FINAL

PRELIMINARY ENGINEERING REPORT

FPN Number: 257093 1 31 01
FAP Number: BRF-1456(9)

S.R. 60 (Memorial Causeway) Bridge

City of Clearwater

Pinellas County, Florida

The proposed project involves the replacement of the existing bascule bridge with a high-level, fixed-span bridge on a south-shifted alignment.

December 1998

Prepared for:

City of Clearwater
Richard J. Baier, P.E.
City Engineer

and the

Florida Department of
Transportation
Kirk R. Bogen, P.E.
Project Manager

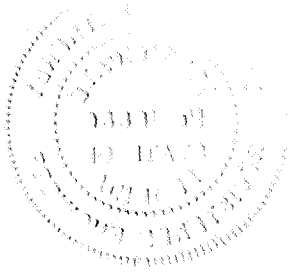
Prepared by:

HDR Engineering, Inc.

Larry Weatherby, P.E.
Project Manager
P.E. No. 0018886

Larry R. Weatherby
2/10/99

THIS PAGE INTENTIONALLY LEFT BLANK



FINAL PRELIMINARY ENGINEERING REPORT

TABLE OF CONTENTS

LIST OF EXHIBITS

Exhibit Name		Follows Page Number
6-6	AADTs for the No Build Project Alternative	6-6
6-7	Year 2020 AADTs for the P4 Alternative	6-6
6-8	Year 2020 Forecasts for the P4 Alternative with Cleveland Street Extension	6-6
6-9	Existing Levels of Service	6-8
6-10	Year 2020 Generalized Segment Levels of Service	6-8
6-11	Year 2020 Projected Intersection Levels of Service	6-8
7-1	Alternative Corridors	7-2
7-2	Alternative D4 - Plan View	7-2
7-3	Alternative D4 - Profile	7-2
7-4	Alternative C4 - Plan View	7-2
7-5	Alternative C4 - Profile	7-2
7-6	Alternative P4 - Plan View	7-2
7-7	Alternative P4 - Profile	7-2
7-8	Alternative P4A - Plan View	7-4
7-9	Alternative P4A - Profile	7-4
7-10	Alternative C1P4 - Plan View	7-4
7-11	Alternative C2P2 - Plan View	7-4
7-12	Projected Levels of Service for Corridor Alternatives	7-3
7-13	Cost Estimates for 4-Lane Corridor Alternative	7-6
7-14	Corridor Alternatives Evaluation Matrix	7-6
7-15	Graphical Comparison of 3 Corridors	7-6
8-1	Cost Estimates for a Mid-Level Bascule Bridge (4-Lane)	8-2
8-2	Estimated Heights of Sailboats Docked Within Project Vicinity	8-1
8-3	Profile View of a Tunnel Alternative	8-4
8-4	Tunnel Cost Estimate	8-4
8-5	Alternative C4WS Plan View	8-8
8-6	Alternative C4WS Profile	8-8
8-7	Alternative P4A Plan View	8-8
8-8	Alternative P4A Profile	8-8
8-9	Alternative P4A North Plan View	8-8
8-10	Alternative P4A North Profile	8-8
8-11	Alternative P4S Plan View	8-10
8-12	Alternative P4S Profile	8-10
8-13	Alternative P4NE Plan View	8-10
8-14	Alternative P4NE Profile	8-10
8-15	Summary of Cost Estimates	8-10
8-16	Plan View of Viable Build Alternatives	8-10
8-17	Alignment Alternatives Evaluation Matrix	8-10
8-18	Preliminary Estimates of Noise Impacts	8-9
8-19	Comparison of the Top Two Alternatives	8-12
9-1	Preliminary Preferred Alternative	9-2
9-2	Recommended Year 2020 Design AADTs	9-2
9-3	Bridge Typical Sections	9-2

Exhibit Name		Follows Page Number
9-4	Proposed Roadway Typical Sections	9-2
9-5	Left Turn Storage Requirements at Pierce Street/Pierce Boulevard	9-1
9-6	Proposed Profiles for "Pierce Street Connection" and Connection to Pierce 100	9-4
9-7	Right-of-Way Needs for the Preliminary Preferred Alternative	9-2
9-8	Cost Estimate for the Preferred Alternative	9-4
9-9	Preliminary Utility Relocation Cost Estimates	9-13
9-10	Local Interest Group Members Ranking of Overall Issues	9-16
9-11	Local Interest Group Members Ranking of Study Criteria	9-17
9-12	Conceptual Signing Plan	9-26

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 SUMMARY

The City of Clearwater, in cooperation with the Florida Department of Transportation (FDOT), is conducting a Project Development and Environment (PD&E) study for the replacement of the S.R. 60 (Memorial Causeway) bridge at Clearwater Harbor, west of downtown Clearwater. Exhibits 1-1 and 1-2 illustrate the location and limits of the project and its relationship to the local highway system.

The purpose of the proposed project is to reduce delays and road user costs and to provide a safer and more reliable evacuation route. The proposed project is also intended to support the City's goals of public safety, tourism, and economic development.

The objective of the PD&E study is to provide documented information and analyses which will help the City reach a decision on the type, design, and location of the necessary improvements to accommodate the future traffic in a safe and efficient manner, consistent with other criteria such as aesthetics and economic development. The PD&E study is designed to satisfy the requirements of the National Environmental Policy Act (NEPA) and other federal laws and Executive Orders which will qualify the project to receive federal funding for design, right-of-way acquisition, and construction.

This report documents the information necessary to confirm the need for this project and develops and evaluates various improvement alternatives. Information relating to the engineering and environmental characteristics essential for alignment and analytical decisions was collected. Once sufficient data were available, alignment criteria were set and alternatives were developed. Comparison of alternatives was based on a variety of parameters using a matrix format. This analytical process, in conjunction with public input, resulted in the selection of a preliminary Preferred Alternative.

The preliminary estimated costs (in $ millions) for the preliminary Preferred Alternative are:

Engineering Design	3.0
Right-of-Way Acquisition	2.4
Construction:	
Bridge	22
Roadway Approaches	2.6
Architectural Urban Design Amenities	2.0
Construction Engineering Inspection	3.5
TOTALS	36

One business relocation is expected based on the present concept. Environmental impacts are also addressed in separate reports in more detail.

Construction of the project is programmed to begin in Fiscal Year 2002/03 per FDOT's 5-Year Work Program.

1.1 Commitments

To minimize the impacts on local residents and business owners and the natural environment and to optimize the effectiveness of the improvements, the following commitments were made during the PD&E process:

1. **Bridge Vertical Clearance** -- The proposed vertical clearance for the fixed-span bridge is approximately 22.6 m (74 ft) over the Gulf Intracoastal Waterway. This vertical clearance exceeds the U.S. Coast Guard's guide clearance of 19.8 m (65 ft) in order to accommodate the taller sailboats in the area and to provide the same clearance as the nearby Clearwater Pass Bridge at Sand Key.

2. **Parking Mitigation** -- A County surface parking lot located west of the Pinellas County Courthouse Annex will likely be impacted due to the roadway geometric improvements required to meet current roadway design standards. Any lost parking will be replaced with either surface parking or parking garage spaces. Coordination with county officials regarding this issue is ongoing.

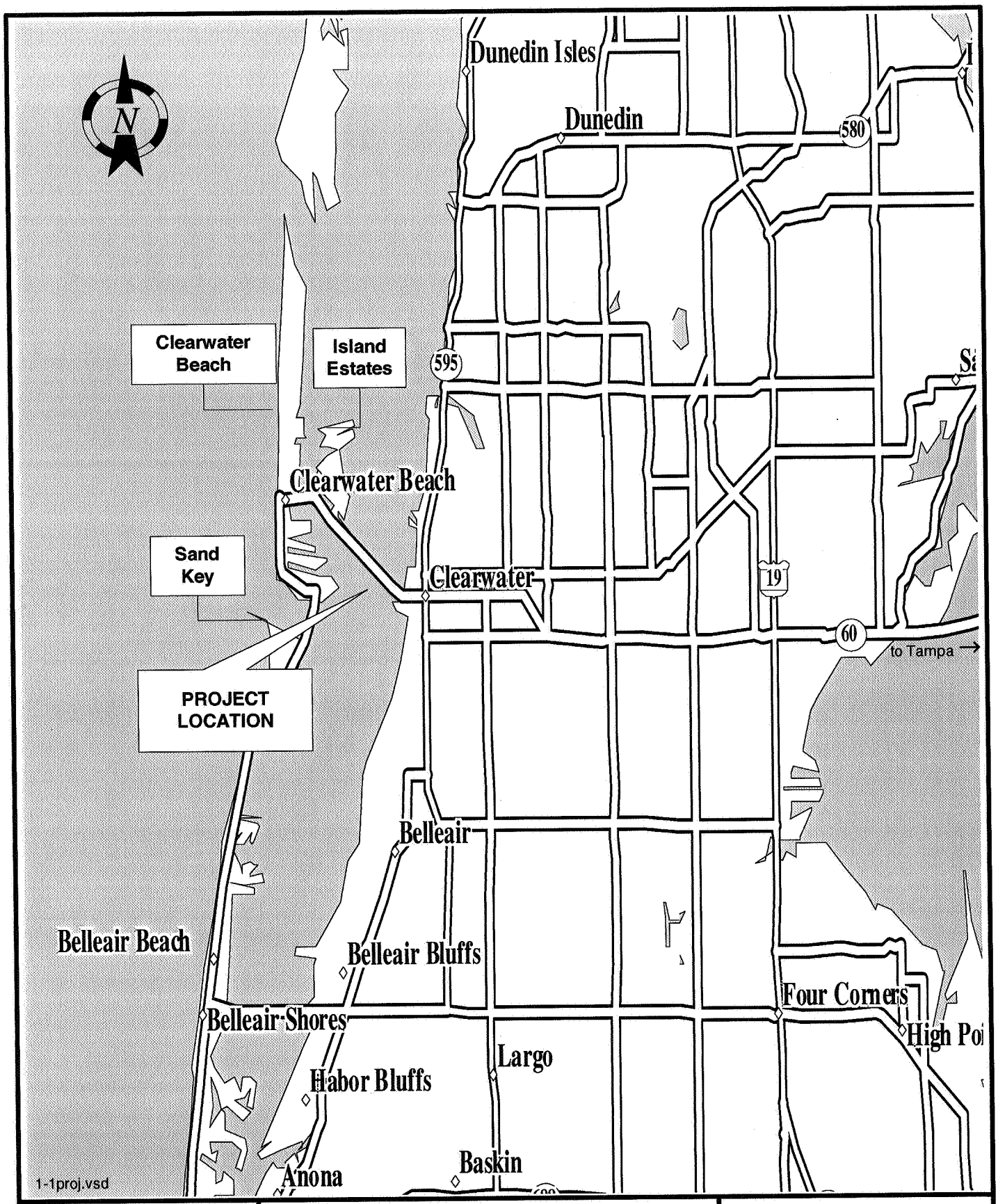
3. **Guide Signing** -- To address the concerns of some downtown Clearwater merchants, guide signing from the bridge to downtown Clearwater will be provided at various locations along the new SR 60 route proposed as part of the Preferred Alternative.

4. **Haven Street House** -- Additional landscaping will be provided in front of the Haven Street House to minimize potential visual effects of the proposed project.

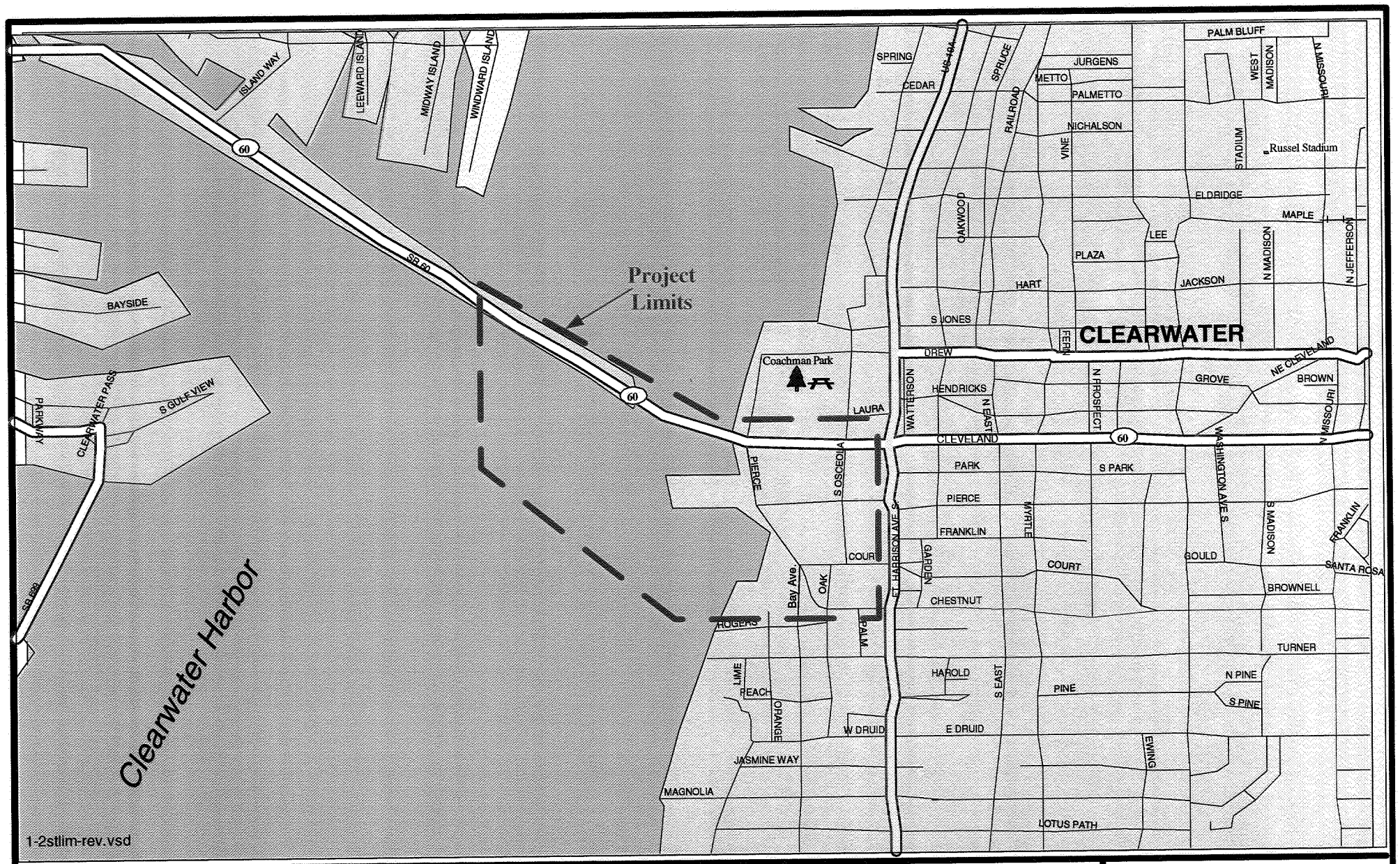
5. **Fishing Pier** -- The City's old-bridge/fishing pier will be demolished as part of the construction of the new bridge, and its functions will be replaced by a more modern fishing facility to be located in the vicinity of Coachman Park. The new fishing pier is planned to be constructed concurrently with the new bridge, so it will be available prior to the removal of the existing fishing pier.

6. **Bridge Aesthetics** -- The new bridge will be designed to be as aesthetically pleasing to the community as possible. During the design phase of the project, the City will seek broad public input regarding the aesthetic design features for the proposed bridge, including lighting, landscaping, pedestrian overlooks, colors and finishes, and other design features.

7. **Wetlands Mitigation** -- The Preferred Alternative minimizes the impacts to wetlands. However, approximately 0.01 ha (0.03 acres) of wetland impacts are anticipated to occur and will require mitigation. One concept to be considered for impact compensation includes the planting of salt marsh grasses along the



Memorial Causeway (S.R. 60) Bridge PD&E Study	PROJECT LOCATION MAP	EXHIBIT 1-1



Memorial Causeway (S.R. 60) Bridge PD&E Study

PROJECT LIMITS

EXHIBIT 1- 2

mainland and causeway shorelines. This will provide additional habitat for fisheries as well as water quality enhancement. Another mitigation option to be considered for compensation is Senate Bill 1986 (SB 1986). This bill provides a mechanism for the Florida Department of Transportation (FDOT) to directly pay the Florida Department of Environmental Protection (FDEP) $75,000/acre of wetland impacts. FDEP then uses these funds for mitigation strategies to compensate for the wetland impacts incurred from the project.

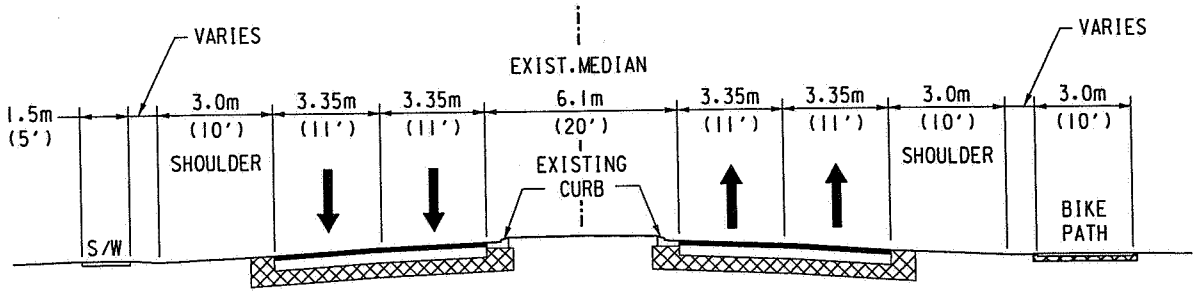
8. **Manatees and Sea Turtles** -- Precautions, safety guidelines, and Best Management Practices will be implemented during construction of the new bridge to protect manatees and sea turtles. A continuous Manatee and Sea Turtle Watch Program (MWP) will be established to minimize the potential impacts of bridge construction on manatees and sea turtles. The conditions which shall constitute the MWP are provided in Appendix F.

9. **Contamination** -- In accordance with FDOT guidelines, Level II hazardous materials investigations are recommended for all three sites identified with a "high" risk rating for potential involvement with hazardous materials or petroleum contamination. These Level II investigations will be conducted after Location/Design Concept Approval has been received from the FHWA and prior to roadway right-of-way acquisition or project construction.

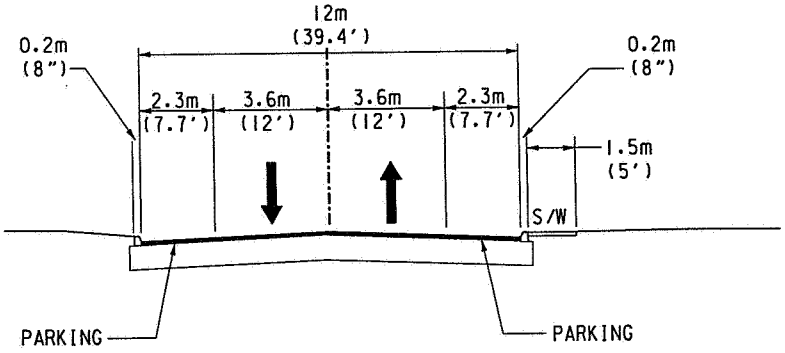
1.2 Recommendations

The proposed action is the replacement of the existing S.R. 60 (Memorial Causeway) bascule bridge with a high-level, fixed-span four-lane bridge. The proposed navigational clearance is approximately 22.6 m (74 ft) over the Gulf Intracoastal Waterway in Clearwater Harbor. The proposed minimum horizontal navigational clearance is 30.48 m (100 ft). Both the existing and design year conditions were evaluated, and various alignment alternatives were considered, including the No-Build alternative, in order to determine the most appropriate recommendation for this project. As a result of the public involvement process, the environmental and engineering studies, and interagency coordination, the alternative recommended for Location/Design Concept Approval is Alternative P4A. The recommended alternative alignment is located just south of and parallel to the existing bridge and connects to Pierce Boulevard which extends to the Court Street/ Chestnut Street one-way pair. An additional connection to downtown in the vicinity of Pierce Street is also proposed.

THIS PAGE INTENTIONALLY LEFT BLANK

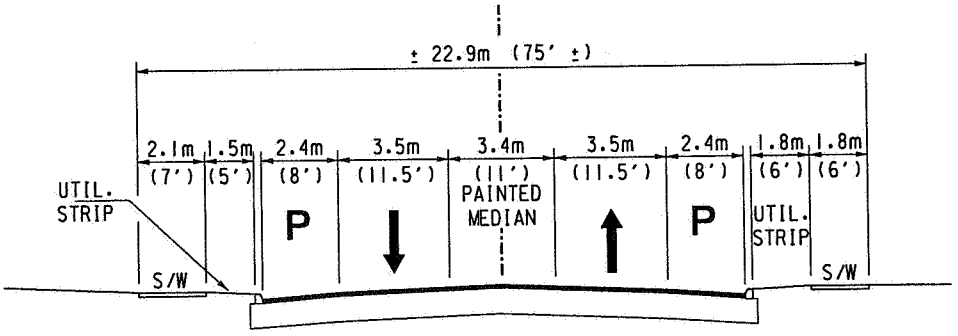


S.R. 60 MEMORIAL CAUSEWAY



DREW STREET (LOOKING NORTH)

P - ON STREET PARKING LANES



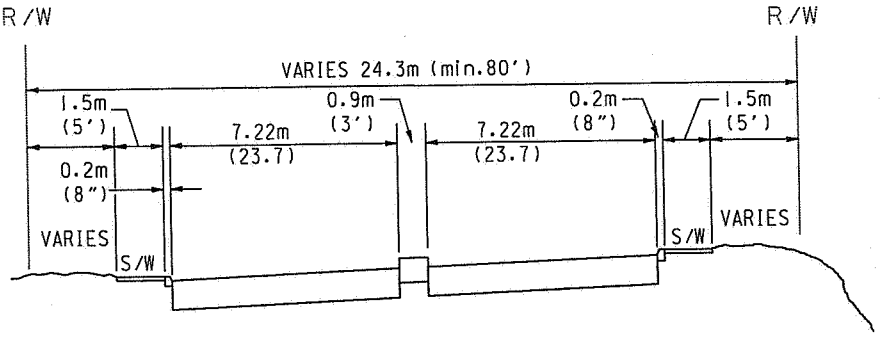
CLEVELAND STREET (LOOKING EAST)

REV. 2/98

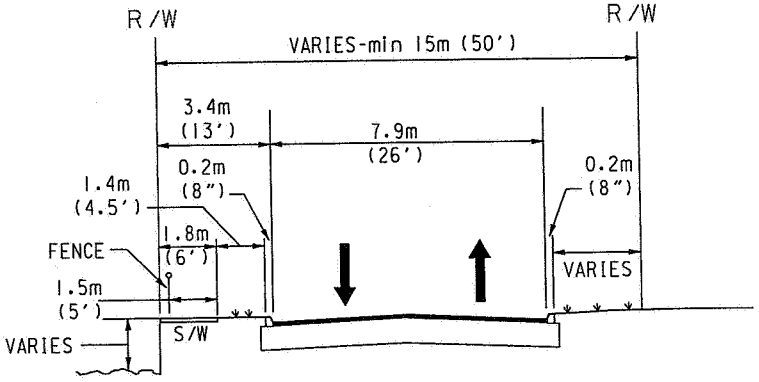
Memorial Causeway (S.R. 60) Bridge PD&E Study

EXISTING ROADWAY TYPICAL SECTIONS

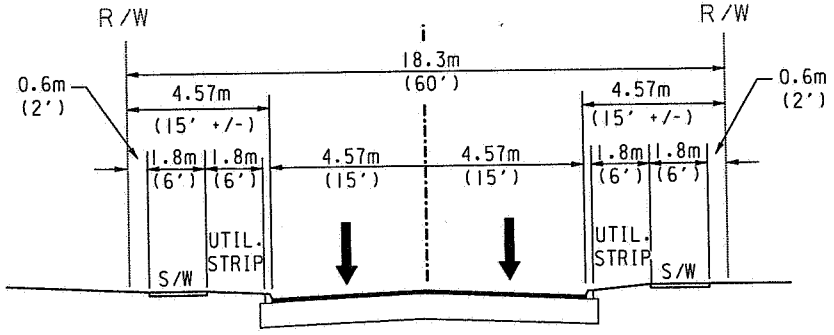
EXHIBIT 4-2
P.1 OF 2



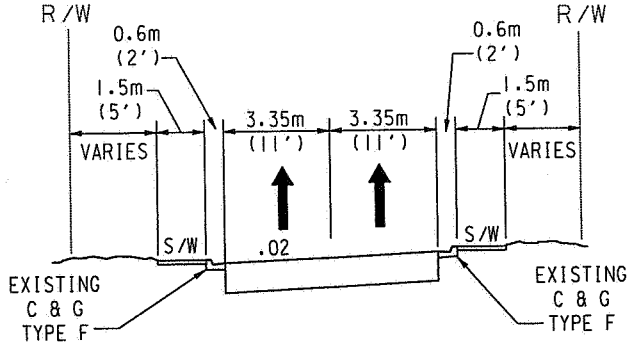
PIERCE BOULEVARD (LOOKING SOUTH)



PIERCE STREET (LOOKING EAST)



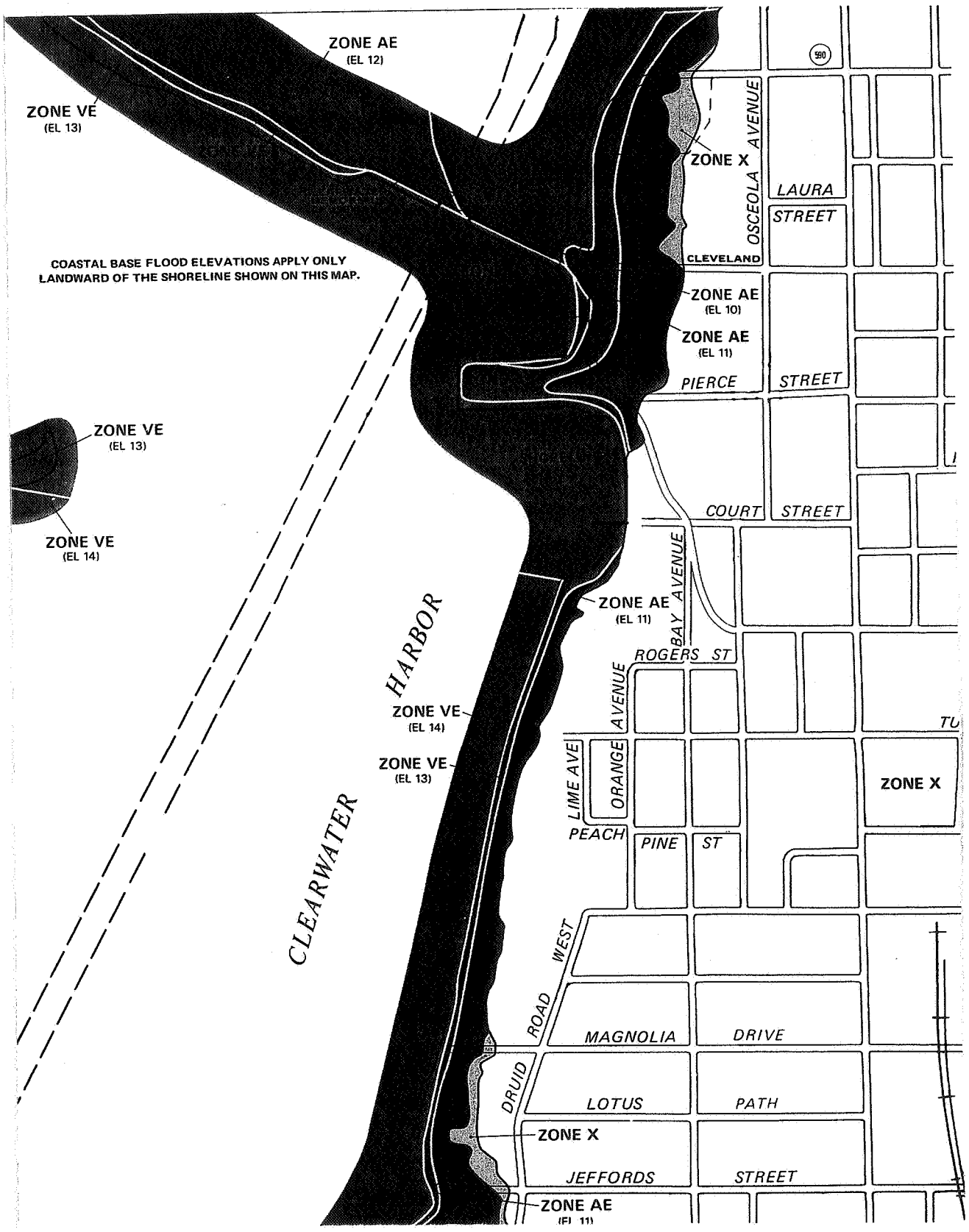
COURT STREET WEST OF OAK AVENUE (LOOKING EAST)



CHESTNUT STREET WEST OF OAK AVENUE (LOOKING EAST)

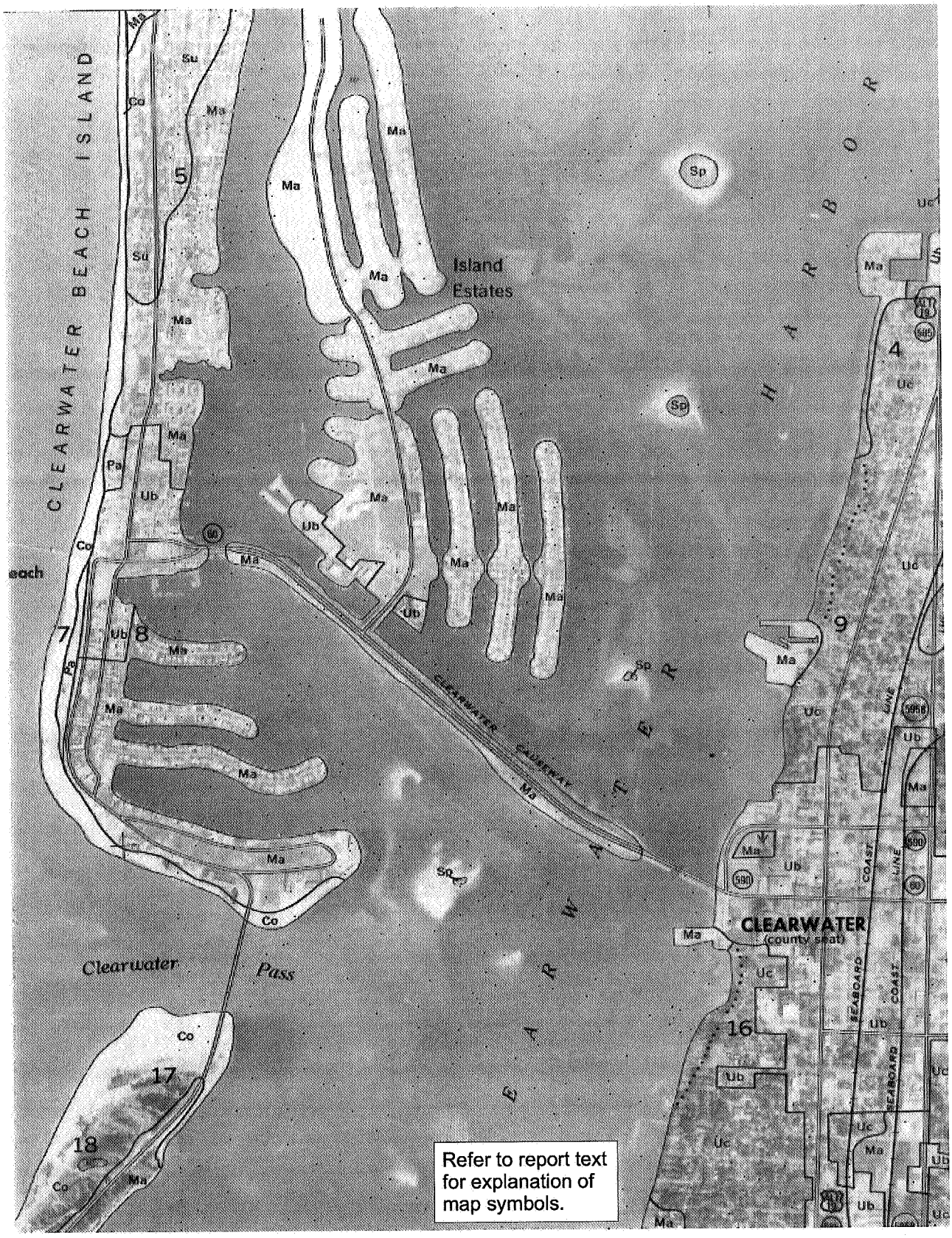
x:\mebs\motboard.dgn = x:\hdrplotdrv\davis.plt

EXISTING ROADWAY TYPICAL SECTIONS	EXHIBIT 4-2	P.2 OF 2



4-firm.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	FLOOD PLAINS IN PROJECT AREA	EXHIBIT 4-4



SOURCE: Soil Survey of Pinellas County, Florida, USDA, SCS 1972

W:\MEMCSWAY\REPORTS\PE\FIGS10-97\EX4-4-5.CDR

S.R. 60/Memorial Causeway Bridge PD&E Study	**PROJECT AREA SOILS SURVEY MAP**	**EXHIBIT 4-5**

2.0 INTRODUCTION

2.1 PD&E Study Process

The objective of the Project Development and Environment (PD&E) Study process is to provide the documentation necessary to reach a decision on the type, design, and specific location of the improvements identified as being needed. Factors considered include transportation needs, socioeconomic and environmental impacts, and engineering requirements. The process includes the preparation of a series of reports that document the analyses that are undertaken for each of these factors.

In general terms, the process involves the following steps: (1) the establishment of project need; (2) the gathering and analysis of detailed information regarding the natural and cultural features of the study area; (3) the development of several alternatives for meeting the project need; and (5) the selection of a Preferred Alternative. During the process, communication with the affected public is accomplished directly, through public meetings and a public hearing, and indirectly, through interaction with elected officials and agency representatives.

2.2 Purpose of Report

The purpose of this report is to document the engineering analysis performed to support decisions related to project alternatives. In addition, it summarizes existing conditions, documents the purpose of and need for the project, and documents other data related to preliminary design concepts. These preliminary design concepts establish the functional or conceptual design requirements which will be the starting point for the final design phase. This study is a follow-up to the feasibility study conducted for the City in 1995 by HDR Engineering, Inc. (Reference 2-1).

2.3 Project Description

The Memorial Causeway Bridge project involves the replacement of the existing S.R. 60 (Memorial Causeway) bascule (moveable span) bridge, located in Clearwater, Florida, with a four-lane high-level 22.6 m (74 ft) vertical clearance fixed-span bridge. The project area limits extend approximately from just east of Island Way to just west of Fort Harrison Avenue and from just north of S.R. 60 (Cleveland Street) to just south of Chestnut Street. The project is approximately 2.6 km (1.6 mi) in length (Exhibits 1-1 and 1-2).

The Memorial Causeway serves as the primary link between mainland Clearwater and Clearwater Beach/ Island Estates. Clearwater Beach is a major tourist and recreation destination, and Island Estates is a large residential community which includes commercial uses. The Memorial Causeway is the primary evacuation route for north Sand Key, Clearwater Beach, and Island Estates.

Memorial Causeway is functionally classified as an urban principal arterial. Pierce Boulevard is a four-lane undivided urban arterial which ties directly into the Court/Chestnut Street one-way pair system. Court and Chestnut are two-lanes each west of Oak Avenue and three lanes each east of Oak Avenue, respectively. Cleveland Street is a two-lane divided urban principal arterial, while Drew Street is generally a four-lane undivided facility maintained by the City; within the study area, it is two-lane undivided west of Alternative U.S. 19 with on-street parking allowed.

The objective of the Memorial Causeway Bridge replacement project is to make improvements to the existing facility which will reduce the number of traffic accidents that occur on the bridge and its approaches, reduce delays to motorists traveling between mainland Clearwater and Clearwater Beach/Island Estates, and improve safety for bicyclists and pedestrians. A new bridge must also be aesthetically compatible with the Downtown Clearwater and Clearwater Beach area. In addition, the study includes a traffic analysis to determine roadway improvements which may be necessary as a result of the new bridge.

3.0 NEED FOR IMPROVEMENT

The Memorial Causeway Bridge serves as the primary link between mainland Clearwater and Clearwater Beach/ Island Estates. Memorial Causeway (S.R. 60) is functionally classified as an urban principal arterial. The existing highway is a four-lane divided "rural" typical section roadway with shoulders and a landscaped median.

The Memorial Causeway Bridge directly serves both the Clearwater Beach resort area and about 2,200 Clearwater Beach/ Island Estates residents. In addition, it is the primary evacuation route for north Sand Key, Clearwater Beach, and Island Estates. Exhibit 3-1 summarizes the needs and benefits of the proposed project.

3.1 Deficiencies

3.1.1 Capacity and Transportation Demand

The 1996 Average Annual Daily Traffic (AADT) on the Memorial Causeway (east of Island Way) was estimated to be approximately 38,500 vehicles per day (VPD). Seasonal variation in traffic on the Causeway is significant; for 1994, weekly averages ranged from a low of 31,000 VPD to a high of 50,400 VPD, a variation of approximately 60 percent.

Future traffic projections (year 2020) for the Memorial Causeway in the vicinity of the bridge were developed based on refinements made to the Pinellas County Metropolitan Planning Organization's Tampa Bay Regional Traffic Model. Based on this analysis, the AADT for year 2020 is projected to be approximately 40,000 VPD. Future estimates for east-west streets (Drew Street, Cleveland Street, Court Street, and Chestnut Street) were determined by the same method; the resulting traffic volumes for 2020 are approximately 11 percent higher than 1996 volumes. Traffic issues are discussed in greater detail in Section 6.0.

"Level of Service" (LOS) is an engineering term used to describe the operating conditions of vehicles in a traffic stream. Six levels of service are defined, "A" through "F", as shown in Exhibit 3-2.

The estimated LOS in 1996 for the four-lane causeway and bridge was LOS F, based on FDOT's 1995 generalized AADT LOS tables (based on a Class Ia arterial). For the year 2020, the LOS is expected to remain "F".

Although the proposed bridge will still be four lanes, the proposed project would eliminate delays associated with bridge openings and malfunctions; providing shoulders, a median, and wider lanes; and providing space for disabled vehicles.

EXHIBIT 3-1
SUMMARY OF PROJECT NEED AND BENEFITS

Need	Benefit
Bridge Openings and Malfunctions	
• The existing bridge opens an average of 14 times per day on weekdays and 25 times per day on weekends. • The average opening time span is 5 minutes, which often results in a 1- 2 mile back-up during the peak season. • Delays due to bridge openings result in a cost to motorists of approximately $1 million dollars per year, in delay and vehicle operating costs. • The existing bridge malfunctions an average of 4 times per month.	• The new bridge will improve the level of service of the bridge for both vehicles and marine traffic by eliminating bridge openings, providing wider lanes and shoulders for disabled vehicles. • A new high-level fixed bridge will eliminate delays and major inconveniences caused by bridge malfunctions
Safety	

• The Memorial Causeway Bridge and the "Bayfront" intersection are among the top accident locations within the City of Clearwater.
• The existing bridge does not meet current design standards. Deficiencies include:
  • the lack of emergency lanes and substandard lane widths;
  • the lack of a median and barrier wall to separate the opposing lanes of traffic;
  • substandard raised separator between pedestrians and vehicular traffic;
  • low design speed (30 mph);
  • a metal bridge grate which has a low skid resistance and is noisy.
• Existing bridge openings create congestion which contribute to rear-end collisions.
• Provisions for bicyclists and pedestrians are inadequate due to narrow sidewalks and narrow traffic lanes.
	• Replacement of the existing bridge with a high-level fixed bridge will eliminate the existing deficiencies and reduce the rate of crashes on the bridge.
	• Conditions for pedestrians and bicyclists will be safer with the proposed bridge.
	• The proposed bridge project will increase the safety of motorists, pedestrians, and bicyclists through downtown, by reducing through-traffic.

Emergency Evacuation	
• The Memorial Causeway Bridge is the primary evacuation route for North Sand Key, Clearwater Beach, and Island Estates.	• A new bridge will result in a more reliable route for both evacuation traffic and emergency vehicles in addition to allowing the uninterrupted passage of marine vessels.
Social Demands and Economic Development	
• Costs and inconveniences associated with the bridge caused by bridge opening delays, malfunctions, and congestion may result in the loss of revenue to the City's businesses if tourists and potential residents go elsewhere. • The existing bridge creates inconveniences to boaters who use the Clearwater Harbor and local marinas. • Traffic congestion along Cleveland Street (downtown) is increased by bridge openings and malfunctions. This congestion makes access to downtown businesses more difficult.	• A new bridge will reduce the congestion of beach traffic through the downtown area by directing the majority of beach traffic to the Court Street/ Chestnut Street one-way pair. • The proposed project will provide an opportunity to create new and interesting activity centers within downtown, particularly along the waterfront. • The project could help to make Clearwater's waterfront a "community place". • A new bridge will promote the City's primary goals of tourism and economic development. • A new bridge would make it possible to extend a span of the Pinellas Trail to Clearwater Beach.

EXHIBIT 3-2
LEVEL OF SERVICE (LOS) DEFINITIONS

Level of Service	Traffic Flow	Speed	Maneuverability	Comfort and Convenience
A	Free Flow	Highly Selective	High Freedom	Excellent
B	Stable	Selective	Slight Decline	Good
C	Stable	Affected by others	Significantly affected	Noted Decline
D	Stable, Dense	Traffic dependent	Severely restricted	Poor
E	Unstable, Capacity	Uniformly low	Extremely difficult	Extremely poor
F	Breakdown	Stop & Go	None	Intolerable

Source: Based on the 1994 Highway Capacity Manual, Transportation Research Board, Special Report No. 209, National Research Council.

3.1.2 Bridge "Functional Obsolescence"

The existing Memorial Causeway Bridge, which was 34 years old in 1997, is classified as "functionally obsolete", although not structurally deficient.

The deficiencies of the existing bridge include:

- the lack of auxiliary emergency lanes (shoulders)
- the lack of a barrier wall to separate opposing lanes of traffic
- the lack of an adequate raised separator between pedestrians and vehicular traffic, as well as an adequate sidewalk width given the volume of pedestrians and bicycle traffic
- the low design speed on the bridge (approximately 50 km/h [30 mph]), while the posted speed limit on the causeway is 70 km/h (45mph)
- the metal bridge grate which has a low skid resistance, especially when wet;

The frequent bridge openings cause traffic back-ups which are conducive to rear-end crashes. The average number of openings per weekday is 13.8, with a weekend day of 24.5, yielding a weighted average of 16.9. The average opening duration is 5.2 minutes, which causes lengthy backups during the peak tourist season.

3.2 Safety

An analysis of the study area's accident history indicates that there are safety deficiencies involving the roadways and intersections near the existing bridge. During the 5-year period between January 1, 1990 and December 31, 1994, there were 283 accidents reported to FDOT along SR 60 from the intersection of Island Way to the Fort Harrison Avenue intersection. These accidents resulted in 230 injuries and two fatalities. As shown in Exhibit 3-3, the majority of these accidents were rear-end collisions, many of which are attributable to congestion associated with bridge openings. These accidents

resulted in a total economic loss of approximately $7.1 million. Additional discussion of historical accident data is included in Section 4.1.9 of this report.

EXHIBIT 3-3
SUMMARY OF CRASHES ON S.R. (1990-1994)

Type of Accident	Island Way to Memorial Causeway Bridge	Memorial Causeway Bridge	Memorial Causeway Bridge to Bayfront Intersection	Bayfront Intersection to Ft. Harrison	Total Number Accidents	Average Number Per Year
Rear-end	92	42	20	6	160	32
Right Angle	6	3	5	8	22	4.4
Left Turn	5	0	1	10	16	3.2
Sideswipe	6	8	2	2	18	3.6
Collision w/ object	15	10	3	5	33	6.6
Other	2	6	4	7	19	3.8
Pedestrian/ Bike	3	1	3	2	9	1.8
Right Turn	1	0	2	0	3	0.6
Head-on	1	1	0	1	3	0.6
Total	131	71	40	41	283	56.6
Injuries	137	46	24	23	230	46
Fatalities	1	1	0	0	2	0.4

Source: Florida Department of Transportation, 1996

Replacement of the existing bridge with a modern, high-level fixed-span bridge will eliminate the existing bridge's design deficiencies and will reduce the accident rate for the Memorial Causeway Bridge. In addition, conditions for pedestrians and bicyclists will be safer with the proposed bridge.

For the eastern roadway approach (Court and Chestnut Streets), the horizontal and vertical alignments will be improved which will improve their safety and allow for more efficient traffic operations along both facilities.

3.3 Consistency with Transportation Plan

The proposed project is currently *inconsistent* with the City of Clearwater Comprehensive Plan and *consistent* with the Pinellas County Metropolitan Planning Organization's (MPO) Long Range Transportation Plan. The City's Comprehensive Plan will be updated during the next revision cycle to include the proposed project.

As mentioned earlier, the Memorial Causeway Bridge is the primary evacuation route for North Sand Key, Clearwater Beach, and Island Estates. The replacement of the existing bridge will result in a more reliable route for both evacuation and emergency services.

3.4 Socioeconomic Demand

The proposed project supports the City's goals of tourism and economic development. Currently, the existing bridge becomes congested due to the proximity of the signalized intersection at Cleveland Street and Pierce Boulevard, and due to frequent drawbridge openings and occasional malfunctions which result in the closure of the roadway. These result in costs to motorists in both time delays and higher vehicle operating costs. These costs, which are estimated to exceed $1 million per year, would be eliminated by replacing the moveable span bridge with a high-level, fixed bridge. Therefore, the proposed project would facilitate economic development by reducing the costs and inconveniences to motorists (residents and beach visitors) traveling between mainland Clearwater and Clearwater Beach and Island Estates.

The existing bridge also creates delays and inconveniences to both recreational and commercial boaters due to the timed openings of the bascule bridge. The proposed action would eliminate these inconveniences.

Finally, the existing bridge with its current traffic patterns causes congestion through Downtown Clearwater along Cleveland Street during bridge openings and malfunctions. This congestion hampers access to downtown businesses, and it also contributes to an unattractive environment for pedestrians. The proposed action would reduce the congestion in this area by both eliminating bridge openings and by re-directing most beach-bound traffic along the Court Street/Chestnut Street one-way pair. The amount of traffic on Cleveland Street would be reduced to a level which would help the City redevelop the existing area into a more pedestrian-friendly downtown, as proposed in the Downtown Clearwater Redevelopment Plan (Reference 3-1). The proposed action would also facilitate the City's plans to expand Coachman Park to the waterfront for public enjoyment and city-sponsored events.

Short term economic benefits are expected during the construction phase due to the temporary increase in employment. Based upon FHWA procedures for estimating construction-related employment, each one million dollars of construction expenses creates an average of 9.75 on-site jobs and 12.7 off-site jobs. For a $40 million construction cost, this would result in approximately 390 on-site jobs and 510 off-site jobs. This increase in employment within the downtown Clearwater area may have a secondary effect of stimulating service-related businesses within the immediate area. Businesses such as restaurants, gas stations, convenience stores, and some retail stores may benefit economically from the bridge construction activities.

THIS PAGE INTENTIONALLY LEFT BLANK

4.0 EXISTING CONDITIONS

4.1 Existing Roadway Characteristics

4.1.1 Functional Classification

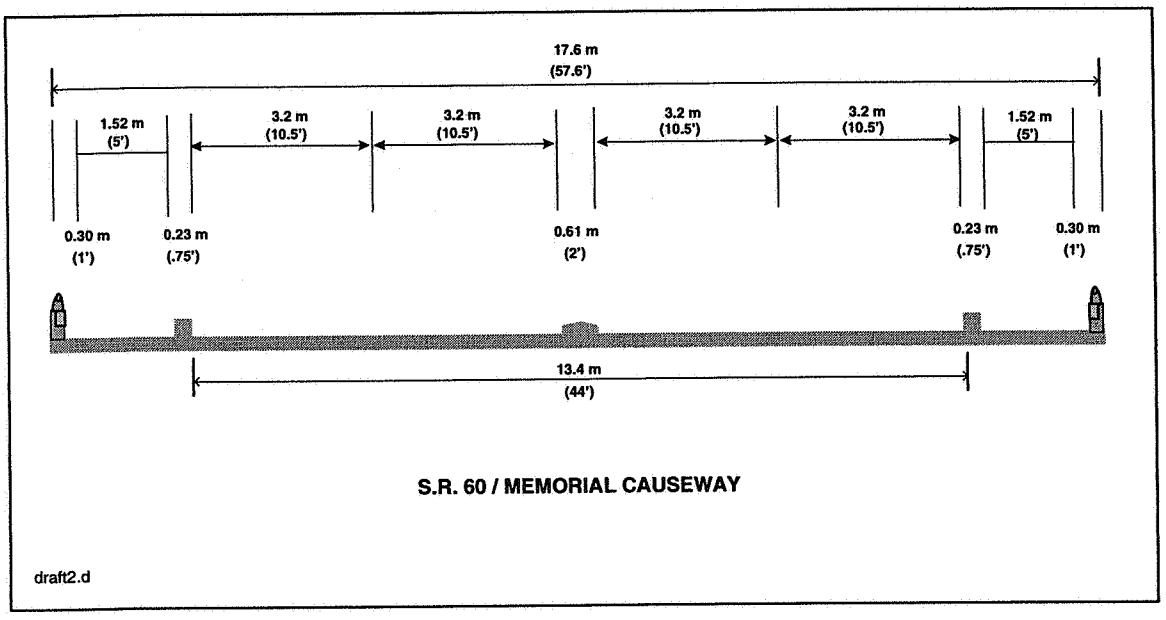
The Memorial Causeway (S.R. 60) is classified as an *urban principal arterial* by the Florida Department of Transportation (FDOT).

4.1.2 Typical Sections and Speed Limits

The Memorial Causeway is a "rural" four-lane divided highway with a 12.2 m (40 ft) landscaped median and 3.05 m (10 ft) grassed shoulders. The lanes are 3.35 m (11 ft) wide. The posted speed limit along the Causeway is 70 km/h (45 mph). The posted speed limit on the existing bridge is 45 km/h (30 mph).

Exhibit 4-1 shows the existing typical section of the Memorial Causeway Bridge. The cross-section of the bridge includes 1.5 m (5.0 ft) sidewalks on each side and four 3.2 m (10.5 ft) travel lanes with a 0.61 m (2 ft) raised center divider. The bridge roadway width curb to curb is 13.4 m (44 ft).

EXHIBIT 4-1
EXISTING BRIDGE TYPICAL SECTION



Other major east/west roadways within the project area include Cleveland Street, Drew Street, and Pierce Boulevard. All of these streets are posted at 45 km/h (30 mph). Existing typical sections for these roadways are included in Exhibit 4-2. Cleveland Street

(S.R. 60) has a width of 15.2 m (50 ft) and a curb and gutter drainage design. It is presently striped as two-lane "undivided" with parallel parking on each side. Drew Street, a city-maintained street, is striped as two-lane undivided with parallel parking on both sides west of Fort Harrison. East of Fort Harrison, it is generally a four-lane undivided roadway with curb and gutter drainage design. The lanes are typically 3.1 m (10 ft) in width.

Pierce Boulevard is a four-lane undivided urban arterial which ties directly into the Court Street and Chestnut Street one-way pair system. Court and Chestnut Streets are two-lanes each west of Oak Avenue and three lanes each east of Oak Avenue. Oak Avenue is directly west of the courthouse annex.

4.1.3 Pedestrian and Bicycle Facilities

The Memorial Causeway is presently classified as a "bicycle friendly" facility by the Pinellas County Metropolitan Planning Organization since it has a paved bicycle path which runs along the south side of the Causeway, between Clearwater Beach and the west end of the Memorial Causeway Bridge. A sidewalk runs along the north side of the causeway.

The existing pedestrian and bicycle facilities on the bridge consists of 1.5 m (5.0 ft) sidewalks on each side of the bridge. There is only a small raised curb to separate the sidewalk from the roadway, making the existing facilities on the bridge deficient under current design standards.

4.1.4 Right of Way

Exhibit 4-3 summarizes the existing right-of-way (ROW) widths within the project area.

EXHIBIT 4-3
SUMMARY OF EXISTING RIGHT OF WAY WIDTHS

Road	From - To	Approx. ROW width meters	(ft)
S.R. 60 Memorial Causeway	Clearwater Beach to Downtown Clearwater	366 m	1,200 ft
S.R. 60 (Cleveland)	Memorial Causeway to Ft. Harrison Ave.	24.4 m	80 ft
Pierce Boulevard	Bayfront Intersection to Pierce Street	18.3 m	60 ft
	Pierce Street to Court Street	24.4 m	80 ft
	Court Street to Chestnut Street	15.2 m	50 ft
Drew Street	Bayfront Intersection to Ft. Harrison Ave.	16.8-18.3 m	55-60 ft
Court Street	Pierce Boulevard to Ft. Harrison Ave.	18.3-21.3 m	60-70 ft
Chestnut Street	Pierce Boulevard to Ft. Harrison Ave.	15.2 m	50 ft

4.1.5 Horizontal Alignment

The horizontal curves on Court Street and Chestnut Street west of Oak Avenue have a design speed of less than 50 km/h (30 mph) based upon current design standards. The horizontal alignment of the existing bridge is discussed in section 4.2.3.

4.1.6 Vertical Alignment

The vertical alignment of the existing bridge is discussed in section 4.2.3.

4.1.7 Drainage

The existing land use and drainage characteristics on the mainland side of the project study area are comprised of urban development, served by curbed roadways and piped stormwater collector systems which discharge non-attenuated stormwater into Clearwater Harbor.

On the causeway (west) side of the project study area, the roadway is drained mainly by lateral overland sheetflow and occasional median drain pipes discharging directly into Clearwater Harbor. Drainage of the existing Memorial Causeway Bridge structure is accomplished by scuppers in the bridge deck discharging directly into Clearwater Harbor.

