

# Drainage Memorandum

## TAMPA INTERSTATE STUDY

(the I-275/I-4 Downtown Interchange Operational Improvement)

WPI No. 7140004, State Project No. 99007-1402, FAP No. IR-9999(43)

Interstate 275 (I-275) from the Hillsborough River to Floribraska Avenue and Interstate 4 (I-4) from the I-275/I-4 merge to east of 22nd Street (Section 10320-MP 0.0 to MP 0.7 and Section 10190-MP 6.389 to MP 8.49) approximately 4.5 kilometers (2.8 miles) in length.

Prepared For

### FLORIDA DEPARTMENT OF TRANSPORTATION

Prepared By  
**GREINER, INC.**

Property of Greiner  
GREINER, INC.  
Tampa, Florida

In Association With  
**KNIGHT APPRAISAL SERVICES, INC.  
JANUS RESEARCH**

APRIL 1996

## **INTRODUCTION**

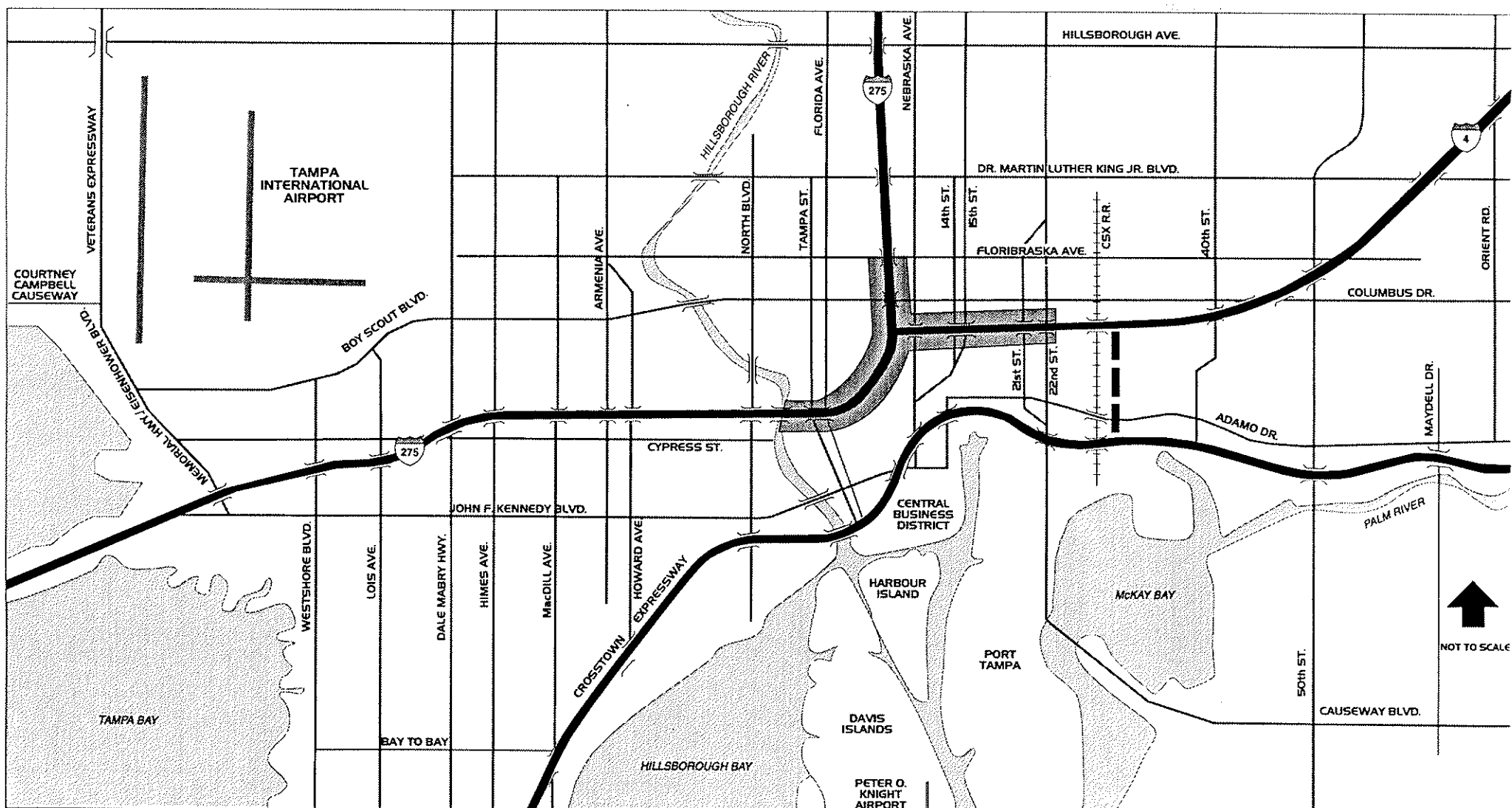
The I-275/I-4 downtown interchange was designed in the early 1960's and is a complex arrangement of overpasses and weaving areas that handle large volumes of traffic. Originally designed to handle 40,000 to 60,000 vehicles per day (vpd), traffic volumes in 1994 ranged as high as 164,000 vpd, nearly three times the amount of traffic intended to travel this section of roadway. With such high volumes of traffic on the interstate, the issue of safety on the I-275/I-4 downtown interchange has become a great concern to the Tampa Bay community. This staged improvement project is intended to improve conflicting merge/diverge areas that currently contribute to congestion in the downtown interchange area, to increase sight distance to reduce accidents and provide a pull off area when accidents occur by providing shoulders where economically and physically possible, and to identify any further safety improvements for the downtown interchange. No major flooding has been reported in the project study limits. The improvements are proposed for new construction. Detailed descriptions of the proposed project and improvement alternatives are provided in the Engineering Summary document, which is published separately. This memorandum will discuss existing drainage conditions within the study limits and proposed roadway alternative drainage requirements.

