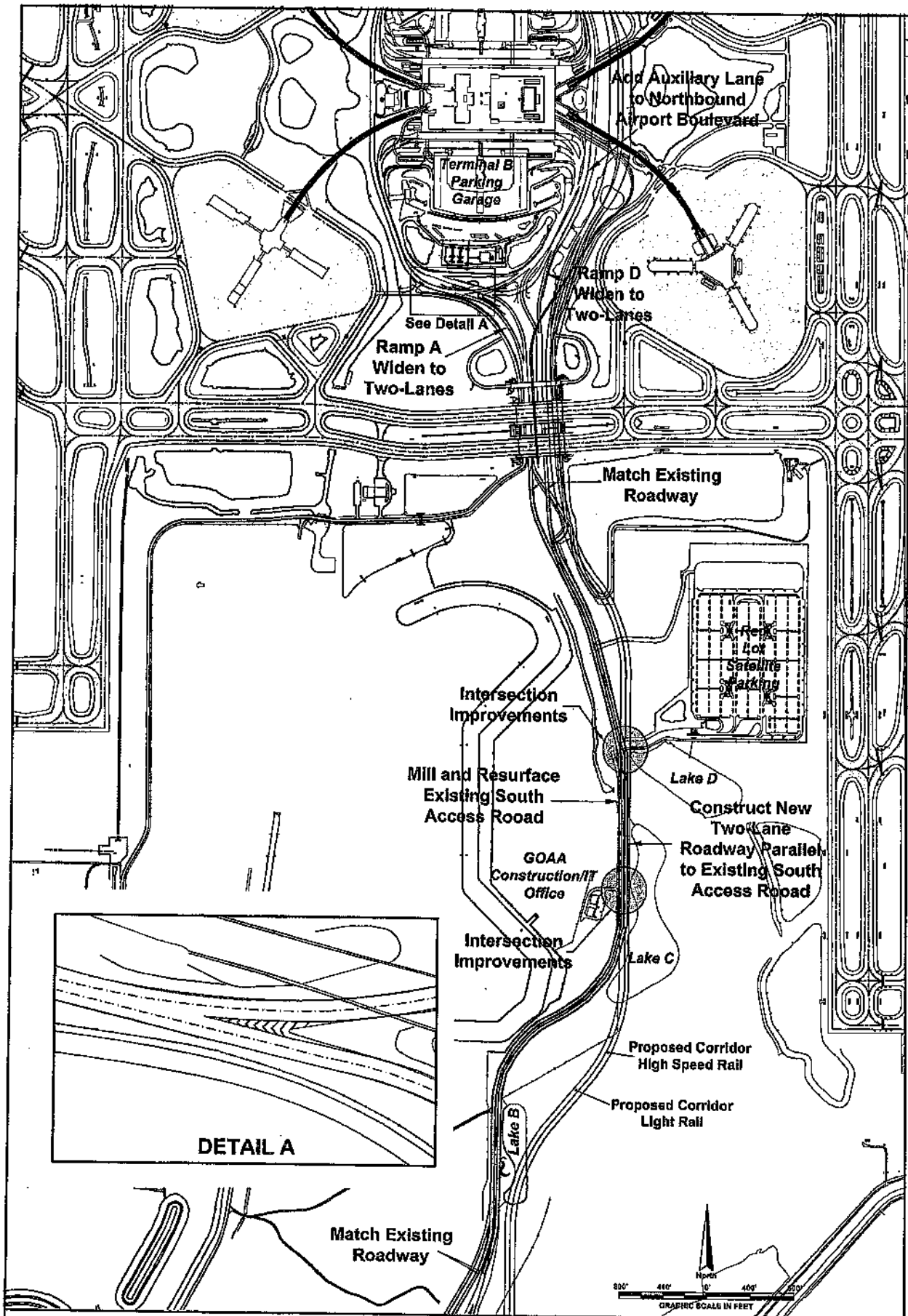
Areas requiring special details or attention include:

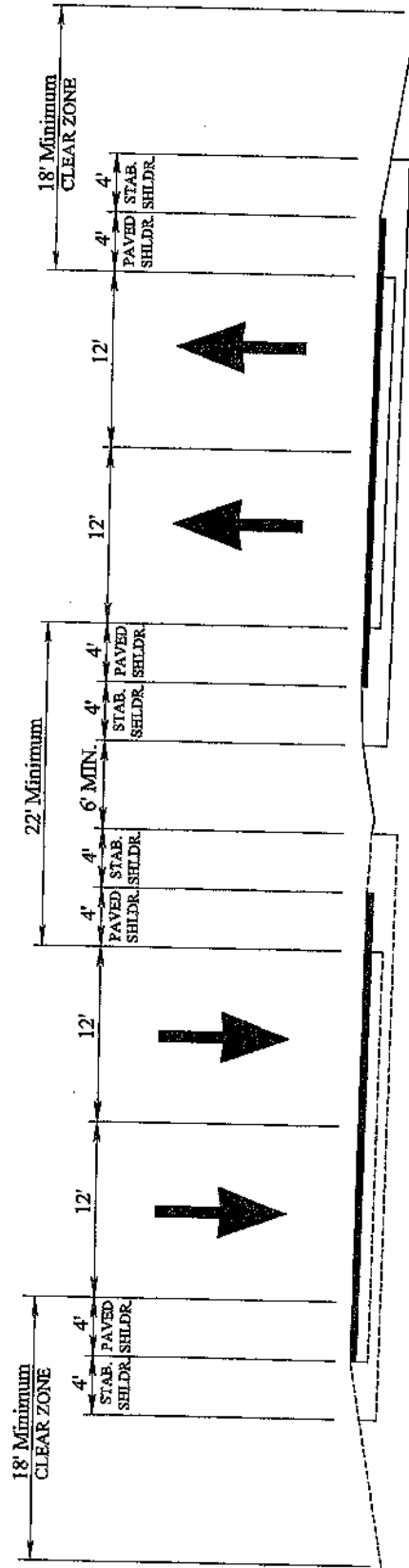
1. Maintaining access to the Red Lot Satellite Parking
2. Maintaining access to the GOAA Construction / IT Office
3. Connection to the existing four lane divided section at the north end of the Heintzelman Boulevard interchange.
4. Connection to the existing four lane divided section at the Mid-Crossfield Taxiway.
5. Avoid or minimize impacts to the proposed rail corridors established for High Speed Rail and Light Rail.

Potential Impacts/Issues:

1. The existing super elevation along some curves of existing South Access Road may need to be increased to meet the design criteria for 40 mph. This will require some reconstruction of those segments of existing South Access Road.
2. Existing parking lot at the GOAA Construction / IT Office.
3. Existing traffic signal at the Red Lot entrance.

4. IT communications/data lines (location not identified).
5. High pressure gas main located is the southern portion of the project (location not identified).
6. Lakes B, C and D as identified in the construction plans for South Access Road dated January 1992 prepared by Kimley-Horn.
7. Existing drainage culverts may need to be extended or replaced.
8. This project will impact the proposed rail corridors established for High Speed Rail and Light Rail during the OIA Master Plan Update. If either of these rail projects are constructed, significant portions of South Access Road will need to be realigned and reconstructed. See Figure One for the location of the proposed rail corridors.
9. Existing large "Welcome to Orlando International Airport" sign located at the southern end of the project.
10. Other impacts as identified during the preliminary engineering phase.





PROPOSED
SOUTHBOUND SOUTH
ACCESS ROAD
(EXISTING ROADWAY)

PROPOSED
NORTHBOUND SOUTH
ACCESS ROAD
(NEW CONSTRUCTION)

Drawing Scale 1"=12'

DESIGN SPEED : 40 MPH

GREATER ORLANDO AVIATION AUTHORITY
Orlando International Airport

URS

**TYPICAL SECTION
INTERIM WIDENING OF SOUTH ACCESS ROAD**

FIGURE:
2

Appendix to
Project Scope
for
Interim Widening of South Access Road
at
Orlando International Airport

Development and Evaluation of Options for the Interim Widening of South Access Road

There are four options for the Interim Widening of South Access Road. These options include: Option 1 - Build a new two lane road parallel to the existing roadway; Option 2 - Build Phase One of the Braided Roadway on the east side of the South Terminal; Option 3 - Hybrid of Options 1 and 2; and Option 4 - Build the west half of the South Terminal Loop Road with return ramps connected to South Access Road. Each of these options is described below and includes a planning level construction cost estimate. All of the options include improvements to Ramps A and D on the north side of the Mid-Crossfield Taxiway as well as an auxiliary lane on northbound Airport Boulevard. The improvements to Ramps A and D and the auxiliary lane on northbound Airport Boulevard will remain following construction of either the South Terminal Loop Road or the Braided Roadway.

Option 1: Build a new two lane road parallel to the existing roadway. Length is approximately 1.4 miles of new two lane roadway. This option has minimum salvage value of the main roadway when either the Braided Roadway or the complete South Terminal Loop is constructed. CIP un-escalated cost is \$10.1 million.

Option 2: Build Phase One of the Braided Roadway on the east side of the South Terminal. Length is approximately 1.5 miles of new four lane roadway with a median barrier. Additional costs include impacts to all three lakes (B, C and D) on the east side of the existing road and additional embankment to support later phases of the Braided Roadway System. Estimated cost is approximately \$23.8 million un-escalated. At least 80% of the project is salvageable for later improvements.

Option 3: Hybrid of Options 1 and 2. Build portions of the braided roadway along the east side of the South Terminal using as much of existing South Access Road as feasible. This will require construction of approximately 2.1 miles of new two lane roadway. Additional costs include impacts to all three lakes (B, C and D) on the east side of the existing road. Only 0.8 miles of the new two lane construction is salvageable. Estimated cost is approximately \$17.2 million un-escalated. This option will require significant reconstruction (not included in this estimate) to accommodate the west half of the South Terminal Loop Road.

Option 4: Build the west half of the South Terminal Loop Road with return ramps connected to South Access Road. This will require an overpass for the north return ramp over the ITS. Existing South Access Road will serve northbound traffic and the west half of the Loop Road will serve southbound traffic. No cost information is available. Assuming that this project is constructed as a three lane section (two lanes for the return loops) without connections to the terminal, it is roughly estimated that the cost would be \$21.1 million. This Option has minimal throw away costs.

The cost for Option 3 is approximately midway between Option 1 and 2. However, because of the higher throw away costs, Option 3 will be more expensive in the long run. Option 3 will also require significant reconstruction at the north end to accommodate the west half of the South Terminal Loop Road due to the high profile needed for the north return loop over the ITS. This reconstruction will result in Option 3 being similar in cost to Option 2, but with limited salvage value. Options 1 and 3 will both require significant reconstruction to accommodate either High Speed Rail or Light Rail. Options 2 and 4 will support both High Speed Rail and Light Rail.

Based on the information provided above, Option 1 is the preferred option. It has the lowest initial cost of all of the options. Although the long term cost for Option 1 is higher than Options 2 and 4, that is based on the future construction of the South Terminal, the Braided Roadway, High Speed Rail and Light Rail. Until funding is committed for these future projects, Option 1 is the most prudent option that will support the complete build-out of the North Terminal.

**Detailed Construction Cost Estimate for Option One
(Updated June 1, 2004)**

**ORLANDO INTERNATIONAL AIRPORT
INTERIM WIDENING OF SOUTH ACCESS ROAD
Estimate Summary**

DESCRIPTION	COST
Const New Two Lane Rdwy Parallel to Existing South Access Rd	\$7,186,000
Mill and Resurface Existing South Access Road	\$380,000
Ramp D - Widen to Two Lanes	\$336,000
Add Auxiliary Lane to NB Airport Blvd	\$352,000
Ramp A - Widen to Two Lanes	\$310,000
Subtotal	\$8,564,000
Contingency (25%)	\$2,141,000.00
TOTAL	\$10,705,000

ORLANDO INTERNATIONAL AIRPORT
INTERIM WIDENING OF SOUTH ACCESS ROAD
Const New Two Lane Rdwy Parallel to Existing South Access Rd
Construction Cost Estimate

URS Corporation / GLF

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
ROADWAY				\$5,938,934
Clearing & Demolition	8.38	ac	\$12,000.00	\$100,580
Erosion Control	7300	lf	\$2.50	\$18,250
Excavation		cy	\$3.50	
Embankment (Borrow)(Bank Meas.)	90,844	cy	\$11.57	\$1,051,065
Pond Construction		ea	\$105,000.00	
Open Drainage System - NDR	1.38	miles	\$210,000.00	\$290,341
Stabilization	30,822	sy	\$3.20	\$98,630
Roadway Base 12 " depth	20,278	sy	\$13.12	\$266,103
Shoulder Base 6 " depth	908.0	sy	\$9.95	\$9,019
Shoulder Pavement 2 " depth	91.0	tons	\$52.00	\$4,732
Tack Coat	879	gal	\$0.22	\$193
Roadway Pavement 4 " depth	3,974.0	tons	\$60.47	\$240,308
Friction Course FC-6	1,687.0	tons	\$68.71	\$115,914
Milling & Overlay Existing		sy	\$7.00	
Curb & Gutter		lf	\$10.80	
Shoulder Gutter		lf	\$15.00	
Miscellaneous Asphalt		tons	\$105.00	
Sidewalks		sf	\$2.60	
Grassing	17,844	sy	\$1.35	\$24,089
Signs (Post & Misc.)	1.38	Miles	\$5,000.00	\$6,913
Signs (OH Truss)	9	ea	\$116,400.00	\$1,047,800
Signs (OH Cantilever)	6	ea	\$39,600.00	\$237,600
Center Striping	7,300	lf	\$0.35	\$2,555
Edge Striping	14,600	lf	\$0.25	\$3,650
Reflective Pavement Markers	183	ea	\$4.25	\$776
Lighting	49	ea	\$5,400.00	\$264,800
Traffic Signals (Model 1) S2-4	1	pi	\$70,149.12	\$70,149
Traffic Signals (Model 2)				
Traffic Signals (Model 3)				
Guardrail (Roadway)	10,517	lf	\$13.00	\$136,721
Guardrail End Anchorage (Type II)	12	ea	\$375.00	\$4,500
Landscaping, Irrigation	1	ls	\$100,000.00	\$100,000
Retention Pond (Allowance)	1	ea	\$86,250.00	\$86,250
Wetland Mitigation	1	ls	\$500,000.00	\$500,000
Subsoil Excavation	68133	cy	\$6.90	\$470,118
Replacement Embankment	68133	cy	\$11.57	\$788,299

STRUCTURES			
Approach Slab Concrete		cy	\$295.00
Approach Slab Reinforcing		lbs	\$0.70

SUBTOTAL		\$5,938,934
MOT 10.0%		\$593,893
Mobilization 10.0%		\$653,283
SUBTOTAL		\$7,186,111
CONSTRUCTION TOTAL (Rounded)		\$7,186,000

**ORLANDO INTERNATIONAL AIRPORT
 INTERIM WIDENING OF SOUTH ACCESS ROAD
 Mill and Resurface Existing South Access Road
 Construction Cost Estimate**

URS Corporation / GLF

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
-------------	----------	------	------------	------------

ROADWAY				
Clearing & Demolition				\$313,823
Erosion Control		ac	\$12,000.00	
Excavation	7298	lf	\$2.50	\$18,245
Embankment (Borrow)(Bank Meas.)		cy	\$3.50	
Pond Construction		cy	\$11.57	
Drainage System - RSU		ea	\$105,000.00	
Stabilization		miles		
Roadway Base		sy	\$3.20	
Shoulder Base		sy		
Shoulder Pavement	6 "	depth	\$9.95	
Tack Coat	2 "	depth	\$52.00	
Roadway Pavement	67	gal	\$0.22	\$15
Friction Course	2,185.0	tons	\$60.47	\$132,127
Milling & Overlay Existing	1,687.0	tons	\$68.71	\$115,914
Curb & Gutter		sy	\$7.00	
Shoulder Gutter		lf	\$10.80	
Miscellaneous Asphalt		lf	\$15.00	
Sidewalks		tons	\$105.00	
Grassing		sf	\$2.80	
Signs (Post & Misc.)		sy	\$1.35	
Signs (OH Truss)		Miles	\$2,666.67	
Signs (OH Cantilever)		ea	\$75,000.00	
Center Striping		ea	\$33,000.00	
Edge Striping	7,298	lf	\$0.35	\$2,554
Reflective Pavement Markers	14,596	lf	\$0.25	\$3,649
Lighting	182	ea	\$4.25	\$775
Traffic Signals (Model 1)		ea	\$5,400.00	
Traffic Signals (Model 2)				
Traffic Signals (Model 3)				
Milling (2" Avg Depth)	20,272	sy	\$2.00	\$40,544
Landscaping, Irrigation		ls	\$100,000.00	
Landscaping, Irrigation		ls	\$100,000.00	

STRUCTURES

Approach Slab Concrete		cy	\$295.00	
Approach Slab Reinforcing		lbs	\$0.70	

SUBTOTAL				\$313,823
MOT	10.0%			\$31,382
Mobilization	10.0%			\$34,621
SUBTOTAL				\$379,726

CONSTRUCTION TOTAL (Rounded) \$380,000

**ORLANDO INTERNATIONAL AIRPORT
 INTERIM WIDENING OF SOUTH ACCESS ROAD
 Ramp D - Widen to Two Lanes
 Construction Cost Estimate**

URS Corporation / GLF

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
-------------	----------	------	------------	------------

ROADWAY				
Clearing & Demolition				\$277,578
Erosion Control	0.86	ac	\$12,000.00	\$7,920
Excavation	825	lf	\$2.50	\$2,063
Embankment (Borrow)(Bank Meas.)		cy	\$3.50	
Pond Construction	4,125	cy	\$11.57	\$47,726
Closed Drainage System - NUU		ea	\$105,000.00	
Stabilization	0.16	miles	\$560,000.00	\$87,500
Roadway Base	993	sy	\$3.20	\$3,178
Shoulder Base	642	sy	\$13.12	\$8,425
Shoulder Pavement		sy	\$9.95	
Tack Coat		tons	\$62.00	
Roadway Pavement	28	gal	\$0.22	\$6
Friction Course	89.0	tons	\$60.47	\$5,382
Milling & Overlay Existing	59.0	tons	\$68.71	\$4,054
Curb & Gutter	1,100	sy	\$7.00	\$7,700
Shoulder Gutter	825	lf	\$10.80	\$8,910
Miscellaneous Asphalt		lf	\$15.00	
Sidewalks		tons	\$105.00	
Grassing		sf	\$2.80	
Signs (Post & Misc.)	2,658	sy	\$1.35	\$3,588
Signs (OH Truss)	0.16	Miles	\$30,000.00	\$4,688
Signs (OH Cantilever)		ea	\$75,000.00	
Center Striping		ea	\$33,000.00	
Edge Striping	825	lf	\$0.35	\$289
Reflective Pavement Markers	1,650	lf	\$0.25	\$413
Lighting	21	ea	\$4.25	\$88
Traffic Signals (Model 1)	6	ea	\$5,400.00	\$32,400
Traffic Signals (Model 2)				
Traffic Signals (Model 3)				
Impact Attenuator (6 bay)	1	ea	\$23,250.00	\$23,250
Landscaping, Irrigation	1	ls	\$30,000.00	\$30,000

STRUCTURES				
Approach Slab Concrete		cy	\$295.00	
Approach Slab Reinforcing		lbs	\$0.70	

SUBTOTAL				\$277,578
MOT	10.0%			\$27,758
Mobilization	10.0%			\$30,534
SUBTOTAL				\$335,869

CONSTRUCTION TOTAL (Rounded)				\$338,000
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**ORLANDO INTERNATIONAL AIRPORT
 INTERIM WIDENING OF SOUTH ACCESS ROAD
 Add Auxillary Lane to NB Airport Blvd
 Construction Cost Estimate**

URS Corporation / GLF

DESCRIPTION	QUANTITY	UNIT	B/B	COST
ROADWAY				\$290,729
Clearing & Demolition	0.74	ac	\$12,000.00	\$8,880
Erosion Control	920	lf	\$2.50	\$2,300
Excavation		cy	\$3.50	
Embankment (Borrow)(Bank Meas.)	10,836	cy	\$11.57	\$125,373
Pond Construction		ea	\$105,000.00	
Drainage System - WNU	0.17	miles	\$88,100.00	\$15,351
Stabilization	2,027	sy	\$3.20	\$6,486
Roadway Base	1,329	sy	\$13.12	\$17,440
Shoulder Base		sy	\$9.95	
Shoulder Pavement		tons	\$52.00	
Tack Coat	58	gal	\$0.22	\$13
Roadway Pavement	192.0	tons	\$60.47	\$11,610
Friction Course	114.0	tons	\$68.71	\$7,833
Milling & Overlay Existing	1,227	sy	\$7.00	\$8,589
Curb & Gutter	920	lf	\$10.80	\$9,936
Shoulder Gutter		lf	\$15.00	
Miscellaneous Asphalt		tons	\$105.00	
Sidewalks		sf	\$2.60	
Grassing	2,351	sy	\$1.35	\$3,174
Signs (Post & Misc.)	0.17	Miles	\$2,666.67	\$485
Signs (OH Truss)		ea	\$75,000.00	
Signs (OH Cantilever)		ea	\$33,000.00	
Center Striping	920	lf	\$0.35	\$322
Edge Striping	1,840	lf	\$0.25	\$460
Reflective Pavement Markers	23	ea	\$4.25	\$98
Lighting	6	ea	\$5,400.00	\$32,400
Traffic Signals (Model 1)				
Traffic Signals (Model 2)				
Traffic Signals (Model 3)				
Landscaping, Irrigation	1	ls	\$40,000.00	\$40,000

STRUCTURES			
Approach Slab Concrete		cy	\$296.00
Approach Slab Reinforcing		lbs	\$0.70

SUBTOTAL		\$290,729
MOT	10.0%	\$29,073
Mobilization	10.0%	\$31,980
SUBTOTAL		\$351,782
CONSTRUCTION TOTAL (Rounded)		\$352,000

ORLANDO INTERNATIONAL AIRPORT
INTERIM WIDENING OF SOUTH ACCESS ROAD
Ramp A - Widen to Two Lanes
Construction Cost Estimate

URS Corporation / GLF

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
ROADWAY				\$256,358
Clearing & Demolition	0.66	ac	\$12,000.00	\$7,920
Erosion Control	821	lf	\$2.50	\$2,053
Excavation	152	cy	\$3.50	\$532
Embankment (Borrow)(Bank Meas.)	3,375	cy	\$11.57	\$39,049
Pond Construction		ea	\$105,000.00	
Closed Drainage System - NUU	0.16	miles	\$560,000.00	\$87,076
Stabilization	1,262	sy	\$3.20	\$4,038
Roadway Base	639	sy	\$13.12	\$8,385
Shoulder Base		sy	\$9.95	
Shoulder Pavement		tons	\$52.00	
Tack Coat	28	gal	\$0.22	\$6
Roadway Pavement	89.0	tons	\$60.47	\$5,382
Friction Course	58.0	tons	\$68.71	\$3,985
Milling & Overlay Existing		sy	\$7.00	
Curb & Gutter	821	lf	\$10.80	\$8,867
Shoulder Gutter		lf	\$15.00	
Miscellaneous Asphalt		tons	\$105.00	
Sidewalks		sf	\$2.60	
Grassing	2,645	sy	\$1.35	\$3,571
Signs (Post & Misc.)	0.16	Miles	\$30,000.00	\$4,665
Signs (OH Truss)		ea	\$75,000.00	
Signs (OH Cantilever)		ea	\$33,000.00	
Center Striping	821	lf	\$0.35	\$287
Edge Striping	821	lf	\$0.25	\$205
Reflective Pavement Markers	21	ea	\$4.25	\$87
Lighting	5	ea	\$5,400.00	\$27,000
Traffic Signals (Model 1)				
Traffic Signals (Model 2)				
Traffic Signals (Model 3)				
Impact Attenuator (6 bay)	1	ea	\$23,250.00	\$23,250
Landscaping, Irrigation	1	ls	\$30,000.00	\$30,000

STRUCTURES			
Approach Slab Concrete		cy	\$295.00
Approach Slab Reinforcing		lbs	\$0.70

SUBTOTAL		\$256,358
MOT	10.0%	\$25,636
Mobilization	10.0%	\$28,199
SUBTOTAL		\$310,194
CONSTRUCTION TOTAL (Rounded)		\$310,000

APPENDIX K

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**

Orlando International Airport Master Plan Update

Surface Transportation Working Paper Cut-Through Traffic

Prepared For:

Greater Orlando Aviation Authority

Prepared By:

URS

August 2004

Orlando International Airport Master Plan Update

Surface Transportation Working Paper Cut-Through Traffic

Prepared For:

Greater Orlando Aviation Authority

Prepared By:

URS

August 2004

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APPENDICES

APPENDIX

A	Mid Crossfield Taxiway Bridge Memorandum
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1.0 PURPOSE

The purpose of this Working Paper is to document the issue of cut-through traffic and determine how it will impact operations at Orlando International Airport (MCO). Solutions are developed and evaluated. A course of action is identified. For the purpose of this working paper, cut-through traffic is defined as *vehicles that travel on airport roadways that do not have an origin or destination on airport property.*

2.0 NEED

The existing transportation network surrounding MCO has limited north/south and east/west routes. North/south travel is accommodated by Narcoossee Road (SR 15) on the east side of the airport and Boggy Creek Road on the west and south sides of the airport. The distance between these two facilities is approximately 5.3 miles. East/west travel is accommodated by the Bee Line Expressway (SR 528) on the north side of the airport and the GreeneWay (SR 417) on the south side of the airport. The distance between these two facilities is approximately 5.7 miles. The airport presents an obstacle to motorists on their way between residences and employment areas surrounding the airport and thereby encourages these motorists to use airport roadways to shorten their trips. These trips passing through the airport without stopping on airport property are defined as cut-through traffic.

Current cut-through traffic comprises approximately 8% of all traffic on MCO roadways on a daily basis and 13% during the peak hour. For specific locations, cut-through traffic comprises as much as 18% of traffic on a daily basis and 26% during the peak hour. As private residential and commercial development around the airport continues, this percentage will grow as local drivers search for alternative routes including airport roadways. By 2025, cut-through traffic is projected to comprise approximately 25% of all traffic on airport roadways on both a daily and peak hour basis. For specific locations, cut-through traffic is projected to be as high as 32%. Cut-through traffic increases the overall volumes on airport roadways thereby reducing capacity for airport traffic. This reduction in capacity will begin to impact airport terminal operations prior to the year 2025.

3.0 BACKGROUND

In 2003, during the Master Plan Update, cut-through traffic was identified as a major contributor to projected traffic operations deficiencies. Also, during the Master Plan Update, the Orlando Urban Area Transportation Study (OUATS) traffic model was used to project the percentage of cut-through traffic for key locations on MCO roadways in 2025. The following sub-sections describe each of these efforts to quantify and analyze the impact of cut-through traffic on terminal operations.

3.1 Year 2025 Traffic Projections

Traffic projections were prepared for the year 2025 utilizing a passenger forecast of 60 MAP including 35 MAP at the North Terminal, 25 MAP at the South Terminal. The following summarizes the methodology and procedure used in the development of the future traffic projections. The complete documentation is provided in the Surface Transportation Plan, Section 7 of the Master Plan Update. The year 2025 traffic projections are provided on Figures 3.1 and 3.2.

The traffic forecasts were developed by integrating a subarea model for the airport roadways with a regional model for the off-site roadways. The regional traffic model utilized was the Year 2000 OUATS. The OUATS model was used to estimate the distribution of airport traffic in relation to the location of regional population and employment. The subarea model was based on the Subarea Travel Demand Model created for the 1995 MCO Master Plan. This model includes both airport roadways and off-site roadways that allow access to/from MCO. The subarea model provides a more detailed airport roadway network and focuses on internal traffic circulation. Additional data including daily traffic counts, terminal surveys, historical traffic counts, land use information, and employee data were used to generate the subarea traffic model. The subarea model network was validated to reflect Year 2000 traffic conditions.

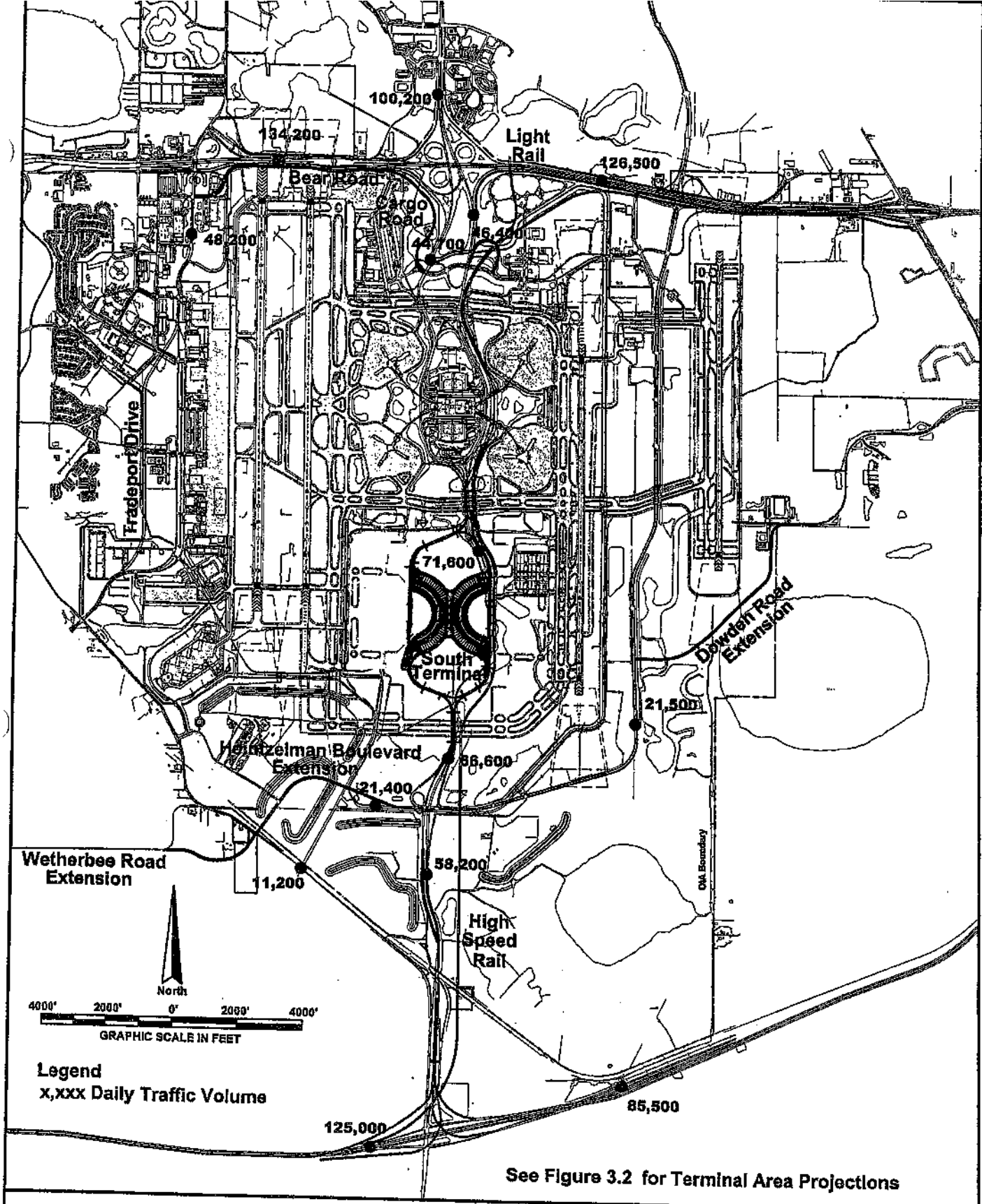
The following land use and surface transportation network assumptions were utilized in the subarea model roadway network for the Year 2025:

- Projected growth includes the construction of the South Terminal, the development of south terminal support zones, and increased support activity in the north and mid-field development areas.
- Roadway network includes all regional existing, programmed and planned roadway improvements in the Metroplan Orlando Long Range Transportation Plan (LRTP), new airport access on Dowden Road, and the extension of Heintzelman Boulevard to the west.

3.2 Year 2025 Projected Deficiencies

Projected deficiencies in the airport roadway network were identified through the use of capacity analyses. The capacity analyses are based on the methods outlined in the Highway Capacity Manual, Transportation Research Board, 2000 (2000 HCM). Several improvements as recommended in the Master Plan Update were assumed for the future year roadway network in 2025 for the purpose of these analyses. These assumed improvements are listed below:

- Northbound Airport Boulevard between Cargo Road and SR 528 -- Widened to four lanes;

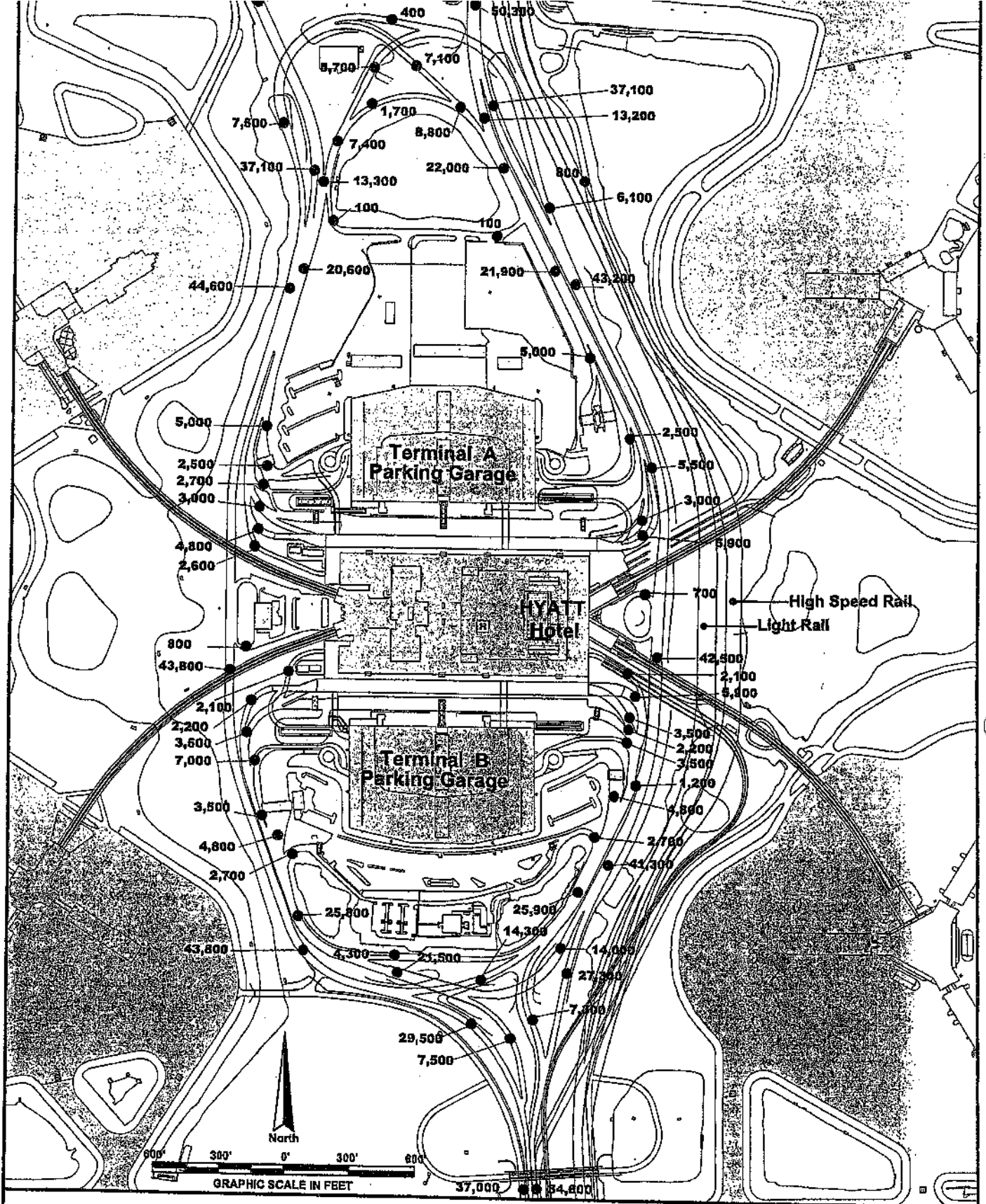


See Figure 3.2 for Terminal Area Projections

GREATER ORLANDO AVIATION AUTHORITY
URS Orlando International Airport Master Plan Update

2025 PROJECTED PEAK SEASON REGIONAL AVERAGE DAILY TRAFFIC VOLUMES

FIGURE: 3.1



GREATER ORLANDO AVIATION AUTHORITY
 Orlando International Airport
 Master Plan Update

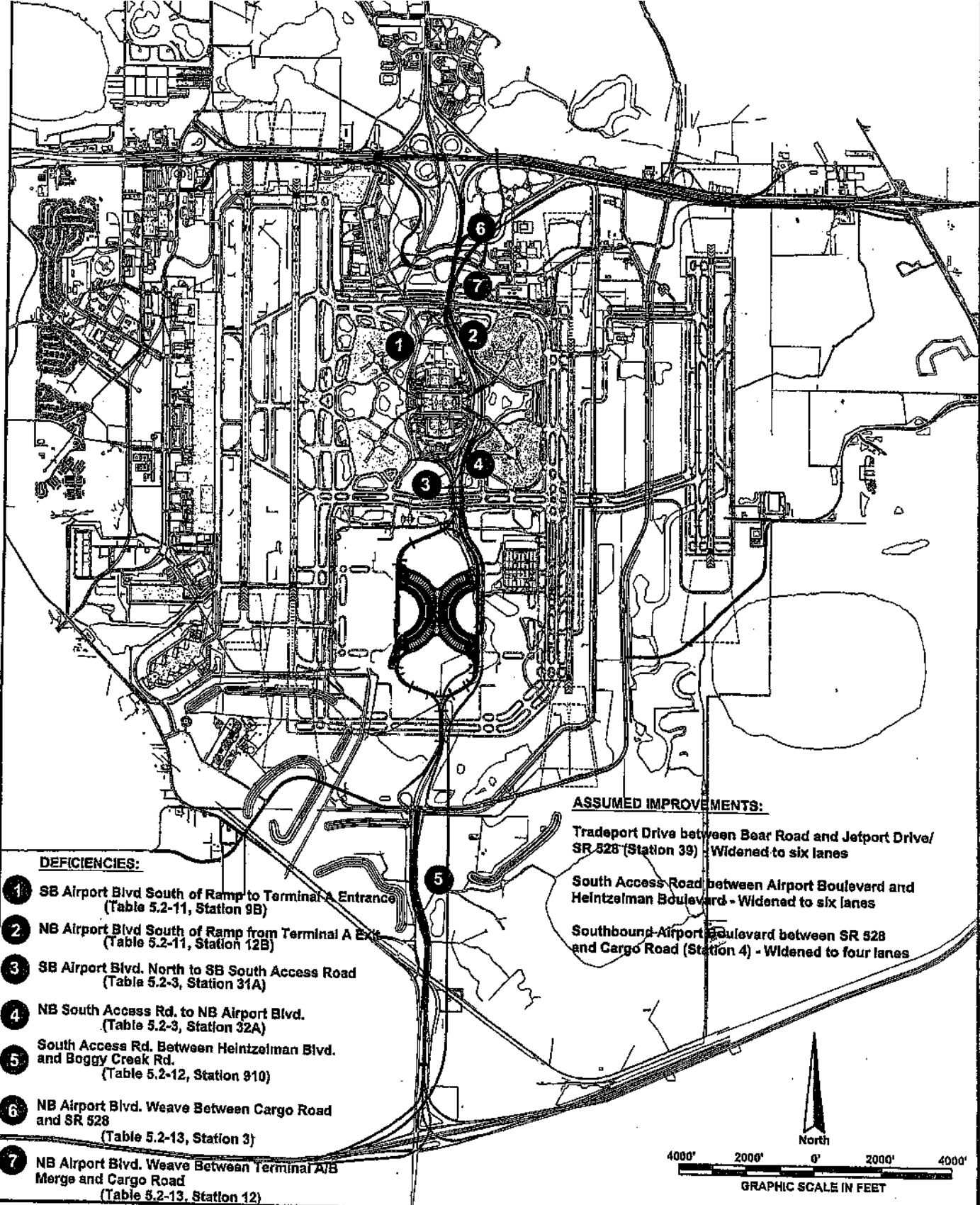
**2025 PROJECTED PEAK SEASON
 AVERAGE DAILY TRAFFIC VOLUMES**

**FIGURE:
 3.2**

- Southbound Airport Boulevard between SR 528 and Cargo Road – Widened to four lanes;
- SR 417/Boggy Creek Road Interchange improvement – Direct connect ramps between South Access Road and SR 417;
- Southbound Airport Boulevard ramp to Southbound South Access Road – Widened to two lanes;
- Northbound South Access Road ramp to Northbound Airport Boulevard – Widened to two lanes;
- Heintzelman Boulevard Extension – New four lane road between South Access Road and Boggy Creek Road at Wetherbee Road;
- Wetherbee Road Widening and Realignment – Widened to four lanes west of Boggy Creek Road and realigned to line up with the Heintzelman Boulevard Extension;
- Dowden Road Extension – New two lane road between its current terminus adjacent to the HBJ Building and Heintzelman Boulevard; Ultimate construction includes expanding this roadway segment to four lanes
- Cargo Road Extension – New two lane road between its current terminus west of Airport Boulevard and Bear Road next to the Old Terminal Building;
- Bear Road Widening – Widened to four lanes between Tradeport Drive and Cargo Road; and
- Tradeport Drive Realignment and Widening – Widened to six lanes between Boggy Creek Road and SR 528. Realigned between Boggy Creek Road and Binnacle Way.

The locations listed below are projected to operate below Level of Service (LOS) D by the year 2025. These locations are shown on Figure 3.3.

- Southbound Airport Boulevard south of the ramp to Terminal A;
- Northbound Airport Boulevard south of the ramp from Terminal A;
- South Access Road ramp to Northbound Airport Boulevard;
- Southbound Airport Boulevard ramp to South Access Road;
- South Access Road between Heintzelman Boulevard and Boggy Creek Road;



DEFICIENCIES:

- 1 SB Airport Blvd South of Ramp to Terminal A Entrance
(Table 5.2-11, Station 9B)
- 2 NB Airport Blvd South of Ramp from Terminal A Exit
(Table 5.2-11, Station 12B)
- 3 SB Airport Blvd. North to SB South Access Road
(Table 5.2-3, Station 31A)
- 4 NB South Access Rd. to NB Airport Blvd.
(Table 5.2-3, Station 32A)
- 5 South Access Rd. Between Heintzelman Blvd.
and Boggy Creek Rd.
(Table 5.2-12, Station 910)
- 6 NB Airport Blvd. Weave Between Cargo Road
and SR 528
(Table 5.2-13, Station 3)
- 7 NB Airport Blvd. Weave Between Terminal A/B
Merge and Cargo Road
(Table 5.2-13, Station 12)

ASSUMED IMPROVEMENTS:

- Tradeport Drive between Bear Road and Jetport Drive/
SR 528 (Station 39) - Widened to six lanes
- South Access Road between Airport Boulevard and
Heintzelman Boulevard - Widened to six lanes
- Southbound Airport Boulevard between SR 528
and Cargo Road (Station 4) - Widened to four lanes



GRAPHIC SCALE IN FEET

GREATER ORLANDO AVIATION AUTHORITY
 **URS** Orlando International Airport Master Plan Update

2025 ROADWAY DEFICIENCIES

FIGURE:
3.3

- Northbound Airport Boulevard weave between Cargo Road and SR 528; and
- Northbound Airport Boulevard weave between Terminal A/B merge and Cargo Road

3.3 Identification of Future Cut-Through Traffic

A detailed analysis was completed, as part of the Master Plan Update for MCO, to understand and document the land use and transportation dynamics that cause cut-through traffic. Because of limited resources, efforts were focused on reducing or eliminating cut-through traffic on the main passenger access facilities. Information on the origins and destinations for trips assigned to airport roadways was obtained from the OUATS traffic model output. Table 1 lists key locations on the main passenger access roadways and identifies the percentage of cut-through traffic projected by the model for the year 2025.

Cut-through traffic is projected to comprise between 23% and 32% of total north/south traffic through the terminal roadways. This level of cut-through traffic is projected to deteriorate traffic operations and is primarily responsible for the projected operating deficiencies along airport roadways. These projected deficiencies must be addressed in order to continue to provide a high level of service to passengers accessing the airport terminal.

Two basic approaches were identified to address these projected deficiencies. The first is to accommodate the cut-through traffic by providing additional capacity. This can be accomplished by either adding lanes to the existing roadways or by constructing a bypass roadway to relieve the existing roadways. The second approach is to reduce or eliminate the cut-through traffic. This would be accomplished by either physically restricting the traffic from passing through the airport without first entering the terminal, or by providing a disincentive to pass through the airport such as a toll. The remainder of this document details the development and evaluation of concepts to address cut-through traffic based on the approaches identified above and provides a recommended course of action.

Table 1 - Projected (Year 2025) Cut-Through Traffic

Location	Peak Hour Projection			Daily Projection		
	% Cut-Through	Total Volume	Cut-Through Volume	% Cut-Through	Total Volume	Cut-Through Volume
NB Airport Blvd - N. of Cargo Rd	24%	3,308	794	24%	46,400	11,136
SB Airport Blvd - N. of Cargo Rd	24%	3,187	765	23%	44,700	10,281
South Access Rd - N. of Heintzelman Blvd	32%	4,995	1,598	32%	66,600	21,417
South Access Rd - S. of Heintzelman Blvd	30%	4,365	1,310	30%	58,200	17,460

Source: HDR, Inc. and URS, Inc. 2003

4.0 OPTIONS FOR ACCOMMODATING CUT-THROUGH TRAFFIC

The options presented in this section were developed to address the deficiencies projected through 2025 by adding capacity to the existing network. No attempt was made to reduce or eliminate cut-through traffic. The first option adds capacity to existing Airport Boulevard to support the projected volumes through 2025. The second option involves the construction of a bypass facility for through traffic adjacent to existing Airport Boulevard to relieve congestion along the existing roadway.

Both of these options will require additional improvements including a modification to the exit ramps to SR 528 and widening South Access Road to six lanes between Heintzelman Boulevard and Boggy Creek Road. These projects are described in the Master Plan Update.

4.1 Widen Airport Boulevard

This concept involves widening Airport Boulevard to support the projected traffic demand through 2025. Segments with projected operating deficiencies would be expanded to support the forecast demand. Auxiliary lanes are added to adjacent segments to provide lane balance for smoother merging and diverging operations. The concept for this improvement is illustrated on Figure 4.1.