The project is located in a Tidal influenced area which has a storm surge associated with the 100 year flood. The 100 year flood defined by FEMA results from the hurricane storm surge elevation estimated at 3.96 m (13 ft NGVD). FIRM maps for the City of Clearwater, panels no. 8,14, and 15 (Exhibit 4-4) show the flood zone areas of the bridge corridor vicinity. A constant 100 year floodplain elevation of 3.96 m (13 ft NGVD) is shown for the project site, designated as zone VE. FEMA identifies this zone as areas of coastal flood with velocity hazard attributed to tidal surge wave action. Additional drainage-related information is available in the project's *Location Hydraulic Report and Stormwater Management Summary* (Appendix C).

4.1.8 Geotechnical Data

Based on the USGS Quadrangle Map of Clearwater, Florida (1974), the elevation within the study area ranges from 0 to 9.1 m (30 ft) (NGVD of 1929). The portion of the study area which falls within the lower range of elevation is along the manmade Memorial Causeway island in Clearwater Harbor. The elevation at the east side of the project along the Clearwater shoreline starts at 1.5 m (5 ft) and gradually slopes from the west to the east. Along the Clearwater bluff, the elevation ranges from approximately 7.6 to 9.1 m (25 to 30 ft).

According to the *Geotechnical Report* prepared for the project (Williams Earth Sciences 1996) (Reference 4-1), the regional geology of the project study area is characteristic of the Tampa Formation and "post Tampa" geologic units. The "post Tampa" geologic units which are present are probably members of the Hawthorn Formation.

The Tampa Formation consists of alternating series of sands, clays and silts, as well as subordinate limestone. It is partly marine in origin and is also characterized by the presence of fossilized mollusks. The rock units of the Tampa Formation are of early Miocene Age and rest unconformably on the underlying Suwanee limestone.

The Hawthorn Formation overlies the Tampa Formation and has a similar lithology. It also consists of an alternating series of sands, clays and carbonate units.

A review of the *Soil Survey of Pinellas County, Florida* (U.S. Department of Agriculture 1972) and the project's *Geotechnical Report* (Williams Earth Sciences 1996) indicated that there are three soil types within the immediate project area including: Made Land (ma), Urban Land (Ub), and Urban Land- Astatula Complex (Uc) (Exhibit 4-5).

Exhibit 4-6 summarizes the characteristics of the soil types located in the immediate project area and surrounding areas. A more detailed explanation of the geotechnical characteristics of the project area may be found in the *Geotechnical Report* (Williams Earth Sciences 1996) prepared for this study.

4.1.9 Accident Data

An analysis of the Florida Department of Transportation's historical accident data for the Memorial Causeway Bridge (S.R. 60) study area provided crash summaries. During the 5-year period between January 1, 1990 and December 31, 1994, there were 283 accidents reported to FDOT along S.R. 60 from the intersection of Island Way and Memorial Causeway (S.R.60) to the intersection of Fort Harrison Avenue and Cleveland Street (S.R.60). These accidents resulted in 230 injuries and 2 fatalities. As summarized in Exhibit 4-7, the majority of these accidents were rear-end collisions, many of which are attributable to bridge openings and the "bayfront" intersection light. Approximately 20 percent of these accidents occurred on the Memorial Causeway Bridge, which is 12 percent of the total roadway length. According to FDOT records, these accidents resulted in a total economic loss of approximately $7.1 million.

Historical accident data for the period between January 1, 1994 to December 31, 1995 was provided from the City of Clearwater's accident report file. A summary of the accidents which occurred on Pierce Boulevard, Court Street and Chestnut Street is summarized in Exhibit 4-8. These 1994-1995 accidents resulted in a total economic loss of approximately $1.2 million.

EXHIBIT 4-6 - SOIL TYPES

PART 1: SOIL TYPES - IMMEDIATE PROJECT AREA

Soil Name	Soil Symbol	Soil Description
Made Land	Ma	Nearly level land extensively altered by man.
Urban Land	Ub	Consists of areas where the original soil has been modified through cutting, grading, filling, and shaping or has been generally altered for urban development.
Urban Land-Astatula Complex	Uc	This complex is about 30-70 percent Astatula fine sand, of which 10-20 percent has been modified by cutting, grading, and shaping. About 20-40 percent of this complex is urban land that is developed.

Source: U.S. Department of Agriculture 1972

PART 2: SOIL TYPES - SURROUNDING PROJECT AREA

Soil Name	Soil Symbol	Soil Description
Astatula Fine Sand, (Moderately deep water table)	As	Nearly level to gently sloping excessively drained sandy soils on low ridges and isolated knolls. These soils have very rapid permeability, very low available water capacity, low organic-matter content, and low natural fertility.
Immokalee Fine Sand	Im	Nearly level, poorly drained sandy soils that formed in thick beds of acid marine beds. These soils have very low available water capacity, low organic-matter content, and low natural fertility.
Myakka Fine Sand	My	Nearly level, poorly drained sandy soils that formed in thick beds of acid marine sands. These soils have very low available water capacity, low organic-matter content, and low natural fertility.
Urban Land-Myakka Complex	Um	About 30-50 percent of this complex is Myakka fine sand, of which 15-30 percent has been modified by cutting, grading, and shaping. About 25-40 percent of this complex is Urban land that is covered by developments.

Source: U.S. Department of Agriculture 1972, Williams Earth Sciences 1996

EXHIBIT 4-7
S.R. 60 ACCIDENT DATA SUMMARY
(1990-1994)

Type of Accident	Island Way to Memorial Causeway Bridge	Memorial Causeway Bridge	Memorial Causeway Bridge to Bayfront Intersection	Bayfront Intersection to Ft. Harrison	Total Number Accidents	Average Number Per Year
Rear-end	92	42	20	6	160	32
Right Angle	6	3	5	8	22	4.4
Left Turn	5	0	1	10	16	3.2
Sideswipe	6	8	2	2	18	3.6
Collision w/ object	15	10	3	5	33	6.6
Other	2	6	4	7	19	3.8
Pedestrian/ Bike	3	1	3	2	9	1.8
Right Turn	1	0	2	0	3	0.6
Head-on	1	1	0	1	3	0.6
Total	131	71	40	41	283	56.6
Injuries	137	46	24	23	230	46
Fatalities	1	1	0	0	2	0.4

Source: Florida Department of Transportation, 1996

EXHIBIT 4-8
ACCIDENT SUMMARY DATA 1994-1995 FOR PIERCE BOULEVARD, COURT STREET, AND CHESTNUT STREET

Type of Accident	Pierce Blvd., Cleveland to Court Street	Court/Chestnut, Pierce Blvd. to Ft. Harrison	Court/Chestnut, Ft. Harrison to Prospect Ave.
Rear-end	0	6	3
Right Angle	0	11	27
Left Turn	2	8	7
Sideswipe	1	4	2
Collision w/ object	5	2	3
Other	0	2	0
Pedestrian/ Bike	1	3	0
Right Turn	0	0	0
Head-on	0	0	0
Total	9	36	42
Injuries	8	24	28
Fatalities	0	0	0

Source: City of Clearwater Accident Files, 1996

4.1.10 Intersections and Signalization

The existing lane geometries for major intersections within the study area and the type of intersection traffic controls are shown in Exhibit 4-9.

4.1.11 Lighting

Street lighting is currently provided along the majority of main roads throughout the project area, including Drew Street, Cleveland Street, Pierce Boulevard, Court Street, and Chestnut Street. On these streets, the lighting is provided on both sides of the road in a staggered arrangement.

The approximate spacing between existing street light poles varies from 21.3 to 33.5 m (70-110 ft). The street lights are owned and maintained by Florida Power.

The existing bridge has similar street lights on both sides of the road. The approximate spacing of the light poles on the bridge is approximately 38.1 to 45.7 m (125 to 150 ft)

4.1.12 Utilities and Railroads

The type, location and ownership of the existing utilities along the Memorial Causeway Bridge, Cleveland Street and Pierce Boulevard are summarized in Exhibit 4-10.

In addition to those utilities shown in Exhibit 4-10, there is a 0.305 m (12 in) subaqueous natural gas line which runs between the north side of the causeway and Drew Street, beneath Clearwater Harbor. Subaqueous Florida Power electrical cables and GTE telephone cables also cross the Harbor south of and parallel to the existing bridge (Reference 4-2).

The City also has a 0.51 m (20 in) sanitary sewer force main which crosses the Harbor between the south side of the causeway and the lift station located south of the Bayfront Tennis Complex below the bluff, near City Hall. A 0.15 m (6 in) gas main runs parallel to this force main (Reference 4-3).

In addition to the above utilities, power lines and underground telephone lines run along Pierce Boulevard south of Cleveland Street.

A CSX railroad line runs along East Avenue within the project study area. According to CSX, the track is used by one freight train which travels from the train depot in Bellair to Tampa, via Oldsmar. The train departs from Bellair at 4:00 p.m. daily, Monday through Friday, passing through downtown Clearwater between 4 and 5 p.m. It then arrives back at the Bellair depot at approximately 2:00 am, Monday through Thursday. An additional train passes through downtown Clearwater between 8 and 9 a.m. on weekdays. The train remains in Tampa from Friday night to Sunday night at approximately midnight, at which time it returns to Bellair. Therefore, there is no train traffic during the weekend. The

railroad is also used by other trains on some special occasions (i.e., the Ringling Brothers Circus train). However, this only occurs 2-3 times a year.

The Clearwater segment of the Pinellas Trail is currently under construction alongside the CSX tracks on East Avenue through the project study area.

EXHIBIT 4-10
EXISTING UTILITIES

Street Segment	Sanitary Sewer	Gas	Storm Sewer	Water	Electric	Tele-phone
Memorial Causeway west of Pierce Boulevard	✓	✓	✓	✓	✓	✓
Drew Street west of Ft. Harrison	✓	✓	✓	✓	✓	✓
Cleveland Street west of Ft. Harrison	✓	✓	✓	✓	✓	✓
Pierce Street west of Ft. Harrison	✓	✓	✓	✓	✓	✓
Court Street west of Ft. Harrison	✓	✓	✓	✓	✓	✓
Pierce Boulevard south of Cleveland Street	✓	✓	✓	✓	✓	✓

Notes: Data based on utility atlas sheets provided by the City, field observations, and limited responses from the contacted utilities.

4.1.13 Pavement Conditions

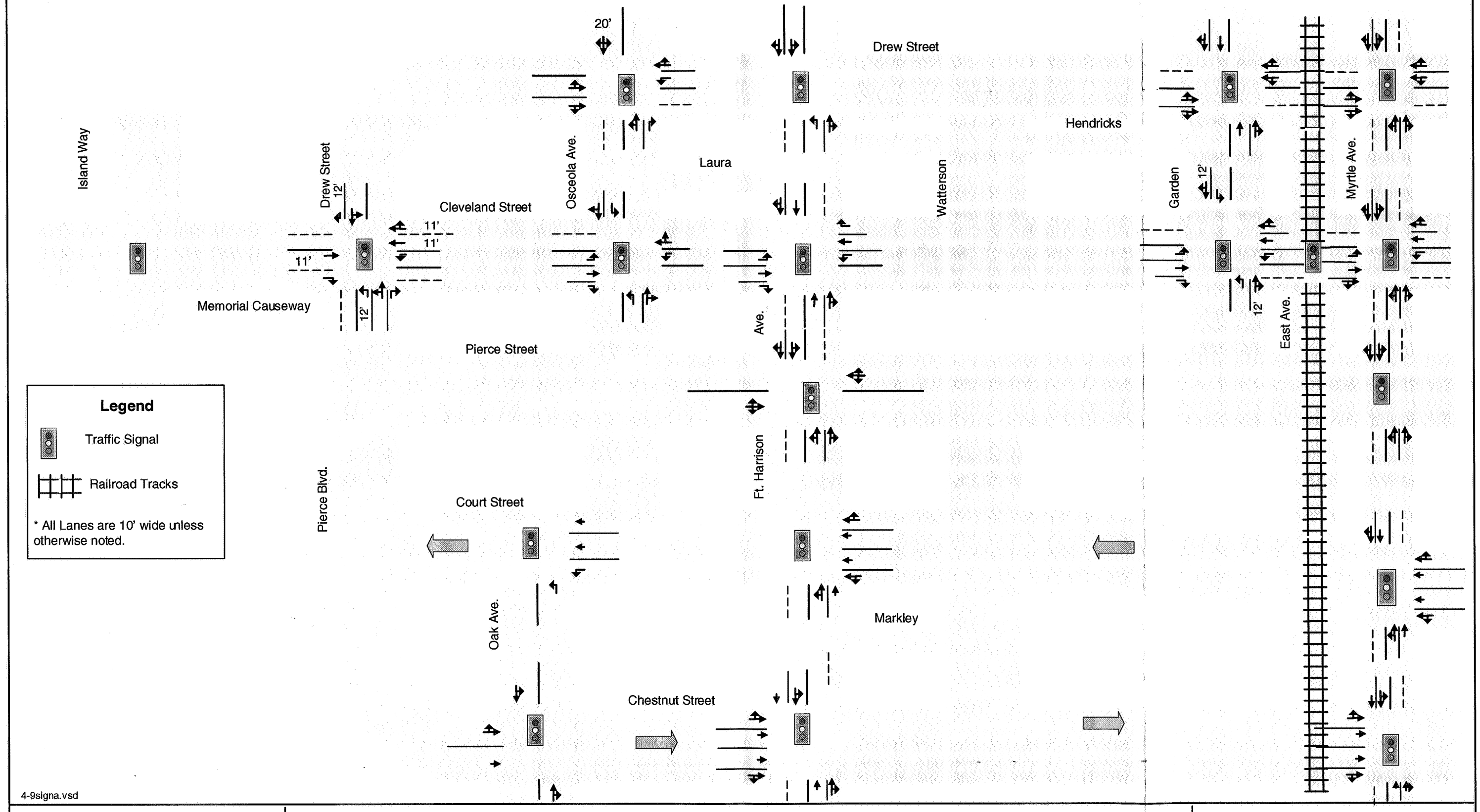
The City does not have a computerized pavement condition inventory or appraisal system, so no information is available for city-maintained streets within the study area. According to engineer John Rooks, the City periodically performs visual inspections to determine when resurfacing or other street maintenance is required. A color-coded map is maintained showing the year last resurfaced. Data for state-maintained roadways within the study area were obtained from the FDOT, District 7:

Roadway	From	To	Pavement Ratings CRK	RUT	Ride
S.R. 60 (Memorial Causeway)	Island Way	Pierce Blvd.	9.0	9	8.3
S.R. 60 (Cleveland Street)	Pierce Blvd.	Myrtle Ave.	10.0	9	7.3
Drew Street	Alt. U.S. 19	Myrtle Ave.	6.5	5	5.1
Alt. U.S. 19 (Ft. Harrison Ave.)	Drew Street	Chestnut St.	8.5	6	6.4

Source: FDOT Flexible Pavement Condition Survey, 1996. (10 = Best)

4.1.14 Access Management Classification

The Florida Department of Transportation has classified the Memorial Causeway Bridge (S.R. 60) as access management Class 3 (a "controlled access facility").



Memorial Causeway (S.R. 60) Bridge PD&E Study	**EXISTING GEOMETRY AND SIGNALIZATION FOR MAJOR INTERSECTIONS WITHIN THE STUDY AREA**	**EXHIBIT 4-9**

4.2 Bridges

4.2.1 Type of Structure

The existing Memorial Causeway Bridge (bridge no. 15044), located at milepost 1.508 to 1.725, consists of a 33.5 m (110 ft) long steel moveable bascule center span with 18 fixed approach spans. The total length of the bridge is 312 m (1024 ft) and the total out-to-out width is 17.6 m (57.6 ft). The bridge cross-section includes 1.5 m (5.0 ft) sidewalks on each side and four 3.2 m (10.5 ft) travel lanes with a 0.61 m (2 ft) raised center divider. The bridge roadway curb to curb width is 13.4 m (44 ft) (Reference 4-4). Exhibit 4-11 includes photos of the existing bridge structure.

4.2.2 Current Condition and Year of Construction

The Memorial Causeway Bridge was constructed in 1963 making it 34 years old in 1997. It was last inspected on June 30, 1996. Its condition is rated as "functionally obsolete" with a sufficiency rating of 55.9, due to the lack of shoulders and a median. Condition ratings for the bridge based on the latest inspection are as follows:

Deck	7	"good condition"
Superstructure	7	"good condition"
Substructure.	7	"good condition"
Channel & Channel Protection	7	"good condition "

The bridge is not posted for weight restrictions. Current bridge appraisal ratings are as follows:

Structural Evaluation.	6	"satisfactory condition"
Deck Geometry	2	"critical condition"
Waterway Adequacy	8	"very good condition"
Approach Roadway Alignment	8	"very good condition "
Scour Critical Bridges	6.	"satisfactory condition"

4.2.3 Horizontal and Vertical Alignment

The bridge itself is tangent horizontally. The existing bridge profile is estimated to have a design speed of approximately 48 km/h (30 mph) based on current design standards (Exhibit 4-12). The existing profile utilizes maximum grades of 6.0 percent on each approach and is shown in Exhibit 4-13.

EXHIBIT 4-12
ESTIMATED EXISTING DESIGN SPEED ON THE EXISTING BRIDGE

Vertical Curve No.[1]	Type Curve	Vertical Curve Length m	ft	Algebraic Difference in Grades (A)	K = L/A	Design Speed[2] km/h	(mph)
1	Sag	91.4	300	6.0	50	56	35
2	Crest	152	500	12.0	41	48	30
3	Sag	73.2	240	6.202	38	<48	<30

[1] Existing curve data taken from the bridge "as-built" plans.

[2] Based on Tables 2.8.5 and 2.8.6 in the FDOT Plans Preparation Manual. The overall design speed is estimated to be approximately 48 km/h (30 mph).

4.2.4 Span Arrangement

The existing horizontal clearance at the bascule span is 27.4 m (90 ft) and the vertical clearance in the closed position is 7.6 m (25 ft).

The existing Memorial Causeway Bridge (bridge no. 15044), located at milepost 1.508 to 1.725, consists of a 33.5 m (110 ft) long steel moveable bascule center span with 18 fixed approach spans. The existing approach spans for the bridge consist of a reinforced concrete deck slab supported by prestressed concrete beams and piles. The approach spans are 13.7 m (45 ft) long on the west side of the bascule span and 15.2 m (50 ft) on the east side.

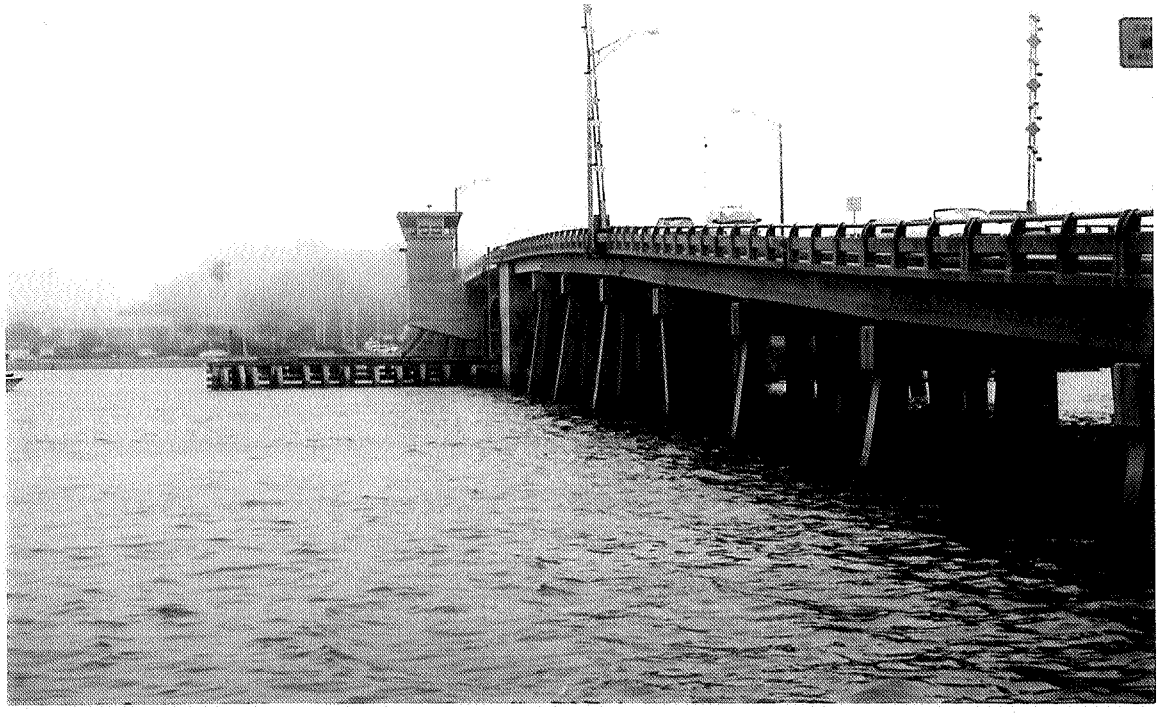
4.2.5 Channel Data

The existing horizontal clearance at the bascule span is 27.4 m (90 ft) and the vertical clearance in the closed position is 7.5 m (25 ft).

The existing navigational channel in Clearwater Harbor is part of the Gulf Intracoastal Waterway, which is maintained by the Army Corps of Engineers; the U.S. Coast Guard has navigational jurisdiction.

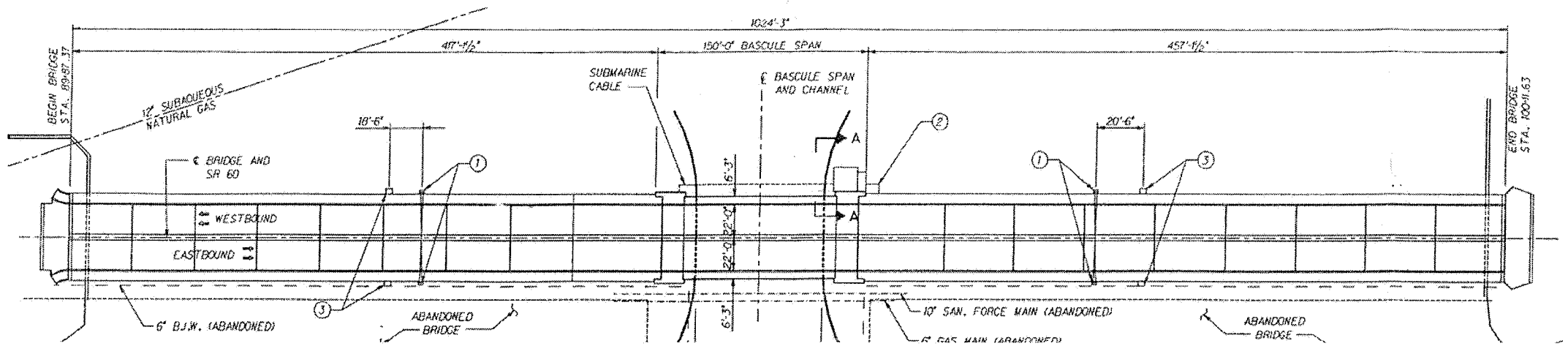
The channel was last surveyed in August 1994 as part of an "Examination Survey (P&S Scope), 9-Foot Project" (Reference 4-5). The hydrographic survey determined harbor depths for an approximate 91m (300 ft) wide band which straddled the 30.5 m (100 ft) Intracoastal Waterway. Water depths in the channel near the existing bridge ranged from about 2.9 m (9.6 ft) to 4.4 m (14 ft) at Mean Low Water (Exhibit 4-14).

Channel and navigational data are also included on the National Oceanic and Atmospheric Administration (NOAA) Nautical Chart No. 11411, Intracoastal Waterway, from Tampa Bay to Port Richey, June 1994.



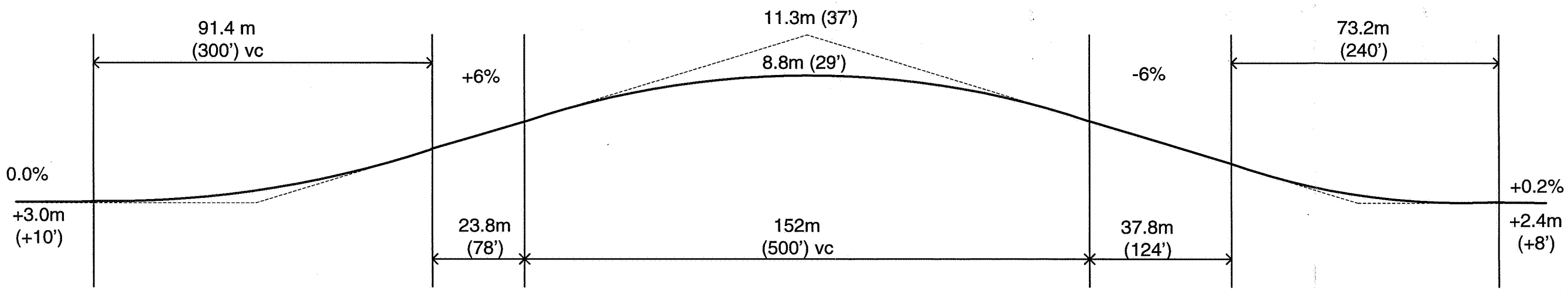
figbdr_p.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	EXISTING BRIDGE PHOTOS	EXHIBIT 4-11



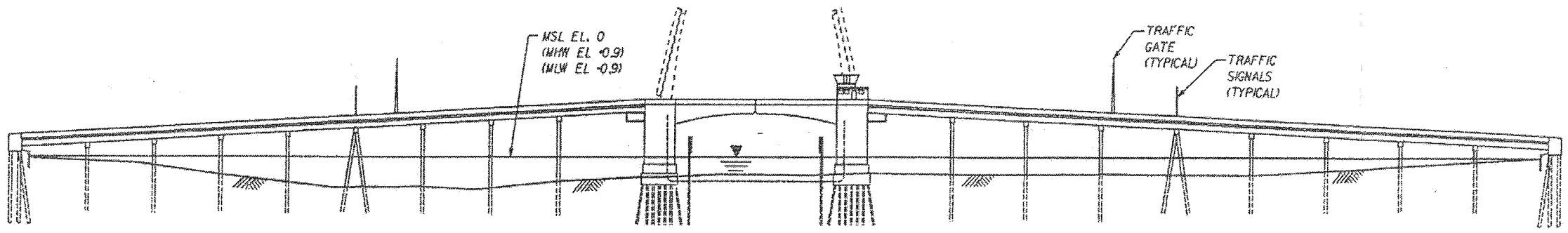
Plan View

Source: Plans of Proposed Bridge Rehabilitation for SR 60 over Gulf ICWW Drawing No. G-23 10/93



Profile View

Source: "As Built" Construction Plans Project No. 15220-3502, Sheet No. B-2, June 1960

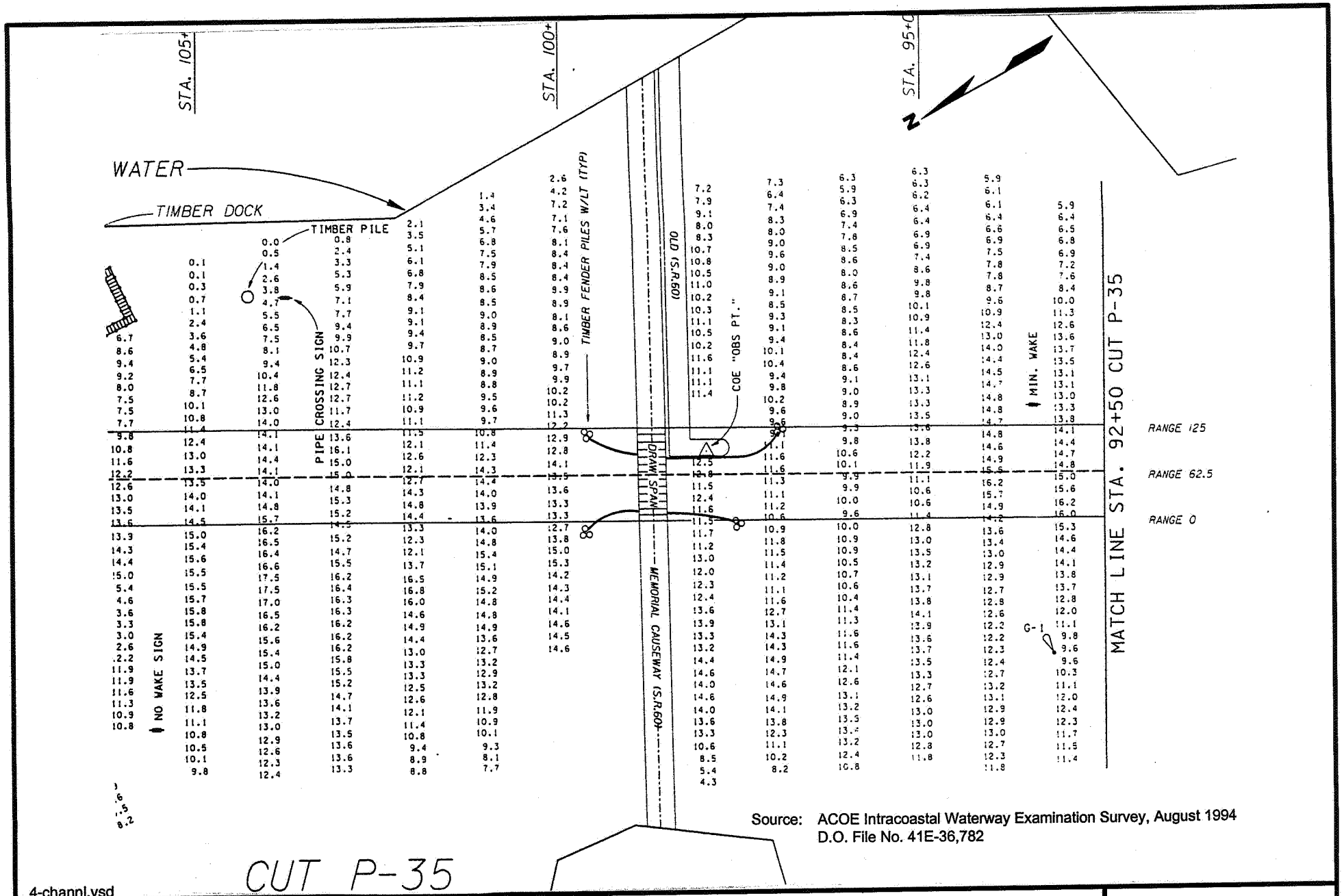


ELEVATION

Source: Plans of Proposed Bridge Rehabilitation for SR 60 over Gulf ICWW Drawing No. G-23 10/93

4-13pl&pro.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	**PLAN AND PROFILE DRAWINGS OF THE EXISTING BRIDGE**	**EXHIBIT 4-13**



Source: ACOE Intracoastal Waterway Examination Survey, August 1994
D.O. File No. 41E-36,782

4-channl.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	**WATER DEPTHS (AT MLW, IN FEET) IN THE VICINITY OF THE EXISTING BRIDGE**	**EXHIBIT 4-14**

4.2.6 Bridge Openings

Existing bridge opening frequencies are restricted by the following regulation (Reference 4-2):

> From 9 a.m. to 6 p.m., the draw need not be open except on the hour, 20 minutes past the hour, and 40 minutes past the hour to allow any accumulated vessels to pass. From 2 p.m. to 6 p.m. Saturdays, Sundays and legal holidays, the draw need open only on the hour and half-hour to allow accumulated vessels to pass. At all other times, the draw shall open on signal.

Opening frequencies are controlled by the bridge tender, who works for FDOT on a contract basis. The bridge is manned 24 hours a day.

Historical data related to opening frequencies was obtained from two different sources: FDOT and the City of Clearwater's engineering division.

Data from FDOT are summarized in Exhibit 4-15, which shows the number of openings by month for a 12-month period. The average number of openings per month was 460, for an average of 15.1 openings per day.

Bridge opening data obtained from the City's traffic control system events log printouts were presented in detail in the *Memorial Causeway Bridge Feasibility Study.* Data from the City regarding bridge opening durations were compiled for both weekdays and weekends based on a sample of 26 days over a 12-month period. Exhibit 4-16 graphically summarizes the bridge openings by time of day based on this sample. Exhibit 4-17 summarizes the duration of the bridge openings for this same sample.

EXHIBIT 4-17
SUMMARY OF THE DURATION OF BRIDGE OPENINGS

	Weekday	Weekend Day	Weighted Average
Avg. # openings per day	13.8	24.5	16.9
Avg. opening duration	4.5 min.	5.2 min.	4.7 min.
Min. opening duration *	1 min.	1 min.	
Max. opening duration**	8 min.	11 min.	

* Typically for routine maintenance
** Excluding bridge malfunctions

4.3 Environmental Characteristics

4.3.1 Land Use Data

Existing land uses adjacent to the project include recreation, commercial, public/semi-public, and multi-family residential (Exhibit 4-18). The downtown Clearwater area is

highly developed with numerous restaurants, retail shops, office buildings, public city and county office buildings, and several churches. The multi-family residential uses which are located within the project area include Pierce 100 Condominiums, the Oaks (retirement home), and Oak Cove.

The causeway's existing land use is recreation/open space. Other recreation/open space sites included Coachman Park, Bayfront Tennis Complex, and the old bridge fishing pier.

Future land uses for the project are shown in Exhibit 4-19. These are similar to the existing land uses with the addition of the Downtown Development District/ Regional Activity Center land use.

4.3.2 Cultural Features and Community Services

The study area contains numerous cultural resources and community services including churches, police, fire, post office, parks, city tennis courts, public offices, historical structures and historical districts. The community services sites are shown in Exhibit 4-20. The cultural resources and historical structures are shown in Exhibit 4-21.

Potential Section 4(f) properties in the study area include Coachman Park, the City of Clearwater Bayfront Tennis Complex, and the old bridge fishing pier. A *Section 4(f) Determination of Applicability Report* was prepared for these properties. On April 9, 1998, the Federal Highway Authority (FHWA) issued a finding of no Section 4(f) involvement. Section 106 properties which could be affected by the proposed project include the Haven Street House (Pinellas County Arts Council Building- #8PI-8022) and several other sites as shown in the exhibit. A *Section 106 Consultation Case Study Report* was completed for the proposed project. On April 13, 1998, the FHWA, in concurrence with the State Historic Preservation Office (SHPO), issued a finding of "no adverse effect" for the Haven Street House and "no effect" for the other Section 106 properties within the project area. The Section 106 Consultation Case Study Report is currently being reviewed by the Executive Director of the Advisory County of Historic Preservation. Potential impacts to cultural and recreational resources are addressed in Section 9.14.7.

4.3.3 Natural and Biological Features

Several environmental concerns exist regarding this project, including the potential effects on wetlands (specifically sea grasses and mangroves), wildlife and plants, including threatened and endangered species. The existing environmental characteristics are provided below. The specific impacts of these parameters for the various alignment alternatives are discussed in Section 8.

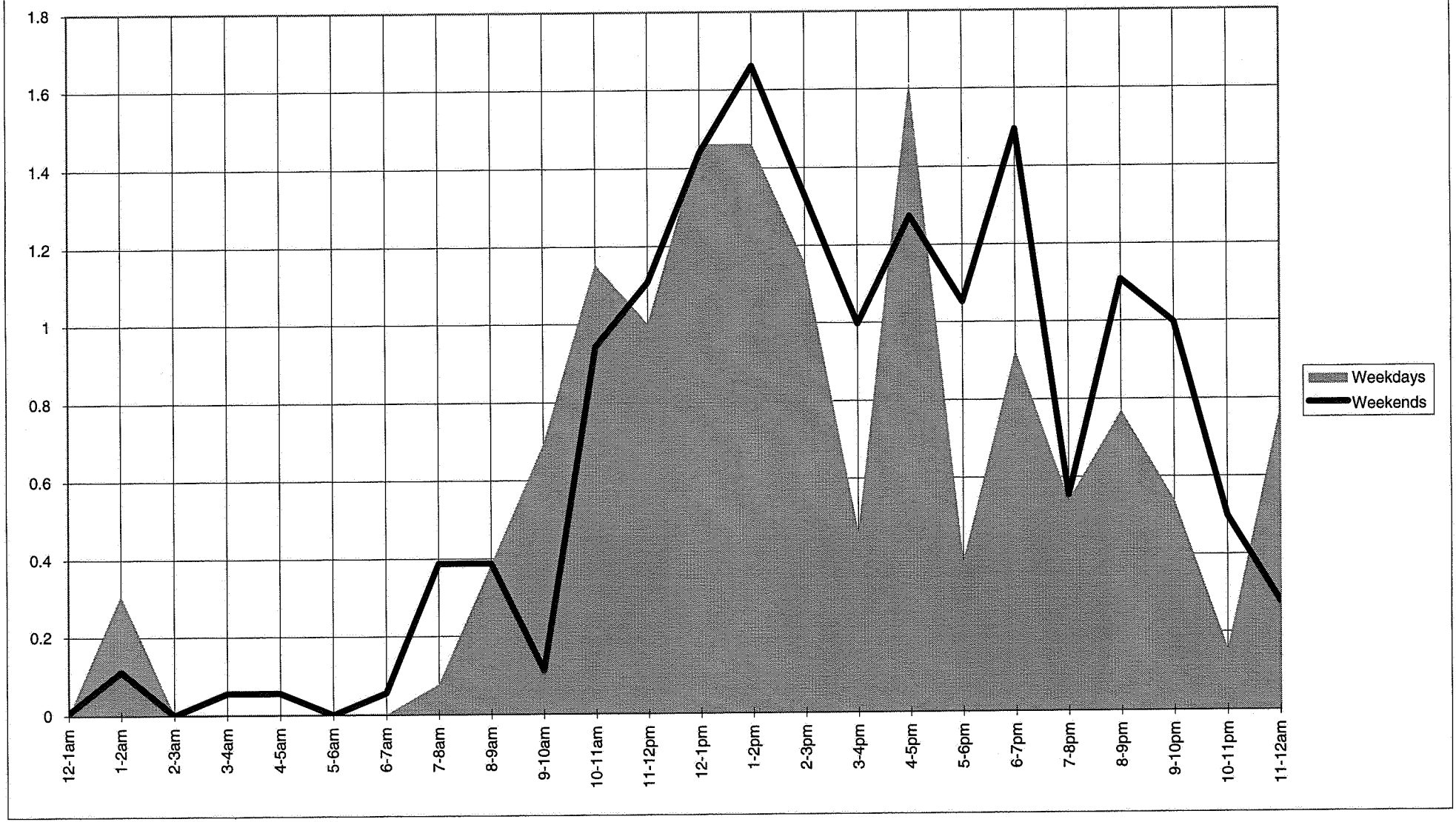
Wetlands

The following is an overview of the wetland vegetation and deepwater habitat as described in the *Wetland Evaluation Report* (Reference 4-6).

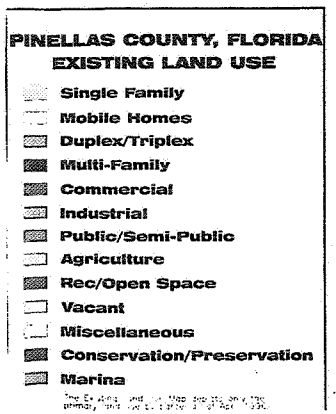
EXHIBIT 4-15
NUMBER OF BRIDGE OPENINGS BY MONTH

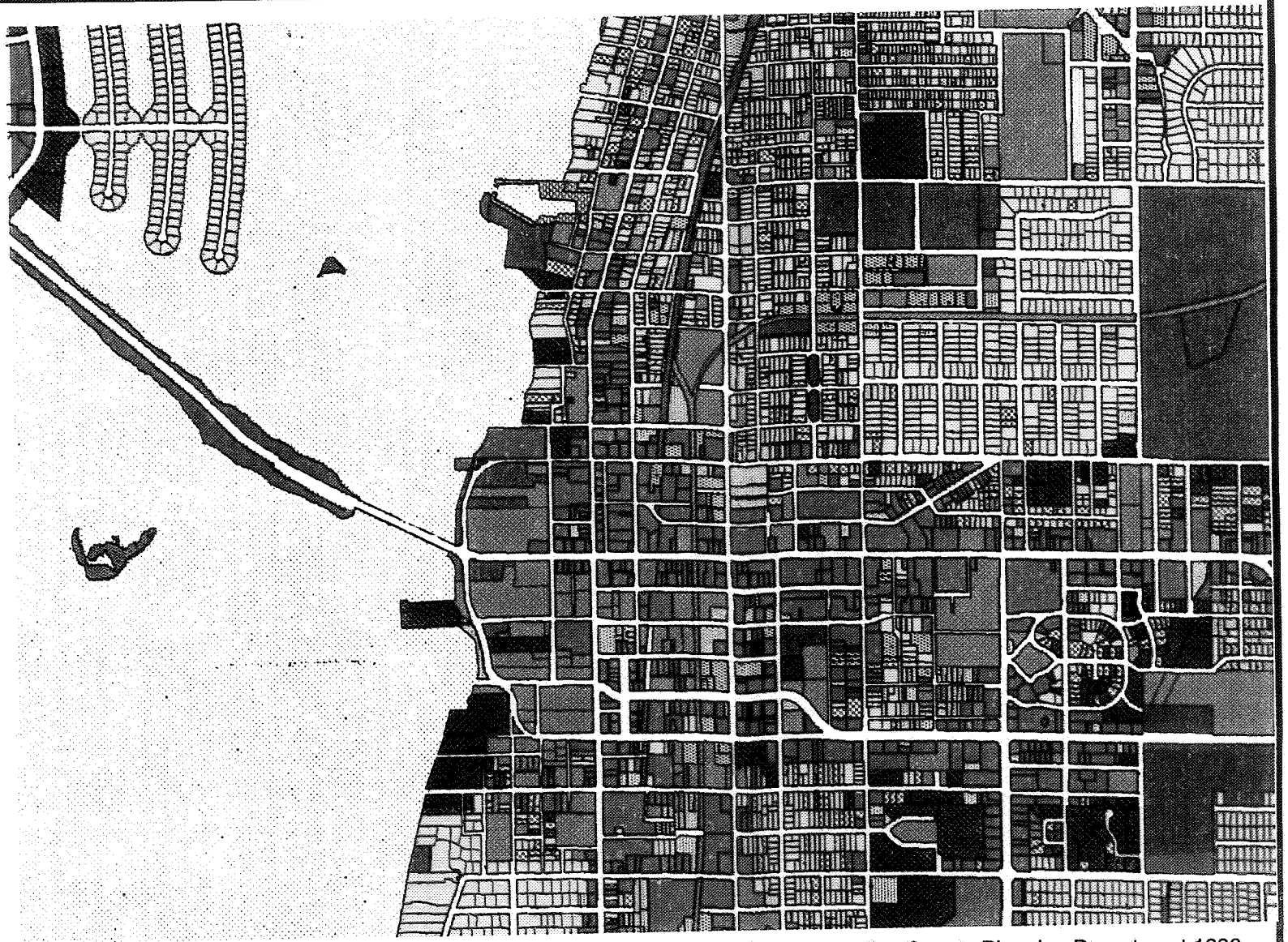
Month	Number of Openings				Number of Boats		
	1994	1995	1996		1994	1995	1996
January	261	353	328	January	306	410	405
February	388	365	367	February	567	495	498
March	528	539	620	March	845	783	672
April	590	627	581	April	903	955	861
May	572	557	551	May	854	834	804
June	514	444	524	June	702	581	692
July	361	560	505	July	755	758	667
August	464	433	448	August	603	518	573
September	458	483	462	September	631	682	639
October	547	435	526	October	803	610	687
November	507	483		November	763	683	
December	412	473		December	526	629	
Total	5602	5752	4912	Total	8258	7938	6498

EXHIBIT 4-16 AVERAGE BRIDGE OPENINGS BY TIME OF DAY



Based on a sample of 26 days over a 12-month period



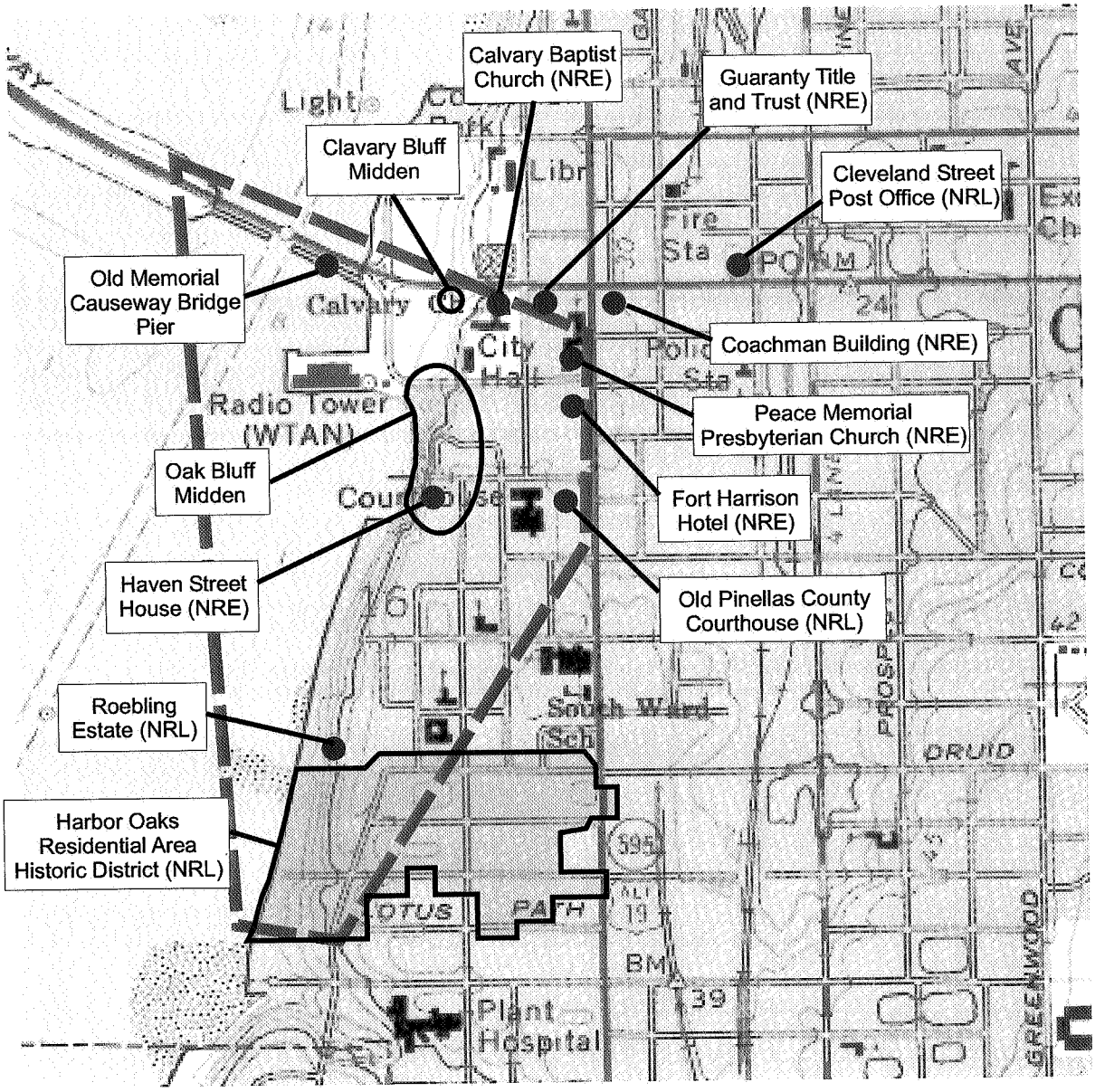


Source: Pinellas County Planning Department 1996

Memorial Causeway (S.R. 60) Bridge PD&E Study

EXISTING LAND USE MAP FOR THE PROJECT AREA

EXHIBIT 4-18



Legend

- Archaeological Site
- Historic Structure
- Historic District
- Area of Potential Effect

(NRL) - Listed on the National Register
(NRE) - Eligible for listing on the National Register

W:\MEMCSWAY\REPORTS\ENVIRON\FIGURES\FIGURE4-4.CDR

S.R. 60/Memorial Causeway Bridge PD&E Study

CULTURAL RESOURCES IN THE PROJECT AREA

FIGURE 4-21

Various wetland communities are located within the project study area. These wetland communities include estuarine intertidal unconsolidated shore, mangroves, intertidal sea grass and algae beds, subtidal sea grass beds, intertidal mangroves and salt marsh, and subtidal unconsolidated bottom. These wetland communities are identified, classified according to the National Wetlands Inventory classification, and described in Exhibit 4-22. Exhibit 4-23 shows the location of these wetland communities within the project area.

EXHIBIT 4-22
WETLAND CLASSIFICATION AND DESCRIPTION

Wetland ID	NWI Classification	Description
Wetland 1	E2US2 - Estuarine, Intertidal, Unconsolidated Shore, Sand	Sandy Shore
Wetland 2	E2Ab1 - Estuarine, Intertidal, Aquatic Bed, Algal	Algal Bed
Wetland 3	E2AB3 - Estuarine, Intertidal, Aquatic Bed, Rooted Vascular	Shoal Sea Grass Bed
Wetland 4	E2FO3 - Estuarine, Intertidal, Forested, Broad Leaved Evergreen	Mangroves
Wetland 5	E1AB3 - Estuarine, Subtidal, Aquatic Bed, Rooted Vascular	Manatee and Turtle Sea Grass Bed
Wetland 6	E1UB2 - Estuarine, Subtidal, Unconsolidated Bottom Sand	Open Water with a Sand Bottom

Three species of sea grass were found within the project area: shoal grass (*Halodule wrightii*), manatee grass *(Syringodium filiforme)*, and turtle grass *(Thalassia testudinum).* Shoal grass beds exist within the intertidal zone (Wetland 3), adjacent to the northern and southern sides of the causeway shoreline. Manatee and turtle grass beds are found in the shallower portions (up to 1.83 m [6 ft] deep) of the subtidal zone (Wetland 5). These areas (Wetland 5) exist to the north and south of the causeway and to the south of the bridge, along the eastern shore (HDR 1996).

These submerged and intertidal sea grass beds are considered high quality, due to their water quality and habitat functions. Collectively, the sea grass beds provide refuge, substrata, and or sustenance for a variety of plants and animals. Various macro-algae species exist among the beds, both along the substrate and epiphytically on the leaves. Numerous species of fish utilize these areas during larval, juvenile, and adult life stages. In addition, numerous other organisms utilizes these sea grass beds, including crustaceans (shrimp, crabs), Echinoderms (urchins), Gastropods (whelk, conch), marine mammals (dolphins, manatee), sea turtles (green, loggerhead), various shore and wading birds (plovers, sandpipers, herons, egrets) (HDR 1996).

Mangroves exist along the western portion of the project area (Wetland 4), primarily along the northern side of the causeway. The dominant species is black mangrove (*Avicennia germinans*) with scattered red mangroves (*Rhizophora mangle*) waterward of

EXHIBIT 4-24
POTENTIAL THREATENED, ENDANGERED, & PROTECTED SPECIES IN THE PROJECT AREA

Species	Status*		Documented (Y/N)
Amphibians and Reptiles	**State**	**Federal**	
Atlantic green turtle *(Chelonia mydas*	SE	FE	N
Atlantic ridley *(Lepidochelys kempii)*	SE	FE	N
Loggerhead sea turtle *(Caretta caretta)*	ST	FT	N
Leatherback turtle *(Dermochelys coriacea)*	SE	FE	N
Atlantic hawksbill turtle *(Eretmochelys imbricata)*	SE	FE	N
Birds	**State**	**Federal**	
Reddish egret *(Egretta rufescens)*	Rare	FC	Y
Snowy egret *(Egretta thula)*	SSC	---	Y
Least tern *(Sterna antillarum)*	ST	---	N
Brown pelican *(Pelecanus occidentalis)*	SSC	---	Y
Little blue heron *(Egretta caerulea)*	SSC	---	Y
Tricolored heron *(Egretta tricolor)*	SSC	---	Y
White ibis *(Eudocimus albus)*	SSC	---	Y
Great egret *(Casmerodius albus)*	SSC	---	Y
Black-crowned night heron *(Nycticorax nycticorax)*	SSC	---	Y
Piping plover *(Charadrius melodus)*	ST	FT	N
Mammals	**State**	**Federal**	
Manatee *(Trichechus manatus latirostris)*	SE	FE	Y
Fish	**State**	**Federal**	
Atlantic sturgeon *(Acipenser oxyrhynchus)*	SSC	---	N
Common snook *(Centropomus undecimalis)*	SSC	---	N
Plants	**State**	**Federal**	
Hairy beach sunflower *(Helianthis debilis ssp. vestitus)*	---	FC	Y

* FE: Federally Endangered, FT: Federally Threatened, FC: Federal Candidate Species, ST: Threatened in Florida, SE: Endangered in Florida, SSC: Species of Special Concern in Florida

In addition to the "Element Occurrence Records", FGFWFC correspondence, and National Audubon Society correspondence, species listed in "Rare and Endangered Biota of Florida" were also evaluated for possible occurrence within the project area. These evaluations included consideration of the known species ranges and habitat requirements, site reviews, and literature reviews. Potential threatened, endangered and protected species in the project area are summarized in Exhibit 4-24.