## **PROJECT DESCRIPTION**



The study limits for the proposed downtown interchange improvements are Interstate 275 (I-275) from the Hillsborough River north to Floribraska Avenue and Interstate 4 (I-4) from the I-275/I-4 merge to east of 22nd Street, approximately 4.5 kilometers (2.8 miles) in length. The project study limits are shown on Exhibit 1.

## **EXISTING CONDITIONS**

The project is located in an area which is characterized by heavily urbanized development. The existing stormwater systems within the project area outfall to the Hillsborough River or to McKay Bay.



**LEGEND**

-  Proposed Crosstown Connector
-  Project Study Limits

FLORIDA DEPARTMENT OF TRANSPORTATION  
 DRAINAGE MEMORANDUM  
**TAMPA INTERSTATE STUDY  
 PHASE II**  
 Hillsborough County, Florida

**PROJECT STUDY LIMITS**



The existing drainage system within the project area consists of enclosed storm sewer systems. The majority of the stormwater outfall systems for the existing interstate system were constructed in the early 1960's and are considered to be undersized or overloaded.

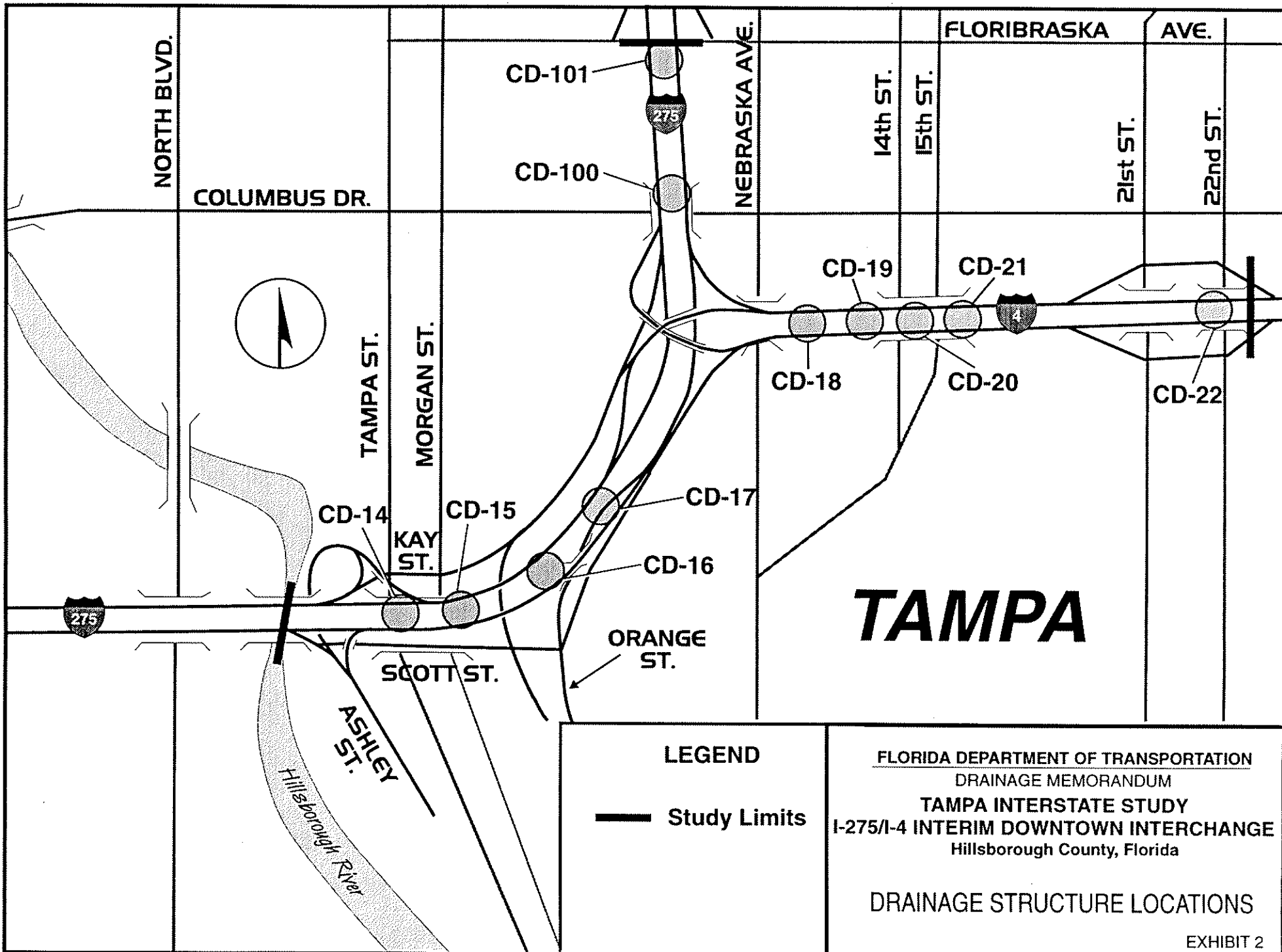
Various drainage basin studies within the project limits have been supplied to the study team by the City of Tampa for the Nuccio Parkway Basin and Ybor City Basin. These studies document existing drainage problem areas upstream and downstream of the interstate, existing structures and outfalls, and recommend structure improvements within the basin.