Specific Improvements:

- Add one lane to southbound Airport Boulevard from the Terminal A/B split to the entrance ramp to Terminal B.
- Add one lane to the ramp from southbound Airport Boulevard to the South Terminal.
- Add one lane to the ramp from the South Terminal to northbound Airport Boulevard.
- Add one lane to northbound Airport Boulevard from the ramp from the South Terminal to the Cargo Road off-ramp.

Benefit:

Satisfies basic capacity needs to meet projected traffic demand through 60 MAP along Airport Boulevard.

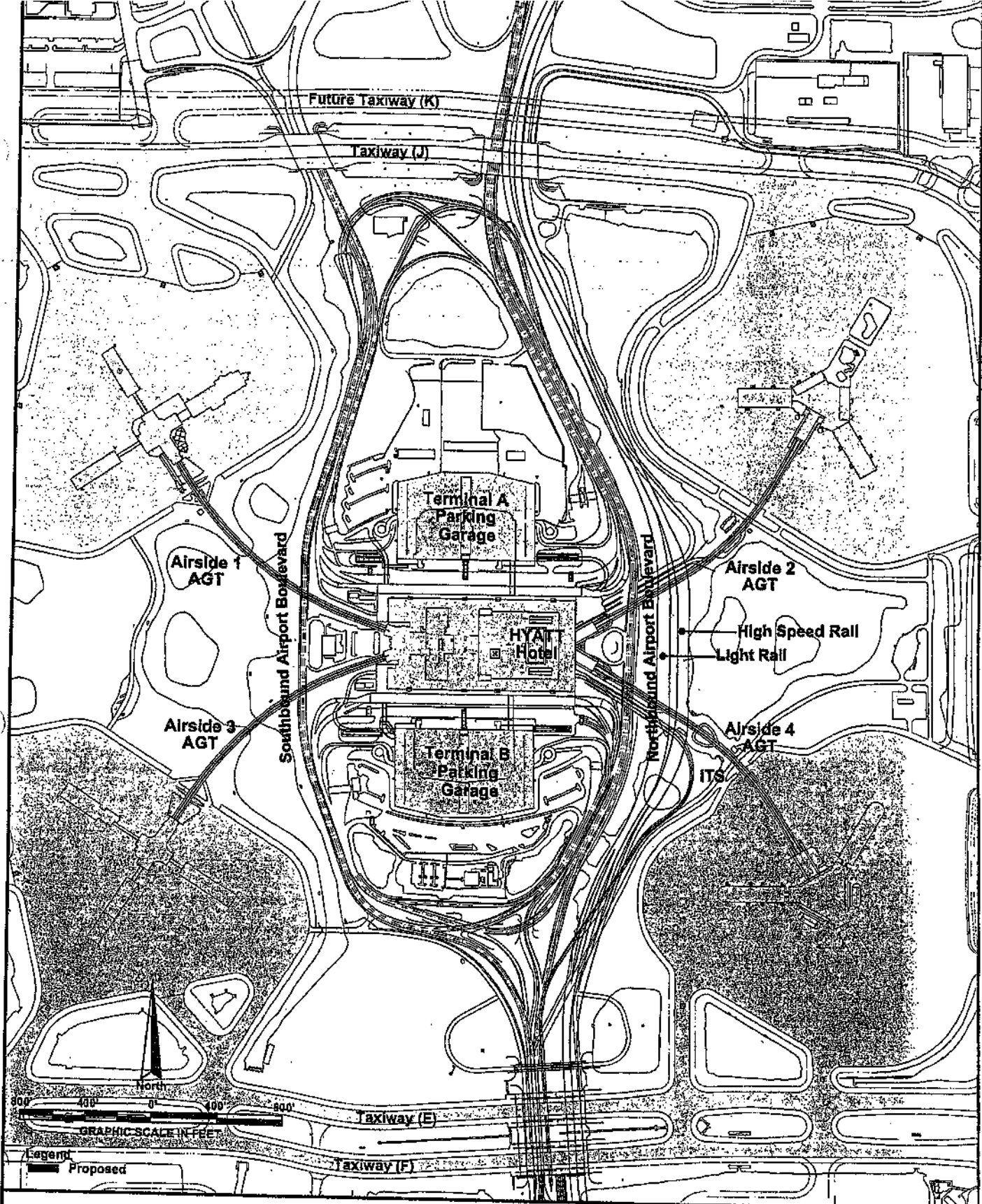
Issues:

- Does not address the deficient weaving operations projected for the northbound Airport Boulevard segments between the Terminal A/B split and Cargo Road and between Cargo Road and SR 528. These weaving segments will require interchange ramp modifications at Cargo Road and at SR 528 to address the projected deficiencies.
- Construction of this improvement concept will require reconstruction of portions of the Automated Guideway Transit (AGT) structures for all four airside.
- Construction of this improvement concept will require reconstruction of portions of the Intermodal Transit System (ITS) structure.
- Requires improvements to the exit ramps to SR 528 from northbound Airport Boulevard.
- Requires South Access Road between Heintzelman Boulevard and Boggy Creek Road to be widened to six lanes.
- Does not eliminate or reduce cut-through traffic.

Cost Est.: \$45.5 Million

This estimate includes improvements to the exit ramps to SR 528 and widening South Access Road to six lanes between Heintzelman Boulevard and Boggy Creek Road.

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CBI, administration, legal fees, right-of-way or mitigation for environmental impacts.




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AIRPORT BOULEVARD ULTIMATE WIDENING

FIGURE:
4.1

4.2 Bypass Roadway

This concept separates through traffic (traffic not accessing Terminals A or B or the hotel) from Airport Boulevard by providing a bypass roadway system. The bypass roadway concept includes the construction of new two-lane roadways parallel to northbound and southbound Airport Boulevard. The bypass roadway crosses under the AGTs through the opening between the support columns adjacent to Airport Boulevard and avoids conflicts with these columns. Figure 4.2 illustrates this concept.

Specific Improvements:

- Southbound Bypass Road – New two-lane road beginning just south of the North Crossfield Taxiway “J” (diverging from southbound Airport Boulevard just north of the Terminal A/B split) and terminating just north of the Mid-Crossfield Taxiways “E” & “F” (connecting to existing southbound South Access Road).
- Northbound Bypass Road – New two-lane road beginning just north of the Mid-Crossfield Taxiways (at the north terminus of northbound South Access Road) and continuing to just south of the North Crossfield Taxiway where it merges with northbound Airport Boulevard (north of the Terminal A/B merge).
- The existing on-ramp to southbound Airport Boulevard (from the north return loop) is replaced with a ramp that connects to southbound Airport Boulevard and the new southbound bypass roadway.
- The existing ramp from southbound Airport Boulevard to South Access Road is closed. Southbound traffic heading to South Access Road (and the South Terminal) is signed to the bypass roadway.
- A slip ramp from the northbound bypass road to northbound Airport Boulevard is provided for access to the hotel and Terminal A.

Benefit:

Reduces traffic demand along existing Airport Boulevard south of the North Crossfield Taxiway by diverting traffic on to the Bypass Roadway.

Issues:

- Increases the complexity of weaving operations for the northbound Airport Boulevard segments between the Terminal A/B merge and Cargo Road and between Cargo Road

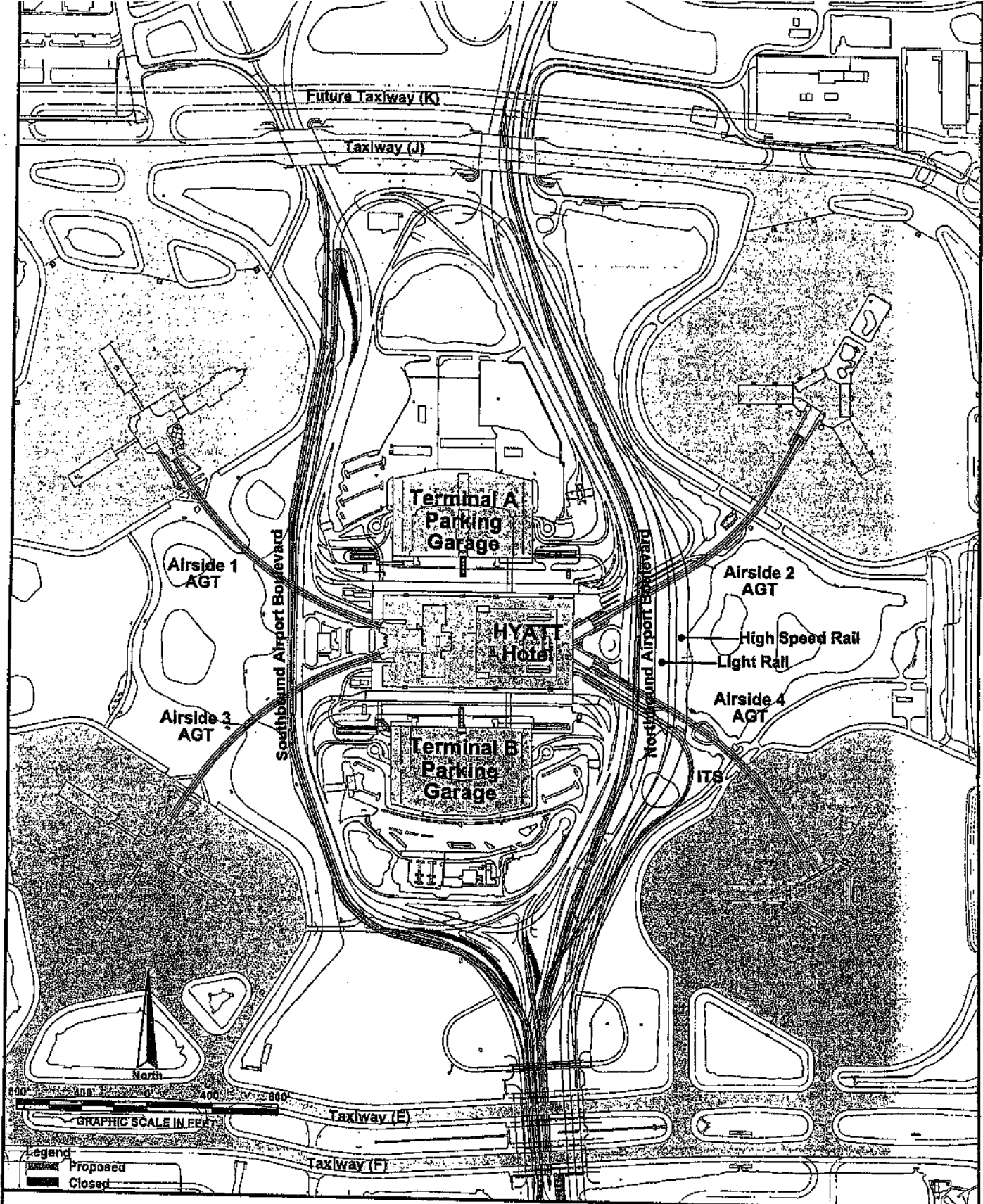
and SR 528. These weaving segments will require interchange ramp modifications at Cargo Road and at SR 528 to address the projected deficiencies.

- Introduces complex weaving operations for southbound Airport Boulevard between Cargo Road and the Terminal A/B split.
- Impacts the proposed light rail corridor just south of the North Crossfield Taxiway.
- Impacts the existing piers of the North Crossfield Taxiway and will require reconstruction of the existing taxiway bridge.
- Requires improvements to the exit ramps to SR 528 from northbound Airport Boulevard.
- Requires South Access Road between Heintzelman Boulevard and Boggy Creek Road to be widened to six lanes.
- Does not eliminate or reduce cut-through traffic.

Cost Est.: \$46.5 Million

This estimate includes improvements to the exit ramps to SR 528 and widening South Access Road to six lanes between Heintzelman Boulevard and Boggy Creek Road.

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way or mitigation for environmental impacts.




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URS

BYPASS ROADWAY CONCEPT

FIGURE:
 4.2

5.0 OPTIONS TO ELIMINATE OR REDUCE CUT-THROUGH TRAFFIC

The options presented in this section were developed to address the deficiencies projected through 2025 by eliminating or reducing cut-through traffic. The first option eliminates cut-through traffic by physically restricting traffic entering the airport and only allowing access to the passenger terminals. The second option reduces cut-through traffic by providing a disincentive to travel through the airport. This option involves the installation of a toll system along airport roadways.

5.1 Braided Roadway

The braided roadway concept consists of a dual roadway system around the north and south terminals that physically separates inbound and outbound traffic. This concept prevents cut-through traffic from using the loop roads around the terminals without passing through the curbsides. It includes the construction of new roadways, northbound and southbound, parallel to existing Airport Boulevard around the North Terminal. The proposed loop road system around the South Terminal is modified to include an outer loop road. Several options were developed and evaluated.

Development of the braided roadway concept began first with the North Terminal because the configuration of the proposed roadway for the South Terminal was still unclear. Later, as the development of the South Terminal advanced, a braided roadway concept for the South Terminal was developed.

The following sections describe each of the braided roadway options considered.

5.1.1. Concept A (North Terminal)

Concept A includes a new outer loop road around the North Terminal. Northbound traffic entering the airport from the south entrance is forced into the outer loop road and can only access the North Terminal or the Hyatt Hotel. Southbound traffic exiting the North Terminal is directed onto the outer loop with direct access to the south exit. Southbound traffic entering the airport from the north entrance does not have direct access to the outer loop road and can only access the North Terminal or the South Terminal. A third northbound roadway along the east side of the North Terminal, outside of the new outer loop road, is provided for northbound traffic exiting the South Terminal. This concept is illustrated on Figure 5.1.

Specific Improvements:

- Southbound Exit Road - New two-lane southbound roadway beginning at the existing north return ramp to Terminal B and continuing south of the Mid-Crossfield Taxiways to the outer loop road for the South Terminal. This road will carry traffic exiting Terminal A and the Hyatt Hotel and headed for the south exit.
- Northbound Entrance Road - New two-lane northbound roadway beginning south of the Mid-Crossfield Taxiways from the inner loop road for the South Terminal and continuing north to the existing return ramp to Terminals A and B. This road will carry inbound traffic from the south entrance to Terminals A and B and the Hyatt Hotel.
- Northbound South Terminal Exit Road - New two-lane northbound roadway beginning south of the Mid-Crossfield Taxiways from the outer loop road for the South Terminal and continuing north. Crosses over the northbound entrance road and connects to existing northbound Airport Boulevard. This road will carry traffic exiting the South Terminal and headed for the north exit.
- The existing ramp from South Access Road to northbound Airport Boulevard is closed.
- The existing slip ramp from Terminal B to northbound Airport Boulevard is closed.
- A new flyover ramp from southbound Airport Boulevard to northbound Airport Boulevard is provided to maintain access from north of MCO to the Hyatt Hotel.

Circulation Highlights:

- NB Traffic to Terminal A Uses New Outer Loop – Terminates at Return Loop

- Access to Hotel From North Via Flyover
- Access to South Exit From North Terminal Via Exclusive SB Roadway
- Terminal B to South Exit -- Loops Around North Terminal

Benefits:

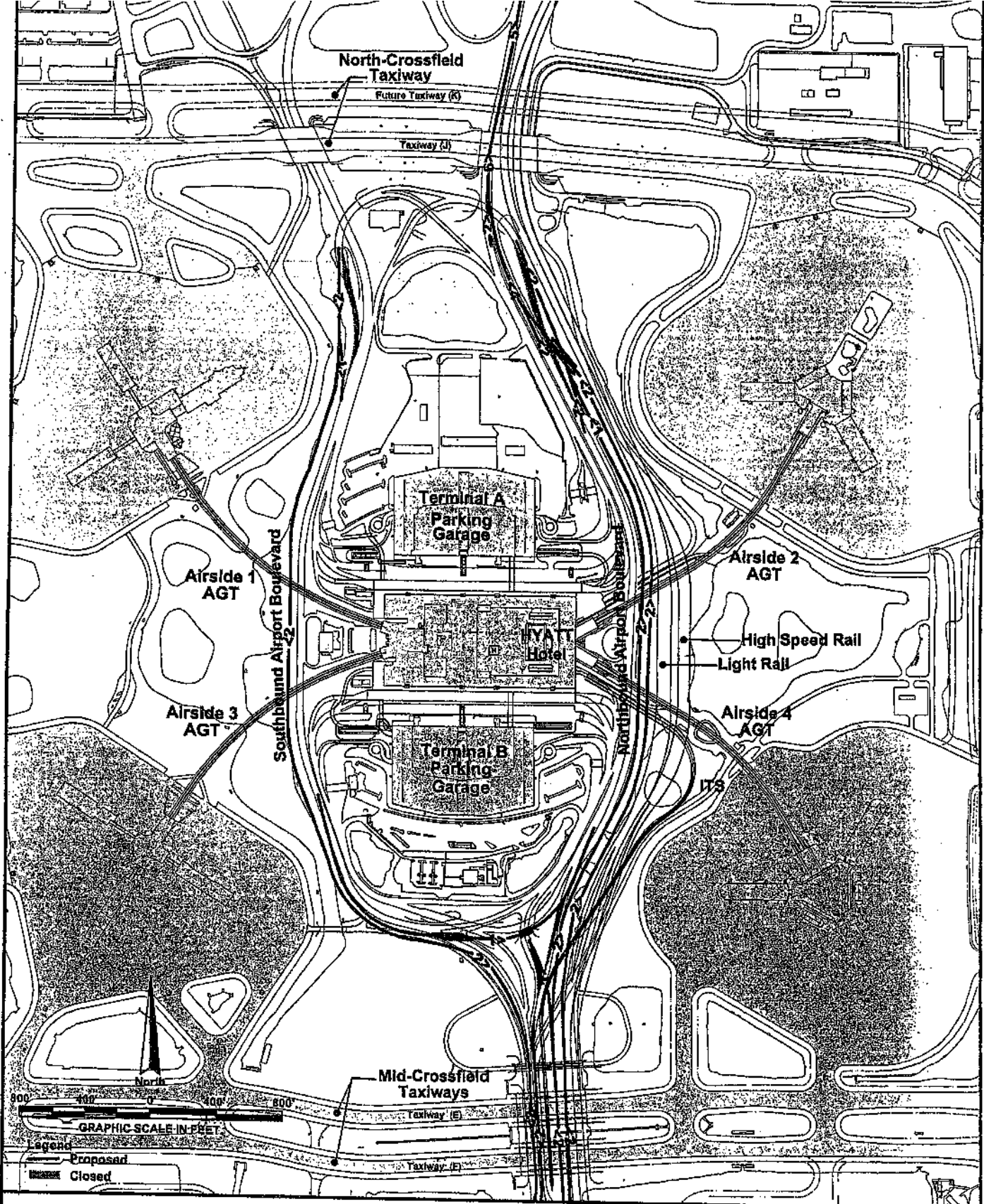
- Eliminates cut-through traffic on terminal roadways.
- Reduces weaving and signing complexity by providing positive guidance to motorists.

Issues:

- Traffic leaving Terminal B to the South Exit must make a complete loop around the North Terminal.
- Flyover ramp from southbound Airport Boulevard to Hyatt Hotel is at 3rd level.

Cost Est.: \$30.9 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way or mitigation for environmental impacts.



5.1.2. Concept A-1 (North Terminal)

Concept A-1 is similar to Concept A, except that the direct ramp from Terminal B to the South Terminal is closed. This traffic must make a complete loop around the North Terminal. Closing this ramp reduces the fly-over ramp from the north to the hotel to a second level bridge from a third level bridge. This concept is illustrated on Figure 5.2.

Specific Improvements:

- Southbound Exit Road - New two-lane southbound roadway beginning at the existing north return ramp to Terminal B and continuing south of the Mid-Crossfield Taxiways to the outer loop road for the South Terminal. This road will carry traffic exiting Terminals A and B and the Hyatt Hotel and headed for the south exit.
- Northbound Entrance Road - New two-lane northbound roadway beginning south of the Mid-Crossfield Taxiways from the inner loop road for the South Terminal and continuing north to the existing return ramp to Terminals A and B. This road will carry inbound traffic from the south entrance to Terminals A and B and the Hyatt Hotel.
- Northbound South Terminal Exit Road - New two-lane northbound roadway beginning south of the Mid-Crossfield Taxiways from the outer loop road for the South Terminal and continuing north. Crosses over the northbound entrance road and connects to existing northbound Airport Boulevard. This road will carry traffic exiting the South Terminal and headed for the north exit.
- The existing ramp from South Access Road to northbound Airport Boulevard is removed.
- The existing slip ramp from Terminal B to northbound Airport Boulevard and the existing direct ramp from Terminal B to South Access Road are closed.
- A new flyover ramp from southbound Airport Boulevard to northbound Airport Boulevard is provided to maintain access from north of MCO to the Hyatt Hotel.

Circulation Highlights:

- NB Traffic to Terminal A Uses New Outer Loop – Terminates at Return Loop
- Access to Hotel From North Via Flyover
- Access to South Exit From North Terminal Via Exclusive SB Roadway

- Terminal B to South Exit – Loops Around North Terminal
- Terminal B to South Terminal – Loop Around North Terminal

Benefits:

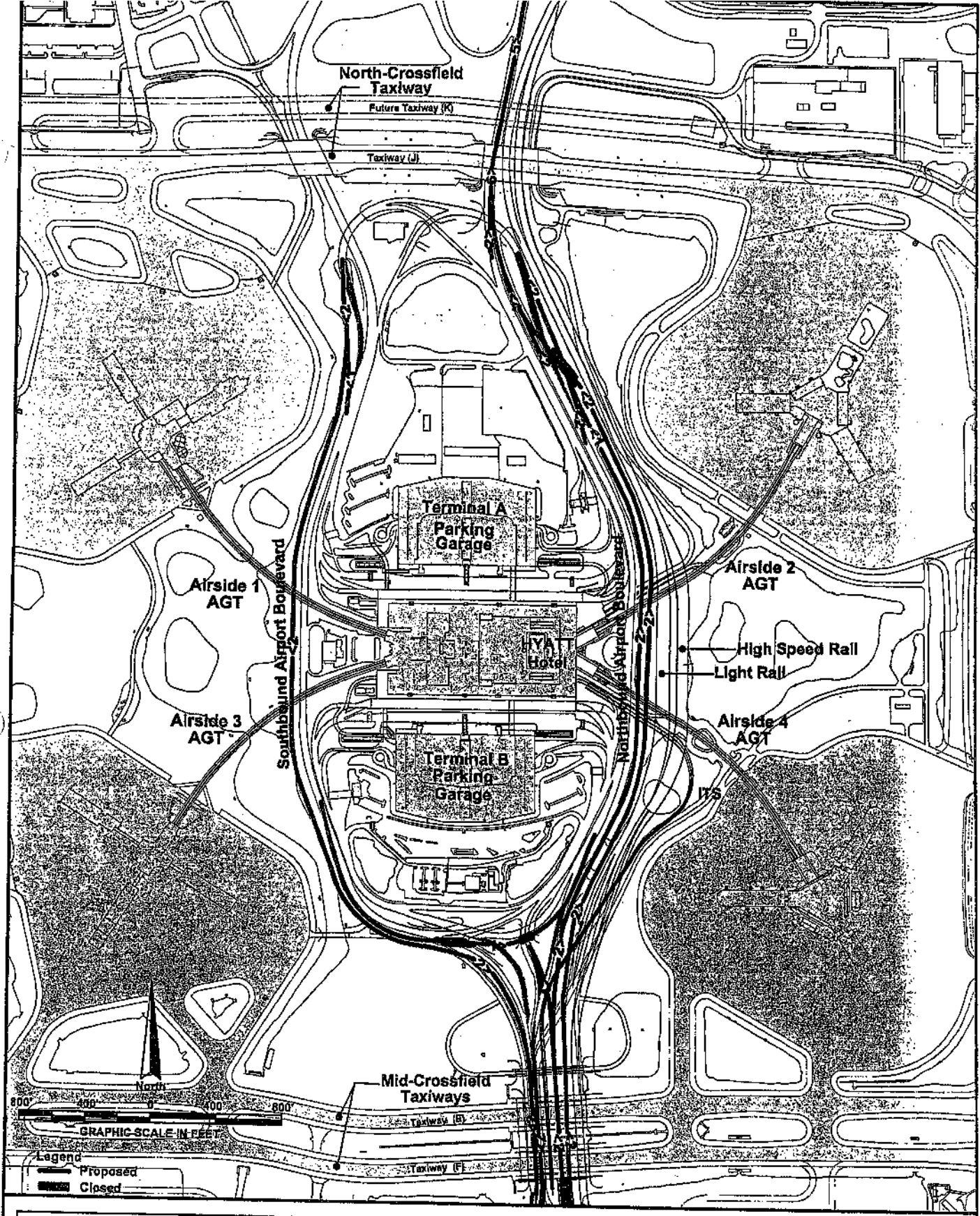
- Eliminates cut-through traffic on terminal roadways.
- Reduces weaving and signing complexity by providing positive guidance to motorists.
- Hotel fly-over reduced to 2nd level.

Issues:

- Traffic leaving Terminal B to the South Exit or the South Terminal must make a complete loop around the North Terminal.

Cost Est.: \$28.9 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way or mitigation for environmental impacts.




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BRAIDED ROADWAY CONCEPT A-1

FIGURE: 5.2

5.1.3. Concept C (North Terminal)

Concept C includes a new outer loop road around the North Terminal. Northbound traffic entering the airport from the south entrance is forced into the existing inner loop road and can only access the North Terminal or the Hyatt Hotel. Southbound traffic exiting the North Terminal is directed onto the new outer loop road with direct access to the south exit. Southbound traffic entering the airport from the north entrance does not have direct access to the outer loop road and can only access the North Terminal or the South Terminal. Northbound traffic exiting Terminal B, the hotel or the South Terminal is directed onto the new outer loop road. This concept is illustrated on Figure 5.3.

Specific Improvements:

- Southbound Exit Road - New two-lane southbound roadway beginning at the existing north return ramp to Terminal B and continuing south of the Mid-Crossfield Taxiways to the outer loop road for the South Terminal. This road will carry traffic exiting Terminal A and the Hyatt Hotel and headed for the south exit.
- Northbound Exit Road - New three-lane northbound roadway beginning south of the Mid-Crossfield Taxiways from the outer loop road for the South Terminal and continuing north past the north return ramp to Terminals A and B. Connects to existing northbound Airport Boulevard under the North Crossfield Taxiway. This road will carry traffic exiting the South Terminal, Terminal B and the Hyatt Hotel headed for the north exit.
- Existing northbound Airport Boulevard is closed between the north return ramp to Terminals A and B and the exit ramp from Terminal A.
- The exit ramp from Terminal B to northbound Airport Boulevard is reconstructed over northbound Airport Boulevard to connect to the northbound exit road.
- A new flyover ramp from southbound Airport Boulevard to the northbound exit road is provided to maintain access from the Hyatt Hotel to the north exit.

Circulation Highlights:

- NB Traffic to Terminal A Uses Existing Loop Road on East Side
- Access to Hotel from North Via Existing Slip Ramp from Terminal B
- Access to South Exit from North Terminal Via Exclusive SB Roadway
- Terminal B to South Exit – Loops Around North Terminal

- Exit from Hyatt Hotel to North Exit - Loops Around North Terminal
- Terminal B to North Exit Via New Outer Loop Road

Benefits:

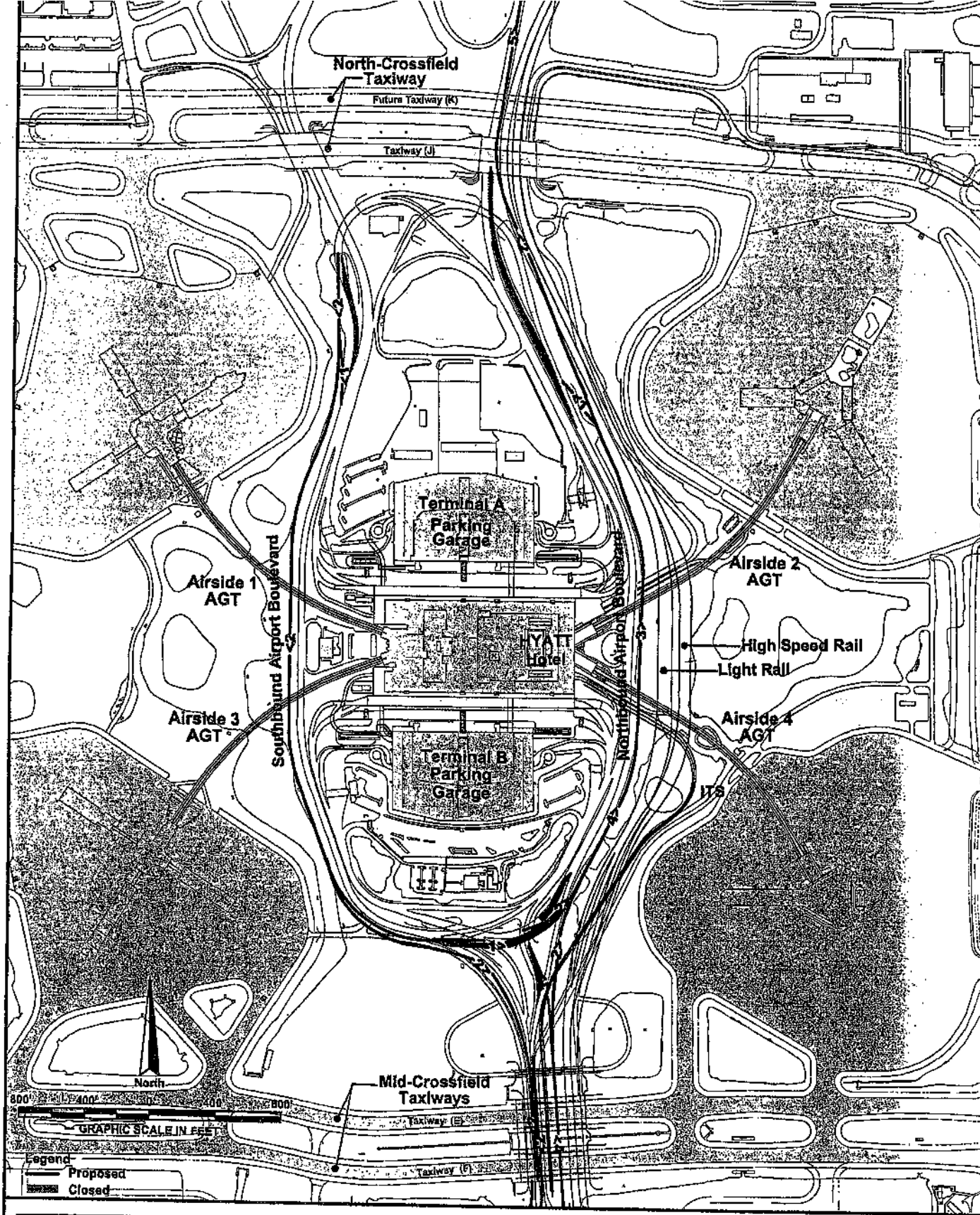
- Eliminates cut-through traffic on terminal roadways.
- Reduces weaving and signing complexity by providing positive guidance to motorists.

Issues:

- Traffic leaving Terminal B to the South Exit must make a complete loop around the North Terminal.
- Flyover ramp from southbound Airport Boulevard to northbound exit road is at 3rd level.
- Traffic leaving the Hyatt Hotel to the north exit must make a complete loop around the North Terminal.

Cost Est.: \$41.7 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way or mitigation for environmental impacts.



5.1.4. Concept C-1 (North Terminal)

Concept C-1 is similar to Concept C, except that the direct ramp from Terminal B to the South Terminal is closed. This traffic must make a complete loop around the North Terminal. Closing this ramp reduces the fly-over ramp from the north to the Hyatt Hotel to a second level bridge from a third level bridge. This concept is illustrated on Figure 5.4.

Specific Improvements:

- Southbound Exit Road - New two-lane southbound roadway beginning at the existing north return ramp to Terminal B and continuing south of the Mid-Crossfield Taxiways to the outer loop road for the South Terminal. This road will carry traffic exiting Terminal A and the Hyatt Hotel and headed for the south exit.
- Northbound Exit Road - New three-lane northbound roadway beginning south of the Mid-Crossfield Taxiways from the outer loop road for the South Terminal and continuing north past the north return ramp to Terminals A and B. Connects to existing northbound Airport Boulevard under the North Crossfield Taxiway. This road will carry traffic exiting the South Terminal, Terminal B and the Hyatt Hotel headed for the north exit.
- Existing northbound Airport Boulevard is closed between the north return ramp to Terminals A and B and the exit ramp from Terminal A.
- The exit ramp from Terminal B to northbound Airport Boulevard is reconstructed over northbound Airport Boulevard to connect to the northbound exit road.
- A new flyover ramp from southbound Airport Boulevard to the northbound exit road is provided to maintain access from the Hyatt Hotel to the north exit.

Circulation Highlights:

- NB Traffic to Terminal A Uses Existing Loop Road on East Side
- Access to Hyatt Hotel from North Via Existing Slip Ramp from Terminal B
- Access to South Exit from North Terminal Via Exclusive SB Roadway
- Terminal B to South Exit – Loops Around North Terminal
- Terminal B to South Terminal – Loops Around North Terminal

- Exit from Hyatt Hotel to North Exit - Loops Around North Terminal
- Terminal B to North Exit Via New Outer Loop Road

Benefits:

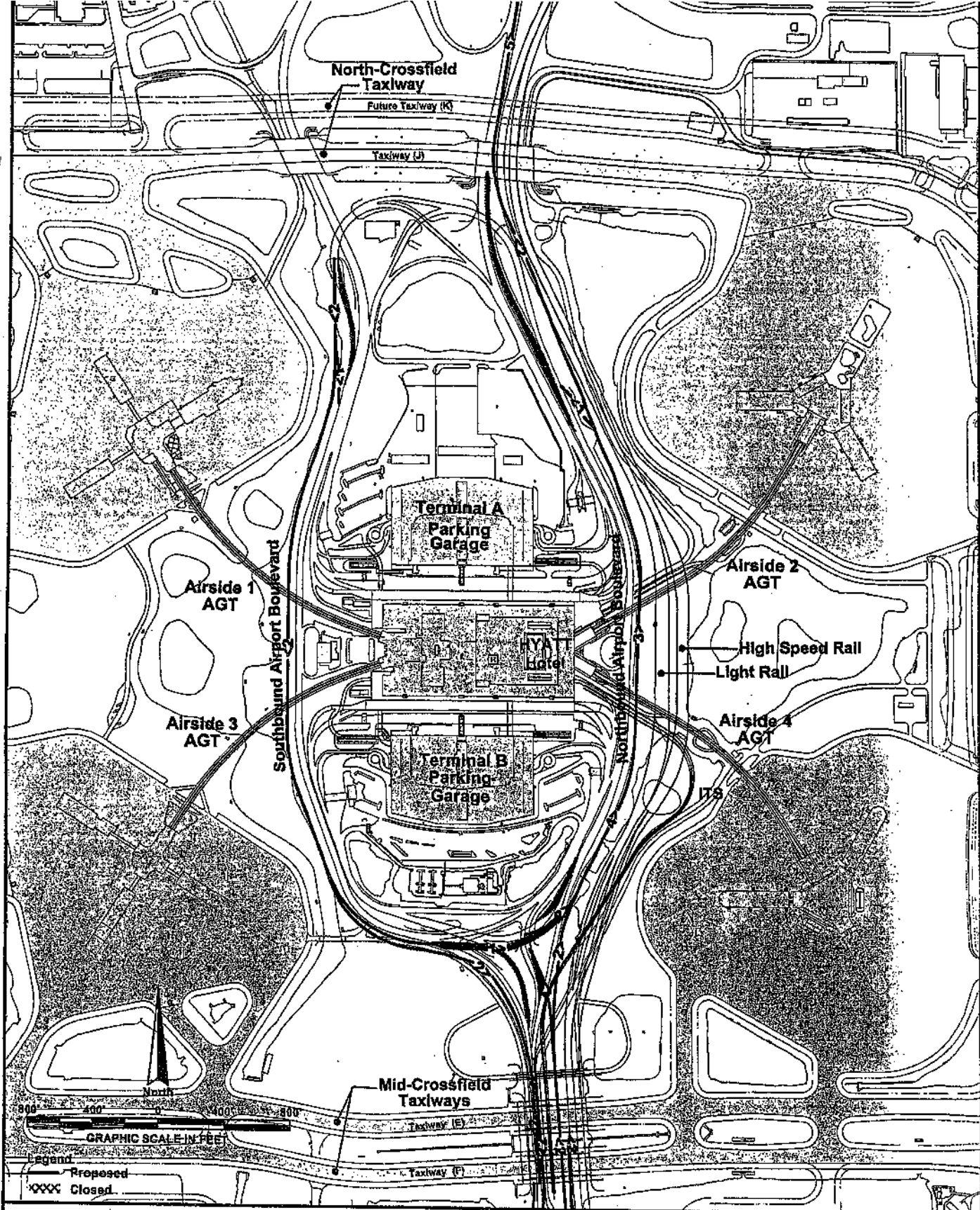
- Eliminates cut-through traffic on terminal roadways.
- Reduces weaving and signing complexity by providing positive guidance to motorists.
- Hotel fly-over reduced to 2nd level.

Issues:

- Traffic leaving Terminal B to the South Exit or the South Terminal must make a complete loop around the North Terminal.
- Traffic leaving the Hyatt Hotel to the north exit must make a complete loop around the North Terminal.

Cost Est.: \$39.7 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way or mitigation for environmental impacts.




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BRAIDED ROADWAY CONCEPT C-1

FIGURE:
5.4

5.1.5. South Terminal

The improvements developed for this concept are modifications to the proposed loop road currently under design for the South Terminal. It consists of a new outer loop road to accommodate all traffic exiting from the terminals. Traffic inbound to the new South Terminal and circulating between terminals will use the inner loop road. This concept is illustrated on Figure 5.5. The specific improvements listed below are additions to the loop road proposed for the South Terminal.

Specific Improvements:

- Southbound Exit Road - New two/three-lane southbound roadway continuing from north of the Mid-Crossfield Taxiways along the west side of the South Terminal and continuing south to the Heintzelman Boulevard interchange with South Access Road. This road will carry traffic exiting Terminals A, B and future D and the Hyatt Hotel and headed for the south exit.
- Northbound Exit Road - New two-lane roadway beginning at the exit from future Terminal C. This road crosses over the inner loop road and the connections to South Access Road at the south end of the South Terminal and continues north on the east side of the northbound inner loop road. The road continues north under the Mid-Crossfield Taxiways and connects to the northbound exit road at the North Terminal.
- Direct grade separated ramps are provided at the exit from Terminal D to allow access to either the southbound exit road or the northbound exit road.
- A slip ramp from the Terminal C exit is provided for access to the inner loop to allow return circulation to the Terminals.
- A slip ramp from the Terminal D exit is provided for access to the inner loop to allow return circulation to the Terminals.

Circulation Highlights:

- All inbound traffic to the Terminals uses the inner loop road.
- All outbound traffic from the Terminals uses the outer loop road.
- Traffic circulating between terminals, such as shuttle buses, uses the inner loop road.

Benefits:

- Eliminates cut-through traffic on terminal roadways.

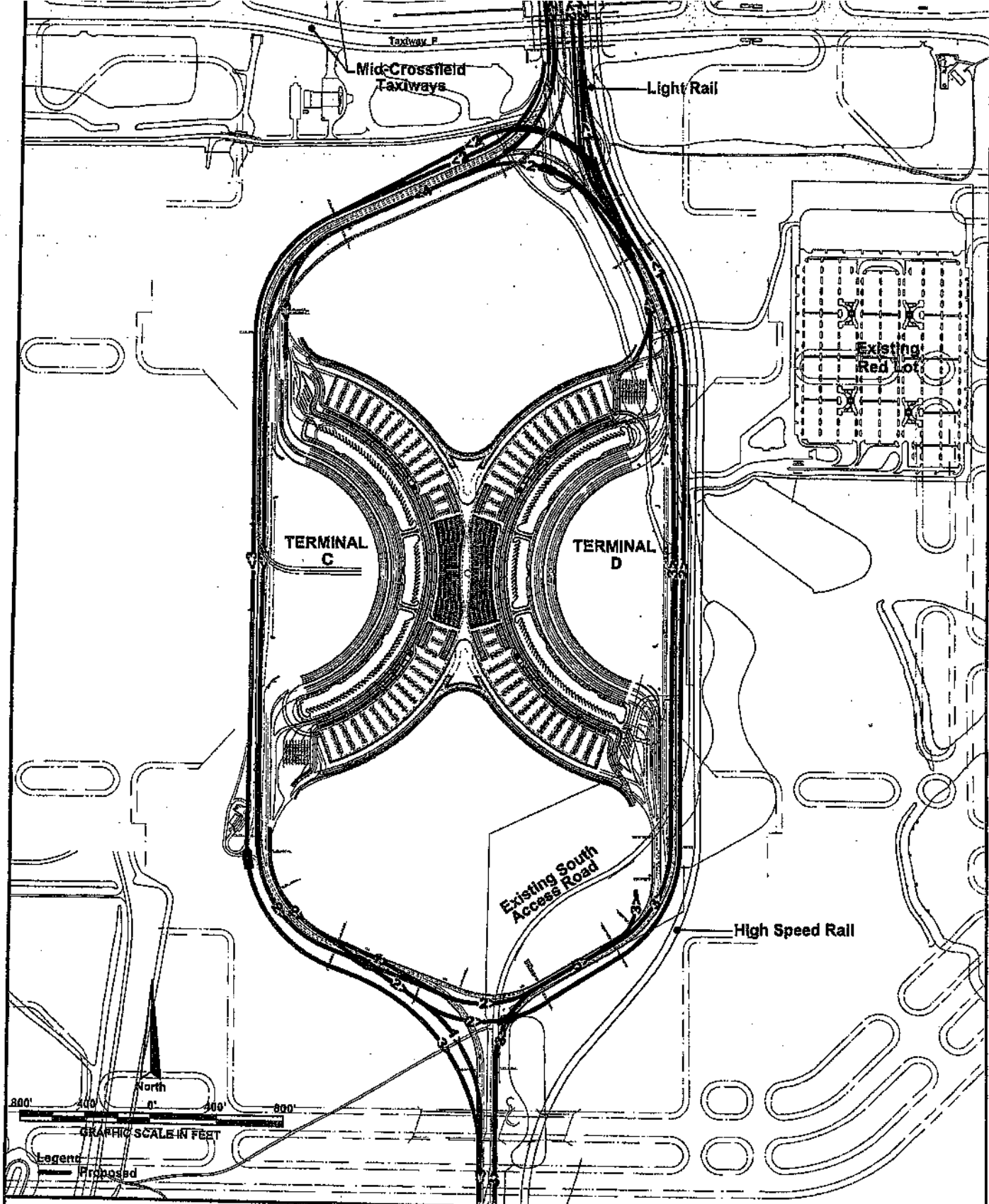
- Can be implemented with modifications to South Terminal loop road design.
- No significant modifications to South Terminal circulation plan.
- Will work with either of the options developed for the North Terminal.
- Reduces weaving and signing complexity by providing positive guidance to motorists.

Issues:

- Direct connection from Terminal D to north exit may not be feasible due to grades required.

Cost Est.: \$28.6 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way or mitigation for environmental impacts.




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**BRAIDED ROADWAY CONCEPT
 (SOUTH TERMINAL)**

**FIGURE:
 5.5**

5.2 Preferred Braided Roadway Concept

An evaluation of the braided roadway options for the North Terminal included a comparison of construction costs, terminal circulation and traffic operations. The results of these evaluations are summarized in an evaluation matrix presented in Table 2.

Concepts A and A-1 provide the best level of traffic operations and terminal circulation at lower costs than Concepts C or C-1. Concept A-1 has the lowest estimated construction cost of all of the options. Therefore, Concept A-1 is recommended as the preferred option for the North Terminal. Overall, the preferred Braided Roadway Concept includes both Concept A-1 for the North Terminal and the concept developed for the South Terminal illustrated in Figures 5.2 and 5.5 respectively.

The dual roadway system requires that two northbound and two southbound roadways, all physically separated from each other, must be accommodated under the Mid-Crossfield Taxiways. The proposed assignment of these roadways to specific areas under each span followed a detailed analysis of multiple options. This analysis has been documented and is provided in Appendix A. Figure 5.6 illustrates the proposed typical section for the Mid-Crossfield Taxiways. This typical section will accommodate all of the braided roadway options.

A circulation plan and a phasing plan for Concept A-1 are presented in the following subsections.

5.2.1. Circulation Plan

A circulation plan was developed to identify the routes for each movement into and out of the terminals and the Hyatt Hotel.

- Figure 5.7 illustrates the circulation for traffic entering and exiting Terminal A.
- Figure 5.8 illustrates the circulation for traffic entering and exiting Terminal B.
- Figure 5.9 illustrates the circulation for traffic entering and exiting Terminal C.
- Figure 5.10 illustrates the circulation for traffic entering and exiting Terminal D.
- Figure 5.11 illustrates the circulation for traffic entering the Hyatt Hotel.
- Figure 5.12 illustrates the circulation for traffic exiting the Hyatt Hotel.