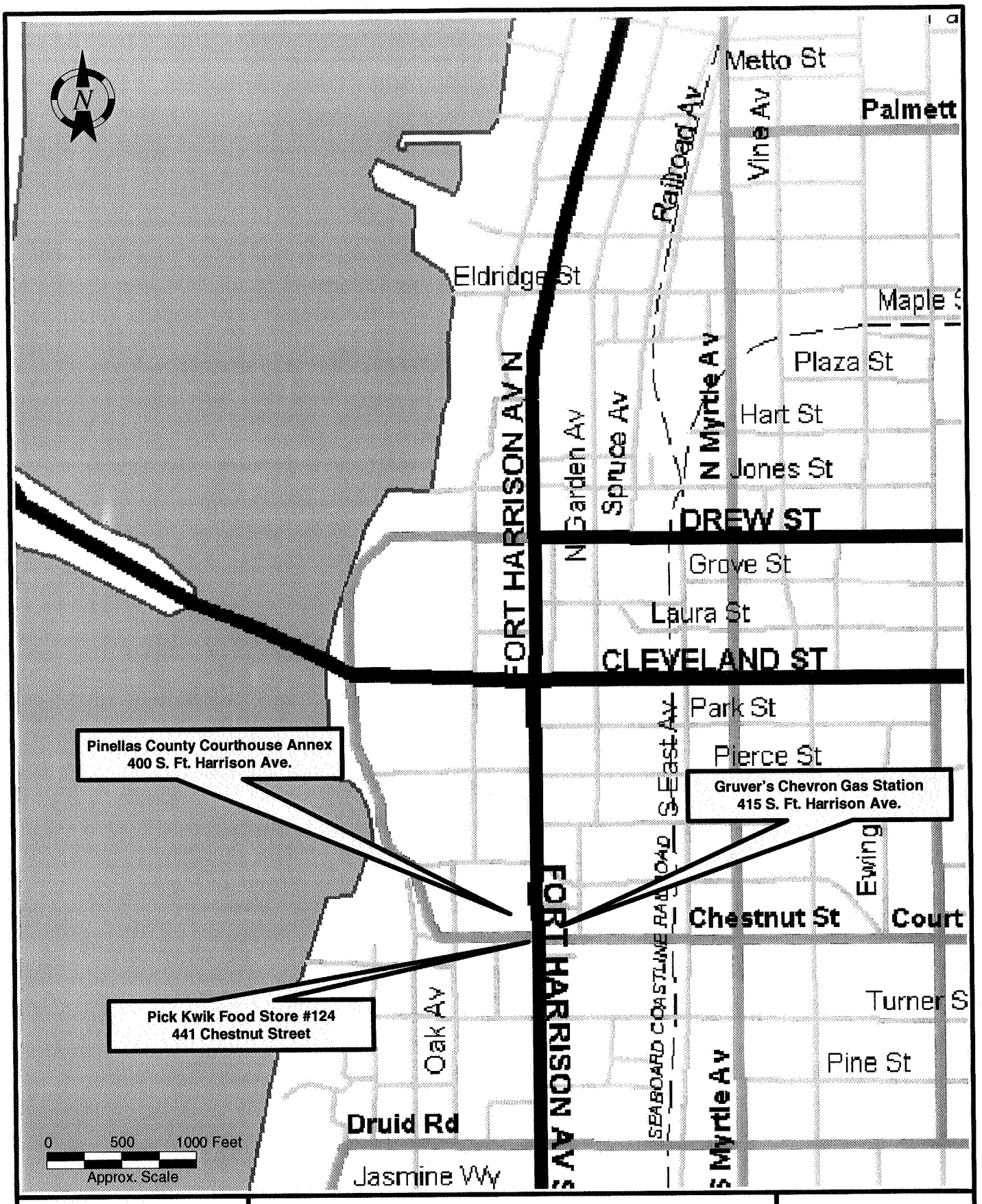
4.3.4 Contamination/Hazardous Wastes

Based upon field work and records inventory, a total of three (3) sites were identified which have potential involvement with hazardous wastes/materials or petroleum contamination (Exhibit 4-25). The sites include two gas stations which are currently operating, including Gruver's Chevron Gas Station (415 South Ft. Harrison Avenue) and Pick Kwik Food Store #124 (441 Chestnut Street). Both of these sites have contamination and are in the States' Early Detection Incentive (EDI) Program. The third site is the Pinellas County Courthouse Annex. This courthouse annex has reported contamination to the Florida Department of Environmental Protection resulting from two underground storage tanks and has submitted a contamination assessment report to the agency. These tanks contained leaded or diesel fuels.

A risk rating was assigned to each site based on a field inspection and evaluation of agency records. These are summarized in Exhibit 4-26. Each of the active gas station sites were given a high risk rating and have documented evidence of existing soil and/or groundwater contamination. However, there has been no actual remediation to date. The Pinellas County Courthouse Annex was also given a high risk rating and warrants further soil and groundwater investigation by the City or FDOT prior to utility placement or construction activities. Additional information is available in the project's Contamination Evaluation Report (Reference 4-8).

EXHIBIT 4-26
RISK RATING OF POTENTIAL CONTAMINATION SITES

Site Number	Site Description	Site Address	Risk Rating
1	Gruver's Chevron Gas Station	415 S. Ft. Harrison Avenue	High
2	Pick Kwik Food Store #124	441 Chestnut Street	High
3	Pinellas County Courthouse Annex	400 S. Ft. Harrison Avenue	High



Memorial Causeway (S.R. 60) Bridge PD&E Study	CONTAMINATED SITES LOCATION MAP	EXHIBIT 4-25

4-hazsit.vsd

5.0 DESIGN CONTROLS AND STANDARDS

To help determine the minimum vertical navigational clearance required under a new bridge, a boat height survey was conducted at the existing bridge location by the bridge tenders between June 3, 1996 and December 31, 1996. A summary of the results of the survey is included in Exhibit 5-1.

EXHIBIT 5-1
BOAT HEIGHT SURVEY RESULTS

*Boat Height	Number of Boats (6/3/96-12/31/96)
15.2 m - 16.7 m (50-54 ft)	71
16.8 m - 18.0 m (55-59 ft)	56
18.1 m - 19.5 m (60-64 ft)	23
19.6 m - 21.0 m (65-69 ft)	**9**
21.1 m - 22.7 m (70-74 ft)	**6**
22.8+ m (75 + ft)	**1**

*Bridge tenders were asked to only estimate heights of vessels over 15.2 m (50 ft)
Source: HDR Engineering, 1997

A more detailed summary of the boat height survey data along with forms and procedural information is included in Appendix B.

Data collected from the boat height survey suggests that a bridge with a vertical navigational clearance *greater* than 19.8 m (65 ft) may be required. In a telephone conversation on December 12, 1996, Coast Guard officials indicated that for the purposes of estimating costs and impacts, a bridge with a vertical clearance of 22.6 m (74 ft) should be *strongly* considered based on the results of this boat height survey and due to the proximity of the Clearwater Pass bridge, which has a vertical clearance of 22.7 m (74.4 ft). (An official determination cannot be made until a bridge permit application is submitted in the design stage of the project.) A higher bridge would add an estimated $2 million to the cost of a new bridge, due to the longer structure and bridge piers required.

Based on the above factors, it has been recommended to the City Commission that the City design a new bridge with a vertical clearance of approximately 22.6 m (74 ft).

Based on the recommended 22.6 m (74 ft) vertical navigational clearance, the roadway profiles were revised for the alternatives to utilize the following clearances:

	Meters	Feet	
	0.402	1.32	MHW
	22.555	74	Vertical Clearance
	2.743	9	Structure Depth
	0.354	1.16	Cross Slope of Bridge
Totals	26.054	85.48	Profile Elevation @ Critical Point

Proposed design criteria, including sources, are given in Exhibit 5-2. In November 1998, FDOT design personnel requested that the design speed for the project be revised to 80 km/h (50 mph). Based on this request, adjustments may be made to the proposal vertical profile during the design phase.

EXHIBIT 5-2
PROPOSED DESIGN CRITERIA

DESIGN ELEMENT	VALUE		SOURCES
Functional Classification	Urban Principal Arterial		SLD
Design Vehicle	WB-50		1: p. 1-5
Design Speed	70 km/h (45 mph)	60 km/h (35 mph)	1: p. 1-5
Bridge Typical Section			
Lane Widths			
Minimum	3.3 m (11')	3.3 m (11')	1: Table 2.1.1
Desirable	3.6 m (12')	3.6 m (12')	3: Figs. 2-1, 2-4
Shoulder Width (minimum)			
Inside	0.8 m (2.6')	0.8 m (2.6')	1: Table 2.3.2
Outside	2.4 m (8')	2.4 m (8')	(high volume)
Sight Distance, Stopping* (minimum)	110 m (350')	85 m (250')	1: Table 2.7.1
Horizontal Alignment			
Curve, Minimum Radius	215 m (8E15')	150 m (14E15')	1: Table 2.8.3
Superelevation e Urban Maximum	0.05 m	0.05 m	2: Index 511 &
Minimum Radius of Curve w/o Super-elevation	2330 m (2E45')	1745 m (5E00')	Table 2.9.2 1: Table 2.8.4
Vertical Alignment			
Grades			
Maximum	7.0% (6.5%)	7.0 % (7.5%)	1: Table 2.6.1
Minimum	0.3%	0.3%	1: Section 2.6.3
Crest Vert. Curve Length, Min.	42 m (135')	36 m (105')	1: Table 2.8.5
Crest "K", Minimum	30 (90)	18 (50)	1: Table 2.8.5
Sag Vertical Curve Length, Min.	42 m (135')	36 m (105')	1: Table 2.8.6
Sag "K", Minimum	25 (80)	18 (50)	1: Table 2.8.6
Max. Grade Change w/o Vert. Curve	0.70 (0.70)	0.80 (0.90)	1: Table 2.6.2
Min. Vertical Clearance Between Structure & Roadway	5.0 (16'-4")	5.0 (16'-4")	1: Table 2.10.1 3: Figure 2-9
Desirable Vertical Clearance Between Structure & Roadway	5.05 (16'-6")	5.05 (16'-6")	
Navigational Clearance			
Horizontal	30.5 m (100')	30.5 m (100')	4
Vertical	19.8 - 22.6 m (65'-74')	19.8 - 22.6 m (65'-74')	4 (see report text)

Sources:
1. FDOT "Roadway Plans Preparation Manual (metric)" (1995) (Vol. 1) with 1-1-96 revisions.
2. FDOT "Roadway and Traffic Design Standards" (1996)
3. "Structures Design Guidelines" (1994) with subsequent revisions
4. Rev. Coast Guard Guide Clearances, Public Notice 18-96 dated September 3, 1996.

Note: Also, see proposed typical sections shown elsewhere in this report.

*These values are for grades of 2% or less; adjust these values for steeper grades.

THIS PAGE INTENTIONALLY LEFT BLANK

6.0 TRAFFIC

Much of the information in this chapter has been extracted from the Traffic Report (Reference 6-1) prepared for this project.

6.1 Existing Traffic Volumes & Seasonal Variation

For the traffic analysis phase of the PD&E study only, the study area limits were expanded to Highland Avenue on the east side, in order to be able to assess the traffic impacts on four-lane Court Street west of Highland Avenue.

Approximately 54 machine (road-tube) street segment counts were collected in March 1996 as part of this study. These raw counts were adjusted for both day-of-week and season (week of the year). Seasonal adjustment factors for 1995 were provided by FDOT. In addition, daily totals from a number of the City's computerized traffic control system sensors were collected for this same time period. Day-of-week adjustment factors were derived from these counts. The *adjusted* machine counts (AADT estimates) are shown in Exhibit 6-1 along with other annual average daily traffic (AADT) estimates and 24-hour counts from the City and FDOT. In some cases it was necessary to rely on earlier AADT estimates to either fill in gaps in the new counts or to help verify the accuracy of new counts taken for this study. (*Printouts for all count data collected [both machine and manual intersection turning movement counts] are available in a separately bound supplemental traffic "report."*)

The 1996 AADT for Memorial Causeway at the bridge is estimated to be approximately 38,500 vehicles per day (VPD).

In addition to street segment counts, manual 10-hour intersection turning movement counts (TMCs) were made in March 1996 at approximately 20 signalized intersections. These 10-hour TMCs were "expanded" to 24-hour estimates, in order to develop estimates for existing AADT turning volumes.

No bicycle counts were made as part of the manual turning movement counts; however, light bicycle traffic has been observed on Memorial Causeway, especially on weekends. Coachman Park seems to be a popular destination or stopping point for bicyclists.

Pedestrian counts were made at the major signalized intersections as part of the manual turning movement counts. The highest pedestrian volumes occur at intersections along Cleveland Street.

Exhibit 6-2 illustrates the magnitude of the seasonal variation in traffic on the causeway in 1994. Weekly averages ranged from a low of 31,400 VPD to a high of 50,400 VPD, a variation of approximately 60 percent. This variation is substantially higher than that reflected in FDOT's countywide seasonal adjustment factors for Pinellas County.

Seasonal variation for several different count sensor locations was compared as part of the traffic analysis. The week-to-week variation in traffic on the causeway appears to be greater than the variation at other stations in the downtown area. This is expected due to the fact that the causeway carries a greater proportion of beach/tourist/recreational traffic than the other locations.

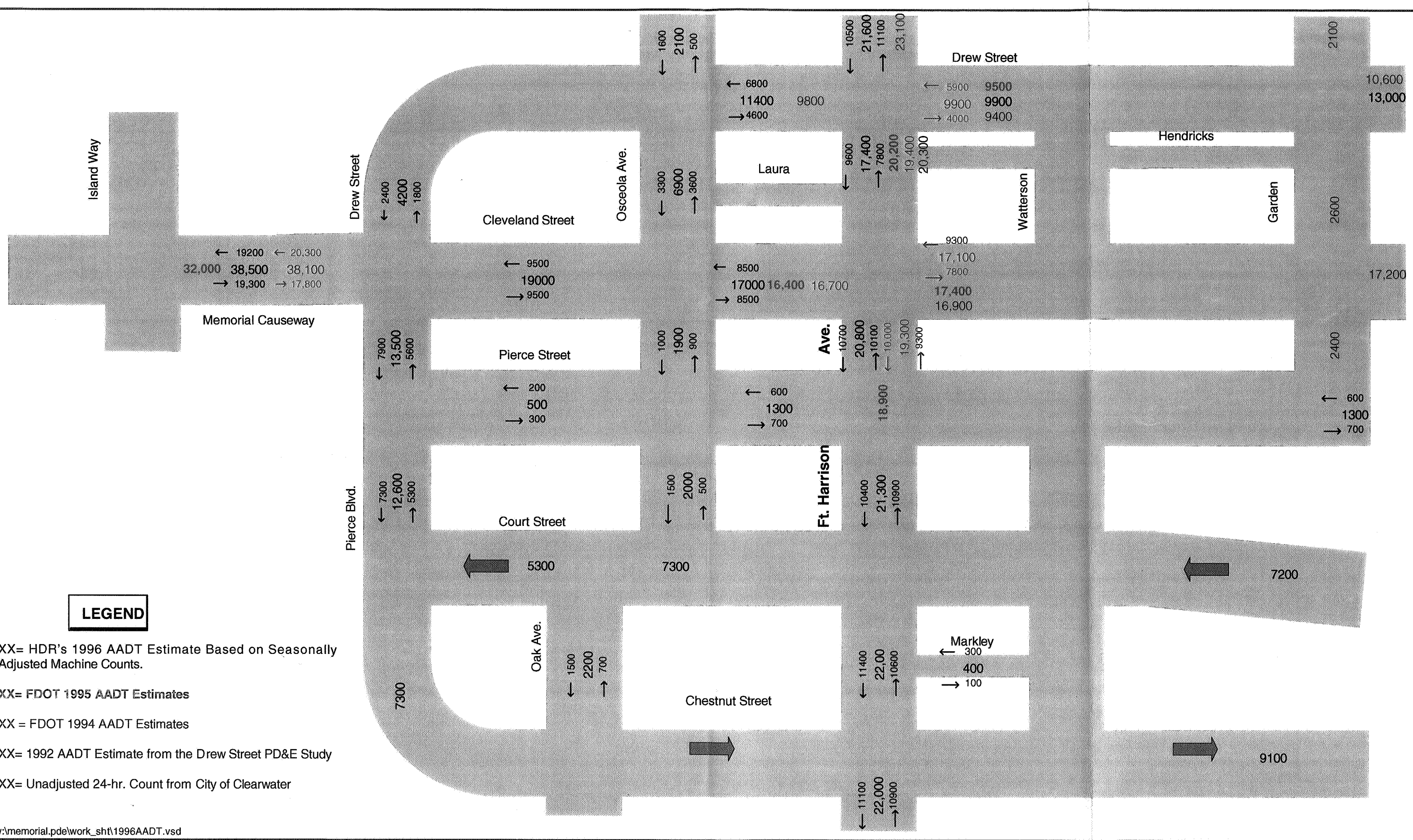
6.2 Multi-Modal Systems Considerations

Bus service within the study area is currently provided by two different services, the Pinellas Suncoast Transit Authority (PSTA) and the Jolley Trolley Company.

Local bus service throughout the study area is provided by PSTA. Ten routes currently travel through the project study area. One route provides bus service to Clearwater Beach via the Memorial Causeway Bridge. In addition, a PSTA bus terminal is located within the study area at Park Street and Garden Avenue. Exhibit 6-3 summarizes the routes within the project area.

The Jolley Trolley Company is a non-profit corporation, subsidized by the City of Clearwater, which operates shuttles primarily oriented toward tourists. It operates small trolley-like buses which run between downtown Clearwater and Clearwater Beach, in addition to a separate route which runs along the beach. Its downtown route operates every 30 minutes from 10 a.m. to 8 p.m. daily and 9 p.m. Thursday through Saturday. The trolley travels east across Memorial Causeway stopping at the Publix on Island Estates. The route continues through downtown Clearwater on Cleveland Street, passing by the post office, PSTA bus terminal, and Park Street parking garage then heads back to the beach station via Island Estates, stopping at the shopping center on Island Way and the Marine Science Center. The trolley station is located at 40 Causeway Boulevard at the Memorial Civic Center. The corporation's board of directors includes representatives from PSTA, the city commission, and other city and downtown groups. Estimated ridership in 1996 for the downtown route was approximately 65,800, according to the corporation; this represents approximately 30 percent of its total ridership for both routes.

Waterborne traffic is served by several marinas near Clearwater Beach and the Clearwater Ferry Service, located near the end of Drew Street on Clearwater Harbor. The ferry service is currently inactive; the current contract calls for it to be operated as demanded by the City.



LEGEND

XX= HDR's 1996 AADT Estimate Based on Seasonally Adjusted Machine Counts.

XX= FDOT 1995 AADT Estimates

XX = FDOT 1994 AADT Estimates

XX= 1992 AADT Estimate from the Drew Street PD&E Study

XX= Unadjusted 24-hr. Count from City of Clearwater

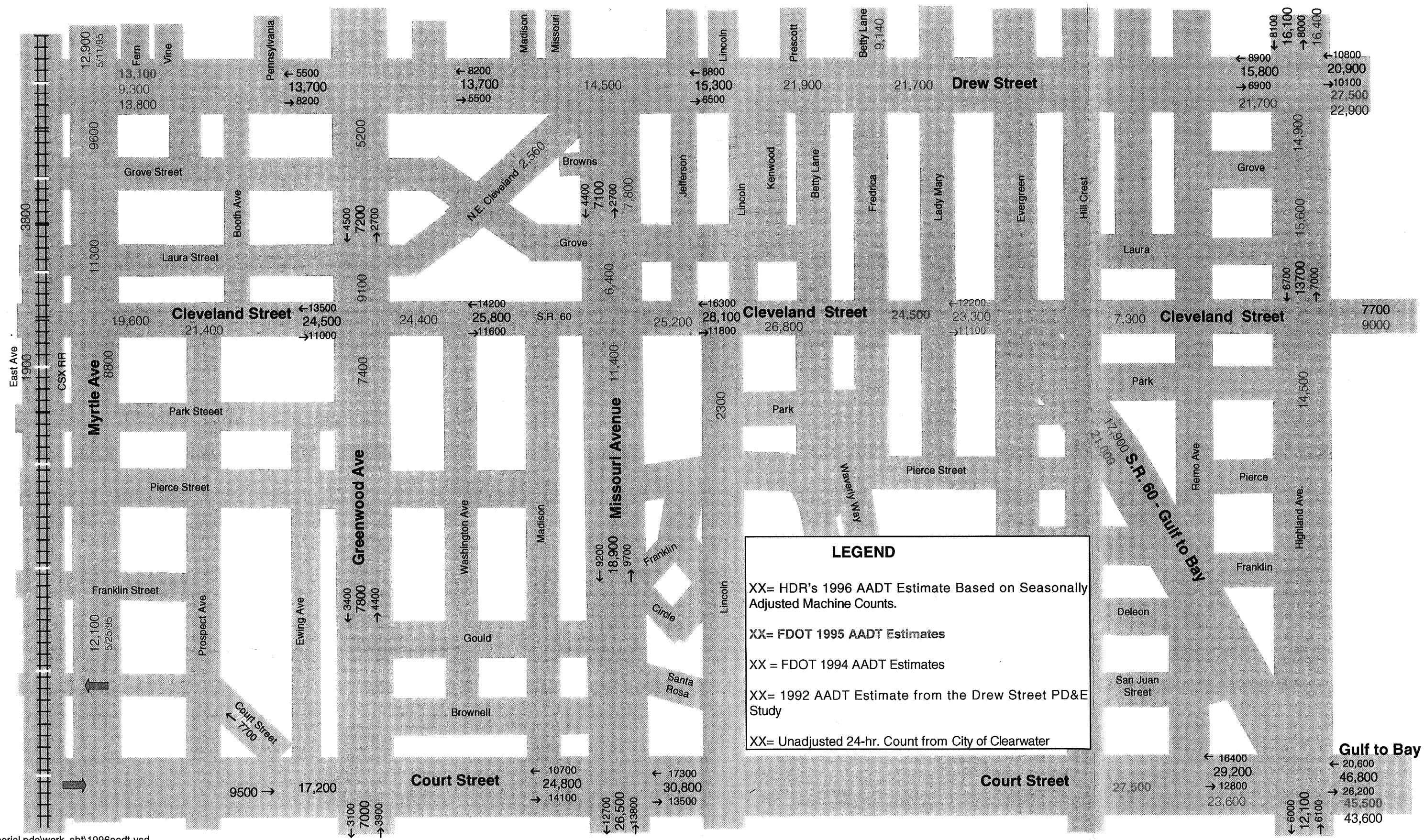
w:\memorial.pde\work_sht\1996AADT.vsd

MEMORIAL CAUSEWAY BRIDGE
(S.R. 60)
PROJECT DEVELOPMENT & ENVIRONMENT STUDY

HDR ENGINEERING, INC.

EXHIBIT 6 - 1

1996 AADT Estimates
(Sheet 1 of 2)



w:\memorial.pde\work_sht\1996aadt.vsd

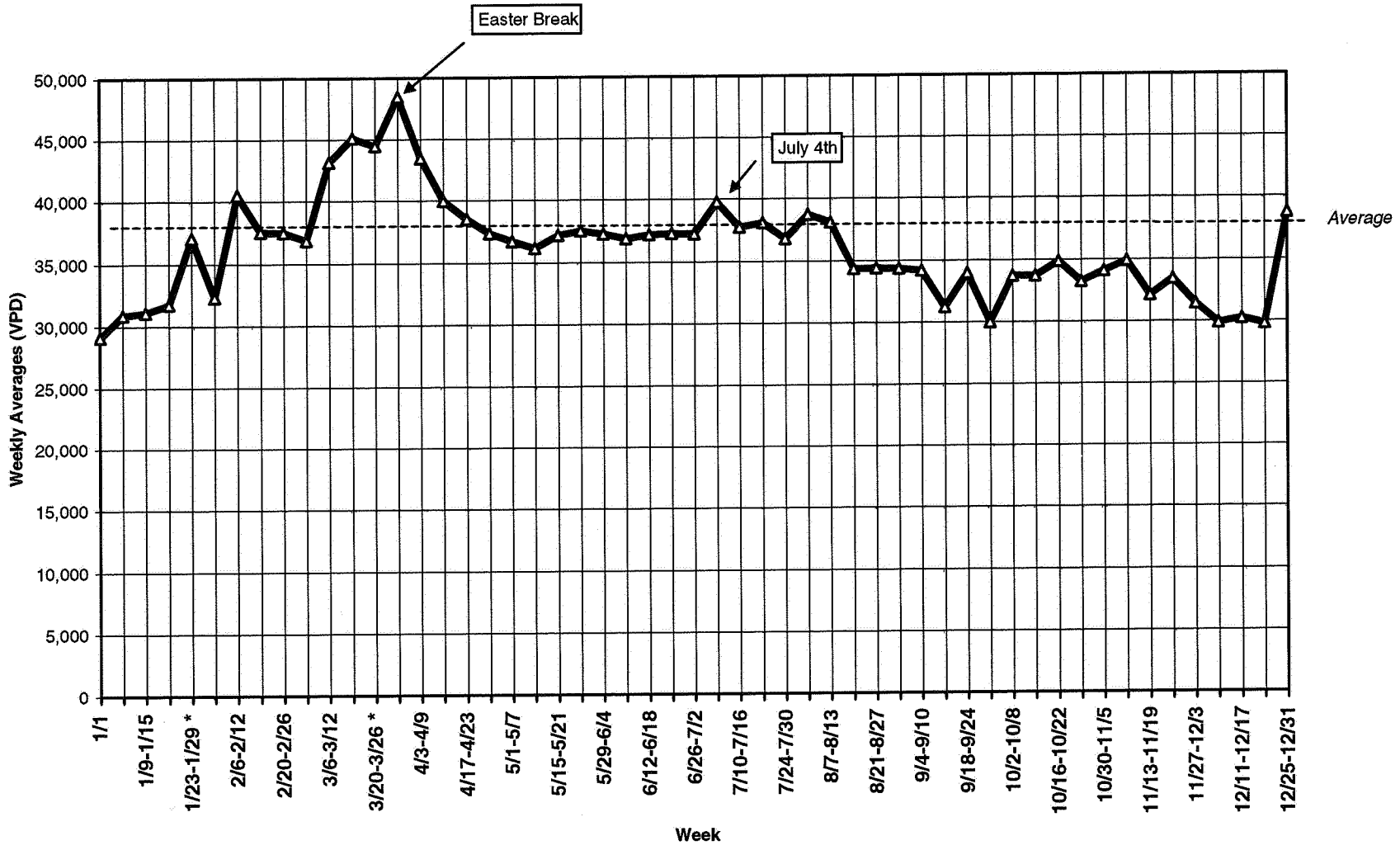
MEMORIAL CAUSEWAY BRIDGE
(S.R. 60)
PROJECT DEVELOPMENT & ENVIRONMENT STUDY

HDR ENGINEERING, INC.

EXHIBIT 6-1

1996 AADT Estimates
(Sheet 2 of 2)

5-96



Memorial Causeway (S.R. 60) Bridge PD&E Study	**SEASONAL VARIATION IN TRAFFIC ON THE CAUSEWAY (BY WEEKS)**	**EXHIBIT 6-2**

EXHIBIT 6-3
PSTA ROUTES WITHIN THE PROJECT AREA

Route	From	To	Route in Project Area
18	Cleveland St. and Pierce St.	Sunshine Mall	Druid Rd. to Cleveland St. via Myrtle Ave.
60	PSTA Station, Clearwater	Clearwater Mall	Cleveland St. to Gulf-to-Bay
61	PSTA Station, Clearwater	Largo	Cleveland St. to Missouri Ave.
63	Cleveland St./Myrtle Ave.	Clearwater Mall	Cleveland St. to Lakeview Rd. via Myrtle Ave.
66	Indian Rocks Road	Tarpon Springs	Myrtle Ave. to Court St. to Ft. Harrison Ave.
67	PSTA Station	Oldsmar	Garden Ave. to Drew St.
76	PSTA Station	Countyside Square	Cleveland St. to Belcher Rd.
78	Pierce St.	Countryside Mall	Pierce St. to Myrtle Ave. to Palmetto St.
80	PSTA Station	Clearwater Beach	Osceola Ave. to Memorial Causeway to the Beach
97	PSTA Station	St. Petersburg	Court Street to Gulf-to-Bay

Source: Pinellas Suncoast Transit Authority

Sporadic bicycle and pedestrian facilities exist throughout the downtown area and Clearwater Beach. Sidewalks are provided throughout downtown and along the causeway. Bicycle paths exist on Memorial Causeway, but the narrow traffic lanes throughout most of downtown Clearwater are not conducive to safe bicycle travel. The "missing link" of the Pinellas Trail through downtown Clearwater is currently under construction along East Avenue.

There are no special provisions for bicyclists on the existing Memorial Causeway bridge. The proposed replacement bridge will include special provisions to accommodate bicyclists and pedestrians.

Additional transportation facilities and systems in the project area are currently planned or under study. The Pinellas County Metropolitan Planning Organization is currently conducting the Pinellas Mobility Major Investment Study. This study will evaluate the feasibility of constructing a fixed guideway rail system within Pinellas County. One of the alignments which is being considered runs along SR 60 from downtown Clearwater to Safety Harbor. There are presently no plans for a fixed guideway system to run between Clearwater and Clearwater Beach.

6.3 Traffic Analysis Assumptions & Projection Methodology

The general methodology followed in developing future year traffic projections is consistent with the FDOT's published procedures for developing design traffic.

6.3.1 MPO's Long Range Transportation Plan

The basis for all future year traffic forecasts is the Pinellas County Metropolitan Planning Organization's (MPO) adopted Year 2015 Long Range Transportation Plan. The plan development is documented in a report (Reference 6-2), and the MPO's Year 2015 "Cost-Feasible Plan" (CFP) is illustrated in Exhibit 6-4.

The adopted CFP includes several projects that are in or near this project's traffic impact study area:

Street	From	To	Proposed
Highland Avenue	Gulf-to-Bay	Druid	4-lane divided
Drew	Ft. Harrison	Cleveland St.	4-lane divided
Missouri	Cleveland	Drew	4-lane divided

Highland Avenue between Gulf-to-Bay and Sunset Point Road is presently being widened by the City to a 3-lane typical section.

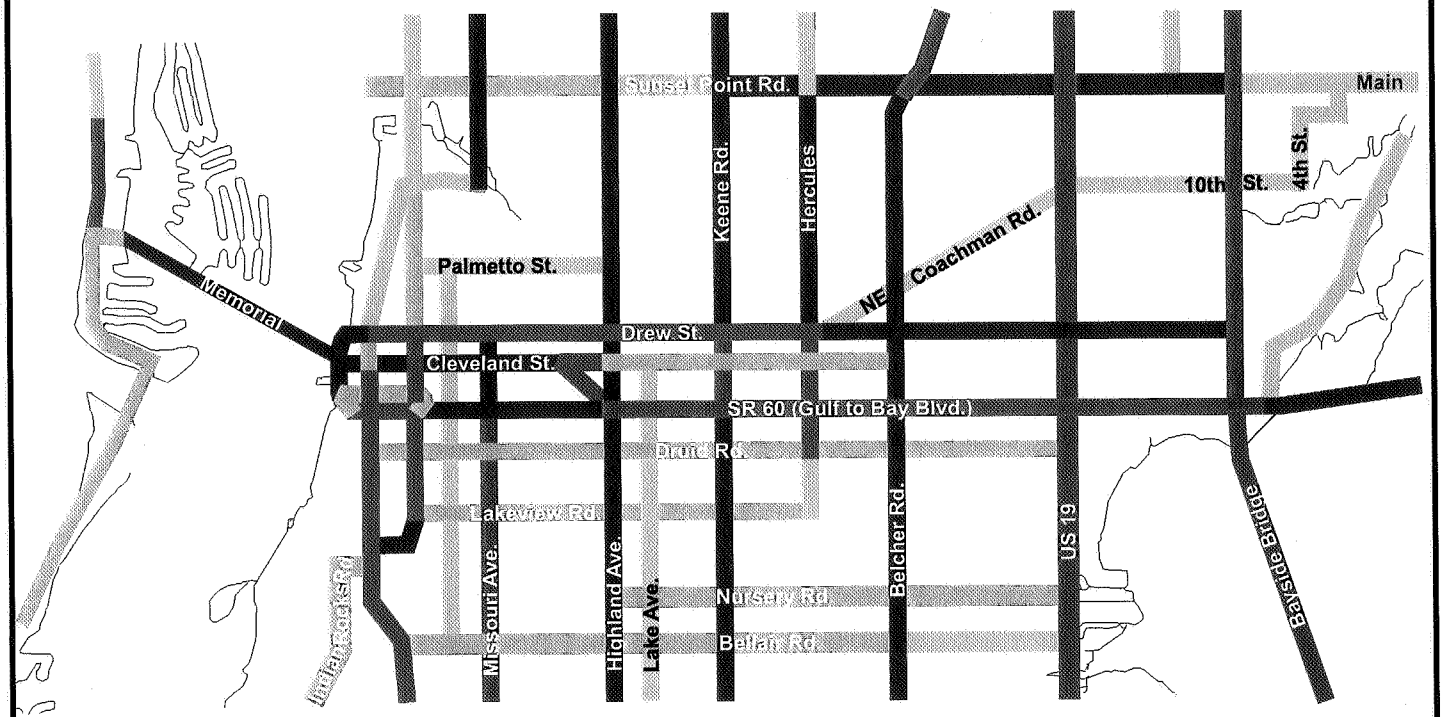
Additional roadway changes proposed in the CFP are shown in Exhibit 6-5, where existing laneage is compared to the laneage proposed in the CFP. Memorial Causeway is proposed to remain a four-lane divided highway (in the previous MPO's long-range plan, it was proposed to be a *six*-lane divided highway).

6.3.2 Tampa Bay Regional Model Runs

In order to evaluate changes in the traffic network due to the proposed bridge project, several special traffic model runs were requested from the Pinellas MPO staff; these are designated Alternatives 1 through 4 in Exhibit 6-5. These runs were made using the new Tampa Bay Regional Model. Runs were received for:

- 1996 Existing System
- Year 2015 Adopted Cost Feasible Plan
- Alt. P4, 2015, with 4-lane Court Street
- Alt. P4, 2015, with 6-lane Court Street
- Alt. P4, 2015, with Cleveland Street Extension

The first step was to convert all of the model outputs from peak season weekday traffic to annual average daily traffic (AADT) by use of a conversion factor (0.93) provided by FDOT. The next step was to check the model results for reasonableness. The reasonableness of the traffic model 1996 No-Build run results was checked by comparison of various screenline totals of model forecasts vs. estimated AADTs. In general, the model appeared to give very good results based on screenline totals. The differences range from less than 1 percent to approximately 15 percent. (These differences are probably less than the probable errors associated with trying to estimate 1996 AADTs, given the high degree of seasonal variation in traffic in the study area.)



Legend

- 2-Lane Undivided/2-Lane One Way
- 2-Lane Divided/3-Lane One Way
- 4-Lane Undivided/4-Lane One Way
- 4-Lane Divided
- 6-Lane Divided
- 6-Lane Partially-Controlled Access

Memorial Causeway (SR 60) Bridge PD&E Study

MPO's Year 2015 Cost Feasible Plan

EXHIBIT 6-4

W:\.....\reports\pe\figs10-97\6-4map.cdr

Revised 3/21/97

EXHIBIT 6-5

(Note: Memorial Cswy is proposed for 4L D) **YEAR 2015 MODEL RUNS** 1/30/96 **Rev. 6/11/96**

		D=Divided	Note: Alternates 3 & 4 involve cutting off Cleveland St. and connecting the bridge directly to Pierce Blvd/Court/Chestnut					
		UD=Undivided		Alt. 1	Alt. 2			Alt. 5
		O.W.=One Way		Existing	"Adopted CFP"*	Alternate	Alternate	"Cleveland St.
	On-Street	**From Street**	**To Street**	**Laneage**	**2015**	**3**	**4**	**Extension"**
East-West Street Segments								
	Drew Street	Pierce Blvd	Ft. Harrison	4L UD	4L D	2L D	→	Drew would have cul de sac at west end
	Drew Street	Ft. Harrison	Myrtle	2L D & 4L UD	4L UD/4L O.W.	2L D	→	→
	Drew Street	Myrtle	Missouri	4L UD	4L UD/4L O.W.	2L D	→	→
	Drew Street	Missouri	Highland	4L UD	4L UD/4L O.W.	2L D	→	→
	Drew Street	Highland	Hercules	4L UD	4L UD/4L O.W.	4L D	→	→
	Drew Street	Hercules	U.S. 19	4L UD	4L D	4L D	→	→
	Cleveland St.	Pierce Blvd	Ft. Harrison	2L D	4L D	2L D	→	2L Cleveland St. Ext. would tie in to rotary
	Cleveland St.	Ft. Harrison	Myrtle	2L D	4L D	2L D	→	→
	Cleveland St.	Myrtle	Missouri	4L D	4L D	→	→	→
	Cleveland St.	Missouri	Gulf to Bay Cutoff	4L D	4L D	→	→	→
	Gulf to Bay (Diagonal Cutoff)	Cleveland	Highland	4L UD	4L UD	→	→	→
	Court & Chestnut Sts.	Pierce Blvd	Ft Harrison	2-3 One Way	3L One Way	→	→	→
	Court & Chestnut Sts.	Ft. Harrison	Myrtle	3L One Way	3L O.W. or 4L O.W.	3L O. W.	→	→
	Court & Chestnut Sts.	Myrtle	Ewing Ave.	3L One Way	3L One Way ??	→	→	→
	Court St.	Ewing Ave.	Missouri Ave.	4L UD	4L D	→	6L D	4L D
	Court St.	Missouri	Highland	4L D	4L D	→	6L D	4L D
	Gulf to Bay	Highland	US 19	6L D	6L D	→	→	→
North-South Street Segments								
	Ft. Harrison	S. of Chestnut	Cleveland	4L UD	4L UD/4L O.W.	→	→	→
	Ft. Harrison	Cleveland	Drew	4L UD	2L D/3L O.W.	→	→	→
	Ft. Harrison	Drew	N. of Drew	2L D	2L UD/2L O.W.	→	→	→ Error in plan? Existing is 2L D.
	Myrtle Ave.	S. of Chestnut	Chestnut	4L UD	4L UD/4L O.W.	→	→	→
	Myrtle Ave.	Chestnut	Cleveland	4L UD	4L UD/4L O.W.	→	→	→
	Myrtle Ave.	Cleveland	Drew	2L D	4L UD/4L O.W.	→	→	→
	Myrtle Ave.	N. of Drew	?	2L D	2L D/3L O.W.	→	→	→
	Missouri Ave.	S. of Court St.	Court St.	6L D	6L D	→	→	→
	Missouri Ave.	Court St.	Cleveland	4L D	4L D	→	→	→
	Missouri Ave.	Cleveland	Drew	2L UD	4L D	→	→	→
	Highland Ave.	S. of Court St.	Court St/ Gulf to B.	4L UD	4L D	→	→	→
	Highland Ave.	Court St/ Gulf to B.	Drew St.	2L UD	4L D	2L D	→	→
	Highland Ave.	Drew St.	N. of Drew St.	2L UD?	4L D	2L D	→	→

*Adopted 12/18/95 by the MPO

File: 6-5MODELRUN.xls

Rev. 6/11/96 to add Cleveland St. Ext. Alt.

The Traffic Report recommended that the year 2015 projected AADTs be used for the year 2020 design year, due to the low projected growth rate and the declining *rate* of growth. For example, based on the MPO's model, traffic volumes on Memorial Causeway are expected to grow only 3.9 percent between 1996 and 2015. Based on this growth trend, the difference in projected traffic volumes on the causeway between 2015 and 2020 is only about 1/2 of 1 percent.

6.3.3 2020 No-Build Volumes

The regional traffic model results for the year 2015 adopted cost feasible plan (No-Build Project Alternative) were refined using the same procedures that the MPO staff use to adjust for imperfections in the model validation process. Three different refinement methods were utilized: 1) the difference model; 2) the ratio method; and 3) the average method. The specific method utilized for each roadway segment was a function of the ratio of 1996 traffic count to the 1996 model volume (Reference 6-2). After obtaining a refined 2015 projection for each roadway segment, a review was made for reasonability, with further adjustments performed, as required, based on engineering judgment. As mentioned above, the year 2015 projections were then used as the year 2020 projections.

The recommended AADTs for the No-Build Project Alternative, 1996 and 2020, are included in Exhibit 6-6.

Future turning volumes for the 2020 No-Build Project Alternative were estimated by use of the B-turns spreadsheet. This procedure uses a macro-driven iterative algorithm to estimate future turning volumes given base year turning volumes and future year link volumes. The procedure is based on the methodology contained in NCHRP Report No. 255 (Reference 6-3). Existing and future turning volumes are also included in Exhibit 6-6.

6.3.4 Year 2020 Projections for the P4 Build Alternatives

Regional traffic model forecasts for the Pierce Boulevard (P4) tie-in alternatives were obtained from the MPO staff for both 4-lane and 6-lane Court Street alternatives between Ewing Avenue (approximate end of the Court/Chestnut Streets one-way pair) and Highland Avenue. Based on a review of the two sets of model projections, recommended year 2020 AADTs were developed as shown in Exhibit 6-7. These were based primarily on the 6-lane Court Street projections, as they appeared to be more reasonable. Manual adjustments were made to the model projections, where required, to obtain more reasonable results.

Projected turning volumes for this alternative were developed using the B-turns spreadsheet, as previously described.

6.3.5 Year 2020 Projections for the P4 Build Alternatives with Cleveland Street Extension

In June 1996, a new model run was requested from the MPO consisting of Alternative P4 (new bridge tie-in to Pierce Boulevard) with a two-lane extension of Cleveland Street tying in to the southeast approach to the new bridge. This tie-in would consist of a signalized intersection which would allow protected southeastbound-to-eastbound left turns off of the bridge and westbound to northwestbound right turns onto the bridge, off of the Cleveland Street extension.

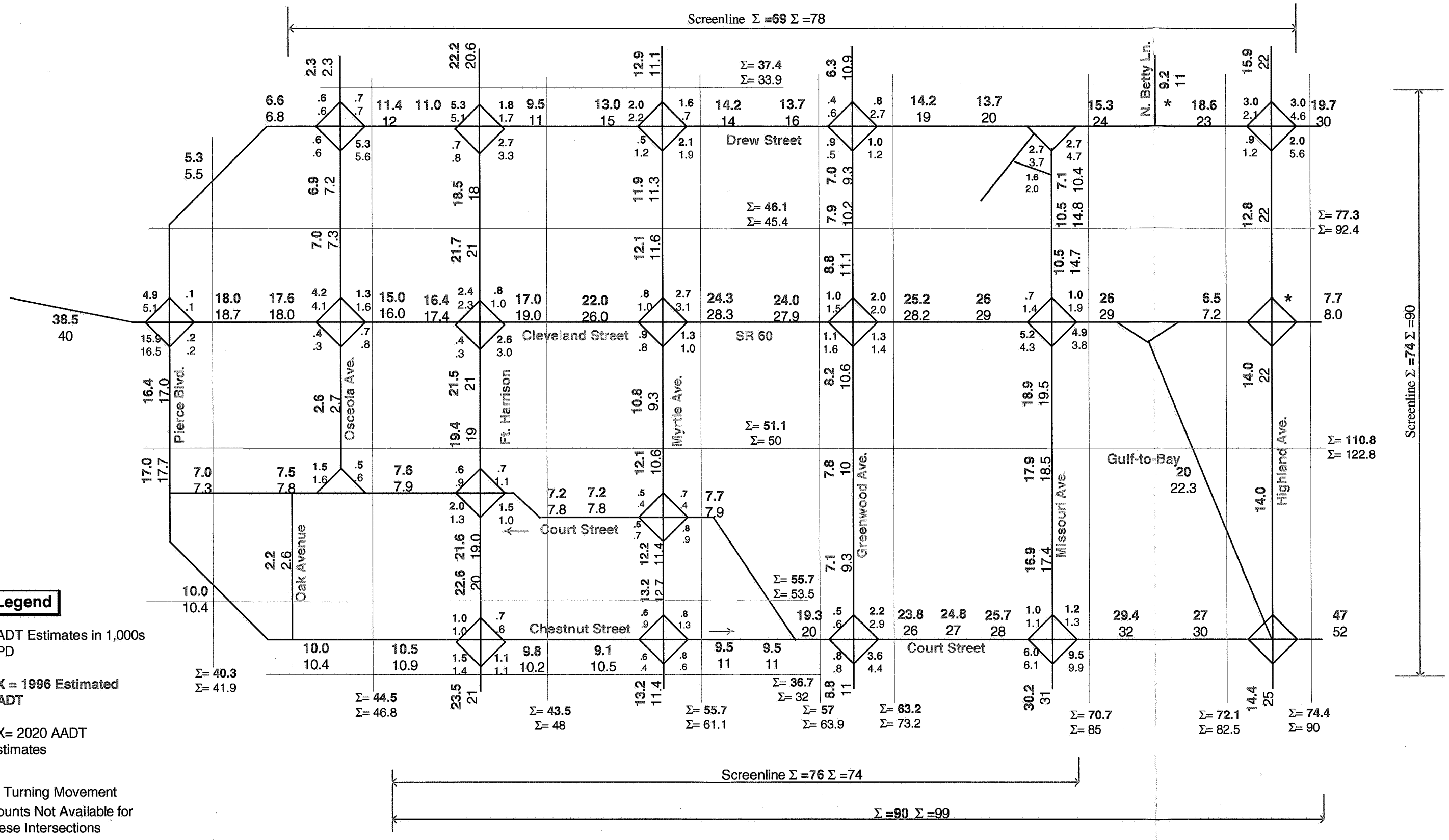
Based on a review of the model results, refined model results, and existing traffic patterns, recommended AADTs for 2020 were developed, as shown in Exhibit 6-8. These projections also include manual revisions from the first two traffic Report Addenda, as described below.

6.3.6 Additional Manual Adjustments to Traffic Projections

Subsequent to the submittal of the initial draft traffic report, two different addenda were prepared and submitted in response to comments received from City staff. The first addendum revised the projected turning volumes at Court and Chestnut at Ft. Harrison to make them more consistent with existing volumes, and projections along Court Street were adjusted such that north-south screenline totals for the No Build and Build scenarios were more in line with each other.

A second addendum shifted projected traffic on Cleveland Street west of Myrtle Avenue to Court and Chestnut Streets. The resulting volumes on Cleveland Street are more consistent with the available capacity (travel lanes on Cleveland Street go from 4 to 2 lanes west of Myrtle Avenue) and with the City's downtown redevelopment plan's goal of making downtown a more pedestrian-friendly place. The details of the manual adjustments are included in the Traffic Report (Reference 6-1).

In August 1997, additional manual revisions were made to shift traffic from the now defunct "Cleveland Street Extension" to the proposed Pierce Street Connection. Traffic which would have used the former roadway was re-routed down Osceola Avenue to the multi-way stop at Osceola Avenue/Pierce Street, and then on to Pierce Street west of Osceola Avenue, where it will connect to the new bridge approach on Pierce Boulevard. The resulting volumes are shown in Chapter 9, Exhibit 9-2.



Legend

AADT Estimates in 1,000s VPD

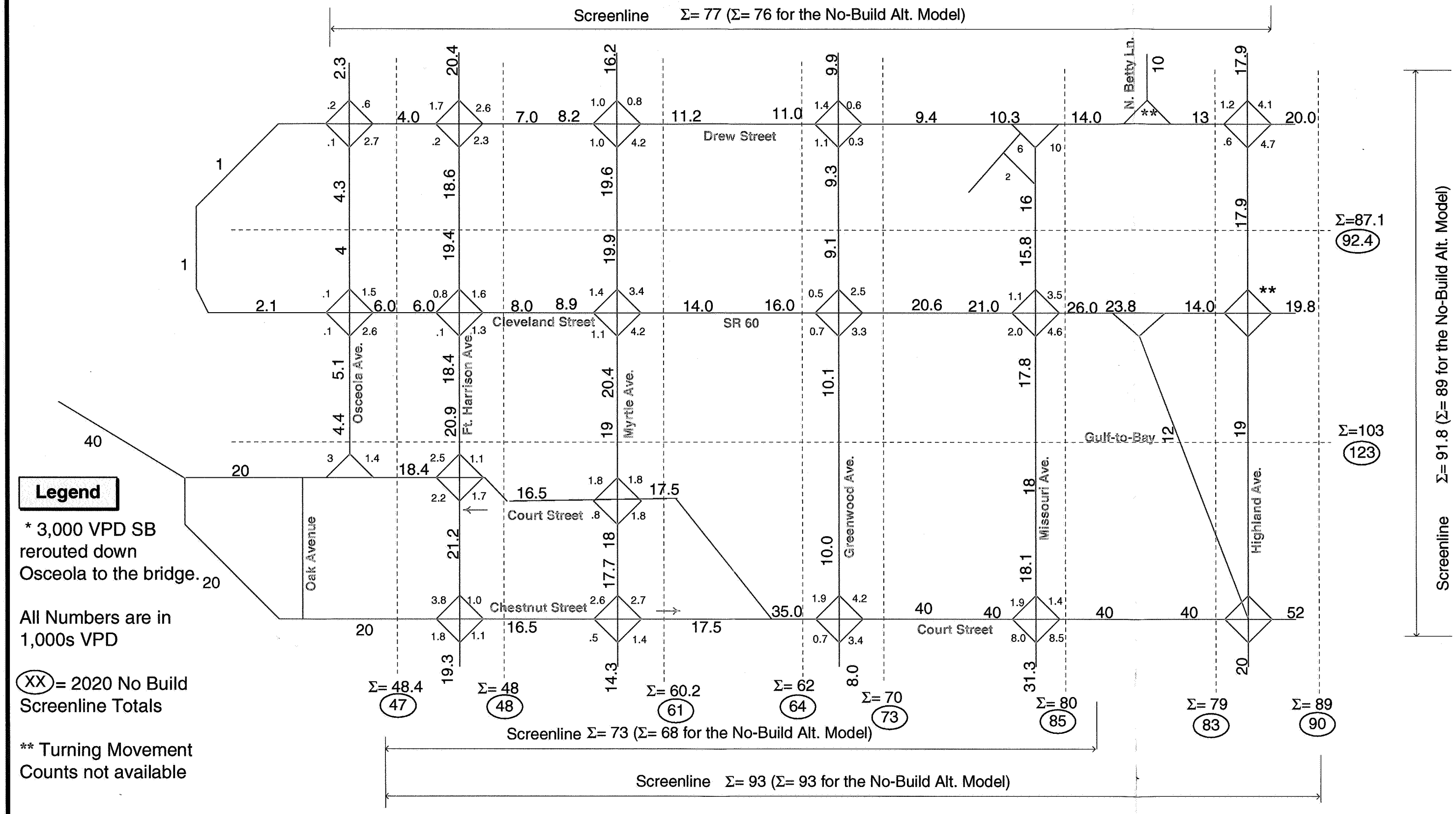
XX = 1996 Estimated AADT

XX= 2020 AADT Estimates

* Turning Movement Counts Not Available for these Intersections

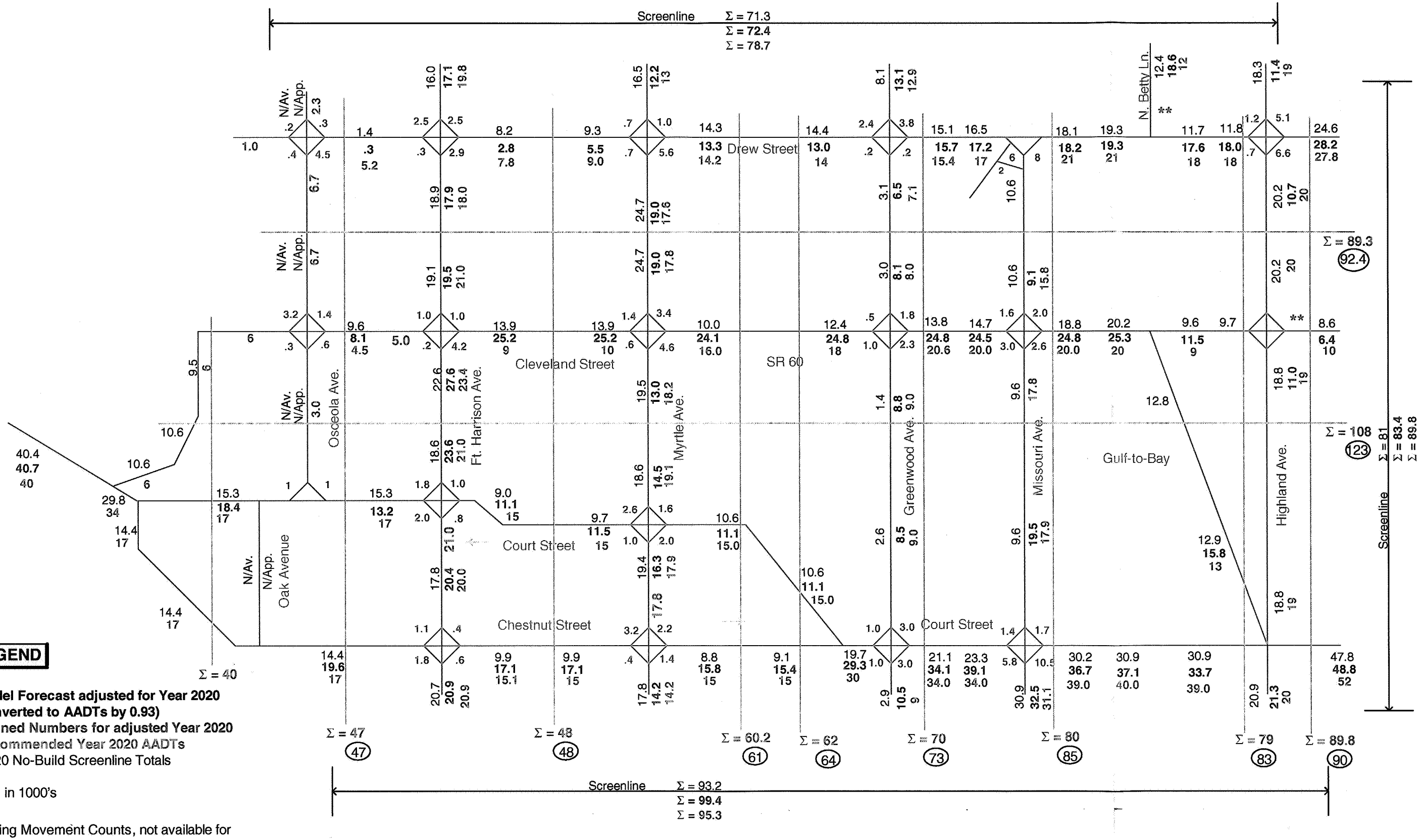
w:\memcsway\reports\Pe\Figs 10-97\6-6rec_aadt.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	**AADTs for the No-Build Project Alternative**	**EXHIBIT 6-6** Rev. 8/29/96



w:\memcsway\reports\Pe\Figs 10-97\6-7rec_p4.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	**Year 2020 AADTs for the P4 Alternatives**	**EXHIBIT 6-7** Rev. 9/24/96



LEGEND

XX- Model Forecast adjusted for Year 2020 (Converted to AADTs by 0.93)
XX- Refined Numbers for adjusted Year 2020
XX- Recommended Year 2020 AADTs
(XX)- 2020 No-Build Screenline Totals

*All VPD in 1000's

** Turning Movement Counts, not available for theses intersections

w:\memcsway\reports\Pe\Figs 10-97\6-8-2015ext.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	**Year 2020 Forecasts for the P4 Alternatives with the Cleveland Street Extension**	**EXHIBIT 6-8** Rev. 9/24/96

6.4 Recommendations for Year 2020 and Directional Design Hour Volumes

Directional design hour volumes (DDHV) were calculated for key intersections by first applying the K_{30} Factor (10.55 percent) to the estimated AADTs to yield design hour volumes. Then the D Factor (57.9 percent) was applied to the sums of complimentary intersection directional movements to simulate directional effects for design purposes. For example, southbound to westbound right turns are complimentary to eastbound to northbound left turns; in the AM peak design hour, one movement would be assigned 57.9 percent of the sum of the two volumes, and the pattern would be reversed for the PM peak design hour.