Existing cross-drain structures and outfalls were located using City of Tampa drainage maps, basin studies, other similar sources, and field verification and are shown on Exhibit 2. Approximately 11 cross-drain structures range in size from a 45.7 -cm (18-in.) Reinforced concrete pipe (RCP) to a 2.1m (7.0 ft.) X 1.5-m (5-ft.) box culvert (BC).

Floodplain areas within the study limits were identified from the FEMA Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS) and are shown in Exhibit 3. The base floodplain (Zone A10) with the study limits results from tidal storm surge. No floodways were identified within the study area.

## **ALTERNATIVE DESCRIPTION**

Several roadway improvement alternatives were developed for the Interim Downtown Interchange improvements. Three alternatives were initially developed. The preferred Alternative is comprised of many of the improvements developed for Alternative 2 with Alternative 1 improvements at the west end of the project and a refinement of the westbound I-4 ramping to the local freeway. Descriptions of all the roadway Alternatives are provided in the Engineering Summary document, which is published separately.



NORTH BLVD.

COLUMBUS DR.

CD-101

CD-100

NEBRASKA AVE.

14th ST.

15th ST.

FLORIBRASKA

AVE.

21st ST.

22nd ST.



TAMPA ST.

MORGAN ST.

CD-19

CD-21

CD-18

CD-20

CD-22

CD-14

CD-15

CD-17

CD-16

KAY ST.

ORANGE ST.

**TAMPA**

SCOTT ST.

ASHLEY ST.