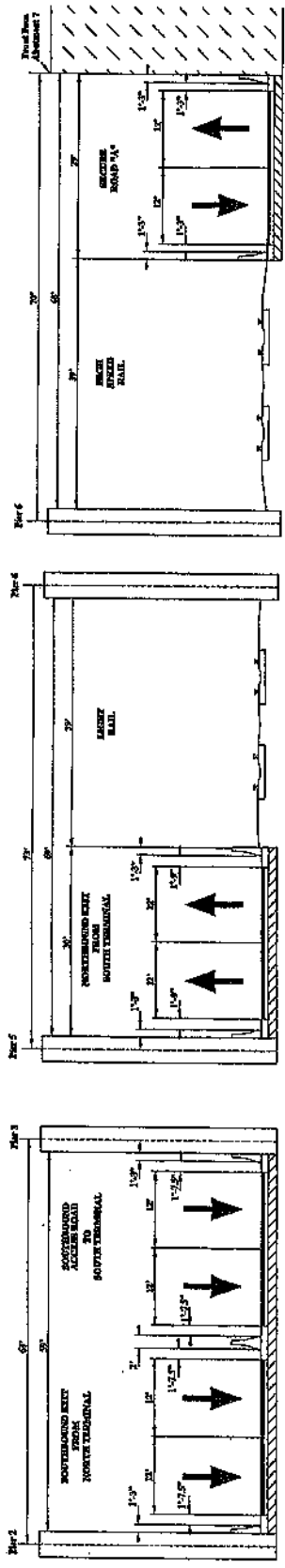
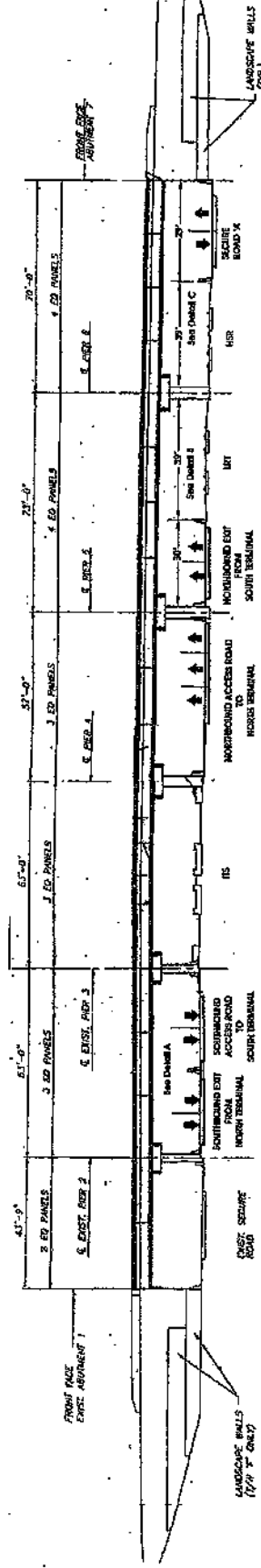
Table 2 - Evaluation Matrix for Braided Roadway Options

Option	¹ Construction Cost Est. (Millions)	² Terminal Circulation	³ Traffic Operations	⁴ Overall Ranking	Issues
Concept A	\$30.9	1	2	2	Traffic exiting Terminal B to the south must make a complete loop around the North Terminal.
Concept A-1	\$28.9	2	1	1	Traffic exiting Terminal B to the south must make a complete loop around the North Terminal.
Concept C	\$41.7	3	4	4	Significant Impacts to the North Crossfield Taxiway and the Light Rail Corridor. Traffic exiting Terminal B to the south must make a complete loop around the North Terminal.
Concept C-1	\$39.7	4	3	3	Significant Impacts to the North Crossfield Taxiway and the Light Rail Corridor. Traffic exiting Terminal B to the south must make a complete loop around the North Terminal.

Source: URS, 2003.

Notes:

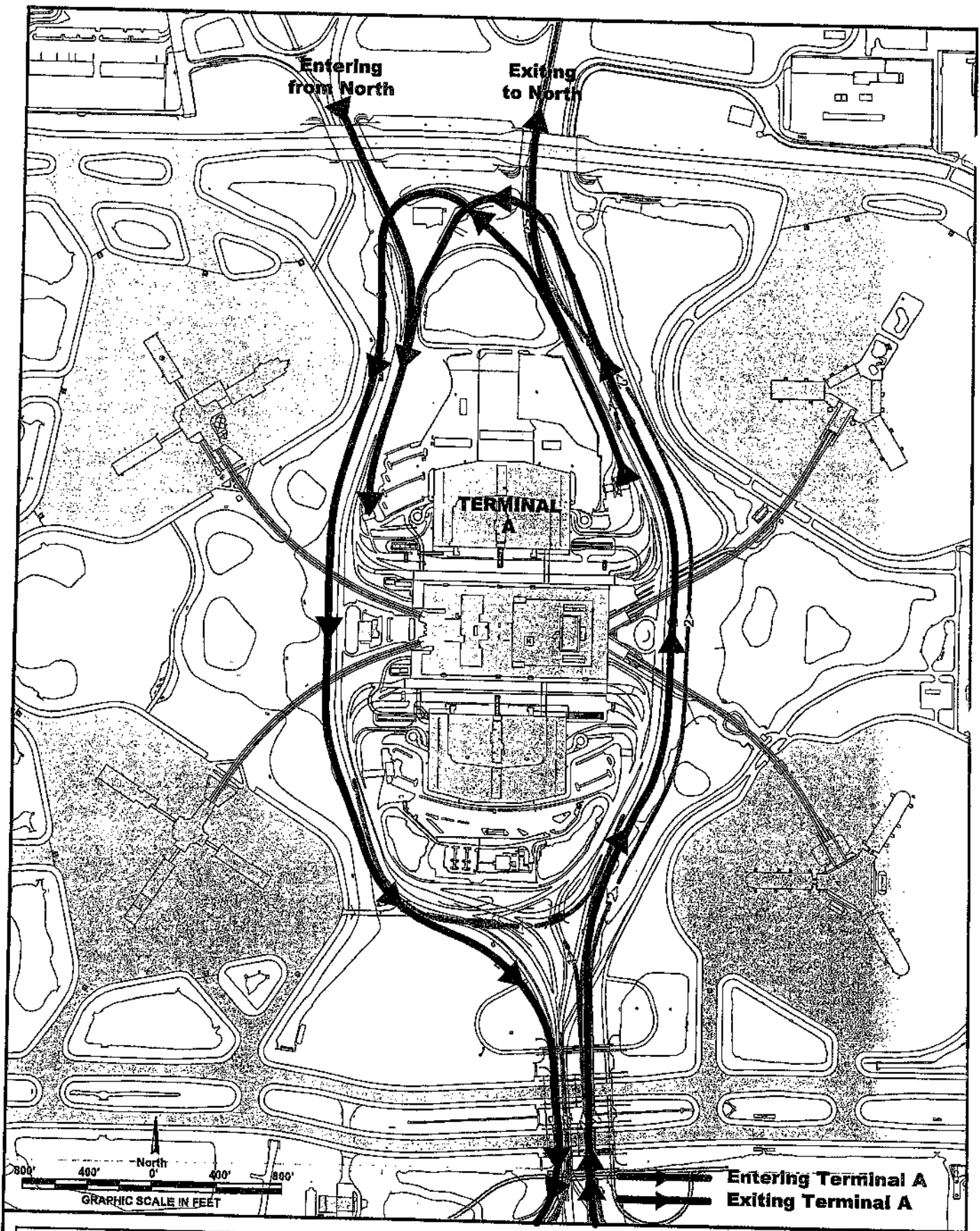
- 1) These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars and are included in Appendix B.
- 2) Options ranked based on the level of direct access to and from the terminals and the hotel with "1" being the highest.
- 3) Options ranked based on an evaluation of projected traffic operations with "1" being the highest.
- 4) Options ranked (with "1" being the highest) based on the option with both the highest combined ranking for the evaluation of Terminal Circulation and Traffic Operations and the lowest cost estimate. The Preferred Option is shown in bold.



DETAIL C

DETAIL B

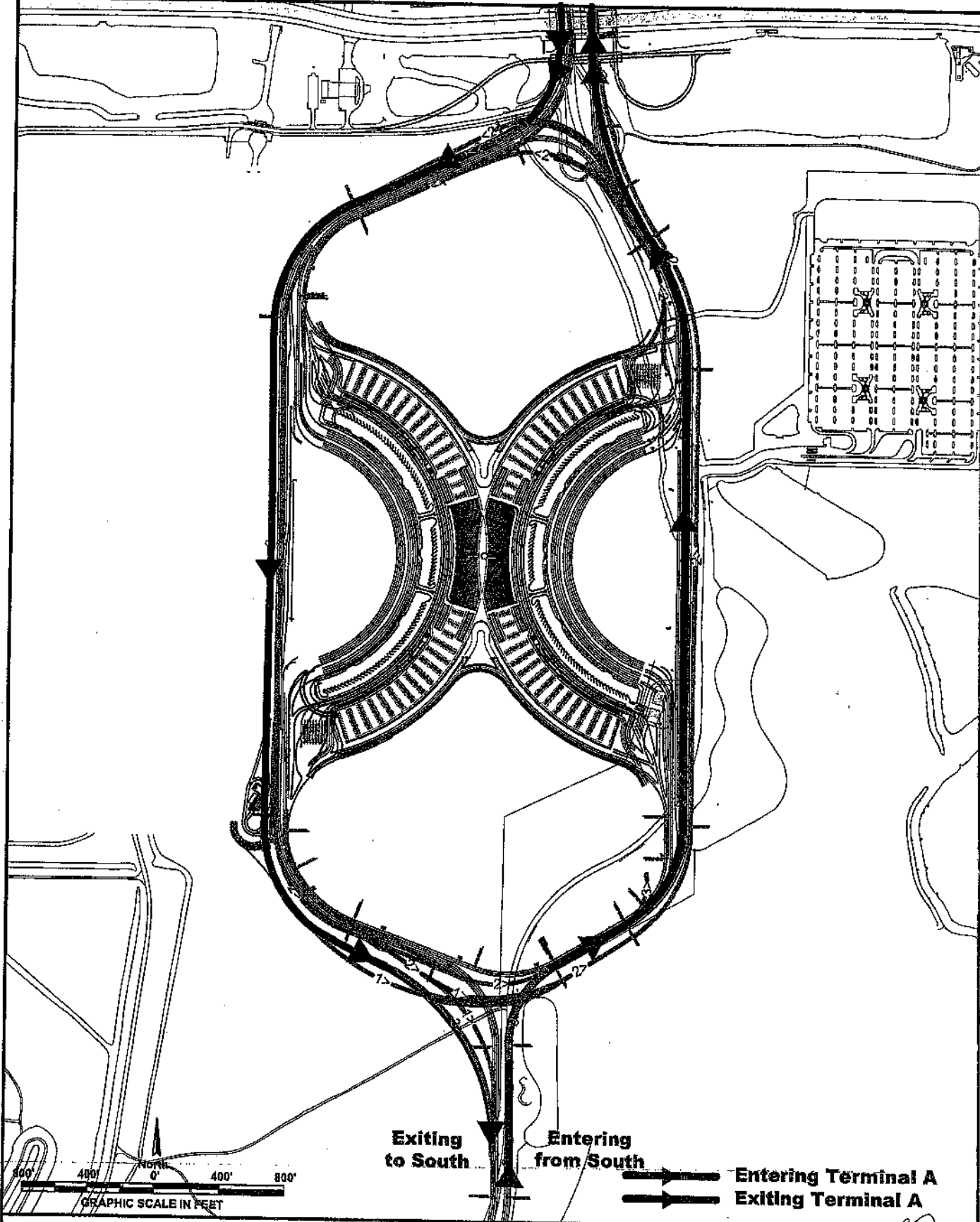
DETAIL A



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**TERMINAL A CIRCULATION
 AT NORTH TERMINAL**

FIGURE:
 5.7
 1 of 2



Exiting to South

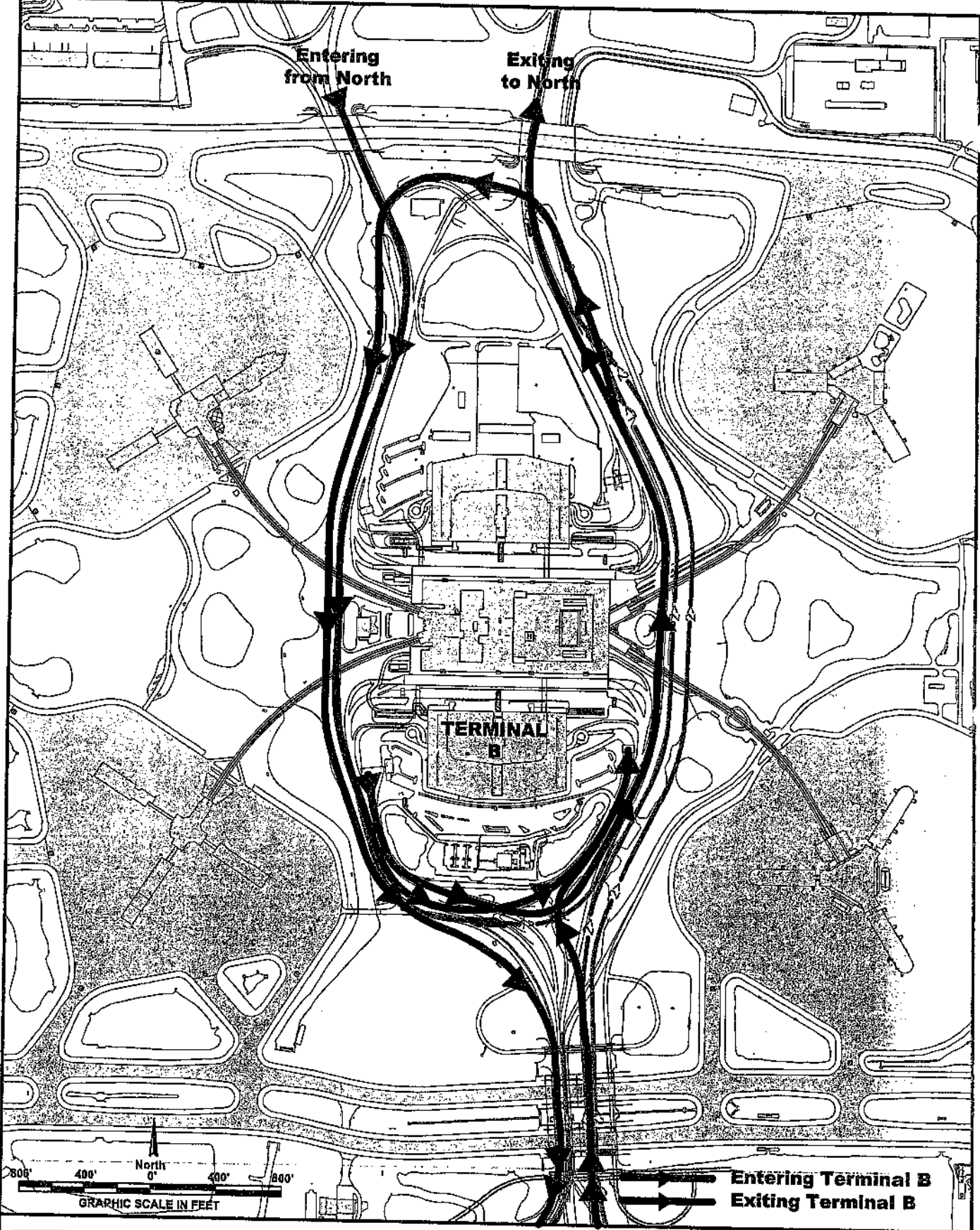
Entering from South

 Entering Terminal A
 Exiting Terminal A

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TERMINAL A CIRCULATION
AT SOUTH TERMINAL

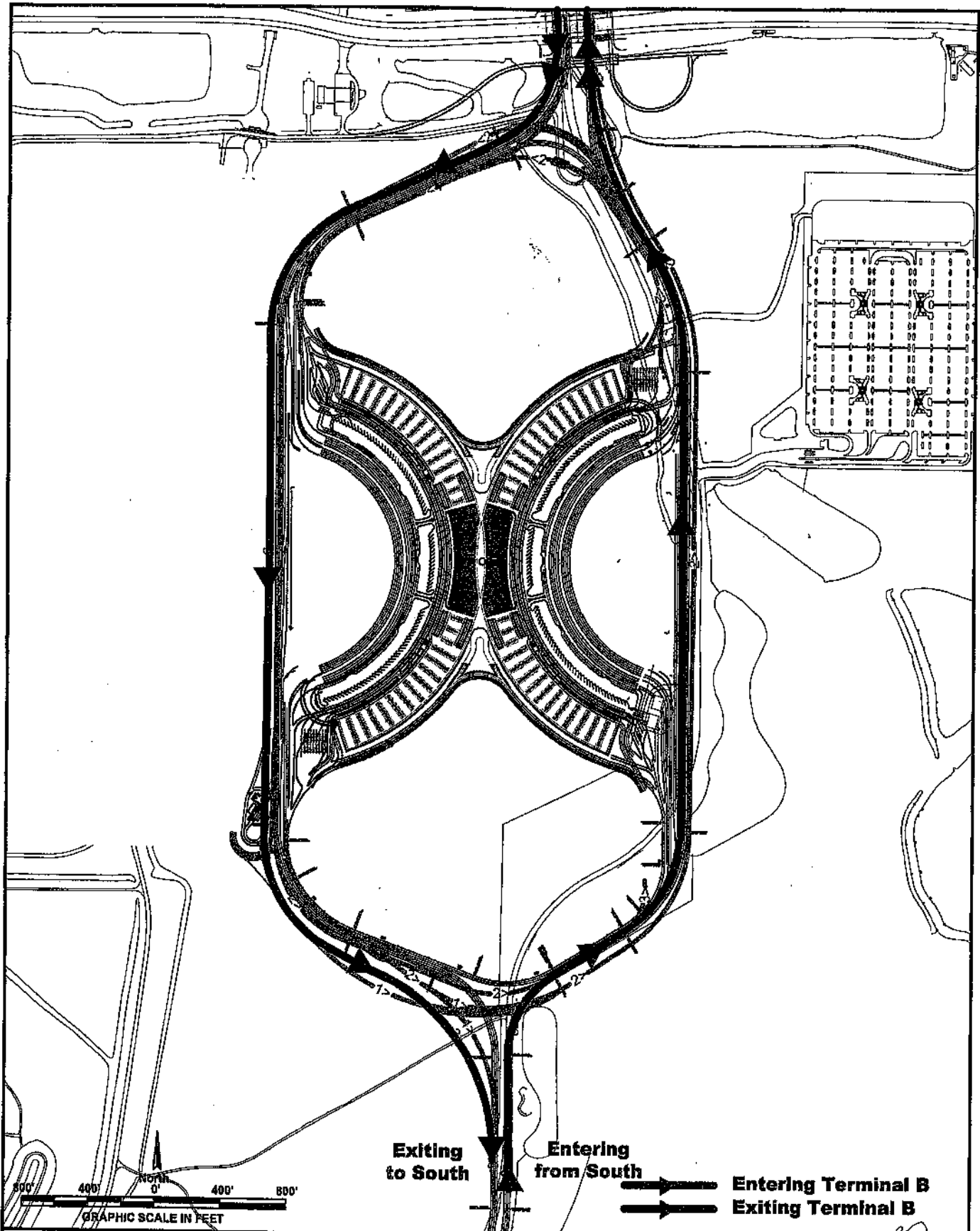
FIGURE:
5.7
2 of 2




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**TERMINAL B CIRCULATION
 AT NORTH TERMINAL**

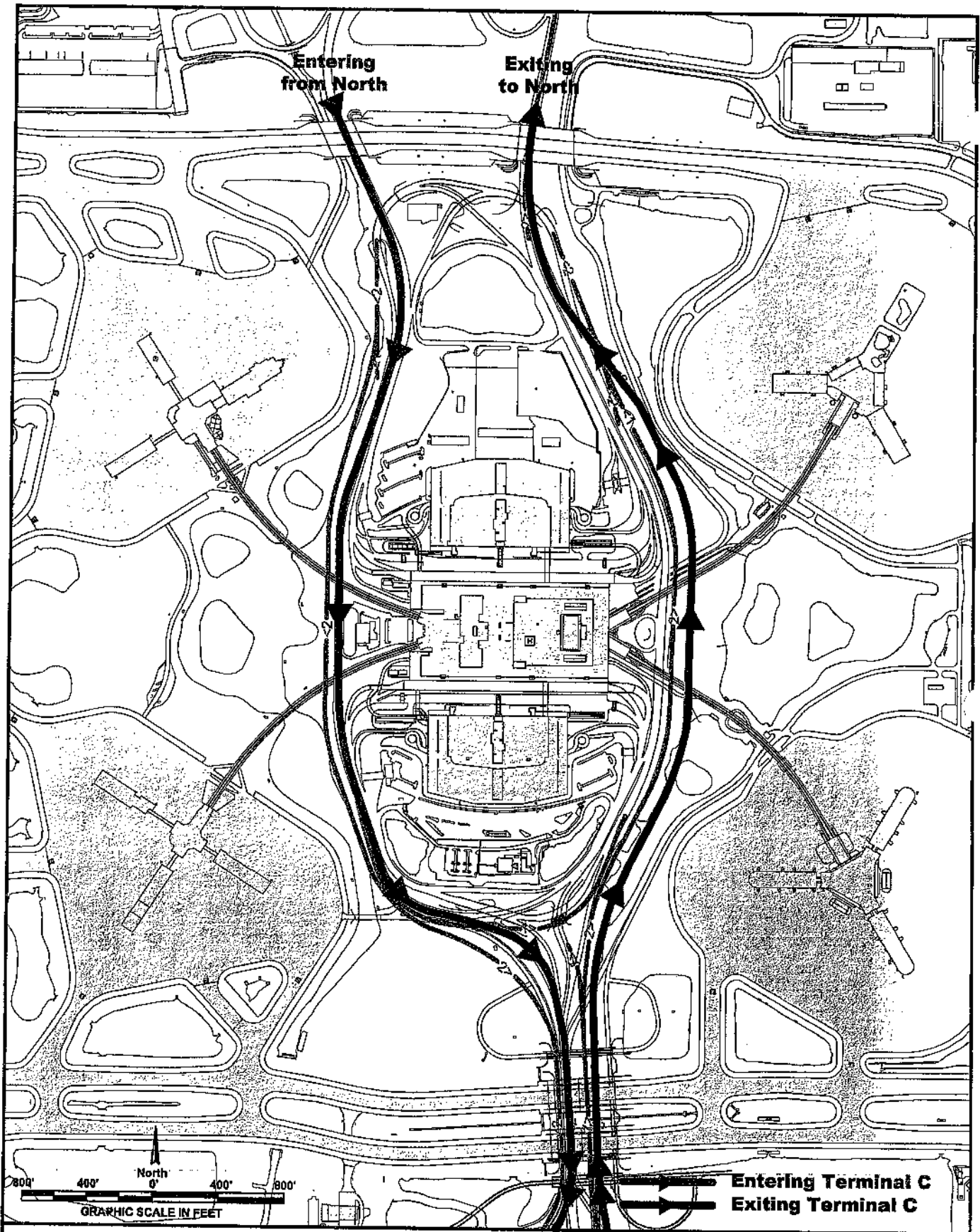
FIGURE:
5.8
 1 of 2




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**TERMINAL B CIRCULATION
 AT SOUTH TERMINAL**

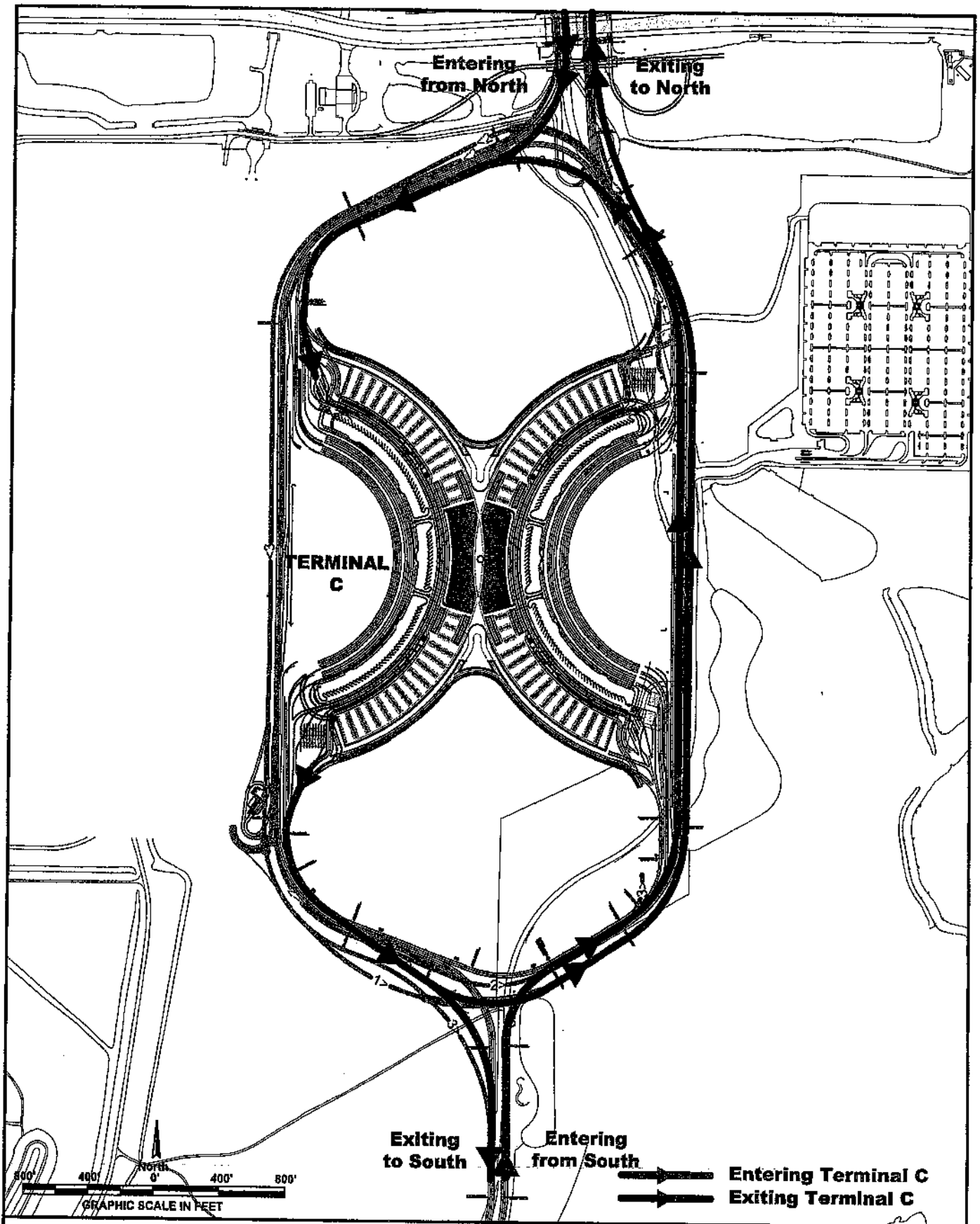
**FIGURE:
 5.8
 2 of 2**



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**TERMINAL C CIRCULATION
AT NORTH TERMINAL**

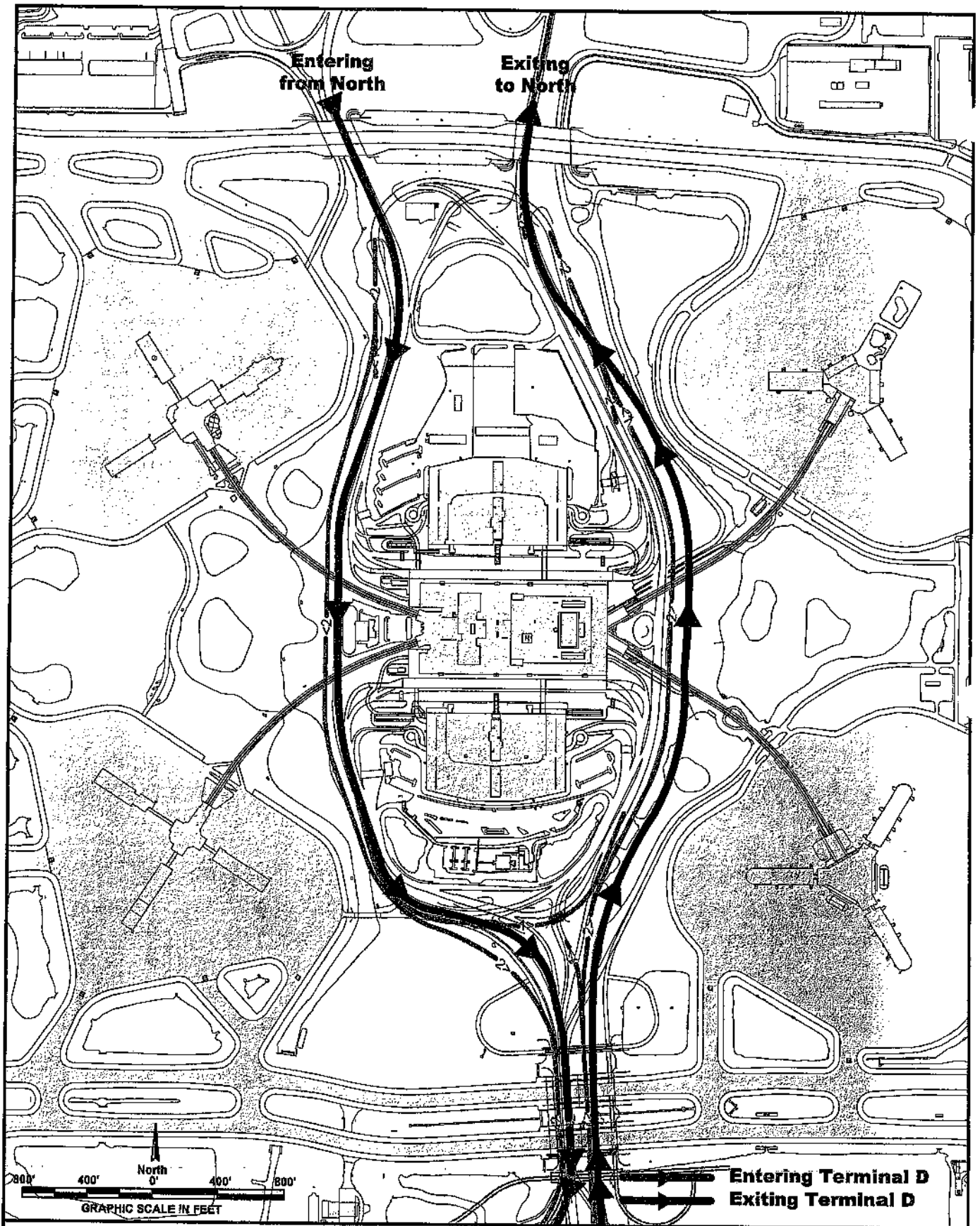
FIGURE:
5.9
1 of 2



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**TERMINAL C CIRCULATION
 AT SOUTH TERMINAL**

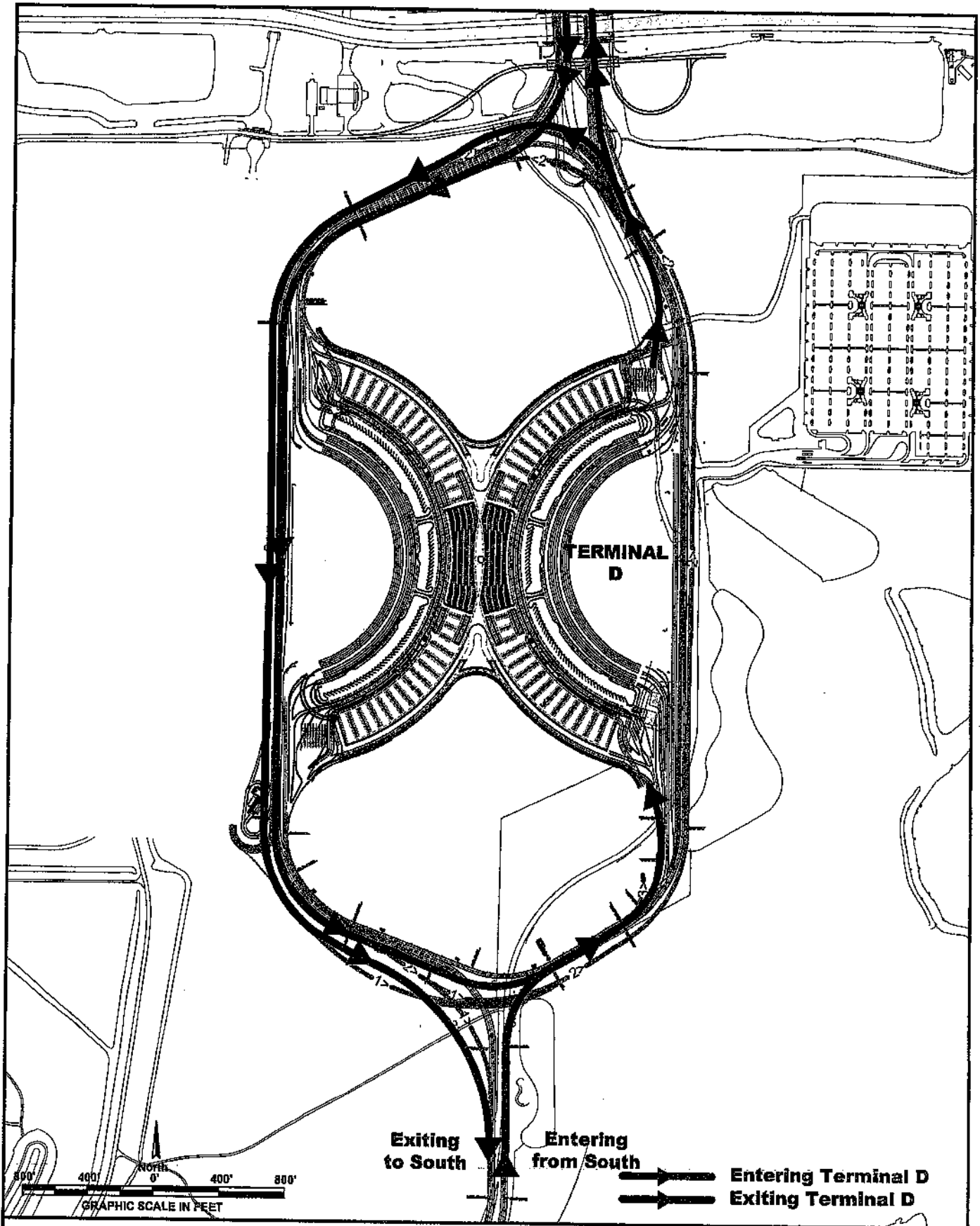
FIGURE:
 5.9
 2 of 2



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**TERMINAL D CIRCULATION
 AT NORTH TERMINAL**

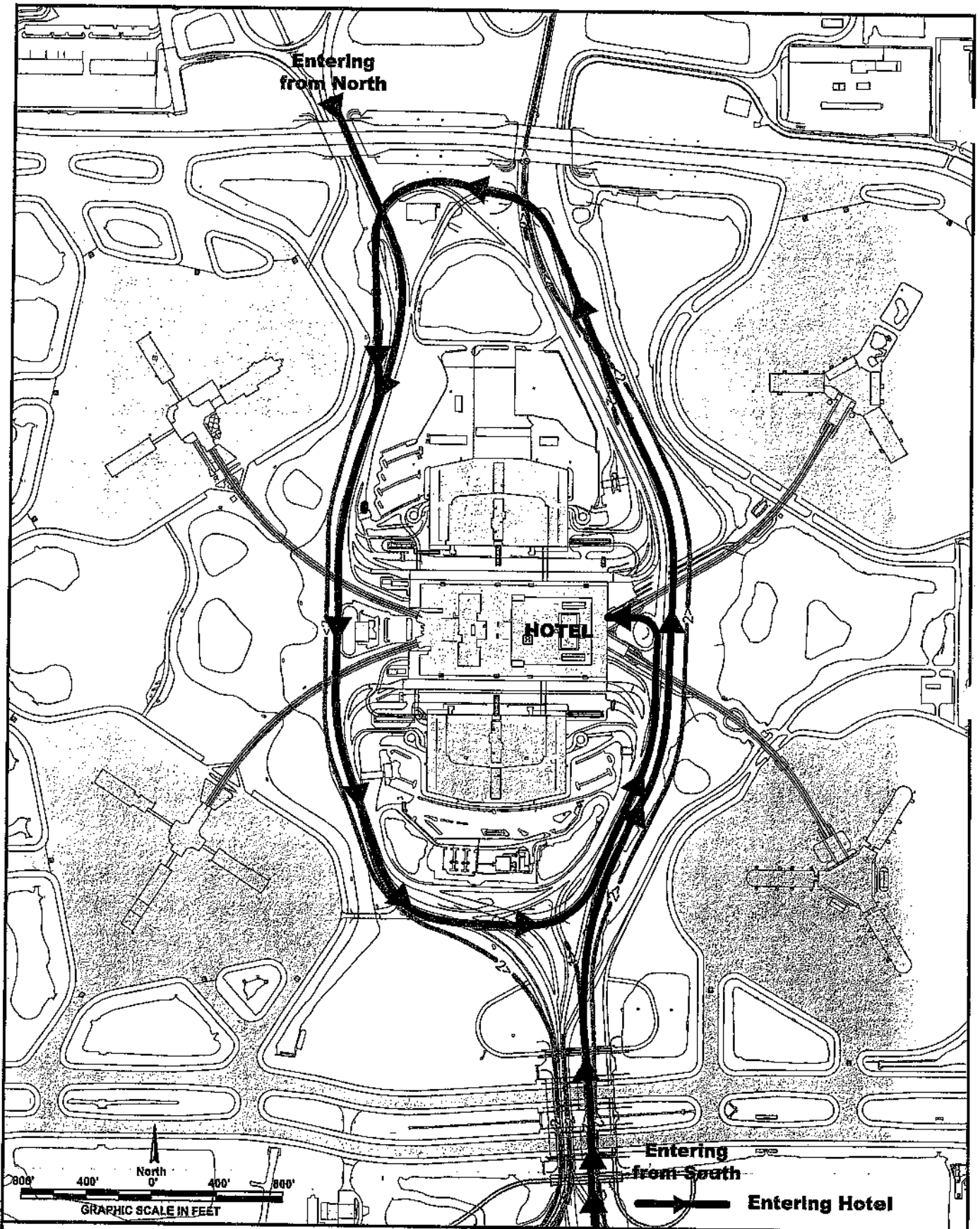
FIGURE:
5.10
1 of 2




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**TERMINAL D CIRCULATION
 AT SOUTH TERMINAL**

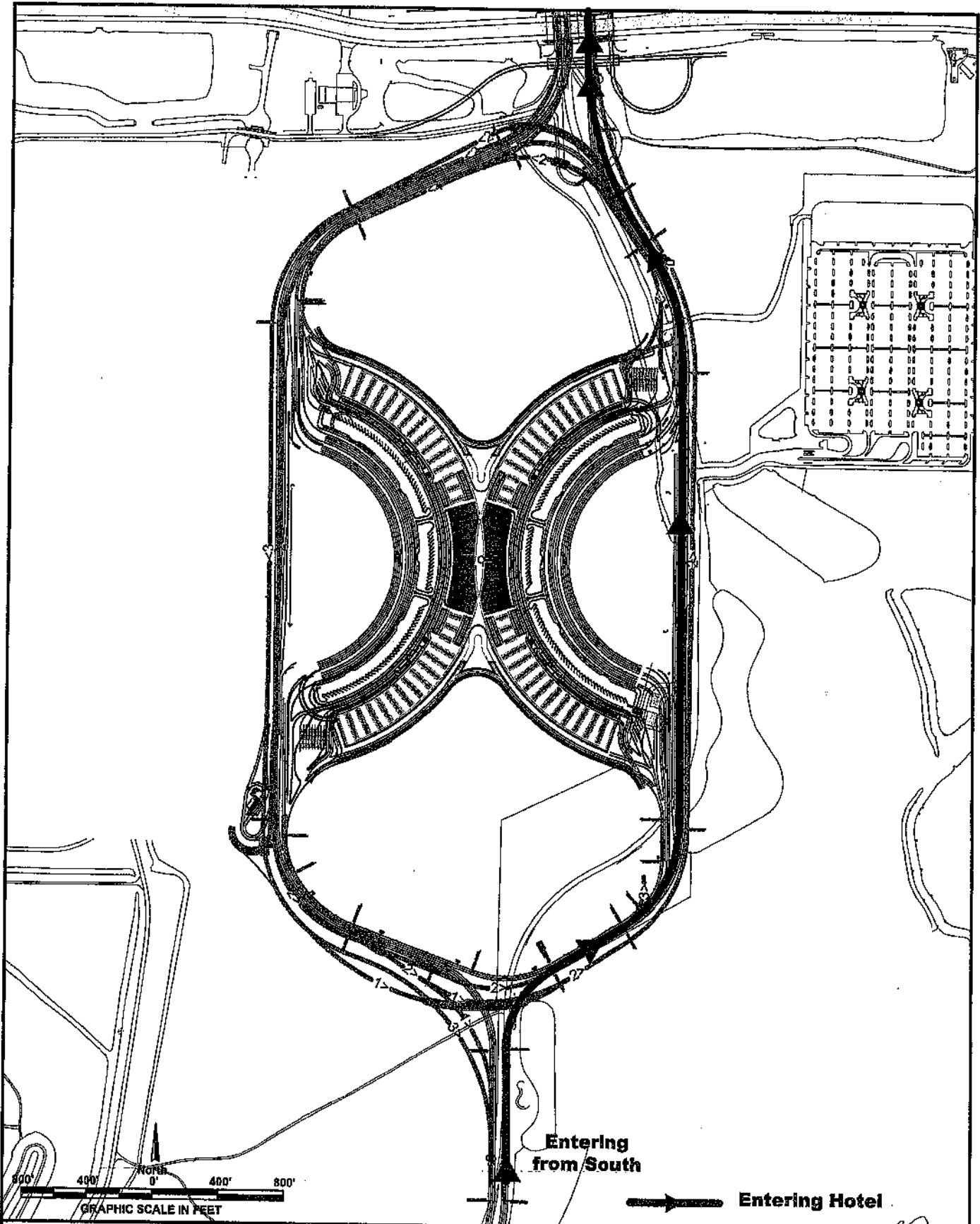
FIGURE:
5.10
2 of 2



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**HOTEL CIRCULATION
 AT NORTH TERMINAL**

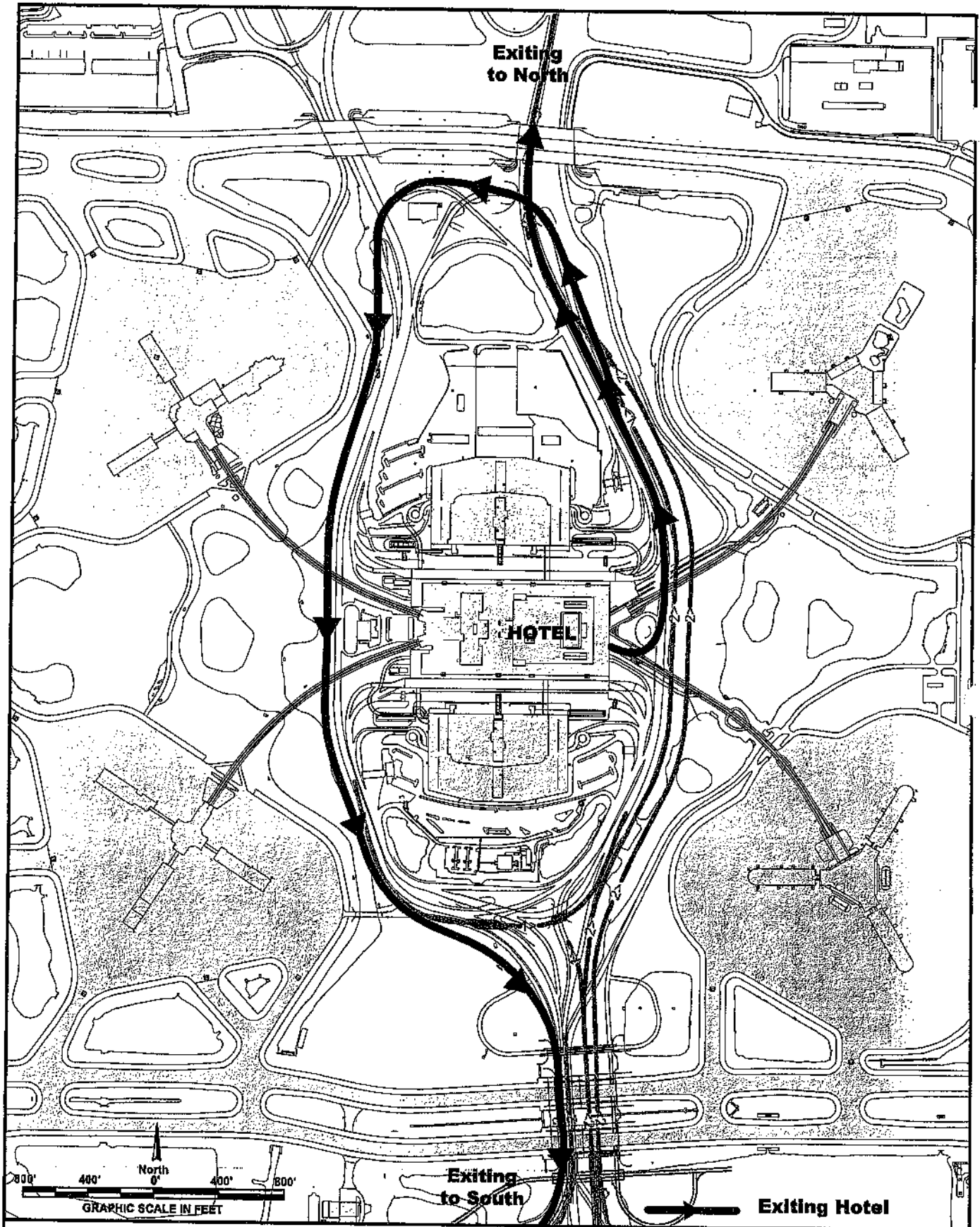
**FIGURE:
 5.11
 1 of 2**




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**HOTEL CIRCULATION
 AT SOUTH TERMINAL**

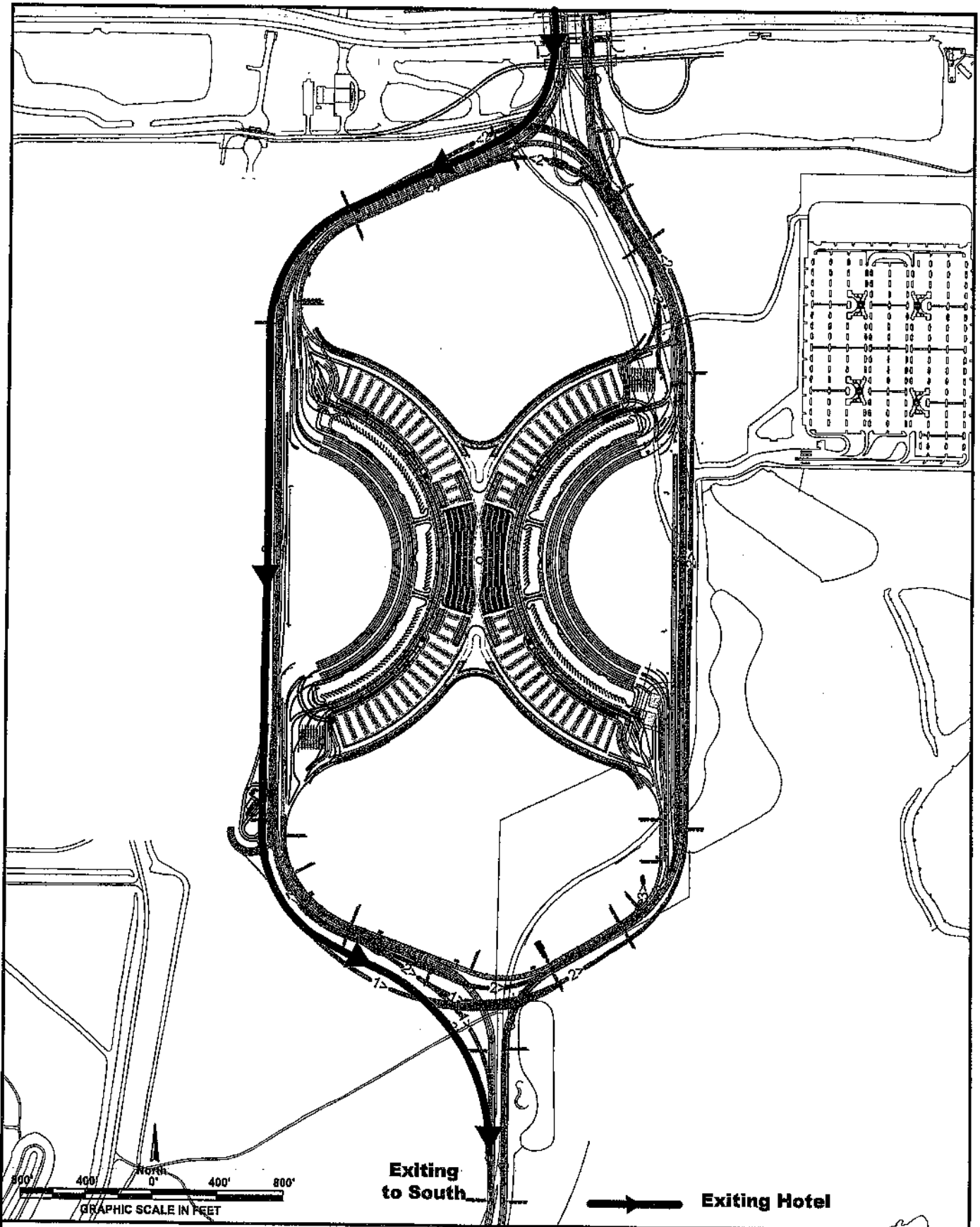
**FIGURE:
 5.11
 2 of 2**



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**HOTEL CIRCULATION
 AT NORTH TERMINAL**

**FIGURE:
 5.12
 1 of 2**



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**HOTEL CIRCULATION
AT SOUTH TERMINAL**

**FIGURE:
5.12
2 of 2**

5.2.2. Phasing Plan

A phasing plan has been developed for the braided roadway concept. This plan will allow a phased implementation of the improvements so that the cost can be spread out.

