Tampa Bay Intermodal Center(s)

Drainage Technical Memorandum

Project Development and Environment (PD&E) Study
Hillsborough/Pinellas Counties, Florida

FINAL



Florida Department of Transportation
District Seven

Financial Project Number: 415348 1 94 01
December 2005

DRAFT
DRAINAGE TECHNICAL MEMORANDUM

Tampa Bay Intermodal Center(s)
Project Development and Environment Study
Hillsborough/Pinellas Counties, Florida

FPN: 415348 1 94 01
Contract No. C8947

Prepared for:

Florida Department of Transportation
District Seven
11201 N. Malcolm McKinley Drive
Tampa, Florida 33612-6403

Prepared by:

5300 West Cypress Street
Suite 200
Tampa, Florida 33607

April 2005 (Revised June 2005)

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Section 1.0
PROJECT DESCRIPTION

1.1 BACKGROUND

All too often, individual modes of transportation are planned and operated independently of each other. The result is often duplication of services or misuse of valuable economic resources. The 2020 Florida Transportation Plan emphasizes that the transportation system should enhance Florida's economic competitiveness. In response to this challenge, the Florida Department of Transportation (FDOT) has initiated the development of the Strategic Intermodal System (SIS). Components of the SIS include: the Florida Intrastate Highway System (FIHS), the National Highway System, airports, seaports, spaceports, rail lines and stations, and selected intermodal facilities. FDOT has recently completed the designation of existing SIS components; several of which are located within District Seven boundaries. The SIS legislation *(S.B. 676 Section 46 and F.S. Section 339.61)* concluded that:

> The designation of a strategic intermodal system, composed of facilities and services of statewide and interregional significance, will efficiently serve the mobility needs of Florida's citizens, businesses, and visitors and will help Florida become a worldwide economic leader, enhance economic prosperity and competitiveness, enrich quality of life, and reflect responsible environmental stewardship.

In light of the State's view of global trade, recent changes in travel behavior, and the passing of SIS legislation; an analysis of local and regional transportation studies and plans reveals the need for connectivity of the FDOT-District Seven region's transportation system and SIS components. This project proposes the construction of one or more intermodal center(s) in the Tampa Bay area. These intermodal center(s) will

provide the opportunity for connections between local and regional transportation systems including airports, seaports, highways, and transit services, such as high speed rail and light rail transit. As a result, the center(s) will enhance existing and planned transportation systems in the area. Specifically, the intermodal center(s) are intended to facilitate better transit linkages between Hillsborough and Pinellas counties, thereby maximizing the potential effectiveness of systems in each county and eventually the surrounding counties.

FDOT-District Seven envisions the Tampa Bay Intermodal Center(s) project as the first step in assessing transit needs and achieving connectivity of the entire region. Therefore, the FDOT-District Seven Adopted Five Year Work Program for Fiscal Year (FY) 2004/2005-2008/2009 includes three phases of development for potential intermodal center(s). Phase I is the Feasibility Study (FY 03/04-initiated in previous work program), Phase II is the Project Development and Environment (PD&E) Study (FY 04/05), and Phase III is the Preliminary Engineering (FY 04/05).

The Tampa Bay Intermodal Center(s) Feasibility Report (Feasibility Report) presented information and issues relevant to the project decision and provided an objective and complete analysis of all factors related to the design and location of the facility(s), including transportation needs, social impacts, engineering analysis, and right-of-way (ROW) requirements. In order to make the best decisions for the region as a whole, FDOT-District Seven invited transportation/transit officials from Hillsborough and Pinellas counties to serve on the Executive Transportation Team (ETT). The ETT served in an advisory capacity to FDOT-District Seven throughout the course of the Feasibility Study and provided valuable input to shape the study process and outcome. The Feasibility Report serves as the basis for this Project Development and Environment (PD&E) Study.

The PD&E study comprises Phase II of the project. Through an extensive travel demand analysis, detailed site investigation, and evaluation of regional goal/objectives, the project team recommends two sites to serve as regional intermodal centers. A more detailed

description of the site alternatives analysis is documented in the Environmental Assessment. The project team will evaluate environmental impacts and preliminary design alternatives associated with the remaining sites for potential environmental effects based upon available data.

The Federal Transit Administration (FTA) will serve as the lead federal agency in this study. The recommended sites are:

- Downtown Tampa-Former County Jail Site
- Gateway- Former Sunshine Speedway Property

1.2 REPORT PURPOSE

As part of the PD&E Study, the purpose of this report is to determine the preliminary size of stormwater management facilities (SMFs) to meet SWFWMD treatment and attenuation requirements based on the Ultimate Solution for the intermodal centers selected above. This report addresses drainage considerations and analysis for each intermodal site proposed for development and documents the acreage required for stormwater management on each site. The SMF locations are located within the proposed intermodal sites and the estimated pond sizes will not have any effect on additional land costs. This report shows that the preliminary pond sizes and locations allow for adequate room to develop the facilities necessary for each intermodal center. The layout for each site can be found in Appendix A. Information such as cultural resources, environmental impacts, hazardous materials, and contamination were evaluated for the entire downtown Tampa Site and the Gateway Site, which includes the SMF locations, under separate reports for the PD&E Study. In addition, this report serves as the Location Hydraulics Report which assesses impacts to base floodplains and regulatory floodways to comply with 23 CFR 650 and 23 CFR 771. The report documents the flood risk associated with each encroachment.

1.3 PROJECT LOCATION

The downtown Tampa Site is located between Morgan Street and west of Jefferson Street and south of I-275 in Section 13, Township 29 south, and Range 18 east in Hillsborough County. The intermodal center is approximately 12 acres.

The Gateway Site is located south of Ulmerton Road and north of 118th Avenue in Section 10, Township 30 south, and Range 16 east in Pinellas County. The Gateway site is approximately 112 acres; however only 34 acres south of 126th Avenue North are anticipated to be developed for the intermodal center. The project locations for the Hillsborough and Pinellas site are identified on the Project Location Map (Figure 1) and shown on the site layout maps in Appendix A.

Tampa Bay Intermodal Center(s) Project Development & Environment (PD&E) Study

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

District 7

N.T.S.