Hillsborough River

**LEGEND**

**— Study Limits**

FLORIDA DEPARTMENT OF TRANSPORTATION  
DRAINAGE MEMORANDUM

**TAMPA INTERSTATE STUDY**  
**I-275/I-4 INTERIM DOWNTOWN INTERCHANGE**  
Hillsborough County, Florida

**DRAINAGE STRUCTURE LOCATIONS**

**TABLE 1**  
**DRAINAGE STRUCTURE LOCATION SUMMARY**

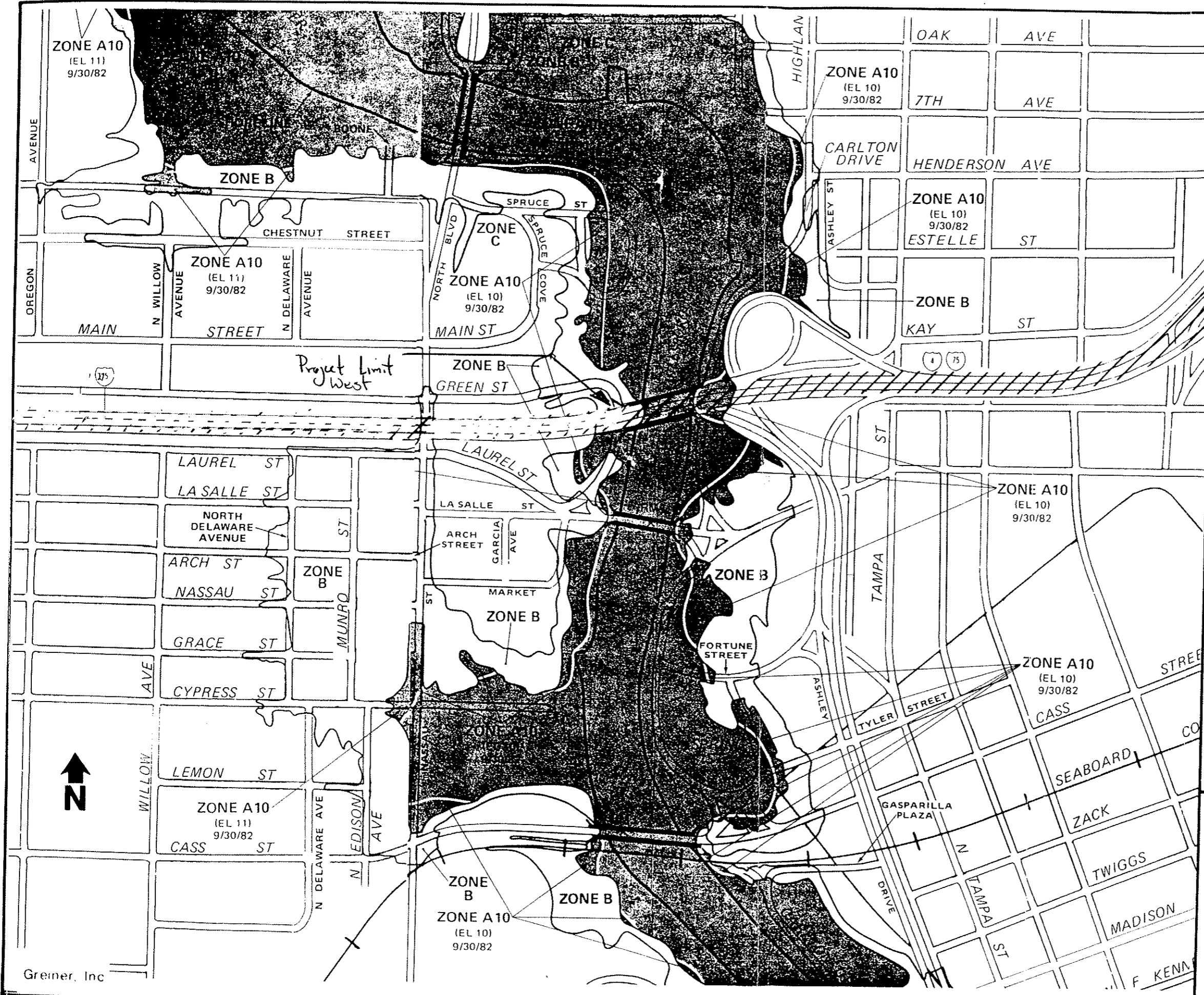
**Tampa Interstate Study**

**I-275/I-4 Interim Downtown Interchange**

**Drainage Memorandum**

Structure ID.	Location	Size/Type	Length	Invert el. (Upstream) (m/ft. NGVD)	Invert el. (Downstream) (m/ft. NGVD)	Drainage Basin
CD14	Franklin St.	91.4 cm RCP (36 in.)	91.4 m (300 ft.)	3.8 m (12.4 ft.)	2.1 m (7.1 ft.)	W. to Hillsborough River
CD15	Morgan St.	152.4 cm RCP (60 in.)	60.9 m (200 ft.)	3.2 m (10.6 ft.)	3.1 m (10.3 ft.)	W. to Hillsborough River
CD16	Henderson Ave.	45.7 m RCP (18 in.)	82.3 m (270 ft.)	13.2 m (43.4 ft.)	11.2 m (37.0 ft.)	W. to Hillsborough River
CD17	Palm St.	60.9 cm RCP (24 in.)	134.1 m (440 ft.)	12.1 m (40.0 ft.)	10.9 m (36.0 ft.)	Nuccio Pkwy.
CD18	10th St.	1.5 m x 1.5 m BC (5 ft. x 5 ft.)	70.7 m (232 ft.)	8.7 m (28.6 ft.)	8.5 m (28.0 ft.)	Nuccio Pkwy.
CD19	13th St.	2.1 m x 1.5 m BC (7 ft. x 5 ft.)	304.8 m (1,000 ft.)	11.7 m (38.5 ft.)	--	Ybor City
CD20	14th St.	45.7 cm RCP (18 in.)	76.2 m (250 ft.)	10.8 m (35.7 ft.)	9.5 m (31.2 ft.)	Ybor City
CD21	15th St.	106.6 cm RCP (42 in.)	60.9 m (200 ft.)	--	8.8 m (29.0 ft.)	Ybor City
CD22	22nd St.	76.2 cm RCP (30 in.)	--	--	5.3 m (17.4 ft.)	29th Street
CD-100	Columbus Dr.	45.7 cm RCP (18 in.)	79.2 m (260 ft.)	N/A	N/A	Nuccio Parkway
CD-101	Floribraska Ave.	60.9 cm RCP (24 in.)	N/A	N/A	N/A	Robles Park/Hillsborough River

BC = Box Culvert  
RCP = Reinforced Concrete Pipe  
CBC = Concrete Box Culvert  
N/A = Not Available  
NGVD = National Geodetic Vertical Datum  
HW = Headwater  
TW = Tailwater



**LEGEND**

**EXPLANATION OF ZONE DESIGNATIONS**

- Zone
- A Area of 100-year flood; base flood elevations and flood hazard factors not determined.
  - A1-A30 Area of 100-year flood; base flood elevations and flood hazard factors determined
  - B 100-500 year floodplain
  - C Area of minimal flooding (No Shading)
- /// Project Corridor

**FLORIDA DEPARTMENT OF TRANSPORTATION**

**TAMPA INTERSTATE STUDY  
PHASE II**  
Hillsborough County, Florida

**FLOODPLAINS**

## ALTERNATIVE EVALUATION

### Stormwater Management

The three alternatives and the preferred alternative were evaluated for proposed stormwater management requirements. This included determining proposed stormwater treatment volumes, preliminary detention pond locations and estimated conveyance and outfall system improvements.