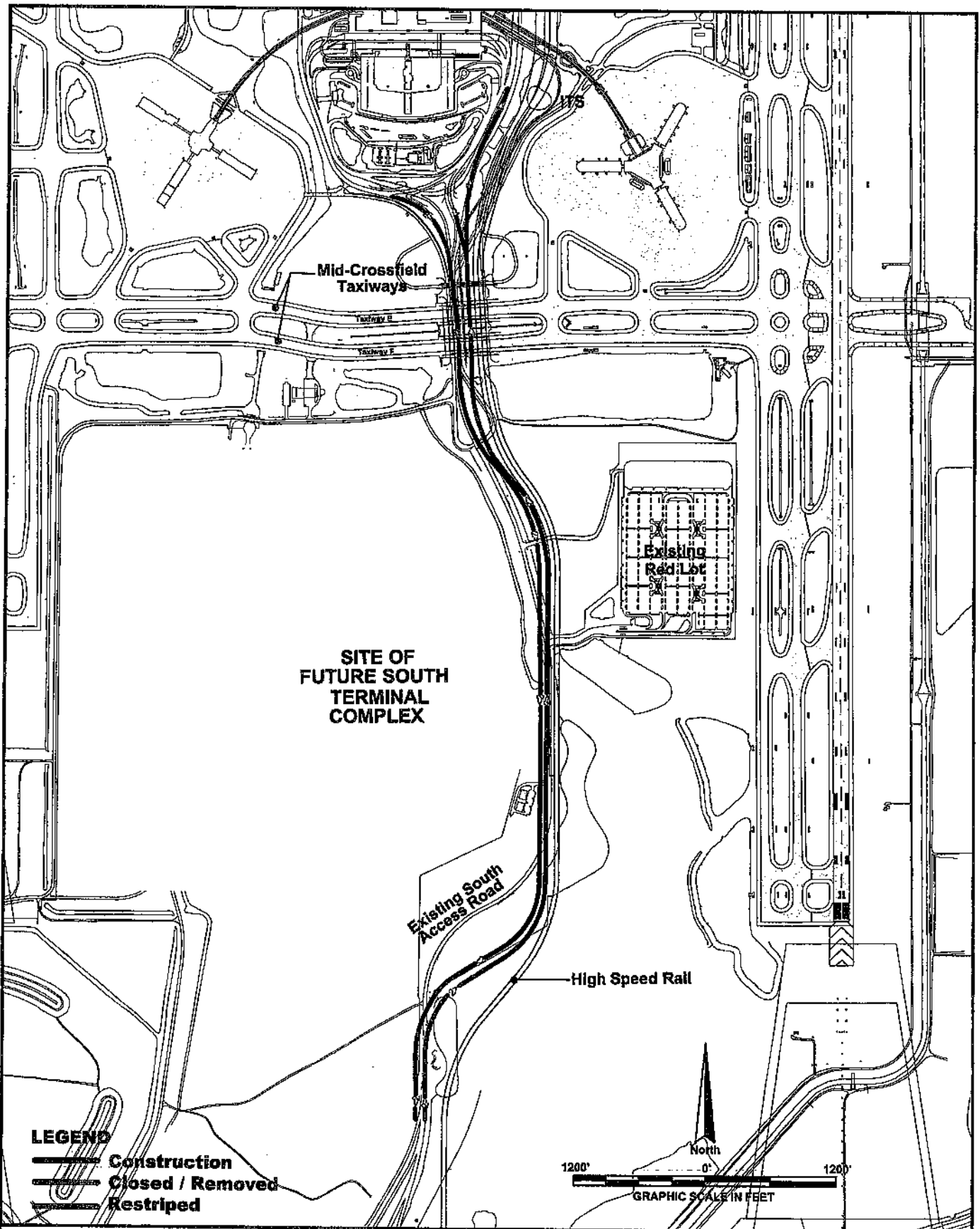
Phase One consists of the construction of the east side of the braided roadway concept in the South Terminal. This phase essentially replaces existing South Access road between Heintzelman Boulevard and the Mid-Crossfield Taxiways and uses the inner loop road on the east side for southbound traffic. This phase would occur prior to the construction of the South Terminal and could replace the Interim South Access Road Widening project. Phase One is illustrated in Figure 5.13. The estimated construction cost for Phase One is \$18.0 million.

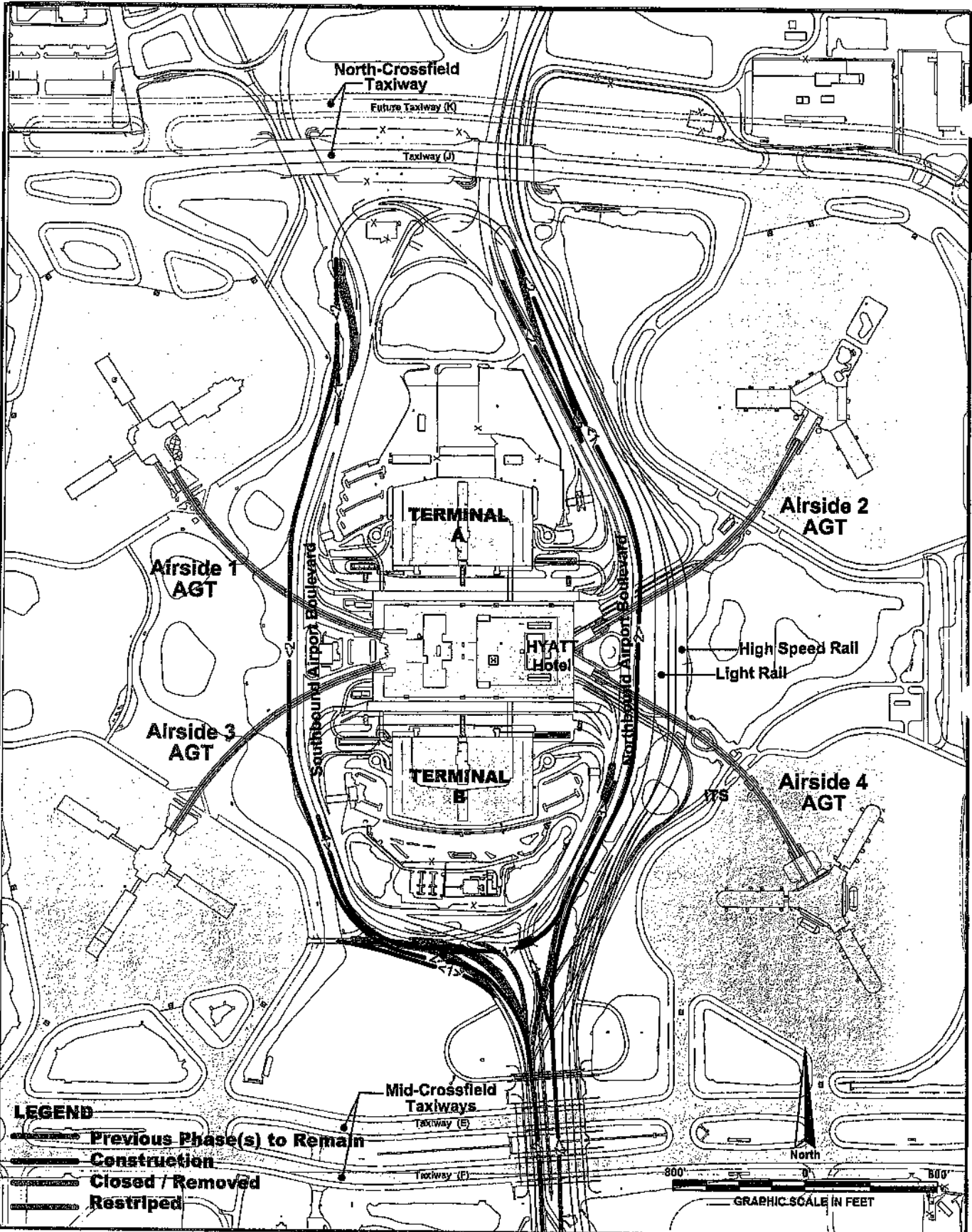
Phase Two consists of the construction of the braided roadway improvements at the North Terminal with the exception of the northbound exit road from the South Terminal. This phase would occur prior to the construction of the South Terminal and would eliminate cut-through traffic. Phase Two is illustrated in Figure 5.14. The estimated construction cost for Phase Two is \$21.0 million.

Phase Three consists of the construction of the braided roadway improvements on the west side of the South Terminal and the northbound exit road at the North Terminal. This phase would occur concurrently with the opening of the South Terminal and assumes that only west side of the South Terminal, Terminal C, is open. Phase Three is illustrated in Figure 5.15. The estimated construction cost for Phase Three is \$28.5 million.

Phase Four consists of the construction of the remaining elements of the braided roadway improvements for the South Terminal. These elements will support Terminal D. This phase would occur with the opening of Terminal D. Phase Four is illustrated in Figure 5.16. The estimated construction cost for Phase Four is \$13.6 million.

The costs listed above are planning level estimates of construction costs. They do not include costs for contingencies, design, CEI, administration, legal fees, right-of-way or mitigation for environmental impacts.

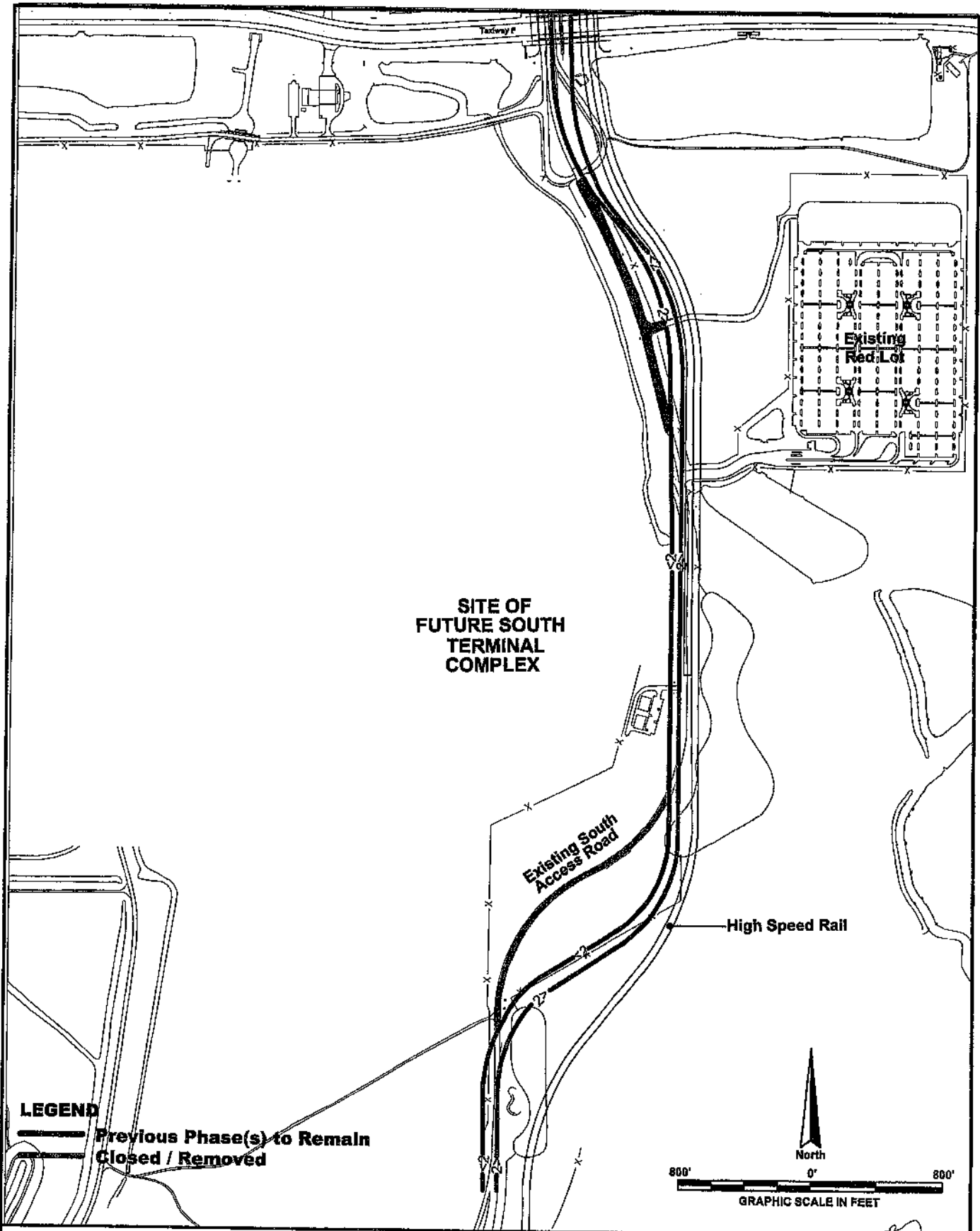




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**BRAIDED ROADWAY CONCEPT
 NORTH TERMINAL (PHASE II)**

**FIGURE:
 5.14a**



LEGEND

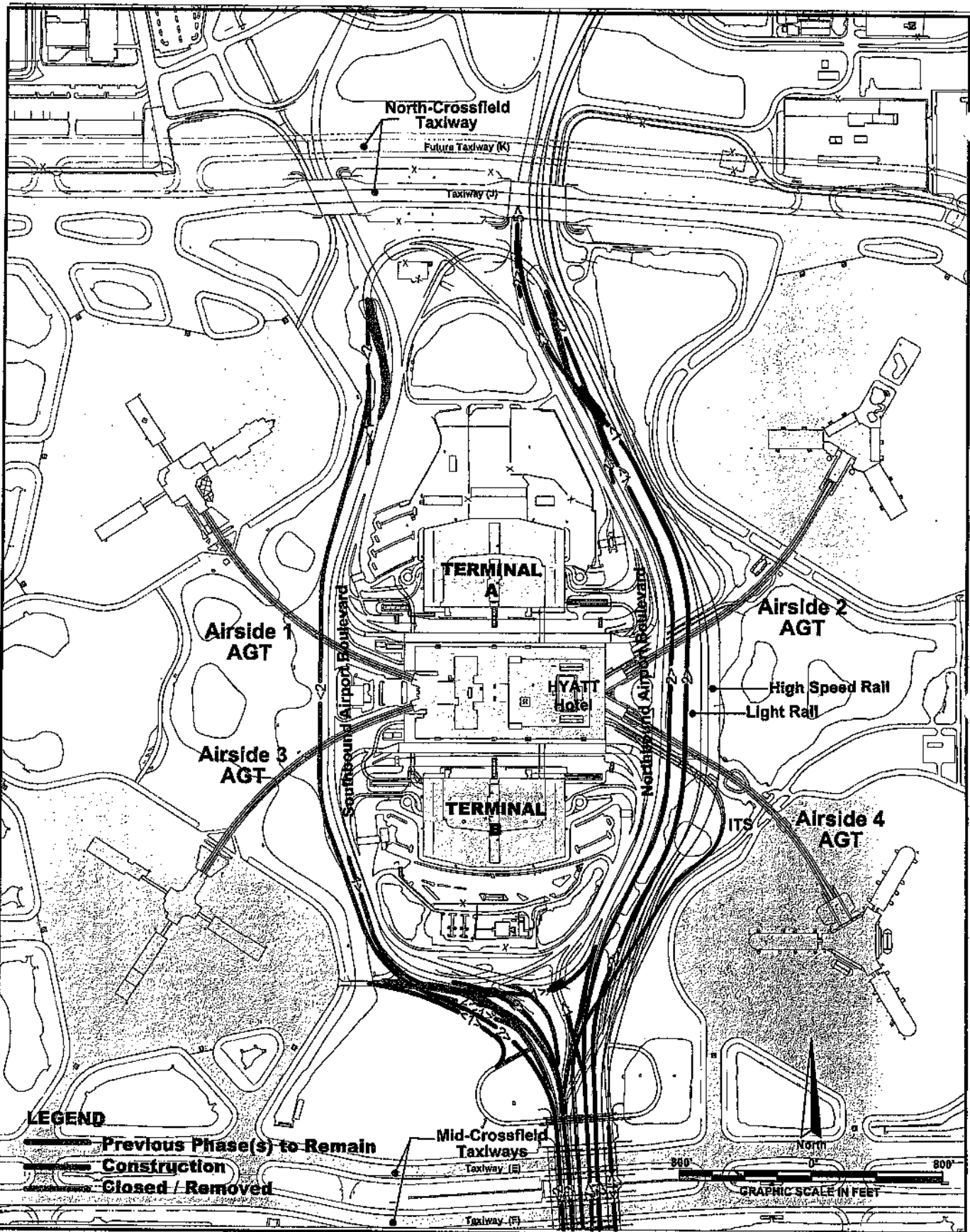
— Previous Phase(s) to Remain Closed / Removed



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BRAIDED ROADWAY CONCEPT SOUTH TERMINAL (PHASE II)

FIGURE: 5.14b



LEGEND

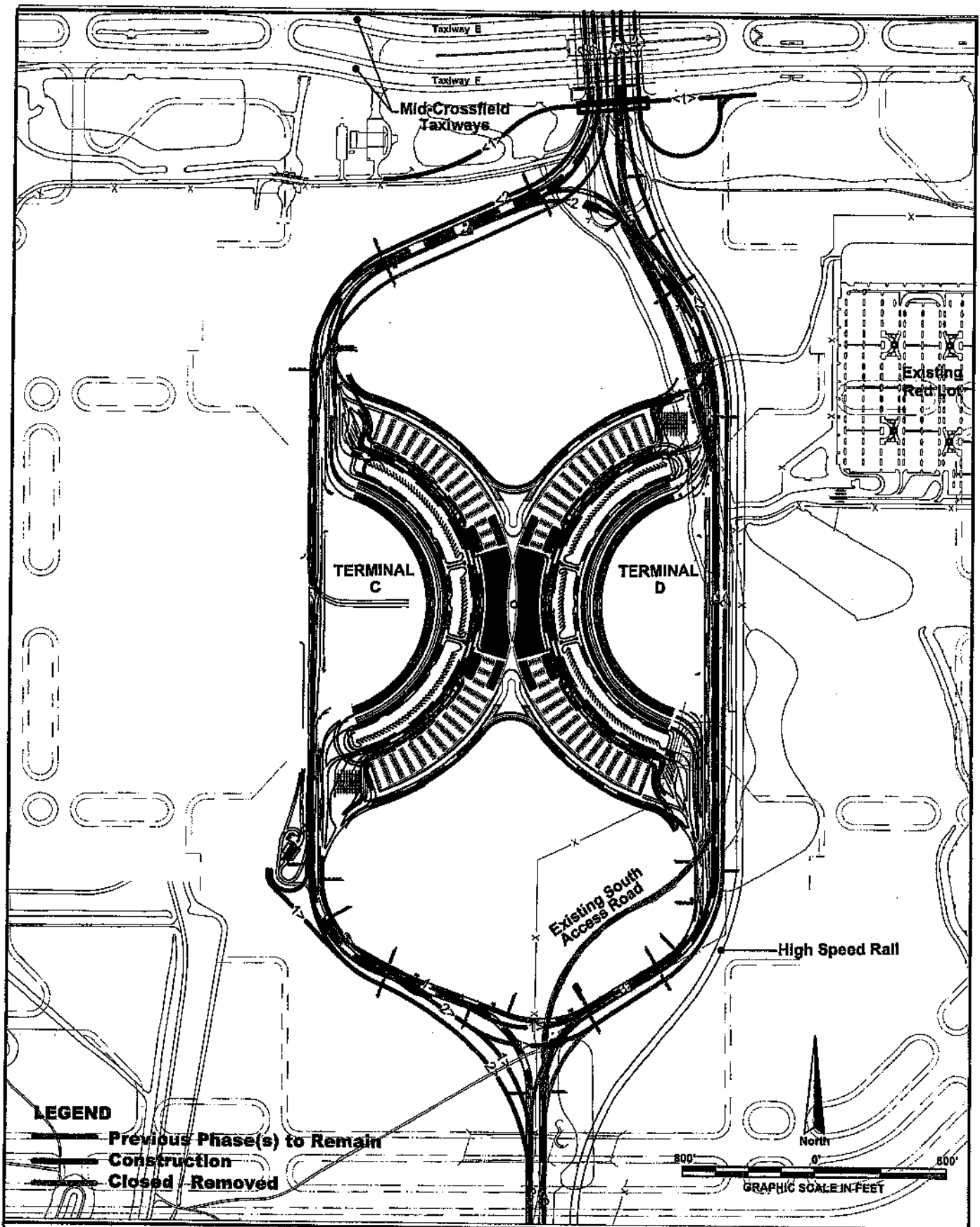
-  Previous Phase(s) to Remain
-  Construction
-  Closed / Removed




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**BRAIDED ROADWAY CONCEPT
 NORTH TERMINAL (PHASE III)**

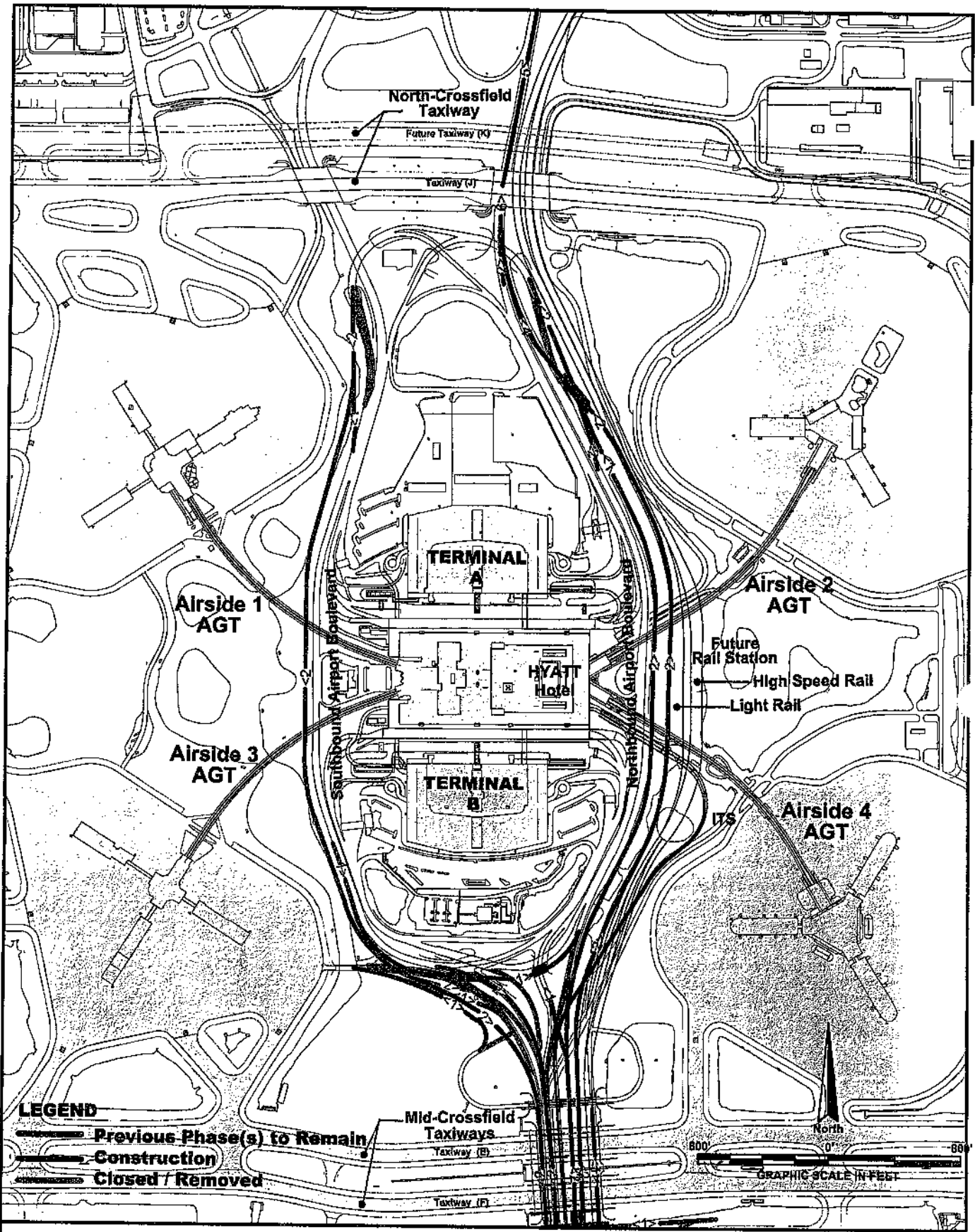
**FIGURE:
 5.15a**

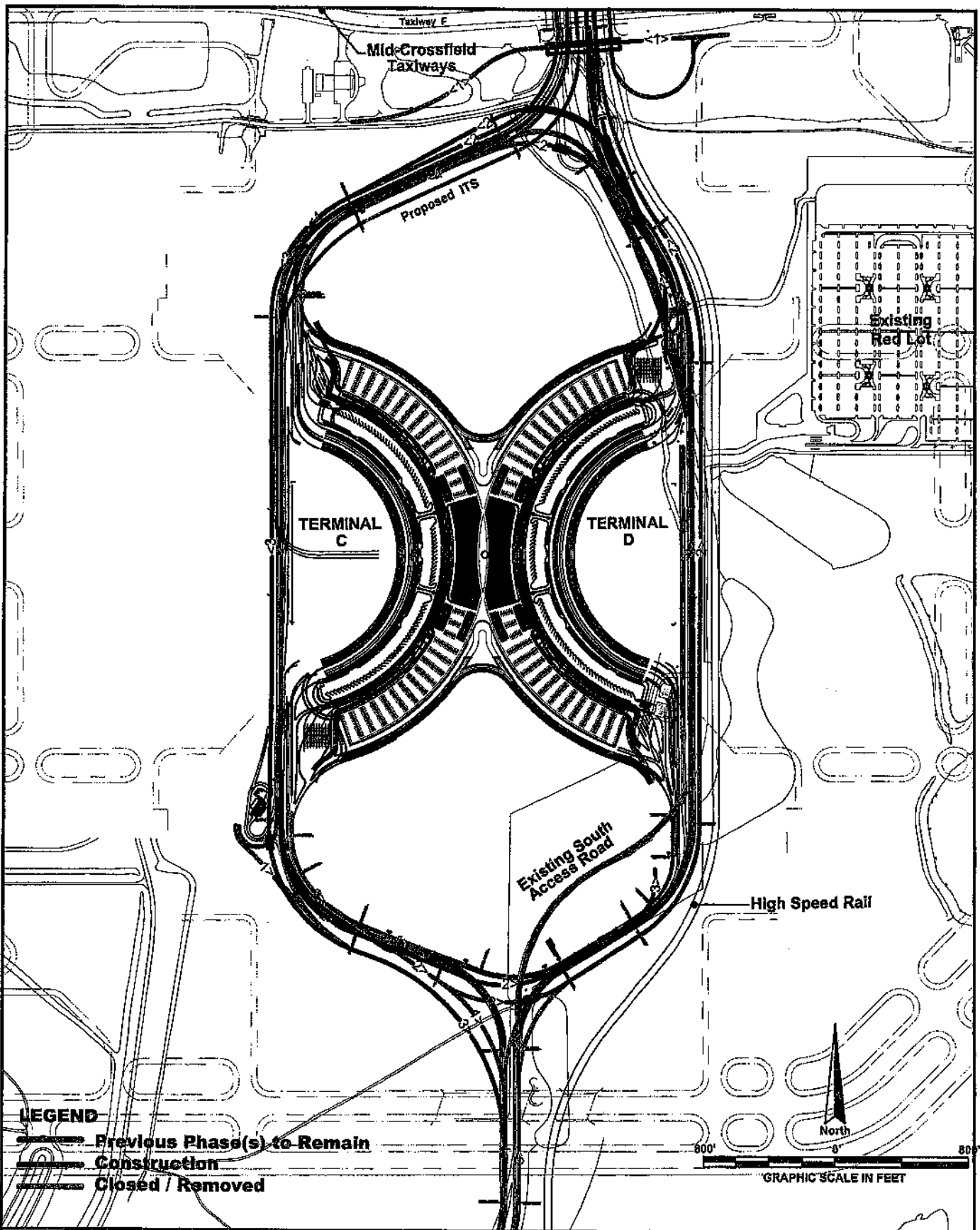


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**BRAIDED ROADWAY CONCEPT
 SOUTH TERMINAL (PHASE III)**

FIGURE:
5.15b





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**BRAIDED ROADWAY CONCEPT
 SOUTH TERMINAL (PHASE IV)**

FIGURE:
5.16b

5.3 Toll System

This concept is designed to reduce cut-through traffic by providing a disincentive for motorists to drive through the airport without accessing the terminal or one of the satellite parking lots. A toll is charged when a motorist attempts to drive across the airport within a minimum time period without first stopping at the terminal or one of the parking lots. Toll plazas are installed at all access points to Airport Boulevard for toll collection. Because of the desire to shorten trip lengths and reduce travel time, many drivers that would cut across the airport would also be willing to pay a toll to save time. Therefore, this concept will only reduce cut-through traffic rather than eliminate it.

Two options were developed for this concept. Both options utilize the same tolling plaza locations as illustrated in Figure 5.17. In addition to the toll plazas, this concept includes improvements to the exit ramps to SR 528 from northbound Airport Boulevard and a reconfiguration of the interchange at South Access Road and Heintzelman Boulevard. These improvements are required to provide adequate weaving distances to support the toll operations.

5.3.1. Option 1 – Maintain Revenue Collection at the Parking Exits

Under this option, the revenue collection for the parking operations is maintained at the individual parking areas. To accommodate the tolling of the through movements on Airport Boulevard, new toll plazas are required at the following locations:

- Southbound Airport Boulevard between SR 528 and Cargo Road,
- Northbound Airport Boulevard between Cargo Road and SR 528,
- On-ramp from Cargo Road to southbound Airport Boulevard,
- Off-ramp from northbound Airport Boulevard to Cargo Road,
- Southbound Airport Boulevard north of Heintzelman Boulevard, and
- Northbound Airport Boulevard north of Heintzelman Boulevard.

Under this scenario, the payment for parking occurs at the existing exits. The new toll plazas would be used to collect tolls only from those traversing the airport property. The toll plazas are required on the Cargo Road ramps to capture those entering the airport property via Cargo Road and exiting to the south and those entering the airport from the south and exiting on Cargo Road. Those making movements to/from the airport property would be able to pass through the toll plazas at no charge. Therefore, the tolling system would need to accommodate the following movements at no charge to the user:

- Entering the airport from the north or south, dropping passengers at the curbside and moving into either the Red Lot or the Blue Lot.
- Leaving the Red or Blue lots, picking up passengers at the North or South Terminal and exiting the airport property.

- Exiting the parking garages after payment and exiting the airport.
- Exiting the rental car area after pick-up and exiting the airport.

Each of these can be accommodated by providing the driver with a ticket as they exit the parking area/rental car pick-up area that is then used to provide free passage through the toll plaza on their exit from the airport property. In addition, the entrances to the parking areas could accept the ticket drivers obtained upon entering the airport property. The only exception to this is for a driver that would enter the airport, drop passengers at the departure curb, and then proceed to the Blue Lot. This driver would be required to traverse the northbound off-ramp to Cargo Road and would use his entering ticket. Therefore, they would need to be allowed entry into the Blue Lot without a ticket.

The major disadvantage of this option is that two revenue systems are required, one for the parking and one for the roadway system. The major advantage of this option is that the roadway toll plazas will be relatively free-flow for those patrons entering/exiting the airport property.

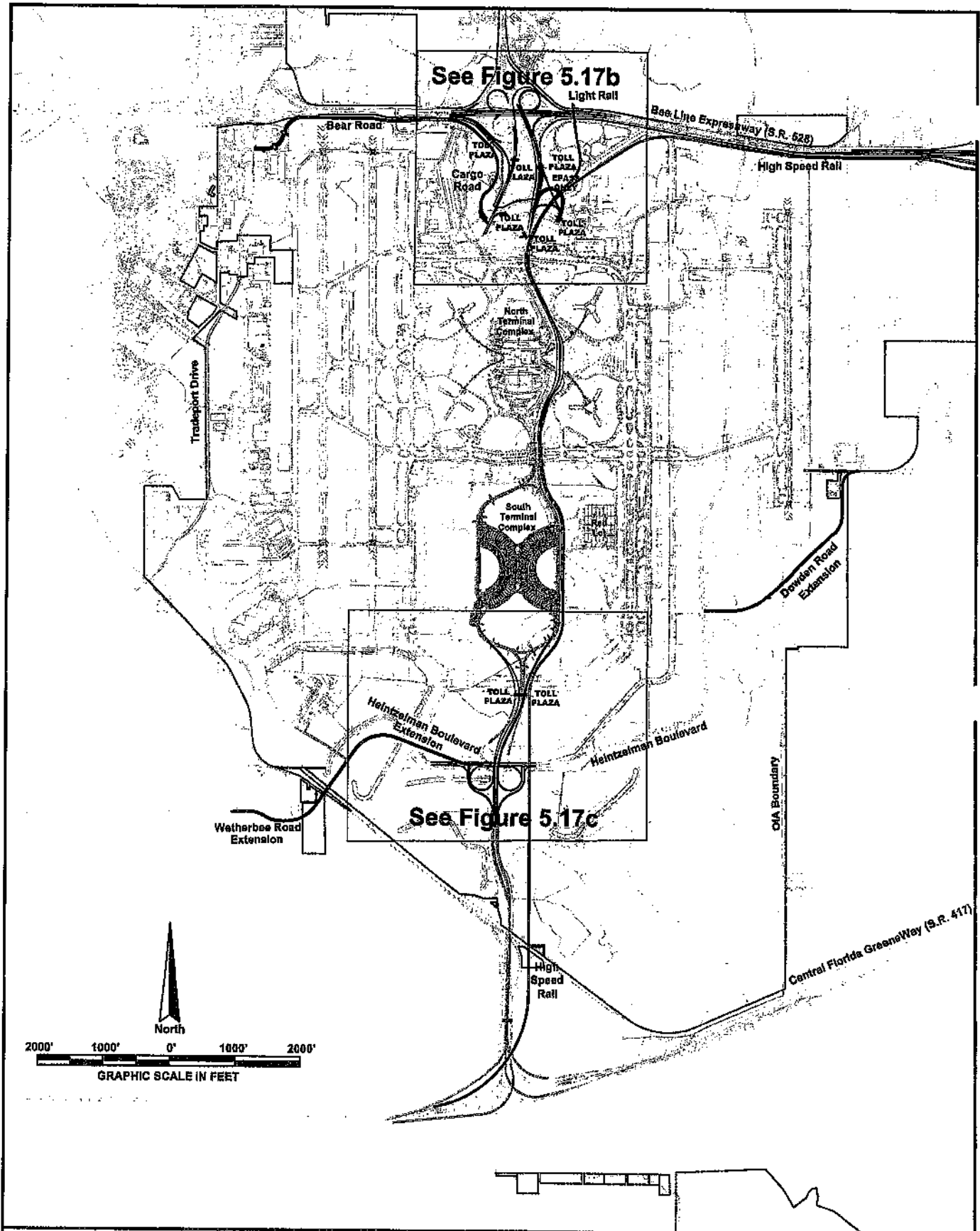
The estimated construction cost for Option 1 is \$53.1 million. This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way, mitigation for environmental impacts or toll plaza operations.

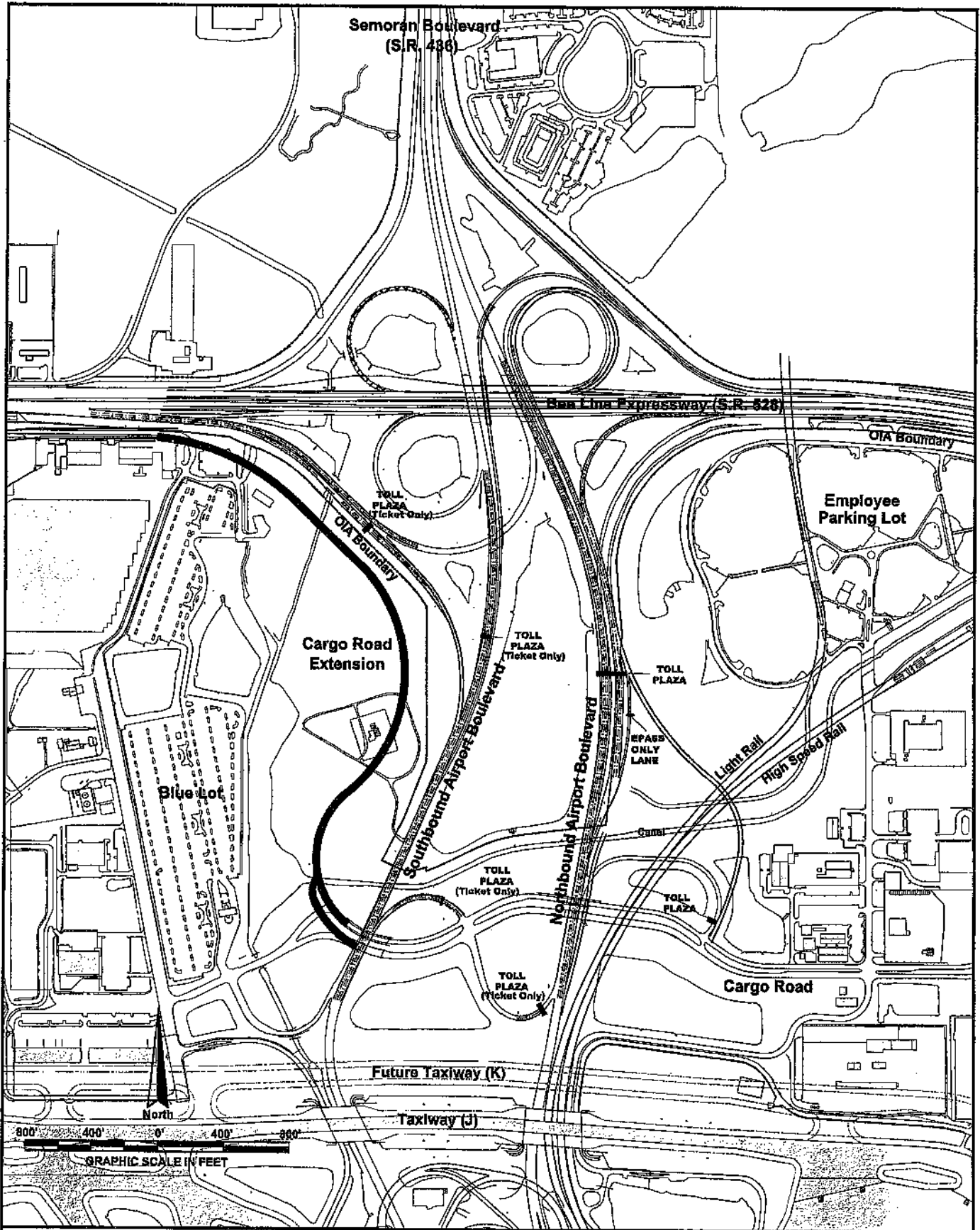
5.3.2. Option 2 – Collecting all Revenue at the Main Toll Plazas

Under this option, the revenue collection for the parking operations is accommodated at the toll plazas. To accommodate the tolling of the through movements on Airport Boulevard as well as the collection of parking fees, toll plazas are required at the following locations:

- Southbound Airport Boulevard between SR 528 and Cargo Road,
- Northbound Airport Boulevard between Cargo Road and SR 528,
- On-ramp from Cargo Road to southbound Airport Boulevard,
- Off-ramp from northbound Airport Boulevard to Cargo Road,
- Southbound Airport Boulevard north of Heintzelman Boulevard, and
- Northbound Airport Boulevard north of Heintzelman Boulevard.

Under this scenario, the payment for parking occurs at the toll plazas. A toll would also be collected from those vehicles traversing the airport property. As with Option 1, toll plazas are required on the Cargo Road ramps to capture those entering the airport property via Cargo Road and exiting to the south and those entering the airport from the south and exiting on Cargo Road. All users would be charged the toll when passing north or south through the airport. The system would need to accommodate the following movements free of charge:

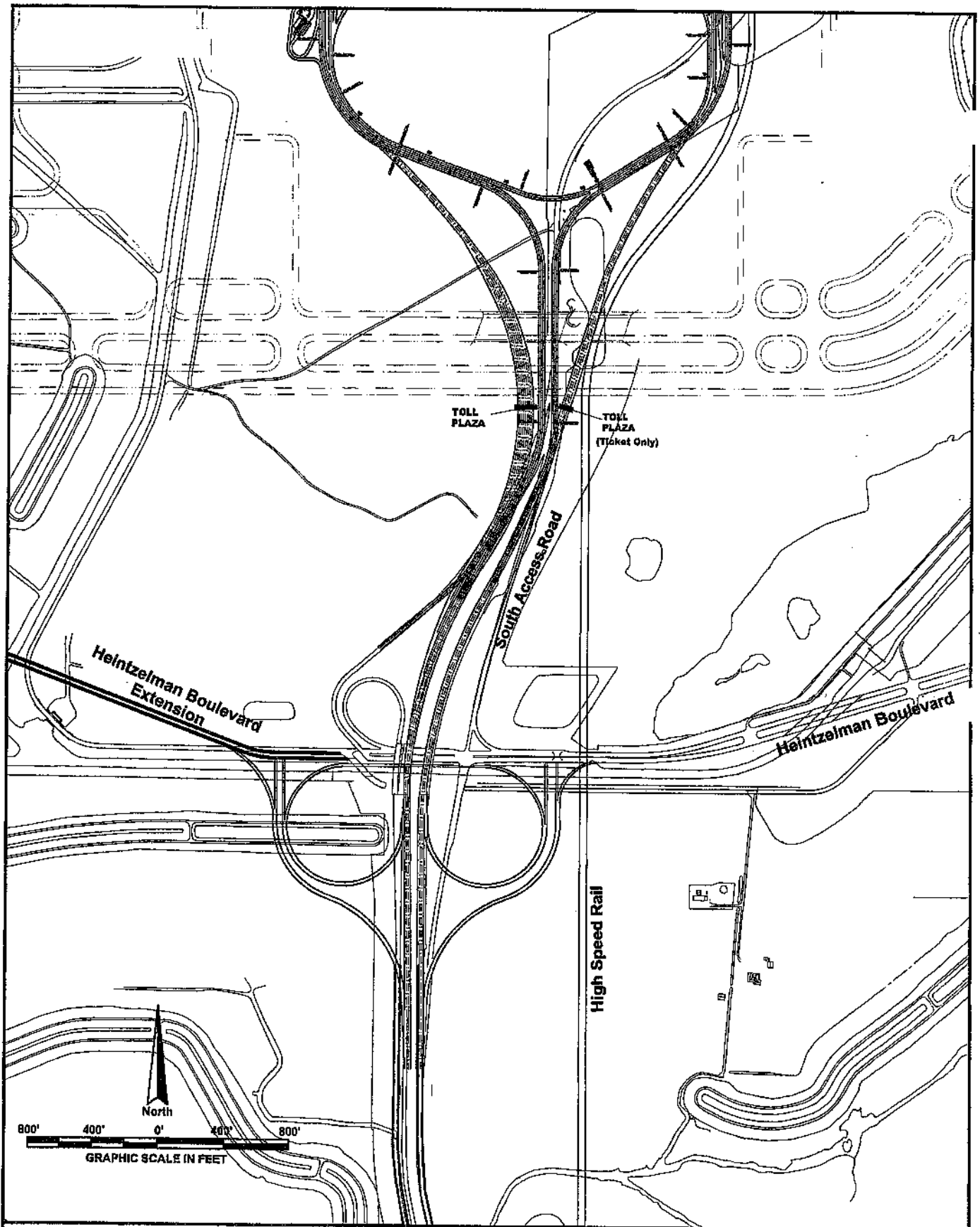




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**TOLL SYSTEM CONCEPT
OPTION 1**

**FIGURE:
5.17b**




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**TOLL SYSTEM CONCEPT
 OPTION 1**

**FIGURE:
 5.17c**

- Entering the airport from the north, traversing the terminal to drop-off or pick-up passengers, and exiting the airport property to the north.
- Entering the airport from the south, traversing the terminal to drop-off or pick-up passengers, and exiting the airport property to the south.
- Exiting the rental car pick-up, then exiting the airport property.