6.5 Recommended Traffic Design Factors (K, D, T, & PHF)

Existing traffic characteristics (AADT estimates, hourly, daily and seasonal variation, K, D, T, and Peak Hour Factors) are described in the Traffic Report. Recommended traffic factors for design are presented below:

Factor	Recommended Value
K	10.55%
D	57.9%
T des. hr.	2.0% (Ft. Harrison) 1.5% (S.R. 60, etc.)
PHF	0.95
Design Year	2020

6.6 Existing and Expected Levels of Service Without Improvements

Capacity analyses were run to determine *existing* levels of service (LOS) for the "average" traffic conditions, based on the estimated annual average daily traffic (AADT). These analyses do not reflect the higher levels of congestion which occur during the peak tourist season, typically in the spring of each year.

Estimated levels of service for 1996 for both roadways and intersections are shown in Exhibit 6-9. The intersection LOS were determined using the Highway Capacity Software (HCS) and the segment LOS were determined using FDOT's generalized LOS tables (Reference 6-4). All segment LOS results are based on a Class Ib arterial (2.5 to 4.5 signalized intersections per mile). Copies of all HCS printouts are included in the Traffic Report (Reference 6-1).

As shown in the exhibit, several segments of both Cleveland and Court Streets are presently operating at LOS F, based on the generalized LOS tables. In addition, several intersections along Cleveland Street are presently operating at LOS F, based on the 1996 directional design hour volumes (with K_{30} = 10.55 percent and D = 57.9 percent).

Projected levels of service for year 2020 for roadway segments are shown in Exhibit 6-10, for both the No Build and Build scenarios. The segment levels of service were determined using FDOT's generalized LOS tables. For the No Build scenario, Cleveland Street west of Myrtle is expected to operate at LOS E or F. For the Build scenario (Pierce Boulevard alternatives), traffic is shifted from Cleveland Street to Court and Chestnut Streets (due to the new bridge alignment and tie-in point), and as a result, Court Street between Greenwood Avenue and Highland Avenue would likely operate at LOS E or F. The net result of the proposed bridge project would be to shift congestion from a two-lane undivided street (Cleveland Street) to a one-way pair (Court Street and Chestnut Street). Gulf-to-Bay is expected to operate at LOS F under either scenario.

The level of service on the causeway is expected to improve with the Build Alternative due to the absence of bridge openings and malfunctions, which add to motorist delay.

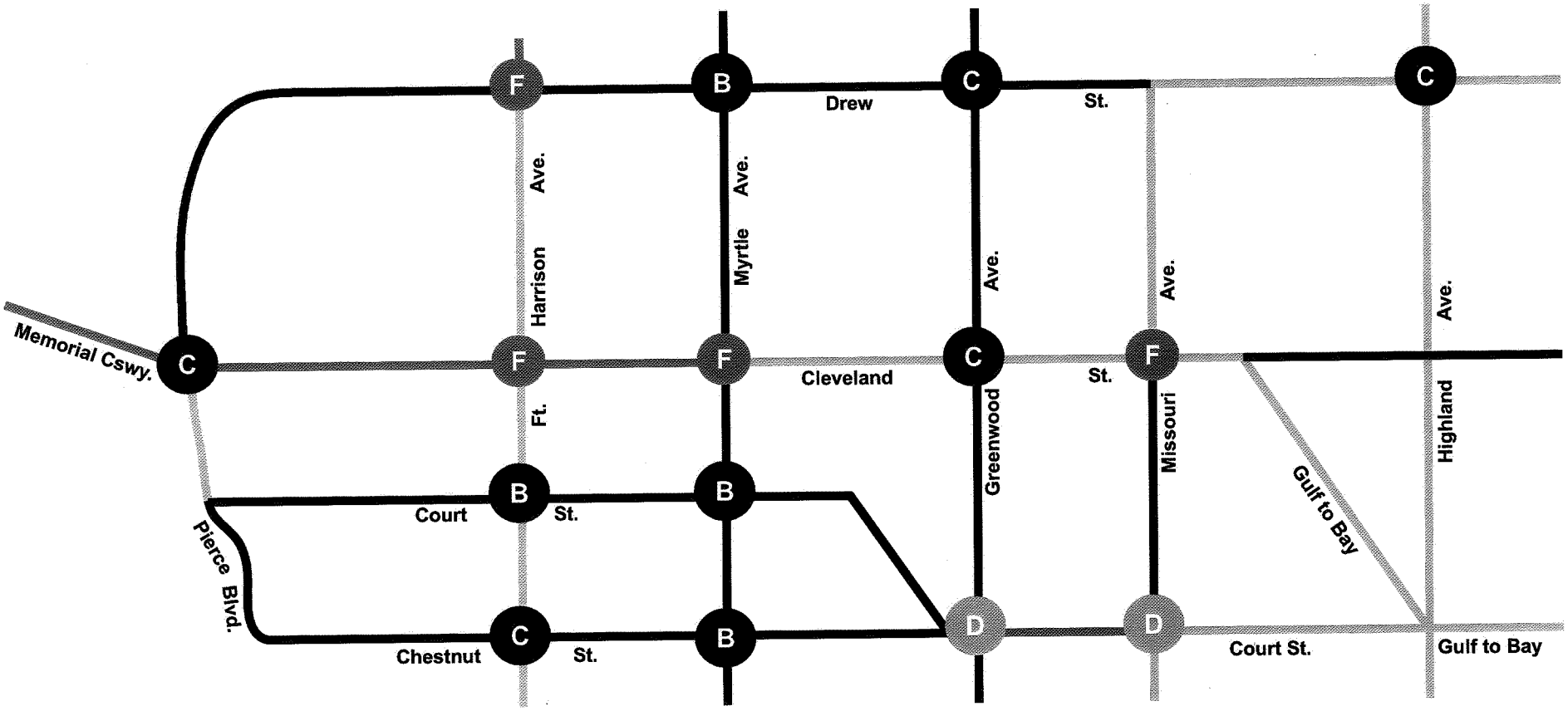
Projected levels of service for *intersections* are shown in Exhibit 6-11. The levels of service were determined by the use of the Highway Capacity Software (HCS) program. The first page gives the results using the future directional design hour volumes (with K = 10.55 percent and D = 57.9 percent). The second sheet shows the results using DDHV based on K = 10 percent and D = 50 percent, which results in lower design volumes and, in some cases, better levels of service. The second sheet facilitates easier comparison of the No Build vs. Build Alternatives because fewer of the intersections are operating at LOS F. The results show that, like the Segment LOS comparison, with the Build Alternative, intersection levels of service along Cleveland Street would be expected to improve while the levels of service along Court and Chestnut Streets would decline somewhat, due to the expected diversion of traffic from Cleveland Street to Court/ Chestnut Streets.

At present, no improvements are either planned or proposed for the four-lane segment of Court Street, between the end of the one-way pair (west of Greenwood) and Highland Avenue.

Potential improvements were evaluated for the intersection of Court Street and Missouri Avenue (Sheet 2 in Exhibit 6-11 shows it at LOS "F" under both the No-Build and Build scenarios). Two improvement scenarios were evaluated with the following results:

Segment LOS Legend (Results Based on FDOT's Generalized LOS Tables)

B or C — D — E — F



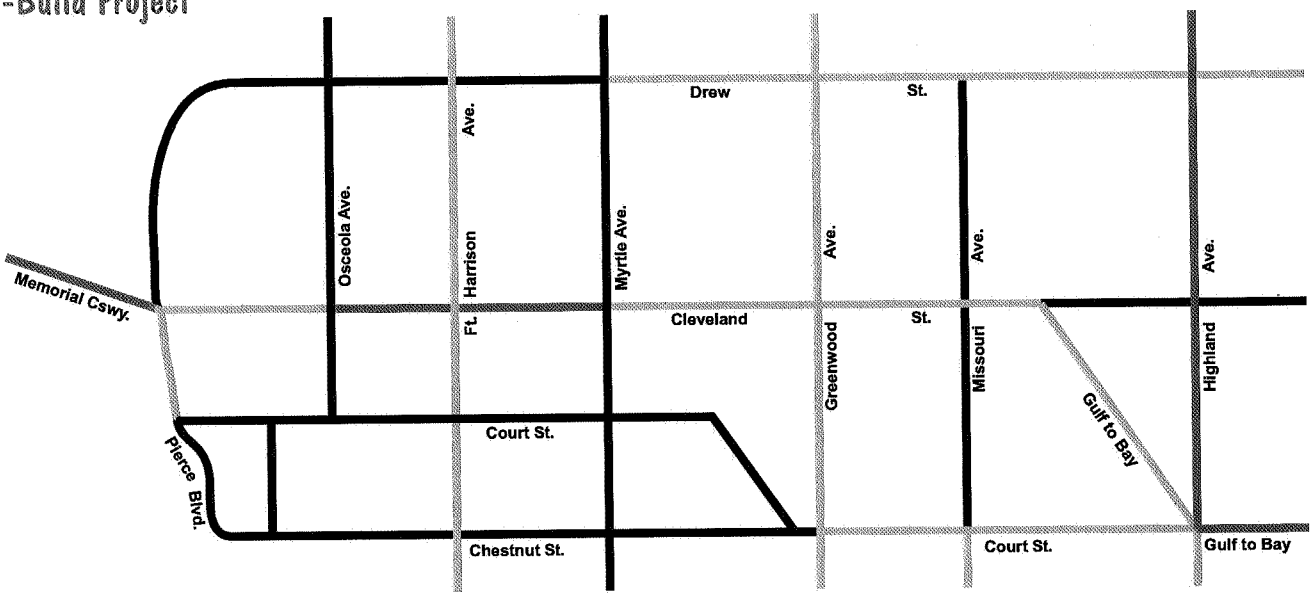
F Intersection LOS results from HCS runs for 1996 DDHV, PM peak.

Memorial Causeway (SR 60) Bridge PD&E Study	EXISTING LEVELS OF SERVICE	EXHIBIT 6-9

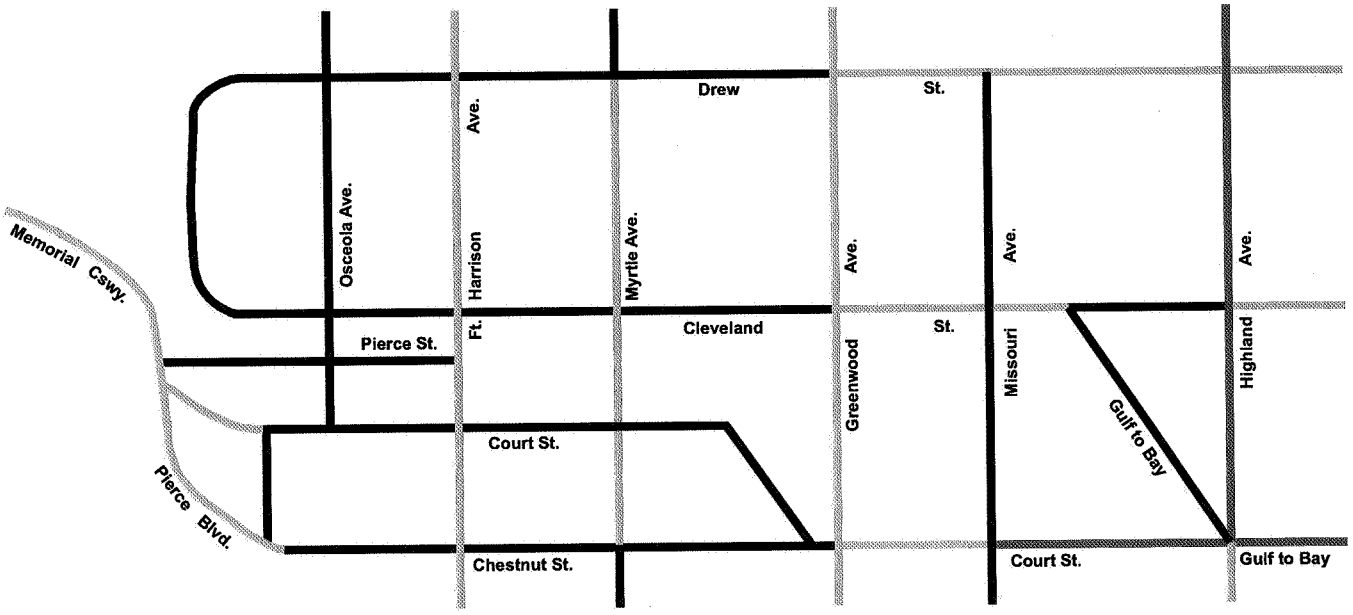
W:\....\reports\pe\figs10-97\6-9ex_levels.cdr

LOS C — LOS D — LOS E — LOS F

No-Build Project



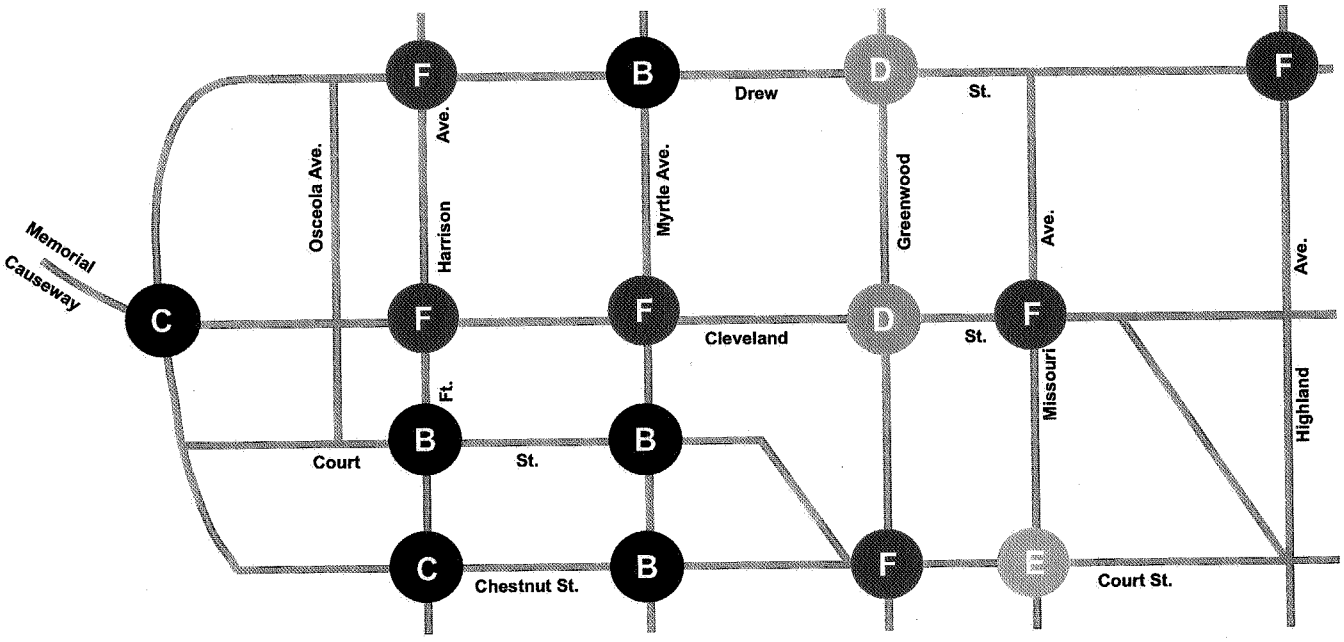
Alt. P4A With Pierce Street Connection



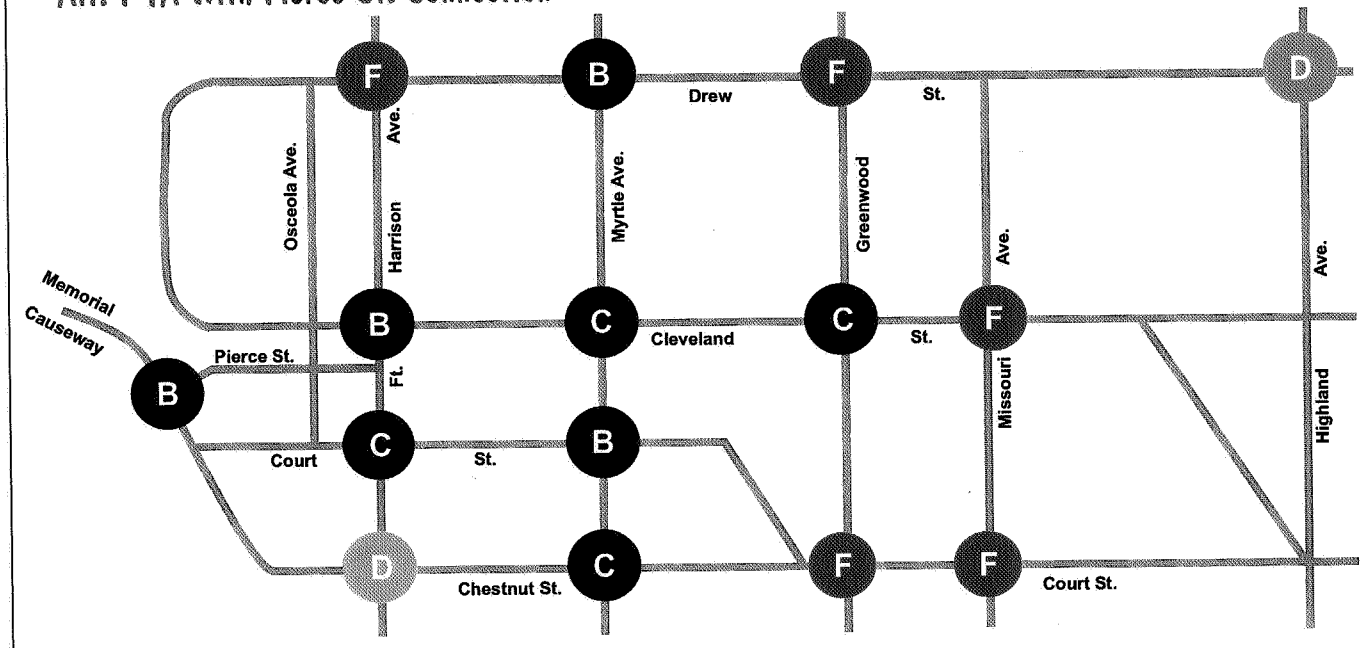
Memorial Causeway (SR 60) Bridge PD&E Study	**YEAR 2020 GENERALIZED SEGMENT LEVELS OF SERVICE**	**EXHIBIT 6-10**
		Rev. 10/97

w:\ . . . \Reports\pe\figs10-97\6-10yr2020.cdr

No-Build Scenario



Alt. P4A With Pierce St. Connection



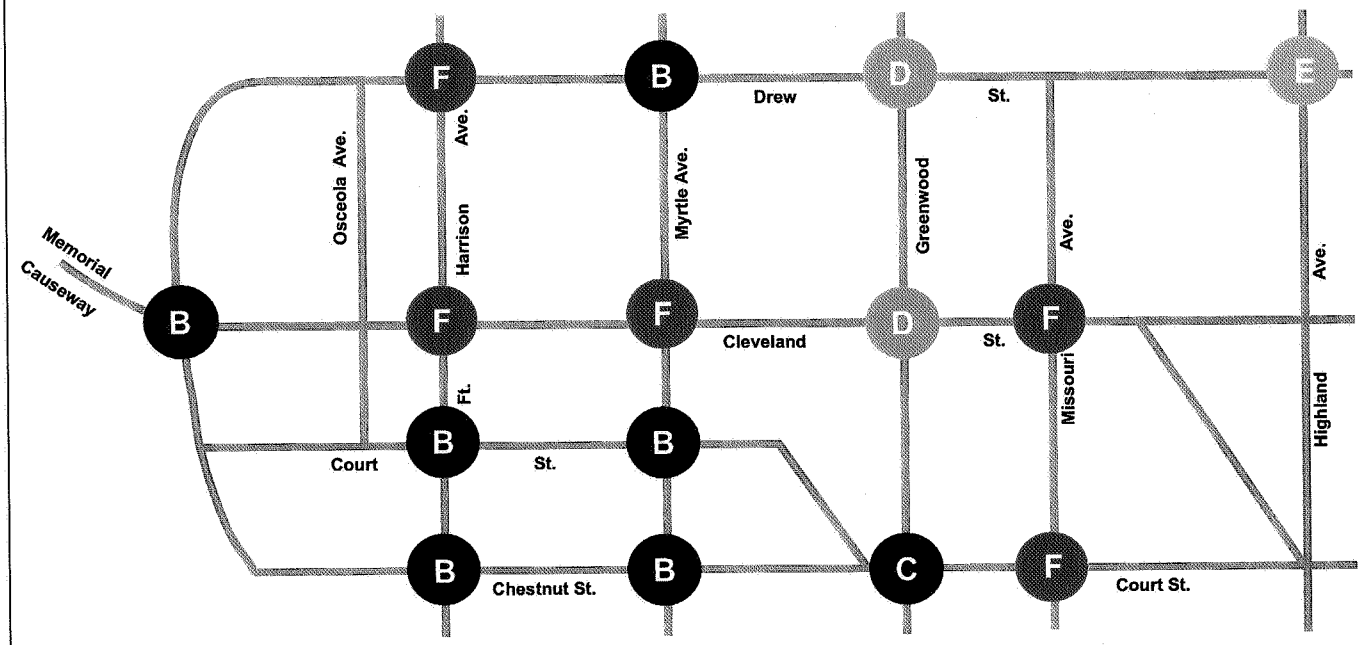
(Analysis based on Highway Capacity Software (HCS) with K = 10.55%, D = 57.9%, PM Peak Hour)

Memorial Causeway (SR 60) Bridge PD&E Study	YEAR 2020 PROJECTED INTERSECTION LEVELS OF SERVICE	EXHIBIT 6-11

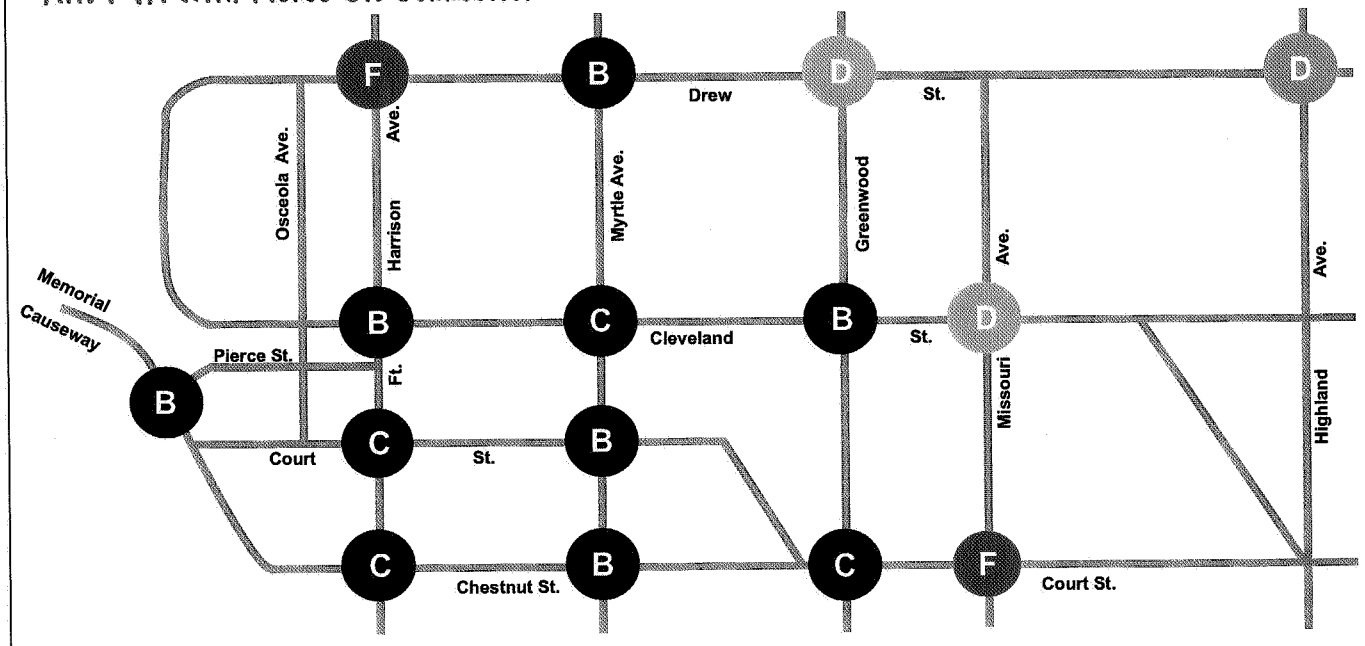
Rev. 10/97

w:\ . . . \Reports\pe\figs10-97\6-11los2020.cdr

No-Build Scenario



Alt. P4A With Pierce St. Connection



(Analysis based on Highway Capacity Software (HCS) with K = 10%, D = 50%)

Memorial Causeway (SR 60) Bridge PD&E Study	**YEAR 2020 PROJECTED INTERSECTION LEVELS OF SERVICE**	**EXHIBIT 6-11**

Rev. 10/97

w:\ . . . \Reports\pe\figs10-97\6-11los2020_2.cdr

Add dual left turn lanes on westbound approach

	Before	After
LOS:	F	E

Add dual lefts and also six-lane Court Street

	Before	After
LOS:	F	D

(These were done using the DDHV based on K = 10 percent and D = 50 percent)

THIS PAGE INTENTIONALLY LEFT BLANK

7.0 CORRIDOR ANALYSIS

7.1 Introduction

A comprehensive corridor analysis was completed previously as part of the Memorial Causeway Bridge Feasibility Study, prepared for the City in 1995. Excerpts from the Feasibility Study Report (Reference 2-1) are included in this chapter.

One of the primary objectives of the Feasibility Study was to determine the best corridor (or combination of "corridors") of three alternatives, each of which has a different tie-in point at the east end of the project. These three alternatives include Drew Street, Cleveland Street, and Pierce Boulevard. Additional analysis of alternative alignments within several corridors is included in Chapter 8.

The limits of the feasibility study extended from just west of Island Way on Memorial Causeway (S.R. 60) to just east of Ft. Harrison Avenue, and from just north of Drew Street to just south of Chestnut Street. These boundaries limited the corridor study area to approximately 2.6 km (1.6 mi) in length.

7.2 Description of Alternative Corridors

7.2.1 Common Elements

In addition to the *existing* corridor (Cleveland Street), two alternative corridors were evaluated to determine whether or not a new corridor would meet the objective of providing a safe, cost-effective bridge which would handle the projected vehicular, bicycle and pedestrian traffic and which is aesthetically compatible with the downtown and beach area. These three corridor alternatives were also evaluated with respect to their projected environmental impacts. The three alternative corridors all tie-in to the west end of the causeway and connect to Drew Street, Cleveland Street (existing corridor), and Pierce Boulevard, respectively (Exhibit 7-1). In addition, various combinations of the three primary alternatives were considered.

Initially, both four-lane and six-lane bridge alternatives were considered for each of the three corridors. However, in late 1995, the Pinellas County Metropolitan Planning Organization updated their long-range transportation plan which changed the future six-lane Memorial Causeway to a four-lane causeway. Therefore, the six-lane alternatives were eliminated from further consideration.

The proposed design criteria and typical sections used in the Feasibility Study are included in Reference 2-1. The bridge structure out-to-out width was approximately 30.2 m (99 ft) for all alternatives. The proposed bridge typical section included 2.4 m (8 ft) inside shoulders and 3.6 m (12 ft) outside shoulders.

The proposed 19.8 m (65 ft) vertical navigational clearance used for all alternatives was based on regulations established by the U.S. Coast Guard pertaining to the Gulf Intracoastal Waterway (Federal Register May 25, 1984).

Initially 60 km/h (35 mph) design speeds were proposed for all alternatives, to minimize the visual impacts and costs of construction. However, after the FDOT expressed concerns, all alternatives were revised to achieve minimum 70 km/h (45 mph) design speeds.

In order to evaluate the costs and impacts of each alternative, plan and profile drawings were prepared for at least one alignment within each of the three alternative "corridors."

7.2.2 Drew Street Corridor Alternative

Drew Street, a city-maintained street west of Ft. Harrison Avenue (Alt. U.S. 19), is generally a four-lane undivided roadway with curb and gutter. The lanes are 3.05 m (10 ft) in width, like most of the traffic lanes in the downtown area. West of Ft. Harrison, Drew Street is striped two-lane undivided with on-street parking on both sides. East of Ft. Harrison, Drew Street becomes S.R. 590. This corridor alternative, designated as "D4", ties in directly to Drew Street. As shown in the plan and profile views (Exhibits 7-2 and 7-3), the navigational channel would have to be shifted approximately 109 m (356 ft) farther west in order to obtain the needed 19.8 m (65 ft) vertical clearance under the new bridge. During the construction period, approximately 17.4 m (57 ft) of vertical clearance would be provided under an approach span at the existing navigational channel.

7.2.3 Cleveland Street Corridor Alternative

Cleveland Street (S.R. 60) is classified as an urban principal arterial by FDOT. It has 15.2 m (50 ft) of pavement between curbs. It is presently striped as a two-lane divided roadway with parallel on-street parking on each side. Alignment Alternative C4 within this corridor consists of a single four-lane structure which ties directly into Cleveland Street only. Alternative C4 requires a shift in the navigational channel of approximately 67 m (220 ft), as shown in the plan and profile views (Exhibits 7-4 and 7-5).

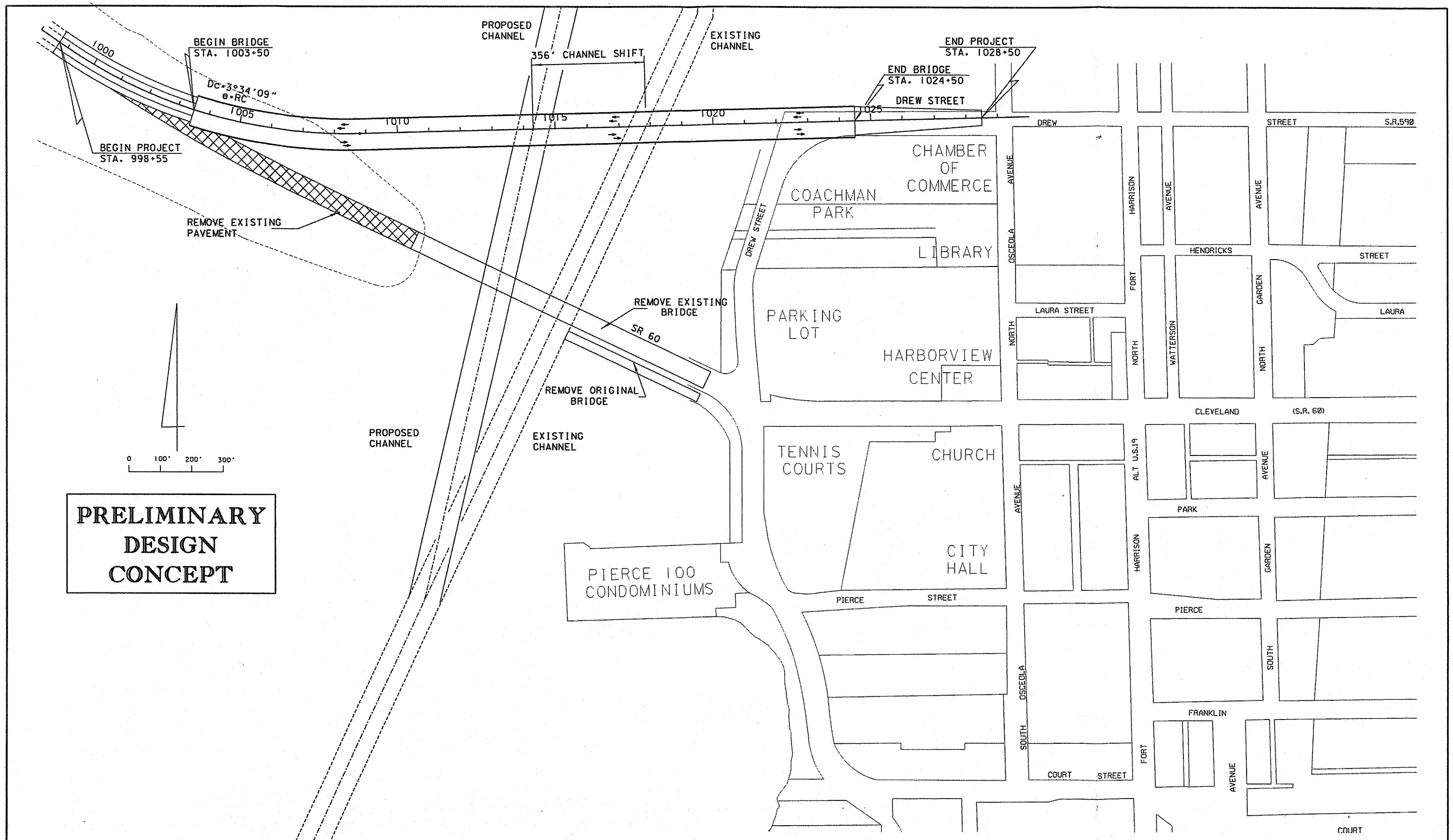
7.2.4 Pierce Boulevard Corridor Alternatives

Pierce Boulevard is a four-lane undivided urban arterial which ties directly into the Court Street and Chestnut Street one-way pair. Court and Chestnut are two-lanes each west of Oak Avenue and three lanes each east of Oak Avenue. The horizontal curves on Court Street and Chestnut Street west of Oak Avenue have estimated design speeds of less than 50 km/h (30 mph) based on current design standards.

For the Pierce Boulevard corridor, two different alternatives were developed and evaluated: Alternatives P4 and P4A.
Alternative P4 consists of a single four-lane structure which ties directly in to Pierce Boulevard (Exhibits 7-6 and 7-7). The navigational channel would need to be shifted

Memorial Causeway (SR 60) Bridge PD&E Study	**ALTERNATIVE CORRIDORS**	**EXHIBIT 7-1**

W:\....\reports\pe\figs10-97\7-1alt_corr.cdr



PRELIMINARY DESIGN CONCEPT

Memorial Causeway Bridge Feasibility Study

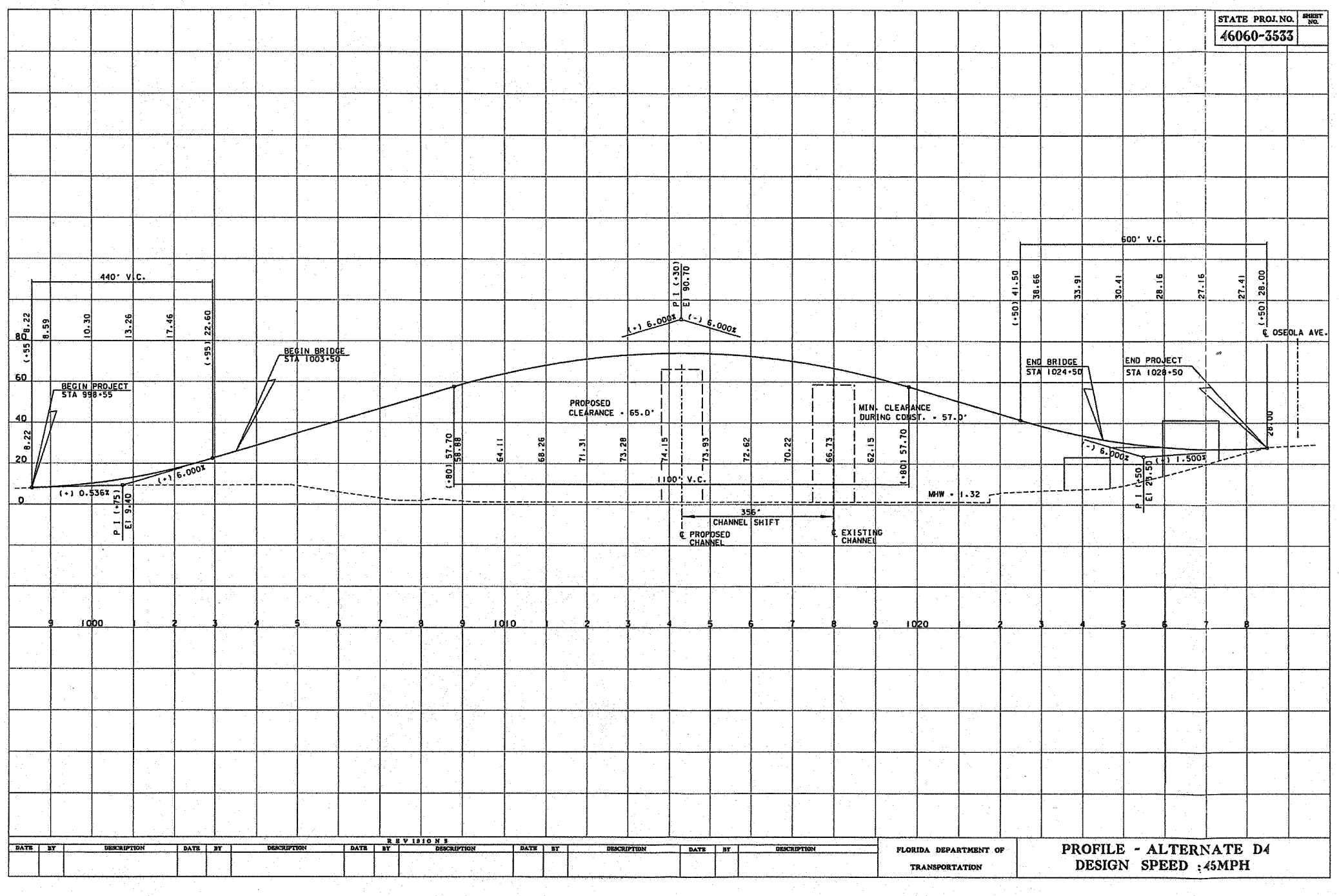
HDR ENGINEERING, INC.

May 1995

ALTERNATIVE D4
4 LANE BRIDGE

EXHIBIT 7-2

STATE PROJ. NO.	SHEET NO.
46060-3533	



REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

FLORIDA DEPARTMENT OF TRANSPORTATION

PROFILE - ALTERNATE D4
DESIGN SPEED : 45MPH

EXHIBIT 7-3 ALTERNATIVE D4 - PROFILE

BEGIN PROJECT
STA. 997+75

BEGIN BRIDGE
STA. 1004+00

1000

1005

REMOVE EXISTING
PAVEMENT

1010

Dc=2°00'
e=NC

1015

REMOVE EXISTING
BRIDGE

REMOVE ORIGINAL
BRIDGE

SR 60

1020

END BRIDGE
STA. 1024+50

1025

Dc=6°00'
e=RC

1030

END PROJECT
STA. 1033+25

0 100' 200' 300'

PROPOSED
CHANNEL

220'
SHIFT

EXISTING
CHANNEL

PRELIMINARY DESIGN CONCEPT

CHAMBER OF COMMERCE

COACHMAN PARK

LIBRARY

PARKING LOT

HARBORVIEW CENTER

TENNIS COURTS

CHURCH

CITY HALL

PIERCE 100 CONDOMINIUMS

DREW STREET

PIERCE BLVD.

DREW AVENUE

OSCEOLA AVENUE

HARRISON AVENUE

FORT HARRISON AVENUE

GARDEN AVENUE

S.R.590

HENDRICKS STREET

LAURA STREET

LAURA

NORTH WATTERSON

NORTH GARDEN

CLEVELAND STREET

CLEVELAND (S.R. 60)

ALT U.S.19

PARK

PIERCE STREET

PIERCE

SOUTH OSCEOLA

SOUTH HARRISON

SOUTH GARDEN

FRANKLIN

COURT STREET

FORT HARRISON AVENUE

Memorial Causeway Bridge Feasibility Study

HDR ENGINEERING, INC.

May 1995

ALTERNATIVE C4
4 LANE BRIDGE
EXHIBIT 7-4

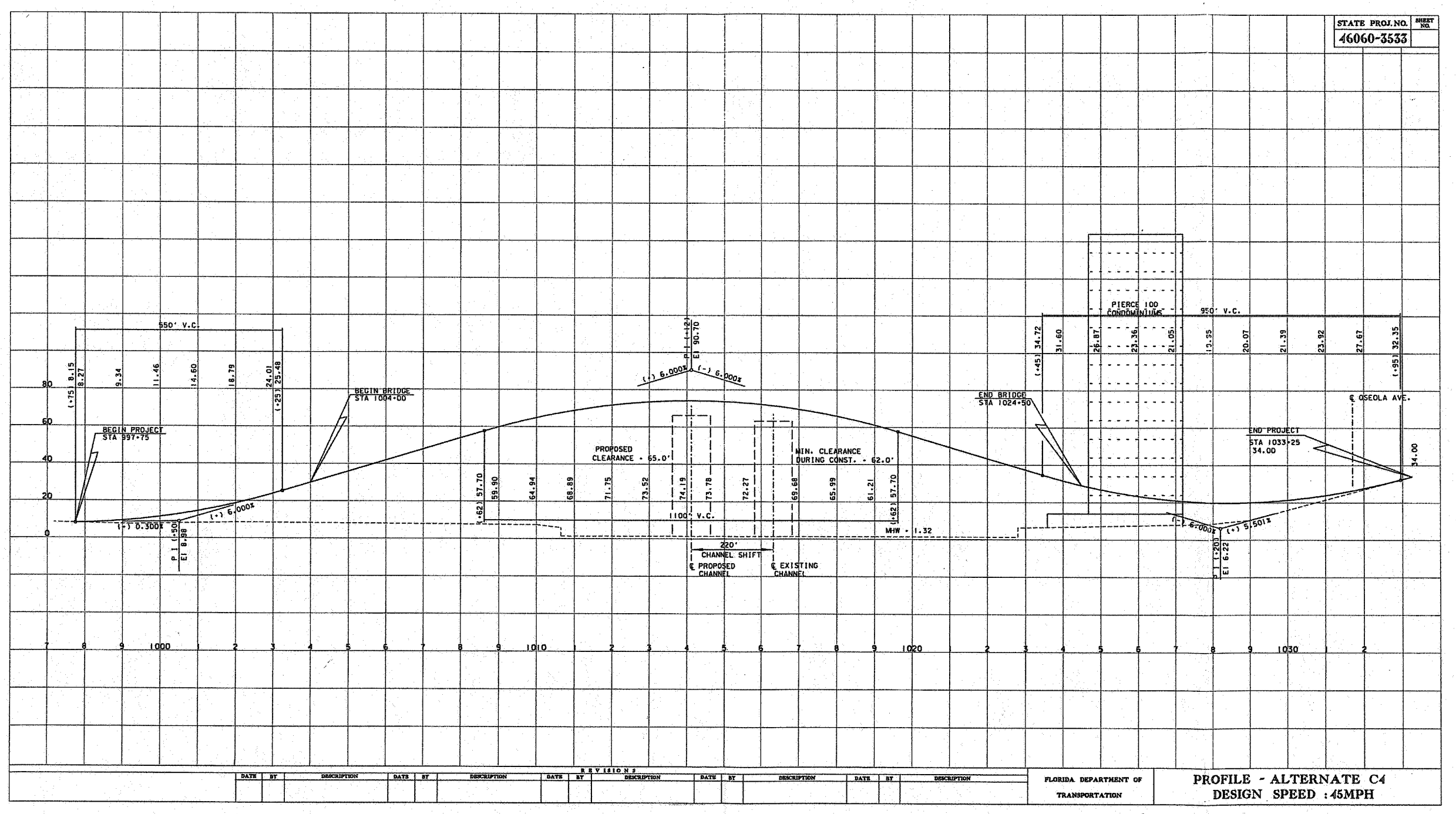


EXHIBIT 7-5 ALTERNATIVE C4 - PROFILE

approximately 59 m (192 ft) to the west to provide the required 19.8 m (65 ft) vertical navigational clearance. During construction, approximately 19.5 m (64 ft) of vertical clearance would be provided at the existing channel location. Under this alternative, the new bridge would not span Pierce Street; access to Pierce 100 Condominiums from Pierce Boulevard would be provided underneath the new bridge in the parking area located west of Pierce Boulevard, south of the Causeway.

Alternative P4A is very similar to Alternative P4; the main difference is in the vertical profiles (Exhibits 7-8 and 7-9). Alternative P4A would *not* require a shift in the navigational channel, and the eastern end of the bridge would be high enough to span Pierce Street, allowing access to the Pierce 100 Condominium via Pierce Street underneath the new bridge structure.

Both Alternatives P4 and P4A tie into Pierce Boulevard which in turn transitions into the Court Street and Chestnut Street one-way pair. The existing curves in the vicinity of this transition have estimated design speeds under 50 km/h (30 mph). Given that a new bridge will likely be designed for 70 km/h (45 mph), it would be desirable to "flatten out" these curves, especially for eastbound motorists coming off of a new bridge onto Pierce Boulevard. The additional costs and impacts of straightening out these curves were not included in the cost and impact estimates during the feasibility study corridor analysis; however, they *are* included in the current PD&E study.

7.2.5 Other Four-Lane Bridge Alternatives Considered

Two other four-lane bridge alternatives were considered in the previous feasibility study which utilize a combination of corridors:

C1P4 — This alternative is similar to P4A except that it adds a westbound on-ramp from Cleveland Street (Exhibit 7-10). The profile of the 4-lane portion would be identical to that of P4A and the profile of the on-ramp from Cleveland Street would be similar to the profile for Alternative C4. Access to Pierce 100 would be the same as for Alternative P4A. Like Alternative P4A, no relocation of the navigational channel would be required.

C2P2 — This alternative is similar to C1P4 except that all westbound traffic would come off of Cleveland Street and all eastbound traffic coming off the bridge would proceed down Pierce Boulevard and continue to Chestnut Street (Exhibit 7-11). Vertically, the profiles would be similar to C1P4, and no relocation of the navigational channel would be required.

7.3 Projected Traffic Demands and Levels of Service

Future traffic projections for Memorial Causeway in the vicinity of the existing bridge were developed based on a least-squares regression trendline using FDOT historical counts. Based on this trendline, the projected annual average daily traffic (AADT) for 2020 would be approximately 42,500 vehicles per day (VPD). The LOS for the existing

four-lane causeway would be "D", although it would be very close to E. This LOS estimate does not include the effect of bridge openings or malfunctions, which would further degrade the LOS of the causeway.

A traffic impact analysis was conducted for the three primary corridor alternatives to determine the probable effects on the existing street system of a new bridge with realigned approaches. The methodology for this analysis is discussed in detail in the Memorial Causeway Bridge Feasibility Study Report (Reference 2-1). The "Modified No Build" Scenario was used, which is based on the existing street system with some geometric modifications. This scenario was used as a basis for the comparison of all alternatives.

Following a manual traffic reassignment for each alternative corridor, capacity analyses were run for the major signalized intersections. The results are summarized in Exhibit 7-12. Because all three alternatives had at least one intersection operating at level of service (LOS) F, additional HCS runs were made using a 20 percent reduction in design hour volumes to differentiate among the LOS F intersections.

The results showed that of the three primary corridor alternatives, the Pierce Boulevard Alternative (P4/P4A) would do the best job of handling the projected traffic. The results also suggested that, regardless of which alternative is ultimately selected, improvements to the surface streets in downtown Clearwater may be required in order for the new bridge and street system to operate in a safe and efficient manner.

EXHIBIT 7-12
PROJECTED LEVELS OF SERVICE FOR CORRIDOR ALTERNATIVES

Intersection	Alternative Scenario[1]						
	"Modified No-Build"	D4	C4	P4[3]	With 20% Volume Reduction		
					D4	C4	P4
Drew/Cleveland/Pierce Blvd.	C	--[4]	--	--	--	--	--
Drew & Ft. Harrison	D	F	D	B	F	--	--
Cleveland & Ft. Harrison	D	D	F	C	--	D	--
Court St. & Ft. Harrison	C	B	C	F	--	--	C
Chestnut St. & Ft. Harrison	C	B	C	D	--	--	--

Notes: [1] All scenarios use the modified intersection geometry shown in the 1995 Feasibility Study Report.
[2] All runs use HDR's recommended 1994 DDHV with 100 second cycle length.
[3] Traffic impacts are essentially identical for P4 & P4A.
Source: HDR Engineering, Inc., 1995.

BEGIN PROJECT
STA. 998+43

1000

BEGIN BRIDGE
STA. 1004+00

1005

REMOVE EXISTING
PAVEMENT

1010

Dc=2°00'
e=NC

1015

REMOVE EXISTING
BRIDGE

SR 60

REMOVE ORIGINAL
BRIDGE

1020

Dc=6°00'
e=RC

1025

PROPOSED
CHANNEL

192'
SHIFT

EXISTING
CHANNEL

0 100' 200' 300'

PRELIMINARY DESIGN CONCEPT

PIERCE 100
CONDOMINIUMS

1030

END BRIDGE
STA. 1029+00

1035

END PROJECT
STA. 1035+03

DREW STREET

CHAMBER
OF
COMMERCE

COACHMAN
PARK

LIBRARY

PARKING
LOT

HARBORVIEW
CENTER

DREW

STREET

S.R.59

OSCEOLA AVENUE

HARRISON AVENUE

AVENUE

HENDRICKS

STREET

LAURA STREET

LAURA

NORTH

FORT

WATTERSON

GARDEN

NORTH

CLEVELAND

(S.R. 60)

PIERCE BL VD.

TENNIS
COURTS

CHURCH

CITY
HALL

ALT U.S.19

AVENUE

PARK

HARRISON

GARDEN

PIERCE

STREET

PIERCE

SOUTH

OSCEOLA

SOUTH

FRANKLIN

COURT STREET

COURT

STREET

FORT

AVENUE

COURT

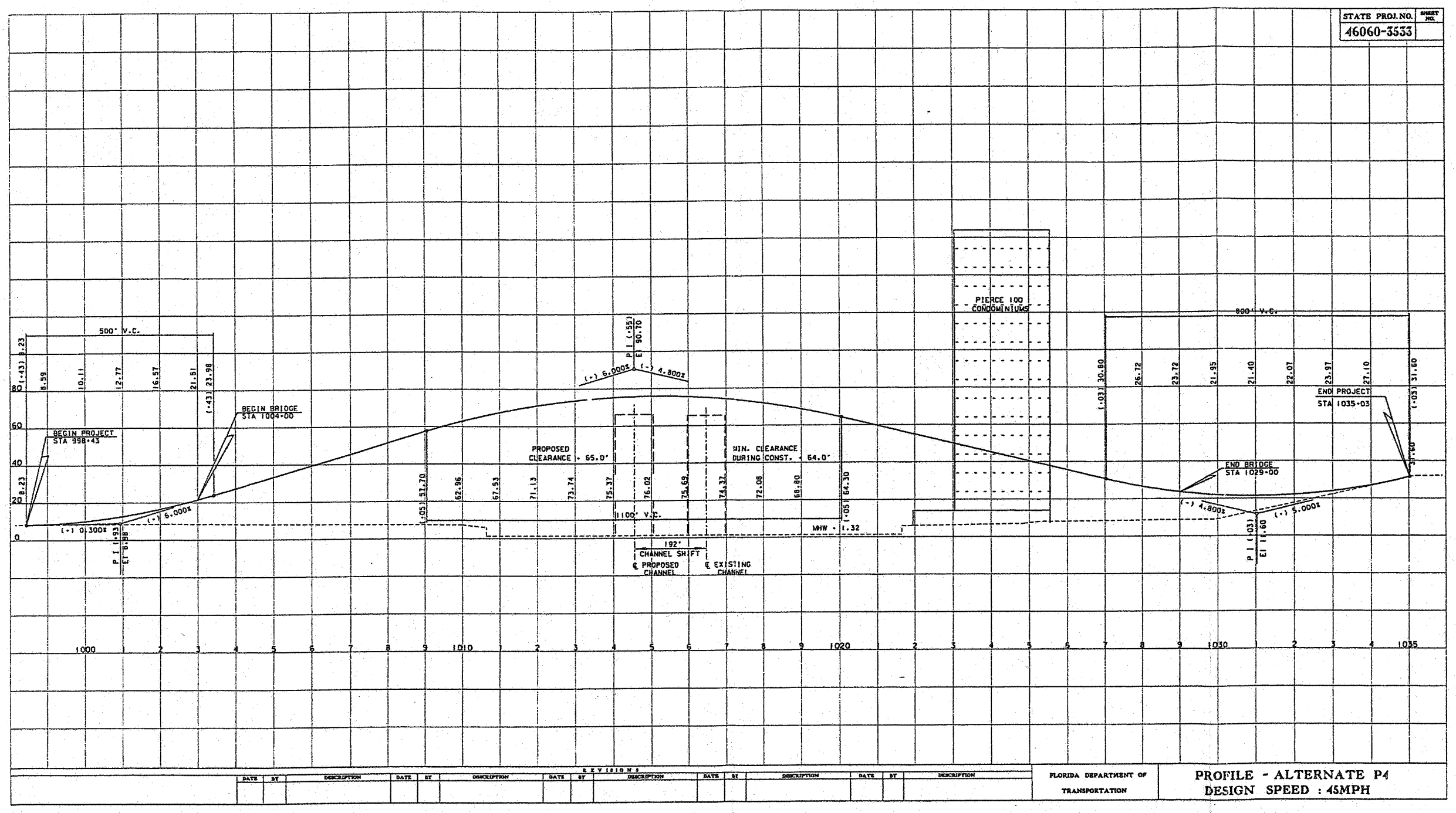
Memorial
Causeway
Bridge
Feasibility
Study

HDR ENGINEERING, INC.