Existing and proposed new impervious areas were determined from 1"=100 foot scale aerial photographs for each alternative and are shown in Table 2. Since the runoff from the existing and proposed roadways flows to the tidally influenced Hillsborough River, no stormwater peak attenuation per FDOT 14-86, F.A.C. or SWFWMD 40D-4, F.A.C. was considered.

Stormwater treatment of the first one-inch of runoff from the new impervious areas was determined for each alternative. Approximately 1.0 ac.-ft., 0.7 ac.-ft., 2.1 ac.-ft. and 0.8 ac.-ft. of stormwater treatment volume will be required for Alternatives 1, 2, 3 and the preferred respectively. Preliminary detention pond locations were identified within existing right-of-way at the proposed interchange infield and ramp areas or within impacted areas adjacent to the proposed roadway. Preliminary detention pond sizes were estimated assuming "wet" ponds with approximately two (2) feet of storage fluctuation and 20-foot maintenance berms. The total detention pond area was 0.8 acres, 0.7 acres, 1.5 acres, and 0.8 acres for Alternative 1, 2, 3 and the preferred respectively. Calculations of treatment volumes and preliminary pond sizes are included in Appendix A.

With the construction of any of the alternatives, the existing stormwater conveyance and outfall system will require modifications and improvements. Currently, the interstate is on a fill or bridge section throughout the project area. The existing drainage is then conveyed to scuppers, inlets or ditches and directed down to ground level. The existing drainage is then conveyed via a system of large diameter pipes (54"-66" RCP) directly to the Hillsborough River along Scott Street. Drainage on the at-grade street is conveyed via pipes and inlets to either the FDOT Scott Street outfall or to



**TABLE 2**

**TIS DOWNTOWN INTERCHANGE**

**EXISTING AND PROPOSED NEW IMPERVIOUS AREAS**

Location	Existing Pav't (Ac)	Pavement Area (Ac)			
		New Pav't Alt. 1	New Pav't Alt. 2	New Pav't Alt. 3	New Pav't Preferred
Rome to Hill. River	9.0	*(1)	*	3.7	*
Hills. River to Orange St.	10.6	*	*	4.2	1.4
Orange St. to Palm Ave.	9.9	6.3	4.5	5.9	1.5
Palm Ave. To Columbus to Nebraska Ave.	10.5	2.2	1.7	7.9	2.6
Nebraska Ave. To 13th St.	6.4	1.1	0.4	0.9	2.2
13th St. to 19th St.	6.4	1.1	0.4	0.9	2.2
19th St. to 22nd St.	2.6	0.2	0.4	0.9	0.5
Total	53.9	11.6	8.0	25.5	9.7