The revenue control system would be based on the time the vehicle passed through the entering toll plaza until they passed through the exiting toll plaza. Revenue control could be maintained by having access to the rental car return area controlled by the ticket obtained on entry and a ticket to pass through the exiting toll plaza provided at rental car pick-up (similar to the system used at the DFW Airport). One movement that will require special consideration is patrons entering from the north, dropping passengers at the terminal, and continuing to the Blue Lot. These patrons would use their entering ticket at the northbound Airport Boulevard off-ramp to Cargo Road and not have a ticket to enter the Blue Lot. Similarly, patrons entering from the south, dropping passengers at the terminal, and continuing north to the Blue Lot would appear to be through movements to the toll system.

The major disadvantage to this system is that the toll plazas would need to have more lanes than Option 1 to accommodate the longer transaction times associated with payment for parking. More lanes would be required to minimize delays to users. The major advantage of this option is that there is one revenue control system.

The estimated construction cost for Option 2 is \$57.1 million. This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way, mitigation for environmental impacts or toll plaza operations.

5.3.3. Option 2B - Barrier Toll Plaza Alternative

This alternative is a variation of Option Two. It consists of a barrier system of toll plazas that covers all entry points into the terminal and parking areas of the airport. The layout of the location of these toll plazas is illustrated on Figure 5.18.

The operation of this toll system option is similar to Option 2 in that parking revenue is collected at the barrier toll plazas. The main differences are that tolls are collected on Cargo Road rather than on the Cargo Road ramps. Also, a toll plaza is installed on South Access Road south of Heintzelman Boulevard, rather than north of Heintzelman Boulevard. Toll plazas are also installed on Heintzelman Boulevard east and west of South Access Road. These differences reduce east/west cut-through traffic in addition to the reduction in north/south cut-through traffic. The toll plazas on Heintzelman Boulevard and on South Access Road also eliminate the need to reconfigure the interchange.

Benefits:

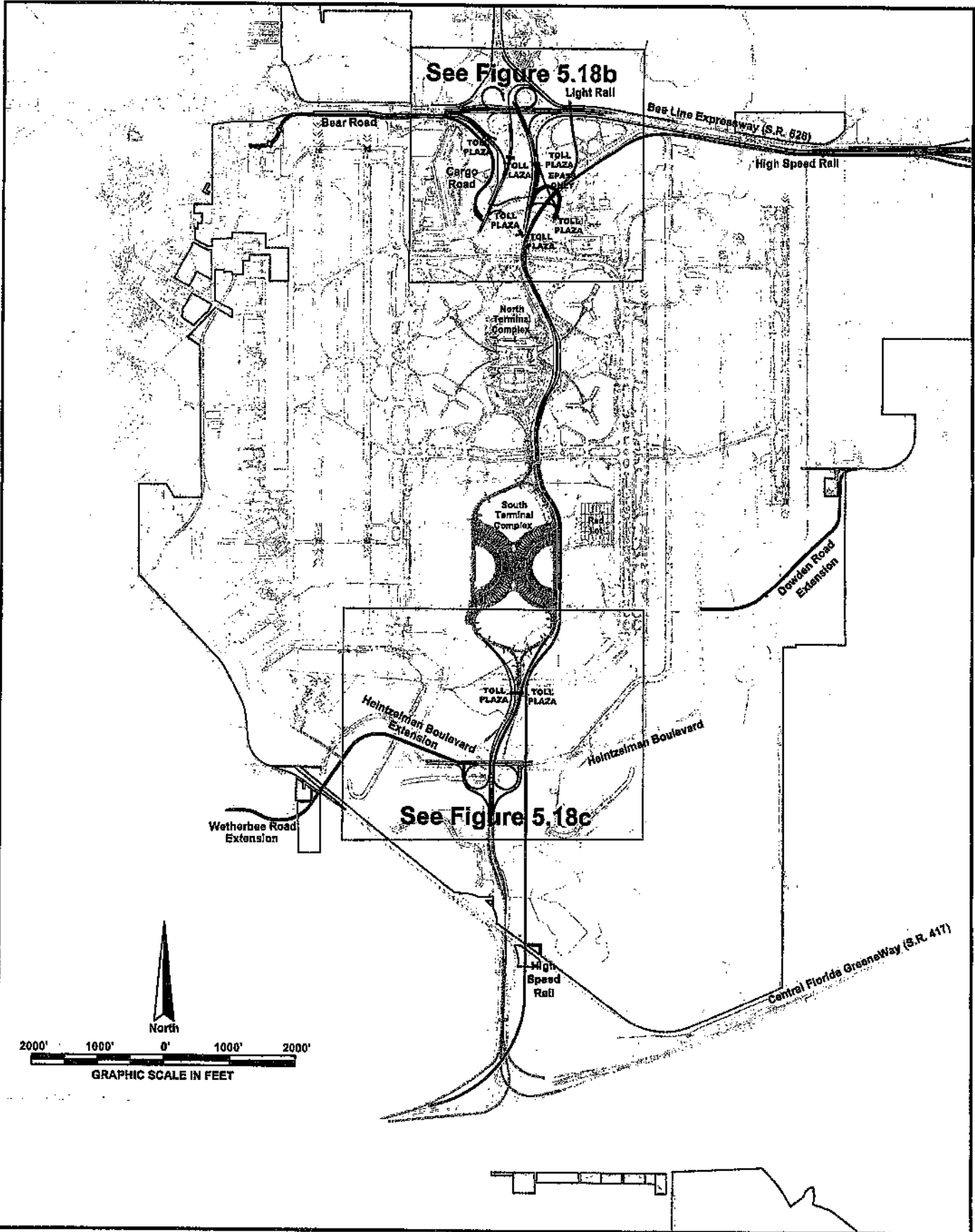
- Reduces east/west cut-through traffic with the installation of toll plazas on Cargo Road and Heintzelman Boulevard.
- Reconfiguration of interchange at South Access Road and Heintzelman Boulevard is not required.

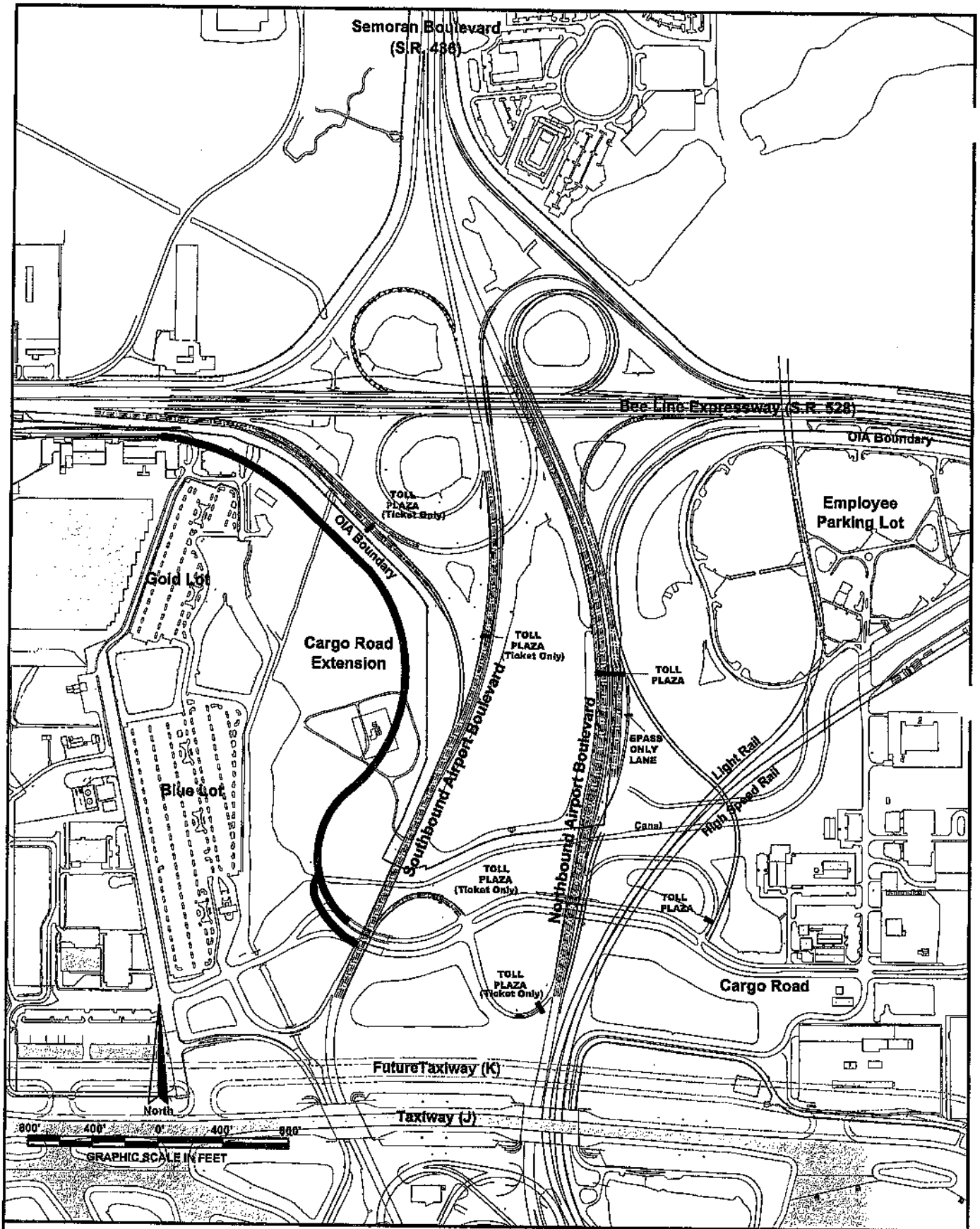
Issues:

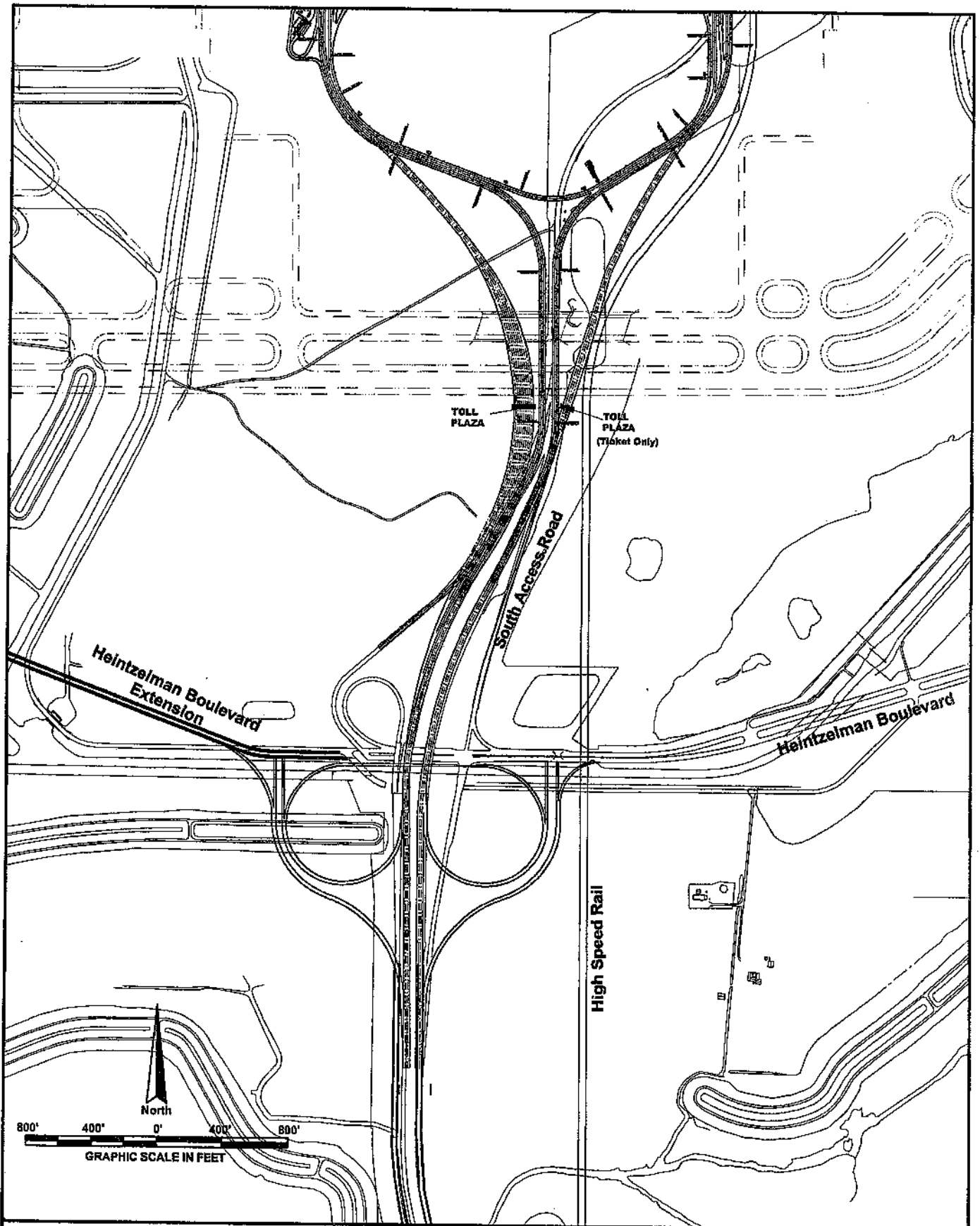
- High operational costs due to the number of toll plazas installed.
- Public acceptance.
- Increased delays.

Cost Estimate: \$ 53.7 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CBI, administration, legal fees, right-of-way, mitigation for environmental impacts or toll plaza operations.



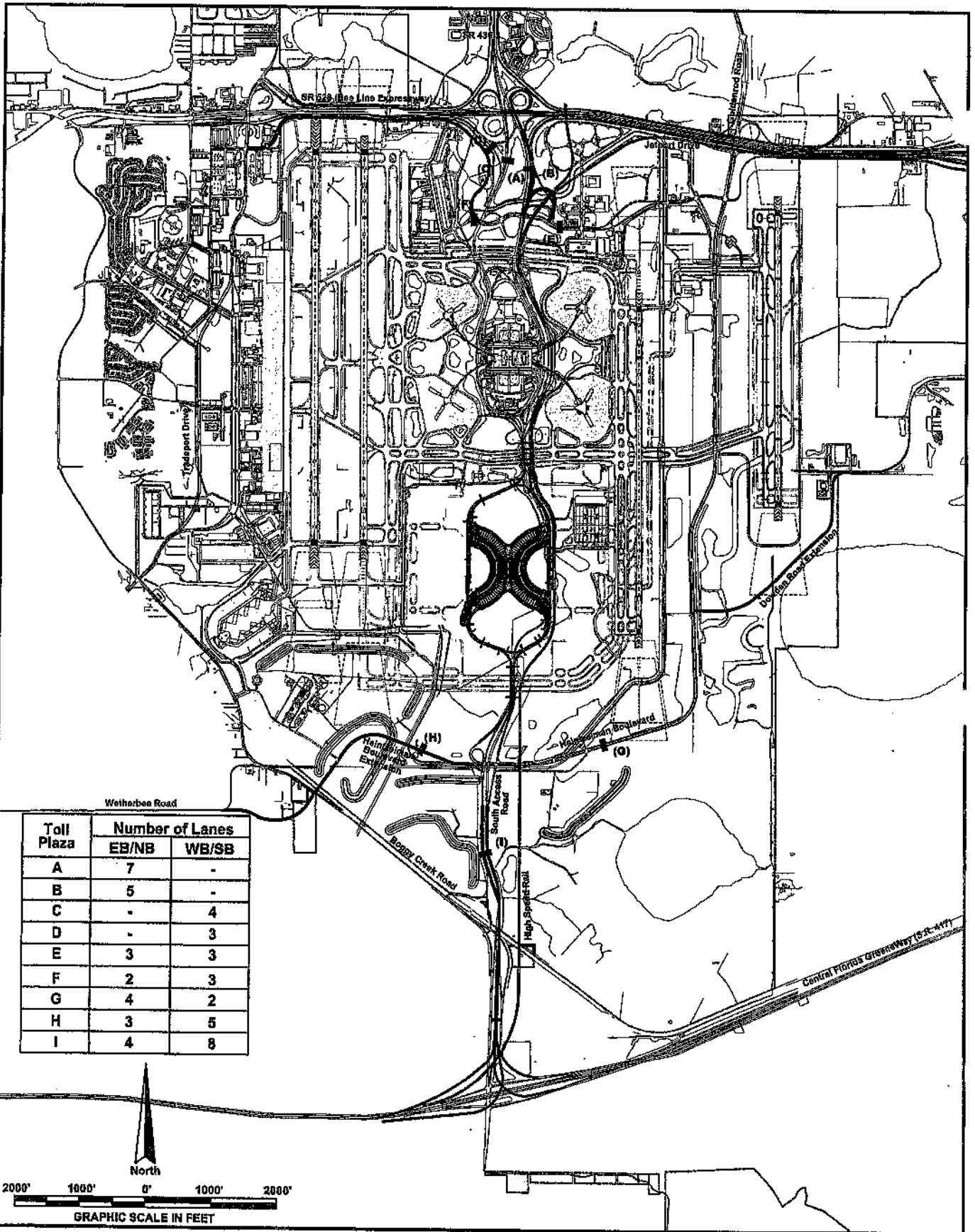




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**TOLL SYSTEM CONCEPT
 OPTION 2**

**FIGURE:
 5.18c**



Toll Plaza	Number of Lanes	
	EB/NB	WB/SB
A	7	-
B	5	-
C	-	4
D	-	3
E	3	3
F	2	3
G	4	2
H	3	5
I	4	8


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**BARRIER TOLL ALTERNATIVE
 OPTION 3**

**FIGURE:
 5.19**

6.0 EVALUATION OF ALTERNATIVES

An evaluation of the options developed to address cut-through traffic included a comparison of construction costs, effectiveness at reducing cut-through traffic, traffic operations and public acceptance. The results of these evaluations are summarized in an evaluation matrix presented in Table 3.

Braided Roadway Concept A-1 has the best overall score including the categories of reducing cut-through traffic, traffic operations and public acceptance. Although it has the highest cost of all of the options, this project can be constructed in four phases thus deferring much of the cost until later years. The Braided Roadway is the only option that eliminates cut-through traffic through the main passenger access roadways. Therefore, the Braided Roadway Concept A-1 is recommended as the preferred option to address cut-through traffic.

Table 3 - Evaluation Matrix for Ultimate Cut-Through Traffic Options

Option	¹ Cost Est. (Millions)	² Effectiveness at Reducing Cut-Through Traffic	³ Traffic Operations	⁴ Public Acceptance	⁵ Overall Ranking	Issues
Widen Airport Boulevard	\$45.5	4	2	1	2	No Reduction in Cut-Through Traffic. Significant Impacts to all of the existing AGTs and the ITS.
Bypass Roadway	\$46.5	4	3	2	3	No Reduction in Cut-Through Traffic. Significant Impacts to the North Crossfield Taxiway and the Light Rail Corridor
Braided Roadway Concept A-1	\$57.5	1	1	2	1	Some Movements Require Additional Circulation Around the North Terminal.
Toll System Option 1	\$53.1	3	4	3	4	Operational and Maintenance Costs of Toll Plazas not included in Cost Estimate. Low Public Acceptance.
Toll System Option 2	\$57.1	3	5	3	5	Operational and Maintenance Costs of Toll Plazas not included in Cost Estimate. Low Public Acceptance.
Toll System Option 2B	\$53.7	2	6	4	6	Operational and Maintenance Costs of Toll Plazas not included in Cost Estimate. Low Public Acceptance.

Source: URS, 2003.

Notes:

- 1) These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars and are included in Appendix B.
- 2) Options ranked on a scale of 1 to 4 according to their ability to reduce or eliminate cut-through traffic. Rank of 1 indicates that cut-through traffic is eliminated and a Rank of 4 indicates no reduction in cut-through traffic.
- 3) Options ranked based on an evaluation of projected traffic operations with "1" being the highest.
- 4) Options ranked based on level of anticipated public acceptance with "1" being the highest.
- 5) Options ranked (with "1" being the highest) based on the option with the highest combined ranking for Effectiveness at Reducing Cut-Through Traffic, Traffic Operations and Public Acceptance. The Preferred Option is shown in bold.

7.0 NEAR-TERM OPTIONS

All of the options developed and presented in the previous sections address long-term solutions to the increase in cut-through traffic. These options would require substantial capital investments. As an interim solution, three Near-Term options were developed to discourage cut-through traffic. These options are relatively inexpensive to implement compared to the options already presented. However, the Near-Term options are not designed to address the higher volumes projected through the Master Plan Horizon. The options include: 1) constructing toll plazas on the existing slip ramps from Boggy Creek Road to South Access Road; 2) constructing a toll plaza on South Access Road south of Heintzelman Boulevard; and 3) closing the slip ramps from Boggy Creek Road to South Access Road.

7.1 Option 1 – Toll NB and SB Slip Ramps Between South Access Road and Boggy Creek Road

This option consists of installing toll plazas on the northbound and southbound slip ramps between Boggy Creek Road and South Access Road. When the SR 417 / Boggy Creek Road Interchange improvements are constructed, these ramps will serve mainly local traffic. The proportion of cut-through traffic on these ramps will be significantly higher than from the connector road from SR 417. This concept will require the existing ramps to be widened to accommodate the toll plazas. Option 1 is illustrated in Figure 7.1.

Specific Improvements:

- Widen existing ramps to accommodate toll plazas. Minor widening of existing bridge over Boggy Creek Road.
- Install two lane toll plazas with one E-Pass only lane on each ramp.
- Construct toll administration building.

Benefit:

May reduce the volume of traffic accessing South Access Road directly from Boggy Creek Road.

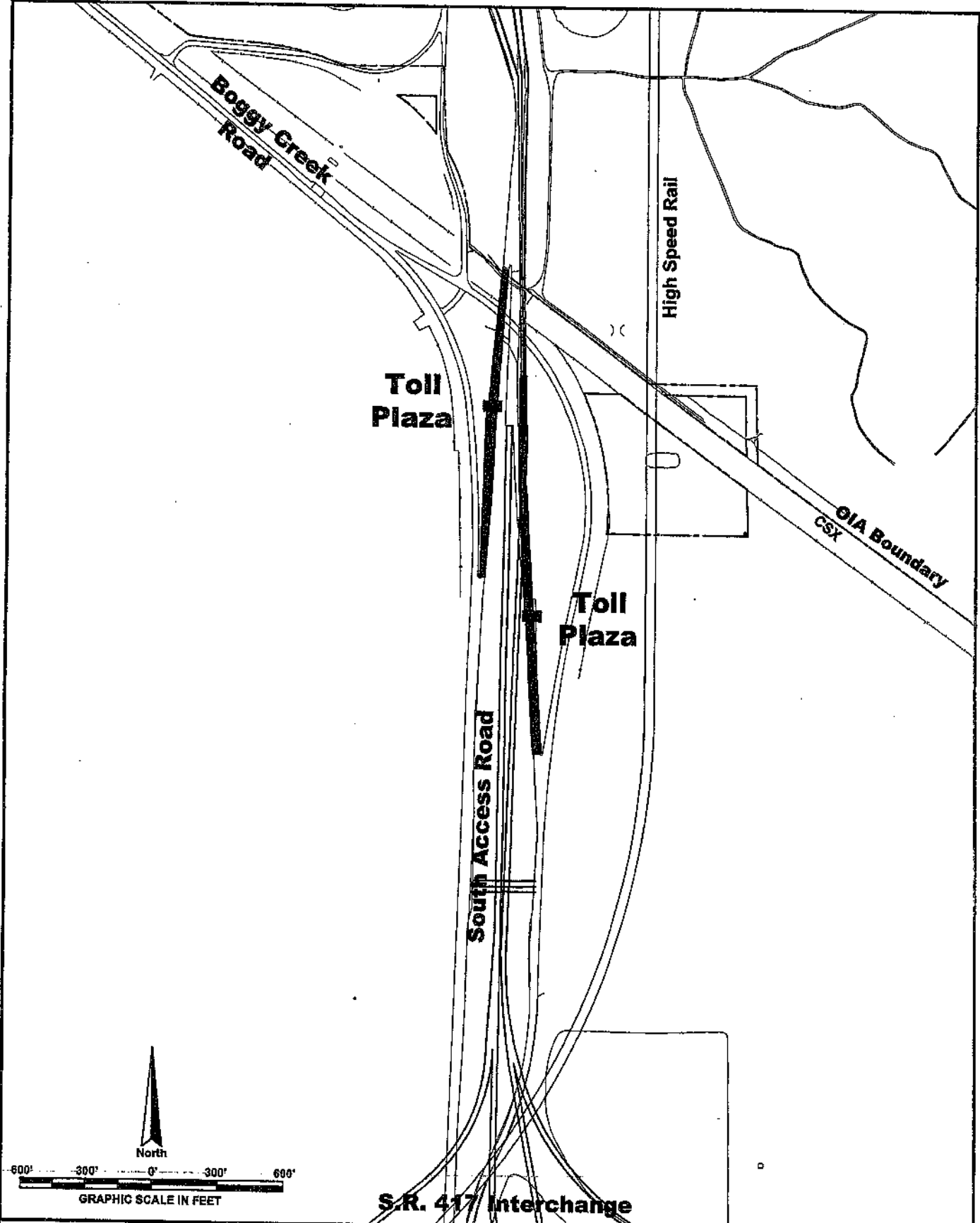
Issues:

- Ramps are located off of airport property and will require coordination with Orange County and OOCEA.

- Increased delays.
- Increased operational costs.
- Requires proposed modifications to the Boggy Creek Road / SR 417 interchange to be in place.
- Public acceptance.

Cost Estimate: \$ 6.5 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way, mitigation for environmental impacts or toll plaza operations.




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NEAR-TERM CUT-THROUGH TRAFFIC SOLUTION (OPTION 1)

FIGURE: 7.1

7.2 Option 2 – Toll South Access Road Between Heintzelman Boulevard and Boggy Creek Road

This options consists of installing a toll plaza on South Access Road between Heintzelman Boulevard and the Boggy Creek Road slip ramps. All traffic in both directions will be required to pay a toll. The proposed interchange modifications at Boggy Creek Road and SR 417 are not required. This option is illustrated in Figure 7.2.

Specific Improvements:

- Construct a two three-lane toll plazas on South Access Road between Heintzelman Boulevard and the slip ramps to/from Boggy Creek Road. One lane in each direction will be for E-Pass only.
- Construct a toll plaza administration building.
- Widen South Access Road to accommodate the toll plazas.

Benefit:

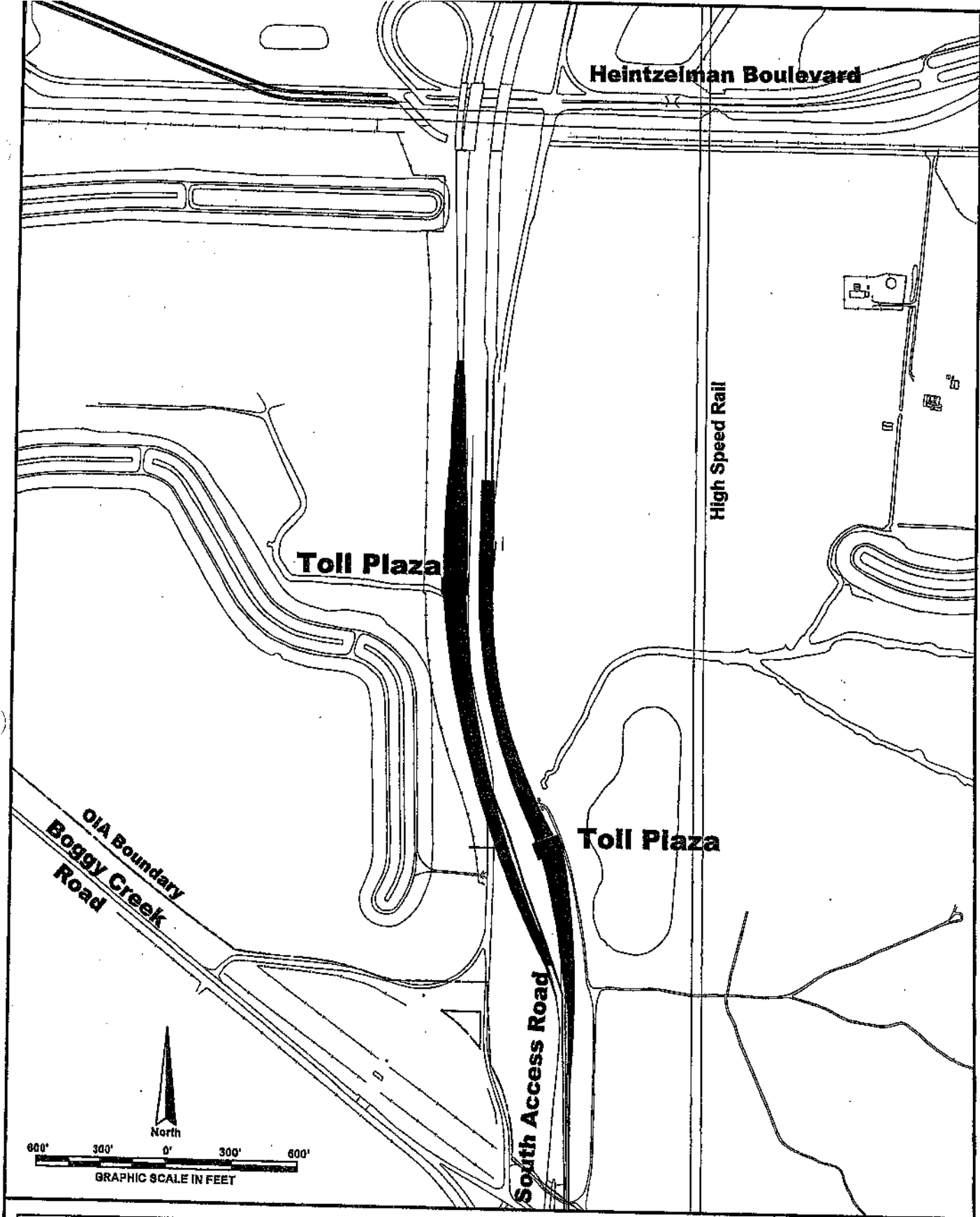
May reduce cut-through traffic at the south entrance to the airport.

Issues:

- Public acceptance.
- Movements to and from SR 417 west of Boggy Creek Road are tolled twice.
- Creates weaving areas between the toll plazas, the slip ramps and the ramps to Heintzelman Boulevard.
- Increased delays for passengers.

Cost Estimate: \$ 7.7 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way, mitigation for environmental impacts or toll plaza operations.




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NEAR-TERM CUT-THROUGH TRAFFIC SOLUTION (OPTION 2)

FIGURE: 7.2

7.3 Option 3 – Close Slip Ramps Between South Access Road and Boggy Creek Road

This option consists of closing the slip ramps between South Access Road and Boggy Creek Road. The SR 417 / Boggy Creek Road interchange improvements and the Heintzelman Boulevard Extension need to be in place for this option to be implemented. Local traffic accessing the airport from the south (not including traffic from SR 417) will travel north on Boggy Creek Road to the Heintzelman Boulevard Extension. This option is illustrated in Figure 7.3.

Specific Improvement:

Close the existing slip ramps between Boggy Creek Road and Heintzelman Boulevard.

Benefit:

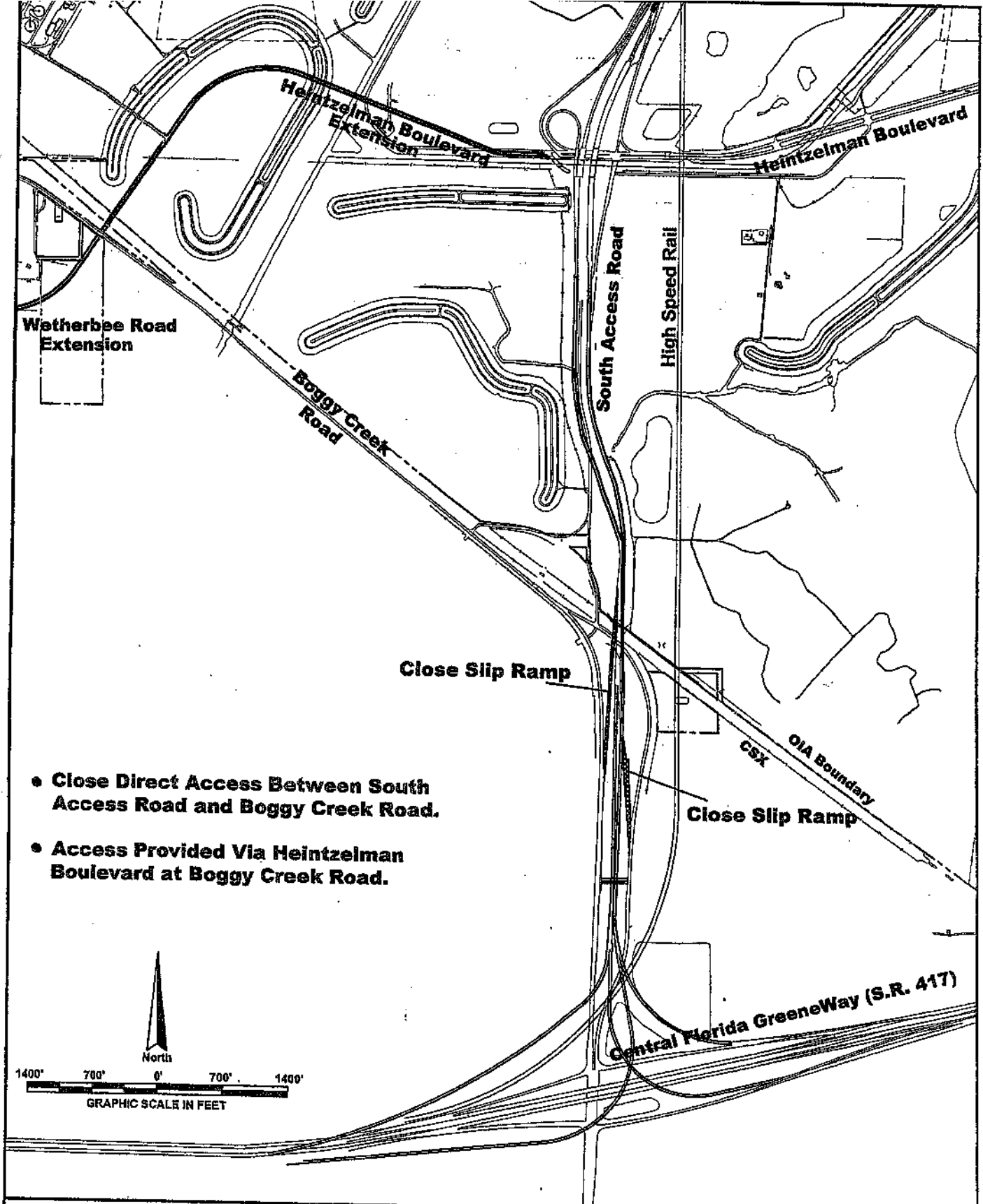
Eliminates direct connection between Boggy Creek Road and South Access Road which may reduce overall cut-through traffic at the airport.

Issues:

- Requires interchange modification at Boggy Creek Road and SR 417 including the direct connect ramps between SR 417 and South Access Road.
- Requires the construction of the Heintzelman Boulevard Extension between Boggy Creek Road and South Access Road.
- Ramps are located off of airport property and will require coordination with Orange County and OOCEA.
- Public acceptance.

Cost Estimate: \$ 0.5 Million

This is a planning level estimate of construction costs. It does not include costs for contingencies, design, CEI, administration, legal fees, right-of-way, mitigation for environmental impacts or toll plaza operations.



- Close Direct Access Between South Access Road and Boggy Creek Road.
- Access Provided Via Heintzelman Boulevard at Boggy Creek Road.


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NEAR-TERM CUT-THROUGH TRAFFIC SOLUTION OPTION 3

FIGURE: 7.3

7.4 Evaluation of Near-Term Options

An evaluation of the Near-Term options to address cut-through traffic included a comparison of construction costs, effectiveness at reducing cut-through traffic, traffic operations and public acceptance. The results of these evaluations are summarized in an evaluation matrix presented in Table 4.

Option 3, closing the slip ramps between Boggy Creek Road and South Access Road, has the best overall score including the categories of reducing cut-through traffic, traffic operations and public acceptance. It also has the lowest estimated construction cost. However, Option 3 requires that both the SR 417 / Boggy Creek Road interchange modifications and the Heintzelman Boulevard extension to Boggy Creek Road be completed.

Although Option 3 appears to be the preferred Near-Term Option, the evaluations of the effectiveness at reducing cut-through traffic and traffic operations provided are only qualitative. The rankings were determined following a logical assessment of each option based on engineering judgement. Additional quantitative analyses are needed to fully evaluate the effectiveness of each of these options in reducing cut-through traffic and the projected traffic operations. This should include additional traffic model runs to compare the differences in traffic assignment for each option. Therefore, it is recommended that GOAA proceed with a detailed study to fully evaluate the Near-Term Options.

Table 4 - Evaluation Matrix for Near-Term Cut-Through Traffic Options

Option	¹ Cost Est. (Millions)	² Effectiveness at Reducing Cut-Through Traffic	³ Traffic Operations	⁴ Public Acceptance	⁵ Overall Ranking	Issues
1) Toll Slip Ramps	\$6.5	3	2	2	2	This project is located off of OIA property and will require coordination with Orange County and OOCEA.
2) Toll South Access Road	\$7.7	1	3	3	3	Weaving operations between the slip ramps and the Heinzelman Boulevard interchange. Movement between the airport and SR 417 West is tolled twice.
3) Close Slip Ramps	\$0.5	2	1	1	1	This project is located off of OIA property and will require coordination with Orange County and OOCEA.

Source: URS, 2003.

Notes:

- 1) These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars and are included in Appendix B.
- 2) Options ranked according to their ability to reduce cut-through traffic with "1" being the highest.
- 3) Options ranked based on an evaluation of projected traffic operations with "1" being the highest.
- 4) Options ranked based on level of anticipated public acceptance with "1" being the highest.

8.0 RECOMMENDATIONS

Cut-through traffic is projected to become a significant impact on passenger terminal and roadway operations over the next twenty years. The need to address this issue has been documented in this working paper. Ultimately, it will be necessary to eliminate cut-through traffic from the main passenger terminal access roadways in order to maintain acceptable levels of service through the year 2025. Therefore, based on the evaluations of the concepts developed to address long-term cut-through traffic and the need to ultimately eliminate cut-through traffic from the passenger terminal roadways, it is recommended that GOAA proceed with the ultimate development of the Braided Roadway Concept A-1. This concept is illustrated in Figures 5.2 for the North Terminal and 5.5 for the South Terminal. It is further recommended that this concept be implemented in phases as presented in Section 5.2.2. All future planning and design efforts at MCO should consider and accommodate the Braided Roadway concept.

Efforts to address cut-through traffic in the near-term should include a detailed evaluation of the Near-Term Options presented in Section 7. The evaluations of these options provided in this document are only qualitative. A final decision should be based on a quantitative study of the effectiveness of each Near-Term Option to reduce cut-through traffic.

In summary, to address current cut-through traffic and increasing motor vehicle traffic activity at MCO, the following specific recommendations are provided:

- Conduct a detailed study of the Near-Term Options. (Section 7)
- Promote the construction of the proposed interchange improvements at SR 417 and Boggy Creek Road. (Section 3.2)
- Begin the development and design of Phase 1 of the Preferred Braided Roadway Concept. (Section 5.2.2)
- Design all future airport projects to accommodate the Preferred Braided Roadway Concept. (Section 5.2)
- Continue coordination with all rail planning efforts (AGT, HSR, ITS, LRT) to ensure that sufficient space to construct the Preferred Braided Roadway Concept is provided. (Section 5.2)
- Allocate funding for the full development, design and construction of the Preferred Braided Roadway Concept. (Section 5.2)

APPENDIX A

Date: May 20, 2004
To: Rob Brancheau
From: Jan Everett, Tom Ross
Subject: **Mid-Crossfield Taxiway Bridge**

On March 5, 2004, GOAA provided the following comments on the proposed typical section for the Mid-Crossfield Taxiway with the Braided Roadway Concept:

1. Place the High Speed Rail (HSR) corridor east of the Light Rail (LRT) corridor. This will eliminate the need to cross the LRT over the HSR at the north end of the airport.
2. Locate both the southbound access road to the South Terminal and the southbound exit road from the North Terminal into the span between Piers 2 and 3. This revision will maintain the existing secure road under the west side of the taxiway and eliminate the need for a new secure road bridge on the south side of the taxiway.
3. Locate both the northbound access road to the North Terminal and the northbound exit road from the South Terminal into the span between Piers 4 and 5. This will allow both rail corridors to be placed in the same span between Piers 5 and 6.

Response to Comment 1:

The Braided Roadway Concept for the South Terminal was not developed until January 2004. Prior to that time, it was proposed that northbound traffic exiting the South Terminal would be directed to Heintzelman Boulevard. During the development of the South Terminal Braided Roadway Concept, it was proposed by PBS&J that the northbound exit from the South Terminal could be placed together with the HSR in the span between Piers 5 and 6. The LRT corridor was moved into the location identified for the Future Public Service Road adjacent to Secure Road "A" between Pier 6 and Abutment 7. (See Figure 1)

LRT has more flexible requirements than HSR and could more easily fit into the slightly narrower span. It was understood at that time that if the LRT was placed on the east side of HSR, LRT would have to cross over HSR north of Cargo Road as the HSR corridor continues on to the east along SR 528 and the LRT corridor continues to the north crossing over SR 528.

After a closer review of the clearance requirements for HSR and the design of the Mid-Crossfield Taxiway improvements, it appears that the HSR corridor could be placed adjacent to Secure Road "A"

(See Figure 2). This is based on information provided by the High Speed Rail Authority and design details for the Mid-Crossfield Taxiway dated December 21, 2000. Some excavation beneath the span will be needed to achieve the required 19 feet minimum vertical clearance for HSR. A review of the taxiway bridge structural design should be undertaken by the designers for HSR to ensure the structure will accommodate any required excavation needed to obtain the minimum vertical clearance and any dynamic loads (such as vibration) resulting from HSR operations.

However, following discussions with GOAA staff, it was agreed that Option 3 would be advanced as the preferred option. Option 3 is the lowest cost option and satisfies AASHTO criteria.

It should be noted that the Future Public Service Road designation has been removed from the space between Pier 6 and Abutment 7. During the meeting on March 5, you had indicated that due to issues unrelated to the Mid-Crossfield Taxiway bridge, it was unlikely that a public service road would be constructed between the North and South Terminals and that it was acceptable to reassign the use for this space.

Response to Comment 2:

There are three options for accommodating access across the Mid-Crossfield Taxiway for the existing secure road and the two southbound roadways proposed for the braided roadway concept.

Option 1 – As originally proposed. (See Figure 3)

Option 2 – Delete the proposed secure road bridge south of the Mid-Crossfield Taxiway. The secure road access is provided via an at-grade crossing of the taxiway on the west side of Airport Boulevard.

Option 3 – Combine both southbound roadways under the span between Piers 2 and 3. Delete the proposed secure road bridge south of the Mid-Crossfield Taxiway. (See Figure 4)

Option 1 provides an offset between the edge of travel and the face of the adjacent pier of 17'-6" on both sides of the southbound access road to the South Terminal and 8'-10 1/2" on both sides of the southbound exit road from the North Terminal. These dimensions are based on the design of the Mid-Crossfield Taxiway dated December 21, 2000. This option also allows a lane to be added to each roadway in the future if needed.

Option 2 provides significant cost savings over Option 1 due to the elimination of the proposed secure road bridge on the south side of the taxiway. It still provides the same areas for the southbound roadways and the ability to add a lane to each roadway in the future as Option 1.

Option 3 also has significant cost savings when compared to Option 1 due to the elimination of the proposed secure road bridge on the south side of the taxiway. The clear width available between Piers 2 and 3 is only 59 feet which yields an offset of only 1'-7 1/2" between the travel way of each roadway and the adjacent barrier wall. Although this offset satisfies AASHTO minimum requirements, this

option provides significantly less lateral clearance than Options 1 and 2. Also, no additional lanes can be added to either roadway under this option.

Based on the evaluations of each option for the southbound roadways, we recommend Option 1. Option 1 provides the most lateral clearance for both southbound roadways and provides a grade separated crossing of the taxiway for the secure roads on both the east and west sides of the airfield. Although the cost of the proposed secure road bridge on the south side of the taxiway is significant, it represents less than five percent of the total cost of the braided roadway concept and it provides significant benefits, including improved roadway operations and safety, to both arriving and departing passengers.

Response to Comment 3:

There are three options for accommodating access across the Mid-Crossfield Taxiway for northbound traffic exiting the South Terminal in the braided roadway concept.

Option A – Provides the northbound exit from the South Terminal adjacent to the LRT corridor between Piers 5 and 6. HSR corridor adjacent to Secure Road "A" between Pier 6 and Abutment 7. (See Figure 5)

Option B - Northbound traffic exiting from the South Terminal is directed to Heintzelman Boulevard. HSR and LRT corridors combined under one span between Piers 5 and 6. A Public Service Road is provided adjacent to Secure Road "A" between Pier 6 and Abutment 7. (See Figure 6)

Option C – Combines both northbound roadways under one span between Piers 4 and 5. HSR and LRT corridors combined under one span between Piers 5 and 6. Public Service Road is provided adjacent to Secure Road "A" between Pier 6 and Abutment 7. (See Figure 7)

Option A is the result of the recommendation made in response to Comment 1. This option provides an offset between the edge of travel and the face of the adjacent pier of 14'-6" on both sides of the northbound access road to the North Terminal. This option also allows a lane to be added to the northbound access road to the North Terminal in the future if needed. A clear width of 69 feet is provided between Piers 5 and 6. The HSR corridor requires a minimum of 39 feet of clear width. The remaining 30 feet of space is available for the northbound exit from the South Terminal. This allows an offset of 1'-9" between the travel way and the barrier wall. This offset meets minimum AASHTO requirements. However, no additional lanes can be added to the northbound exit from the South Terminal.

Option B is the same as what had been previously proposed for the braided roadway concept. Northbound traffic exiting the South Terminal is directed to use Heintzelman Boulevard. This option can support projected traffic volumes through 65 MAP (assuming 30 MAP at the South Terminal). Beyond 65 MAP, the southbound weave between the South Terminal and Heintzelman Boulevard is projected to operate at unacceptable levels of service. This option also allows both the LRT and HSR

corridors to use the same span between Piers 5 and 6. This option provides significant cost savings when compared to Option A due to the elimination of the northbound exit roadway from the South Terminal (approx. \$20 mil.); however, it can not accommodate passenger growth beyond 65 MAP.