May 1995

ALTERNATIVE P4
4 LANE BRIDGE
EXHIBIT 7-6

STATE PROJ. NO.	SHEET NO.
46060-3533	

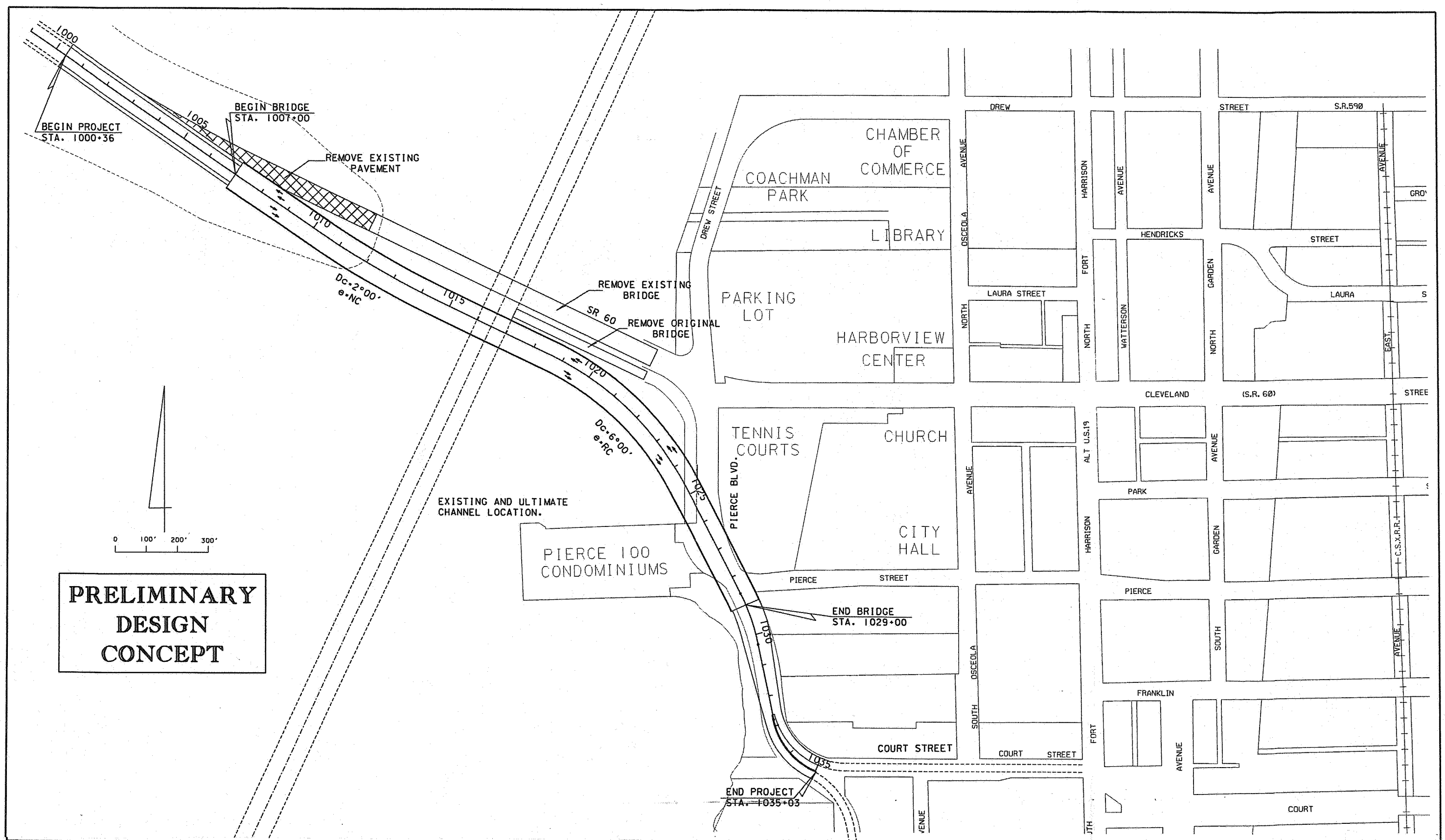


REVISIONS																	
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

FLORIDA DEPARTMENT OF TRANSPORTATION

PROFILE - ALTERNATE P4
DESIGN SPEED : 45MPH

EXHIBIT 7-7 ALTERNATIVE P4 - PROFILE



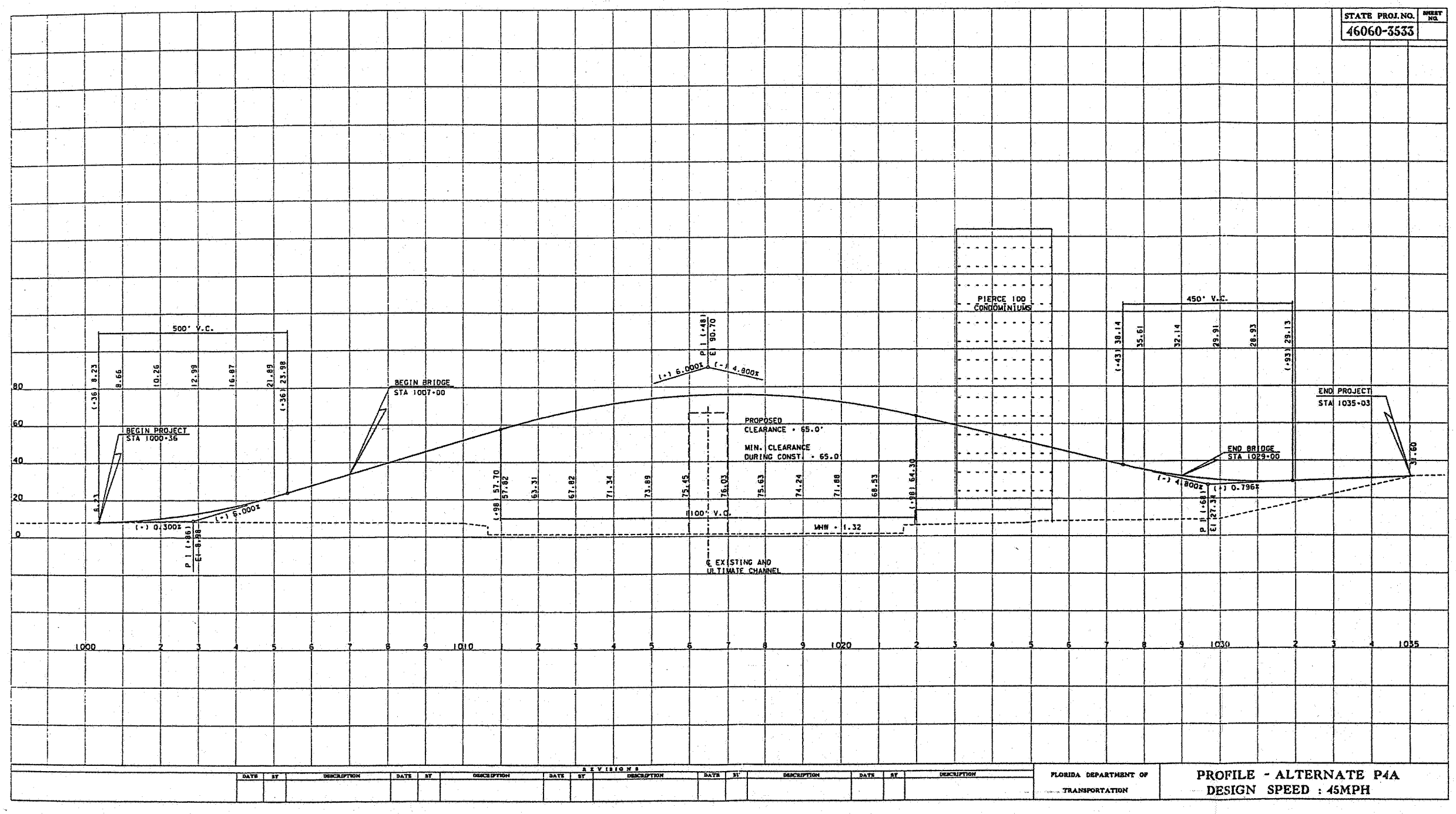
Memorial Causeway Bridge Feasibility Study

HDR ENGINEERING, INC.

May 1995

ALTERNATIVE P4A
4 LANE BRIDGE
EXHIBIT 7-8

STATE PROJ. NO.	SHEET NO.
46060-3533	

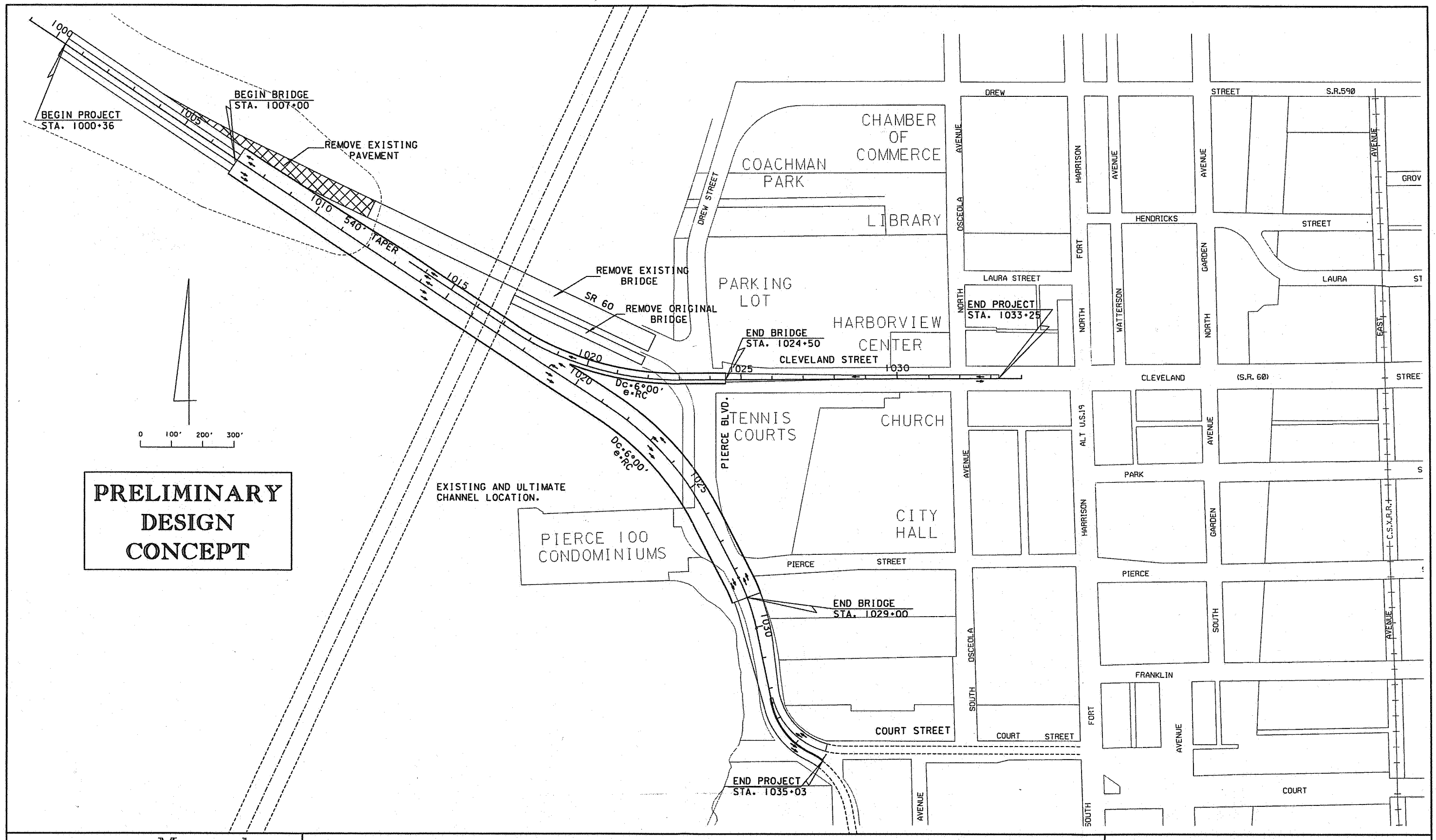


REVISIONS															
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	

FLORIDA DEPARTMENT OF TRANSPORTATION

PROFILE - ALTERNATE P4A
DESIGN SPEED : 45MPH

EXHIBIT 7-9 ALTERNATIVE P4A - PROFILE



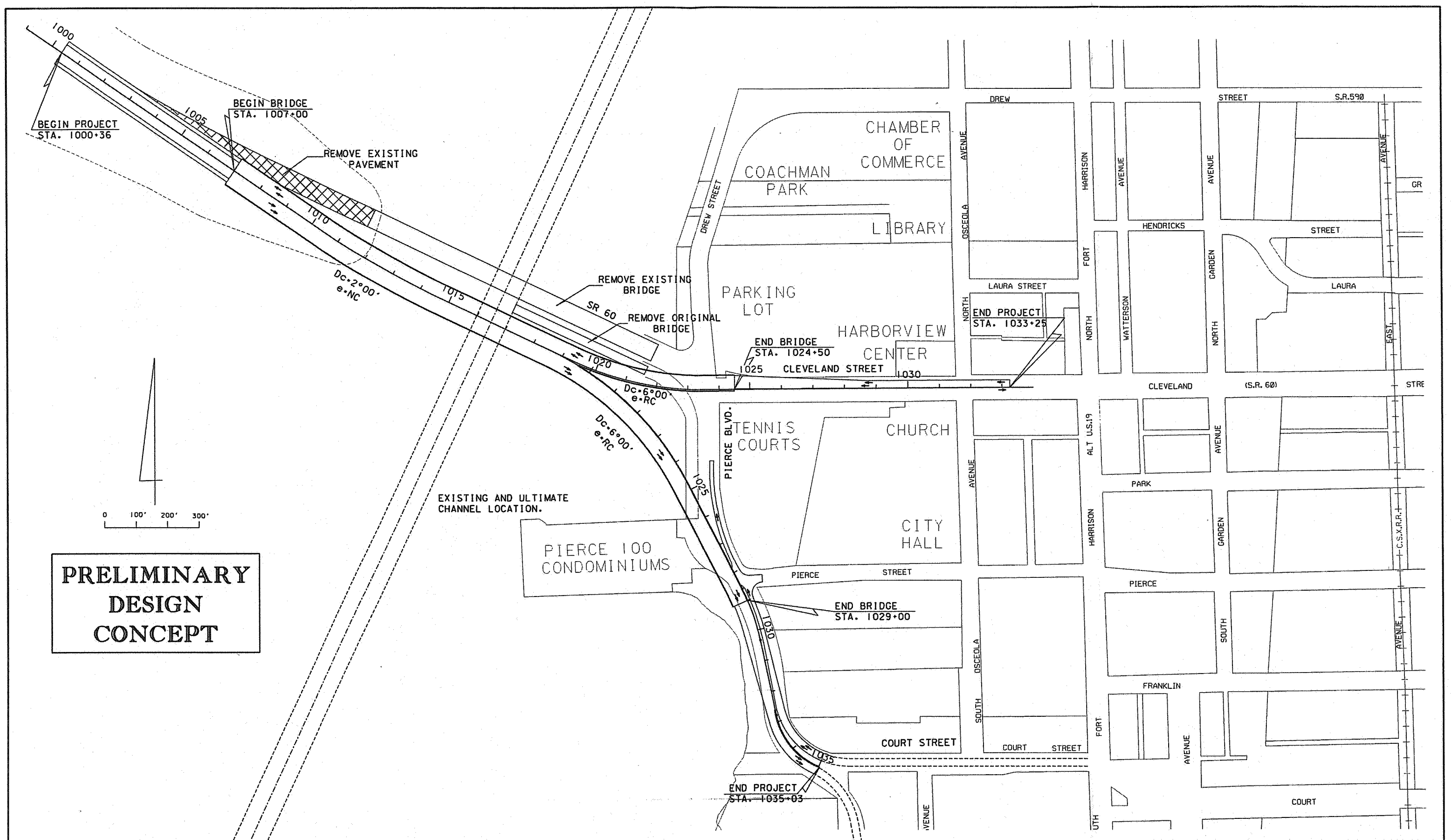
PRELIMINARY DESIGN CONCEPT

Memorial Causeway Bridge Feasibility Study

HDR ENGINEERING, INC.

May 1995

ALTERNATIVE C1P4
4 LANE BRIDGE
EXHIBIT 7-10



PRELIMINARY DESIGN CONCEPT

Memorial Causeway Bridge Feasibility Study

HDR ENGINEERING, INC.

May 1995

ALTERNATIVE C2P2
4 LANE BRIDGE

EXHIBIT 7-11

7.4 Evaluations of Corridor Alternatives

Cost estimates (in 1995 dollars) for the corridor alternatives are included in Exhibit 7-13. All cost estimates for the bridge structure were based on the commonly used Florida Bulb Tee type structure. An evaluation matrix which includes the environmental impacts for all alternatives is shown in Exhibit 7-14. In addition, a more qualitative graphical comparison of the three basic corridor alternatives is shown in Exhibit 7-15.

The pros and cons of each corridor alternative are discussed below.

Drew Street Alternative

- The intersection of Drew Street and Ft. Harrison would not be able to handle the amount of traffic which would have to flow through it to get to the new bridge. By comparison, the traffic-carrying capacity of the Court Street/Chestnut Street one-way pair is much higher due to the greater number of lanes and the more efficient one-way street operations.

- With this alternative, it would be necessary to redesignate a segment of Drew Street as S.R. 60, to maintain continuity in the state road system. In addition, a smooth transition would need to be developed to connect Gulf-to-Bay (S.R. 60) to the S.R. 60 segment of Drew Street. Unfortunately, there is no place where a diagonal connector could be built without resulting in high costs and impacts to businesses and residents. Depending on the location of the transition, a reduction in traffic on Gulf-to-Bay Boulevard could adversely affect existing businesses located on or near it. In addition, the costs and impacts to widen Drew Street between Osceola and Highland Avenue would be very high; widening would be required to be able to handle the traffic which would be diverted from other routes.

- This alternative has a high estimated cost ($21.8 million) compared to some of the other alternatives. These costs include: construction, engineering and CEI; right of way; and mitigation for wetland impacts.

- The right-of-way required for this alternative is approximately 0.42 ha (1.04 ac). The total area impacted is the second highest of any of the corridor alternatives. In addition, the estimated cost of right-of-way is approximately $2.1 million. This is almost four times the cost of the right-of-way for the other corridors. In addition, connecting the bridge to Drew Street would adversely impact the Sandcastle Resort, owned by the Church of Scientology. These impacts contribute to the high estimated right-of-way costs and business damages.

- The shift of the navigational channel required for the Drew Street alternative is one of the largest shifts among all the alternatives.

- This alternative had the highest impacts to sea grasses and mangroves, which are sensitive estuarine wetland habitats.

- This alternative is the only one which would reduce the traffic noise level changes for the Pierce 100 condominiums. However, it is the only alternative which has probable noise impacts to Coachman Park, a locally significant recreational property protected by Section 4(f) of the Department of Transportation (DOT) Act of 1966.
- The Drew Street alternative would have the most adverse impacts to Coachman Park, including land acquisition, noise and visual impacts.

Cleveland Street Alternative

- A shift in the navigational channel is required of approximately 67.1 m (220 ft).

- Alternative C4 will not reduce the volume of through traffic traveling on Cleveland Street in Downtown Clearwater. This will worsen the existing congestion problems in downtown. The removal of on-street parking on Cleveland Street would be necessary for Cleveland Street to be able to handle the projected traffic demand. This is inconsistent with the downtown redevelopment plan.

- There should be no noise level changes to either Pierce 100 Condominiums or Coachman Park. However, it would likely impact the Bayfront Tennis Courts, a public recreational property protected under Section 4(f) of the DOT Act of 1966.

- For Alternative C4, the visual impacts to downtown Clearwater are significant because of the structure width and vertical height required.

- The cost estimate for Alternative C4 ($16.9 million) is the least expensive alternative for construction/engineering, right-of-way and wetlands mitigation.

Pierce Boulevard Alternatives

- There would be no shift in the navigation channel required if alternative P4A is selected; Alternative P4 would require a shift of approximately 58.5 m (192 ft).

- The existing S.R. 60 roadway (Gulf-to-Bay Boulevard) already connects to Court Street and the existing one-way pair system of Chestnut Street and Court Street. Therefore with this alternative, it is not necessary to redirect motorists to a new route or to construct a new connector roadway.

- Unlike the other corridors, there are no impacts to churches with this alternative. However, there are potential impacts to the Pinellas Arts Council building, which

EXHIBIT 7-13 COST ESTIMATES FOR 4-LANE CORRIDOR ALTERNATIVES

Cost Item	Units	Estimated Unit Cost	Estimated Quantities By Alternative						Estimated Costs ($1000's)					
			P4	P4A	C4	D4	C1P4	C2P2	P4	P4A	C4	D4	C1P4	C2P2
New Bridge Construction	FT	width:	99	99	99	99	99	99						
	FT	length:	2500	2200	2050	2462	2525	1997						
1000's of	SF	area:	248	218	203	244	250	198						
Nonstaged Const.	SF	$55	248	218	203	244	250		13640.0	11979.0	11162.3	13405.6	13748.6	
Staged Const./Twin Struct.	SF	69						198						13641.5
Existing Bridge Removal [1]	SF	10	77390	77390	77390	77390	77390	77390	773.9	773.9	773.9	773.9	773.9	773.9
Roadway Approaches														
New (Perm.) Pavement	SY	14.00	6860	7510	8680	5900	9047	8520	96.0	105.1	121.5	82.6	126.7	119.3
Shoulder Pavement	SY	10.30	960	1150	1080	844	1150	1150	9.9	11.8	11.1	8.7	11.8	11.8
Pavement Removal	SY	13.80	3670	3760	3670	5590	3670	3670	50.6	51.9	50.6	77.1	50.6	50.6
Conc. Barrier Wall	LF	60.00	1160	814	850	1100	1660	1660	69.6	48.8	51.0	66.0	99.6	99.6
Conc. Appr. Slab (inc steel)	SF	31.66	3960	3960	3960	4680	4680	4020	125.4	125.4	125.4	148.2	148.2	127.3
Earthwork (Embankment)	CY	2.60	16680	44550	41250	22780	50190	53220	43.4	115.8	107.3	59.2	130.5	138.4
MSE Wall	SF	15.75	9530	29730	27060	25080	44950	43850	150.1	468.2	426.2	395.0	708.0	690.6
Other/ Misc.														
Chnl Dredging/Excavation [2]	CY	14.00	10000		10000	10000	10000	10000	140.0	--	140.0	140.0	140.0	140.0
Relocate Navig. Devices	LS								10.0	--	10.0	10.0	10.0	10.0
Remove Signal @ PierceClev.	LS								10.0	10.0	10.0	10.0	10.0	10.0
Relocate Two Statues	LS								2.0	2.0	1.0	--	2.0	2.0
Dry Detention Ponds (6 Lane)	LS								--	--	--	--	--	--
Const. Subtotal									15121	13692	12990	15176	15960	15815
Routine MOT (4%)									605	548	520	607	638	633
Mobilization (4%)									605	548	520	607	638	633
CEI (10%)									1512	1369	1299	1518	1596	1582
Construction Total									17843	16157	15329	17906	18833	18662
Right-of-Way/TCE	AC								466	466	2	2058	466	498
Seagrass Impacts Estimate	AC					0.52								
Mitigation Excl. Land (4:1)	AC	10000				2.08						20.8		
Mangroves Impact Estimate	AC					0.22								
Mitigation Excl Land (4:1)	AC	40000				0.88						35.2		
(a) Tot. Const., R/W & Mitig.									18309	16623	15331	20022	19299	19160
(b) Engr. Des. (10% of Const.Total)									1784	1616	1533	1791	1883	1866
(c) Utility Reloc. Costs														
(d)Totals [3]									20,093	18,238	16,863	21,813	21,182	21,026

Notes: 1. Exist. Bridge = 58' x 1024' Assume 100% removal + 450' x 40' (original bridge) = 77,390 SF

2. Unit cost based on Clearwater Pass Bridge; other costs based on FDOT's statewide or District 7 average bid amounts.

3. Does not include costs of improving surface streets adjacent to the bridge approaches

EXHIBIT 7-14 - CORRIDOR ALTERNATIVES EVALUATION MATRIX

Evaluation Factor	4-Lane Build Alternatives						No-Build
	C4	P4A	P4	C2P2	C1P4	D4	
Estimated Costs ($millions)							
Construction, Engineering, & CEI	16.86	17.77	19.63	20.53	20.72	19.70	
Right of Way (R/W)	0.00	0.47	0.47	0.50	0.47	2.06	
Mitigation for Wetlands						0.06	
Total	$16.9	$18.2	$20.1	$21.0	$21.2	$21.8	$6.0*
Right-of-Way Impacts							
Publicly-Owned Land (acres)	0.51	0.44	0.44	0.89	0.64	0.57	
Privately-Owned Land (acres)		0.27	0.27	0.31	0.27	0.47	
Total Acres	0.51	0.71	0.71	1.2	0.91	1.04	
Business Relocations	None	1	1	1	1	1	None
Church Impacts	1	None	None	1	1	1	None
Environmental Impacts							
Channel Relocation Required	Yes	No	Yes	No	No	Yes	No
Sea Grass Impacts (acres)	None	None	None	None	None	0.52	None
Mangrove Impacts (acres)	None	None	None	None	None	0.22	None
Probable Noise Level Changes							
Pierce 100 Condos	Minor	Minor	Minor	Minor	Minor	Minor	None
Coachman Park	Minor	Minor	Minor	Minor	Minor	Major	None
Potential Section 4(f) Involvement							
Coachman Park	None	None	None	None	None	Yes	None
Bayfront Tennis Courts	Yes	None	None	None	None	None	None
Traffic Flow, Access, & Service							
Need to Redirect Traffic to Drew St.	No	No	No	No	No	Yes	No
New East-West One-Way Pr Req'd	No	No	No	No	No	No	No
Requires some Parking Removal on Cleveland	No	No	No	No	No	No	No
Aesthetic Impacts							
Multiple Structures/ Ramps	No	No	No	Yes	Yes	No	No
View ***of*** the Bridge from ...							
Island Estates	No	No	No	No	No	Yes	No
Pierce 100 Condominiums	Yes	Yes	Yes	Yes	Yes	No	No
Coachman Park	?	?	?	?	?	Yes	No
Sandcastle Retreat Complex	?	?	?	?	?	Yes	No
City Hall	No	Yes	Yes	Yes	Yes	No	No
Harborview Center	Yes	Yes	Yes	Yes	Yes	No	No
The Oaks (on Chestnut)	No	Yes	Yes	Yes	Yes	No	No
View ***from*** the bridge to Downtown Clearwater	No	Yes	Yes	Yes	Yes	No	No
Socioeconomic Impacts							
Potential Impacts to Downtown Redevelopment Plan	Yes	Yes	Yes	Yes	Yes	No	Yes

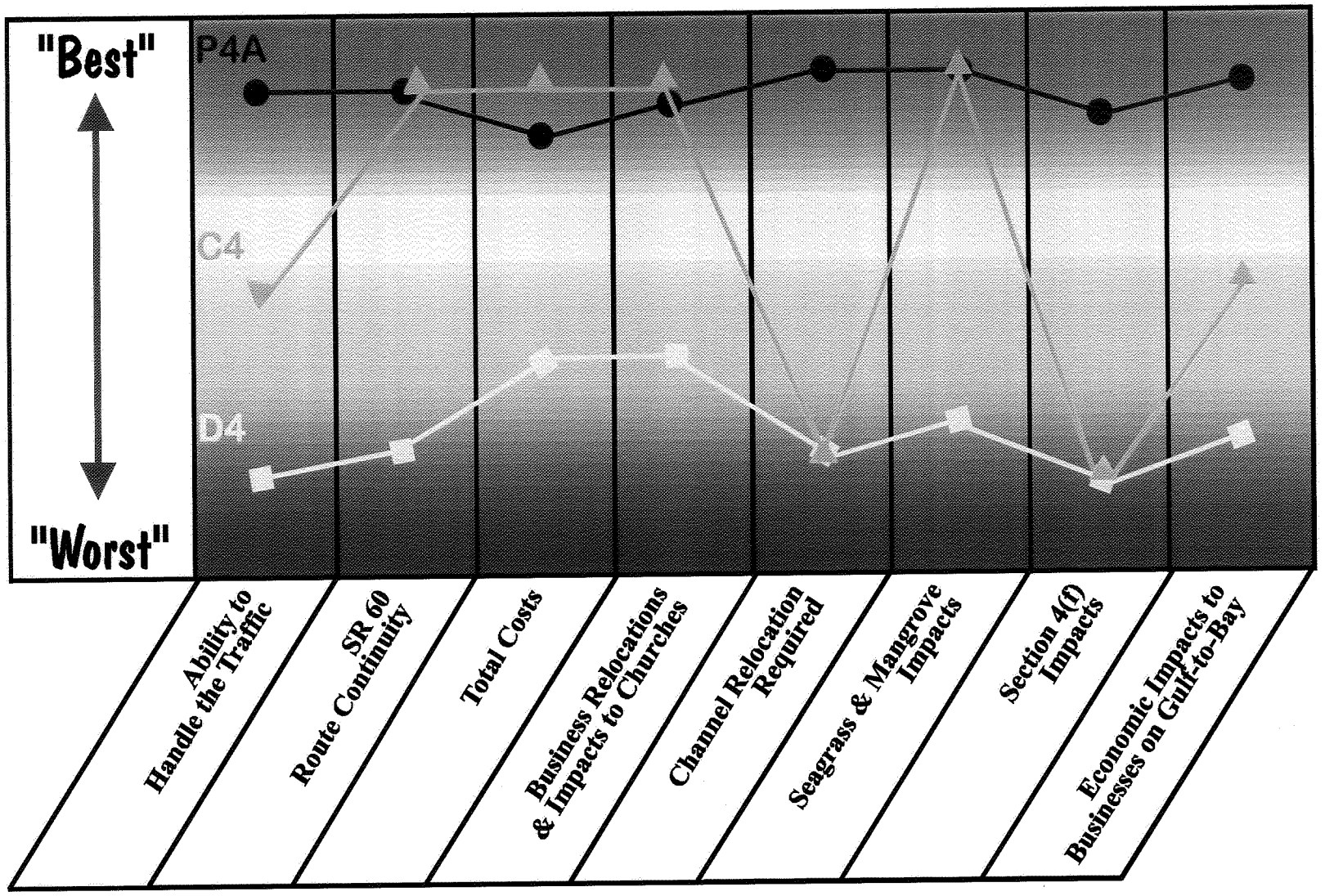
* Costs include $2 million for a major rehabilitation (97-98) & $4 million for a major rehabilitation (2015); Costs do not include the estimated annual maintenance cost of $250,000 or the annual cost associated with delays due to bridge openings of over $1 million.

? = Possible adverse impact although difficult to determine

7/16/95

EXHIBIT 7-15

Graphical Comparison of 3 Corridors



P4A = Pierce Blvd. C4 = Cleveland St. D4 = Drew St.

is a historic property protected by Section 4(f) of the DOT Act of 1966 and Section 106 of the National Historic Preservation Act of 1968.

- The cost estimate of this corridor ($20.1 million) falls below the estimate for the Drew Street corridor, but it is higher than the cost estimate for the Cleveland Street alternative.

- The traffic congestion which currently exists along Cleveland Street would be reduced to some extent due to the diversion of traffic to Court and Chestnut Streets.

7.5 Recommended Corridor

Based on considerations of traffic carrying capacity, S.R. 60 continuity, costs, and environmental impacts, the Pierce Boulevard corridor (represented by Alternatives P4 and P4A) was recommended for further evaluation to the Clearwater city commission on June 15, 1995. At that meeting, the commission voted unanimously to accept the recommendation and directed staff to concentrate on the Pierce Boulevard corridor for further development of alternatives.

THIS PAGE INTENTIONALLY LEFT BLANK

8.0 ALTERNATIVE ALIGNMENT ANALYSIS

8.1 No-Build Alternative

The No-Build Alternative consists of simply maintaining the existing bridge and performing maintenance and repairs as required. Estimated costs associated with the No-Build Alternative include approximately $2 million in FY 1998/1999 for major rehabilitation, and annual maintenance and operating costs of about $250,000 per year. In addition, a second major rehab of $3-4 million would be required around the year 2015.

The advantages of the No-Build Alternative include:

- No new construction costs
- No right-of-way acquisition
- No business relocations
- No adverse environmental impacts

The disadvantages of the No-Build Alternative include:

- No improvement in the traffic congestion along SR 60 which currently exists due to bridge openings and malfunctions
- The annual economic loss associated with delays due to bridge openings is over $1 million
- Increased maintenance and repair costs as the bridge ages
- Periodic traffic congestion due to repairing and maintaining the bridge
- Continuation of the existing safety deficiencies; continuation of economic losses due to increase in vehicle collisions
- Eventual replacement of the 34-year old bridge as it continues to age and eventually becomes structurally obsolete
- Delays opportunity to expand Coachman Park to the west and south

The No-Build Alternative will be retained as a viable alternative at least through the public hearing stage of this study.

8.2 Transportation System Management

The Transportation System Management (TSM) alternative, which consists of low capital improvements that maximize the efficiency of the present system, was also considered for this project. Such improvements typically include signal timing optimization, construction of auxiliary lanes at intersections, and provision of high-occupancy-vehicle (HOV) lanes.

Although TSM-type improvements would help alleviate some congestion and to some extent improve traffic safety in the project corridor for the short-term, they will not

effectively address the *project need*, which is to replace a congestion causing moveable bridge with a more reliable and safer fixed span bridge. Therefore, the TSM Alternative is not considered viable as a replacement for the high-level fixed-bridge Build Alternative.

8.3 Mid-Level Bascule Bridge

A higher "mid-level" bascule bridge was evaluated as part of the 1995 Feasibility Study in addition to high-level fixed bridges, because typically, a higher bascule bridge would require fewer openings (thus reducing delay to motorists) and it would have less of an aesthetic impact on downtown Clearwater. A cost estimate for this alternative is included in Exhibit 8-1.

The existing bridge has a vertical navigational clearance of 7.62 m (25 ft). If a new bridge could provide 4.6 m (15 ft) higher clearance, for example, this would provide a 12.2 m (40 ft) vertical navigational clearance. Unfortunately, it is estimated that this clearance would accommodate only approximately 13 percent of the sailboats which are docked in the immediate project area, based on a field survey conducted of marinas in the area. Other types of boats use the harbor, but sailboats constitute a high percentage of the users.

A survey of marinas within a half-mile radius of the Memorial Causeway Bridge was conducted in March 1995. Three marinas -- Clearwater Harbor, Island Estates Yacht Club, and the Clearwater Marina -- have a combined total of approximately 230 boat slips. Based on conversations with the city's Harbormaster and boat owners, it was determined that the sailboat heights from the water line to the top of mast (including wind vanes and antennas) range from 7.6 m to 18.3 m (25 to 60 ft). Exhibit 8-2 summarizes the estimated distribution of sailboat heights.

EXHIBIT 8-2
ESTIMATED HEIGHTS OF SAILBOATS
DOCKED WITHIN PROJECT VICINITY

	Range of Total Heights				
Location in Relation to the Bridge	<12.2 m (<40 ft)	12.3-14.3 m (40-47 ft)	14.4-16.8 m (47-55 ft)	>16.8 m (>55 ft)	Totals
North of ...	15	25	25	5	70
South of ...	15	55	65	25	160
Totals	30	80	90	30	230
Percent of Total	13	35	39	13	100

Source: HDR Engineering, March 1995.

Based on this survey, it appears that increasing the vertical navigational clearance to 12.2 m (40 ft) would result only in a slight reduction in the number of bridge openings required.

EXHIBIT 8-1
COST ESTIMATE FOR A MID-LEVEL BASCULE BRIDGE (4-LANE)

Cost Item	Units	Est. Unit Cost($)	Estimated Quantities	Estimated Costs $1000's
New Bridge Construction				
Mid-Level Fixed Spans				
Staged Construction	SF	48		
Non-Staged Construction	SF	40	152460	6098.4
Bascule Span, mid-level	SF	350	14850	5197.5
Existing Bridge Removal [1]	SF	10	77390	773.9
Roadway Approaches				
New (Perm.) Pavement	SY	14.00	7160	100.2
Shoulder Pavement	SY	10.30	1280	13.2
Pavement Removal	SY	13.80	3733	51.5
Guardrail	LF	10.00		
Conc. Barrier Wall	LF	60.00	1060	63.6
Guardrail Anchors	EA	505		
Conc. Appr. Slab (inc steel)	SF	31.66	3960	125.4
Earthwork (Embankment)	CY	2.60	10523	27.4
MSE Wall	SF	15.75	6678	105.2
MOT - Special				
Temp. Traffic Signal	ED	20.00		
Temp. Rdwy Pavement	SY	5.50		
Temp. Rdwy fill & culverts				
Chnl Dredging/Excav.	CY	14.00		
Relocate Navig. Devices	LS			
Modify Signal @ PierceClev.	LS			10.0
Relocate Two Statues	LS			2.0
Dry Detention Ponds (6 Lane)	LS			
Const. Subtotal				12568
Routine MOT (4%)				503
Mobilization (4%)				503
CEI (10%)				1257
Construction Total				14831
Right-of-Way/TCE	AC			2.5
Seagrass Impacts Estimate	AC			
Mitigation Excl. Land (4:1)[2]	AC	10000		
Mangroves Impact Estimate	AC			
Mitigation Excl Land (4:1)[2]	AC	40000		
(a) Tot. Const., R/W & Mitig.				14833
(b) Engr. Des. (10% of Const.Total)				1483
(c) Utility Reloc. Costs				
(d)Totals				$16,316

Notes: 1. Exist. Bridge = 58' x 1024' Assume 100% removal + 450' x 40' (orig bridge) = 77,390 SF

2. SB 1986 is also an option for mitigation resulting in a cost of $75,000/ac

Source: HDR Engineering, 1995

In addition to the frequency of openings required, a new "mid-level" bascule bridge would have other drawbacks to it. Since boat traffic flow in the Intracoastal Waterway must be maintained during construction, relocating the channel further to the west would not be practicable with this alternative because the vertical clearance under the approach spans would be insufficient to pass most of the sailboats during construction of the new bridge. The existing bridge already has maximum grades of 6 percent on the approaches. Therefore, if the high point of the new bridge can't be shifted further west, then the approaches need to be raised approximately 4.6 m (15 ft) to achieve the 12.2 m (40 ft) vertical clearance in the channel. This 4.6 m (15 ft) increase in heights would result in aesthetic impacts and traffic circulation problems which are similar to the high-level bridge alternatives.

For example, the roadway pavement and approach grades at the existing intersection of Cleveland/Pierce Boulevard/Drew Street would have to be raised approximately 4.6 m (15 ft) for this intersection to continue as it presently operates. The alternative would be to cut off access to two of the three east approaches to the bridge and only raise the grade for say, Drew Street or Pierce Boulevard. The cost estimate was based on a tie-in to Pierce Boulevard only, with access cut off to Drew and Cleveland Streets.

Finally, public support for a higher level bascule bridge appears to be lacking, based on comments received at the two informal public information workshops held during the 1995 Feasibility Study.

For the above reasons, and due to the high initial cost and higher expected annual maintenance, operating, and road-user costs, a mid-level bascule bridge alternative was *not* recommended for further study.

8.4 The Tunnel Alternative

At the request of the City, the tunnel alternative was evaluated because this alternative has been periodically suggested by interested citizens throughout the study process. The perceived need for a tunnel alternative is related to the importance that many residents place on the view from the bluff in downtown Clearwater. Due to the prohibitive costs, however, this alternative was determined to be *nonviable*. Additional information on this alternative is included below. Exhibit 8-3 includes a cross section view, and example profile drawing.

A possible cross-section of the tunnel would include two tubes for the vehicular traffic and two smaller tubes on either side of the main tubes for pedestrians, bicycles and emergency access. The ventilation tubes could be located above and below the pedestrian opening. This would result in a 33.5 m (110 ft) wide concrete section, with a depth of approximately 9.1 (30 ft).

The cost of a tunnel is estimated to be in the range of $19,690 per lane-meter ($6,000 per lane-foot); this cost was derived from bid prices for cut-and-cover tunnels for the Central

Artery project in Boston; it is expected that the cost of a sunken tube, as would be used for the Memorial Causeway crossing, would be *more* expensive.

Counting the two sidewalks as one lane yields a cost for the tunnel of $98,400 per lineal meter ($30,000 per linear foot) of tunnel. For the approaches to the tunnel, the open transition section is assumed to be half this cost.

Cost estimates are given in Exhibit 8-4 for an alignment which would closely follow either Alternative P4S or P4A. A tunnel connecting directly to Cleveland Street isn't considered viable because Cleveland Street can't handle the projected traffic demand and this alignment would be inconsistent with the Clearwater Downtown Redevelopment Plan (Reference 3-1).

Advantages of a tunnel:

- Generally less visual impact on the surroundings; however, ventilation buildings would be required possibly at both ends, and the causeway end of the tunnel would have to be raised about 1.5 m (5 ft) to clear the 100-year storm elevation.

- Minimal right-of-way costs

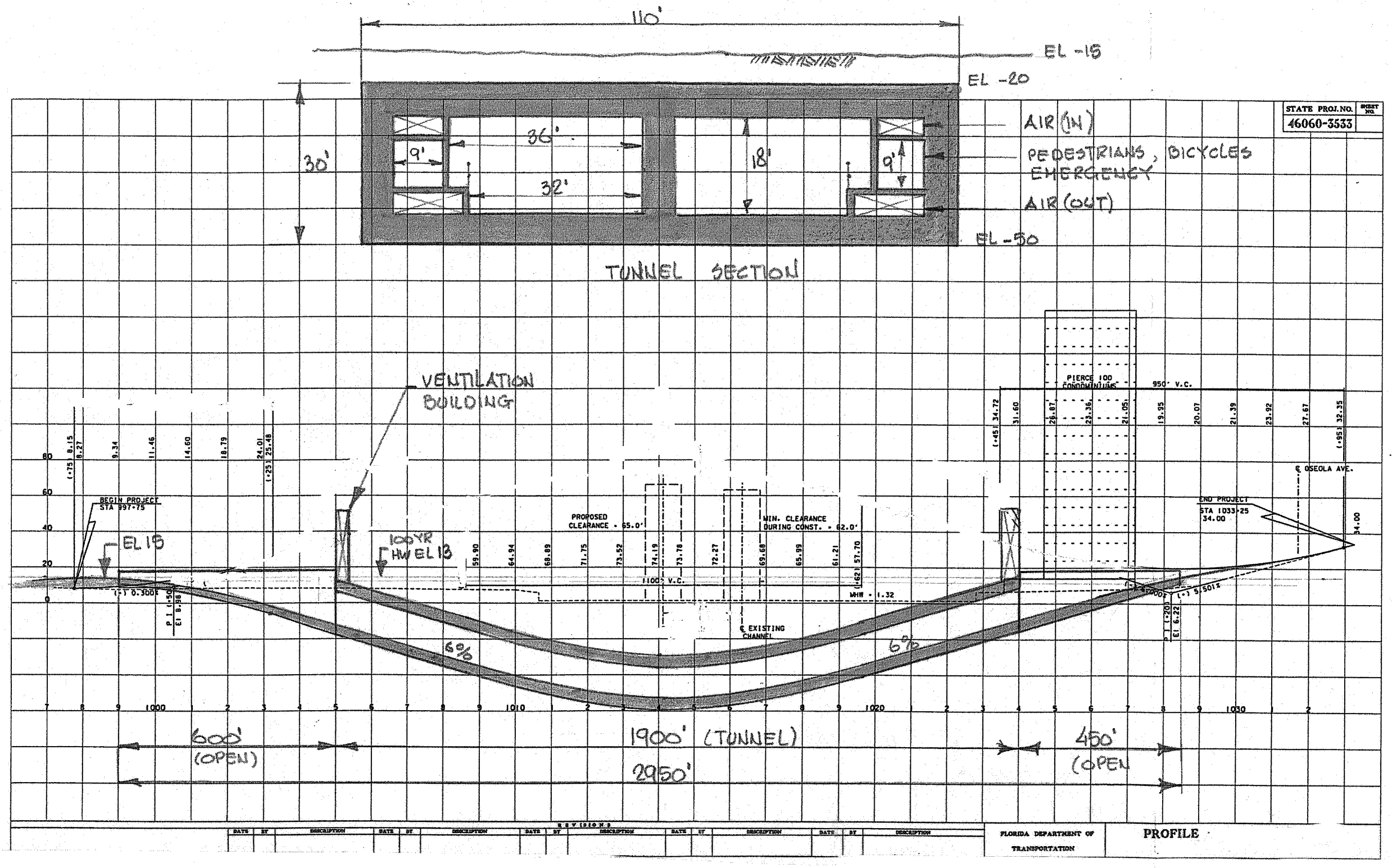
Disadvantages of a tunnel:

- Construction of a tunnel is many times more expensive than construction of a bridge. It is estimated that the cost of the tunnel would be approximately $133 million, based on an alignment that connects to Pierce Boulevard.

- The tunnel for the pedestrians would be viewed as a safety concern. Closed circuit cameras would be required to address this concern, at additional capital and operating costs. Some pedestrians might be very uncomfortable in a long tunnel.

- A trench would need to be dredged to provide the required water depth above the roof of the tunnel to allow water traffic to pass. The dredging would have direct impacts to sensitive estuarine habitats. Disposal of the spoil could be a problem.

- The tunnel would need to be constantly lighted inside, ventilated and drained resulting in continuing operation & maintenance costs. Backup power and communications systems would be required for power outages and emergencies. The air quality inside the tunnel would have to be constantly monitored, especially for the pedestrians.



8-tunn.vsd

CITY SEAL * CITY CLEARWATER FLORIDA	**Memorial Causeway (S.R. 60) Bridge PD&E Study**	**SAMPLE CROSS SECTION AND PROFILE VIEW OF A TUNNEL ALTERNATIVE (CLEVELAND STREET ALIGNMENT ILLUSTRATED)** 2-13-97	**EXHIBIT 8-3**

- Normally no shoulders of any significance are provided in tunnels (the above cost assumes this). To rapidly take care of disabled vehicles in the tunnel it is normal practice to have a tow truck on stand-by at all times.

- The ventilation, lighting, drainage, closed circuit television monitoring and the tow truck service will require a significant annual budget, which is expected to be significantly higher than that required for the operation of a movable bridge.

EXHIBIT 8-4
TUNNEL COST ESTIMATE

Component	Unit Cost or Basis	Quantity	Cost (Cut and Cover) ($Mill)
Construct tunnel-main portion	$98,400/LM	823 m	81
Construct tunnel-end sections	$49,200/LM	320 m	16
Ventilation buildings & equip.			1.5
Drainage sumps (pumps)			0.75
Backup power & communication			0.75
Closed circuit TV system			0.75
Archit. elements: special ceiling finishes, "park" at entrances, etc.			3
Tunnel const. cost subtotal			103
Design, shop drwgs, construction supervision	Des. 8% Shop draw 2.2%, Supv. 15%		8.2 2.3 15
Subtotal for tunnel only			129
Remove existing bridge			1
Raise causeway & reconstruct west roadway approaches			0.5
Park extension, pedestrian paving, water taxi, etc.			1
Utility relocation costs			0.5
Seagrass mitigation costs			0.5
Right-of-way costs			0.5
Total Cost ($ Millions)			133

Notes: Ventilation equipment would include air quality monitoring equipment
Source: HDR Engineering, 1997

8.5 Widen Existing Structure

Widening the existing bridge to improve its safety and functional characteristics is not considered to be a practicable alternative to constructing a new bridge, for the following reasons:

- Widening the existing bridge would not eliminate motorists' delay cost and vehicle operating costs associated with frequent bridge openings. These costs are estimated to be approximately $1 million per year (Reference 2-1). Therefore, this alternative would not meet the project's need.
- Widening and rehabilitating the existing bascule bridge (and the approach spans) would cost an estimated $21 million. Total bridge closure or extended land closures would be required which would cause extreme economic hardship and inconvenience to motorists. It would also deter tourism, which is the economic livelihood of Clearwater and its beaches.
- The widened bridge would have to be *replaced* in 20 or 30 years anyway due to the age of the mechanical components.

8.6 Other Build Alternatives

Of the 6 four-lane Build alternatives studied in the previous feasibility study, only one alternative alignment (P4A) was carried recommended for further study. The others were eliminated for the following reasons:

- Alternatives C1P4 and C2P2 involve multiple structures, are more expensive, have greater visual impacts, and received little public support.
- Alternative C4 would not be able to handle the traffic demand, would require channel relocation, impact the tennis courts, exacerbate existing congestion in downtown, and adversely affect the view from the bluff.
- Alternative P4 is very similar to Alternative P4A; however, it would require channel relocation.
- Alternative D4 was eliminated due to the higher environmental impacts, large channel relocation required, intersection capacity deficiency at Drew/Ft. Harrison, visual and noise impacts to Coachman Park (a section 4[f] protected resource), impacts to the Sandcastle Retreat, and the cost and impacts associated with having to widen Drew Street and build a S.R. 60 connector between Gulf-to-Bay and Drew Street.

The viable Build alternatives, described below, all tie directly into the existing four-lane Memorial Causeway on the western end. At the eastern end of the bridge, the manner of tie-in varies by alternative. The same typical section and design criteria were used for each of the alternatives, as described in Chapter 5.

8.6.1 Cleveland Street West Shifted (C4WS) Alternative

This alternative is significantly different from Alternative C4 which was studied previously in the feasibility study (corridor analysis). Alternative C4WS was developed in response to frequent citizen suggestions for this alternative.

The Cleveland Street West Shifted alternative consists of a single four-lane structure which ties in to the existing Drew Street/Cleveland Street/Pierce Boulevard intersection, at the existing grade. Exhibits 8-5 and 8-6 show the plan and profile for this alternative. With this alternative, the signalized bayfront intersection would still exist. The new bridge, with this alternative, would extend much further west on the causeway than the existing facility. It would also require an approximate 400 m (1300 ft) westerly shift of the existing navigational channel in order to achieve the minimum 19.8-22.6 m (65-74 ft) vertical navigational clearance required.

The advantages of this alternative include:

- Not necessary to reroute traffic from the Downtown Clearwater area
- Minimal impacts to Pierce 100 condominiums with respect to access and aesthetics.
- Minimal impacts to the mainland Clearwater portion of the bridge

The disadvantages of this alternative include:

- Highest cost of all alternatives; approximately $14 million dollars higher than the other alternatives, excluding future maintenance costs for the new navigational channel
- Major relocation of the navigational channel (400m [1300 ft]) to the west; difficulty in obtaining Environmental Resource Permits (ERPs) due to environmental impacts
- Substantial impacts to seagrass beds (an estimated 4.86 ha [12 ac]) and mangroves; both of which are unique natural communities which are not able to be replanted and are difficult to mitigate
- Does not eliminate the bayfront signalized intersection nor alleviate the traffic congestion downtown
- Does not improve access for Pierce 100
- No increase in the amount of waterfront land for redevelopment and park expansion efforts

8.6.2 Pierce Boulevard (P4A) Alternative

The Pierce Boulevard Alternative consists of a single four-lane structure which ties directly into Pierce Boulevard (Exhibits 8-7 and 8-8). The eastern portion of the bridge is high enough to span Pierce Street and provide access to Pierce 100 via Pierce Street. The

Pierce Boulevard Alternative terminates into the one-way pair of Court Street and Chestnut Street.

The advantages of the Pierce Boulevard Alternative include:

- No navigational channel relocation required
- Minimal impacts to sea grass beds and mangroves, which are unique natural systems which cannot be replaced
- Improved safety and access to Pierce 100 Condominiums
- Improved traffic flow between mainland Clearwater and Clearwater Beach
- Increase in amount of waterfront land along Clearwater Harbor for City redevelopment and park expansion efforts

The disadvantages of the Pierce Boulevard Alternative include:

- Potential aesthetic and noise level changes to Pierce 100, City Hall, Harborview Center, and The Oaks
- Relocation of radio station WTAN required

8.6.3 Pierce Boulevard North (P4A North) Alternative

The Pierce Boulevard North Alternative is almost identical in concept to the Pierce Boulevard Alternative described above. However, the main difference is in the alignment of the bridge crossing Clearwater Harbor. With this alternative, the bridge is located partially north of the existing bridge (Exhibits 8-9 and 8-10). Once again, there would be no required shift in the navigational channel, and the eastern portion of the bridge would be high enough to span Pierce Street in order to provide Pierce 100 residents access to the condominiums. This alternative also ties into the one-way pair of Court Street/ Chestnut Street.

The advantages of this alternative include:

- No navigational channel relocation required
- Minimal impacts to sea grass beds and mangroves
- Improved safety and access to Pierce 100 Condominiums
- Improved traffic flow between mainland Clearwater and Clearwater Beach
- Increase in the amount of waterfront land along Clearwater Harbor City for redevelopment and park expansion efforts.