\*(1) No construction proposed in these segments with the alternative

an existing City of Tampa outfall system along Laurel Street. The proposed alternatives will consist of adding new travel lanes and shoulders. Depending on the alternative, the existing roadway collection system may still be utilized. However, additional inlets and pipes may be required to tie the new lanes or shoulder drainage system to the existing drainage system. In other cases, due to the roadway geometry, a new separate drainage collection system will be required. The ultimate roadway drainage will have to be determined during final design.

It is anticipated that the interstate outfall system to the Hillsborough River will also require modification. This will be required for two reasons: the outfall will have to convey runoff from increased impervious area, and portions of the proposed alternatives will cover the existing pipe alignment. A preliminary hydraulic analysis of the interstate outfall system to the Hillsborough River was completed using proposed roadway impervious areas and alignments. Preliminary estimates of proposed outfall system pipe sizes are shown in Table 3.

## **CROSS-DRAINS**

As discussed in the existing conditions section, eleven (11) cross drain structures were identified within the project limits.

All of the cross drains identified are part of a storm sewer network which are located on roadways which are spanned by I-275 or are included with enclosed systems both upstream and downstream of the interstate. Therefore, it is anticipated that the storm sewer system below the existing road will not be significantly affected by the interim improvements.

**TABLE 3**

**TIS DOWNTOWN INTERCHANGE  
PROPOSED OUTFALL PIPE SIZE TO THE HILLSBOROUGH RIVER**

Location	Existing Pipe Size (in.)	Proposed Pipe Size (in.)(1)
Columbus Dr. to Park	60	72
Park to Palm Ave.	60	72
Palm Ave. To Henderson	60	72
Henderson to Marion St.	66	84
Marion St. to Tampa St.	66	84
Tampa St. to Hills. River	66	84

(1) or equivalent

## AGENCY COORDINATION

Greiner reviewed the proposed alternatives with representatives of FDOT, SWFWMD, and the City of Tampa. Minutes of the meetings are included in Appendix B. The major items discussed with the agencies will include:

- The existing interchange drainage system discharges directly to the Hillsborough River, which is tidally influenced. There is no existing stormwater treatment provided.
- FDOT indicated that since the interchange area is discharging to the Hillsborough River (tidal area), FDOT 14-86 requirements will not apply.
- Due to the combination of new and the expansion of existing pavement, equivalent stormwater treatment is proposed. SWFWMD wants us to maximize our treatment capacity. We are currently proposing to treat as a minimum, one-inch of runoff over the area of new pavement (wet-detention).
- No peak attenuation will be required by SWFWMD since we are discharging to the Hillsborough River provided that it is demonstrated that there is no adverse impact to adjacent drainage systems.
- The City will also not require peak attenuation for the interchange area discharging to the Hillsborough River. However, the City may require improvements to the outfall system in lieu of peak attenuation in the Ybor City area. During final design the increase in peak discharge due to the roadway improvements will be calculated to determine what outfall improvements may be required.

## APPENDIX A

# Greiner, Inc.

JOB TIS Downtown Interchange SHEET 1 OF      PROJ. NO.       
 DESCRIPTION Proposed Interchanges COMPUTED BY WES DATE 2/94  
 CHECKED BY      DATE     

## TIS Downtown Interim Interchange Proposed Impervious Area

- Areas estimated from 1"=100' aerial photo with alternatives

Location	Existing	Pavement Area (Ac)			New Pavt Preferred Alt.
		New Pavt Alt. 1	New Pavt Alt. 2	New Pavt Alt. 3	
Rome to Hills River	-	-	-	3.7	-
Hills River to Orange St.	10.6	-	-	4.2	1.6
Orange St to Palm Ave.	9.9	6.3	4.5	5.9	2.1
Palm Ave. to Columbus to Nebraska Ave.	10.5	2.2	1.7	7.9	4.2
Nebraska Ave to 13 <sup>th</sup> St.	4.9	1.8	1.0	1.0	1.9
Columbus to Plymouth St.	-	-	-	1.0	-
13 <sup>th</sup> St. to 19 <sup>th</sup> St.	6.4	1.1	0.4	0.9	2.2
19 <sup>th</sup> St. to 22 <sup>nd</sup> St	2.6	0.2	0.4	0.9	0.5
Total	44.9	11.6	8.0	25.5	12.5

# Greiner, Inc.

JOB TIS Downtown Interchange  
DESCRIPTION Proposed Treatment Vol.