CLEARWATER
SAFETY HARBOR
MOBBLY BAY
PINELLAS COUNTY
HILLSBOROUGH COUNTY
OLD TAMPA BAY
TPA
WESTSHORE
VETERANS EXPWY.
DALE MABRY HWY.
HILLSBOROUGH RIVER
TAMPA
USF
FLETCHER AVE. 582A
FOWLER AVE. 582
BUSCH BLVD. 580
HILLSBOROUGH AVE.
MLK JR. BLVD. 574
KENNEDY BLVD. 60
LEE ROY SELMON EXPWY. TOLL 618
MCKAY BAY
PORT OF TAMPA
EAST BAY
BRANDON
HILLSBOROUGH BAY
LEE ROY SELMON EXPWY.
E. BAY DR. 686
ULMERTON RD. 688
PIE
GATEWAY
GULF BLVD.
GANDY BLVD.
LAKE SEMINOLE
PARK BLVD. 694
4TH ST.
MACDILL AIR FORCE BASE
GULF OF MEXICO
TAMPA BAY
ST. PETERSBURG
19
Alt. 19
60
92
275
75
4
301
597
580
589
611
699
618

LEGEND

- County Limits
- Florida High Speed Rail
- Tampa TECO Line Streetcar System (Phase 1)
- Tampa TECO Line Streetcar System (Phase 2)
- Tampa TECO Line Streetcar System (Phase 3)
- Pinellas Mobility Initiative
- Pinellas Mobility Initiative (Supplemental Monorail Phase)
- Tampa Rail Project
- Looper Downtown Trolley
- PSTA Downtown Transit Circulator Rt.32
- Future Pinellas Trail Extension
- City of Tampa Greenways & Trails
- Express Bus
- Interstate Highway
- Toll Road
- County Road
- State Road
- U.S. Highway
- Greyhound Terminal
- PSTA Transit Terminals (1-Williams Park 2- Central Plaza)
- Looper Downtown Trolley Station
- Marion Transit Center
- HSR Station Location
- TECO Station Location
- Pinellas Station Location
- Light Rail Station Location
- Light Rail Station Location (Park and Ride)
- Local Transit Center
- Activity Center Boundary

★ PD&E Study Sites

Figure 1

Project Location Map

Section 2.0
DESIGN INFORMATION

2.1 DESIGN INFORMATION SOURCES

The design information sources used are listed below:

- FDOT Drainage Manual, 2003
- Southwest Florida Water Management District (SWFWMD) Environmental Resource Permitting Manual, February 2003
- SWFWMD aerials, 1973, 1977, and 1981
- Soil Surveys of Hillsborough County (1989) & Pinellas County (1982), Florida
- Field reviews
- Tampa Bay Drainage Atlas
- Federal Emergency Management Agency (FEMA) Maps, 1982/2003
- Draft PSR CR296 Connector-Phase 4, March 2005

2.2 SOIL CONDITIONS

The soils encountered along the project can be categorized according to the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey of Hillsborough County, May 1989 and the Soil Survey of Pinellas County, 1972.

According to the SCS Soil Survey of Hillsborough County, the downtown Tampa site consists of only Urban land. Urban lands are areas covered by concrete, asphalt, building or other impervious surfaces which obscure or alter the soils so that identification is not feasible.

According to the SCS Soil Survey of Pinellas County, the Gateway Site consists of poorly drained soils with a water table of less than 10 inches. These soils are: Made Land, Manatee Loamy Fine Sand, Myakka Fine Sand, Oldsmar Fine Sand and Pompano Fine sand. Due to the high seasonal high water table (SHWT), D soils will be assumed since the soils of Pinellas County are not classified with a hydrologic group.

2.3 SEASONAL HIGH WATER DETERMINATION AND TREATMENT METHOD

With high SHWT elevations at both sites, wet detention ponds are anticipated. The assumption for SHWT elevations were estimated based on SWFWMD contour elevations and SCS soil survey information. For the Gateway Site, SHWT elevations from the CR 296 Connector Pond Siting Report were compared to the SHWT assumption and utilized for the analysis.

One inch over the runoff will be treated per SWFWMD requirements. Since the downtown Tampa Site outfalls to the Hillsborough River, which is classified as Outstanding Florida Waters, an additional 50% of treatment is required.

2.4 ATTENUATION

Attenuation is estimated based on the difference in pre-developed runoff volume and post-developed runoff volume for the 25 year 24 hour SWFWMD rainfall event. The attenuation volume for the downtown site is minimal since the existing condition consists of mostly impervious development

2.5 POND CONFIGURATION

The pond volumes are calculated with the assumption of 1:4 side slopes, 20 ft maintenance berm, and 10 ft tie down slopes. Preliminary pond calculations are provided in Appendix C.

Section 3.0
FLOODPLAIN ENCROACHMENT

3.0 FLOODPLAINS

This section of the document will serve as the PD&E Location Hydraulic Report requirements that comply with 23 CFR 650 and 23 CFR 771. For both the Downtown Tampa and Gateway Site, the flood risk associated with each encroachment was analyzed.

FEMA Flood Insurance Rate Map (FIRM) panel number 120114 0024C shows the downtown Tampa Site is within Zone C, areas of minimal flooding; therefore, there will be no impacts to the 100-year floodplain. The encroachments are classified as **"no involvement"**; this means there are no floodplains in the vicinity of the proposed site. No work is being performed below the 100-year flood elevation and, as a result, this project does not encroach upon the base floodplain.

FEMA Flood Insurance Rate Map (FIRM) panel number 12103C0138G shows the Gateway Site is mostly within Zone X, areas of 500-year flood. In addition, there are shaded areas within Zone AE, where a base flood elevation of 9 ft. was determined based on tidal influences. No floodplain compensation volume is required since floodplains associated with storm surge are not beneficial floodplains. As a result, this project will not affect flood heights or floodplain limits. In addition, this project will not have any impacts on human life, transportation facilities, and natural and beneficial floodplains. **Therefore, it has been determined that the level of significance for floodplain encroachment is classified as "minimal encroachment."** FIRM maps are provided in Appendix D.

Section 4.0
DRAINAGE BASINS AND PONDS

4.1 DOWNTOWN TAMPA SITE DRAINAGE

The downtown Tampa Site is located in a drainage basin that extends from the south, between Harrison Street and north to Kennedy Avenue and from Governor Street draining west to the Hillsborough River via storm sewer systems. Refer to Appendix E for the drainage atlas.

This site is currently urban land that drains south to a 60 x 38 inch elliptical storm sewer trunkline system that progressively increases up to a 6.5 ft x 8 ft concrete box culvert and outfalls west into the Hillsborough River. The site ranges in elevation from 19.5 to 22.9 draining from east to west as depicted on the SWFWMD contour aerial in Appendix E. The 2.1 acre pond site will be located on the former county jail parcel located west of Jefferson Street and South of I-275. This site was selected based on most efficient use of the overall site planning which outweighs being a less hydraulically feasible area because of its upstream location. A planning consideration was to provide a buffer zone for the cemetery and adjacent neighborhoods by use of the pond. In addition, rail lines are anticipated crossing the pond site which would make this portion of land difficult and costly for use as a parking structure. Also by use of this site as a parking garage, the pedestrians would have to walk a further distance to the intermodal station.