The disadvantages of this alternative include:

- Visual impacts to Pierce 100, The Oaks, Harborview Center, City Hall and the Pinellas County Arts Council
- Relocation of radio station WTAN required

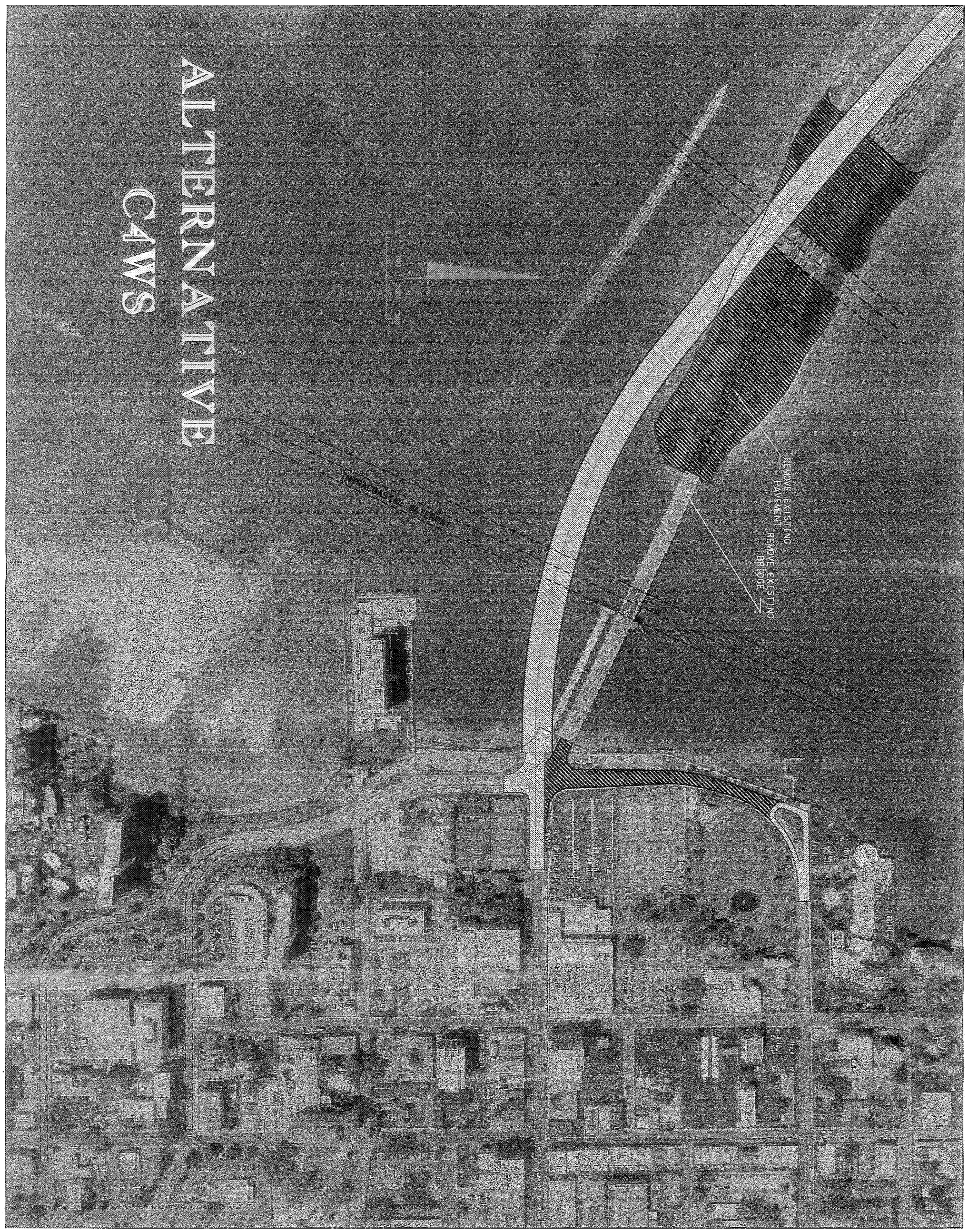
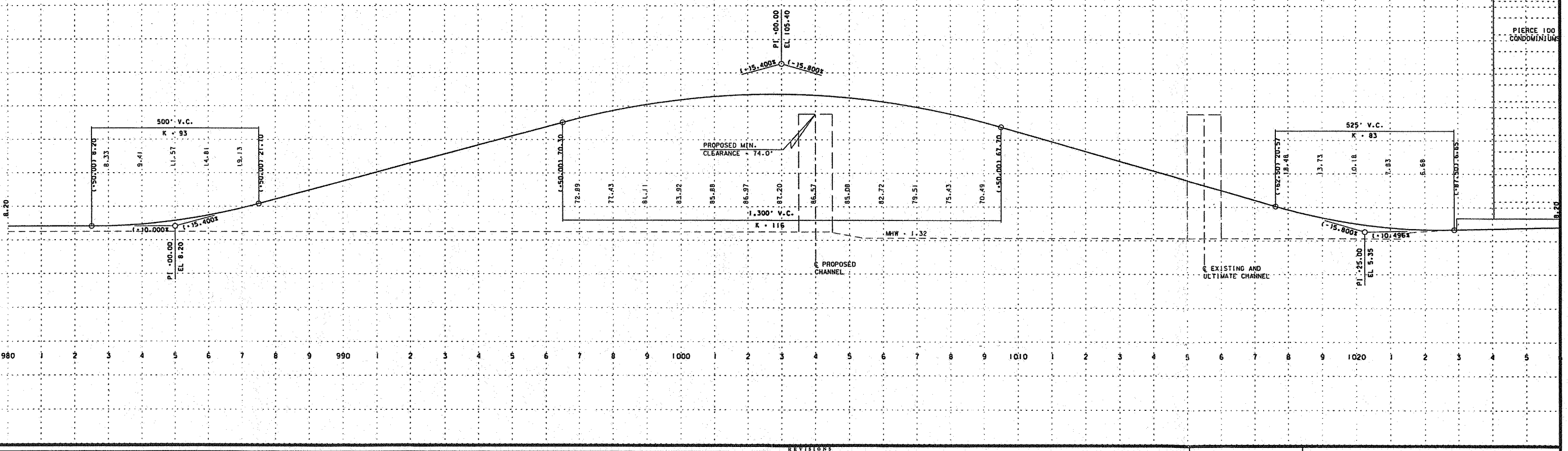


EXHIBIT 8-5 ALTERNATIVE C4WS PLAN VIEW

STATE PROJ. NO.	SHEET NO.
15220-1599	

PIERCE 100 CONDOMINIUMS



X:\MCBS\P4N6577.DGN

REVISIONS																																			
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

FLORIDA DEPARTMENT OF TRANSPORTATION

PROFILE - ALTERNATE C4WS
DESIGN SPEED : 70 KM/H (45MPH)

EXHIBIT 8-6 ALTERNATIVE C4WS - PROFILE

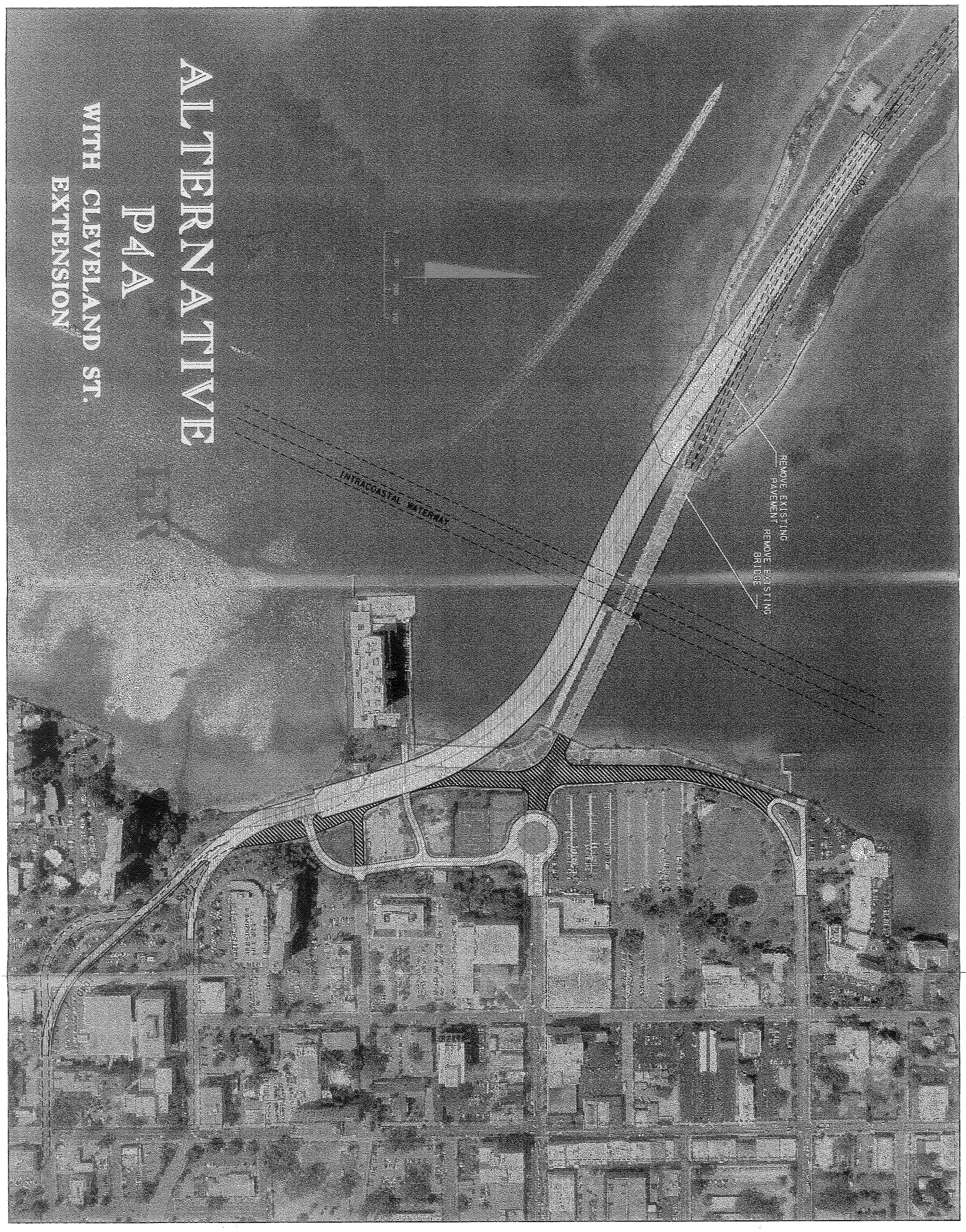
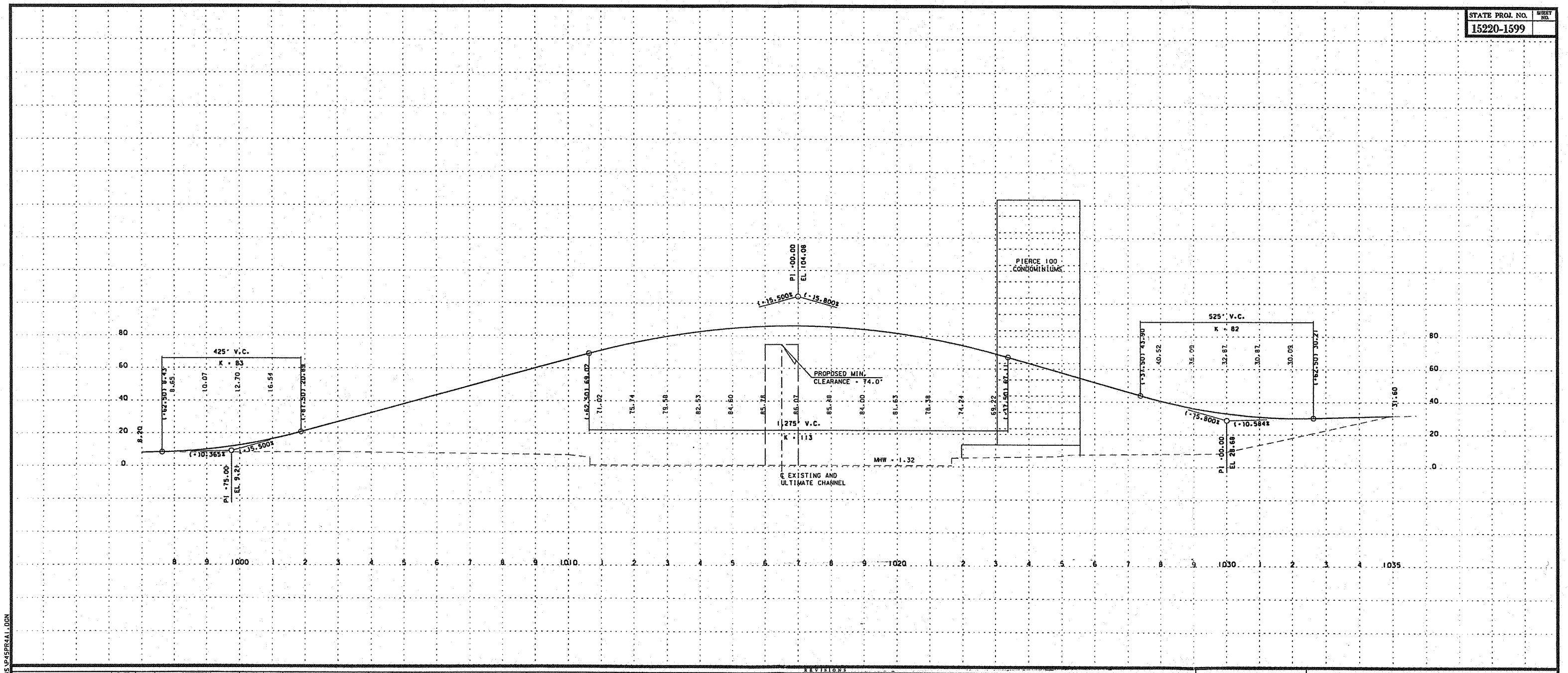


EXHIBIT 8-7 ALTERNATIVE P4A PLAN VIEW

STATE PROJ. NO.	SHEET NO.
15220-1599	



REVISIONS																							
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

FLORIDA DEPARTMENT OF TRANSPORTATION

PROFILE - ALTERNATE P4A
DESIGN SPEED : 70 KM/H (45MPH)

X:\MCBS\P45PR4A1.DGN

EXHIBIT 8-8 ALTERNATIVE P4A - PROFILE

8.6.4 Pierce Boulevard South (P4S) Alternative

The Pierce Boulevard South Alternative consists of a single four-lane structure which ties in directly to the southern portion of Pierce Boulevard at the Court Street/ Chestnut Street one-way pair (Exhibits 8-11 and 8-12). The bridge's alignment is south of both the existing bridge and the Pierce 100 Condominiums. This alternative would not require a shift in the navigational channel in order to achieve a 19.8 to 22.6 m (65 to 74 ft) vertical clearance. In addition, the existing access to Pierce 100 would not be altered.

The advantages of this alternative include:

- No navigational channel relocation for Intracoastal Waterway, probable relocation of secondary east/west channel south of the Causeway
- Minimal impacts to sea grass beds and mangroves
- Improved traffic flow between mainland Clearwater and Clearwater Beach
- Improved safety and access to Pierce 100 Condominiums
- Provides the largest increase in the amount of open waterfront area along Clearwater Harbor, compared to the other alternatives, for City redevelopment and park expansion efforts.
- Radio station WTAN would not have to be relocated

The disadvantages of this alternative include:

- Visual impacts to Pierce 100, The Oaks, and Prelude 80
- Pinellas Arts Council building would have to be relocated

8.6.5 Alternative P4NE ("Bluff Boulevard")

This alternative, which is the newest of the 5 alternatives, is illustrated in Exhibits 8-13 and 8-14. The roadway approach on the east end of the bridge is designed to be an extension of the Bluff, which results in a shorter bridge structure. This shorter bridge structure, in turn, results in a lower construction cost since the bridge structure is the highest cost item. This alternative would have an at-grade intersection at Pierce Street, to allow right turns onto the new bridge and left turns off of the new bridge into downtown.

Advantages of this alternative include:

- No navigational channel relocation required
- Minimal impacts to sea grass beds and mangroves
- Increase in the amount of waterfront land along Clearwater Harbor for City redevelopment and park expansion efforts
- Improved traffic flow between mainland Clearwater and Clearwater Beach
- Increase in the amount of waterfront land along Clearwater Harbor for City redevelopment and park expansion efforts
- Radio station WTAN would not have to be relocated

Disadvantages of this alternative include:

- Visual impacts to Harborview Center and City Hall
- Greater amount of right-of-way necessary, potentially including a portion of the Pinellas County Parking Garage and Harborview Center Parking area
- Potential visual and noise impacts to Coachman Park

8.7 Cost Estimates

Detailed construction and right-of-way cost estimates are included in Appendix D. A summary of these cost estimates is included in Exhibit 8-15. For ease of reference, a plan view of all five alternatives is included in Exhibit 8-16.

8.8 Evaluation Matrix

Each of the alternative alignments was evaluated. These initial evaluations and preliminary cost and other data, which were used during the selection of the "Preliminary Preferred Alternative", are summarized in the preliminary evaluation matrix contained in Appendix E. Exhibit 8-17 is a revised evaluation matrix that includes updated information based on the use of the proposed Pierce Street connection, instead of the Cleveland Street connection. This revision to the Preferred Alternative was made in order to eliminate impacts to the Bayfront Tennis Complex, a recreational property protected by Section 4(f) of the DOT Act of 1966. Other alignment refinements have been made to minimize impacts to the Haven Street House, a historic property protected by Section 106 of the National Historic Preservation Act of 1968.

Additional information with respect to noise impacts is included in Exhibit 8-18.

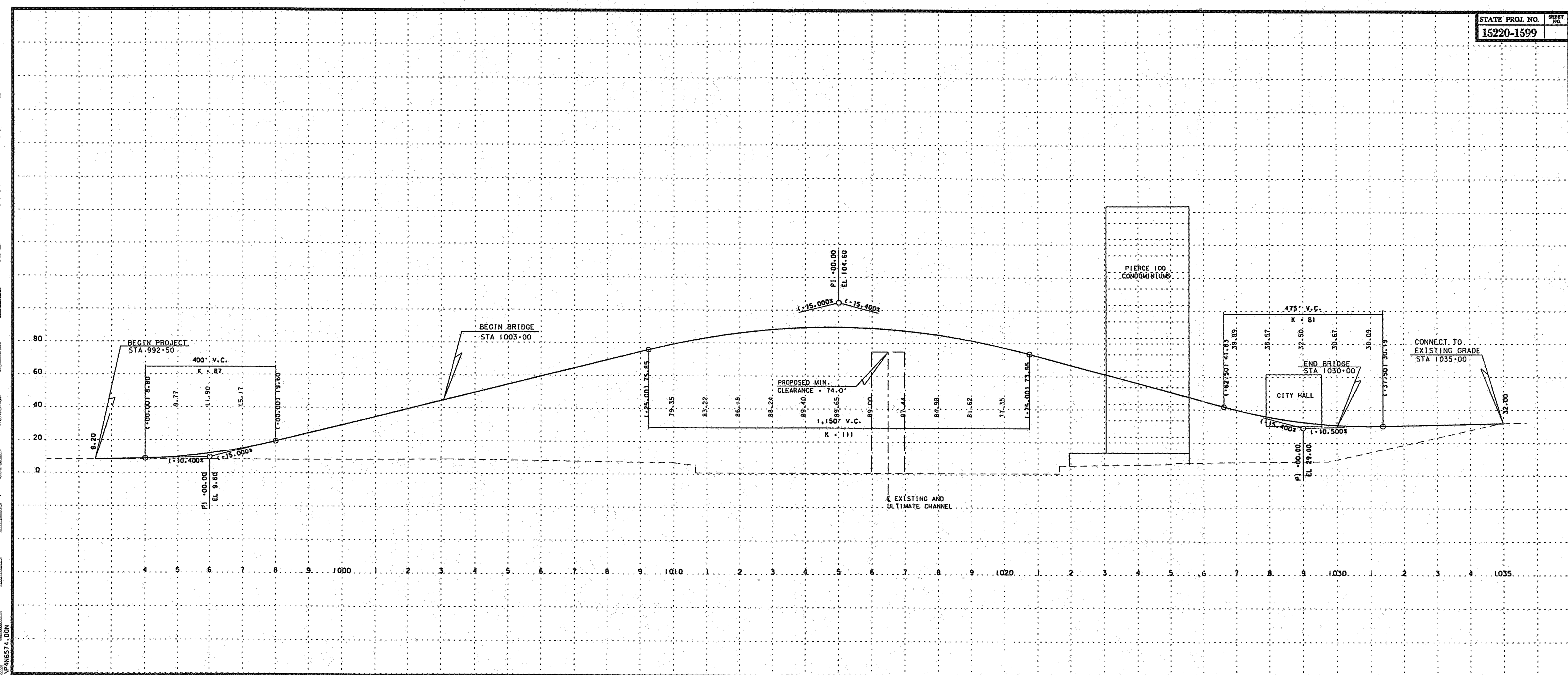
EXHIBIT 8-18
PRELIMINARY ESTIMATE OF NOISE IMPACTS*

Alternative	Number of Noise Sensitive Sites With Potential Noise Level Changes Due to the Proposed Project
Existing	14 (Includes Park)
No-Build	14 (Includes Park)
P4A	86
P4A with Cleveland Street Extension	86
P4A North	57
P4A North with Cleveland Street Extension	57
C4WS	14
P4S	58
P4NE	57

* Based on initial noise study analysis. The Noise Study Report, March 1998 provides greater detail of changes to noise levels for the preliminary preferred alternative.
Source: Transportation Solutions, Inc. January 16, 1997 memo to HDR

EXHIBIT 8-9 ALTERNATIVE P4A NORTH PLAN VIEW

STATE PROJ. NO.	SHEET NO.
15220-1599	



REVISIONS																													
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
4-26-96		VERTICAL CURVE & PROFILE GRADE P4A NORTH (VER 5)																											

FLORIDA DEPARTMENT OF TRANSPORTATION

PROFILE - ALTERNATE P4A (NORTH)
DESIGN SPEED : 70 KM/H (45MPH)

X:\MCBS\P4N6574.DGN

EXHIBIT 8-10 ALTERNATIVE P4A NORTH - PROFIL

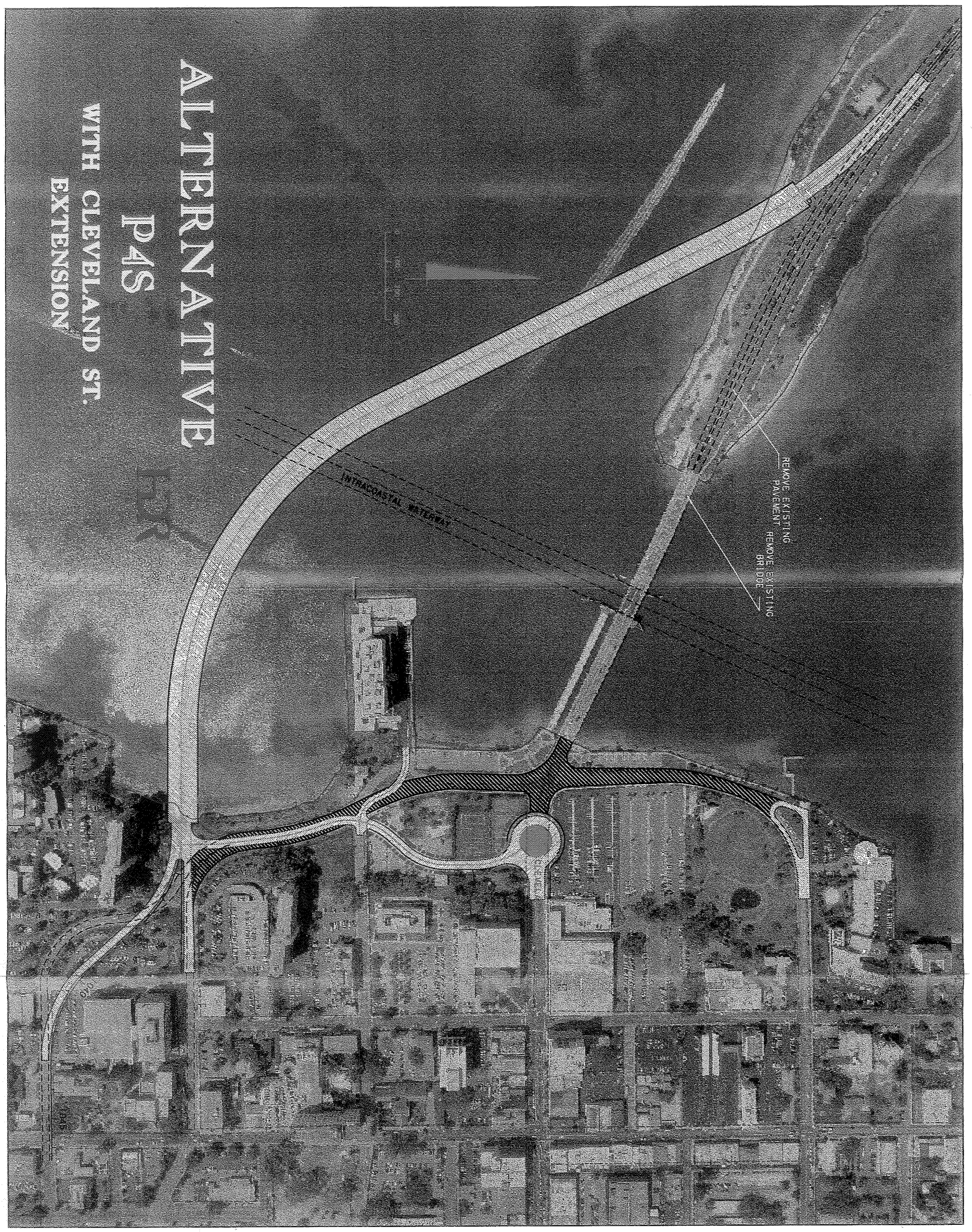


EXHIBIT 8-11 ALTERNATIVE P4S PLAN VIEW

EXHIBIT 8-12 ALTERNATIVE P4S - PROFILE

PROFILE - ALTERNATE P4S
DESIGN SPEED : 70 KM/H (45MPH)

FLORIDA DEPARTMENT OF TRANSPORTATION

REVISIONS

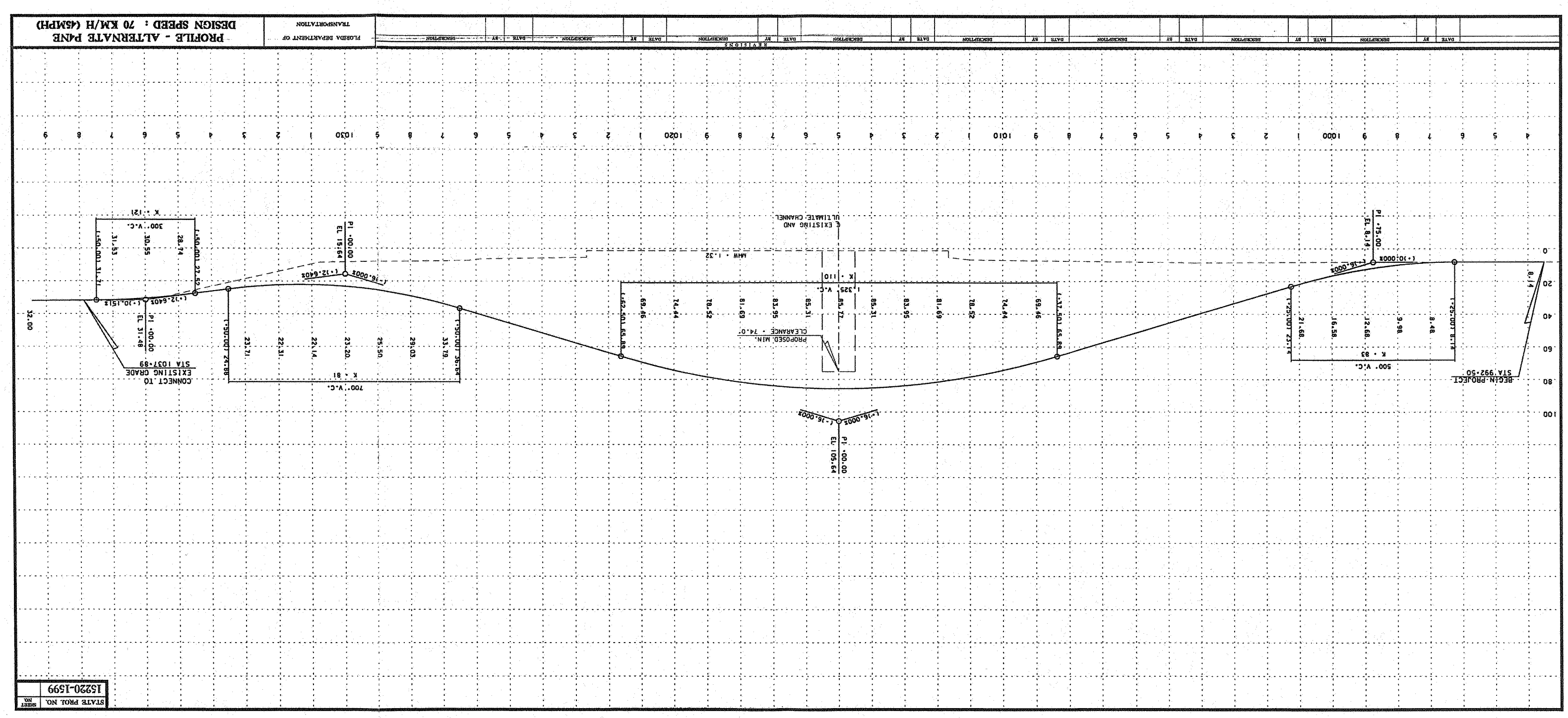
DESCRIPTION	BY	DATE
DESCRIPTION	BY	DATE
DESCRIPTION	BY	DATE
DESCRIPTION	BY	DATE
DESCRIPTION	BY	DATE
DESCRIPTION	BY	DATE
DESCRIPTION	BY	DATE
DESCRIPTION	BY	DATE

X:\MCES\P4MS376.DGN

STATE PROJ. NO. 15220-1599
SHEET NO.

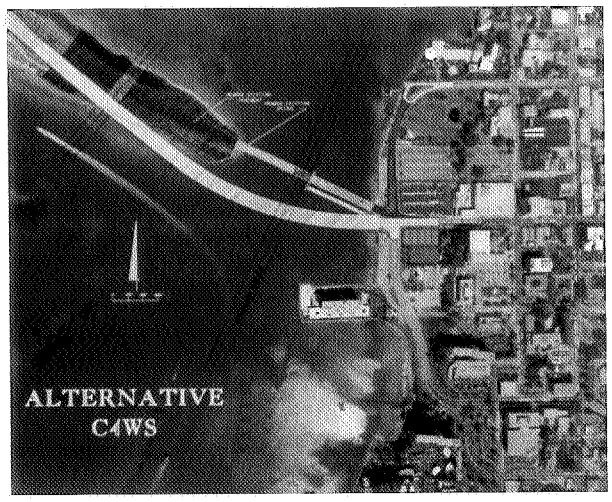
EXHIBIT 8-13 ALTERNATIVE P4NE PLAN VIEW

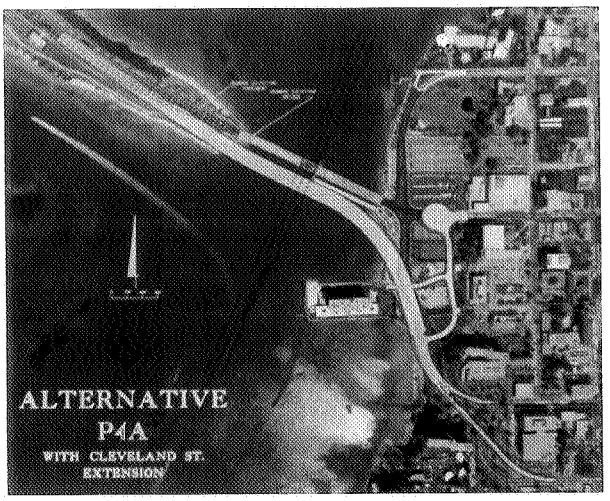
EXHIBIT 8-14 ALTERNATIVE P4NE - PROFILE

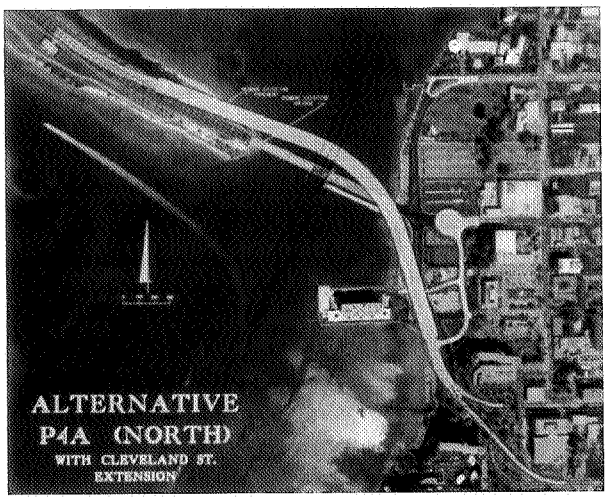


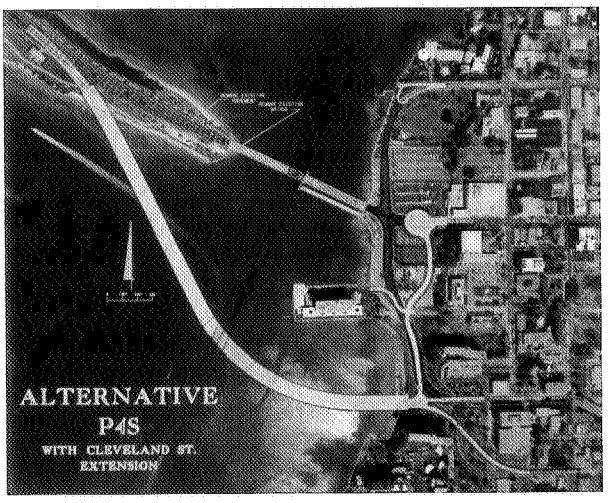
SUMMARY OF COST ESTIMATES
(Concrete Segmental Structure with 74' +/- Clearance)

	P4A	P4A North	P4S	C4WS	P4NE
Construction Costs ($million)					
Bridges					
New Bridge Structure (incl. channel dredging for C4WS)	22	24.6	26.8	36.8	19
($77/sf for concrete segmental)					
Remove Existing Bridges	1	1	1	1	1
Subtotal for Bridges	23	25.6	27.8	37.8	20
Roadway					
Roadway Approaches at either end of the bridge	1.5	1.5	1.5	1.0	1.9
Cleveland St Extension	0.3	0.3	0.4	--	0.2
Widening of Ft. Harrison **or** Resurfacing & Restriping of Ft.Harrison & Myrtle	--	--	--	--	--
Subtotal for Roadway Improvements	1.8	1.8	1.9	1.0	2.1
Architectural and Urban Design Elements					
Railings, overlooks, stairs/elevator, & lighting	1	1	1	1	1
Park extension, pedestrian paving, water taxi, & roundabout	1	1	1	1	1
Subtotal for Architectural/Urban Design	2	2	2	2	2
Total of all Construction	26.8	29.4	31.7	40.8	24.1
CEI (at 15%)	4.0	4.4	4.8	6.1	3.6
Total Construction incl CEI	30.8	33.8	36.5	46.9	27.7
Design Fee Estimate (Maximum Upset Limit)	3	3	3	3	3
Total of Design & Construction ($millions)	34	37	39	50	31
Utility Relocation	0.5	0.5	0.5	0.5	1
Right- of - Way Costs	1.9	1.9	1.2	--	4
Total of Design, ROW, Utility Reloc. & Construction ($mill.)	36	39	41	50	36







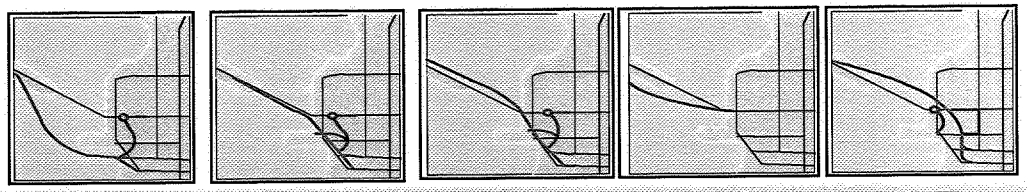


Memorial Causeway (SR 60) Bridge PD&E Study	**Plan View of Viable Build Alternatives**	**EXHIBIT 8-16**

W:\.....\reports\pe\figs10-97\8-16brg_alts.cdr

EXHIBIT 8-17
Alignment Alternatives Evaluation Matrix

Revised April 1998



Est. Costs ($ Mill.) for Bridge w/ 74' Clearance	P4S	P4A	P4A North	C4WS	P4 NE
Construction, Design, & Const. Supervision[1] (FL Bulb T/Segm. Box)	$31/ $37	$25/ $31	$29/ $35	$40/ $48	$24/ $29
Architectural and Urban Design Elements[2]	$2	$2	$2	$2	$2
Right-of-way and Utility Relocation Costs	1.2	2.4	1.9	0	3.9
Wetlands Mitigation ($75,000/ac. SB 1986)	0.0034	0.0024	0.0020	1.02	0.0013
Total Capital Costs (to nearest mill.) (FL Bulb T/Segm. Box)	$35/ $41	$31/ $36	$33/ $39	$43/ $51	$31/ $36
Periodic Channel Maintenance Costs to the City	None	None	None	Yes	None
Right-of-Way (R/W) Acreages & Relocations					
Net County-Owned Land Required (acres) *	0.37	0.63	0.42	0	1.33
Privately-Owned Land Required (acres)	0.02	0.10	0.16	0	0.33
Business Relocations (WTAN Radio)	No	Yes	Yes	No	No
Nonprofit Relocations (Arts Council)	Yes	No	Yes	No	Yes
Environmental Impacts & Navigational Issues					
Channel Relocation Required for 65' or 74' Clearanc	No	No	No	Yes	No
Potential Need to Relocate Minor Channel South of the Causeway	Yes	No	No	No	No
Sea Grass Impacts (acres)	0.013 ac	0	0.0015 ac.	12 ac.	0.0016 ac.
Mangrove Impacts (acres)	0	0.0011 ac.	0.0064 ac.	1.6 ac.	0.0016 ac.
Other Wetland Impacts	0.032 ac	0.031 ac.	0.019 ac.	.023 ac.	0.014 ac.
Probable Noise level changes (# of noise sensitive receptors)	58	86	57	14	57
Potential Cultural Resource Involvement* **					
Harbor Oaks Residential Area Historic District	Yes	No	No	No	No
Bayfront Tennis Courts (Section 4(f))	No	No	No	No	Yes
Fort Harrison Hotel (candidate for *National Register*)	No	No	No	No	No
Pinellas Arts Council Building (candidate for *National Register*)	Yes	Yes	Yes	No	No
Traffic Flow & Access* **					
Requires Some On-Street Parking Removal	No	No	No	No	No
Maint. of Traffic (MOT) During Const. (1=Best, 5=Worst)	2	4	5	1	3
Socioeconomic Impacts					
Potential Avg.% Reduction in Sales to Cleveland St. Bus. west of Myrtle	0 to 5 %	0 to 5 %	0 to 5 %	Not Affected	0 to 5 %
Ability to connect peds & bicyclists, beach to downtown (1=Best	5	3 **	3 **	1	2
Land Use Changes					
Ability to Expand Coachman Park to the west and south	Excellent	Good	Fair	Poor	Poor
Create more opportunity for pedestrian & waterfront uses	Excellent	Good	Fair	Poor	Poor

[1] Includes roadway approaches

[2] Includes railings, overlooks, stairs/elevator, lighting, park extension, pedestrian paving & roundabou

* includes allowance for existing R/W to be vacated, based on Cleveland Street Extension Concept except for P4A (based on Pierce Street Connection)

**pedestrian/bicyclist access could be improved by provision of an elevator/ramp/staircase structure

*** Based on Pierce Street Connecton refinement

Finally, a more qualitative comparison of the "top two" alternatives is included in Exhibit 8-19.

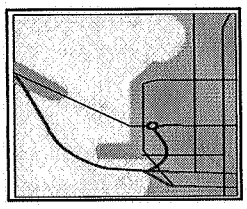
8.9 Preliminary Preferred Alternative

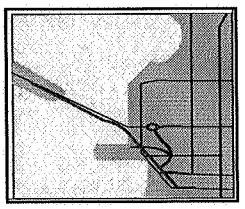
On April 17, 1997, the Clearwater City Commission selected Alternative P4A as the proposed (preliminary) Preferred Alternative. The reasons for this selection, as stated by Commissioner Karen Seel in a newspaper editorial dated April 28, 1997, include the following:

- It has the least environmental impact and maintenance.
- The Haven Street House can be preserved as an important city landmark.
- It reduces the risk of inverse condemnation lawsuits since it closely follows the current roadway alignment.
- It is a fiscally responsible choice in that it is about $5 million less costly to build than Alternative P4S.
- It will facilitate the City's intention to expand Coachman Park to the waterfront.

According to the editorial, "all of the following factors were considered in reaching a decision: design amenities and impacts, traffic flow, site constraints, environmental and water quality issues, state and local permitting, downtown economic development, residential and tourist access, fiscal responsibility, legal issues, and flexible future planning."

EXHIBIT 8-19
COMPARISON OF THE TOP TWO ALTERNATIVES





	Alt. P4S	Alt. P4A
Total Capital Costs (rounded to nearest million)[1] (FL Bulb T/ Concrete Segmental Box)	$35/ $41	$30/ $36
Relocations Required	Pinellas Arts Council	Radio Station & Potential for Arts Council
Privately-Owned Land Required (acres)	0.02	0.17
Total Sea Grass + Mangrove Impacts (acres)	0.0026 ac.	0
Probable Noise Impacts (# receptors >/= 65dBA)	58	86
Description of Noise Impacts	Primary noise impacts are to Pierce 100; 3-4 dBA increase expected. No impacts to Prelude 80 expected	Primary noise impacts are to Pierce 100; 3-4 dBA increase expected. No impacts to Prelude 80 or Coachman Park expected
Potential Cultural Resource Impacts or Involvement (Section 4(f) & 106)	Harbor Oaks Residential Area Historic District & Haven House (Arts Council bldg.)	Fort Harrison Hotel & Haven House (Arts Council Bldg.)
	Bayfront Tennis Complex	Bayfront Tennis Complex
Maint. of Traffic (MOT) During Construction	Good	Difficult
Connectivity to Cleveland Steet	Good	Good
Ability to connect peds & bicyclists, beach to downtown	Fair (longer distance)	Fair[2]
Ability to expand Coachman Park to the west and south	Excellent	Good
Create more opportunity for pedestrian & waterfront uses	Excellent	Good
Visual Impacts	Greater effect on Pierce 100 and Prelude 80	Greater effect on Pierce 100 & some effect on the bluff
Public Acceptance [3]	Favored by 10 people at W/S & Endorsed by the DDB; opposed by condo residents Received 16 votes at LIG Mtg. No.4	Favored by 1 person at W/S; strong opposition from Pierce 100 Received 6 votes at LIG Mtg. No. 4
Areas of Special Concern	Relocation of secondary channel south of the Causeway may be required	(Channel relocation N/A)
	Arts Council bldg would have to be demolished or moved	Arts Council bldg could remain but access would be more difficult
	County's parking lot to be impacted unless design exception can be obtained	County's parking lot to be impacted unless design exception can be obtained
Maximum grade required on vertical curves	5.5 %	5.8%

[1] Includes expansion of Coachman Park & Roundabout and other urban design elements; based on a 22.6 m (74') clearance bridge

[2] Could be improved by provision of stairs/ramp/elevator stucture located near the end of Cleveland Street

[3] w/s = workshop; DDB = Downtown Development Board; LIG = Local Interest Group

9.0 PRELIMINARY DESIGN ANALYSIS

Subsequent to the selection of Alternative P4A as the "preliminary Preferred Alternative" by the Clearwater City Commission on April 17, 1997, various refinements were made to the proposed alignment to reduce impacts to private property, the Bayfront Tennis Complex, and the Haven Street House. For this reason, acreage and other data in this chapter may not match data contained in earlier chapters. A plan view of the refined preliminary Preferred Alternative is shown in Exhibit 9-1.

9.1 Design Traffic Volumes

Design traffic volumes for the proposed year 2020 design year are included in Exhibit 9-2 as AADTs and in the Traffic Report (Reference 6-1) as directional design hour volumes (DDHV). Further background information is included in Chapter 6 of this report.

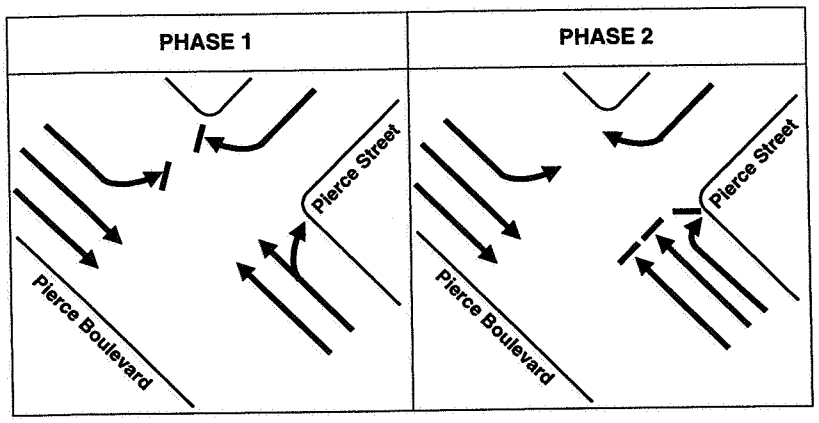
9.2 Typical Sections

Proposed typical sections for the bridge are shown in Exhibit 9-3. The proposed bridge typical sections were revised in August 1997 to adjust shoulder widths and to add a special 3.6 m (12 ft) bike-pedestrian facility on the south side of the bridge. Additional revisions to all typical sections were made in November 1998. The proposed 6.1 m (20 ft) median would be consistent with the existing median width on the causeway.

Preliminary proposed roadway typical sections are included in Exhibit 9-4. These may be further refined during the design phase, for example, to identify the extent of the mechanically-stabilized earth (MSE) wall versus use of embankment. Special attention to landscaping will be needed to ensure that the Pierce Street connection architecturally blends in with the existing and proposed park-like surroundings.

9.3 Intersection Concepts and Signal Analysis

Future intersection levels-of-service were previously given in Section 6.6. A new signalized intersection is proposed at Pierce Street and Pierce Boulevard (the southern roadway approach to the new bridge). This signal is proposed to be a simple two-phase operation which would be coordinated with the traffic signals on Court and Chestnut Streets. The proposed phasing is illustrated below:



Note that southeastbound traffic would be free flow all of the time, and only the northwest (beach)-bound traffic would be stopped to allow left turns off of and right turns onto the bridge. Calculations for the length of left-turn storage required (mostly on the bridge) are included in Exhibit 9-5.

EXHIBIT 9-5
LEFT-TURN STORAGE REQUIREMENTS AT PIERCE STREET/PIERCE BOULEVARD

2-Way AADT in 2020 is 6,000 VPD
to and from Pierce Street

DDHV = 6,000 x K x D Factors
6,000 x 10.55% x 57.9%
= 367 VPH

Cycle Length	# Cycles/Hour	Average # Vehicles/Cycle	Storage Required for Twice the Average No.*	
60 sec.	60	6.1	93 m	(305 ft)
80 sec.	45	8.2	125 m	(410 ft)
100 sec.	36	10.2	155 m	(510 ft)
120 sec.	30	12.2	186 m	(610 ft)

*Based on 7.6 m (25 ft) storage per vehicle

Choose values for 100 sec. cycle to match existing peak-hour cycle lengths.

Per Index 301, for 70 km/h (45 mph) design speed, need total deceleration distance (include. 15.2 m (50 ft) taper) of 56.4 m (185 ft) + Queue Length

Total Distance = 155 m (510 ft) + 56 m (185 ft)
= 211 m (695 ft; say 700 ft)

S.R. 60
MEMORIAL CAUSEWAY BRIDGE
PROJECT DEVELOPMENT & ENVIRONMENT STUDY
WPI SEG. NO. 257093 1
FAP NO. BRF-1456 (9)

CONCEPTUAL DESIGN PLANS FOR
ALTERNATIVE P4A WITH THE
PIERCE STREET CONNECTION

REV. 8-17-98

PREPARED FOR

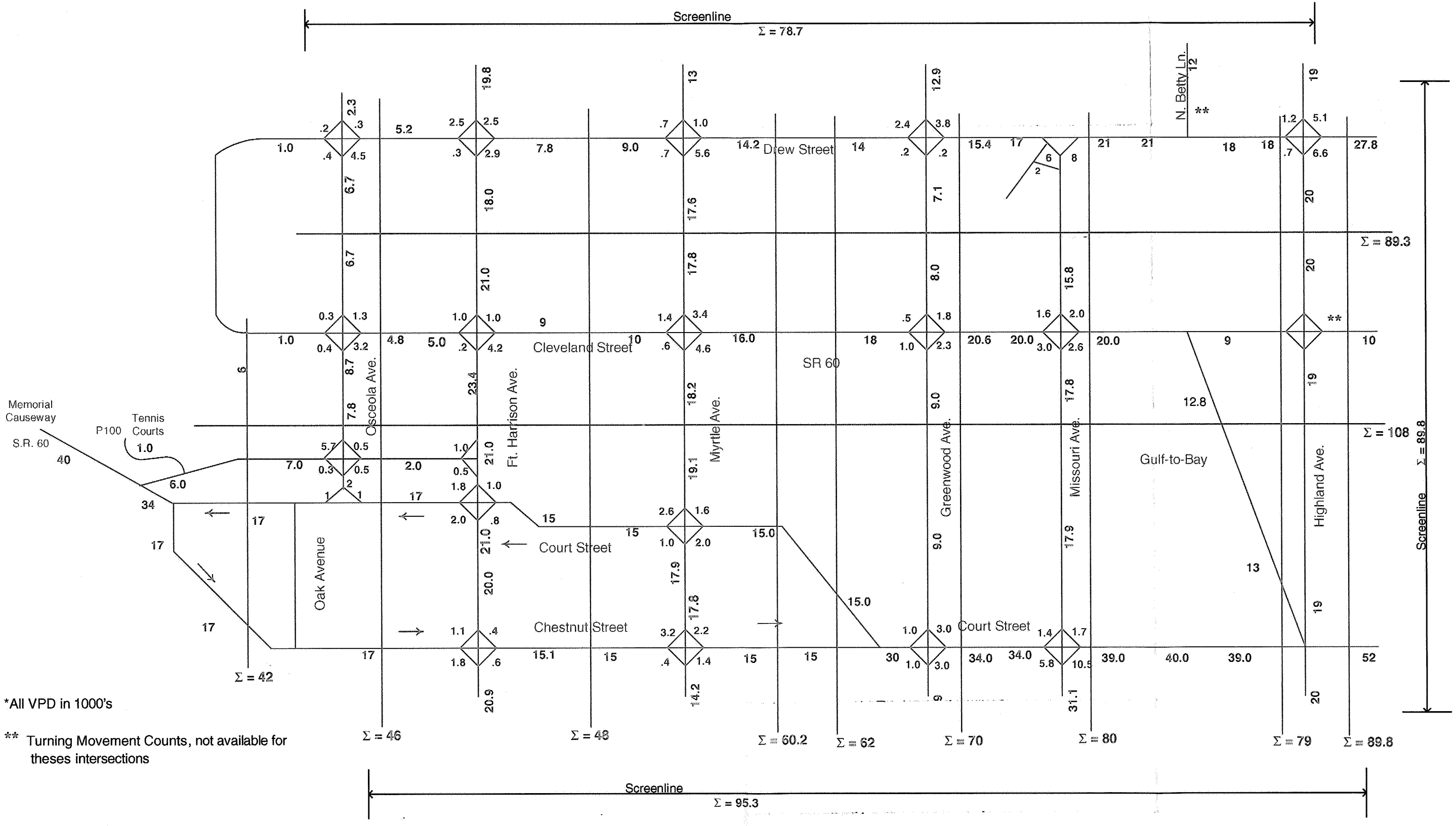
CITY OF CLEARWATER | **FLORIDA DEPARTMENT OF TRANSPORTATION**

LEGEND:

- PROPOSED R/W ---------- EXISTING R/W
- PROPOSED PAVEMENT REMOVAL
- PROPOSED PEDESTRIAN/BICYCLE FACILITY

4 LANE BRIDGE
DESIGN SPEEDS:
BRIDGE 70 KM/H (45 MPH)
APPROACHES 60 KM/H (35 MPH)

EXHIBIT 9-1 PRELIMINARY PREFERRED ALTERNATIVE

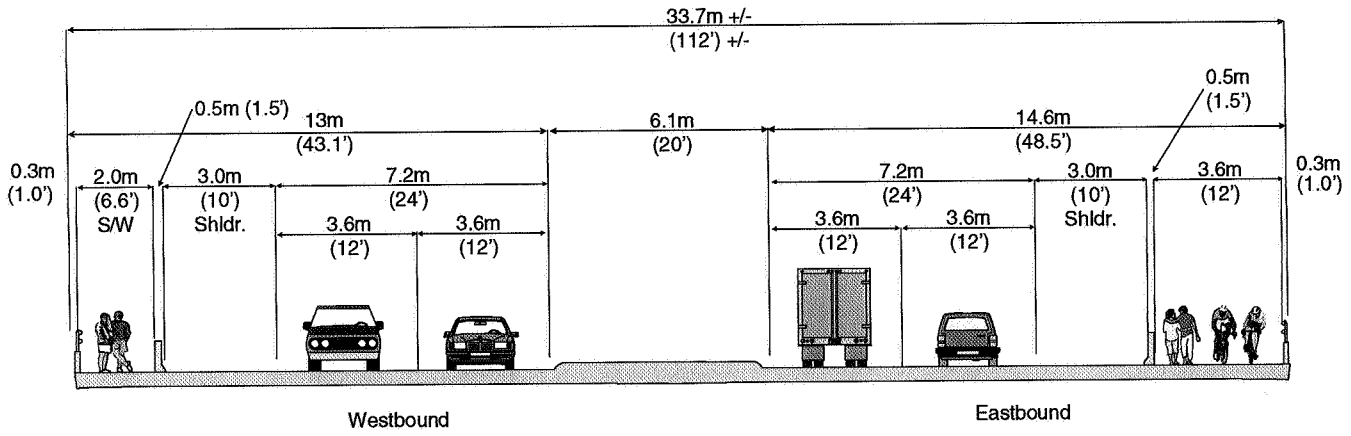


*All VPD in 1000's

** Turning Movement Counts, not available for theses intersections

w:\memcsway\reports\pe\figs 10-97\9-1rec2020rev.vsd

Memorial Causeway (S.R. 60) Bridge PD&E Study	**RECOMMENDED YEAR 2020 DESIGN AADTS**	**EXHIBIT 9-2** Rev. 9/97



(Looking East or Southeast)

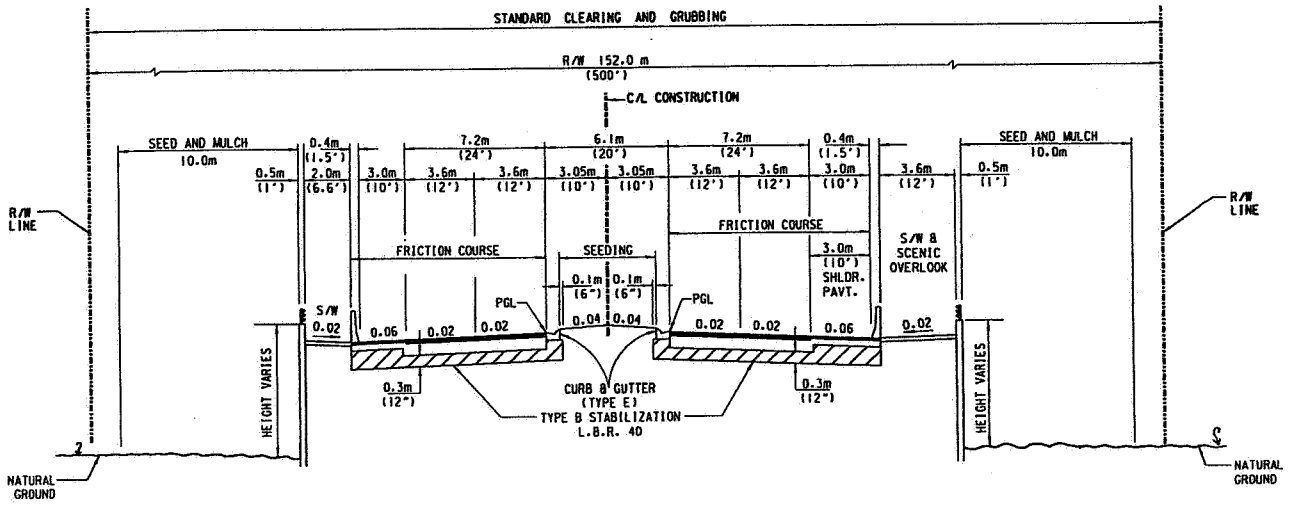
Design Speed = 80 km/h (50mph)

"Metric to English conversions are nominal rather than exact."