SHEET 2 OF      PROJ. NO.       
COMPUTED BY MEJ DATE 2/96  
CHECKED BY      DATE     

## TIS Downtown Interchange Stormwater Treatment Volumes

- Assume treatment volume equal to one-inch of runoff from new impervious areas
- Area discharging to Hills River - no peak attenuation req'd.

### Alternative 1

New Pav't Area = 11.6 Ac

Treatment Volume = 11.6 Ac  $\times$  1"/12 = 1.0 Ac-ft

### Alternative 2

New Pav't Area = 8.0 Ac

Treatment Volume = 8.0 Ac  $\times$  1"/12 = 0.7 Ac-ft

### Alternative 3

New Pav't Area = 25.5 Ac

Treatment Volume = 25.5 Ac  $\times$  1"/12 = 2.1 Ac-ft

### Preferred Alt.

New Pav't Area = 12.5 Ac

Treatment Volume = 12.5 Ac  $\times$  1"/12 = 1.0 Ac-ft

# Greiner, Inc.

JOB T15 Downtown Interchange SHEET      OF      PROJ. NO.       
DESCRIPTION      COMPUTED BY LET DATE 2/96  
CHECKED BY      DATE     

## T15 Downtown Interchange

### Pond Area Required

- Ponds "wet" ponds
- Use 4:1 slopes
- 2' storage depth
- 1' freeboard
- 20-foot maint berms

### Total Area

- Vol required = 1.0 Ac-ft (Preferred Alt.)

- Pond Bottom =  $150 \times 150 = 22,500 \text{ ft}^2$
- Pond DHW (2') =  $166 \times 166 = 27,556 \text{ ft}^2$
- Pond Top (1' freeboard) =  $174 \times 174 = 30,276 \text{ ft}^2$
- Pond (w/ 20' maint berms) =  $214 \times 214 = 45,796 \text{ ft}^2 = 1.1 \text{ Ac}$

### Pond Area Provided

- Ashley St. Ramp = 0.91 Ac
- Kay St. Ramp = 0.40 Ac
- Scott St Ramp = 0.73 Ac
- I-4/I-275 Interchange = 1.8 Ac + 0.7 Ac = 2.5 Ac

Total area = 4.5 Ac

(Note all area within existing R.O.W.)



## APPENDIX B



## RECORD OF CONVERSATION

DATE: 11/7/95 JOB NO: C102380.21

RECORDED BY: R. Johnson OWNER/CLIENT: FDOT

TALKED WITH: Carlos Lopez OF FDOT District 7 Drainage

NATURE OF CALL: INCOMING  OUTGOING  MEETING

ROUTE TO: Elaine Illes

MAIN SUBJECT OF CONVERSATION: TIS Downtown Interchange

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**ITEMS DISCUSSED:** I reviewed with Carlos my discussion with Alba Evans of SWFWMD concerning stormwater requirements for the TIS Downtown Interchange project.

Carlos concurred with the results of the discussion.

I asked Carlos about upgrading the existing 66-inch outfall from the interchange in lieu of providing peak attenuation ponds. Carlos said the outfall should be evaluated to determine existing capacity and upgrade requirements from this project. He said additional right-of-way for ponds should be avoided if possible. I told Carlos we would take a preliminary look at the outfall. I also asked Carlos about FDOT 14-86 requirements. He said since we are discharging to the Hillsborough River (tidal area), FDOT 14-86 will not apply.

I told him we would schedule meetings with SWFWMD and City of Tampa to discuss preferred alternative.



# Southwest Florida Water Management District

## PRE-APPLICATION MEETING NOTES

Date: 12.21.95  
Project Name: Tampa Interstate Study - Interchange  
Attendees: Robert Johnson  
Carlos Lopez  
Alba Már

The following is the District's understanding of the meeting. Please do not send copies of minutes. If you have any questions or need clarifications, please feel free to contact us at (813) 985-7481.