Due to the high water table and low elevation (19.5 ft) on the west side of the site, a pond liner is necessary to drawdown the control elevation for hydraulic feasibility while maintaining the surrounding groundwater table. An allowable high water of 18.5 was estimated based on providing a 1 ft freeboard from the low, assumed hydraulic losses and the assumption that the western portion of the intermodal site will be at grade. Based on the allowable high water elevation of 18.5, a liner will be utilized to set the control elevation at approximately elevation 17. Conveyance of the downtown Tampa Site runoff

will require a proposed storm drain extending from North Tampa Street to the pond site east of Morgan Street. The pond outfall will utilize the existing 60x38 inch elliptical storm sewer system.

4.2 GATEWAY SITE DRAINAGE

The 112-acre Gateway Site is the former Sunshine Speedway site in Pinellas County and is within the Roosevelt Creek Basin. The Roosevelt Creek Basin ultimately discharges easterly via ditches to the Tampa Bay. This site has been divided into two sub-basins at 126th Avenue. The sub-basins are referred to as Basin 1 and Basin 2. Basin 1 is located between the 118th Avenue and 126th Avenue, while Basin 2 is between 126th Avenue and Ulmerton Road. At this preliminary phase, it is assumed that approximately 34 acres of the 112 acre proposed site boundaries will be developed for the Gateway Site. The 34 acre site is entirely within Basin 1 and is located east of the proposed CR 296 Connector and north of the proposed 43rd Street Extension. The CR 296 Connector improvements are to occur prior to the intermodal implementation. The proposed CR 296 Connector and 43rd Street Extension are depicted in the Gateway Site layout in Appendix A

Basin 1 has a ditch around the west, south and east perimeters of the site and discharges towards the east through a long series of ditches directly into Roosevelt Creek.

For the purpose of this report, a pond size of 3.5 acres is necessary for the 34-acre Gateway Site. The 34 acre site ranges in elevation from 25 ft to 2.8 ft draining from the east to the outfall ditch as depicted on the SWFWMD contour aerial in Appendix E. The elevations substantially vary due to embankment for the former speedway site and lower elevations adjacent to the outfall ditch. The pond area is at elevation 10.5 ft. An allowable high water of 10.7ft. was assumed based on the design high water elevation of a pond (Pond 6) proposed near the Gateway Site in the CR 296 Pond Siting Report. A conservative assumption is to assume the intermodal center will most likely be at grade with the CR 296 improvements. This would require that the surrounding elevations of the intermodal site be no lower than elevation 12.7 ft. which incorporates hydraulic losses

and clearance. Per the CR 296 Pond Siting Report, Pond 6 for that project is located adjacent to the Gateway Site at the northeast quadrant of the proposed Connector and 43rd Street intersection. Expansion of Pond 6 should be considered for the Intermodal Center project to make the most efficient use of the land available. However as an alternative, there is flexibility in constructing a separate pond adjacent to Pond 6. A pond size of 3.5 acres conservatively assumes that a stand alone pond is required. The outfall ditch is located on the eastern border of the parcel adjacent to the Gateway Site and 40th Street.

APPENDIX A

TAMPA BAY INTERMODAL CENTERS

ULTIMATE CONCEPT : DOWNTOWN TAMPA

→ POTENTIAL LIGHT RAIL ROUTE → HSR ROUTE

SCALE 1:100

0' 100' 200' 400'

LEGEND

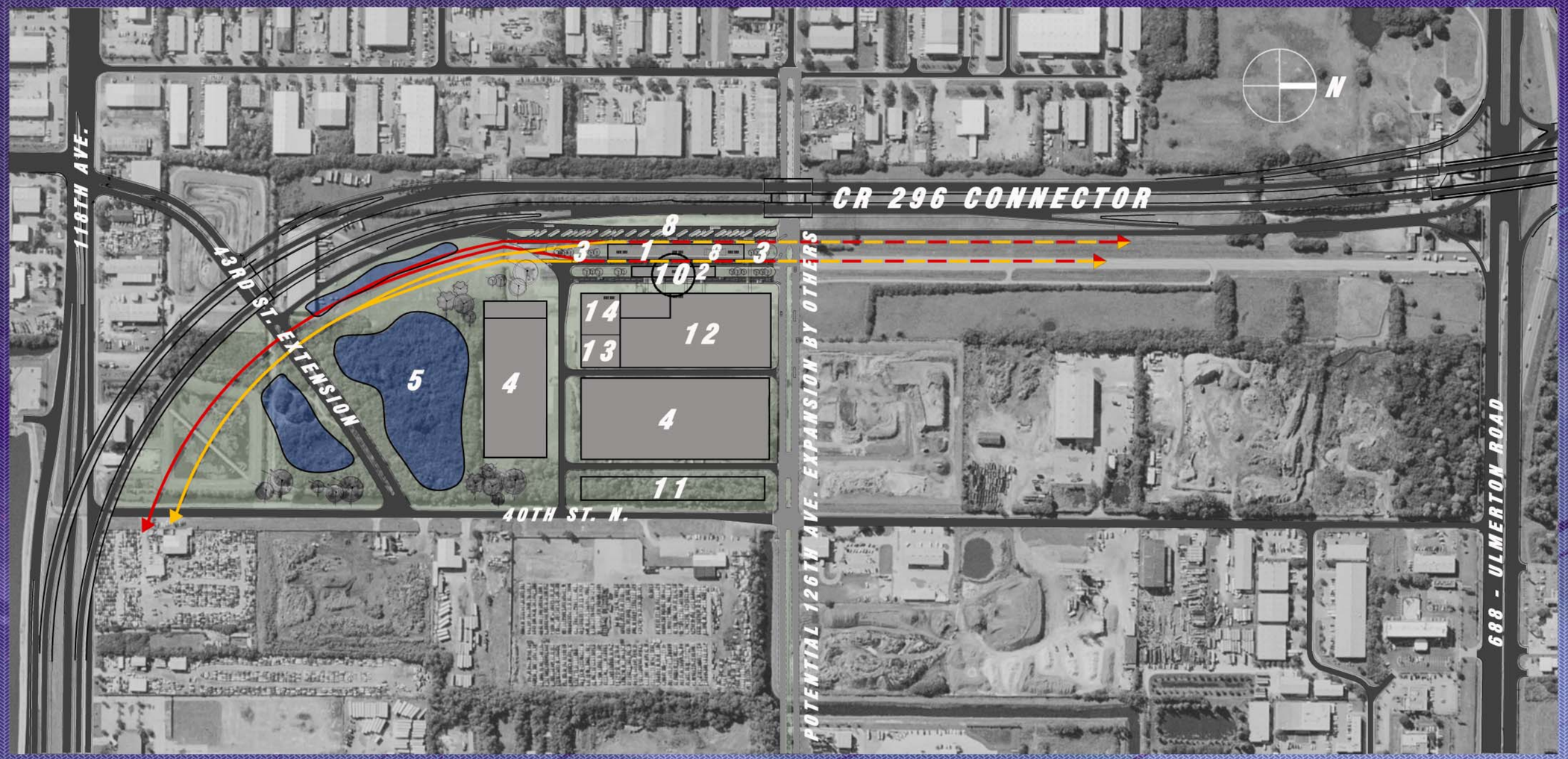
1-INTERMODAL STATION/LIGHT RAIL (3RD LEVEL) AND HIGH SPEED RAIL (4TH LEVEL)WITH GREYHOUND AND HART LINE BUS DROP-OFF/PICK-UP AREA AT GROUND LEVEL.
2-LIMO AND TAXI PICK-UP AND DROP-OFF AREA
3-HSR SWITCH-BACK PLATFORM
4-PARKING GARAGE #1 WITH MIXED-USE DEVELOPMENT
5-RETENTION POND/PARK
6-PEDESTRIAN PARK
7-PARKING GARAGE #2 WITH MIXED-USE DEVELOPMENT
8-GREYHOUND OFFICES AND DORMITORIES WITH PULL-OUT AND PULL-OFF AREAS
9-MARION TRANSIT CENTER EXPANSION
10-PEDESTRIAN CIRCULATION/URBAN NODE (2ND LEVEL)
14-HART LINE ADMINISTRATION OFFICES AT GROUND LEVEL
16-EXISTING MARION TRANSIT CENTER