Option C combines both northbound roadways under one span between Piers 4 and 5. The distance between Piers 4 and 5 is only 57 feet measured center of pier to center of pier. With a pier width of four feet, only 53 feet of clear width is provided between the piers. Combining both roadways within this span results in the typical section illustrated in Figure 7. This section provides a travel way of only 22'-3" for each roadway and an offset of only 1' between the travel way and the barrier wall. This section does not meet all of the minimum AASHTO requirements listed below. Therefore, URS recommends that Option C be eliminated from further consideration.

AASHTO minimum requirements:

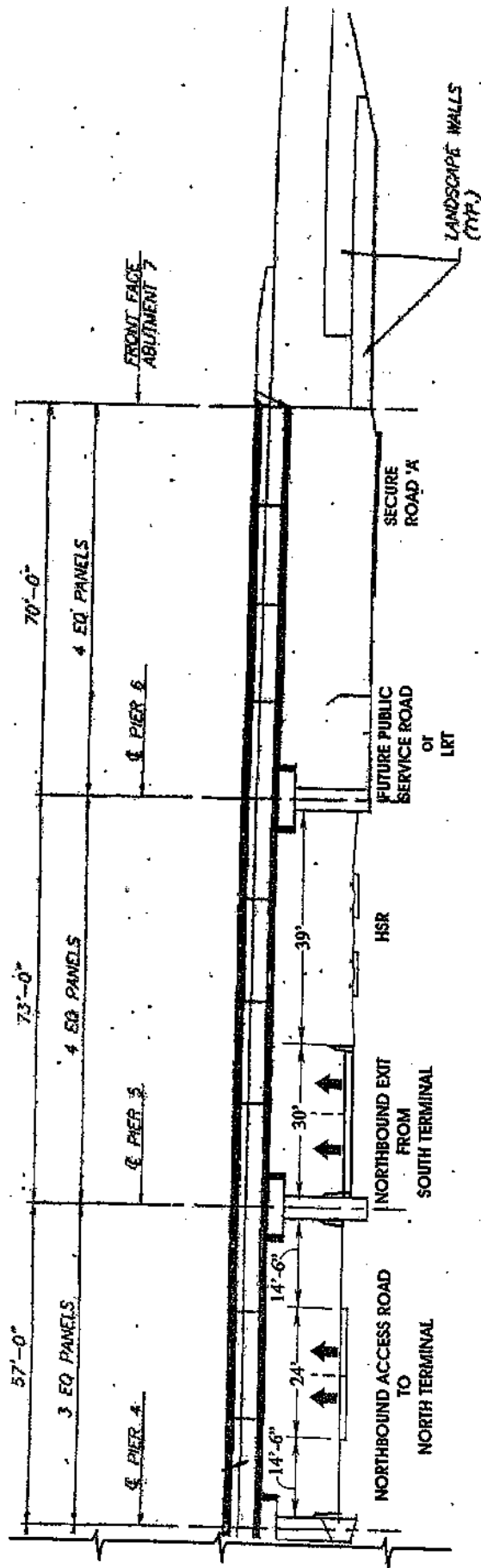
1. Width of travel way for two lanes of traffic with 2,000 ADT or greater - 24 feet
2. Offset between face of curb and edge of travel way - 1 to 2 feet
3. Horizontal clearance to obstructions - 1.5 feet behind the face of the curb

Based on the evaluations of each option for the northbound roadways, we recommend Option A. Option A provides the most lateral clearance for both northbound roadways and provides the best traffic operations and safety to both arriving and departing passengers beyond the horizon of the Master Plan Update (60 MAP).

Conclusion

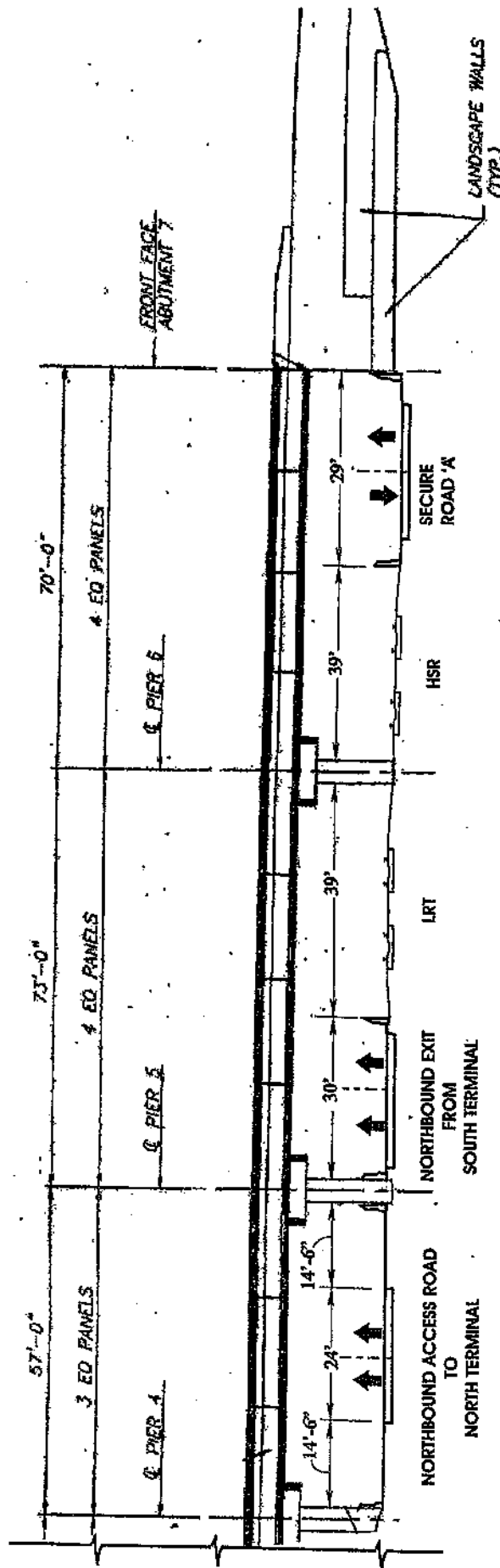
The Master Plan Update will reflect the proposed improvements as provided in the Braided Roadway Concept including the proposed typical section for the Mid-Crossfield Taxiway Bridge illustrated in Figure 8 (Option 3A). This is a combination of both Option 3 for the southbound roadways and Option A for the northbound roadways. Option 3A will support passenger traffic through the Master Plan horizon.

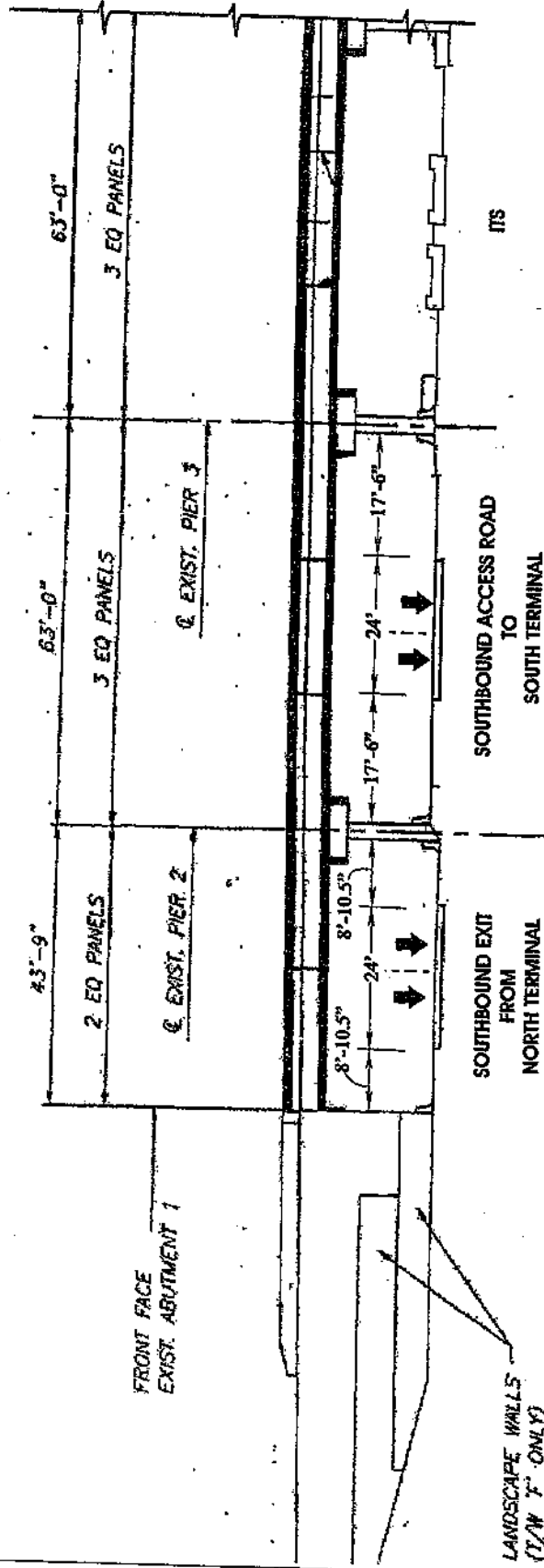
cc: Win Beyea



**MID-CROSSFIELD TAXIWAY
RAIL ASSIGNMENTS PROPOSED FOR BRAIDED ROADWAY CONCEPT
(January 2004)**

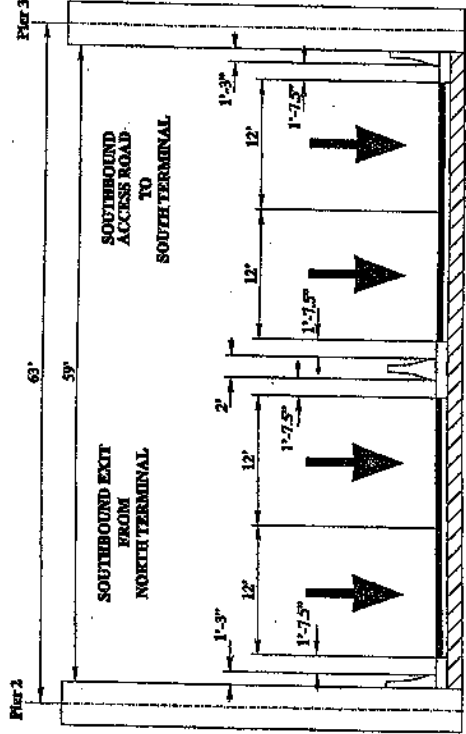
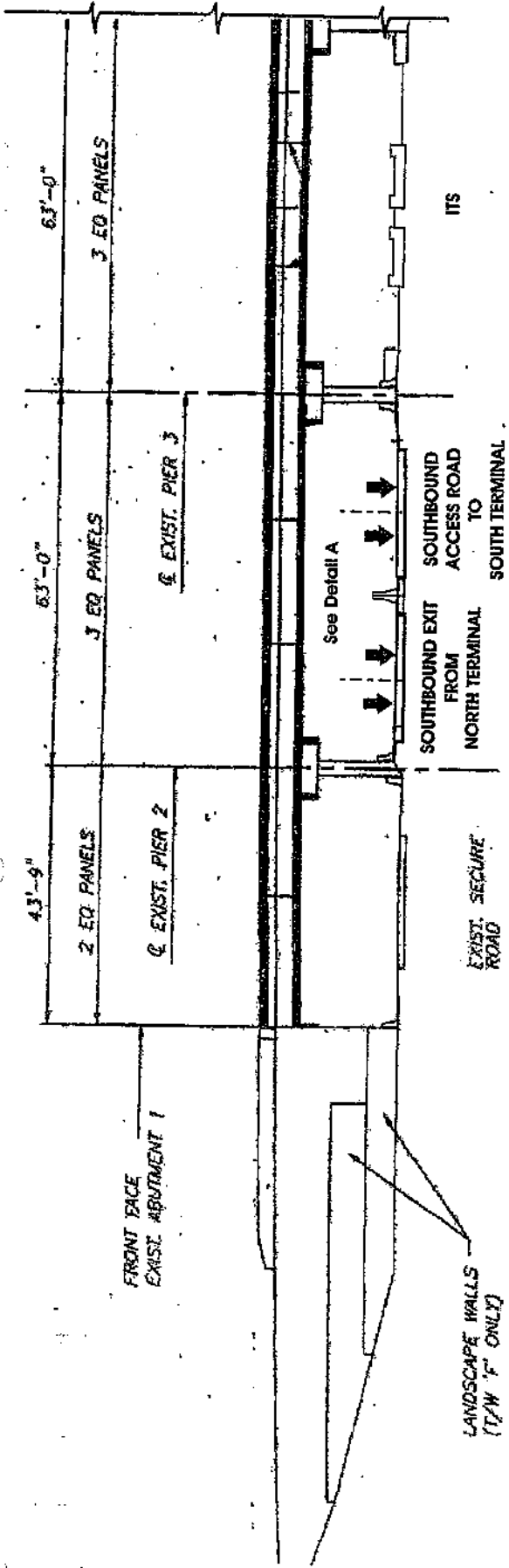
FIGURE:
1





**MID-CROSSFIELD TAXIWAY
SOUTHBOUND ROADWAYS
OPTIONS 1 & 2**

FIGURE:
3

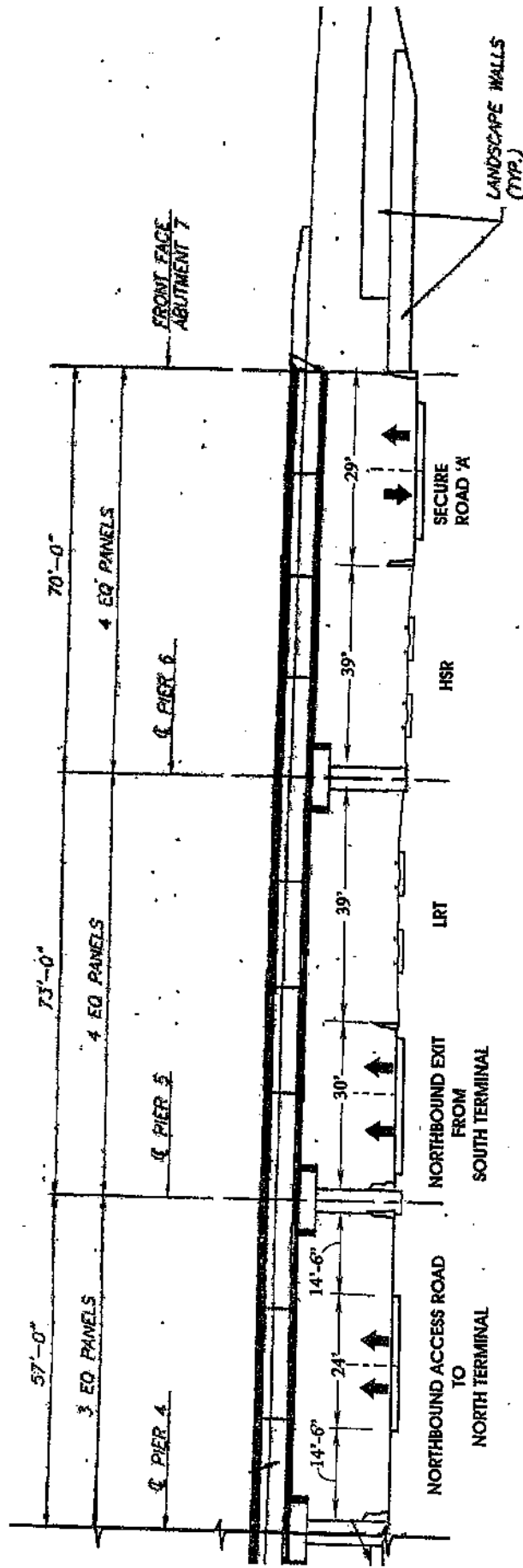


DETAIL A

MID-CROSSFIELD TAXIWAY
SOUTHBOUND ROADWAYS
OPTION 3

GREATER ORLANDO AVIATION AUTHORITY
Orlando International Airport
Master Plan Update

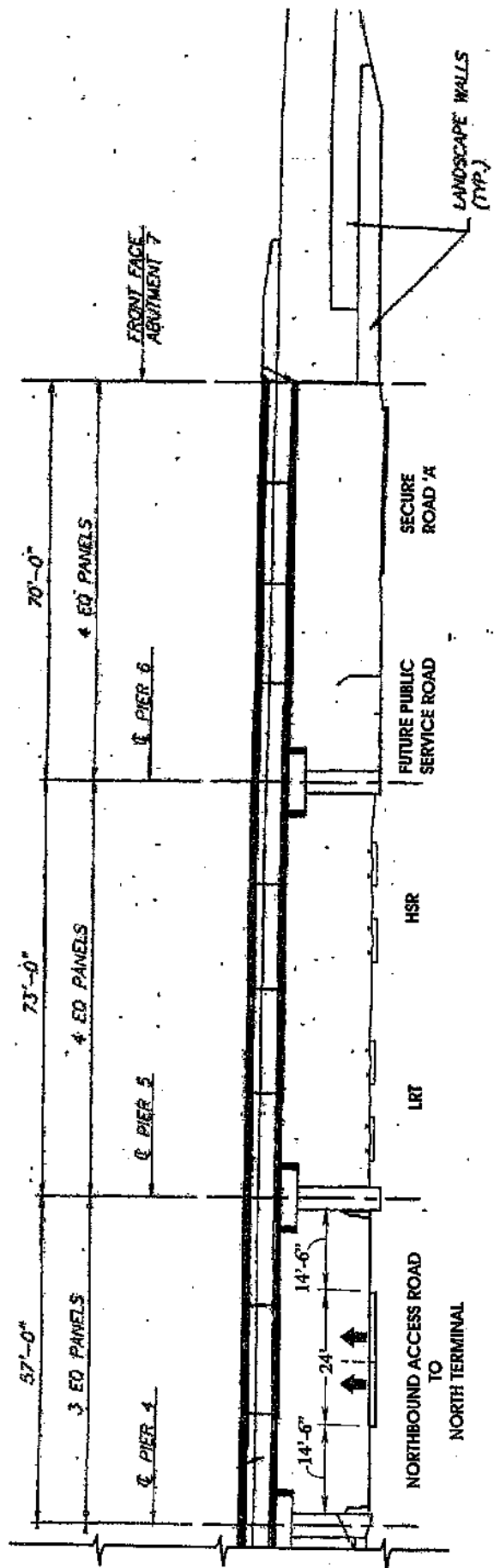




MID-CROSSFIELD TAXIWAY
NORTHBOUND ROADWAYS
OPTION A

FIGURE:
5

URS
GREATER ORLANDO
AVIATION AUTHORITY
Orlando International Airport
Master Plan Update

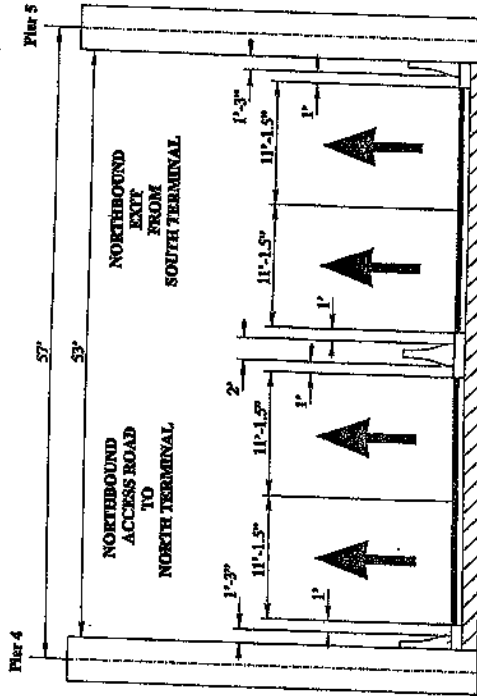
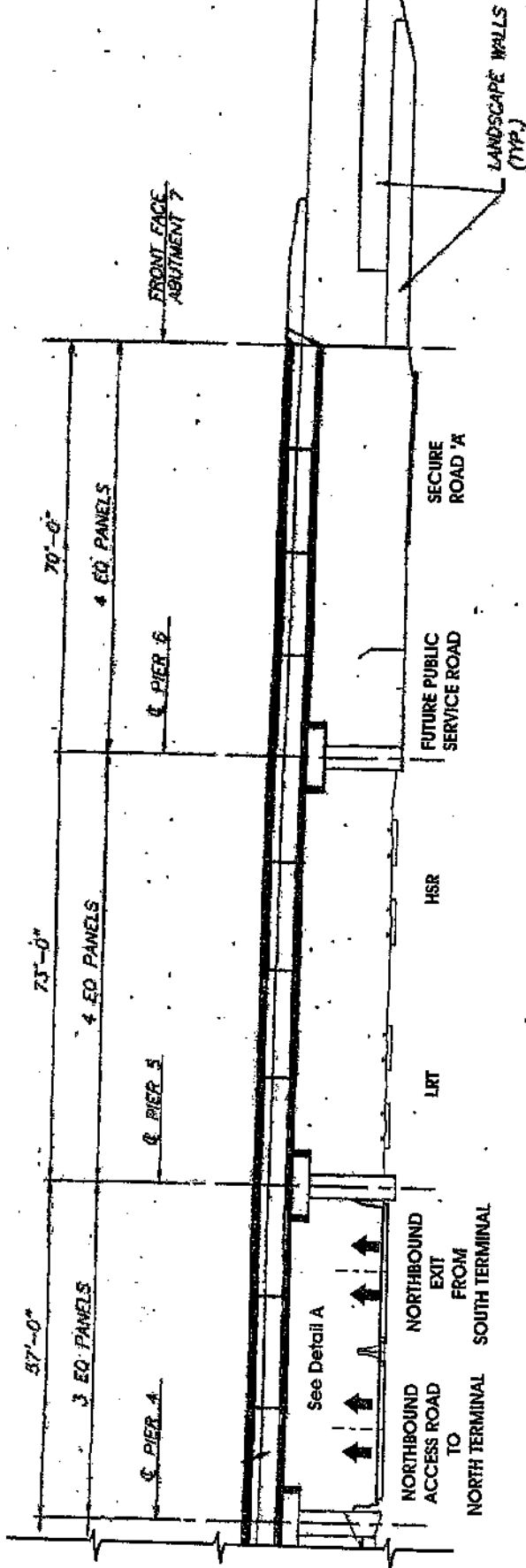


MID-CROSSFIELD TAXIWAY
 NORTHBOUND ROADWAYS
 OPTION B

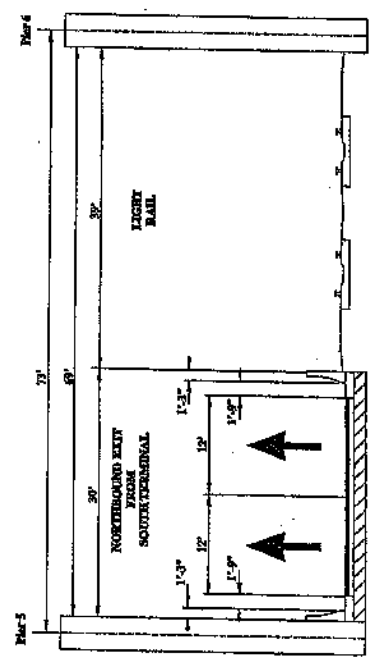
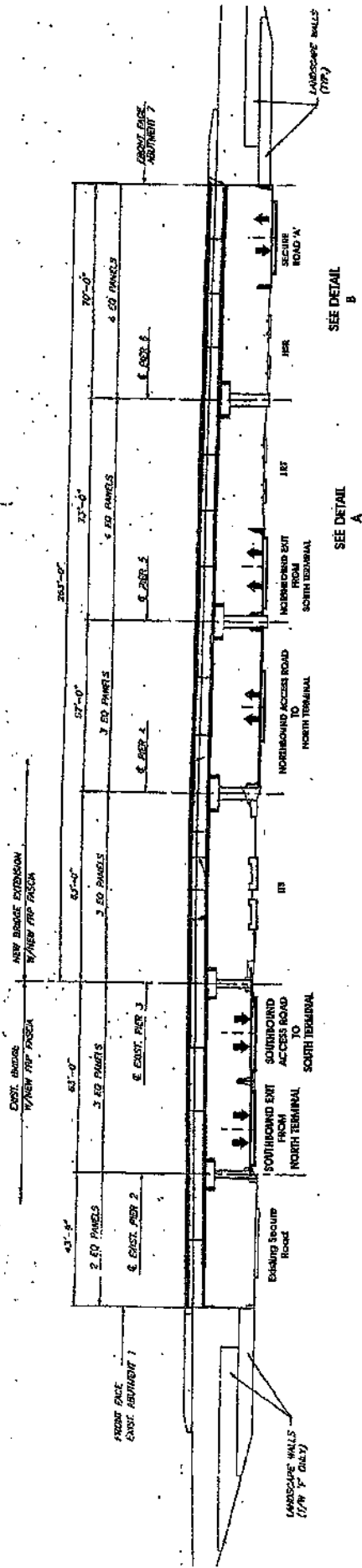
FIGURE:
 6

GREATER ORLANDO AVIATION AUTHORITY
 Orlando International Airport
 Master Plan Update

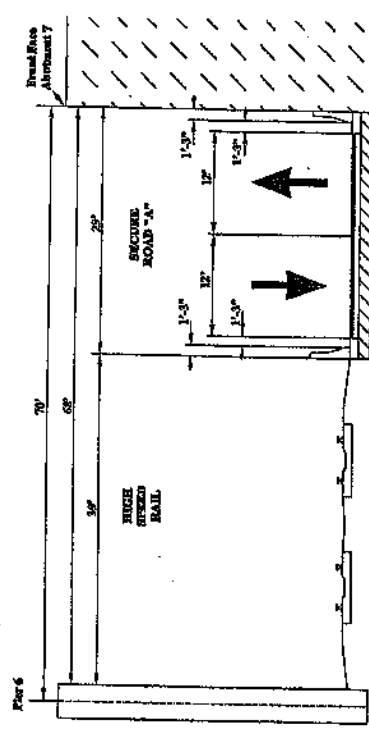
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DETAIL A



DETAIL A



DETAIL B

APPENDIX B

Roadway Projects

Widen Airport Boulevard

Project	Item	Length/ Quantity	Unit Cost	Subtotal
North Exit Improvements	One Lane Roadway	2.4 miles	\$ 2,000,000 per mile	\$ 4,800,000
	Two Lane Roadway	0.6 miles	\$ 3,300,000 per mile	\$ 1,980,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	60,000 c.y.	\$ 6 per c.y.	\$ 360,000
	Overhead Signing	8 signs	\$ 100,000 per sign	\$ 800,000
	Bridges	23,000 sq. ft.	\$ 85 per sq. ft.	\$ 1,955,000
	Barrier Walls	1,000 sq. ft.	\$ 70 per sq. ft.	\$ 70,000
	Total			\$ 9,965,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Widening Improvements	Widening one Lane Roadway	0.1 miles	\$ 2,600,000 per mile	\$ 260,000
	Widening two Lane Roadway	1.3 miles	\$ 3,300,000 per mile	\$ 4,290,000
	Widening three Lane Roadway	0.1 miles	\$ 4,950,000 per mile	\$ 495,000
	Embankment	0.0 c.y.	\$ 6 per c.y.	\$ -
	Overhead Signing	10 signs	\$ 100,000 per sign	\$ 1,000,000
	Bridges	0 sq. ft.	\$ 85 per sq. ft.	\$ -
	Taxway Bridge Expansion	0 sq. ft.	\$ 120 per sq. ft.	\$ -
	Total			\$ 5,985,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
AGT Improvements	Bridges	100,000 sq. ft.	\$ 120 per sq. ft.	\$ 12,000,000
	Other construction cost			\$ 13,000,000
	Total			\$ 25,000,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
South Access Road Improvements	One Lane Roadway	0.1 miles	\$ 2,000,000 per mile	\$ 200,000
	Two Lane Roadway	1.2 miles	\$ 3,300,000 per mile	\$ 3,960,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	0.0 c.y.	\$ 6 per c.y.	\$ -
	Overhead Signing	4 signs	\$ 100,000 per sign	\$ 400,000
	Bridges	0 sq. ft.	\$ 85 per sq. ft.	\$ -
	Taxway Bridge Expansion	0 sq. ft.	\$ 120 per sq. ft.	\$ -
	Total			\$ 4,560,000

Source: URS, 2003.

Total

\$ 45,510,000

Notes:

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Roadway Projects

Bypass Concept

Project	Item	Length/ Quantity	Unit Cost	Subtotal
North Exit Improvements	One Lane Roadway	2.4 miles	\$ 2,000,000 per mile	\$ 4,800,000
	Two Lane Roadway	0.6 miles	\$ 3,300,000 per mile	\$ 1,980,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	60,000.0 c.y.	\$ 6 per c.y.	\$ 360,000
	Overhead Signing	8 signs	\$ 100,000 per sign	\$ 800,000
	Bridges	23,000 sq. ft.	\$ 85 per sq. ft.	\$ 1,955,000
	Barrier Walls	1,000 sq. ft.	\$ 70 per sq. ft.	\$ 70,000
Total				\$ 9,965,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Bypass	One Lane Roadway	0.7 miles	\$ 2,000,000 per mile	\$ 1,400,000
	Two Lane Roadway	2.7 miles	\$ 3,300,000 per mile	\$ 8,910,000
	Three Lane Roadway	0.2 miles	\$ 4,950,000 per mile	\$ 990,000
	Embankment	0.0 c.y.	\$ 6 per c.y.	\$ -
	Overhead Signing	16 signs	\$ 100,000 per sign	\$ 1,600,000
	Bridges	0 sq. ft.	\$ 85 per sq. ft.	\$ -
	Taxiway Bridge Expansion	48,000 sq. ft.	\$ 120 per sq. ft.	\$ 5,760,000
Total				\$ 18,660,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Secure Road	One Lane Roadway	0.4 miles	\$ 2,000,000 per mile	\$ 800,000
	Two Lane Roadway	0.74 miles	\$ 3,300,000 per mile	\$ 2,442,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	200,000.0 c.y.	\$ 6 per c.y.	\$ 1,200,000
	Overhead Signing	6 signs	\$ 100,000 per sign	\$ 600,000
	Bridges	30,000 sq. ft.	\$ 85 per sq. ft.	\$ 2,550,000
	Taxiway Bridge Expansion	48,000 sq. ft.	\$ 120 per sq. ft.	\$ 5,760,000
Total				\$ 13,352,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
South Access Road Improvements	One Lane Roadway	0.1 miles	\$ 2,000,000 per mile	\$ 200,000
	Two Lane Roadway	1.2 miles	\$ 3,300,000 per mile	\$ 3,960,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	0.0 c.y.	\$ 6 per c.y.	\$ -
	Overhead Signing	4 signs	\$ 100,000 per sign	\$ 400,000
	Bridges	0 sq. ft.	\$ 85 per sq. ft.	\$ -
	Taxiway Bridge Expansion	0 sq. ft.	\$ 120 per sq. ft.	\$ -
Total				\$ 4,560,000

Source: URS, 2003.

Total

\$ 46,537,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Roadway Projects

Braided Roadway Concept A

Project	Item	Length/Quantity	Unit Cost	Subtotal
North Exit Improvements	One Lane Roadway	2.4 miles	\$ 2,000,000 per mile	\$ 4,800,000
	Two Lane Roadway	0.6 miles	\$ 3,300,000 per mile	\$ 1,980,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	60,000.0 c.y.	\$ 6 per c.y.	\$ 360,000
	Overhead Signaling	8 signs	\$ 100,000 per sign	\$ 800,000
	Bridges	23,000 sq. ft.	\$ 85 per sq. ft.	\$ 1,955,000
	Barrier Walls	1,000 sq. ft.	\$ 70 per sq. ft.	\$ 70,000
Total				\$ 9,965,000

Project	Item	Length/Quantity	Unit Cost	Subtotal
Braided Roadway Concept A	One Lane Roadway	0.6 miles	\$ 2,000,000 per mile	\$ 1,200,000
	Two Lane Roadway	2.4 miles	\$ 3,300,000 per mile	\$ 7,920,000
	Three Lane Roadway	0.3 miles	\$ 4,950,000 per mile	\$ 1,485,000
	Embankment	30,000 c.y.	\$ 6 per c.y.	\$ 180,000
	Overhead Signaling	14 signs	\$ 100,000 per sign	\$ 1,400,000
	Bridges	30,000 sq. ft.	\$ 85 per sq. ft.	\$ 2,550,000
	Taxiway Bridge Expansion	48,000 sq. ft.	\$ 120 per sq. ft.	\$ 5,760,000
Total				\$ 20,895,000

Source: URS, 2003.

Total

\$ 30,860,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Roadway Projects

Braided Roadway Concept A-1

Project	Item	Length/ Quantity	Unit Cost	Subtotal
North Exit Improvements	One Lane Roadway	2.4 miles	\$ 2,000,000 per mile	\$ 4,800,000
	Two Lane Roadway	0.6 miles	\$ 3,300,000 per mile	\$ 1,980,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	80,000.0 c.y.	\$ 6 per c.y.	\$ 360,000
	Overhead Signing	8 signs	\$ 100,000 per sign	\$ 800,000
	Bridges	23,000 sq. ft.	\$ 85 per sq. ft.	\$ 1,955,000
	Barrier Walls	1,000 sq. ft.	\$ 70 per sq. ft.	\$ 70,000
Total				\$ 9,965,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Braided Roadway Concept A-1	One Lane Roadway	0.8 miles	\$ 2,000,000 per mile	\$ 1,600,000
	Two Lane Roadway	2.4 miles	\$ 3,300,000 per mile	\$ 7,920,000
	Three Lane Roadway	0.3 miles	\$ 4,950,000 per mile	\$ 1,485,000
	Embankment	20,000 c.y.	\$ 6 per c.y.	\$ 120,000
	Overhead Signing	12 signs	\$ 100,000 per sign	\$ 1,200,000
	Bridges	10,000 sq. ft.	\$ 85 per sq. ft.	\$ 850,000
	Taxiway Bridge Expansion	48,000 sq. ft.	\$ 120 per sq. ft.	\$ 5,760,000
Total				\$ 18,935,000

Source: URS, 2003.

Total

\$ 28,900,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Roadway Projects

Braided Roadway Concept C

Project	Item	Length/ Quantity	Unit Cost	Subtotal
North Exit Improvements	One Lane Roadway	2.4 miles	\$ 2,000,000 per mile	\$ 4,800,000
	Two Lane Roadway	0.6 miles	\$ 3,300,000 per mile	\$ 1,980,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	80,000 c.y.	\$ 6 per c.y.	\$ 360,000
	Overhead Signage	8 signs	\$ 100,000 per sign	\$ 800,000
	Bridges	23,000 sq. ft.	\$ 85 per sq. ft.	\$ 1,955,000
	Barrier Walls	1,000 sq. ft.	\$ 70 per sq. ft.	\$ 70,000
	Total			\$ 9,985,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Braided Roadway Concept C	One Lane Roadway	0.5 miles	\$ 2,000,000 per mile	\$ 1,000,000
	Two Lane Roadway	2.8 miles	\$ 3,300,000 per mile	\$ 9,240,000
	Three Lane Roadway	0.6 miles	\$ 4,950,000 per mile	\$ 2,970,000
	Embankment	170,000 c.y.	\$ 6 per c.y.	\$ 1,020,000
	Overhead Signage	22 signs	\$ 100,000 per sign	\$ 2,200,000
	Bridges	44,000 sq. ft.	\$ 85 per sq. ft.	\$ 3,740,000
	Taxiway Bridge Expansion	96,000 sq. ft.	\$ 120 per sq. ft.	\$ 11,520,000
	Total			\$ 31,690,000

Source: URS, 2003.

Total

\$ 41,655,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Roadway Projects

Braided Roadway Concept C-1

Project	Item	Length/ Quantity	Unit Cost	Subtotal
North Exit Improvements	One Lane Roadway	2.4 miles	\$ 2,000,000 per mile	\$ 4,800,000
	Two Lane Roadway	0.6 miles	\$ 3,800,000 per mile	\$ 1,980,000
	Three Lane Roadway	0.0 miles	\$ 4,950,000 per mile	\$ -
	Embankment	60,000.0 c.y.	\$ 6 per c.y.	\$ 360,000
	Overhead Signaling	8 signs	\$ 100,000 per sign	\$ 800,000
	Bridges	23,000 sq. ft.	\$ 85 per sq. ft.	\$ 1,955,000
	Barrier Walls	1,000 sq. ft.	\$ 70 per sq. ft.	\$ 70,000
Total				\$ 9,965,000

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Braided Roadway Concept C-1	One Lane Roadway	0.5 miles	\$ 2,000,000 per mile	\$ 1,000,000
	Two Lane Roadway	2.8 miles	\$ 3,300,000 per mile	\$ 9,240,000
	Three Lane Roadway	0.6 miles	\$ 4,950,000 per mile	\$ 2,970,000
	Embankment	60,000 c.y.	\$ 6 per c.y.	\$ 480,000
	Overhead Signaling	20 signs	\$ 100,000 per sign	\$ 2,000,000
	Bridges	30,000 sq. ft.	\$ 85 per sq. ft.	\$ 2,550,000
	Taxiway Bridge Expansion	36,000 sq. ft.	\$ 120 per sq. ft.	\$ 4,320,000
Total				\$ 29,760,000

Source: URS, 2003.

Total

\$ 39,725,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Roadway Projects

Project	Item	Length/ Quantity	Unit Cost	Subtotal
South Terminal Braided Roadway Concept	One Lane Roadway	1 miles	\$ 2,000,000 per mile	\$ 2,000,000
	Two Lane Roadway	3.8 miles	\$ 3,360,000 per mile	\$ 12,540,000
	Embankment	450,000.0 c.y.	\$ 6 per c.y.	\$ 2,700,000
	Overhead Signing	8 signs	\$ 100,000 per sign	\$ 800,000
	Bridges	112,000 sq. ft.	\$ 85 per sq. ft.	\$ 9,520,000
	Barrier Walls	15,000 ft.	\$ 70 per ft.	\$ 1,050,000
	Total			

Source: URS, 2003.

Total

\$ 28,610,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Roadway Projects

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Total Option 1	One Lane Roadway	2.7 miles	\$ 2,000,000 per mile	\$ 5,400,000
	Two Lane Roadway	1.3 miles	\$ 3,300,000 per mile	\$ 4,290,000
	Three Lane Roadway	1.6 miles	\$ 4,950,000 per mile	\$ 7,920,000
	Four Lane Roadway	0.0 miles	\$ 6,600,000 per mile	\$ -
	Overhead Signling	7 signs	\$ 100,000 per sign	\$ 700,000
	Bridges	0 sq. ft.	\$ 85 per sq. ft	\$ -
	Toll Lanes	64 Lane	\$ 450,000 per lane	\$ 24,300,000
	Total			\$ 42,610,000

Source: URS, 2003.

Administration Building	7 Build	\$ 1,500,000 per bldg	\$ 10,500,000
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Total

\$ 53,110,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Freeway Projects

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Toll Option 2	One Lane Roadway	3 miles	\$ 2,000,000 per mile	\$ 6,000,000
	Two Lane Roadway	1.5 miles	\$ 3,300,000 per mile	\$ 4,950,000
	Three Lane Roadway	2.0 miles	\$ 4,950,000 per mile	\$ 9,900,000
	Four Lane Roadway	0.1 miles	\$ 6,600,000 per mile	\$ 660,000
	Overhead Signging	10 signs	\$ 100,000 per sign	\$ 1,000,000
	Bridges	156,000 sq. ft.	\$.85 per sq. ft.	\$ 13,260,000
	Toll Lanes	34 Lane	\$ 450,000 per lane	\$ 15,300,000
	Total			\$ 51,070,000

Source: URS, 2003.

Administration Building	4 Build	\$ 1,500,000 per bldg	\$ 6,000,000
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Total

\$ 57,070,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Roadway Projects

Project	Item	Length/ Quantity	Unit Cost	Subtotal
Toll Option 3	One Lane Roadway	2.7 miles	\$ 2,000,000 per mile	\$ 5,400,000
	Two Lane Roadway	1.2 miles	\$ 3,300,000 per mile	\$ 3,960,000
	Three Lane Roadway	1.6 miles	\$ 4,950,000 per mile	\$ 7,920,000
	Four Lane Roadway	0.0 miles	\$ 6,600,000 per mile	\$ -
	Overhead Signing	7 signs	\$ 100,000 per sign	\$ 700,000
	Bridges	0 sq. ft.	\$ 85 per sq. ft.	\$ -
	Toll Lanes	56 Lane	\$ 450,000 per lane	\$ 25,200,000
	Total			\$ 43,180,000

Source: LRS, 2003.

Administration Building	7 Bldg	\$ 1,500,000 per bldg	\$ 10,500,000
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Total

\$ 53,680,000

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars.

Rampway Projects

NB Direction		0.38		miles		\$ 3,300,000		per mile	
Two Lanes Roadway		2		toll lane		\$ 450,000		per lane	
Plaza								\$1,254,000	
Total								\$900,000	
								<u>\$2,154,000</u>	

SB Improvements		0.38		miles		\$ 3,300,000		per mile	
Adding One Lane		30,000.0		c.y.		6		per c.y.	
Embankment		2		toll lane		\$ 450,000		per lane	
Widen Bridge		6,000		sq. ft.		\$ 85		per sq. ft.	
Total								\$510,000	
								<u>\$2,844,000</u>	

Roadway improvements **\$4,998,000**

Administration Building **\$1,500,000**

\$6,498,000

TOTAL ESTIMATED COST FOR NEAR -TERM OPTION 1

Notes:

These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars. Source: URS, 2003.

Roadway Projects

NB Direction						
Two Lanes Roadway	0.5	miles	\$ 3,300,000	per mile	\$	1,650,000
Overhead Signing	1	signs	\$ 100,000	per sign	\$	100,000
Plaza Structure	3	toll Lanes	\$ 450,000	per toll lane	\$	1,350,000
Total					\$	3,100,000

SB Improvements						
Adding One Lane	0.5	miles	\$ 3,300,000	per mile	\$	1,650,000
Overhead Signing	1	signs	\$ 100,000	per sign	\$	100,000
Plaza Structure	3	toll Lanes	\$ 450,000	per toll lane	\$	1,350,000
Total					\$	3,100,000

Roadway improvements \$ 6,200,000

Administration Building \$1,500,000

TOTAL ESTIMATED COST FOR NEAR -TERM OPTION 2 **\$7,700,000**

Notes:
 These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars. Source: URS, 2003.

Runway Projects

NB Direction		2000	sq. ft.	10	per mile	\$	20,000
Demolition of Ramp		0.42	miles	\$ 500,000	per sign	\$	210,000
Pavement & Restripping		1,000.0	sq. ft.	70	per sq. ft.	\$	70,000
Barrier Walls		1	signs	\$ 100,000	per sign	\$	100,000
Signs						\$	
Total						\$	400,000

SB Improvements		3000	sq. ft.	10	per mile	\$	30,000
Adding One Lane		0.42	miles	\$ 500,000	per sign	\$	210,000
Pavement & Restripping		1,000.0	sq. ft.	70	per sq. ft.	\$	70,000
Barrier Walls		1	signs	\$ 100,000	per sign	\$	100,000
Signs						\$	
Total						\$	410,000

TOTAL ESTIMATED COST FOR NEAR -TERM OPTION 3 **\$500,000**

Notes:
 These are planning level cost estimates based on concept sketches. They do not include contingencies, design, CEI, administration, legal fees or right-of-way. These cost estimates are provided for comparative purposes only. Actual costs will vary based on final design and project specifications. Cost estimates are shown in 2003 dollars. Source: URS, 2003.

APPENDIX L

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**

**Florida High Speed Rail Authority
High Speed Rail Project Civil Infrastructure Design Guidelines**

July 16, 2002

**Parsons
225 East Robinson Street, Suite 300
Orlando, FL 32801**

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Florida High Speed Rail Authority
High Speed Rail Project Civil Infrastructure Design Guidelines
July 16, 2002

1.0 Introduction

It is anticipated that a high speed rail system will be constructed in the State of Florida under a design build operate and maintain (DBOM) contract. Preliminary engineering and environmental assessment are proceeding on the St. Petersburg to Orlando corridor in order to select a preferred alignment, satisfy the NEPA process and develop DBOM request for proposal documents.

Multiple high speed ground transportation technologies exist, including diesel-electric and electric powered steel wheel/steel rail systems and magnetic levitation systems. Rail systems offer both conventional and tilt suspensions. The performance and infrastructure requirements of each technology are different. The key differences for alignment are the maximum speeds attainable with each technology – a range of 120mph to 250 mph.

In order to enable the competitive marketplace to present the best option for the citizens of Florida, the Authority has not made a technology selection. This complicates the preliminary engineering task, as the alignments and infrastructure must be designed to allow the application of the range of technologies. The alignments must be designed, so as not to preclude the use of or unjustly penalize the performance of any technology. (One exception to this concept exists – Maglev systems shall not be permitted adjacent to the existing CSX railroad due in part to the perception by CSX that EMI may affect the performance of the CSX signal system.) The High Speed Rail Project Civil Infrastructure Design Guidelines are established to guide the preliminary design decisions in a manner consistent with these objectives.

The basic infrastructure design during the preliminary engineering phase shall accommodate an electrified high speed rail system capable of speeds of 150 mph. On award of a contract to a DBOM contractor, it is anticipated that the contractor shall optimize the alignment and infrastructure design for his technology within right of way and other constraints.

The high speed rail system shall be designed to serve high speed passenger equipment and will not be used by general railway freight equipment. The high speed passenger equipment may include special, similarly constructed freight cars operating in separate trains or within the passenger train consists. Conventional track maintenance equipment including work trains, diesel electric locomotives, ballast cars, tampers, geometry cars and hi-rail inspection cars shall operate on the track (except Maglev).

2.0 Codes, Standards and Regulations

Tracks shall be designed to meet applicable requirements of Track Safety Standards 49 U.S.C. Part 213 Subpart G for Class 8 track.

Except as noted specifically herein, infrastructure design shall be in accord with Florida DOT standards including:

- Project Development and Environmental Manual
- Roadway Plans Preparation Manual
- Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways
- Bicycle Facilities Planning and Design Manual
- Right-of-Way Engineering Manual
- Survey Manual
- Drainage Manual
- Soils and Foundations Manual

- Structures Design Guidelines
- Computer Aided Design and Drafting (CADD) Roadway Standards and Guidelines

Railroad track and structures shall be designed in accord with recommended practice of the AREMA Manual for Railway Engineering 2002.

3.0 Survey and Right of Way

The preliminary engineering alignment shall be plotted on scaled low resolution aerial photography base maps. Scaled high resolution aerial photography and digital terrain models shall be provided to potential design build contractors during the RFP process to enable the contractors to optimize the alignment for their systems.

During preliminary engineering, approximate right of way limits shall be determined from existing highway plans and railroad valuation maps. Boundaries shall be plotted on the plan sheets.