- 
- Ashley Exit will be rerouted  
Widening shoulders
  - New pavement is 8 acres  
will upgrade pipes so there's no attenuation
  - Treating ~~off~~ <sup>only</sup> road <sup>no off-site</sup> - will treat as much as he can in ponds  
(over 8 acres) can take equivalent treatment for portions that he can't treat by treating existing (even though he should have treated those anyway since not off line)
  - Standard General permit \$1600  
Forms A, C, E

# Greiner

C102380.21  
December 26, 1995

## MEMORANDUM

TO: File

FROM: Robert E. Johnson, P.E. *ry*

SUBJECT: **Tampa Interstate Study Downtown Interchange  
Project - SWFWMD Meeting**

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On Thursday, December 21, 1995 a meeting was held at the SWFWMD Tampa office to discuss drainage issues regarding the TIS Downtown Interchange Project. The following were in attendance:

Alba Mas	SWFWMD
Carlos Lopez	FDOT
Robert Johnson	Greiner

The following major topics were discussed:

- \* Greiner reviewed the proposed project. The project improvements are intended to improve safety and lane movements and are not capacity improvements. Several alternatives have been identified and the preferred alternative selected. The alternative will include construction of new pavement areas, widening of existing areas and removal of pavement areas.
- \* Greiner indicated that approximately 8.0 acres of new pavement area is proposed.
- \* Pond areas within the Ashley Street and I-4/I-275 interchange are proposed for stormwater treatment areas.

- \* Due to the combination of new and the expansion of existing pavement, equivalent treatment is proposed. SWFWMD wants us to maximize our treatment capacity. We are currently proposing to treat one-inch of runoff over the 8.0 acres of new pavement (wet-detention).
- \* The interchange and interstate roadway from the interchange to the Hillsborough River (134 acres) is currently drained directly to the River via a storm sewer outfall system (54"-66" RCP). Since this area drains directly to the tidally influenced Hillsborough River, no peak attenuation is proposed. However, due to the interchange project construction, the outfall system may require upgrading of the pipes. SWFWMD did not object to this providing that it is demonstrated that there is no adverse impact to adjacent drainage systems.
- \* SWFWMD said the project will require a standard general permit (\$1600 permit fee). No wetland impacts are anticipated.
- \* See attached sheet for a copy of the SWFWMD minutes.

RJ:ha

xc: Elaine Illes  
Carlos Lopez

# Greiner

C102380.21  
January 18, 1996

## MEMORANDUM

TO: File

FROM: Robert E. Johnson, P.E. *RET*

SUBJECT: **Tampa Interstate Study Downtown Interim Interchange  
City of Tampa Meeting**

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On Thursday, January 11, 1996 a meeting was held at Greiner, Inc. to discuss drainage and utility issues regarding the TIS Downtown Interim Interchange Project. The following were in attendance:

Henry Dorzback	-	City of Tampa
Michael Burwell	-	City of Tampa
Elaine Illes	-	Greiner, Inc.
Larry Sly	-	Greiner, Inc.
Robert Johnson	-	Greiner, Inc.

The following major topics were discussed:

- Greiner reviewed the proposed project. The project improvements are intended to improve safety and lane movements and are not capacity improvements. Several alternatives have been identified and the preferred alternative selected. The alternative will include construction of new pavement areas, widening of existing areas and removal of pavement areas.
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- Pond areas within the Ashley Street and I-4/I-275 interchange are proposed for stormwater treatment areas.

- Due to the combination of new and the expansion of existing pavement, equivalent treatment is proposed. We are currently proposing to treat one-inch of runoff over the 8.0 acres of new pavement (wet-detention).
- The interchange and interstate roadway from the interchange to the Hillsborough River (134 acres) is currently drained directly to the River via a storm sewer outfall system (54"-66" RCP). Since this area drains directly to the tidally influenced Hillsborough River, no peak attenuation is proposed. However, due to the interchange project construction, the outfall system may require upgrading of the pipes. The City of Tampa did not object to this providing that it is demonstrated that there is no adverse impact to adjacent drainage systems.
- The City may require improvements to the outfall system in lieu of peak attenuation in the Ybor City area. These outfalls are currently overloaded. Some discussion of outfall improvements has been done between the City and FDOT (Lisa Hansen).

During final design the increase in peak discharge due to the roadway improvements will be calculated to determine what outfall improvements may be required.

- Greiner discussed potential utility conflicts due to the lowering of Marion and Morgan Streets from the superelevation/widening of the interstate structures. The City requested that Greiner send proposed plans and profiles to the City (Mike Davis - Utility Coordinator) for review. The City may want to coordinate with FDOT on replacement of existing 8-inch sanitary line along Marion Street during construction.

REJ:ha

xc: Attendees