JUNE 28, 2005

FUTURE * HIGH SPEED * ACCESSIBILITY * MOBILITY * CONVENIENCE * ICON * IDENTITY * TRANSIT * LINK * CONNECTIVITY * ACTIVITY
VITALITY * STRATEGIC CONVERGENCE * HIGH TECH * INTERCHANGE * URBAN ENVIRONMENT * DYNAMIC * PROGRESSIVE * LIFESTYLE * ART

TAMPA BAY INTERMODAL CENTERS

ULTIMATE CONCEPT : GATEWAY SITE



POTENTIAL HSR ROUTE

POTENTIAL PMI ROUTE

SCALE 1:200

0' 200' 400' 800'

LEGEND

1-INTERMODAL STATION WITH BUS DROP-OFF/PICK-UP AREA AT GROUND LEVEL. PINELLAS MOBILITY INITIATIVE PLATFORM AT 3RD LEVEL AND HIGH SPEED RAIL AT 4TH LEVEL.
2-LIMO AND TAXI PICK-UP AND DROP-OFF AREA
3-HSR SWITCH BACK PLATFORM
4-PARKING GARAGE AND MIXED-USE DEVELOPMENT
5-PROPOSED RETENSION POND
8-GREYHOUND OFFICES WITH PULL-OUT AND PULL-OFF AREAS
10-PEDESTRIAN CIRCULATION/URBAN NODE (2ND LEVEL)
11-BUFFER/GREEN SPACE
12-PARKING GARAGE
13-CAR RENTAL
14-ADMINISTRATION OFFICES

JUNE 28, 2005

FUTURE * HIGH SPEED * ACCESSIBILITY * MOBILITY * CONVENIENCE * ICON * IDENTITY * TRANSIT * LINK * CONNECTIVITY * ACTIVITY
VITALITY * STRATEGIC CONVERGENCE * HIGH TECH * INTERCHANGE * URBAN ENVIRONMENT * DYNAMIC * PROGRESSIVE * LIFESTYLE * ART

APPENDIX B

TIERRA

April 6, 2005

PBS&J
5300 West Cypress Avenue, Suite 200
Tampa, Florida 33607

Attention: Ms. Rebecca Spain-Schwarz
Ms. Alice J. Price

RE: Geotechnical Services
Tampa Bay Intermodal Center(s) PD&E Study
Tampa and Gateway Sites
Hillsborough/Pinellas Counties, Florida
FPN: 415348 1
Tierra Project No.: 6511-03-198

Ms. Spain-Schwarz:

Tierra, Inc. has reviewed the Soil Surveys of Hillsborough and Pinellas Counties, Florida published by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS). The results are depicted below.

Hillsborough County Soil Survey – Tampa Site

Based on a review of the Hillsborough County Soil Survey, it appears that there is one (1) soil-mapping unit noted within the project alignment. The general soil description is presented below, as described in the Soil Survey.

> Urban land (Unit 56)
> This mapping unit consists of miscellaneous areas that are covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

The Tampa Site is located in an area of Hillsborough County that has previously been developed. Structures under three stories in height are typically founded on shallow foundations with standard asphalt type parking and access drives. Structures greater than three stories will typically be founded on a modified shallow foundation system or a deep foundation system comprised of drilled piers or a driven piling system.

7805 Professional Place · Tampa, Florida 33637
813.989.1354 · FAX 813.989.1355

Pinellas County Soil Survey – Gateway Site

Based on a review of the Pinellas County Soil Survey, it appears that there are five (5) soil-mapping unit noted within the project alignment. The general soil description is presented below, as described in the Soil Survey.

Made Land (Unit Ma)
This soil consists of mixed sand, clay, hard rock, shells, and shell fragments that have been transported, reworked, and leveled by earth-moving equipment. Many areas consist of material that has been dredged from the bay and used to fill diked areas.

Manatee Loamy Fine Sand (Unit Mn)
This is a nearly level, very poorly drained soil that has loamy subsoil. It occurs in depressions and along broad drainageways. The water table commonly is at a depth of less than 10 inches.

Myakka Fine Sand (Unit My)
This is a nearly level, poorly drained soil on broad flats between sloughs and swamps. In places it is gently sloping. The water table is normally at a depth of 10 to 30 inches.

Oldsmar Fine Sand (Unit Om)
This a nearly level, poorly drained sandy soil on broad low ridges in the flatwoods. The water table is at a depth of less than 10 inches for 1 or 2 months during wet periods and at 10 to 30 inches for 2 to 6 months in most years. Most areas are periodically wet.

Pompano Fine Sand (Unit Pp)
This a nearly level, poorly drained soil near ponds and in low areas between sloughs in the flatwoods. The water table normally is at a depth of 10 to 40 inches. It is within 10 inches for 1 to 2 months during wet seasons and is below 40 inches during dry periods.