Tangent segments of the high speed rail alignment shall be designed to fit within a 44 foot envelope in highway medians and 50 foot envelope within existing railroad alignments. Curves and spirals may require a greater envelope width and/or additional right of way. Excursions outside the existing median or right of way shall be identified on the plans. In addition, excursions outside the existing right of way are required for connections between railroad and highway median alignments, between highway median alignments and station sites and between different highway alignments. Additional right of way requirements shall be identified on the plans.

4.0 Typical Sections

Typical sections are provided for the following configurations:

- Open Terrain Electrified Center Pole Rail Tangent Track
- Open Terrain Electrified Side Pole Tangent Track
- Electrified Rail Tangent Track in Highway Median Depressed Under Roadway Overpass
- Electrified Center Pole Rail Tangent Track Adjacent to Existing CSX at a 25 foot Track Centers with Standard Ditch
- Electrified Center Pole Rail Tangent Track Adjacent to Existing CSX at a 25 foot Track Centers with Underdrains
- Maglev Tangent Track at Grade in Highway Median
- Maglev Tangent Track at Grade in Highway Median Depressed Under Roadway Overpass
- Electrified Side Pole Rail Tangent Track in Highway Median
- Electrified Side Pole Rail Curved Track in Highway Median
- Electrified Side Pole Rail Tangent Track Adjacent to CSX 25 foot Centers
- Electrified Side Pole Rail Curved Track Adjacent to CSX at 25 Foot Centers

Where standard roadbed and ballast section back-slopes intersect existing ground lines beyond the existing ROW, retaining walls shall be designed and constructed within the property with diversion ditches or drains provided behind the retaining wall to divert runoff from adjacent properties toward stabilized drainage outfall structures. Where applicable, profiles may be adjusted to minimize earthwork and reduce or eliminate the need for retaining walls.

Due to the minimal ROW width or inaccessibility due to geological conditions a parallel access roadway shall not be constructed.

Emergency and inspection walkways shall not be required in constrained right of way or highway median construction. Emergency access and evacuation shall be provided along the adjacent track.

Soil engineering and analysis shall be employed to design the subgrade embankments and cuts. New side slopes shall not be steeper than 1.5:1. Unless designed from site specific soils data, slopes shall not be steeper than 2:1

To minimize right-of-way and excavation requirements, underdrains rather than ditches shall be employed where necessary for drainage.

5.0 Design Speeds

The preliminary engineering alignment shall be designed for a peak speed of 160 mph (maximum 150 mph operating speed), where not restricted by right of way limitations.

6.0 Track and Guideway

Mainline roadbed, trackwork and alignment shall be designed for high speed passenger service at speeds up to 160 mph, unless otherwise restricted by geometric considerations, special trackwork, or yard limits. All track on earthen roadbed shall be ballasted construction. Direct fixation shall be permissible on flyover structures to eliminate the dead load of the heavy rock ballast and provide longer span lengths. Where high-speed operation is permissible, the facilities shall be designed to support Class 8 gage, alignment and surface criteria without excessive maintenance.

A double track mainline shall be constructed to ensure reliable service. High speed crossovers are required at roughly 25 mile intervals to allow heavy maintenance under single track operations without shutting down the system.

Main tracks used by passenger service shall be constructed using new 136RE continuous welded and controlled cooled rail (CWR). Rail for sidings and yards shall be either new 136RE CWR (as above) or relayed continuous welded rail of not less than 115 lbs. per yard.

Main track shall use 8'6" reinforced concrete ties, spaced at 24 in centers. Yard track may use either concrete or timber ties. Timber ties shall be spaced at 19.5 in centers. The concrete tie track shall be suitably designed to provide electric isolation of one rail from the other and both from ground to satisfy train control circuit integrity requirements, and, if the track is electrified using the running rails as the negative return, the track shall include electric isolation sufficient to provide suitable protection of adjacent facilities from stray current corrosion.

Track gage shall be 4 ft 8.5 in measured at right angles to the track alignment 5/8 in below the top of rail.

Rail fasteners installed with concrete ties shall be spring clip design with elastomeric pads to prevent tie wear. Timber ties shall employ tie plates, spikes and anchors.

Ballast shall be suitable for use with concrete or timber ties. Mainline ballast gradations shall conform to No. 24, 3 or 4A to provide for drainage and performance under load. Yard ballast shall meet No. 5 gradation requirements to provide for improved walkway and safety conditions along the track. Due to the high crushing loads under concrete ties, ballast materials shall be limited to granite, trap rocks or quartzite. The minimum ballast depth shall be 14 in under mainline ties. The minimum ballast shoulder width shall be 12 inches. Ballast shoulder slopes shall not be steeper than 2H: 1V.

Subballast shall conform to Florida DOT specifications for crushed aggregate base course and shall consist of hard, durable particles of crushed stone or crushed concrete and a filler of natural sand, stone sand or other finely divided mineral matter. Subballast depth shall be not less than 8 inches. Subballast shall be sloped as shown on the cross section prints to promote drainage of the track structure.

The mainline track shall be entirely grade separated. Grade crossings are permitted in yards and possibly in slow speed territory, where grade separation is not economically feasible. Where such grade crossings exist, precast steel reinforced concrete panels with elastomeric flange fillers shall be used. Concrete panels provide the most uniform crossing surface and security of installation of the commercially available grade crossing products. Grade crossings shall include gated warning systems.

7.0 Special Trackwork

All new turnouts, crossovers, and special crossings shall be in accordance with current AREMA Portfolio of Trackwork Plans for standard curved switch and rigid frog lateral turnouts, unless otherwise modified due to location within mainline track curves and spirals.

The point of switch or heel of frog shall be located no closer than the following:

TS or ST of adjoining mainline track curve 200 feet

PVC or PVT of a vertical curve 100 feet

Where unconstrained by geometry, all mainline crossovers shall be #32.75 with movable point frogs. Crossovers and turnouts in close proximity to terminal stations may be #20 with curved switch points and RBM frogs. Yard turnouts shall be no smaller than #8. All mainline turnouts shall be on concrete ties.

8.0 Horizontal Alignment

The following design guidelines are based on AREMA 2002. All horizontal alignment design shall conform to current AREMA guidelines.

8.1 Tangents

The minimum tangent length between curves shall be the greater of 100 feet or three times the design speed. The alignment shall be tangent through the platform area to a distance of 100 feet from platform edges.

8.2 Curvature

Curvature shall not exceed 9 degrees on mainline tracks and 12 degrees on yard tracks. The minimum length of circular curve shall be determined by the formula: $L = 2.22 * V$, where L is in ft and V is in mph. In no case shall the length of circular curve be less than 100 feet

8.3 Superelevation/Cant Deficiency

Mainline curves shall be superelevated. The maximum design superelevation E(A) shall not exceed 6 inches. FRA permits a maximum superelevation of 7 inches.

Maximum cant deficiency E(U) shall not exceed 9 inches. (FRA permits a maximum cant deficiency of 9 inches on qualified equipment, i.e. tilt body equipment. For non-tilt body equipment E(U) shall be limited to 3 inches unless the roll angle is within limits specified by AREMA in which case the E(U) may be increased to 4.5 inches.)

Mainline curves shall be designed with E(A) established to balance forces on both rails, employing cant deficiency as required to achieve design speeds. The balancing speed in a curve shall be determined by the formula: $E(A) = .0007 * D * V * V$, where E(A) is in inches, D is in degrees and V is in mph. The maximum permissible speed in a curve shall

be determined by the formula: $E(A)+E(U) = .0007*D*V*V$, where $E(A)$ and $E(U)$ are in inches, D is in degrees and V is in mph. The sum of $E(A)+E(U)$ shall not exceed 15 inches.

Superelevation shall be run off at a constant rate in the spiral. Superelevation shall not be runoff on tangent track.

Actual and unbalanced superelevation may be simultaneously introduced provided that AREMA spiral length guidelines are followed.

8.4 Spirals

Mainline curves and tangents shall be connected with a spiral transition. The length of the spiral shall be determined by the maximum value determined by the following formulae:

- $L(S) = 1.63 * E(U) * V$, where $L(S)$ is in ft, $E(U)$ is in inches and V is in mph.
- $L(S) = 1.30 * E(A) * V$, where $L(S)$ is in ft, $E(A)$ is in inches and V is in mph.
- $L(S) = 124 * E(A)$, where $L(S)$ is in ft and $E(A)$ is in inches. (Applies to Class 8 track)

Spiral and curve geometry shall be determined using the formula and notation of AREMA 5-3-2 through 5-3-5.

The application of spirals for high speed operation is anticipated to result in conflicts with existing CSX railroad and highway median alignments, as the original alignments were not constructed with long spirals. Each curve shall be evaluated to determine site specific solutions. Where the cost of realigning existing infrastructure proves prohibitive, the design speed and spiral length shall be reduced as necessary.

9.0 Vertical Alignment

The following design guidelines are based on AREMA 2002. All vertical alignment design shall conform to current AREMA guidelines.

9.1 Grades

The vertical alignment shall follow the existing track or highway gradients, wherever practicable. The desired maximum grade shall not exceed 3.5%. Under no circumstances shall the grade exceed 5%. The minimum grade length shall be determined by the formula: $L=2.22*V$, where L is in ft and V is in mph. Yard tracks and station track grades shall not exceed .25%. It is desired to design such tracks at 0% grade.

9.2 Vertical Curves

Where changes in grade occur, gradient lines should be connected by vertical curves, observing the following provisions:

The length of a vertical curve is determined by the difference in grades to be connected and the rate of change adopted. For high-speed main tracks, the rate of change should not be more than 0.05' per station of 100' in sag curves and not more than 0.10' per station of 100' in crest curves.

Where geometric constraints prevail, the following formula shall be used to determine the vertical curve lengths:

$LVC = \Delta g * V * V * K / A$, where:

LVC = Length of Vertical Curve (in ft)

Delta g = difference in grades (in ft/ft)

V = speed (in mph)

K = 2.15, constant to convert mph into feet

A = 0.60 ft/sec/sec

The minimum vertical curve length, $LVC_{(min)}$, shall not be less than 100 feet

10.0 Clearances and Track Centers

10.1 Tangent

Main tracks shall be constructed at 13.5 foot minimum track centers on tangent. The desirable main line high speed rail track centers shall be 15.0 feet. Track centers shall be increased to provide clearance for center catenary support structures. The minimum clearance to catenary poles support structures shall be 9.5 feet as recommended by AREMA. The desired clearance is 12 ft-0 in. High speed rail tracks shall be separated from adjacent freight rail tracks by a distance of not less than 25 feet measured between freight and high speed rail track centerlines.

Yard and storage tracks shall be spaced at not less than 13.5 feet measured between track centerlines.

The minimum permissible clearance from track centerlines to adjacent fixed obstructions shall be 8 feet measured from the track centerline in accord with Florida law.

10.2 Curves

The minimum horizontal clearance (8.0 feet) and track spacing (13.5 feet) shall be increased 1.5 inches per degree of curvature. Where superelevation is applied, the minimum horizontal clearance of 8.0 feet shall be increased on the inside of the curve 3 inches per inch of actual superelevation.

10.3 Vertical Clearance

The high speed rail alignment shall be designed to provide 19 feet of clearance between the top of rail and the low point of the bridge. This clearance value allows the installation of a catenary system with sufficient electrical clearance to the bridge for a 25kV power system. Clearance for existing structures may be obtained by rebuilding the structure or lowering the track elevation.

10.4 Vehicular Dynamic Clearance

The vehicular dynamic clearance shall not exceed AREMA Plate C.

11.0 Structures

11.1 Bridges

Highway bridge piers within 25 feet of a track centerline shall be protected with a reinforced concrete deflection wall to a height of 6 feet above the top of rail elevation.

High speed rail bridges shall be constructed with a side walkway, where permitted by median width or railroad right of way width.

11.2 Retaining Walls

The desirable clearance to retaining walls shall be 10.0 minimum from centerline of track to near face of wall.

11.3 Barriers

Standard Florida DOT highway median barriers shall be employed on the boundaries of highway median running high speed rail systems to deflect errant highway vehicles from entering the guideway. On the inside of curves the height of standard barriers shall be increased to 7.5 feet.

11.4 Culverts

Per FDOT drainage criteria.

12.0 Drainage

Per FDOT drainage criteria.

13.0 Fencing

Chain link fencing 6 feet high shall be installed on the boundaries of the new rail alignment. The fencing shall be installed on the top of the highway median barrier separating high speed rail from automotive traffic.

14.0 Provisions for Systems Elements

Nominal contact wire height shall be 23 feet in accord with AREMA recommendations per 33-4-10. The minimum contact wire height shall be 17 feet. An envelope of 18 inches in width shall be provided for catenary support structures. The preferred location of catenary support structures is on the outside of the double track main line. This permits one catenary support system to remain in service if the other is out of service for any reason. All train control and communications cables shall be installed below grade by either direct burial or in ducts.

15.0 Overhead Roadway Bridges

Per FDOT standards with clearances to high speed rail tracks as defined herein.

16.0 Highway Modifications

Per FDOT standards.

17.0 Maintenance of Traffic

Per FDOT standards for highway traffic. Per affected railroad for work adjacent to operating railroads.

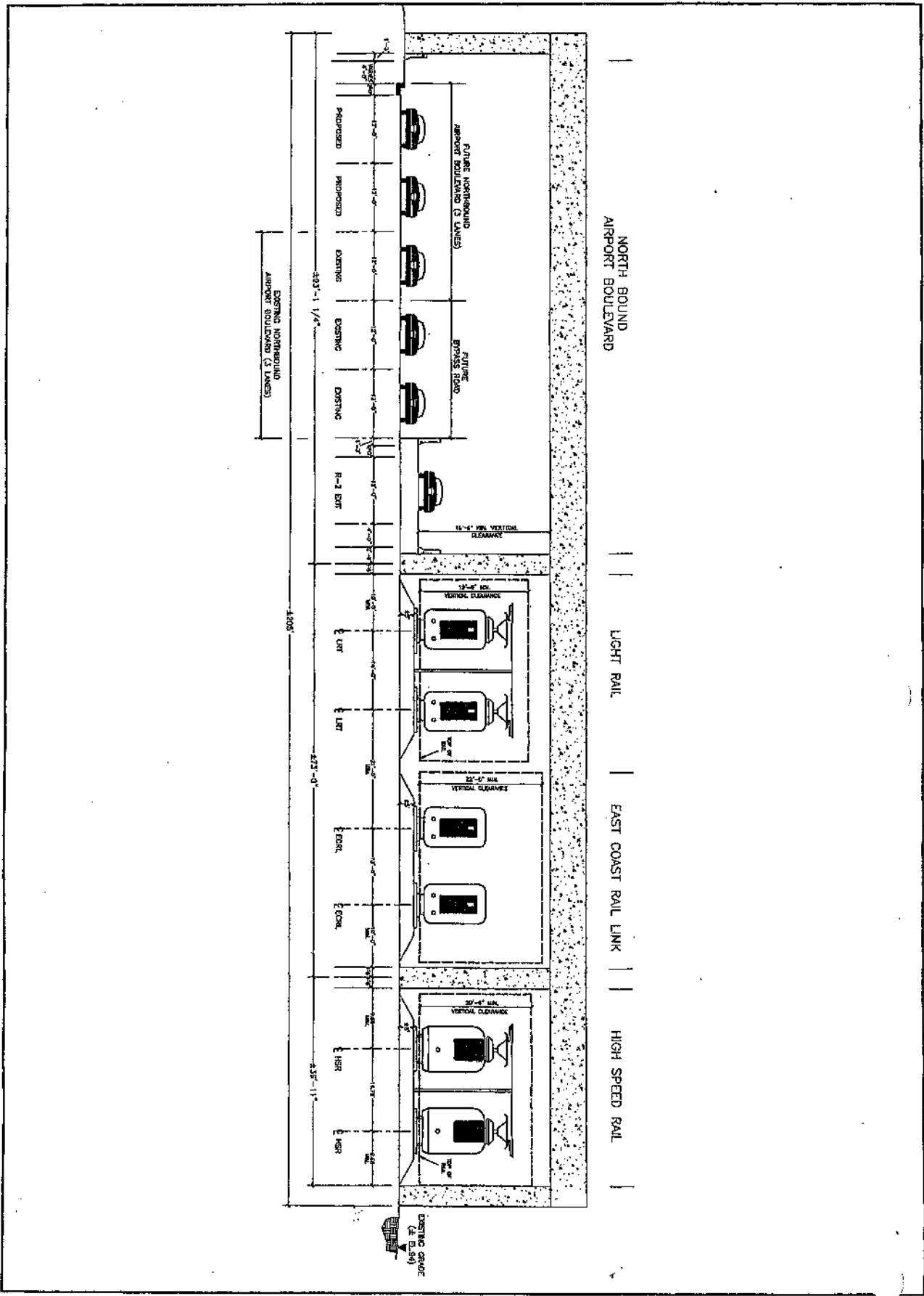
18.0 Stations

Platform length shall be not less than for 9 car trains including locomotives. For preliminary design a platform length of 800 feet shall be used. Center platforms shall be a minimum of 24 feet

in width. Platforms shall be high level and meet ADA clearance requirements. For preliminary design, a distance from centerline of track to platform edge of 5.25 feet shall be used.

APPENDIX M

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**



Orlando
International
Airport
Orlando, Florida

ZHA
ARCHITECTS

Cargo Road
Planning Book

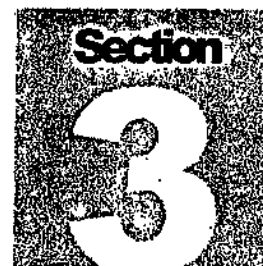
*Future Cargo Road
Stages over
Meridian Airport
Eastbound*

DATE	DESCRIPTION

EXHIBIT
15

APPENDIX N

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**



3.0 Track Alignment and Vehicle Clearances

3.1 Introduction

This chapter establishes the basic track alignment and clearance criteria to be used in the design of the CFLRTS project.

It includes criteria for the design of LRT horizontal and vertical track alignments and also establishes the minimum dimensions required to insure proper clearances between the transit vehicles, or transit structures, and the obstructions involved.

3.2 Light Rail Transit Track Alignment And Clearances

The criteria set forth in this section for the design of CFLRTS track alignment and clearances have been established to allow the provision of comfortable, economical, and efficient transportation for passengers while maintaining adequate factors of safety with respect to overall operation, maintenance, and vehicle stability. They have been developed by utilizing accepted engineering practices and the experiences of currently operating rail transit and railroad systems.

3.2.1 General

Except for areas where the LRT operates within or adjacent to surface streets, the track alignment shall be designed to accommodate the maximum design speed of 89 km/h [55 mph]. Physical constraints along various portions of the system, together with other design limitations, may preclude achievement of this objective. Where the LRT operates within or adjacent to surface streets, the maximum design speed for the track alignment shall be limited to the legal speed of the parallel street traffic, but shall not exceed 57 km/h [35 mph]. In all areas, the civil design speed shall be coordinated with the normal operating speeds as provided on the train performance simulation program speed-distance profiles.

Engineering stationing shall generally progress from south to north and from west to east. Stationing at the south or west end of the project shall not commence with station "0+00," but instead shall begin at an arbitrary station that is sufficiently high that future extensions to the system will not result in negative stationing. Stationing protocol shall remain independent of any mileposting system which may be instituted for operational purposes and which may actually run in the opposite direction from the engineering stationing.

When viewing the LRT alignment looking ahead station, the track on the viewer's right shall be designated as the "Right Track" or Track "R," while the track to the left shall be designated the "Left Track" or Track "L." Each route shall be stationed independently along the centerline of the Right Track. Stationing shall be continuous along the length of the Right Track and this track shall be the basic control for locating all other system facilities along the route.

Independent stationing shall be required for the Left Track when tracks are neither parallel nor concentric, where widened track centers are required around curves, where parallel tracks have independent profiles, or where tracks are on separate structures. Where curvature results in different stationing at the end of a curve, the Left Track stationing shall be equated to the Right Track stationing at the spiral to tangent (ST) point of whichever track has the spiral which extends the furthest ahead station. Geometrics shall be developed for all tracks.

The LRT system may include at-grade portions where light rail vehicles will operate in mixed traffic with rubber-tired vehicles in surface streets. In these segments, the applicable geometric design criteria for such streets shall be met in the design of the track alignment.

Coordination of horizontal and vertical alignment shall avoid a combination of minimum radius, maximum grade, and maximum unbalanced superelevation.

3.2.2 Horizontal Alignment

The horizontal alignment of mainline tracks shall consist of a series of tangents joined to circular curves by means of spiral transition curves. Superelevation shall be used to maximize running speeds where it does not interfere with pavement grades in areas of mixed traffic operation. The nomenclature used to describe horizontal alignments shall be consistent with that illustrated in Figure 3-1.

3.2.2.1 Tangent Alignment

a) Line Sections

The minimum length of tangent track between curved sections of track shall be as follows:

<u>Condition</u>	<u>Tangent Length</u>
Desirable Minimum	60 m [197 ft]
Minimum	30 m [98 ft] or 0.57 times the design speed in km/h [3 times the design speed in mph], whichever is greater
* Absolute Minimum	12 m [40 ft]

(* Not to be reduced without prior LYNX approval)

If adjacent curves in the same direction which are in close proximity to one another cannot be replaced by a single simple curve due to geometric constraints, a series of compound curves shall be the preferred arrangement. Broken back curves (e.g., short tangents between curves in the same direction), shall be avoided where practical.

b) Stations

At station platforms, the horizontal alignment shall be tangent throughout the entire length of the platform. The tangent shall be extended beyond both ends of the platform as follows:

<u>Condition</u>	<u>Tangent Length</u>
Desirable Minimum	23 m [75 ft]
Minimum	18 m [59 ft]
Absolute Minimum*	14 m [46 ft]

(* Not to be reduced without prior LYNX approval)

c) Yard Tracks

Yard tracks shall have a desirable minimum tangent length of 12 m [40 ft], with an absolute minimum of 6 m [20 ft].

d) Special Trackwork

All special trackwork shall be located on horizontal tangents. Refer to Section 4.13 for minimum tangent length criteria in areas of special trackwork.

3.2.2.2 Curved Alignment

Intersections of horizontal tangents shall be connected by circular curves which may be either simple curves or spiraled curves as required by this criteria.

a) Circular Curves

Circular curves shall be specified by their radius. The minimum radii for mainline tracks shall be as follows:

<u>Location</u>	<u>Minimum Radius</u>
At-grade ballasted:	90 m [295 ft] desirable
In-street:	38 m [125 ft] desirable 30 m [98 ft] minimum 25 m [82 ft] absolute minimum

The minimum radii for yard and service tracks shall be as follows:

<u>Location</u>	<u>Minimum Radius</u>
Yard and service tracks:	38 m [125 ft] desirable
	30 m [98 ft] minimum
	25 m [82 ft] absolute minimum

In order to minimize LYNX's required inventory of precurved rail for maintenance replacements, curve radii less than 45 m [148 ft] shall be selected from the following list where practical:

25 m
26 m
30 m
35 m
40 m

The desirable minimum circular curve length shall be determined by the following formula:

$$L(m) = 0.57V$$

$$L(ft) = 3V$$

Where L = minimum length of curve, in m [ft]
V = design speed through the curve, in km/h [mph]

For spiraled circular curves in areas of restricted geometry, the length in m [ft] of the circular curve added to the sum of one half the length of both spirals shall be an acceptable method of determining compliance with the above criteria. The absolute minimum length of a superelevated circular curve shall be 14 m [46 ft].

Curves that include no actual circular curve segment (e.g., double-spiraled curves) shall be permitted only in areas of extremely restricted geometry (such as paved or embedded track in a downtown area), provided no actual superelevation (E_s) is used and prior LYNX approval has been obtained.

The civil design speed for a given horizontal curve shall be based on its radius, length of spiral transition, and actual and unbalanced superelevation through the curve as described in the following sections. Horizontal curve civil design speeds shall be designed using the following increments:

25 km/h	[15 mph]
41 km/h	[25 mph]
57 km/h	[35 mph]
73 km/h	[45 mph]
89 km/h	[55 mph]

b) Superelevation

Superelevation is defined as the difference in mm [in] the outer (high) rail is raised above the inner (low) rail. Equilibrium superelevation is the amount of superelevation that would be required so that the resultant force from the center of gravity of the light rail vehicle will be perpendicular to the plane of the two rails and halfway in between them at a given speed. Equilibrium superelevation shall be determined by the following equation:

$$E_q(\text{mm}) = E_a + E_u = 11.84 \left(\frac{V^2}{R} \right)$$

$$E_q(\text{in}) = E_a + E_u = 3.96 \left(\frac{V^2}{R} \right)$$

- Where E_q = total amount of superelevation required for equilibrium, in mm [in]
 E_a = actual superelevation, in mm [in]
 E_u = unbalanced superelevation, in mm [in]
 V = design speed through the curve, in km/h [mph]
 R = radius of curvature, in m [ft]

In practice, the full equilibrium superelevation (E_q) is rarely installed in track as doing so would require excessively long spiral transition curves. It could also produce passenger discomfort on board a train which is moving much slower than the design speed or stopped in the middle of a steeply superelevated curve. Therefore, only a portion of the calculated E_q , the actual superelevation E_a , shall be designed for. The difference between the equilibrium superelevation and the actual superelevation is called the unbalance, and is designated as E_u .

The desired relationship between E_a and E_u is derived from the following equation:

$$E_u \text{ (mm)} - \left(\frac{E_a \text{ (mm)}}{2} \right) = 25$$

$$E_u \text{ (in)} - \left(\frac{E_a \text{ (in)}}{2} \right) = 1$$

Desirable values of actual superelevation (E_a) shall be determined by the following formula:

$$E_a \text{ (mm)} = 7.89 \left(\frac{V^2}{R} \right) - 16.67$$

$$E_a \text{ (in)} = 2.64 \left(\frac{V^2}{R} \right) - 0.67$$

Use of the above equation will result in the gradual introduction of both actual and unbalanced superelevation. Calculated values for actual superelevation shall be rounded up to the nearest 5 mm [1/4-in] where practical. For a total superelevation ($E_a + E_u$) of 25 mm [1 in] or less, no actual superelevation (E_a) shall be applied. In specific cases where physical constraints limit the amount of E_a which can be introduced, a maximum of 40 mm [1-1/2 in] of E_u shall be permitted without introduction of E_a .

Actual superelevation (E_a) shall be attained and removed linearly throughout the full length of the spiral transition curve by raising the outside rail while maintaining the inside rail at the profile grade.

The maximum values for actual and unbalanced superelevation shall be as follows:

Superelevation	Maximum Value
E_a =	100 mm [3.9 in] desirable * 150 mm [5.9 in] absolute
E_u =	75 mm [3.0 in] desirable * 100 mm [3.9 in] absolute

(* Not to be exceeded without prior approval of LYNX)

Yard and secondary tracks shall not be superelevated.

c) Spiral Curves

Spiral transition curves shall be used in order to develop the superelevation of the track and limit lateral acceleration during the horizontal transition of the light rail vehicle as it enters the curve. Spiral transition curves shall be clothoid spirals as depicted in Figure 3-1. Spirals shall be required on all mainline track horizontal curves with a radius less than 3050 m [10,006 ft].

The desirable lengths of spiral shall be the greater of the lengths determined from the following formulae (rounded up to the nearest 5 m [16 ft] or up to the nearest 1 m [3 ft] where geometric conditions are restricted), but preferably not less than 19 m [62 ft]:

$$L_s(m) = 0.0082E_a V \qquad L_s(ft) = 1.10E_a V$$

$$L_s(m) = 0.0061E_u V \qquad L_s(ft) = 0.82E_u V$$

$$L_s(m) = 0.37E_a \qquad L_s(ft) = 31E_a$$

Where L_s = spiral length in m [ft]
 V = curve design speed in km/h [mph]
 E_a = actual superelevation in mm [in]
 E_u = unbalanced superelevation in mm [in]

Where geometric conditions are extremely restricted, such as in unsuperelevated, embedded track in a CBD area, the spiral length may be reduced to the absolute minimum of 10 m [33 ft] provided that prior LYNX approval has been obtained.

A spiral is preferred, but not required for secondary tracks where design speeds are less than 15 km/h [10 mph]. Secondary tracks which have design speeds greater than 15 km/h [10 mph] shall have spirals, and superelevation is required when at all feasible.

Under normal situations, superelevation shall be introduced and run off uniformly through the length of a spiral transition curve. In extraordinary cases where LYNX has granted approval for the introduction of superelevation in a curve with no spirals, the superelevation shall be developed along the tangent immediately preceding the point of curvature (PC), and shall be run out in the tangent immediately beyond the point of tangency (PT). The transition length is then determined from the minimum spiral length formulae of this subsection. The maximum amount of superelevation which may be run out in tangent track shall be 40 mm [1-1/2 in].

d) Compound Circular Curves

Where compound curves are used, they shall be connected by a spiral transition curve. The absolute minimum spiral length shall be the greater of the lengths as determined by

the following (rounded off to the next largest 5 m [16 ft] or up to the nearest 1 m [3 ft] where geometric conditions are restricted):

$$L_s(m) = 0.0082(E_{a2} - E_{a1}) V \qquad L_s(ft) = 1.10(E_{a2} - E_{a1}) V$$

$$L_s(m) = 0.0061(E_{u2} - E_{u1}) V \qquad L_s(ft) = 0.82(E_{u2} - E_{u1}) V$$

$$L_s(m) = 0.37(E_{a2} - E_{a1}) \qquad L_s(ft) = 31(E_{a2} - E_{a1})$$

- Where L_s = minimum length of spiral, in m [ft]
 E_{a1} = actual superelevation of the first circular curve, in mm [in]
 E_{a2} = actual superelevation of the second circular curve, in mm [in]
 E_{u1} = unbalanced superelevation of the first circular curve, in mm [in]
 E_{u2} = unbalanced superelevation of the second circular curve, in mm [in]
 V = design speed through the circular curves, in km/h [mph]

Spiral transition curves connecting compound curves are not required when both $(E_{a2} - E_{a1})$ and $(E_{u2} - E_{u1})$ are less than 25 mm [1 in]. For compound circular curves without a spiral, the change in superelevation shall be run out entirely within the curve of the larger radius.

e) Reverse Curves

Reverse curves shall be avoided on mainline track, if possible. Every attempt shall be made to use standard circular curves with tangent sections as described in Sections 3.2.2.1 and 3.2.2.2. For those sections of alignment where reverse curves must be used, the following criteria may be used with prior LYNX approval:

- Reverse curves shall have spiral transition curves that meet at the point of reverse curvature, with the rate of change of superelevation constant through both of the spiral curves as defined by the following relationship.

$$L_{s1} \times E_{a2} = L_{s2} \times E_{a1}$$

- Where E_{a1} = actual superelevation applied to the first curve
 E_{a2} = actual superelevation of the second circular curve
 L_{s1} = the length of the spiral leaving the first curve
 L_{s2} = the length of the spiral entering the second curve

- If either of the reverse curves is less than 52 m [170 ft] in radius, each spiral shall be at least 18 m [59 ft] in total length. If possible, the length of spiral shall conform to the criteria in Section 3.2.2.2.
- The superelevation transition through the spirals shall be accomplished by sloping both rails through the entire transition, as shown in Figure 3-2.

Note that through the transition, both rails will be at an elevation above the theoretical profile grade line. This method of superelevation transition creates additional design considerations including an increased ballast section width at the point of reverse spiral and possible increased clearances. Such issues shall be investigated in detail and any impacts identified in the waiver application to LYNX. If the alignment permits, reverse curves shall be separated by the minimum tangent lengths specified in Section 3.2.2.1 to avoid those complications.

On embedded tracks in city streets, if alignment constraints make providing a tangent between two superelevated spiraled reversed curves impossible, a tangent shall not be required provided that the operating speed is limited so that the lateral acceleration is held to a maximum of 0.1 g.

3.2.3 Vertical Alignment

3.2.3.1 General

The vertical alignment shall be composed of constant grade tangent segments connected at their intersection by parabolic curves having a constant rate of change in grade. The nomenclature used to describe vertical alignments shall be consistent with that illustrated in Figure 3-3.

The profile grade line in tangent track shall be along the centerline of track between the two running rails and in the plane defined by the top of the two rails. In curved track, the inside rail of the curve shall remain at the profile grade line and superelevation achieved by raising the outer rail above the inner rail.

In areas of horizontal curvature where the profile is given for the right track only, the top of rail elevation of the left track shall be adjusted uniformly throughout the curve to compensate for the difference in horizontal curve lengths.

3.2.3.2 Vertical Tangents

The minimum length of constant profile grade between vertical curves shall be as follows:

$$L_v \text{ (m)} = 0.57V$$

$$L_v \text{ (ft)} = 3V$$

Where L_v = Minimum length of constant profile grade, in m [ft]
 V = Civil design speed, in km/h [mph]

Absolute minimum L_v shall be 30 m [98 ft], unless otherwise approved by LYNX.

In areas of in-street alignments, where the need to conform to existing street profiles makes compliance with the above criteria economically unfeasible, the above requirement may be waived with prior approval of LYNX.

The profile at stations shall be on a vertical tangent that extends 14 m [46 ft] beyond each end of the platform. Special trackwork shall be located on vertical tangents. Refer to Section 4.13 for minimum vertical tangent length criteria in areas of special trackwork.

3.2.3.3 Vertical Grades

The following profile grade limitations shall apply:

a) Mainline Tracks

Maximum (sustained grade unlimited length)	4.0%
Maximum (sustained grade with up to 760 m [2493 ft] between PVTs of vertical curves)	4.3% ←
Maximum (short sustained grade with no more than 150 m [492 ft] between points of vertical intersection (PVTs) of vertical curves). Any grade exceeding 5.0% requires prior approval of LYNX.	5.0%
Minimum (for drainage on direct fixation track)	0.2%

b) Station Areas

Maximum	1.0%
---------	------

No minimum grade is specified at passenger stations provided adequate track drainage can be maintained.

c) Yard Tracks

Maximum	1.0%
---------	------

d) Yard Storage & Pocket Tracks

Desirable	0.0%
Maximum	0.25%

All tracks entering the yard shall either be level, sloped downward away from the mainline, or dished to prevent rail vehicles rolling from the yard onto the mainline. For yard secondary tracks, it is desirable to have a slight grade, maximum 1.0 percent and minimum 0.35 percent, to achieve good track drainage at the subballast level.

Through storage tracks shall have a maximum gradient of 0.35 percent, unless there is a sag in the middle of their profile to prevent rail vehicles from rolling to either end. It is desirable that the profile grade of a stub end storage track descend toward the stub end, and, if adjacent to a mainline or secondary track, be curved away from that track at its stub end. If it is necessary for the profile grade of a storage track to slope up toward the stub end, the grade shall not exceed 0.2 percent.

Tracks located within maintenance shop buildings shall be level.

3.2.3.4 Vertical Curves

All changes in grade shall be connected by vertical curves. Vertical curves shall be defined by parabolic curves having a constant rate of change in grade.

a) Vertical Curve Lengths

The minimum length of vertical curves shall be determined as follows:

Desirable length	LVC(m)	=	61A
------------------	--------	---	-----

LVC(ft)	=	200A
---------	---	------

Preferred minimum length	LVC(m)	=	31A
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LVC(ft)	=	100A
---------	---	------

Absolute minimum length:

Crest curves	LVC(m)	=	$\frac{AV^2}{212}$
--------------	--------	---	--------------------

LVC(ft)	=	$\frac{AV^2}{25}$
---------	---	-------------------

Sag curves	LVC(m)	=	$\frac{AV^2}{382}$
------------	--------	---	--------------------

LVC(ft)	=	$\frac{AV^2}{45}$
---------	---	-------------------

Where LVC = length of vertical curve, in m [ft]

A = $(G_2 - G_1)$ = algebraic difference in gradients connected by the vertical curve, in percent

G_1 = percent grade of approaching tangent

G_2 = percent grade of departing tangent

V = design speed; in km/h [mph]

Both sag and crest vertical curves shall have the maximum possible length, especially if approach and departure tangents are long. Vertical broken back curves and short horizontal curves at sags and crest of vertical curves shall be avoided.

Minimum vertical curve length and/or design speed may be governed by the overhead contact system (OCS) due to the maximum permissible rate of separation or convergence between the track grade and the contact wire grade. Coordination with the OCS designer shall be required to assure compliance with this limitation.

b) Compound Vertical Curves

Compound and unsymmetrical vertical curves shall be permitted provided each curve conforms to the requirements stated in Section 3.2.3.4.a.

~~Reverse Vertical Curves~~

The minimum length of constant profile grade between reverse vertical curves shall be 30 m [98 ft], unless otherwise approved by LYNX.

d) Combined Vertical and Horizontal Curvature

Where possible, areas of combined vertical and horizontal curvature shall be avoided. Where areas of combined vertical and horizontal curvature cannot be avoided, the geometrics shall not be more restrictive than a 25 m [82 ft] radius horizontal curve combined with a 250 m [820 ft] equivalent radius vertical crest curve.

3.2.4 Vehicle Clearances

3.2.4.1 General

This section establishes the minimum dimensions required to assure proper clearances between the light rail vehicles or transit structures, and the obstructions involved. All designs shall meet or exceed the minimum clearance criteria as specified herein. Since the provision of adequate clearances for the safe passage of light rail vehicles is one of the most fundamental concerns inherent in the design of the system, it shall be rigorously monitored during both the design and construction phases.

3.2.4.2 Clearance Envelope

The Clearance Envelope (CE) is defined as the space occupied by the Vehicle Dynamic Envelope (VDE) plus the effects of other wayside factors (OWF) including construction and maintenance tolerances for track and various facilities, plus running clearances (RC). This relationship can be expressed as follows:

$$CE = VDE + OWF + RC$$

The Clearance Envelope represents the space into which no physical part of the system (other than the light rail vehicle) shall be placed, constructed or protrude. The Clearance Envelope shall be referenced from the centerline of track at the top of rail.

The following factors shall be considered in developing the Clearance Envelope.

a) Vehicle Dynamic Envelope

Determination of the VDE begins with the cross sectional outline of the static vehicle. The dynamic outline of the vehicle is then developed by making allowances for the car body movements that occur when the vehicle is operating on level, tangent track. In addition to car body movements on level, tangent track, the effects of track curvature

and superelevation must also be considered to allow additional room for vehicle overhang on curves and for vehicle lean when the curves are superelevated.

1) Static Vehicle Outline

Design of the project is typically initiated prior to the specific dimensional characteristics of the light rail vehicle being known. In order to allow design of fixed facilities to proceed, a composite design vehicle concept has been employed which incorporates the most critical dimensions and operational characteristics of the possible light rail vehicles considered for the project. For simplicity, the composite light rail vehicle is referred to in this Section as the LYNX-LRV. The 26 points that define the static outline of the LYNX-LRV are depicted graphically in Figure 3-4, while the x and y coordinates of these points are tabulated in Table 3-1.

2) Dynamic Vehicle Outline

The dynamic outline of the vehicle shall be defined as the extreme car body displacement that can occur for any combination of rotational, lateral and vertical car body movements that occur when the vehicle is operating on level, tangent track. These car body movements are due to truck suspension movements, spring action, allowable wheel and rail wear, and permitted tolerances in vehicle and track construction. The car body movements included in the dynamic vehicle outline are defined in Table 3-2a and Table 3-2b.

3) Vehicle Inswing/Outswing

In addition to the dynamic car body movements described above, car body overhang on horizontal curvature also increases the lateral displacement of dynamic outline relative to the track centerline. For design purposes, both mid-car inswing and end-of-car outswing of the vehicle shall be considered. The amount of mid-car inswing and end-of-car outswing depends primarily on the truck spacing and end overhang of the vehicle, and on the radius of track curvature. Mid-car inswing and end-of-car outswing shall be based on a double-articulated light rail vehicle carbody a maximum 28 400 mm [93.18 ft] long. Truck center to center spacing shall be limited to a maximum 14 200 mm [46.59 ft] for calculating mid-car inswing clearance requirements. Truck center to center spacing shall be limited to a minimum 8200 mm [26.90 ft] for calculating end-of-car outswing clearance requirements. Vehicle ends shall be tapered. The LYNX-LRV vehicle plan geometry on curves is depicted graphically in Figure 3-5, while Table 3-1 tabulates the associated dimensions.

4) Superelevation Effects

The effect of superelevation shall also be taken into account in developing the VDE. Superelevation effects shall be limited to the vehicle lean induced by a specified difference in elevation between the two rails of a track and shall be considered independently of other effects on the dynamic outline. In determining the superelevation effects, the shape of the dynamic outline shall not be altered. Rather,

the dynamic outline shall be rotated about the centerline of the top of low rail an amount equal to the actual track superelevation.

Vehicle dynamic values to the outside of curve (T_o) and inside of curve (T_i) for both ballasted and paved/direct fixation (DF) track are presented in Table 3-4 through Table 3-7.

When calculating the VDE for horizontal curves with spirals, the tangent Clearance Envelope shall end 15 m [49.2 ft] before the tangent to spiral (TS) and 15 m [49.2 ft] beyond the spiral to tangent (ST) point. The full curvature Clearance Envelope shall begin 8 m [26.2 ft] prior to the spiral to curve (SC) point and end 8 m [26.2 ft] beyond the curve to spiral (CS) point. The horizontal component of the VDE between these two offset points (i.e., 15 m [49.2 ft] before the TS and 8 m [26.2 ft] before the SC) shall be considered to vary linearly with distance between the two points. Horizontal offsets at intermediate locations shall be calculated by linear interpolation. For simple circular curves, the full curvature Clearance Envelope shall begin 15 m [49.2 ft] prior to the point of curvature (PC) and end 15 m [49.2 ft] beyond the point of tangency (PT).

The Clearance Envelope through turnouts shall be calculated based on the centerline radius of the turnout.

b) Other Wayside Factors

Other wayside factors (OWF) is the second component of the Clearance Envelope. OWF is the sum of certain construction and maintenance tolerances (CMT) plus a chorded wall construction factor (CW) to account for the effects of chorded wall construction, all where applicable. This relationship can be expressed as follows:

$$OWF = CMT + CW$$

The following define the other wayside factors and are applicable to and shall be included in the horizontal component of the Clearance Envelope.

Construction and Maintenance Tolerances (CMT)

Construction Tolerance Along Proposed Soldier Pile and Lagging Wall	150 mm [6 in]
Construction Tolerance Along All Other Proposed Structures	50 mm [2 in]
Construction Tolerance at Poles or Signal Equipment	38 mm [1.5 in]
Track Construction and Maintenance Tolerance for Embedded or Direct Fixation Track	13 mm [0.5 in]
Track Construction and Maintenance Tolerance for Mainline, Ballasted Track	64 mm [2.5 in]
Track Construction and Maintenance Tolerance for Secondary and Yard Tracks	25 mm [1 in]
Allowance for Acoustical Treatment, Where Required	75 mm [3 in]

Chorded Wall Construction Factor (CW)

Additional Width for Chorded Construction of Walls to be added on the Outside of Curves Only	See Figure 3-6 and Figure 3-7
--	-------------------------------

c) Running Clearances

In addition to the Vehicle Dynamic Envelope and other wayside factors, the Clearance Envelope includes an allowance for running clearance (RC). The following define the running clearances to be included in the horizontal component of the Clearance Envelope.

Running Clearances (RC)

Running Clearance at OCS Poles, Signals, Signs and Other Non-Structural Members	50 mm [2 in]
Running Clearance along Soldier Pile and Lagging Walls and Other Structures which are normally constructed with liberal construction tolerances.	150 mm [6 in]

Running Clearance along cast in-place, precast, and masonry walls and other structures which are normally constructed with strict construction tolerances. 50 mm [2 in.]

Running Clearance for Adjacent Light Rail Vehicles 50 mm [2 in.]

The above dimensions are design values, the applicability of which depends on the type of track construction, as well as on the type of structure which the vehicle must clear.

The following is a description of the applicability and rationale of these values.

1) Track Construction and Maintenance Tolerances

The combination of several factors such as track misalignment and wheel and track gauge tolerances create the need for this tolerance. Ballasted track demands a greater track misalignment tolerance than either direct fixation or embedded track would require. Furthermore, a distinction is also made between primary tracks and secondary or yard tracks for safety reasons.

2) Construction Tolerances Along Proposed Structures

Where the facility adjacent to the trackway is a structure, or part of a structure, the minimum horizontal construction tolerance shall be provided on the assumption that the structure, or part thereof, may be misplaced during construction by a dimension of that magnitude. It is emphasized that the term "structure" as used in this subsection applies to any facility to be constructed alongside the LRT system and above the top of rail.

3) Acoustical Treatment

The need for this allowance shall be investigated in cases where noise produced from the LRT system operations may be found in excess of tolerable limits for a given area. The need for acoustical treatment shall be determined by the noise emission criteria specified in this Manual of Design Criteria.

4) Running Clearances

To provide clear passage for a LRV which has moved to the extreme position within the Dynamic Outline, the minimum horizontal clearance to any structure, or part of a structure, shall always include a horizontal running clearance.

3.2.4.3 Special Clearance Situations

In addition to the Clearance Envelope requirements described above, there are several special clearance situations warranting further definition. These special situations include the vehicle

interface at station platforms, retaining walls in both cut and fill sections, through girder bridges, and maintenance and emergency evacuation paths.

All structures installed above the top of the nearest rail must be set either at, or beyond, the offsets shown in Figure 3-8, with the following exclusions:

a) Vehicle Interface at Station Platforms

At passenger stations, the distance from the centerline of the track to the edge of platform shall be 1430 mm [56.25 in] with a tolerance of plus 13 mm [0.5 in] and minus 0.0 mm [0.0 in].

The platform elevation shall be the same as the low-floor level of the LYNX-LRV.

b) Retaining Walls

Where retaining walls are used, they shall comply with the following:

1) Cut Sections

In those cases where a retaining wall along the LRT System is in a cut section, the preferred minimum clearance from the centerline of track to the near face of a retaining wall shall be 2.7 m [9 ft 0 in]. Where no maintenance and emergency evacuation path is required adjacent to the retaining wall, the absolute minimum clearance from the centerline of track to the near face of a retaining wall shall be no less than that required to clear the Clearance Envelope.

2) Fill Sections

In retained fill sections, the top of a retaining wall shall be at the same elevation as the top of the adjacent rail (the rail nearest to the wall), and the preferred minimum distance from the centerline of track to any fencing or hand railing on top of the wall shall be a minimum of 2.7 m [9 ft 0 in]. Where no maintenance and emergency evacuation path is required adjacent to a curb or retaining wall without a fence or railing, the absolute minimum clearance from the centerline of track to the near face of the curb or wall shall be no less than that required to clear the Clearance Envelope.

c) Through Girder Bridges

The lateral distance from a centerline of track to the nearest point on the girder of a through girder bridge shall be a minimum of 2.7 m [9 ft 0 in].

d) Maintenance and Emergency Evacuation Paths

A minimum clear width of 760 mm [2.5 ft] desirable shall be provided between the Clearance Envelope and any continuous obstruction alongside the track in a designated passenger emergency evacuation path. A minimum clear distance of 610 mm [24 in] shall be provided between the Clearance Envelope and any continuous obstruction along a path which is used by maintenance employees in the performance of their duties.