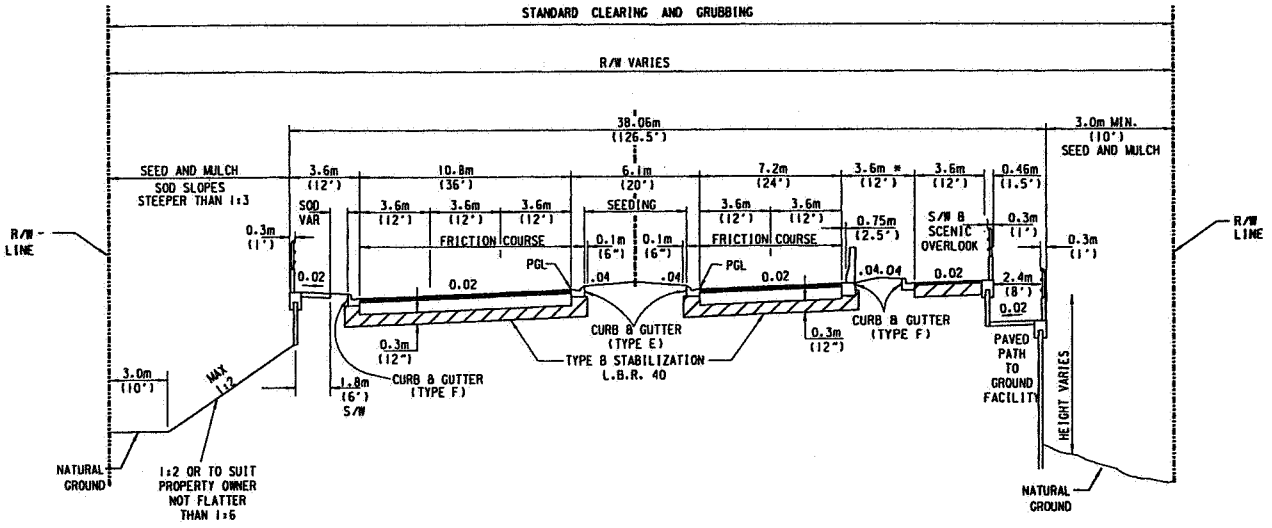
W:\MEMCSWAY\REPORTS\PE\FIGURE9-3 REV12-98.VSD

Memorial Causeway SR 60 Bridge PD&E Study	**PROPOSED BRIDGE TYPICAL SECTION**	**FIGURE 9-3**

12/98



Western Causeway Approach to the Bridge

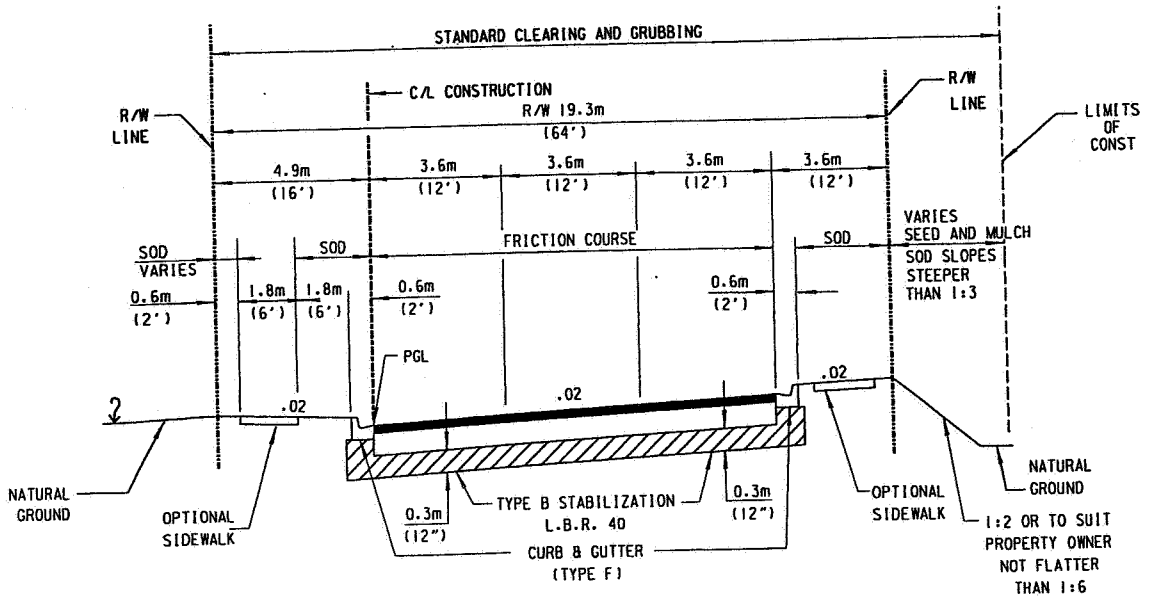


** IF LIMITS OF CONSTRUCTION EXCEED RIGHT OF WAY. A PROPERTY AGREEMENT IS REQUIRED

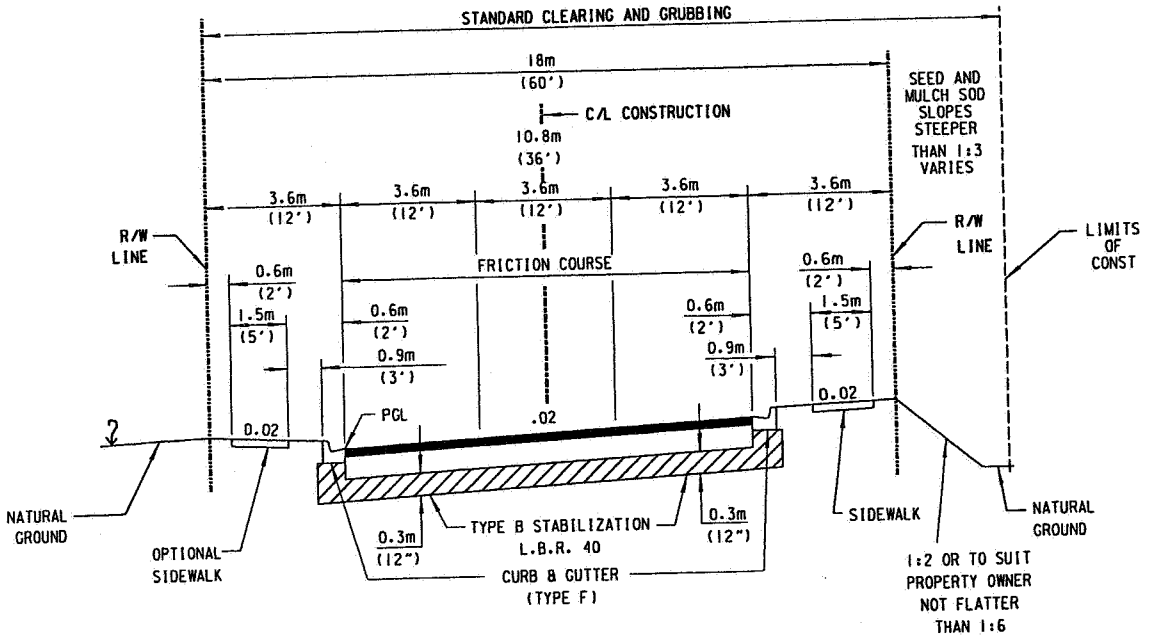
* THIS WIDTH COULD BE REDUCED IF NECESSARY

Pierce Boulevard South of Pierce Street

Memorial Causeway (S.R. 60) Bridge PD&E Study	**PROPOSED ROADWAY TYPICAL SECTIONS**	**EXHIBIT 9-4** P. 1 of 3 Rev. 12/98

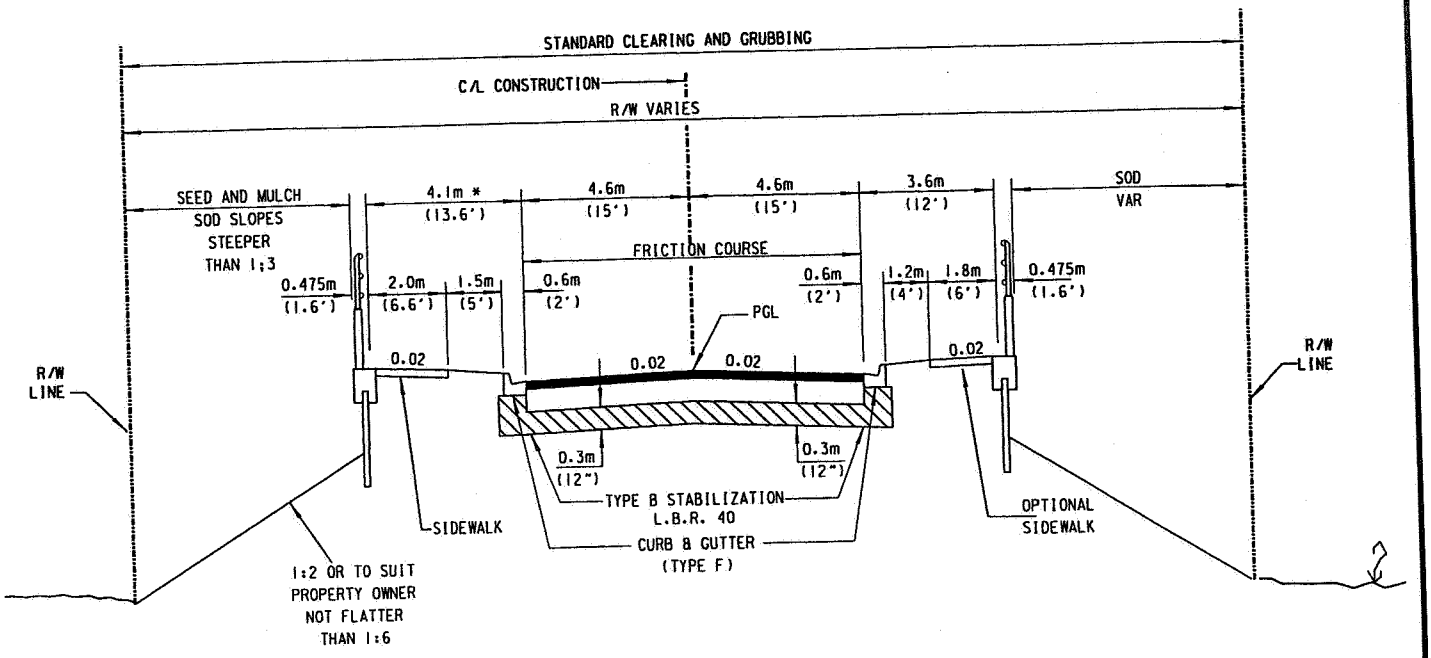


Court Street West of Oak Avenue

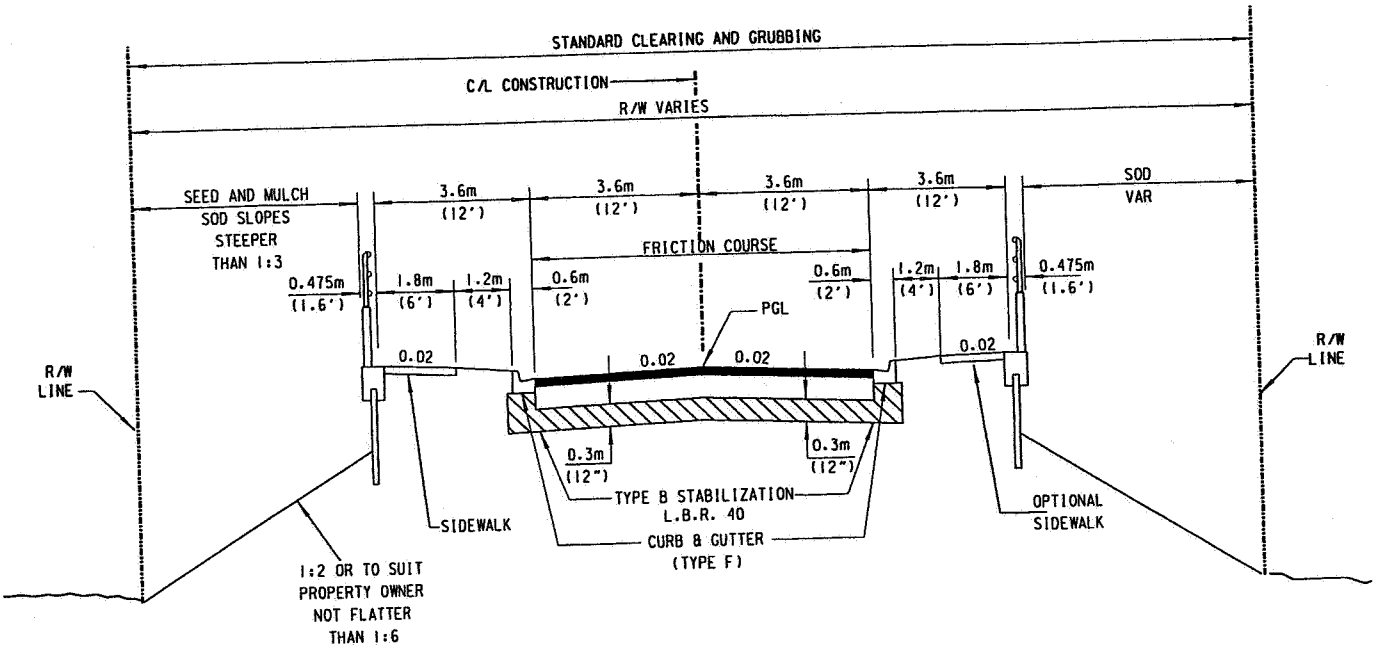


Chestnut Street East of Oak Avenue

Memorial Causeway (S.R. 60) Bridge PD&E Study	**PROPOSED ROADWAY TYPICAL SECTIONS**	**EXHIBIT 9-4** P. 2 of 3



Pierce Street East of Pierce Boulevard



Connection to Bayfront Tennis Complex and Pierce 100

Memorial Causeway (S.R. 60) Bridge PD&E Study	**PROPOSED ROADWAY TYPICAL SECTIONS**	**EXHIBIT 9-4** P. 3 of 3

City traffic engineering personnel have requested that the following features be included in the design of this intersection:

- Preformed loops in concrete bridge deck
- Convenient access to controller cabinet
- Interconnection with other system signals
- Loops for a permanent traffic counting station
- Side-street loops or volume-density operation
- Advance westbound warning signals

The intersection of the access road to Pierce 100 and Pierce Street is proposed to be one-way STOP-controlled. The proposed profiles for Pierce Street and the access roadway to Pierce 100 (and the Bayfront Tennis Complex) are shown in Exhibit 9-6. (These are shown in plan view in Exhibit 9-1 above.)

Pedestrian crossing signals are proposed on Court and Chestnut Street at Oak Avenue if the county does not build any parking garages with pedestrian bridges across Court and Chestnut Streets.

The intersection of Osceola Avenue and Pierce Street is proposed to remain a multi-way STOP-controlled intersection. A rotary or roundabout was considered for this intersection; however, right-of-way limitations would make it difficult to construct one here.

9.4 Alignment and Right-of-Way Needs

The proposed alignment is shown in Exhibit 9-1, above. The minimum proposed radius is approximately 125 m (409 ft) (max. 14 degree curve) at 0.035 superelevation on the east roadway approach.

Most of the right-of-way needed is expected to come from city-owned land, with another portion coming from county-owned land and a very small amount coming from privately owned land. A breakdown on right-of-way needs is included in Exhibit 9-7.

EXHIBIT 9-7
RIGHT-OF-WAY NEEDS FOR THE PRELIMINARY PREFERRED ALTERNATIVE

Source	Area
City-Owned Land	0.83 ha (2.05 ac)
County-Owned Land	0.25 ha (0.63 ac)
Privately-Owned Land	0.04 ha (0.10 ac)
Totals	1.1 ha (2.8 ac)

Source: HDR Engineering, 1997

9.5 Relocations

A minimum of one (1) relocation is expected, Radio Station WTAN, an AM radio station. Several suitable sites are available for relocation, according to the Conceptual Stage Relocation Plan (CSRP) prepared for this study (Reference 9-1).

The preliminary Preferred Alternative has been refined such that the Haven Street House can remain open and accessible by vehicles and pedestrians; therefore, relocation of this nonprofit organization is not expected to be required.

9.6 Right-of-Way Costs

A detailed right-of-way (ROW) cost estimate for the Preferred Alternative is included in Appendix D. A summary of the cost estimate is included in Exhibit 9-8.

9.7 Construction Costs

Cost estimates for the Preferred Alternative are included in Exhibit 9-8.

9.8 Preliminary Engineering Costs

An estimate of these costs is included in the above Exhibit.

9.9 Recycling of Salvageable Material

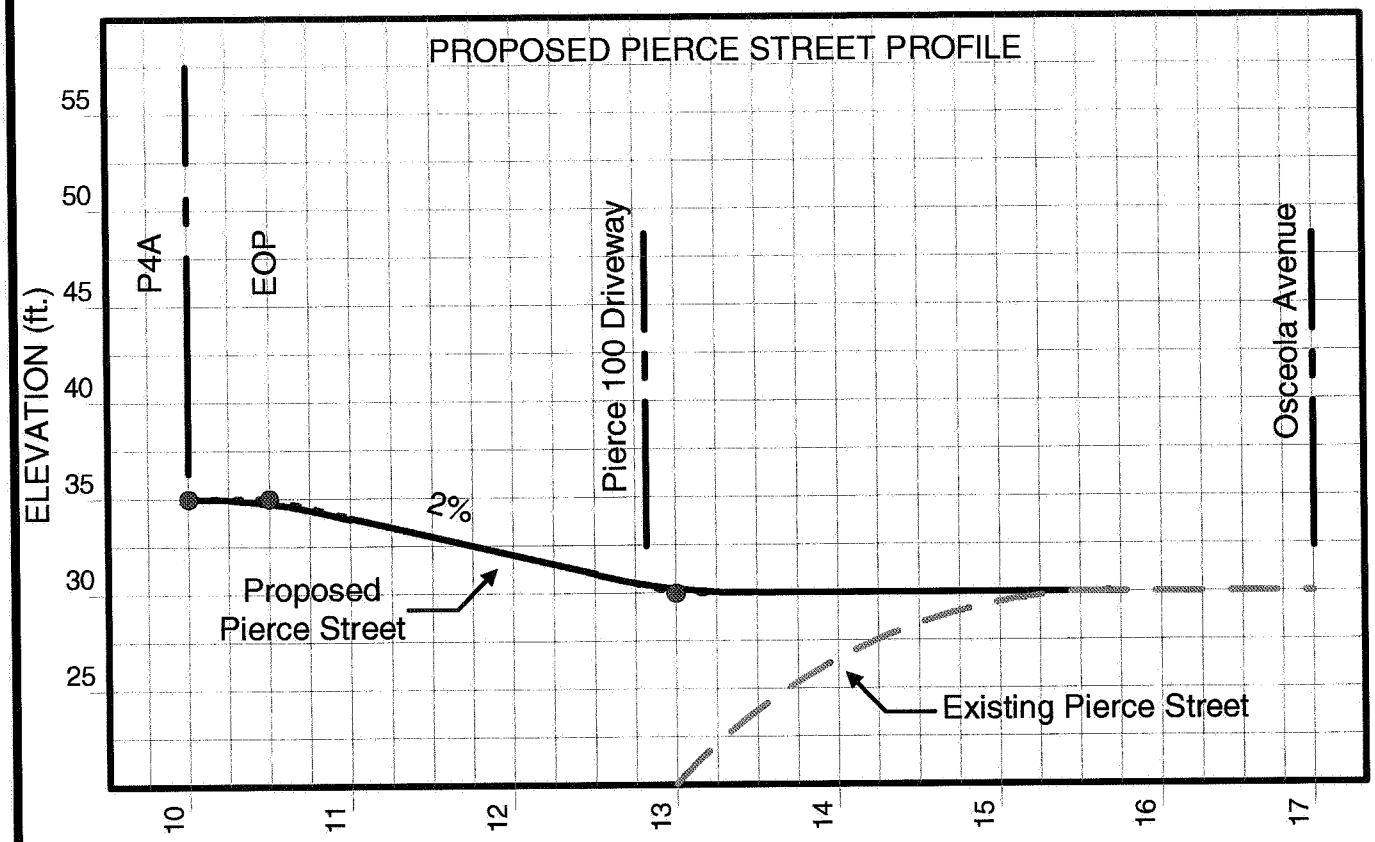
During construction of the project, recycling of re-usable materials will occur to the greatest extent possible. Where possible, milling of the existing pavement to use in the new pavement will be considered to reduce the volume of the materials that need to be hauled and disposed of away from the project and to reduce the cost of purchasing materials suitable for pavement construction. Other materials, such as signs, drainage concrete pipes, etc., will also be salvaged and re-used for regular maintenance operations if they are deemed to be in good condition.

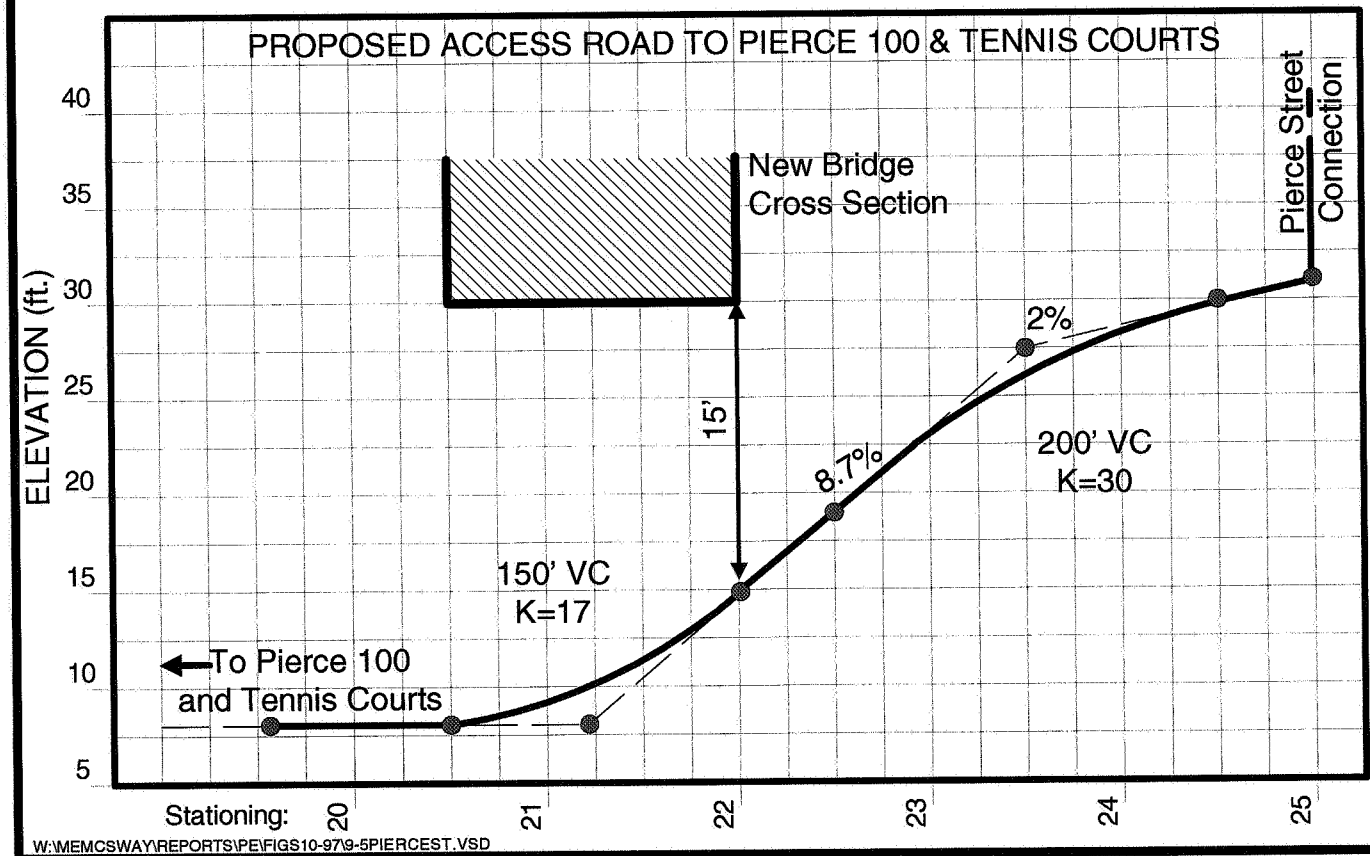
9.10 User Benefits

As part of the previous Feasibility Study (Reference 2-1), an estimate was made of the potential savings which could occur to motorists due to the elimination of bridge openings. The annual estimates amounted to:

	(Rounded Costs)
Delay cost due to bridge openings	$1,200,000
Vehicle operating costs	$52,000
Total average annual savings	$1,300,000

The delay costs were based on projected traffic volumes experiencing delays based on queuing theory, using an average weighted cost of delay for autos and trucks of $15.31





W:\MEMCSWAY\REPORTS\PE\FIGS10-97\9-5PIERCEST.VSD

Memorial Causeway Bridge PD&E Study	**PROPOSED PROFILE FOR "PIERCE STREET CONNECTION" AND CONNECTION TO PIERCE 100**	**EXHIBIT 9-6** 6/11/97

EXHIBIT 9-8 -- COST ESTIMATE FOR THE PREFERRED ALTERNATIVE

Alt. P4A with the Pierce Street Connection & 74' Vertical Clearance

Cost Item	Units	Est. Unit Cost	Quantities	Costs in 1,000's	Comments
Bridge-Related Items					
New Bridge Const.					Total structure length = 2170'
1000's of	SF		232.6		Includes 670' @ 111.6' width + 1500' @ 105.2' width
Concrete Segmental [1]	SF	**$77**	232.6	17,910	Based on other similar bridge costs around the state[1]
FL Bulb Tee	SF	$60			Not used in *this* spreadsheet.
Existing Bridge Removal [2]	SF	12	77,390	929	
Conc. Appr. Slab (inc steel)	SF	35	4,336	152	
Bridge Amenities	LS			1,800	Decorative light poles & luminaires, bridge underside lighting; decorative railings, scenic overlooks, special concrete finishes and colors, etc.
Subtotal Bridge Items				**20,791**	
Roadway Approaches					
West (causeway)	MI	1700	0.18	306	Unit costs based on FDOT's 1995-1996 Transportation Costs booklet (published August 1996) These costs include MOT, mobilizatioin, etc., and are based on statewide averages.
East (Pierce Blvd)	MI	2600	0.22	572	
Pierce St. Connector	MI	1800	0.12	216	
Roadway Subtotal				1,094	
Special Roadway Costs					
Pavement Removal	SY	5	2,500	13	
Conc. Barrier Wall	LF	60	1,350	81	
Earthwork (Embankment)	CY	8	35,000	280	
MSE Wall	SF	22	30,000	660	Also known as proprietary earth wall
Major Arch Culvert	LF	800	60	48	To provide access under Pierce St to underground storage vault owned by Calvary Baptist Church
New Traffic Signal	EA	100000	1	100	At intersection of Pierce St & Pierce Blvd.
Remove Exist.Traffic Signal	EA	10000	1	10	At Cleveland/Drew/Pierce
Special Guide Signs	LS			100	
Upgraded Landscaping	LS			300	
Drainage Ponds					**Not Applicable** for this project
Subtotal Roadway Approaches				**2,686**	
Channel Dredging/Excav.					**Not Applicable** for this alternative
Const. Subtotal				**23,476**	
MOT (10%) on bridge portion				2,079	Mobil. for roadway portion included in those per mile costs
Mobilization (5%) on bridge portion				1,040	MOT for roadway portion included in those per mile costs
CEI (15%)				3,521	(12% for CEI & 3% for testing labs)
Const Total Including CEI				30,116	
Design Costs				3,000	
ROW cost Estimate				2,400	
Utility Reloc.Costs Estimate				-	Cost to be borne by affected utilities
Grand Total				$35,516	Say $ 36 Million*

(*Estimate is only good to 2 significant digits)

Notes

[1] Includes cost of fender systems but not street lighting or any decorative features

[2] Exist. Bridge = 58' x 1024' + 450' x 40' (previous bridge) = 77,390 SF

per vehicle-hour. The vehicle operating costs include fuel, oil, depreciation, maintenance and repair costs. All unit costs were based on MicroBENCOST User's Manual, 1993, prepared by the Texas Transportation Institute (TTI).

9.11 Pedestrian and Bicycle Facilities

Sidewalks are proposed to be included on the outside of each bridge structure, assuming that a "twin structures" alternative is selected. These sidewalks are proposed to be a minimum of 2.0 m (6.6 ft) in width. The sidewalk on the south side is proposed to be a special bicycle/pedestrian facility 3.6 m (12 ft) in width. The bridges are also proposed to include paved outside shoulders which can be used by bicyclists in addition to emergency use by disabled vehicles. All sidewalks and bicycle pathways will tie into connecting facilities on the roadway approaches at either end of the proposed new bridge.

Bicyclists who approach the bridge on the north side will be encouraged through signing to use the south side of the bridge to cross the Harbor, since a special bike/ped facility is proposed for that side of the bridge. For bicyclists who prefer to use the north side of the bridge, they would be free to ride on the shoulder.

9.12 Safety

The proposed build alternative is expected to reduce existing traffic crash rates by providing a bridge facility which meets current design standards, including wider travel lanes, a median barrier, shoulders, and a barrier to separate pedestrians and motor vehicles. In addition, the horizontal and vertical geometry will be improved on the east roadway approaches which will also improve safety and allow for higher operating speeds.

9.13 Economic and Community Development

A separate study of the probable direct economic impacts of diverting traffic off of Cleveland Street in conjunction with the construction of a new bridge was performed by the USF's Center for Urban Transportation Research (CUTR) (Reference 9-2). The CUTR study concluded that businesses on Cleveland Street west of Myrtle Avenue could expect to lose between 0 and 5 percent of their sales due to traffic diversion from Cleveland Street. For businesses east of Myrtle Avenue, the average expected losses range from about 10 to 15 percent, based on an estimated 40 percent diversion of traffic off of Cleveland Street. Impacts to specific businesses could vary significantly, depending on their reliance on pass-by traffic for their business. Some of the most dependent businesses could be expected to relocate to the new "through" street (Court and Chestnut Streets) following the construction of a new bridge which ties into Court and Chestnut Streets. These businesses are predominantly located east of Myrtle Avenue.

The businesses in the central business district (Cleveland Street west of Myrtle) are mostly dependent on destination traffic and the large CBD employment base. The CBD is primarily a destination area and, overall, the economic impact on the CBD of diverting

the pass-by traffic is expected to be negligible. If redevelopment activities for the CBD are implemented (e.g., pedestrian amenities, streetscape improvements, expanded Coachman Park, special signing for businesses, etc.), reduction of traffic and congestion in the CBD could help make the downtown a more attractive destination area, resulting in *increased*, not decreased, sales.

The proposed vision of the Clearwater Downtown Redevelopment Plan (Reference 8-1) includes a Traditional Town Center with the following elements:

- the government center
- supporting commercial and retail uses
- an entertainment district
- new residential focus
- an amenity structure built around the Harborview Park, etc.

Specific goals of the plan which are designed to support the vision include:

- People Goal—To redevelop downtown Clearwater into a successful "people place" that attracts, retains, and inspires those of all ages and incomes to use and enjoy the community town center.

- Movement Goal—To redevelop downtown Clearwater with an efficient, high quality, multi-modal movement system with supportive and visually positive terminal and transition facilities for all modes.

- Activity Goal—To redevelop downtown Clearwater to provide a broad and diverse set of activity centers that accommodate, stimulate and reinforce residing, working, visiting and purchasing in a great waterfront town center.

- Amenity Goal—To redevelop downtown Clearwater to create and enhance a small town center "quality of life" that attracts and sustains a diversity of visual and use elements for cultural, entertainment, recreation and environmental experiences.

- Opportunity Goal—To redevelop downtown Clearwater to attract and continue a process of value creation action that invests time, dollars, resources and creativity to enhance the value, tax base, image and quality of life for Clearwater.

The proposed bridge replacement project is designed to support the above goals, by removing the through traffic from the heart of downtown, thereby decreasing traffic congestion in the CBD resulting in a more pedestrian-friendly environment. It will also make it possible to expand Coachman Park to the west and south, which would further support the above goals.

9.14 Environmental Impacts

Economic and community development impacts are addressed in Section 9.13 above. Other potential areas of impact include air, noise, hazardous wastes/petroleum contamination, wetlands and wildlife, and floodplains. More detail on these impacts is contained in the Draft Environmental Assessment prepared for this project.

9.14.1 Air Quality

The proposed bridge replacement was subjected to an Air Quality Screening Test (Reference 4-4) for carbon monoxide (CO) using the manual screening test, as described in the Florida Department of Transportation's Project Development and Environment Study Manual, Part 2, Chapter 16. This screening test uses a number of parameters including speed and traffic volumes to determine the critical distance between given intersections and receptors. The critical distance is defined as the closest a receptor can be to any leg of a given intersection without experiencing any chance of a significant air quality impact. The screening test for urban areas was used for this analysis.

The receptors which were used for this analysis include the Pierce 100 Pool area, Bayfront Tennis Complex, Coachman Park, and the fishing pier (located just south of the existing bridge).

For Alternative P4A, the closest receptor was found to be the Bayfront Tennis Complex. For each of the intersections, the critical distance is always less than the distance to the closest receptor. The project therefore will not have a significant impact on air quality and passes the air quality screening test. The proposed project is exempt from the requirement that a conformity determination be made pursuant to 40 CFR 51.460.

9.14.2 Noise Impacts

A noise study was conducted to evaluate potential noise impacts with the proposed improvements (Reference 9-4). A total of 123 noise sensitive sites were identified as having the potential to be affected by traffic-related noise. Of the 123 sites, 119 are located at multi-family residences (118 sites at Pierce 100 Condominiums and 1 site at a retirement facility west of Bay Avenue), and 4 sites are recreational (3 sites at the Bayfront tennis courts located east of the project and 1 site at Coachman Park).

The FHWA approved STAMINA Noise Model was used to predict existing and future Build/No-Build noise levels using the predicted design hour demand volumes or level-of-service "C" volumes, whichever are less.

The Noise Study Report contains a table which gives future No-Build and Build noise levels for all 123 noise sensitive sites. Future noise levels with the project are predicted to be below the Federal Highway Administration's Noise Abatement Criteria (NAC) at 121 of the 123 noise sensitive sites and just approach the NAC at 2 of the sites (at the Bayfront tennis courts). The results for specific sites are summarized below.

Pierce 100—Existing and future No-Build noise levels at the Pierce 100 Condominiums are predicted to range from 58 to 62 dBA. With the project, noise levels are predicted to range from 59 to 64 dBA, levels which are below the NAC threshold. Most of the units will experience noise level increases of 1 or 2 dBA; 5 units are expected to experience increases of 3 dBA. The increases in noise levels are a direct result of changes in the relative distance of the two bridges to each of the units and changes in the elevational relationship of both bridges to each unit.

Coachman Park—Existing and future No-Build levels at Coachman Park (at the "bandshell" [stage]) are predicted to be 65 dBA, just approaching the NAC. With the project, noise levels are expected to decrease to 61 dBA, a reduction of 4 dBA.

Bayfront Tennis Complex—Existing and future No-Build noise levels at the tennis courts south of Cleveland Street range from 65 to 70 dBA, levels both approaching and exceeding the NAC. With the project, these levels are expected to decrease to 63 to 65 dBA, a reduction of 2 to 6 dBA depending on the court location. Despite the expected reduction in noise levels, future noise levels with the new bridge are still expected to *approach* the NAC at 2 of the sites. The first site is expected to change from 70 dBA (existing and future No Build) to 65 dBA (future Build). The second site is expected to change from 67 dBA (existing and future No Build) to 65 dBA (future Build).

Noise Abatement Considerations—As required by the FHWA, noise abatement measures were considered for the 2 sites predicted to have noise levels approaching the NAC with the project. The measures considered for this project were traffic management, alternative bridge alignments, and the construction of noise barriers. Each of these is discussed in greater detail in the Noise Study Report.

- Although feasible, **traffic management measures** are not considered to be a reasonable noise mitigation measure for this project.

- Although feasible, **alternative alignments** would increase impacts unrelated to noise in the area surrounding the project. Therefore, this measure is considered to be unreasonable.

- **Noise barriers**—Noise levels at the Bayfront Tennis Complex are predicted to just approach the NAC (65 dBA). The results of the barrier analysis indicated that a barrier 3.65 m (12 ft) in height would not reduce noise levels at this site due to the width of the roadway and the alignment/elevation of the proposed bridge structure. Barriers of greater height are not recommended on bridge structures. Because a barrier of reasonable height would not provide even the minimum required reduction in noise levels (5 dBA), a barrier is not recommended to reduce noise levels at this location.

Based on the results of the evaluation, there appear to be no reasonable methods to reduce predicted noise levels for the 2 sites.

Temporary noise impacts during construction will be controlled by enforcement of the FDOT *Standard Specifications for Road and Bridge Construction.*

9.14.3 Hazardous Wastes/Contamination

This area is covered in Section 4.3.4. Involvement with the Courthouse Annex site is expected. Prior to construction, further soil and groundwater testing will be necessary to determine the extent of contamination and type of remediation required, if any.

9.14.4 Wetlands

A variety of wetland communities are present within the proposed project area (Exhibit 4-22). Wetland communities include estuarine intertidal unconsolidated shore, mangroves, intertidal sea grass and algae beds, subtidal sea grass beds, salt marsh, and subtidal unconsolidated bottom. A wetland location map is provided as Exhibit 4-23 (Reference 4-6).

The sea grass beds (sites 3 and 5) include three species of sea grass: shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*) and turtle grass (*Thalassia testudinum*). Shoal grass beds exist within the intertidal zone (Wetland 3), adjacent to the northern and southern sides of the causeway shoreline. Manatee and turtle grass beds exist within the shallower portions of the subtidal zone, to a depth of approximately 1.8 m (6 ft) (Wetland 5). These turtle and manatee grass beds exist to the north and south of the causeway and to the south of the bridge, along the eastern shore.

Submerged and intertidal sea grass beds are considered high quality, providing various water quality and habitat functions. Collectively, the sea grass beds provide refuge, substrata, and/or sustenance for a variety of plants and animals. Various macro-algae species exist among the beds, both along the substrate and epiphytically on the leaves. Numerous fish species utilize these areas during larval, juvenile, and adult life stages. Crustaceans (shrimp, crabs), Echinoderms (urchins), Gastropods (whelk, conch), marine mammals (dolphins, manatee), sea turtles (green, loggerhead), various wading birds (herons, egrets), and numerous other organisms also utilize these sea grass beds.

Mangroves exist along the western portion of the project area (Wetland 4), primarily along the northern side of the causeway. The dominant species is black mangrove (*Avicennia germinans*) with scattered red mangroves (*Rhizophora mangle*) waterward of the black mangroves. This community provides cover for aquatic wildlife, and provides a critical link in the food chain through leaf fall, resulting in detritus for micro and macro invertebrates.

Wetland impacts expected as a result of the proposed project are approximately 131 m^2 (1412 ft^2) of algal bed, sandy shore and mangroves, along the southern portion of the existing causeway. Of this total, 4.4 m^2 (47 ft^2) are mangroves. Impacts to the wetlands were calculated using 1:2000 scale aerial mapping overlain by the project alternative. Potential mitigation options are described in the draft Environmental Assessment.

9.14.5 Wildlife

This project has been evaluated for impacts on threatened and endangered species. A literature review was conducted to determine those possible threatened or endangered species which may inhabit the project area. This search resulted in findings that no listed species would be affected by the proposed action. This determination was made after review of the advance notification responses and field survey of the project area by a biologist. The potential for impacts to critical habitat was also assessed as the relationship of the project to the Fish and Wildlife's designated "Critical Habitat".

Coordination with United States Fish and Wildlife Service was completed prior to the determination. USFWS concurred with the determination that no Federally listed endangered or threatened species or critical habitat will be adversely affected by the proposed project.

A continuous Manatee and Sea Turtle Watch Program (MWP) will be established to minimize the potential impacts of bridge construction on manatees and sea turtles. The conditions which shall constitute the MWP are provided in Appendix F and have received concurrence with USFWS.

9.14.6 Floodplains

The following information has been extracted from the Location Hydraulic Report (Appendix C) prepared for this project and updated:

1. No impacts to drainage areas are anticipated to occur with any of the Memorial Causeway Bridge replacement alternatives. Flows through the bridge crossing are a result of tidal fluctuation and flushing of the coastal harbor, and are not subject to backwater conditions. Landward alignment alternatives for the new bridge will not block existing drainage patterns due to the new bridge spanning over areas subject to storm water surface runoff and conveyance. Any proposed bridge storm water collector system connections to existing storm water pipe systems will be evaluated and sized to minimize any additional backwater conditions. In reference to areas of potential flooding, the FEMA Flood Insurance Study for the City of Clearwater identifies the flooding source as the Gulf of Mexico which tidally circulates harbor flows both upstream and downstream of the bridge crossing. Consequently, the bridge crossing hydraulic effects on areas of potential flooding are considered to be negligible.

2. The existing bascule bridge was built in 1963, making it 34 years old in 1997. The bridge has proved adequate to handle the water flows associated with the harbor while requiring only routine maintenance of the structure. The bridge was inspected on June 30, 1996 and although it was rated as functionally obsolete, the bridge's channel and channel protection, and scour assessment were given a rating of 7 and 6 respectively, or "good" and "satisfactory condition". The proposed bridge will maintain as a minimum the pre-existing harbor crossing width.

3. The frequency of traffic interruption due to flooding is controlled primarily by the elevation of the existing causeway beyond the limits of the existing or proposed bridge. Table 3 of the FEMA flood study outlines still water flood stages for 10 year through 500 year reoccurrence storms. It is noted that the existing causeway (west bridge approach) elevation 2.44m (8.0 NGVD) would be over topped by the 50 year still water flood stage 2.71 m (8.9 NGVD). In addition, based on these FEMA flood stages, similar flood conditions would occur at the mainland approach of the existing bridge. It is noted that the proposed bridge includes a mainland approach above the floodplain, thereby reducing facility flooding to the extent practicable. Since the existing causeway and barrier island destinations are below the base floodplain elevation, improvement of these flood conditions are beyond the scope of this bridge replacement project.

4. All proposed bridge alignment alternatives will maintain as a minimum the pre-existing harbor crossing width. The existing bascule bridge has proven to provide adequate hydraulic performance . Due to the tidal nature of the harbor crossing bridge hydraulics, no significant change in discharge capacity, backwater or surface water elevation is likely to occur as a result of the proposed bridge project.

5. The proposed bridge replacement improvements are perceived to not cause any flood water related impacts on emergency services or evacuation by virtue of increased vertical clearance and mainland spanning of the base floodplain.

6. This project is located in a Tidal Influenced area which has a storm surge associated with the 100 Year Flood within harbor waters of the Gulf of Mexico. Therefore, there is very little likelihood of flood risk or overtopping as a result of the proposed bridge project.

7. Quantifying encroachment for floodplain compensation is not required since this project is located in a tidal storm surge Floodplain. However, the bridge approaches associated with the proposed project are anticipated to generate on the average no more than 1.0 hectare (2.5 acres) of embankment fill area. Most of this fill quantity would be situated on the mainland bluff areas and out of the "still water" base flood elevation 3.17 m (10.4 NGVD).

8. There are no transverse or longitudinal floodplain encroachments.

9. No known impacts to any regulated floodways would occur as a result of the proposed bridge replacement project.

10. The known floodplain category within the limits of the proposed bridge is the 100 year flood storm surge elevation defined by FEMA as zone VE, 3.96 m (13.0 NGVD). In addition, the FEMA flood study identifies the 100 year still water base flood stage at elevation 3.17 m (10.4 NGVD).

11. Proposed bridge drainage measures were outlined as being in compliance with the water management district during the project's pre-application meeting. The proposed drainage measures include waterward bridge drainage scuppers and landward bridge deck storm water collector drains and pipe systems. In addition, bridge deck drainage systems at the causeway approach will discharge into spreader swales situated along the causeway roadsides providing attenuated broadflow discharge to Clearwater Harbor. The bridge deck drainage systems at the mainland approach will discharge into existing or improved storm water pipe systems discharging to scour abatement dissipater pools proposed at the pipe outfalls along the Clearwater Harbor waterfront. The Memorial Causeway Bridge replacement project is consistent with the City of Clearwater's Downtown Redevelopment plan and the MPO's Long Range Transportation Plan.

12. Based on the fact that both the island communities and downtown Clearwater are already developed within their base floodplain areas, the proposed Memorial Causeway Bridge replacement is not considered to be a catalyst for encouraging new development. However, the proposed project is integral to the City's plans for redevelopment of downtown Clearwater and the expansion of Coachman park.

13. Since this project is not within any regulated floodways, no coordination with FEMA regarding this issue is required. The disposition of this project's exemption from encroachment compensation in a tidal surge floodplain was addressed during the pre-application meeting with the Southwest Florida Water Management District.

14. Based on determinations outlined in the above engineering information, the flood risk associated with the Memorial Causeway Bridge replacement alternatives is considered to be of *insignificant* impact to floodplain issues involving risks to highway users, facility interruption, properties and development, and beneficial floodplain values.

Therefore, since the proposed bridge replacement would basically maintain the existing waterway crossing corridor (to the extent allowable due to traffic control use of the existing bridge during new bridge construction), and no previous history of drainage problems are evident, the Memorial Causeway Bridge replacement project is considered to be a Floodplain Evaluation Category 4.

The proposed structure will perform hydraulically in a manner equal to or greater than the existing structure, and backwater surface elevations are not expected to increase. As a result, there will be no significant adverse impacts on natural and beneficial floodplain values. There will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

9.14.7 Cultural / Recreational Resources

Existing cultural and recreational resources are described in Section 4.3.2. The following excerpt is from the Section 106 Consultation Case Study Report prepared for the project (Reference 9-5).

> Because the proposed Preferred Alternative generally follows the existing Pierce Boulevard alignment, impacts to all but one of the historic properties located within the area of potential effect will be avoided.
>
> For the *National Register*-eligible Haven Street House, it is expected that the Preferred Alternative will have a minor effect on the site's visual setting, although the effect would *not* be adverse. For the remaining sites described [in the Case Study Report], the Preferred Alternative is expected to have no effect on the characteristics which qualify them for listing or eligibility for listing on the *National Register*.

A Section 106 Consultation Case Study Report was completed for several historic properties. On April 9 1998, the FHWA, in concurrence with the State Historic Preservation Office, issued a finding of "no adverse effect" for the Haven Street House and "no effect" for the other historical properties with potential Section 106 involvement. The Executive Director of the Advisory Council of Historic Preservation in Washington DC has concurred with this finding.

There are three sites with recreational uses located within the study area:

- Bayfront Tennis Complex
- Old bridge approach fishing pier
- Coachman Park

For these three sites, a Section 4(f) Determination of Applicability package (Reference 9-6) was prepared and submitted to the Federal Highway Administration (FHWA). On April 13, 1998, the FHWA issued a finding of no Section 4(f) involvement for the proposed project.

9.15 Utility Impacts

Existing utilities in the study are described in Section 4.1.12 earlier in this report. Conceptual design plans of the Preferred Alternative have been sent to all known utility owners for the study area. The plans included a letter requesting a ballpark cost estimate for utility relocation. As of the date of publication of this report edition, responses have been received from only one owner, GTE (telephone), and no cost estimate was provided.

Preliminary utility relocation costs estimates have been prepared as shown in Exhibit 9-9. These costs are expected to be borne by the affected utilities.

EXHIBIT 9-9
PRELIMINARY UTILITY RELOCATION COST ESTIMATES

Utility	Memorial Causeway m (ft)	Pierce St. & Pierce Blvd. m (ft)	Totals m (ft)	Reloc. Unit Cost Estimate $/m ($/ft)	Total $
Water	427 (1,400)	914 (3,000)	1,340 (4,400)	82 (40)	176,000
Sanitary Sewer	427 (1,400)	914 (3,000)	1,340 (4,400)	82 (40)	176,000
Gas	427 (1,400)	152 (500)	580 (1,900)	66 (40)	76,000
Electric Power	427 (1,400)	914 (3,000)	1,340 (4,400)	33 (20)	88,000
Telephone	427 (1,400)	914 (3,000)	1,340 (4,400)	33 (20)	88,000
CATV	427 (1,400)	914 (3,000)	1,340 (4,400)	33 (15)	66,000
Subtotal					$670,000
Contingencies for unknown/other utilities					$130,000
Total including contingency					$800,000

9.16 Traffic Control Plan

A conceptual construction staging and maintenance of traffic (MOT) plan is given below. This plan will be refined and detailed during the final design phase.

1. Relocate all potentially-impacted utilities.

2. On the causeway, construct temporary pavement on the north side of the existing roadway.

3. Remove the old fishing pier bridge approach.

4. Begin construction of the new bridge at the west end.

5. Maintain marine traffic the entire duration of construction. Traffic on the existing bridge is also to be maintained during the entire duration of construction.

6. Construct temporary pavement along the east side of Pierce Boulevard, so that existing traffic can be maintained while the bridge structure is completed. Short-term closures may be required during construction of footings and piers near the south end of the new bridge.

7. At the west end of the new bridge, route traffic to the temporary pavement so that the new roadway approach to the bridge can be constructed. (Temporary sheet piling or other forms of walls may be required to avoid overlap of embankment with the temporary pavement.)

8. Find or construct temporary parking for courthouse annex surface parking lot patrons.

9. Detour westbound traffic on Court Street up Osceola and then westbound on Pierce Street to Pierce Boulevard. Close Pierce Boulevard south of Pierce Street to northbound traffic to construct the south approach to the new bridge on wall and embankment. Construct temporary pavement on Pierce Boulevard, as required, to maintain one lane of southbound traffic on the west side while the grade on the east side is raised to match the elevation of the south end of the new bridge. This will require temporary walls. When the east side of Pierce Boulevard is built up, move eastbound traffic to the east side using the new bridge and build up the west side of Pierce Boulevard to match the grade on the east side.

10. Move eastbound traffic back to the west side of the bridge and the west side of Pierce Boulevard, and re-route westbound traffic on Court Street back to the east side of Pierce Boulevard.

11. Construct the raised portion of Pierce Street where it ties into the bridge roadway approach, then close Pierce Street and raise the rest of the roadway to tie into the new bridge approach on Pierce Boulevard. Also construct the new access road to Pierce 100 and to the tennis complex. Add the new traffic signal at Pierce Boulevard and Pierce Street. During this phase, Pierce 100 will have access to Pierce Boulevard north of Pierce Street.

12. Open up the new intersection of Pierce Street and Pierce Boulevard.

13. Close the old bridge to all traffic.

14. Remove the old bridge.

15. Remove the existing Pierce Boulevard pavement south of Cleveland Street.

9.17 Results of Public Involvement Program

A total of four (4) Local Interest Group (LIG) meetings were held in addition to the alternatives public workshop. A brief summary of these meetings is included here, and memos documenting these meetings in more detail are included in the Comments and Coordination report. In addition to the five meetings described here, numerous presentations have been given to the Metropolitan Planning Organization (MPO) and its committees, community organizations, civic associations, and city advisory boards.

Agency participation and comments were encouraged early on through the issuance of an Advance Notification (AN) package on March 22, 1996. A copy of the AN package, including responses received, is included in the Comments and Coordination report. An AN supplement was issued on August 5, 1996 following the conversion of the

environmental process from a State Environmental Impact Report (SEIR) to a federal process.

The purpose of the Local Interest Group (LIG) was to encourage participation of those members of the community who wanted to be more involved in the details of the study. The responsibilities of the LIG group were to advise the City and its consultants, review key study products, identify concerns and opportunities, assist in the development of design concepts, help to develop consensus, and participate in the formal public meetings. The membership of the LIG was open to all interested citizens; however, certain agency representatives, citizens, and other groups with an identifiable interest in the study were invited to participate. The membership of the LIG was composed primarily of local residents impacted by the proposed project, downtown Clearwater business owners, and other groups including the Downtown Development Board, Clearwater Beautification Committee, and the Clearwater Chamber of Commerce. The attendance at the LIG meetings ranged from 36 people at the first meeting to 110 people at the fourth meeting.