USDA Seasonal High Groundwater Table Estimates

Pinellas County USDA Soil Survey Information

USDA Map Unit	Soil Classification			Permeability (in/hr)	pH	Seasonal High Groundwater	
	Depth (in)	USCS	AASHTO			Depth (in)	Months of year
Ma	No Data Available						
Mn	0-18	SP-SM	A-2	2.0-6.3	6.1-7.8	<10	6 to 12
	18-44	SC, SC-SM	A-2-4	0.63-2.0	6.1-7.8		
	44-72	SP	A-3	6.3-20	6.1-7.8		
My	0-16	SP, SP-SM	A-3	6.3-20	4.5-6.5	<10	1 to 4
	16-25	SP-SM, SM	A-3	0.63-2.0	4.5-6.5		
	25-84	SP-SM, SP	A-3	6.3-20	4.5-6.5		
Om	0-34	SP	A-3	6.3-20	4.5-5.5	<10	1 or 2
	34-44	SP-SM, SM	A-3	2.0-6.3	4.5-6.5		
	44-65	SM-SC, SC	A-2-6	0.63-2.0	6.1-8.4		
Pp	0-14	SP, SP-SM	A-3	6.3-20	5.6-7.3	<10	1 or 2
	14-80	SP, SP-SM	A-3	6.3-20	6.1-7.8		

The Gateway Site is located within an area of Pinellas County known for high groundwater tables. The site will require fill to elevate structures and asphalt parking areas and access drives to maintain proper groundwater separation. Similar to the Tampa Site, structures under three stories in height are typically founded on shallow foundations with standard asphalt type parking and access drives based on final fill heights. Structures greater than three stories will typically be founded on a modified shallow foundation system or a deep foundation system comprised of drilled piers or a driven piling system.

Tierra, Inc. appreciates the opportunity to be of service to PBS&J on this project. If you have any questions or comments regarding this report, please contact our office at your earliest convenience.

Respectfully Submitted,

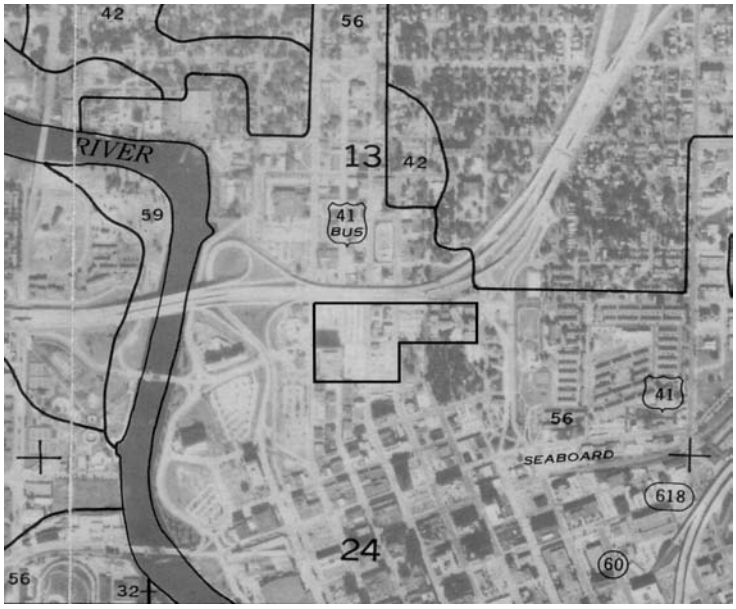
TIERRA, INC.

Anne E. Mize
Environmental Scientist

Henri V. Jean, P.E.
Principal Geotechnical Engineer
Florida Registration No. 55420

Attachment

USDA SOIL SURVEY of HILLSBOROUGH COUNTY, FL



Tampa Site

USDA SOIL SURVEY of PINELLAS COUNTY, FL

Gateway Site

APPENDIX C

Tampa Bay Intermodal Centers
PD&E Study

Downtown Tampa Site
Hillsborough County

PBS&J

Tampa CBD Intermodal Hillsborough

Designed By: LPF
Date: 3/24/2005
Checked By: MM
Date: 4/11/2005

SMF 1

TREATMENT CALCULATIONS

Wet Detention (1"+ 50% for OFW over site area)	12 ac
Treatment Volume Required	**1.50 ac-ft**

VOLUME RETENTION CALCULATIONS

Will attenuation be necessary?	Y
Rainfall Depth - SWFWMD 25-year, 24-hour (P)	8.5 in.

Pre-development Conditions

Total Area to be attenuated for	12.00 ac
Impervious Areas	
Water	0.00 ac
Pavement (roadways, driveways, concrete, etc.)	0.00 ac
Pervious Area (Includes Dry SMF Area)	0.00 ac

CN Calculations

Soil Type(s)	56 - Urban Land
Hydrologic Group	D
SHWT	1'

	Area	*CN*	*Weighted CN*
Impervious Areas			
Commercial and Business Area	12.00 ac	95	95.00
Pavement (roadways, driveways, concrete, etc.)	0.00 ac	98	0.00
Pervious			
		CN_{pre} =	95.0

SCS Method Used to Determine Volume:

$$S = \frac{1{,}000}{CN} - 10$$

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

S_{pre} =	0.53 in.
Q_{pre} =	7.90 in.
Pre-development Runoff Volume =	**7.90 ac-ft**

ATTENUATION CALCULATIONS (CONT.)

Post-development Conditions

Total Area to be attenuated for	12.00 ac
Impervious Areas	
Water	1.68 ac
Pavement (roadways, driveways, concrete, etc.)	10.00 ac
Pervious area	0.32 ac

CN Calculations

Soil Type(s)	56 Urban Land
Hydrologic Group	D
SHWT	1'

		Area	*CN*	*Weighted CN*
Water (80% of pond estimate)		1.68 ac	100	14.00
Pavement (roadways, driveways, concrete, etc.)		10.00 ac	98	81.67
Pervious Area		0.32 ac	80	2.13
			CN_{post} =	97.8

SCS Method Used To Determine Runoff Volume:

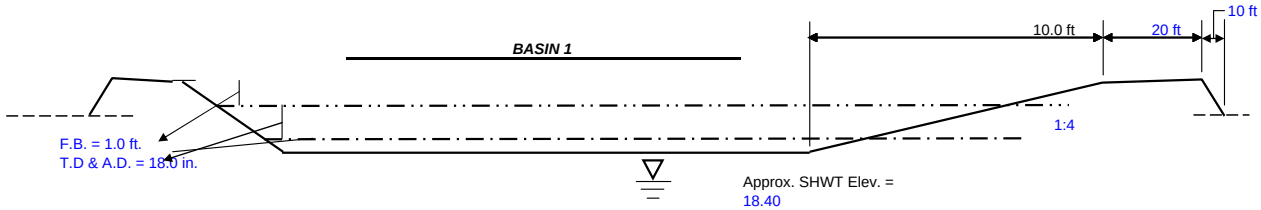
$$S = \frac{1{,}000}{CN} - 10$$

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

S_{pre} =	0.22 in.
Q_{pre} =	8.24 in.
Post-development Runoff Volume =	**8.24 ac-ft**

Attenuation Volume Required (Post-Pre) **0.34 ac-ft** **negligible**

SMF SIZE ESTIMATE



Approx. SHWT Elev. = 18.40
drawdown with liner to 17.0

Approx. low elevation (LEOP)= 19.50
Average Existing Ground Elevation at Pond Site = 22.90 (on ~3' fill)
Approx. hydraulic clearance from LEOP = 1.00 ft
Allowable High Water = 18.50 ft
Available depth for T.D. + A.D. = 18.00 in

Square dimension at bottom of T.D.	224.9 ft	
Square dimension at top of A.D.	236.9 ft	
Treatment & Attenuation Volume provided	**1.84 ac-ft**	*Treatment Volume Required* **1.50 ac-ft**
Square dimension at top of freeboard (F.B.)	244.9 ft	*Attenuation Volume Required* **0.34 ac-ft**
Outside pond dimensions (including maint. berm & tie-down)	304.9 ft	

Minimum Total Area Required: **2.1 ac**

Scale:
1" = 400'

N

Former Sunshine Speedway

118th Ave N

126th Ave N

Ulmerton Rd

Legend

- Proposed Site Boundaries
- Existing Parcel Boundaries
- Flood Plain
- Wetland

Tampa Bay Intermodal Centers
PD&E Study

Gateway Site
Pinellas County

PBS&J

Gateway Site Pinellas County

Designed By: LPF
Date: 3/24/2005
Checked By: MM
Date: 4/11/2005

SMF 1

TREATMENT CALCULATIONS

Wet Detention (1" over site area)	34 ac
Treatment Volume Required	**2.83 ac-ft**

VOLUME RETENTION CALCULATIONS

Will attenuation be necessary?	Y
Rainfall Depth - SWFWMD 25-year, 24-hour (P)	9.0 in.

Pre-development Conditions

Total Area to be attenuated for	34.00 ac
Impervious Areas	
Water	0.00 ac
Pavement (roadways, driveways, concrete, etc.)	16.50 ac
Pervious Area	17.50 ac

CN Calculations

Soil Type(s)	- Mn Ma Pp Wa My Om
Hydrologic Group	D
SHWT	5"

	Area	*CN*	*Weighted CN*
Water	0.00 ac	100	0.00
Commercial and Business Area	0.00 ac	95	0.00
Pavement (roadways, driveways, concrete, etc.)	16.50 ac	98	47.56
Pervious	17.50 ac	80	41.18
		CN_{pre} =	88.7

SCS Method Used to Determine Volume:

$$S = \frac{1{,}000}{CN} - 10$$

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

S_{pre} =	1.27 in.
Q_{pre} =	7.64 in.
Pre-development Runoff Volume =	**21.64 ac-ft**

ATTENUATION CALCULATIONS (CONT.)

Post-development Conditions

Total Area to be attenuated for	34.00 ac
Impervious Areas	
Water	2.80 ac
Commercial and Business Area	30.50 ac
Pervious Area	0.70 ac

CN Calculations

Soil Type(s)	Mn Ma Pp Wa My Om
Hydrologic Group	D
SHWT	5"

		Area	*CN*	*Weighted CN*
Water (80% of pond estimate)		2.80 ac	100	8.24
Commercial and Business Area		30.50 ac	95	85.22
Pavement (roadways, driveways, concrete, etc.)		0.00 ac	95	0.00
Pervious		0.70 ac	80	1.65
			CN_{post} =	95.1

SCS Method Used To Determine Runoff Volume:

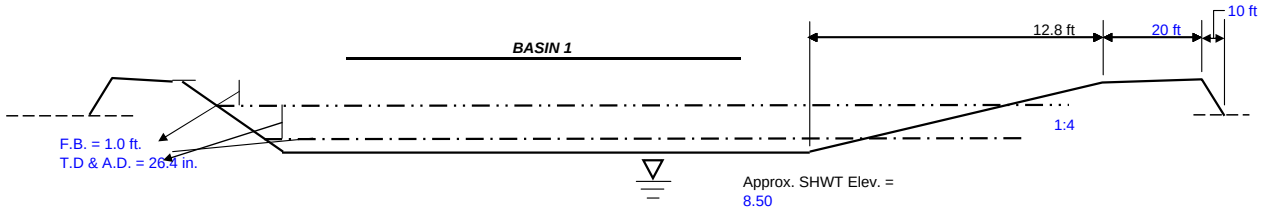
$$S = \frac{1{,}000}{CN} - 10$$

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

S_{pre} =	0.51 in.
Q_{pre} =	8.41 in.
Post-development Runoff Volume =	**23.83 ac-ft**

Attenuation Volume Required (Post-Pre) **2.19 ac-ft**

SMF SIZE ESTIMATE



Approx. low edge of pavement elevation (LEOP)= 12.70
Average Existing Ground Elevation at Pond Site = 10.50
Approx. hydraulic clearance from LEOP = 1.00 ft
Allowable High Water = 10.70 ft
Available depth for T.D. + A.D. = 26.40 in

Square dimension at bottom of T.D.	306.6 ft
Square dimension at top of A.D.	324.2 ft
Treatment & Attenuation Volume provided*	**5.02 ac-ft**
Square dimension at top of freeboard (F.B.)	332.2 ft
Outside pond dimensions (including maint. berm & tie-down)	392.2 ft

Treatment Volume Required
2.83 ac-ft
Attenuation Volume Required
2.19 ac-ft

Minimum Total Area Required: **3.5 ac**

*Treatment Volume Controls

APPENDIX D

Elevation Reference Mark RM7×

Zone D Boundary

River Mile •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

Coastal base flood elevations shown on this map include the effects of wave action.

APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

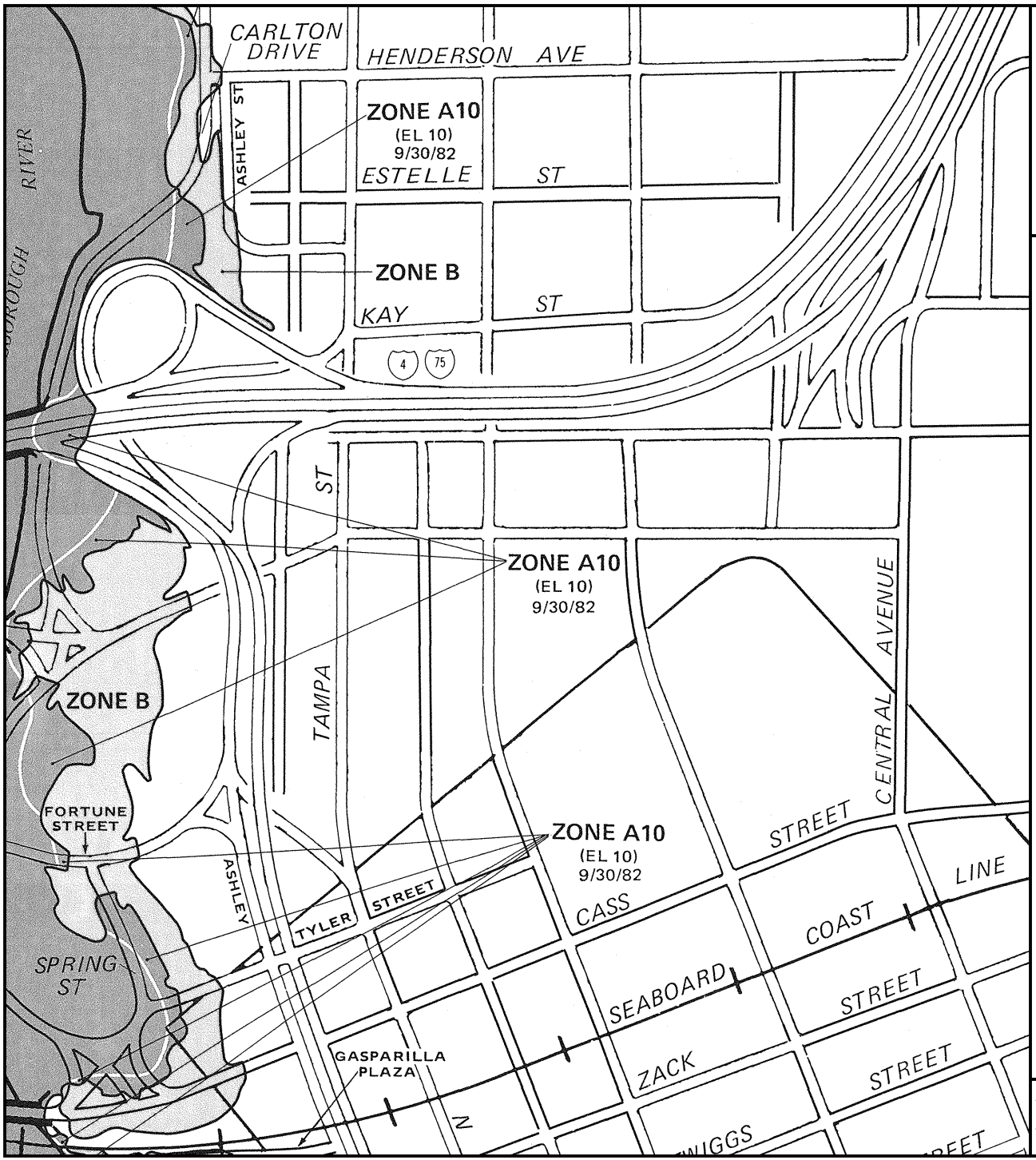
CITY OF
TAMPA, FLORIDA
HILLSBOROUGH COUNTY

PANEL 24 OF 46
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120114 0024 C

MAP REVISED:
SEPTEMBER 30, 1982

Federal Emergency Management Agency



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APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
TAMPA, FLORIDA
HILLSBOROUGH COUNTY

PANEL 24 OF 46
(SEE MAP INDEX FOR PANELS NOT PRINTED)

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MAP REVISED:
SEPTEMBER 30, 1982

Federal Emergency Management Agency

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100–YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE A99 To be protected from 100–year flood by Federal flood protection system under construction; no base flood elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500–year flood; areas of 100–year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100–year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500–year floodplain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

APPROXIMATE SCALE

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

PINELLAS COUNTY, FLORIDA AND INCORPORATED AREAS

PANEL 139 OF 327

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

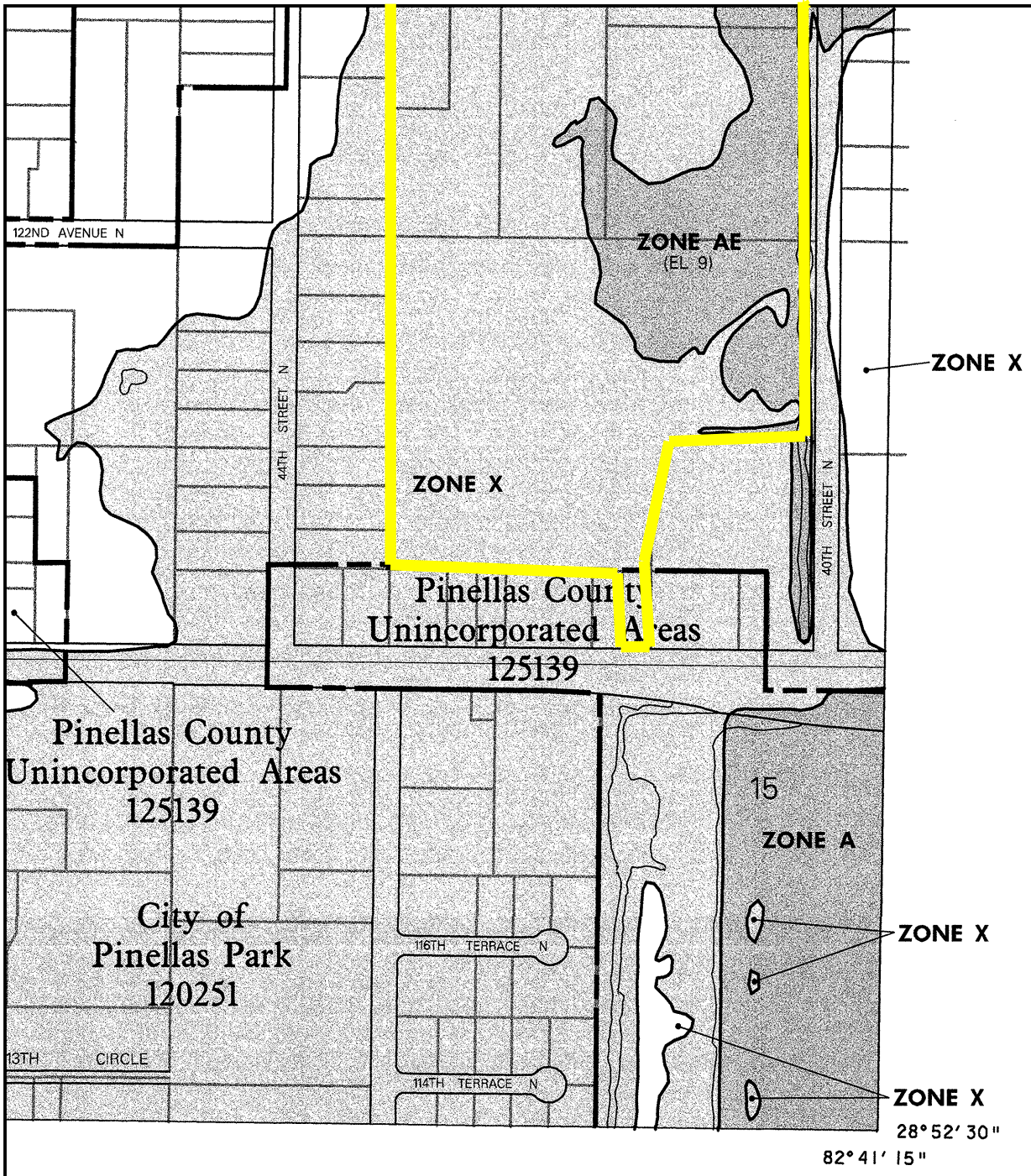
COMMUNITY	NUMBER	PANEL	SUFFIX
PINELLAS COUNTY	125139	0139	G
PINELLAS PARK, CITY OF	120251	0139	G