3.2.4.4 Vertical Clearances to Overhead Structures

Since the LRT system will draw electric traction power from an overhead contact wire system, the following vertical clearances from the top of the high rail along any given section of track to the soffit of any overhead structure, within the horizontal limits of the Clearance Envelope shall be provided:

<u>Location</u>	<u>Minimum Vertical Clearance</u>
At Overhead Bridges	6.0 m [19.7 ft], preferred minimum
	4.9 m [16.1 ft], desired minimum
	4.35 m [14 ft 3 in], absolute minimum

3.2.5 Track Spacing

The minimum allowable spacing between two exclusive LRT mainline tracks, with equal superelevation and no OCS support poles between them, shall be determined from the following formula:

$$d = T_t + T_a + 2 (OWF) + RC$$

- Where d = minimum allowable spacing between track centerlines, in mm [in]
- T_t = dynamic half width of vehicle towards curve center, in mm [in]
- T_a = dynamic half width of vehicle away from curve center, in mm [in]
- OWF = other wayside factors, in mm [in]
- RC = running clearance, in mm [in]

Along sections where OCS poles are located between track centerlines, the minimum track spacing shall be determined from the following formula:

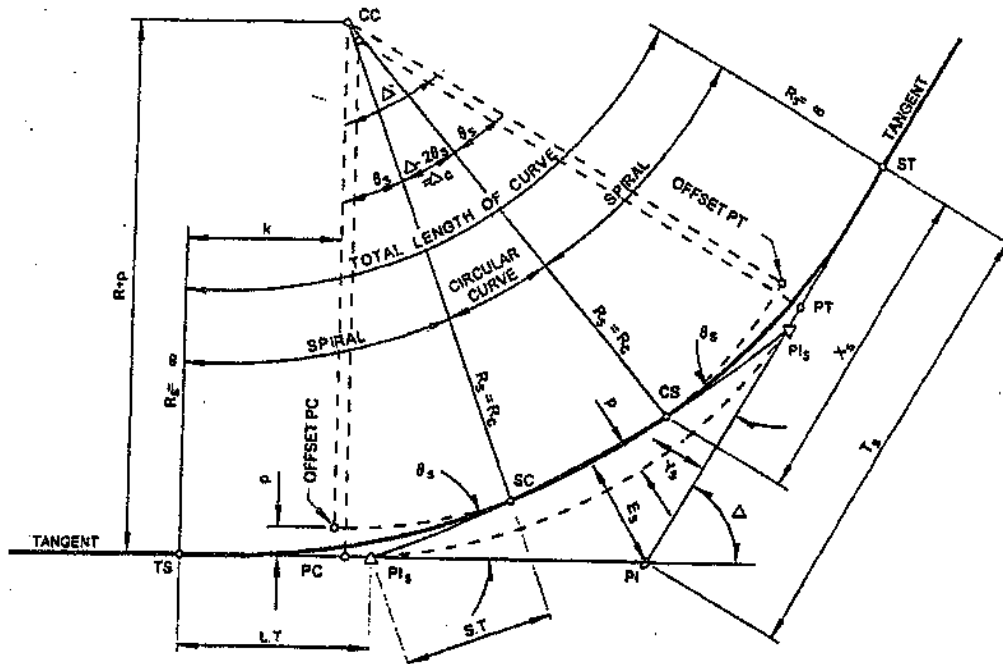
$$d = T_t + T_a + 2 (OWF + RC) + P$$

- Where d = minimum allowable spacing between track centerlines, in mm [in]
- T_t = dynamic half width of vehicle towards curve center, in mm [in]
- T_a = dynamic half width of vehicle away from curve center, in mm [in]
- OWF = other wayside factors, in mm [in]
- RC = running clearance, in mm [in]
- P = maximum allowable OCS pole diameter (including deflection) of 455 mm [17.9 in]

The absolute minimum track spacing to be used along tangent ballasted track with center OCS support poles shall be 4.3 m [14.1 ft]. The absolute minimum track spacing to be used along tangent ballasted track without center OCS support poles shall be 3.8 m [12.5 ft]. Tangent embedded and direct fixation tracks shall have absolute minimum track centers of 3.6 m [11.8 ft].

3.3 Railroad Freight Track Alignment and Clearances

Railroad tracks to be relocated shall be designed in conformance to the requirements of the operating railroad and the American Railway Engineering and Maintenance Association (AREMA) *Manual of Railway Engineering*



NOTATIONS

- | | |
|---|---|
| CC = CENTER OF CIRCULAR CURVE | PT = POINT OF CHANGE FROM CIRCULAR CURVE TO TANGENT |
| CS = POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL | R = RADIUS OF CIRCULAR CURVE |
| D _c = DEGREE OF CIRCULAR CURVE, ARC DEFINITION | SC = POINT OF CHANGE FROM SPIRAL TO CIRCULAR CURVE |
| E _s = TOTAL EXTERNAL DISTANCE OF A SPIRALIZED CURVE | ST = POINT OF CHANGE FROM SPIRAL TO TANGENT |
| k = TANGENT DISTANCE FROM TS OR ST TO PC OR PT OF THE SHIFTED CIRCULAR CURVE | ST = SHORT TANGENT OF SPIRAL |
| L _c = TOTAL LENGTH OF CIRCULAR CURVE ARC | T _s = TOTAL TANGENT DISTANCE FROM TS OR ST TO PI |
| L _s = TOTAL LENGTH OF SPIRAL | TS = POINT OF CHANGE FROM TANGENT TO SPIRAL |
| LT = LONG TANGENT OF SPIRAL | X _s = TANGENT DISTANCE FROM TS TO SC OR ST TO CS |
| p = OFFSET FROM THE MAIN TANGENT TO THE PC OR PT OF THE SHIFTED CIRCULAR CURVE | Y _s = TANGENT OFFSET AT SC OR CS |
| PC = POINT OF CHANGE FROM TANGENT TO CIRCULAR CURVE | Δ = TOTAL CENTRAL ANGLE OF SPIRAL AND CIRCULAR CURVES |
| PI = POINT OF INTERSECTION OF MAIN TANGENTS | Δ _c = CENTRAL ANGLE OF THE CIRCULAR CURVE |
| PI _s = POINT OF INTERSECTION OF MAIN TANGENT WITH TANGENT THROUGH SC OR CS POINT | θ _s = CENTRAL ANGLE OF SPIRAL |

SPIRAL FORMULAS

θ IN RADIANS

CURVE FORMULAS

$$D_c = \frac{5729.578}{R}$$

$$T_s = (R+p) \tan \frac{\Delta}{2} + k$$

$$E_s = (R+p) \left(\frac{1}{\cos \frac{\Delta}{2}} - 1 \right) + p$$

$$L_c = \frac{\Delta_c}{D_c} \times 100 = \frac{\Delta - 2\theta_s}{D_c} \times 100$$

$$X_s = L_s \left(1 - \frac{\theta_s^2}{10} + \frac{\theta_s^4}{216} - \frac{\theta_s^6}{9360} \right)$$

$$Y_s = L_s \left(\frac{\theta_s}{3} - \frac{\theta_s^3}{42} + \frac{\theta_s^5}{1320} - \frac{\theta_s^7}{75600} \right)$$

$$k = L_s \left(\frac{1}{2} - \frac{\theta_s^2}{60} + \frac{\theta_s^4}{2160} - \frac{\theta_s^6}{131040} \right)$$

$$p = L_s \left(\frac{\theta_s}{12} - \frac{\theta_s^3}{336} + \frac{\theta_s^5}{15840} \right)$$

$$L_s = 2R\theta_s$$

$$\theta_s = \frac{1}{2} \frac{L_s}{R}$$

$$LT = X_s + \frac{Y_s}{\tan \theta_s}$$

$$ST = \frac{Y_s}{\sin \theta_s}$$

D:\proj\CF\ERT\001\pct\110\pct\110.dwg 20-01-11-11



PB PARSONS BRINCKERHOFF OLIADE & DOUGLAS, INC

HORIZONTAL CURVE AND SPIRAL NOMENCLATURE

Figure No.

Rev. No.

3-1

Page No.

38

From: Tawny.Olore@dot.state.fl.us
To: Jan_Everett@urscorp.com
cc: "Kate Brady"<KBrady@HNTB.com>
01/15/2004 11:40
Subject: RE: Train Widths AM

Hi Jan,

I have confirmed with HNTB that the 69 feet is adequate for both HSR and LRT from outside wall to outside wall. With the bridge piers factored in, this width increases to 74 feet.

Let me know if there is anything else.

Tawny Olore, P.E.
Rail Transit Project Manager
Telephone (386) 943-5707
Fax (386) 943-5713
SunCom 373-5707

From: Tawny Olore
To: Jan_Everett@URSCorp.com
01/13/2004 01:32 PM
cc:
Subject: RE: Train Widths (Document link: Tawny Olore)

Sorry Jan, been super busy this week. I'm trying to track this stuff down. What I did find out is that from outside wall to outside wall with one train type (HSR or LRT) we need 39 feet. We may be able to get down to 34' if we hang the catenary off the bridge, however, this becomes a maintenance problem. I would say that we should use 39'.

What I have not been able to verify is if we have two train types together, what do we need. You mentioned 69 feet in our telephone conversation, but I have not been able to verify this yet. I will get the answer in the next day or so.

Sorry for the delay.

Tawny Olore, P.E.
Rail Transit Project Manager
Telephone (386) 943-5707
Fax (386) 943-5713
SunCom 373-5707

From: Jan_Everett@URSCorp.com
To: Tawny.Olore@dot.state.fl.us
cc:
01/13/2004 07:52 AM
Subject: RE: Train Widths

Tawny -

Any more data from HNTB yet?

jan

M. Janet Everett, P.E.
Vice President
URS Corporation
315 East Robinson Street, Suite 245
Orlando, Florida 32801
Phone: 407.422.0353
Fax: 407.423.2695
Cell Phone: 407.493.5172

From: "Tom Biggs" TBiggs@hntb.com
To: <Tawny.Olore@dot.state.fl.us>, <Michael.Lambert@earthtech.com>
Cc: <Jan_Everett@urscorp.com>
Sent: 1/07/2004 04:31 PM
Subject: RE: Train Widths

Tawny,

I'll pull up the operating envelope for high speed rail and the dimensions of the current taxiway bridges and forward these today.

It's worth noting the LRT and HSR must be either physically separated (i.e. by barrier, or wall) or time separated. Given that time separation is not a likely option on the GOAA site, I don't think that there is any real change in the required envelopes in the two scenarios below. I'll give you a call.

Tom

-----Original Message-----

From: Tawny.Olore@dot.state.fl.us [mailto:Tawny.Olore@dot.state.fl.us]
Sent: Wednesday, January 07, 2004 4:04 PM
To: Tom Biggs; Michael.Lambert@earthtech.com
Cc: Jan_Everett@urscorp.com
Subject: Train Widths

I received a call from GOAA today and they are doing some roadway and other planning efforts. Jan Everett asked that I get a couple of different widths needed for the LRT and HSR vehicles.

1. What is the bare bones minimum width needed for both the LRT and HSR vehicles from outside wall to outside wall. This assumes that the LRT and HSR vehicles are within their own corridors and are not side by side.
2. What is the bare bones minimum width needed assuming that the LRT and HSR vehicles are side by side within one corridor. This width also needs to be from outside wall to outside wall. Within this assumption, both vehicles are travelling at a slow speed underneath a Taxiway Bridge.

Thanks for your help on this matter. If you could respond ASAP, it would be helpful.

Tawny Olore, P.E.
Rail Transit Project Manager
Telephone (386) 943-5707
Fax (386) 943-5713
SunCom 373-5707

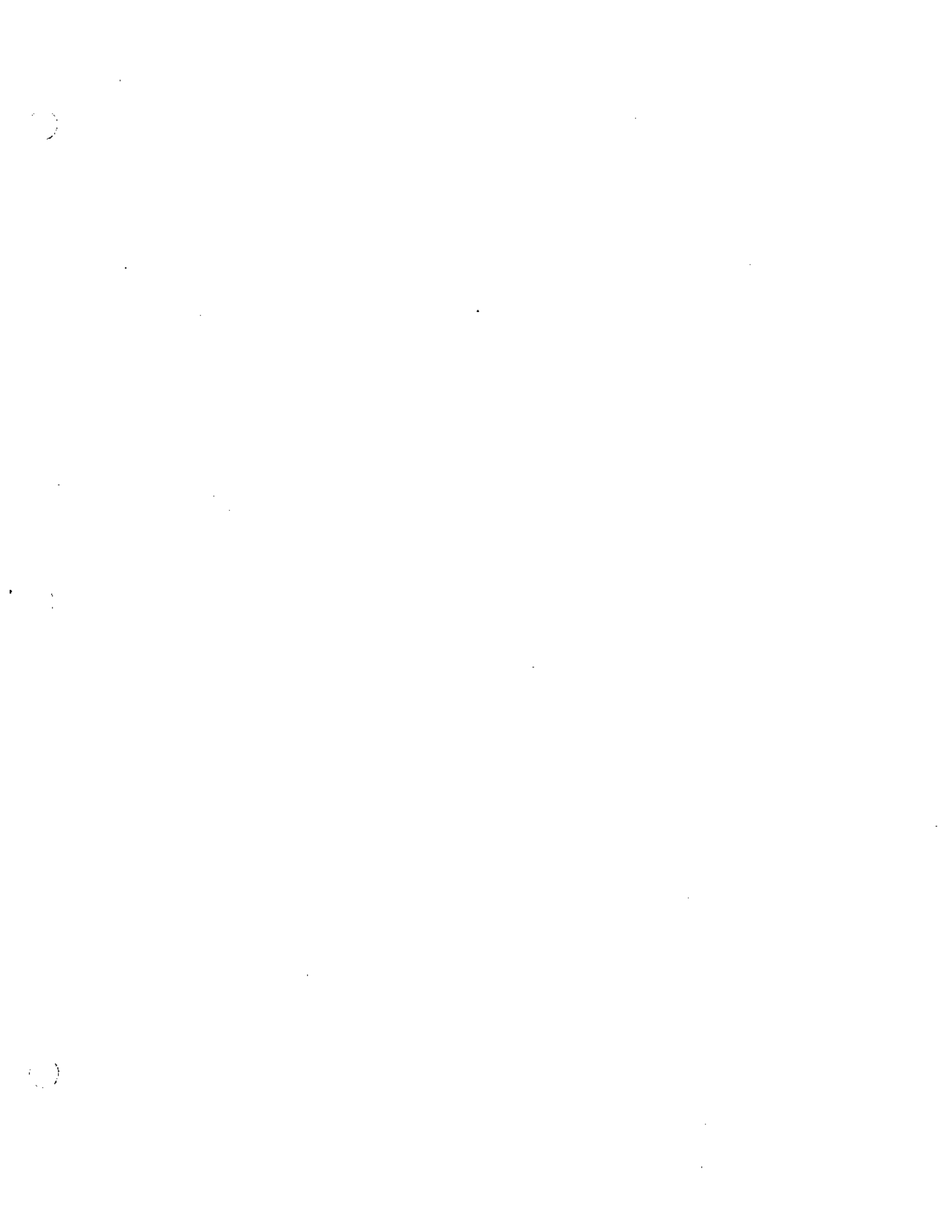
APPENDIX O

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**

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APPENDIX P

**AIRPORT MASTER PLAN UPDATE
ORLANDO INTERNATIONAL AIRPORT**



1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax: 850-687-9364
www.fnai.org

October 24, 2003

David Alberts
URS Corporation
7650 West Courtney Campbell Causeway
Tampa, FL 33607-1462

Dear Mr. Alberts:

Thank you for your request for information from the Florida Natural Areas Inventory (FNAI). We have compiled the following information for your project area.

Project: Orlando International Airport Master Plan Updates
Date Received: October 24, 2003
Location: Township 23 S, Range 30 E, Sections 32, 33
Township 24 S, Range 30 E, Sections 4, 5, 8, 9
Orange County

Element Occurrences

A search of our maps and database indicates that currently we have several Element Occurrences mapped within the vicinity of the study area (see enclosed map and table).

The Element Occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates the precision of the element occurrence location, defined as second (within about 300 feet of the point), minute (within about one mile), or general (within about 5 miles). For animals and plants, Element Occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some element occurrences represent historically documented observations that may no longer be extant.

Potential Natural Areas

Portions of the site appear to be located on or near Potential Natural Areas (PNA). These PNA are priority 4 & 5 and may include the following community types: xeric upland, flatwoods, dome swamp, scrub, wet prairie or cypress slough.

Potential Natural Areas are lands that appear to be relatively intact areas of natural vegetation based on aerial photography, as determined by FNAI scientists. Please see the enclosed explanation sheet for more information. PNAs are not a regulatory designation; they are intended for conservation planning purposes. The maps show a revised version of the PNAs, based on 1995 land use land cover data from the water management districts.



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The Florida State University

Tracking Florida's Biodiversity

David Alberts

10/24/2003

Page 2 of 2

Potential Habitat for Rare Species

Portions of the site appear to be located on or near Potential Habitat for Rare Species. This potential habitat is associated with a known occurrence in the vicinity of: bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), Florida sandhill crane (*Grus canadensis pratensis*) and red-cockaded woodpecker (*Picoides borealis*).

FNAI Potential Habitat for Rare Species indicates areas, which based on landcover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Potential habitat layers have been developed for approximately 250 of the most rare species tracked by the Inventory, including all federally listed species.

Potential Habitat is not a regulatory designation, and should not be confused with "critical habitat", which is an official designation made by the U.S. Fish and Wildlife Service. Information on critical habitats can be found in the Code of Federal Regulations, 50 CFR 17.95, which lists all critical habitats that have been designated. The Code of Federal Regulations can be accessed through the following website: "www.access.gpo.gov/nara/cfr/cfr-table-search.html".

The Inventory always recommends that a site-specific survey be conducted to determine the current presence or absence of rare, threatened, or endangered species. Surveys should be conducted by persons familiar with Florida's flora and fauna. For your convenience, a summary of the elements recorded for Orange County is enclosed.

The database maintained by the Florida Natural Areas Inventory is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore, this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

Information provided by this database may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. FNAI data may not be resold for profit.

Thank you for your use of FNAI services. An invoice will be mailed to your accounts payable department. If I can be of further assistance, please give me a call at (850) 224-8207.

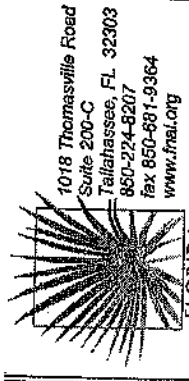
Sincerely,

Edwin A. Abbey

Edwin A. Abbey
Environmental Reviewer

encl

Orange County
 Township 23 S, Range 30 E, Sections 32, 33
 Township 24 S, Range 30 E, Sections 4, 5, 8, 9



10118 Thomasville Road
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 fax 850-881-9364
 www.fnal.org

Element Occurrences

- Precision:
 second minute general
- Animals
 - ▲ Plants
 - ▲ Communities
 - ▲ Other

- U.S. Fish & Wildlife Service
Scrib Jay Survey 1892-96
- FL Fish & Wildlife Cons. Comm.
Breeding Bird Atlas Project 1986-91
center point of 10 sq mi survey block

Conservation Lands

- Federal
- State
- Local
- Private
- State Aquatic Preserves

Land Acquisition Projects

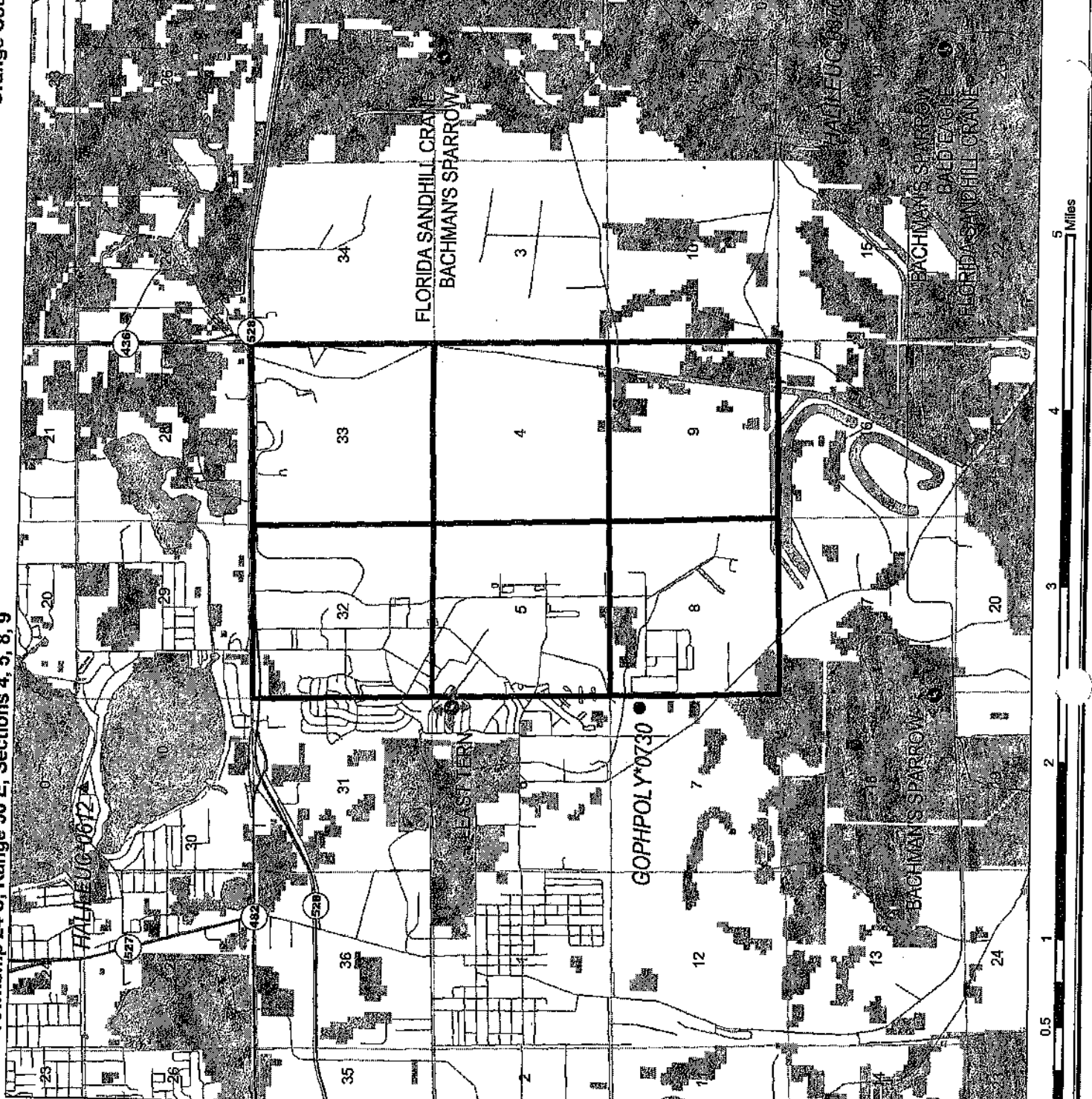
- Florida Forever
- Board of Trustees Projects

Non-Managed Natural Areas

- FNAI Potential Habitat for Rare Species
- FNAI Potential Natural Areas

- County Boundary
- Interstate
- Turnpike
- Major Highway
- Local Road
- Water

Map produced by EAA
 Data Sources: 01/03
 NOTE: Map should not be interpreted without accompanying documents.



0 0.5 1 2 3 4 5 Miles

Township 23 S, Range 30 E, Sections 32
 Township 24 S, Range 30 E, Sections 4, 5, 6, 9

Orange County

18 Mile Radius

1018 Thomasville Road
 Suite 200-C
 Tallahassee, FL 32303
 850-224-3207
 fax 850-681-9364
 www.fnai.org



WOOD STORK DATA

- ★ Wood Stork Occurrences (*Mysticaria americana*)
- ☆ FL Fish & Wildlife Cons. Comm. Breeding Bird Atlas Project 1986-91 center point of 10 sq mi survey block
- Wood Stork Data
- Wood Stork Potential Habitat

Conservation Lands

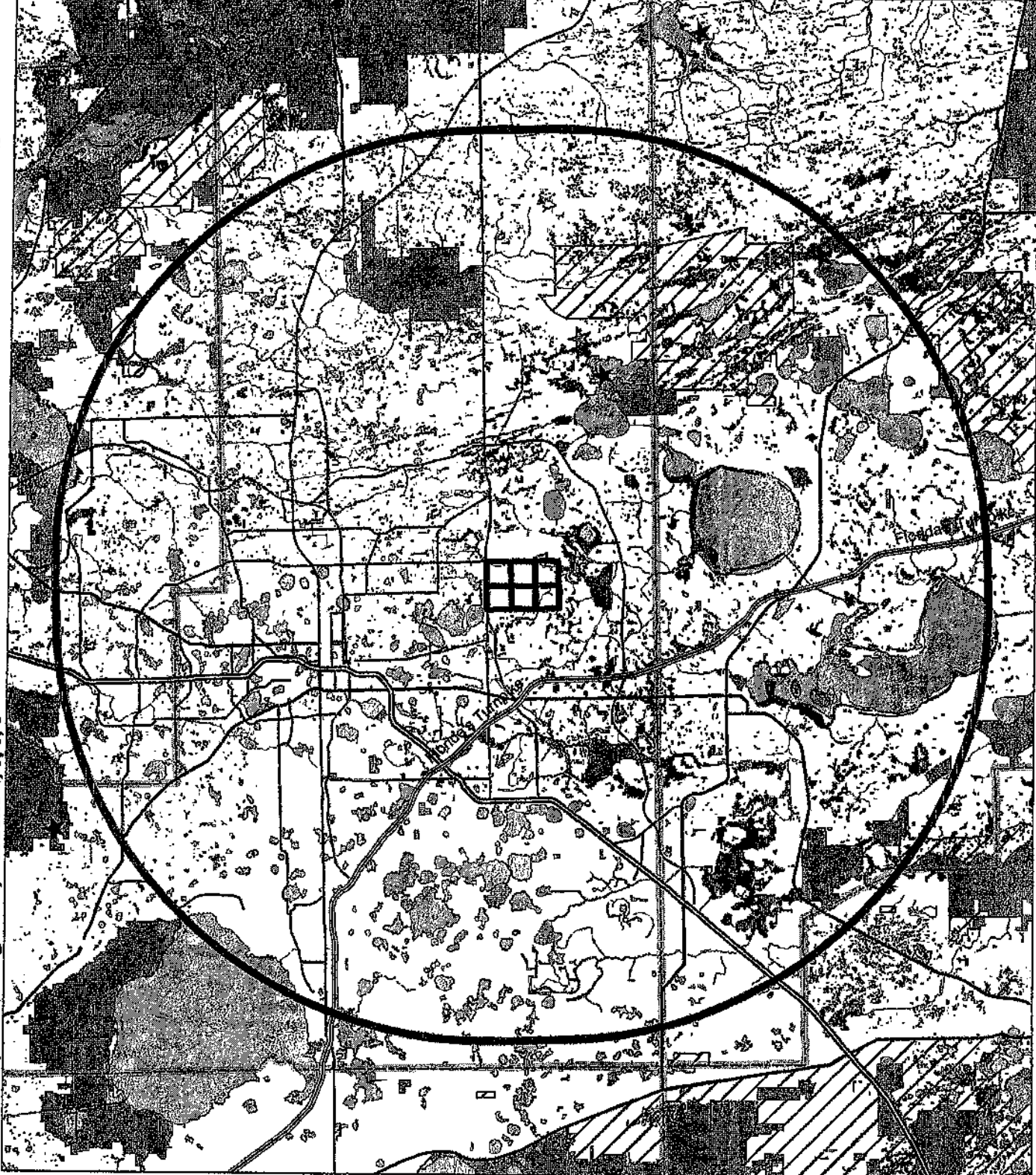
- Federal
- State
- Local
- Private
- State Aquatic Preserves

Land Acquisition Projects

- Florida Forever
- Board of Trustees Projects

County Boundary

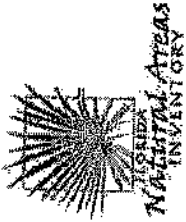
- Interstate
- Turnpike
- Major Highway
- Local Road
- Water



Map produced by EAA
 Date Source: 01/03

NOTE: Map should not be interpreted without accompanying documents.





Florida Natural Areas Inventory

ELEMENT OCCURRENCES ON OR NEAR
ORLANDO INTERNATIONAL AIRPORT



Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Listing	State	Observation Date	Description	EO Comments
HALILEUC0370	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4	S3	LT	LT	1985	NO GENERAL DESCRIPTION GIVEN	NEST: 1985: ACTIVE, PRODUCED 0 YOUNG; 1994: ACTIVE, PRODUCED 0 YOUNG; 1993: PRODUCED 2 YOUNG; 1992: PRODUCED 2 YOUNG; 1991: PRODUCED 1 YOUNG; 1990: PRODUCED 2 YOUNG; 1989: PRODUCED 2 YOUNG; 1988: INACTIVE; 1987: PRODUCED 1 YOUNG; 1986: PRODUCED 2 YOUNG;
GOPHPOLY0730	GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S3	N	LS	1992-01-20	EXTREMELY DISTURBED EX-PINE FLATWOODS COMMUNITY DENSELY PLANTED TO SLASH PINE. BURROWS IN RELATIVELY OPEN AREA HEAVILY INVADED BY YOUNG SLASH PINE.	3 LARGE BURROWS OBSERVED BY PALIS AND KNIGHT ON TWO COLD DAYS. ONE BURROW WAS ACTIVE, THE OTHER TWO APPEARED INACTIVE. ALL THREE BURROWS MAY BELONG TO ONE TORTOISE.

Florida Natural Areas Inventory Potential Natural Areas (PNA) Data Layer

POTENTIAL NATURAL AREAS (PNA)

The Potential Natural Areas data layer indicates, throughout the State of Florida, lands that are in private ownership and are not managed or listed for conservation purposes that are possible examples of good quality natural communities. These areas were determined from FNAI's scientific staff vegetative interpretation of 1988-1993 FDOT aerial photographs and from input received during Regional Ecological Workshops held for each regional planning council. These workshops were attended by experts familiar with natural areas in the region. Element occurrences in the FNAI database may or may not be present on these sites. In order to be classified as a Potential Natural Area (with the exception of internal rank PNA-5) the natural communities identified through aerial photographs must meet the following criteria:

1. Must be a minimum of 500 acres. *Exceptions:* sandhill, min. 320 acres; scrub, min. 80 acres; pine rockland, min. 20 acres; dry prairie, min. 320 acres; or any example of coastal rock barren, upland glade, coastal dune lake, spring-run stream or terrestrial cave.
2. Must contain at least one of the following:
 - a. One or more high quality examples of FNAI state ranked S3 or above natural communities.
 - b. An outstanding example of any FNAI tracked natural community.

Potential Natural Areas have been assigned ranks of PNA-1 through PNA-4 mostly based on size and perceived quality and type of natural community present. The areas included in internal rank PNA-5 (former ACI Category C) are exceptions to the above criteria. These areas were identified through the same process of aerial photographic interpretation and regional workshops as the PNA 1 through 4 ranked sites, but do not meet the standard criteria. These PNA 5 areas are considered lower priority for conservation than areas ranked PNA 1-4, but nonetheless are believed to be ecologically viable tracts of land representative of Florida's natural ecosystems.



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FLORIDA NATURAL AREAS INVENTORY

Florida Scrub-Jay Survey and Breeding Bird Atlas Data Layers

In addition to our element occurrence database of rare species and natural community locations, the Inventory has additional data layers that have been provided by state and federal agencies.

Florida Scrub-Jay Survey - U.S. Fish and Wildlife Service

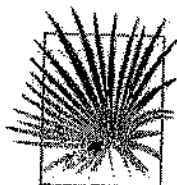
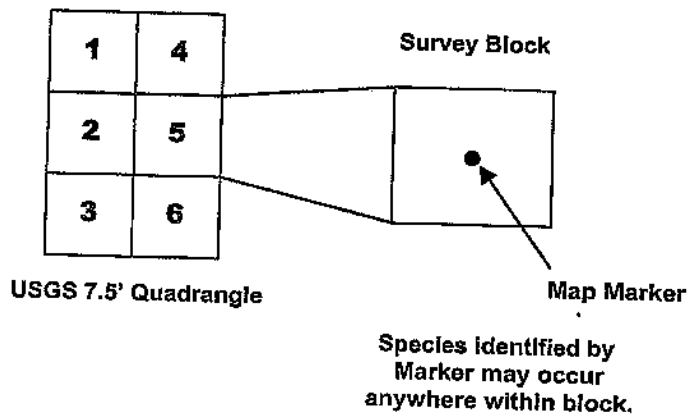
This survey was conducted by staff and associates of the Archbold Biological Station from 1992 to 1996. An attempt was made to record all scrub-jay (*Aphelocoma coerulescens*) groups, although most federal lands were not officially surveyed.

Each map point represents one or more groups.

Florida Breeding Bird Atlas Project - Florida Game and Fresh Water Fish Commission (now Florida Fish and Wildlife Conservation Commission)

This study was conducted from 1986 to 1991, (final report, *An Atlas of Florida's Breeding Birds* by Kale, Pranty, Stith, and Biggs, Nongame Wildlife Program, Florida Game and Fresh Water Fish Commission). The study divided the state into "blocks", with each block representing one-sixth of a U.S. Geological Survey 7.5 minute topographic quadrangle map. Several categories of breeding activity were recorded by observers.

Each map point is located at the center of a block, and represents species listed as Possible or Probable Breeders within the surrounding block (approximately 10 square miles in area).



FLORIDA
Natural Areas
INVENTORY

1018 Thomasville Road
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Tracking Florida's Biodiversity

FLORIDA NATURAL AREAS INVENTORY

April, 1998

1018 Thomasville Road, Suite 200-C, Tallahassee, FL 32303 (850) 224-8207 Page 1

Orange County Summary Rare Species and Natural Communities

Scientific Name	Common Name	Global Rank*	State Rank*	Federal Status*	State Status*	Occurrence Status†
FISH						
<i>Ameiurus brunneus</i>	snail bullhead	G4	S3	N	N	C
<i>Cyprinodon variegatus hubbsi</i>	Lake Eustis pupfish	G5T2Q	S2	N	LS	C
AMPHIBIANS						
<i>Notophthalmus perstriatus</i>	striped newt	G2G3	S2S3	N	N	C
<i>Rana capito</i>	gopher frog	G4	S3	N	LS	C
REPTILES						
<i>Alligator mississippiensis</i>	American alligator	G5	S4	T(S/A)	LS	C
<i>Crotalus adamanteus</i>	eastern diamondback rattlesnake	G5	S3	N	N	C
<i>Drymarchon corais couperi</i>	eastern indigo snake	G4T3	S3	LT	LT	C
<i>Gopherus polyphemus</i>	gopher tortoise	G3	S3	N	LS	C
<i>Neoseps reynoldsi</i>	sand skink	G2	S2	LT	LT	C
<i>Pituophis melanoleucus mugitus</i>	Florida pine snake	G5T3?	S3	N	LS	P
<i>Sceloporus woodi</i>	Florida scrub lizard	G3	S3	N	N	C
<i>Stilosoma extenuatum</i>	short-tailed snake	G3	S3	N	LT	C
BIRDS						
<i>Accipiter cooperii</i>	Cooper's hawk	G4	S3?	N	N	P
<i>Aimophila aestivalis</i>	Bachman's sparrow	G3	S3	N	N	P
<i>Ajaia ajaja</i>	roseate spoonbill	G5	S2S3	N	LS	P
<i>Aphelocoma coerulescens</i>	Florida scrub-jay	G3	S3	LT	LT	C
<i>Aramus guarana</i>	limpkin	G5	S3	N	LS	C
<i>Ardea alba</i>	great egret	G5	S4	N	N	C
<i>Buteo brachyurus</i>	short-tailed hawk	G4?	S3	N	N	P
<i>Egretta caerulea</i>	little blue heron	G5	S4	N	LS	C
<i>Egretta thula</i>	snowy egret	G5	S4	N	LS	C
<i>Egretta tricolor</i>	tricolored heron	G5	S4	N	LS	C
<i>Elanoides forficatus</i>	swallow-tailed kite	G4	S2S3	N	N	P
<i>Eudocimus albus</i>	white ibis	G5	S4	N	LS	C
<i>Falco columbarius</i>	merlin	G5	SU	N	N	P
<i>Falco peregrinus</i>	peregrine falcon	G4	S2	LE	LE	P
<i>Falco sparverius paulus</i>	southeastern American kestrel	G5T3T4	S3?	N	LT	P
<i>Grus canadensis pratensis</i>	Florida sandhill crane	G5T2T3	S2S3	N	LT	C
<i>Haliaeetus leucocephalus</i>	bald eagle	G4	S3	LT	LT	C
<i>Ixobrychus exilis</i>	least bittern	G5	S4	N	N	P
<i>Laterallus jamaicensis</i>	black rail	G4	S3?	N	N	P
<i>Mycteria americana</i>	wood stork	G4	S2	LE	LE	C
<i>Nyctanassa violacea</i>	yellow-crowned night-heron	G5	S3?	N	N	C
<i>Nycticorax nycticorax</i>	black-crowned night-heron	G5	S3?	N	N	P
<i>Pandion haliaetus</i>	osprey	G5	S3S4	N	LS**	P
<i>Picoides borealis</i>	red-cockaded woodpecker	G3	S2	LE	LT	C
<i>Picoides villosus</i>	hairy woodpecker	G5	S3?	N	N	P
<i>Plegadis falcinellus</i>	glossy ibis	G5	S2	N	N	P
<i>Speotyto cunicularia floridana</i>	Florida burrowing owl	G4T3	S3	N	LS	P
<i>Sterna antillarum</i>	least tern	G4	S3	N	LT	P

FLORIDA NATURAL AREAS INVENTORY

1018 Thomasville Road, Suite 200-C, Tallahassee, FL 32303 (850) 224-8207 Page 2

April, 1998

Orange County Summary Rare Species and Natural Communities

Scientific Name	Common Name	Global Rank*	State Rank*	Federal Status*	State Status*	Occurrence Status†
<u>MAMMALS</u>						
<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	G3	S3?	N	N	P
<i>Lasturus cinereus</i>	hoary bat	G5	SU	N	N	C
<i>Mustela frenata peninsulæ</i>	Florida long-tailed weasel	G5T3	S3?	N	N	C
<i>Neofiber alleni</i>	round-tailed muskrat	G3	S3	N	N	P
<i>Peromyscus floridanus</i>	Florida mouse	G3	S3	N	LS	C
<i>Sciurus niger shermani</i>	Sherman's fox squirrel	G5T2	S2	N	LS	C
<i>Sorex longirostris longirostris</i>	southeastern shrew	G5T5	S4	N	N	P
<i>Ursus americanus floridanus</i>	Florida black bear	G5T2	S2	C	LT**	C
<u>INVERTEBRATES</u>						
<i>Aphaostracon monas</i>	Wekiwa hydrobe	G1	S1	N	N	C
<i>Cincinnatia wekiwæ</i>	Wekiwa siltsnail	G1	S1	N	N	C
<i>Procambarus acherontis</i>	Orlando cave crayfish	G1	S1	N	N	C
<i>Troglocambarus sp 1</i>	Orlando spider cave crayfish	G1	S?	N	N	C
<u>VASCULAR PLANTS</u>						
<i>Asclepias curtissii</i>	Curtiss' milkweed	G3	S3	N	LE	C
<i>Bonania grandiflora</i>	Florida bonamia	G3	S3	LT	LE	C
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	LT	R
<i>Centrosema arenicola</i>	sand butterfly pea	G2	S2	N	N	C
<i>Cheiroglossa palmata</i>	hand fern	G4	S2	N	LE	C
<i>Clitorea fragrans</i>	pigeon-wing	G3	S3	LT	LE	C
<i>Coelorachis tuberculosa</i>	piedmont jointgrass	G3	S3	N	N	C
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	LE	R
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	LE	LE	C
<i>Eriogonum longifolium</i>	scrub buckwheat	G4T3	S3	LT	LE	C
<i>var gnaphalifolium</i>						
<i>Glandularia tampensis</i>	Tampa vervain	G1	S1	N	LE	C
<i>Helianthus debilis ssp tardiflorus</i>	beach sunflower	G5T3	S3	N	N	C
<i>Ilex opaca var arenicola</i>	scrub holly	G5T3	S3	N	N	C
<i>Illicium parviflorum</i>	star anise	G1G2	S1	N	LE	C
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	LT	C
<i>Lindera subcoriacea</i>	bog spicebush	G2	S1	N	LE	R
<i>Lupinus westianus var aridorum</i>	scrub lupine	G2T1	S1	LE	LE	C
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	LE	C
<i>Monotropa hypopithys</i>	pinessap	G5	S1	N	LE	C
<i>Nemastylis floridana</i>	fall-flowering ixia	G2	S2	N	LE	C
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	LT	C
<i>Nolina brittoniana</i>	Britton's beargrass	G2	S2	LE	LE	C
<i>Paronychia chartacea ssp chartacea</i>	paper-like nailwort	G3T3	S3	LT	LE	C
<i>Peperomia humilis</i>	terrestrial peperomia	G5	S2	N	LE	R
<i>Persea humilis</i>	scrub bay	G3	S3	N	N	C
<i>Platanthera integra</i>	yellow fringeless orchid	G4	S3S4	N	LE	C
<i>Polygala lewtonii</i>	Lewton's polygala	G2	S2	LE	LE	C
<i>Polygonella myriophylla</i>	Small's jointweed	G3	S3	LE	LE	C
<i>Prunus geniculata</i>	scrub plum	G2G3	S2S3	LE	LE	C
<i>Pteroglossaspis ecristata</i>	wild coco	G2G3	S2	N	LT	C

<i>Rhynchospora decurrens</i>	decurrent beakrush	G3G4	S2	N	N	C
<i>Salix floridana</i>	Florida willow	G2	S2	N	LE	C
<i>Stylisma abdita</i>	scrub stylisma	G2G3	S2S3	N	LE	C
<i>Warea amplexifolia</i>	clasping warea	G1	S1	LE	LE	C
<i>Zephyranthes simpsonii</i>	rain lily	G2G3	S2S3	N	LT	C

NATURAL COMMUNITIES

Aquatic Cave		G3	S2	N	N	C
Blackwater Stream		G4	S2	N	N	C
Depression Marsh		G4?	S3	N	N	C
Floodplain Swamp		G?	S4?	N	N	C
Hydric Hammock		G?	S4?	N	N	C
Mesic Flatwoods		G?	S4	N	N	C
Sandhill		G2G3	S2	N	N	C
Scrubby Flatwoods		G3	S3	N	N	C
Scrub		G2	S2	N	N	C
Slough		G4	S4?	N	N	C
Spring-run Stream		G2	S2	N	N	C
Wet Flatwoods		G?	S4?	N	N	C

OTHER

Bird rookery				N	N	C
Geological feature				N	N	C

* See attached *FNAI Rank Explanations* sheet for definitions of Global and State Ranks, and State and Federal Status

** See attached *FNAI Rank Explanations* sheet, *Special Animal Listings - State and Federal Status* section

† COUNTY OCCURRENCE STATUS

Vertebrates and Invertebrates:

C = (Confirmed) Occurrence status derived from a documented record in the FNAI data base.

P = (Potential) Occurrence status derived from a reported occurrence for the county, or the occurrence lies within the published range of the taxon.

N = (Nesting) For sea turtles only; occurrence status derived from documented nesting occurrences.

Plants, Natural Communities, and Other:

C = (Confirmed) Occurrence status derived from a documented record in the FNAI data base or from a herbarium specimen.

R = (Reported) Occurrence status derived from published reports.



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GLOBAL AND STATE RANKS

Florida Natural Areas Inventory (FNAI) defines an **element** as any rare or exemplary component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature. FNAI assigns two ranks to each element found in Florida: the **global rank**, which is based on an element's worldwide status, and the **state rank**, which is based on the status of the element within Florida. Element ranks are based on many factors, including estimated number of occurrences, estimated abundance (for species and populations) or area (for natural communities), estimated number of adequately protected occurrences, range, threats, and ecological fragility.

GLOBAL RANK DEFINITIONS

- G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or human factor.
- G2 Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or human factor.
- G3 Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals), or found locally in a restricted range, or vulnerable to extinction from other factors.
- G4 Apparently secure globally (may be rare in parts of range).
- G5 Demonstrably secure globally.
- GH Occurred historically throughout its range, but has not been observed for many years.
- GX Believed to be extinct throughout range.
- GXC Extirpated from the wild but still known from captivity or cultivation.
- G#? Rank uncertain (e.g., G2?).
- G#G# Range of rank; insufficient data to assign specific global rank (e.g., G2G3)
- G#T# Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species, and the T portion refers to the subgroup; T# has same definition as G#.
- G#Q Ranked as species but there is some question as to whether it is a valid species.
- G#T#Q Same as above, but validity as subspecies or variety is questioned.
- GU Global rank unknown; due to lack of information, no rank or range can be assigned.
- G? Temporarily not ranked.

STATE RANK DEFINITIONS

State ranks (S#) follow the same system and have the same definitions as global ranks, except they apply only to Florida, with the following additions:

- SA Accidental in Florida and not part of the established biota.
- SE Exotic species established in Florida (may be native elsewhere in North America).
- SX Believed to be extirpated from state.



Florida Resources
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Tracking Florida's Biodiversity

FEDERAL AND STATE LEGAL STATUSES

Provided by FNAI for information only.
For official definitions and lists of protected species, consult the relevant state or federal agency.

FEDERAL LEGAL STATUS

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

LE	Endangered: species in danger of extinction throughout all or a significant portion of its range.
LT	Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
E(S/A)	Endangered due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
T(S/A)	Threatened due to similarity of appearance (see above).
PE	Proposed for listing as Endangered species.
PT	Proposed for listing as Threatened species.
C	Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
XN	Non-essential experimental population.
MC	Not currently listed, but of management concern to USFWS.
N	Not currently listed, nor currently being considered for listing as Endangered or Threatened.

FLORIDA LEGAL STATUSES

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.

LE	Endangered: species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.
LT	Threatened: species, subspecies, or isolated population facing a very high risk of extinction in the future.
LS	Species of Special Concern is a species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.
PE	Proposed for listing as Endangered.
PT	Proposed for listing as Threatened.
PS	Proposed for listing as Species of Special Concern.
N	Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505.

LE	Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.
LT	Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.
PE	Proposed for listing as Endangered.
PT	Proposed for listing as Threatened.
N	Not currently listed, nor currently being considered for listing.