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER 12103C0139G

EFFECTIVE DATE: SEPTEMBER 3, 2003

Federal Emergency Management Agency



APPROXIMATE SCALE

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

PINELLAS COUNTY,
FLORIDA
AND INCORPORATED AREAS

PANEL 139 OF 327

(SEE MAP INDEX FOR PANELS NOT PRINTED)

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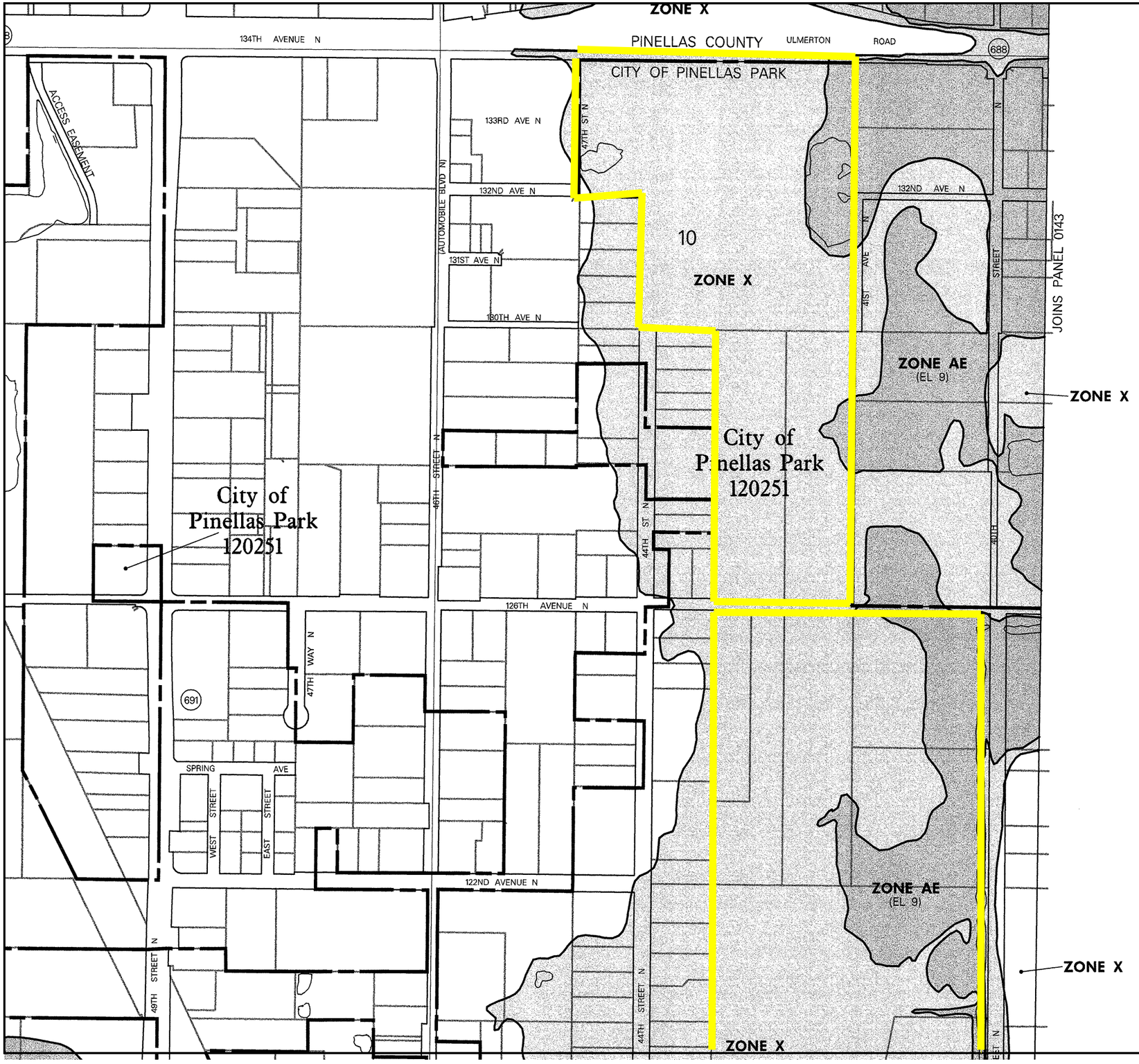

APPROXIMATE SCALE

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

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APPENDIX E

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City of Tampa Drainage Atlas, Sec. 13-T29 S-R18E, Sheet H-12 is available from Hillsborough County.

SWFWMD Aerial (Hillsborough River Basin), Sheet No. 13.29.18, is available from Southwest Florida Water Management District.

SWFWMD Aeria (Roosevelt Creek Basin), Sheet No. 10.30.16, is available from Southwest Florida Water Management District.