Each of the four LIG meetings were directed toward a specific purpose as described below. The LIG meetings were designed to build upon prior meetings, and the format of later meetings was modified based on the input of LIG meeting attendees.

The **first LIG meeting** was held on the evening of March 28, 1996 at Clearwater's Harborview Center. The purpose of the first meeting was to provide an overview of the study, as well as an opportunity for LIG members to identify important design and community issues related to the proposed project. The brainstorming process resulted in the identification of topics of concern to be examined further by the study team.

The **second LIG meeting** was held on the evening of May 23, 1996 at the Peace Memorial Presbyterian Church in downtown Clearwater. The purpose of this meeting was to expand on the topics of concern which were identified at the first meeting. These topics were broken down into four main areas: process (funding and need); navigation, harbor, environment, causeway removal and fishing facilities; traffic and economic development; and urban design. After a project update, the attendees were divided into four smaller groups representing each of the areas of concern. The questions developed from the brainstorming process were used to focus the group discussions. Following the breakout session, a spokesperson for each group summarized the comments on their topic for the rest of the LIG members. In addition, updated information was presented on the alternative alignments and design opportunities for the proposed bridge.

The **third LIG meeting** was held on the evening of June 27, 2996 at the Peace Memorial Presbyterian Church. The purpose of this meeting was to look at the topics and comments from the past meetings and verify which issues were important to LIG members. The criteria to be used to evaluate these issues was also determined. In addition, an overall project update and presentation of the alternative alignments was also provided by the study team. Exhibits 9-10 and 9-11 summarize the LIG-developed issues and criteria in ranked order.

EXHIBIT 9-10
LOCAL INTEREST GROUP MEMBERS RANKING OF OVERALL ISSUES

Ranking Order	Issues in Ranked Order	Relative Weight*
1	Affect mobility downtown?	2.9
2	Affect the goals for downtown and economic development?	2.9
3	Cost of the bridge?	2.5
4	Ensure pedestrian and bridge safety?	2.5
5	Encourage potential new uses of the waterfront?	2.1
6	Affect the environment?	1.9
7	Affect the causeway?	1.9
8	Affect the views from important locations?	1.9
9	Affect navigation?	1.8
10	Enhance Pierce 100?	1.0

* Relative Weight represents the importance of the higher ranked criteria in relation to the lowest ranked criteria (i.e. 4.0 = 4 times as important than the lowest ranked criteria)
This ranking of the issues represents the distribution of responses which were received from the LIG member survey

The **fourth and final LIG meeting** was held on October 15, 1996 in the Calvary Baptist Church Education Building in downtown Clearwater. The beginning of this meeting was an open house format at which the LIG members had an opportunity to view the alternatives currently under consideration and ask the study team questions informally. The formal portion of the meeting included an update to the project, discussion of new alternatives, and presentation of the findings of the downtown economic impacts study conducted for the project. In addition, the LIG members were given an opportunity to

EXHIBIT 9-11
LOCAL INTEREST GROUP MEMBERS' RANKING OF STUDY CRITERIA

Ranking Order		Relative Weight*
#1:	**How should the bridge affect mobility downtown and to the beach?**	
	Criteria	
1	Demonstrate it can accommodate all present and potential traffic flow	**7.4**
2	Ease flow between beach and downtown	**6.1**
3	Reduce or eliminate delays (and back-ups) due to bridge openings	**5.8**
4	Improve safety, particularly during evacuations	3.8
5	Reduce conflicts between east-west and north-south traffic flows	2.9
6	Improve pedestrian crossing opportunities, consider overhead crossing or innovative approaches	1.7
7	Have a backup plan for the seasonal peaks	1.0
#2:	**How should the new bridge location affect the goals for economic development of the beach and downtown particularly with respect to the Downtown Development Plan?**	
	Criteria	
1	Encourage destination trips vs. through trips	**5.1**
2	Reduce traffic back-ups in downtown, not traffic destined for downtown	**5.0**
3	Facilitate and encourage travel to downtown destinations such as Harborview Center	**4.2**
4	Help make downtown a "people place"	**4.1**
5	Free up waterfront land for non-roadway uses	2.8
6	Create a positive perception of the City's progressive approach to development	2.6
7	Create a positive symbol for the City	1.5
8	Improve pedestrian and bicycle access to downtown	1.5
9	Encourage connections to the Pinellas Trail	1.0
#3:	**How should cost be considered?**	
	Criteria	
1	Balance value with cost	**4.4**
2	Be as inexpensive as possible, only the minimum should be spent on this bridge	1.5
3	Disregard costs, expense should not be a limitation	1.0
#4:	**How should the new bridge ensure pedestrian and bicyclist's safety?**	
	Criteria	
1	Minimize traffic conflicts between car, pedestrians, and bicycles	**3.2**
2	Ensure cars, pedestrians, and bicyclists are in full view of each other before they enter zones of conflict	2.0
3	Calm traffic in zones where there is opportunity for conflicts between bicycles and pedestrians	1.4
4	Improve safety and efficiency during evacuations	1.0
#5:	**How should the bridge encourage potential new uses of the waterfront?**	
	Criteria	
1	Create physical opportunity for pedestrian/waterfront activities	**2.8**
2	Create physical opportunity for park extension	2.0
3	Provide pedestrian and bicycle connections	1.4
4	Provide an attractive well-lit underside	1.0

EXHIBIT 9-11 (CONTINUED)
LOCAL INTEREST GROUP MEMBERS' RANKING OF STUDY CRITERIA

Ranking Order		Relative Weight*
#6:	**How should the bridge affect the environment?**	
	Criteria	
1	Improve harbor flushing and water circulation	**2.2**
2	Preserve wetlands and seagrass beds	**1.4**
3	Improve air quality	1.2
4	Minimize effects on historic and cultural resources	1.1
5	Reduce noise	1.0
#7:	**How should the high-level bridge affect the causeway?**	
	Criteria	
1	Provide pedestrian and bicycle connections (e.g. from one side of the causeway to the other)	**1.1**
2	Minimize shortening or removal of the causeway	**1.0**
3	Provide opportunities for recreational facilities	**1.0**
#8:	**How should the bridge affect the views from important locations?**	
	Criteria	
1	Be attractive from all vantage points	**1.7**
2	Preserve/enhance views from Coachman Pk., HarborView Ctr., City Hall Terr., Island Est. and Pierce Boulevard	**1.5**
3	Make the underside view of the bridge attractive to encourage productive or positive use of the area around the bridge	1.1
4	Enhance center-line view down Cleveland Street	1.0
#9:	**How should the new bridge affect navigation?**	
	Criteria	
1	Eliminate delay or a barrier for most marine traffic	**1.5**
2	Improve safety for marine traffic, particularly during evacuations	1.0
3	Minimize relocation of the existing channel	1.0
#10:	**How should the bridge enhance Pierce 100?**	
	Criteria	
1	Not have a negative impact on property values	**4.0**
2	Improve access with less traffic conflicts	**3.8**
3	Improve safety of access for pedestrians and drivers to Coachman Park and downtown	2.3
4	Minimize or reduce noise levels of Pierce 100	2.1
5	Improve the view of the bridge	1.7
6	Minimize construction impacts	1.6
7	Create additional activity opportunities nearby	1.0

* Relative Weight represents the importance of the higher ranked criteria in relation to the lowest ranked criteria (i.e., 4.0 = 4 times as important than the lowest ranked criteria.)

The **bold** numbers represent the most important criteria.

These criteria and issue rankings represent the distribution of responses which were received from the LIG member survey.

evaluate each of the alternatives relative to the criteria and issues determined by the LIG in the earlier meetings. At the end of the meeting, the LIG members were asked to "vote" as to which alternative they preferred. Of the build alternatives, the top choice was Alternative P4NE and the second most popular choice was Alternative P4S.

The LIG meetings provided the study team with an opportunity to receive feedback from interested citizens throughout the PD&E study. These meetings helped the study team focus on the issues which were of concern to community groups. In addition, LIG ideas were used to develop or refine three of the five alignment alternatives.

The **Alternatives Public Workshop** was held on December 3, 1996 at the First Christian Church in Clearwater. All property owners located within 91.4 m (300 ft) of the centerline of any proposed alternative were notified by letter in advance of the meeting. The purpose of this workshop was to present information to the public regarding the various alternative alignments under consideration. In addition, the public was given an opportunity to comment on the project through written comments, statements to a court reporter, or oral statements to the group. Unlike the LIG meetings, the aim of this workshop was to involve a broader segment of the general public. Therefore, this meeting was formally advertised in the *St. Petersburg Times*. The workshop was held as an open house format with a brief formal presentation and public comment period included. A summary of public comments received is included in the Comments and Coordination report.

The **Public Hearing** was held on August 27, 1998 at the Harborview Center at 300 Cleveland Street , Clearwater, Florida. The Public Hearing was held in accordance with the Federal Aid Highway Act of 1968, as amended; 23 U.S.C. (United States Code) 128; 40 CFR (Code of Federal Regulations) 1500-1508; 23 CFR 771, Section 339.155, Florida Statutes, and Titles VI and VIII of the Civil Rights Act. The Public Hearing was also conducted consistent with the Americans with Disabilities Act of 1990.

Conceptual plans and draft PD&E documents were on display at the Clearwater Library, Main Branch at 100 North Osceola Avenue, in downtown Clearwater for twenty one (21) days prior to and ten days following the Public Hearing.

The Public Hearing was held to present the proposed preferred Build Alternative and the No-Build Alternative to the public and to solicit comments from interested citizens. The Hearing was divided into two parts; an informal session was conducted from 4:30 p.m. to 6:00 p.m. and again from 7:00 p.m. to 7:30 p.m. to give the public a chance to view the graphics and documents on display. The formal portion of the Hearing began at 6:00 p.m. and adjourned at approximately 7:00 p.m. Handouts containing pertinent information about the project were available for all in attendance. A tally of the official sign-in sheets indicates that 79 people registered at the Public Hearing, including FDOT staff, City of Clearwater staff and the City's consultants. A copy of the Public Hearing handout and sign-in sheets can be found in the Comments and Coordination Report prepared for this project.

Graphic exhibits and aerial photographs depicting the conceptual design, location and potential impacts for the proposed preferred Build Alternative were on display. In addition, a continuously playing video presentation that provided information on the project's history and the public hearing process was available for viewing during the informal portions of the Hearing. Various PD&E documents were available for review, and representatives from the FDOT and the City of Clearwater were present to discuss the project, answer questions and listen to comments. Two court reporters were in attendance to take statements from the public, as well as record the formal portion of the Hearing. The formal portion of the Hearing included opening statement by the hearing officer, an explanation of the public hearing process, and a public comment session. A copy of the Official Public Hearing Transcript can be found in the Comments and Coordination Report.

Twelve (12) people presented verbal comments during the formal comment session, one (1) person made a statement to the court reporter, and approximately fifteen (15) written comments were received at the Public Hearing or within the 10 day comment period. The written and verbal comments fall into three categories.

First, ten (10) of the verbal and written comments received were in opposition to the proposed high-level fixed-span bridge. The majority of the opposition was from nearby Pierce 100 condominium residents concerned with their views. Other opposition was from citizens who thought the City of Clearwater should wait to build the bridge, because of the potential for the State to pay the full cost of replacing the bridge in the future. Other citizens were concerned about the view of Clearwater Harbor from the bluff near downtown.

Second, seven (7) of the verbal and written comments received were in favor of the new bridge but had some additional suggestions regarding the alignment. Many of these alignments have been evaluated during either the initial feasibility study or during the current PD&E study and have been determined to be non-viable because of the high impacts to the environment and Section 4(f) resources, as well as the large right-of-way or construction costs associated with them.

Finally, eleven (11) of the written and verbal comments were in favor of the new bridge on the existing alignment. Several of the written comments received have supporting editorials and letters from other citizens written prior to the Public Hearing. The favorable comments received were from a variety of sources, including a Clearwater Beach business owner, beach residents, and mainland Clearwater residents. In addition, two of these citizens had questions regarding the Noise Analysis Study completed for the project, but are not opposed to the project.

9.18 Value Engineering

No Value Engineering process was conducted as part of this PD&E study.

9.19 Drainage and Stormwater Management

Existing drainage basin characteristics are described in Section 4.1.7.

Proposed System

Proposed bridge drainage measures will maintain the overall pre-existing drainage flow patterns evident in the existing drainage characteristics in addition to the following. The proposed bridge spans include waterward bridge drainage scuppers and landward bridge deck storm water collector drains and pipe systems. In addition, bridge deck drainage systems at the causeway approach will discharge into spreader swales situated along the causeway roadsides providing attenuated broadflow discharge to Clearwater Harbor. The bridge deck drainage systems at the mainland approach will discharge into existing or improved storm water pipe systems discharging to scour abatement dissipater pools proposed at the pipe outfalls along the Clearwater Harbor waterfront.

On March 20, 1996, a pre-application meeting was held with the Southwest Florida Water Management District to discuss the project's proposed drainage. Recognizing that Clearwater Harbor is an Outstanding Florida Water, the Southwest Florida Water Management District determined that no additional water quality treatment was necessary because the proposed project is a bridge *replacement* with no increase in capacity. Therefore, the proposed drainage system, including waterward bridge scuppers and landward bridge deck storm water collector drains and pipes, is sufficient.

Flood Plain Designations

This project is located in a Tidal Influenced area which has a storm surge associated with the 100 Year Flood. Therefore, there will be no need to compensate for encroachment. The 100 year flood defined by FEMA results from the hurricane storm surge elevation estimated at 3.96 m (13.0 NGVD). FIRM maps for the City of Clearwater, panels no. 8, 14, and 15 show the flood zone areas of the bridge corridor vicinity. A constant 100 year floodplain elevation of 3.96 m (13.0 NGVD) is shown for the project site, designated as zone VE. FEMA identifies zone VE as areas of coastal flood with velocity hazard attributed to tidal surge wave action. In addition, the FEMA flood study identifies the 100 year water base flood stage at elevation 3.17 m (10.4 NGVD).

Water Quality Considerations

During a Pre-application meeting which took place on March 20, 1996 with the Southwest Florida Water Management District (SWFWMD), the following project-specific water quality requirements were outlined:

1. In accordance with the SWFWMD Environmental Resource Permitting Information Manual, Part B Section 5.7a3, the Memorial Causeway Bridge replacement project is exempt from water quality requirements due to the fact that

the project represents an "in-kind bridge replacement" occurring within class III waters.

2. It was noted that the proposed bridge replacement alternatives should allow for improved water quality conditions due to the fact that traffic flow should no longer be halted on the harbor crossing as is presently occurring with the existing bascule bridge. Presently, static bridge traffic resulting from the frequent bridge openings is perceived to allow increased concentrations of oil and heavy metal deposits to drip into the harbor.
3. In addition, a certain degree of water quality pre-treatment will result from bridge deck drainage systems at the causeway approach discharging into grassed spreader swales situated along the causeway roadsides providing attenuated broadflow prior to discharge into Clearwater Harbor.

Water Quantity Considerations

It was determined during the Pre-application meeting with SWFWMD that the Memorial Causeway Bridge replacement project will not require any storm water quantity rate attenuation due to the fact that all storm water runoff is received by the open waters of the Gulf of Mexico.

9.20 Bridge Analysis

9.20.1 Bridge Structure Alternatives

For any new Memorial Causeway bridge several structure alternatives could be considered, including:

- Precast Prestressed Concrete Girders
- Florida Bulb Tee Girders; either made continuous or in a simple-span application.
- Precast Post-tensioned Box Girders (Segmental)
- Steel Plate Girders
- Steel Box Girders

Each structure type has its advantages and disadvantages and is more applicable for certain situations than others. Feasible structure types are discussed below.

1. **Precast prestressed concrete girders** (Type II, III and IV girders) are very popular in Florida and are widely used. The reason for their popularity is the fact that for most cases they provide a very economical solution for bridges with spans of up to approximately 35 m (115 ft). The girders can be used for curved structures by placing the girders on a chord and curving the cast-in-place deck on top of the girders. Varying widths, and ramps can be accommodated easily by spreading the girders further apart and adding girder lines. Depending on the overall width of the structure, the substructure will consist of one or more

columns with a cap on top supporting the girders. The use of one column "hammerhead pier" has become quite popular in Florida and provides an aesthetically pleasing solution for the substructure.

2. **Florida Bulb Tee girders** are basically an alternate solution for the precast prestressed girder alternative. The girders are deeper, have a wider top flange, and can have post-tensioning installed. As a result these girders can be used for longer spans: approximately 35 m (115 ft) when used in simple-span fashion and up to approximately 45m (150 ft) when used for continuous spans. Since the spans are getting longer these girders cannot be used for horizontal alignments that are very sharply curved. The Florida Bulb Tee has provided many economical bridge solutions in Florida.

3. **Precast post-tensioned box girder bridges**, also known as segmental bridges, can provide a good solution for bridges with spans in excess of approximately 40 m (130 ft) up to spans of approximately 100 m (330 ft). The depth of the box girders is normally constant and in the 2.5 m (8-ft) range for the shorter spans to accommodate future inspection of the inside of the boxes. For the larger spans the depth may vary. For the 100 m (330 ft) span, for instance, the depth of the box girder will be approximately 3 m (10 ft) at mid-span and 6 m (20 ft) at the end of the span. Variable deck widths can be accomplished by widening the deck of the box, keeping the actual box dimensions constant (changing the box dimensions would require very special forms and is deemed to be uneconomical for precast construction). If the variation in width exceeds the practical limits of the deck overhangs, box girders can be added. This can become quite complicated and adds to the cost of the project. Horizontally curved alignments can be accommodated very easily. Each individual segment, approximately 3 m (10 ft) long, will be a chord on the arc. Normally these structures become competitive for large projects where many segments need to be produced. The substructure normally consists of one column supporting a box, resulting in an aesthetically pleasing bridge structure. Adding to the aesthetics is the fact that no pier caps are required.

4. **Steel plate girders** can be used for about any span and alignment. A disadvantage of the steel girder is the fact that the Memorial Causeway bridge is located in a severely corrosive environment and the use of a steel structure could lead to high future maintenance costs. Historically, the steel plate girder has not been competitive in the span ranges that are covered by the prestressed girder options; the only exception being horizontally curved structures where curved steel girders were the only feasible solution. The substructure for the steel plate girders are basically the same as described for the concrete girder alternatives.

5. The **steel box girder** is normally a more expensive solution than the plate girder alternative. The reason for using steel boxes would be for sharply curved structures where torsion would be a concern or for structures where aesthetics is

important. The boxes normally provide a more pleasing structure than the girders, both where the girders themselves are concerned as well as the substructure, which can be similar as described for the concrete box girder.

Which structure type to choose is normally based on an economic analysis and in some cases aesthetics can be the governing factor. The overall price for a structure consists of the cost for the substructure and the cost for the superstructure. Lengthening the spans will reduce the number of piers and normally will reduce the overall cost of the substructure. This is especially true when the ship impact forces are governing the design of the substructure. Larger spans, on the other hand, will result in more expensive superstructures, and can result in the exclusion of some of the alternatives discussed above, when exceeding certain span limits. Cost curves can be developed which will show the most economical span length for a certain alternative.

Another limiting factor regarding the span length is the presence of the navigational channel of the Intracoastal Waterway. The required horizontal clearance between fenders is 30.5 m (100 ft). The Florida Structure Design Guidelines recommend that the bridge spanning the channel should have at least a span equal to the clearance plus the width of two design barges. This would result in a channel span of approximately 55 m (180 ft).

The preferred type of structure will be selected during the final design phase.

9.20.2 Bridge Foundation Alternatives

Based on the geotechnical report, it is expected that the most economical foundation for the proposed bridge would be drilled shafts. The actual diameter and anticipated shaft tip elevations would need to be designed after the design loads have been determined and a more extensive site and soil investigation of the proposed bridge site has been conducted. The drilled shaft foundation type appears to be more appropriate than the driven pile foundation type due to the presence of limestone so close to the ground surface and the anticipation that scouring conditions for the Memorial Causeway Bridge will be similar to the Sand Key Bridge. Another advantage of drilled shafts would be lower noise levels during construction as compared to pile driving. A final determination on the type of foundation will be made during the design phase.

9.20.3 Other Bridge Design Considerations

The Clearwater Harbor is open to the Gulf of Mexico. It can reasonably be assumed that the salt water will present a corrosive environment for both the substructure and the superstructure of the bridge.

9.21 Special Features

The following "special features" are presently being considered for inclusion in the final design concept:

- Bridge Features

  - scenic overlooks
  - decorative railings
  - aesthetic light poles and luminaries
  - architectural underside lighting
  - special concrete finishes and colors
  - special bicycle/pedestrian facility proposed for the south side of the structure

- Bridge Approaches

  A sidewalk partially on seawall next to Clearwater Harbor is proposed to run adjacent to the south side of the eastern bridge approach, to connect the higher-level bridge sidewalk to the existing ground level at the south end of the proposed bridge.

- Culvert

  A large culvert is proposed to be included underneath the Pierce Street Connector just east of the south bridge approach, to permit vehicular access to an underground storage vault (at parcel no. 13/08) owned by the Calvary Baptist Church.

- Guide Signing

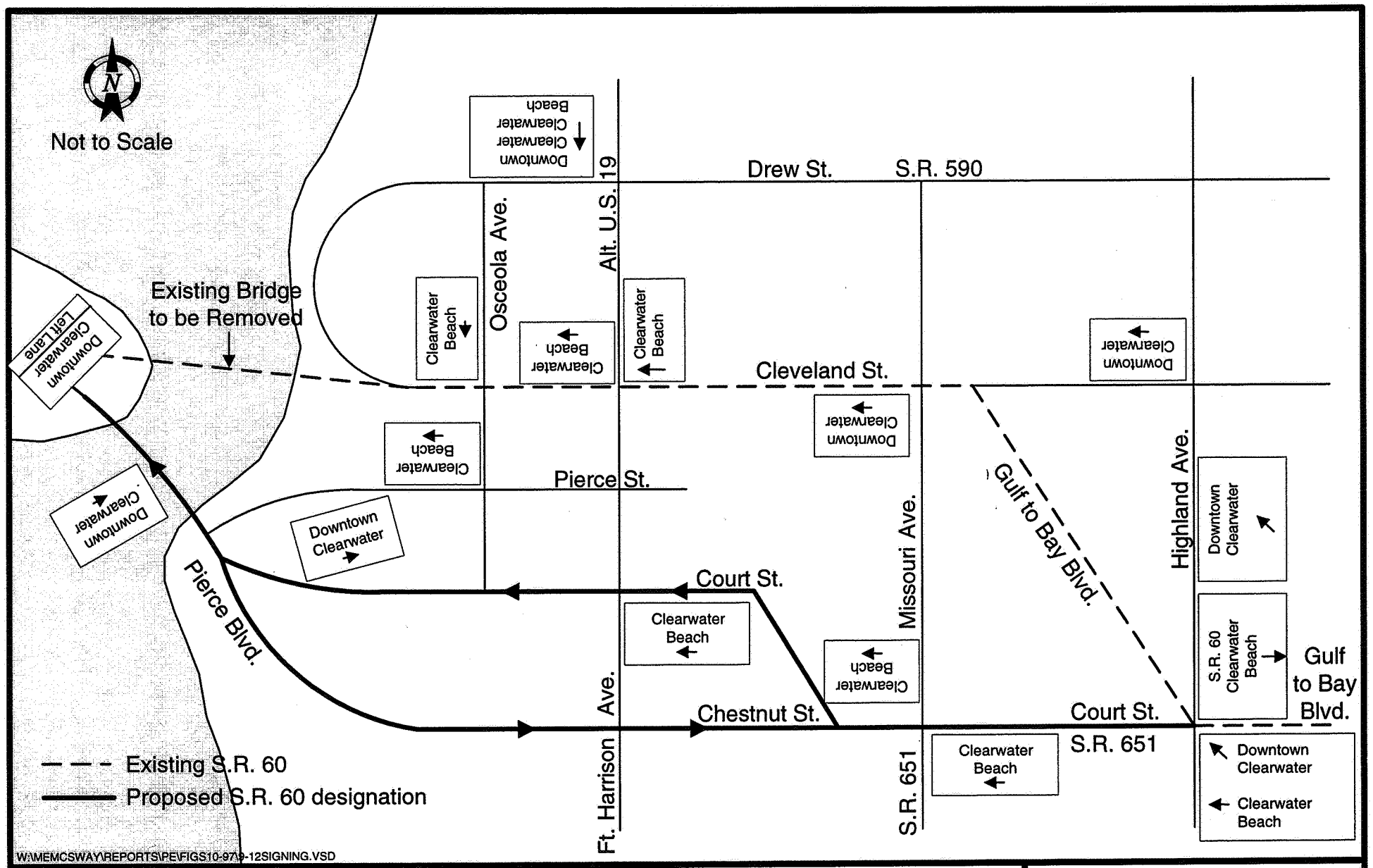
  The City proposes to transfer the S.R. 60 designation from Cleveland Street (and Gulf-to-Bay west of Highland Avenue) to Court and Chestnut Streets and Pierce Boulevard west of Highland Avenue. A conceptual signing plan has been developed which would help guide motorists through the revised street and highway network (Exhibit 9-12).

9.22 Access Management

The existing bridge is classified as access management Class 3 ("controlled access facility"). No changes in the degree of access control are expected as a result of the proposed bridge replacement project.

9.23 Aesthetics and Landscaping

Due to the importance of aesthetics in general and bridge aesthetics in particular to this project, the Preferred Alternative is presently proposed to consist of a concrete segmental box type structure with span lengths in the range of 91 m (300 ft). These longer span lengths are intended to maximize the clear viewing area under the bridge from both the downtown bluff and from the water level in Clearwater Harbor. In addition to the type of structure, ancillary design features will be considered as mentioned above, including scenic overlooks on the bridge, decorative light poles, fixtures and bridge railings, and special concrete finishes and colors.



S.R. 60/Memorial Causeway Bridge PD&E Study

CONCEPTUAL SIGNING PLAN

EXHIBIT 9-12

With respect to landscaping, a conceptual landscaping plan will be developed in coordination with the design of the proposed expansion of Coachman Park, a separate but related project which is proposed by the City.

With respect to the Haven Street House, additional landscaping will be planted to help soften the view towards the new bridge roadway approach from the house structure.

10.0 REFERENCES

2-1 Memorial Causeway Bridge Feasibility Study Report. Prepared for the City of Clearwater in cooperation with FDOT by HDR Engineering, Inc., July 1995.

3-1 Clearwater Downtown Redevelopment Plan. Prepared for the City of Clearwater by Hanson, Taylor, Bellomo & Herbert, June 1995.

4-1 Geotechnical Report for the Memorial Causeway Bridge PD&E Study. Prepared by Williams Earth Sciences, May 1996.

4-2 FDOT Preliminary Plans of Proposed Bridge Rehabilitation, State Project No. 15220-3513. Prepared for FDOT by PBQD, 1993.

4-3 Clearwater Harbor Directional Drill Force Main and Gas Main Installation Plans. Prepared for the City by CD&M, July 1995.

4-4 "As-Built" Construction Plans for S.R. 60 Bridge Over East Channel, Clearwater Causeway. State Project No. 15220-3502, 1960.

4-5 Examination Survey (P&S Scope) 9-Foot Project of Intracoastal Waterway. Prepared for Jacksonville District, ACOE, by Sea Systems Corporation, August 1994. D.O. File No. 41E-36.782.

4-6 Wetland Evaluation Report for Memorial Causeway Bridge PD&E Study. Prepared by HDR Engineering, December 1996.

4-7 Rare and Endangered Biota of Florida, Volumes I-V, University Press of Florida, Gainesville. Various Authors. 1978, 1992, 1996.

4-8 Contamination Evaluation Report for the Memorial Causeway Bridge PD&E Study. Prepared by HDR Engineering, March 1996.

6-1 Traffic Technical Memorandum ("Traffic Report"). Prepared for the Memorial Causeway Bridge PD&E Study by HDR Engineering, Revised Draft, December 1996.

6-2 Year 2015 Long Range Transportation Plan (Adopted 12/18/95 by the MPO). Pinellas County Metropolitan Planning Organization.

6-3 Highway Traffic Data for Urbanized Area Project Planning and Design. NCHRP Report No. 255, 1982, Transportation Research Board.

6-4 Florida's Level of Service Standards and Guidelines Manual for Planning (Topic No. 525-000-005-c). Florida Department of Transportation, April 12, 1992.

9-1 Conceptual Stage Relocation Plan for Memorial Causeway Bridge PD&E Study. Prepared by Gulf Coast Property Acquisition, June 1997.

9-2 An Economic Impact Analysis of the Proposed Memorial Causeway Bridge Realignment on the Central Business District of Clearwater, Florida. Prepared by USF's Center for Urban Transportation Research, November 1996.

9-3 Air Quality Report prepared by HDR Engineering, July 1997.

9-4 Noise Study Report (Draft) prepared by Transportation Solutions, Inc., January 1998.

9-5 Section 106 Consultation Case Study Report and Supporting Documentation. Prepared by HDR Engineering, January 9. 1998.

9-6 Section 4(f) Determination of Applicability package. Prepared by HDR Engineering, February 1998.

11.0 APPENDICES

A. Bridge Data

- Inspection Report Excerpts and Appraisal Sheets
- Malfunction Data Summary

B. Boat Height Survey Data

C. Location Hydraulic Report

D. Cost Estimates

- Construction
- Right-of-Way

E. Preliminary Evaluation Matrix

F. Manatee and Sea Turtle Watch Program

APPENDIX A

Bridge Data

- Inspection Report Excerpts
- Malfunction Data Summary

NATIONAL BRIDGE INVENTORY - - - - - - - STRUCTURE INVENTORY AND APPRAISAL 03/13/97

********** IDENTIFICATION **********
(1) STATE NAME - FLORIDA CODE 12
(8) STRUCTURE NUMBER # 150044
(5) INVENTORY ROUTE (ON/UNDER) - ON = 1 3100600
(2) STATE HIGHWAY DEPARTMENT DISTRICT 07
(3) COUNTY CODE 103 (4) PLACE CODE 12875
(6) FEATURES INTERSECTED - CLEARWATER HARBOR #
(7) FACILITY CARRIED - S.R.60
(9) LOCATION - 0.48 KM WEST OF SR 595
(11) KILOPOINT - (11) MILEPOINT - 1.508
(16) LAT 27 D 57'54.00'' (17) LONG 82 D 38'18.00''
(98) BORDER BRIDGE STATE CODE 000 % SHARE 00 %
(99) BORDER BRIDGE STRUCTURE NO. #
(12) BASE HWY NET 0 (13) LRS RTE SUBRTE

********** STRUCTURE TYPE AND MATERIAL **********
(43) STRUCTURE TYPE MAIN: MATERIAL - STEEL
TYPE - MOVABLE-BASCULE CODE 316
(44) STRUCTURE TYPE APPR: MATERIAL - PRESTRESS CONCR
TYPE - STRINGER/MULTI-BEAM OR GIR CODE 502
(45) NUMBER OF SPANS IN MAIN UNIT 1
(46) NUMBER OF APPROACH SPANS 18
(107) DECK STRUCTURE TYPE - OPEN STEEL GRATING CODE 3
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE - OTHER CODE 9
B) TYPE OF MEMBRANE - NONE CODE 0
C) TYPE OF DECK PROTECTION - NONE CODE 0

********** AGE AND SERVICE **********
(27) YEAR BUILT 1963
(106) YEAR RECONSTRUCTED
(42) TYPE OF SERVICE: ON - HIGHWAY-PEDESTRIAN
UNDER - WATERWAY CODE 55
(28) LANES: ON STRUCTURE 4 UNDER STRUCTURE 0
(29) AVERAGE DAILY TRAFFIC 39500
(30) YEAR OF ADT 1994 (109) TRUCK ADT 15 %
(19) BYPASS, DETOUR LENGTH 19 KM

********** GEOMETRIC DATA **********
(48) LENGTH OF MAXIMUM SPAN 33.5 M
(49) STRUCTURE LENGTH 312.1 M
(50) CORB OR SIDEWALK: LEFT 1.5 M RIGHT 1.5 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 13.4 M
(52) DECK WIDTH, OUT TO OUT 17.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 14.6 M
(33) BRIDGE MEDIAN - CLOSED MEDIAN CODE 2
(34) SKEW 0 DEG (35) STRUCTURE FLARED N
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 13.4 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 5.56 M
(54) MIN VERT UNDERCLEAR REF - NOT A HI 0.00 M
(55) MIN LAT UNDERCLEAR RT REF - NOT A HI 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********
(38) NAVIGATION CONTROL - BRIDGE HAS NAVIG CODE 1
(111) PIER PROTECTION - IN PLACE AND FUNCTI CODE 2
(39) NAVIGATION VERTICAL CLEARANCE 7.6 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR 0.0 M
(40) NAVIGATION HORIZONTAL CLEARANCE 27.4 M

****
SUFFICIENCY RATING = 55.9
STATUS = FUNCTIONALLY OBSOLETE

********** CLASSIFICATION ********** CODE
(112) NBIS BRIDGE LENGTH YES
(104) HIGHWAY SYSTEM - STRUCTURE IS ON NHS 1
(26) FUNCTIONAL CLASS - URBAN OTHER PRINCIPAL A 14
(100) DEFENSE HIGHWAY - NOT A DEFENSE HIGHWAY 0
(101) PARALLEL STRUCTURE - NONE EXISTS N
(102) DIRECTION OF TRAFFIC - TWO WAY TRAFFIC 2
(103) TEMPORARY STRUCTURE - NOT APPLICABLE N
(110) DESIGNATED NATIONAL NETWORK - NOT PART OF N 0
(20) TOLL - ON FREE ROAD 3
(21) MAINTAIN - STATE HIGHWAY AGENCY 01
(22) OWNER - STATE HIGHWAY AGENCY 01
(37) HISTORICAL SIGNIFICANCE - NOT ELIGIBLE FOR 5
(105) LAND HIGHWAY - NOT APPLICABLE 0

********** CONDITION ********** CODE
(58) DECK 7
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION N
(62) CULVERTS

********** LOAD RATING AND POSTING ********* CODE
(31) DESIGN LOAD - UNKNOWN 0
(63) OP RATING METH = 1 LOAD FACT (64) RATING = 45.3
(65) INV RATING METH = 1 LOAD FACT (66) RATING = 27.2
(70) BRIDGE POSTING - EQ OR GT LEGAL LOAD NO P 5
(41) STRUCTURE OPEN, POSTED, OR CLOSED A
DESCRIPTION - OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE
(67) STRUCTURAL EVALUATION 6
(68) DECK GEOMETRY 2
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATERWAY ADEQUACY 8
(72) APPROACH ROADWAY ALIGNMENT 8
(36) TRAFFIC SAFETY FEATURES 0011
(113) SCOUR CRITICAL BRIDGES 6

********** PROPOSED IMPROVEMENTS **********
(75) TYPE OF WORK - NO IMPROVEMENT PLANNED CODE 000
(76) LENGTH OF STRUCTURE IMPROVEMENT 0.0 M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 60423
(115) YEAR OF FUTURE ADT 2016

********** INSPECTIONS **********
(90) INSPECTION DATE 06/1996 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL - YES 12 MO A) 06 1996
B) UNDERWATER INSP - YES 24 MO B) 05 1996
C) OTHER SPECIAL INSP - YES 12 MO C) 04 1995

BRIDGE METRIC INFORMATION IN THE BID FILE FOR 436 ITEMS 12MAR97:13:12

A1(8) BRIDGENO = < 150044 > A6A(6)[FEATINTR]= < CLEARWATER HARBOR > A6B(6)[FEAINGRI]= < * >
A7(7)[FACILCAR]= < S.R.60 > A9[LOCBRNAM]= < CLEARWATER MEMORIAL DRAW >
[RECORD # 1] A12(9)[BRDGLOCA]= < 0.48 KM WEST OF SR 595 > A17(99)[BDRBRGNO]= <

IDENTIFICATION

A2(2) (DISTRICT)= 7
A3(3) (FIPSCOTY)= 103
A4(4) (FIPSCITY)= 12875
A5A(5) (INVRTETY)= 1
A5B(5) (HWYTYPEF)= 3
A5C(5) (HWYDESIG)= 1
A5D(5) (HWYRTENO)= 00060
A5E(5) (HWYDIREC)= 0
A8 (PRIRBRDG)= 000000
A10A (SECTNMBR)= 220
A10B (SUBSECT)= 000
A11 (SECTUNDR)= 000
A13(11) (MILPOINT)= 1.508
A13(11) (KILPOINT)= 0
A14(16) (LAT)= 27 57 54.0
A15(17) (LONG)= 82 48 18.0
A16A(98) (STATENO)= 000
A16B(98) (PERCRESP)= 0
A18 (PROJCODE)= 152203502
A19(12) (BSEHINET)= 0
A20A(13A)[LRSROUTE]=
A20B(13B)[LRSSBRTE]=

STRUCTURE TYPE AND MATERIAL
BRIDGE CHARACTERISTIC INV

B1A(43) (TYPMATL)= 3
B1B(43) (TYPCONST)= 16
B1C (TOTPRCAM)= 2
B2A(44) (TYPMATAP)= 5
B2B(44) (TYPAPCON)= 02
B2C (TOTSTL8M)= 112
B3(45) (NOBRSPAN)= 1
B4 (TOTNOSPN)= 19
B5(46) (NOAPSPAN)= 18
B6A(108) (TYPWEASF)= 9
B6B(108) (TYPMEMBR)= 0
B6C(108) (DECKPROT)= 0
B6D (TOTWEAR)= 0
B7 (SURFTHCK)= 0
B8A(107) (DECKSYS)= T
B8B (TOTCONDK)= 586
B8C (DEFCONDK)= 0
B9A (DECKSYS2)= F
B9B (TOTMETDK)= 4875
B9C (DEFMETDK)= 0
B10A (EXPJOINT)= A
B10B (TOTARMJN)= 277
B11A (EXPJOIN2)= N
B11B (TOTWPFJN)= 0
B11C(EXPJOIN3)= N
B11D(TOTJOIN3)= 0
B12A(BEARTYPE)= B
B12B(TOTBERPD)= 72
B13A(BEARTYP2)= A
B13B(TOTSLPDR)= 60
B14A(BEARTYP3)= N
B14B(TOTRKRDR)= 0
B15A(BEARTYP4)= N
B15B(TOTROLPD)= 0
B16A(TYPABUTN)= A
B16B(TYPFOUNN)= E
B16C(TOTPRCPL)= 12
B17A(TYPABUTP)= A
B17B(TYPFOUNF)= E
B17C(TOTRECPL)= 12
B18A(PIERMAIL)= C
B18B(PIERCO1F)= C
B18C(TOTCMPPL)= 16
B18D(PIERFO1N)= E
B18E(TOTSTLPL)= 112
B19A(PIERMA2L)= C
B19B(PIERCO2F)= F
B19C(TOTTRPL)= 2
B19D(PIERFO2N)= L
B19E(TOTPIERS)= 0
B20A(PIERMA3L)= N
B20B(PIERCO3F)= N
B20C(TOTPIRN3)= 0
B20D(PIERFO3N)= N
B20E(TOTFOUN3)= 0
B21 (TOTTRCP)= 0
B22 (TOTSTLCP)= 0
B23 (TOTCONCP)= 18
B24 (TOTTRCB)= 0
B25 (TOTSTLCB)= 0
B26A(BRGRAIL1)= A
B26B(TOTCONHR)= 558
B27A(BRGRAIL2)= K
B27B(TOTMETHR)= 66
B28A(SLOPRO1)= B
B28B(TOTABPR1)= 473
B29A(SLOPRO2)= N
B29B(TOTABPR2)= 0
B30A(PIRPRO1)= A
B30B(TOTPIPR1)= 0
B31A(PIRPRO2)= N
B31B(TOTPIPR2)= 0
B32A(FENSYS1)= C
B32B(FENWALL)= A
B32C(TOTFEND1)= 132
B33A(FENSYS2)= N
B33B (FENWAL2)= N
B33C (TOTFEND2)= 0
B34A (FISHWALK)= N
B34B (TOTFSHWK)= 0
B35 (MOVEMACH)= A
B36 (ENVRZONE)= 3
B37A (CORPRO1)= G
B37B (PROSTR1)= F
B37C (TOTCOPR1)= 1
B38A (CORPRO2)= N
B38B (PROSTR2)= N
B38C (TOTCOPR2)= 0
B39A (PANSYS1)= G
B39B (PANCOM1)= H
B39C (TOTPANST)= 319
B40A (PANSYS2)= N
B40B (PANCOM2)= N
B40C (TOTPANAL)= 0
B41A (PANDATE)= 1987
B41B (PANDAT2)= 1996
B42A (FRACRIM)= A
B42B (FRACRCON)= H
B43 (ELECREQC)= 2

AGE AND SERVICE

C1(19) (BYPASSLN)= 19
C2(27) (YRBUILT)= 1963
C3A(28)(LANESON)= 4
C3B(28)(LANEUNDR)= 0
C4(29) (AVGADT)= 39500
C5(109)(AVGDATRK)= 5
C6(30) (CALYRADT)= 1994
C7A(42)(SERVOVER)= 5
C7B(42)(SERVUNDR)= 5
C8(106)(YRRECNST)=
C9A1 (UTILTYP1)= N
C9A2 (UTILNBR1)= 0
C9B1 (UTILTYP2)= N
C9B2 (UTILNBR2)= 0
C9C1 (UTILTYP3)= N
C9C2 (UTILNBR3)= 0
C9D1 (UTILTYP4)= N
C9D2 (UTILNBR4)= 0

GEOMETRIC DATA

D1(10) (RIVERCLR)= 99.99
D2(32) (ROADWDTH)= 14.6
D3(33) (BRMEDTYP)= 2
D4(34) (SKEW)= 0
D5(35) (BRFLARED)= N
D6(47) (HORIZCL)= 13.4
D7(48) (MAXSPANL)= 33.5
D8(49) (STRLGTH)= 312.1
D9A(50) (SIDEWLKL)= 1.5
D9B(50) (SIDEWLKR)= 1.5
D10(51) (BRWDTHCC)= 13.4
D11(52) (DECKWDTH)= 17.5
D12(53) (VERTCLER)= 6.56
D13A(54)(VERUNCLU)= N
D13B(54)(VERUNCLR)= 0
D14A(55)(LATRCLRD)= N
D14B(55)(LATRLCLR)= 0
D13(56) (LATRLCLL)= 0
D16A (CULVTYPE)= N
D16B (NBRBAREL)= 0
D16C1 (SPNBAREL)= 0
D16C2 (HGTBAREL)= 0
D16D (LNGBAREL)= 0
D17A (CULVEXTD)=
D17B (CULVINDX)= 00000

NAVIGATION AND HYDRAULIC

E1(38) (NAVCNTRL)= 1
E2(39) (NAVERTCL)= 7.6
E3(40) (NAVHZNCL)= 27.4
E4(111) (PIERPROT)= 2
E5(116) (MINVERT)= 0
E6 (NAVAIDS)= C
E7 (STREMPLN)= 8

CLASSIFICATION

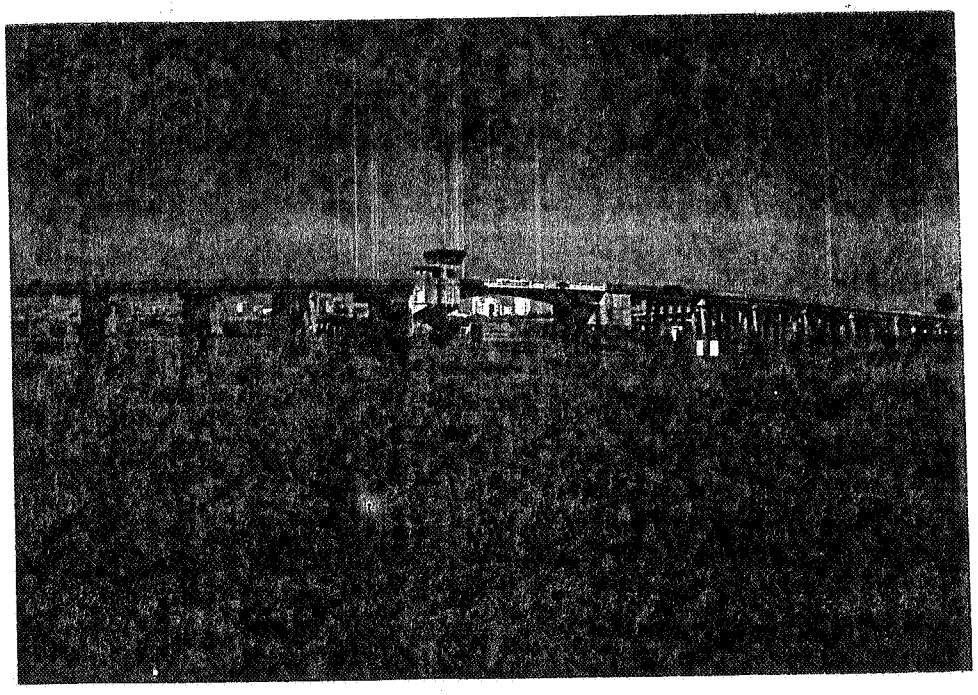
F1(20) (TOLLFACL)= 3
F2(21) (MAINRESP)= 01
F3(22) (BRDGOWNR)= 01
F4(26) (FC1990)= 14
F5(37) (HISTSIG)= 5
F6(100) (DEFHGWY)= 0
F7A(101)(PARSTRID)= N
F7B(101)(PBRDGSEQ)=
F8(102) (DIRTRAFF)= 2
F9(103) (TEMPSTRC)= N
F10(104)(HGWYSYS)= 1
F11(110)(NATNETWK)= 0
F12(112)(MLNBRLTH)= Y
F13(105)(FEDLNDHI)= 0
F14 (MAINYARD)= 799
F15A (MDDORGTP)= N
F15B (METROPLA)= 00

```
BRIDGE METRIC INFORMATION IN THE BID FILE FOR 436 ITEMS                    12MAR97:13:12

A1(8) BRIDGENO = < 150044 > A6A(6)(FEATINTR)= < CLEARWATER HARBOR          > A6B(6)(FEAINCRI)= < * >
A7(7)(FACILCAR)= < S.R.60                  > A9(LOCBRNAN)= < CLEARWATER MEMORIAL DRAW          >
|RECORD # 1| A12(9)(BRDGLOCA)= < 0.48 KM WEST OF SR 595    > A17(99)(BDRBRGNO)= <                >

      DECK                        G5.04  (DEGAGGR )= 7   G8.19  (WEDGCENT)= N       SUPERSTRUCTURE
                                  G5.05  (ALIGMNT )= 8   G8.20  (CENTBEAR)= N         MOVABLE SPANS
G1.00(58)(DECKSURF)= 7            G5.06  (FLOW    )= 8   G8.21  (BALWHLTR)= N
G1.01    (DECKTOP )= 7                                   G8.22  (SHEVDRUM)= N   G12.00 (CHLALIG )= 6
G1.02    (DECKUNDR)= 7          LIGHTING SYSTEMS         G8.23  (WIREROPE)= N   G12.01 (SMSTRGTR)= 5
G1.03    (DEXPJNT )= 7                                   G8.24  (SPANGUID)= N   G12.02 (FLORBEAM)= 7
G1.04    (DECNSJNT)= 7          G6.01  (LIGTSYS )= 3     G8.25  (BALCHAIN)= N   G12.03 (MAINGIRR)= 7
G1.05    (DRNGSYS )= 7          G6.02  (SIGNS   )= 3     G8.26  (MOVTRAFF)= 3   G12.04 (SWAYBRAC)= N
G1.06    (CRBMEDSW)= 7          G6.03  (STRIPNG )= 4     G8.27  (TAILSTOP)= N   G12.05 (LATRBRAC)= 7
G1.07    (HNRBARPR)= 7          G6.04  (REFLCTR )= 3                            G12.06 (SPUPRCHR)= N
                                G6.05  (UTILATT )= 3       MOVABLE BRIDGE       G12.07 (SPLWRCHR)= N
   SUPERSTRUCTURE               G6.06  (FSHWALK )= N     ELECTRICAL CONDITION   G12.08 (SPANVERT)= N
                                G6.07  (ATENATR )= N                            G12.09 (SPANPORT)= N
G2.00(59)(SUPSTRUC)= 7          G6.08  (TRAFCON )= N     G9.00  (MOVELEC )= 3   G12.10 (MISCMEMB)= 7
G2.01    (BEARNGS )= 5          G6.09  (DECKCLN )= 3     G9.01  (ELECMOTR)= 4   G12.11 (COUNTRWT)= 7
G2.02    (BEMSTRGR)= 7          G6.10  (SUPRCLN )= 3     G9.02  (LOCELMTR)= 4
G2.03    (FLRBEMS )= N          G6.11  (SUBSCLN )= 3     G9.03  (MTRCONT )= 4       SUBSTRUCTURE
G2.04    (MAINGRD )= N          G6.12  (FNCGLAR )= N     G9.04  (TRANSFRM)= 4         MOVABLE SPAN
G2.05    (DIASWAB )= 7                                   G9.05  (CIRBRFUS)= 4
G2.06    (LATBRAC )= N               CULVERT            G9.06  (ELECWIRE)= 3   G13.00 (CULRDBR )= 7
G2.07    (UPRCHRD )= N                                   G9.07  (SUBCABLE)= 3   G13.01 (SPRINSUL)= N
G2.08    (LWRCHRD )= N          G7.00(62)(CULVERT )= N   G9.08  (CONJUNBX)= 3   G13.02 (SPFTGCAS)= N
G2.09    (VERTICL )= N          G7.01  (DECSLAB )= N     G9.09  (GENTRNSW)= 3   G13.03 (SPANCAPS)= N
G2.10    (DIAGONL )= N          G7.02  (DECUNDR )= N     G9.10  (CONRELAY)= 3   G13.04 (SPCOLPIR)= 7
G2.11    (PORTALS )= N          G7.03  (SIDEWAL )= N     G9.11  (PRLOGCON)= N
                                G7.04  (HEADWAL )= N     G9.12  (CONCONSL)= 4       PAINT SYSTEM
      SUBSTRUCTURE              G7.05  (WINGWAL )= N     G9.13  (LIMTSWIT)= 4
                                G7.06  (FLRSLAB )= N     G9.14  (SELRESEN)= 4   G14.00 (STRPANT )= 2
G3.00(60)(SUBSTRUC)= 7          G7.07  (CULGRDR )= N     G9.15  (GENLIGHT)= 3   G14.01 (DECKPANT)= 3
G3.01    (PILNSHF )= 7                                   G9.16  (TRAFSIGL)= 4   G14.02 (SUPRPANT)= 2
G3.02    (FTNGCAS )= N          MOVABLE BRIDGE           G9.17  (TRAFGATE)= 3   G14.03 (BEARPANT)= 2
G3.03    (COLWALP )= N        MECHANICAL CONDITION       G9.18  (TRAFBARR)= N   G14.04 (FLRBPANT)= 2
G3.04    (INTRCAP )= 7                                   G9.19  (NAVLIGHT)= 4   G14.05 (MNGRPANT)= 2
G3.05    (BRSTWBW )= N          G8.00  (MOVBRDM )= 3     G9.20A (EMDRMTR )= N   G14.06 (DIPHPANT)= N
G3.06    (ABUTEND )= 7          G8.01  (OPENGEAR)= 3     G9.20B (GEARRDCR)= 4   G14.07 (LABRPANT)= 3
G3.07    (SLOPROT )= 7          G8.02  (RACKPIN )= 3     G9.20C (CLUTDISC)= 3   G14.08 (UPCHPANT)= N
                                G8.03  (SPEEDMPS)= 3     G10.01 (ACESLADR)= 4   G14.09 (LWCHPANT)= N
   APPROACH ROADWAY             G8.04  (MOVBEARN)= 3     G10.02 (TNDRFACL)= 3   G14.10 (VERTPANT)= N
                                G8.05  (MOVCOUPL)= 4     G10.03 (SANWATR )= 4   G14.11 (DIAGPANT)= N
G4.00    (APPRDWY )= 7          G8.06  (MOVSHAFT)= 3                            G14.12 (PORTPANT)= N
G4.01    (APRSLAB )= 7          G8.07  (MOVTRUNS)= 3       DECK MOVABLE SPAN    G14.13 (BEARPANT)= 3
G4.02    (RETWAPR )= 7          G8.08  (MACHSUPP)= 3                            G14.14 (SUBSPANT)= N
G4.03    (RDBRDTR )= N          G8.09  (SPANBRAK)= 1   G11.00 (SPANDECK)= 7     G14.15 (EQIPPANT)= 3
G4.04    (GRDRAIL )= 7          G8.10  (SPANLOCK)= 3   G11.01 (SPANJONT)= 7
G4.05    (CULALIG )= 7          G8.11  (EMERDRIV)= 2   G11.02 (SPANDRAN)= 7
                                G8.12  (SHOESTRK)= 3   G11.03 (SPANGRMS)= 7
 CHANNEL AND CHANNEL PROT       G8.13  (CURSTRTR)= N   G11.04 (SPANHRBR)= 7
                                G8.14  (HYDPWRUN)= N
G5.00(51)(CHNLPROT)= 7          G8.15  (HYDPIPNG)= N
G5.01    (FENDSYS )= 5          G8.16  (HYDCYLMT)= N
G5.02    (NAVLGTS )= 7          G8.17  (BUFCYLST)= 3
G5.03    (EMBSLPB )= 5          G8.18  (HOPKFRAM)= 3

 PAGE 2 OF 3
```

```
                BRIDGE METRIC INFORMATION IN THE BID FILE FOR 436 ITEMS                    12MAR97:13:12

 A1(6) BRIDGENO = < 150044 > A6A(6)(FEATINTR)= < CLEARWATER HARBOR          > A6B(6)(FEAINCRI)= < + >
 A7(7)(FACILCAR)= < S.R.60          > A9(LOCBRNAM)= < CLEARWATER MEMORIAL DRAW          >
 |RECORD # 1| A12(9)(BRDGLOCA)= < 0.48 KM WEST OF SR 595     > A17(99)(BDRBRGND)= <          >

 LOAD RATING AND POSTING        PROPOSED IMPROVEMENTS          COMMENTS

 H1        (GOVSPLGT)= 5.4      J1A(75) (WORKTYPE)= 00     L1 (COMMENT1)= 7117181
 H2A       (LOADISTB)= 0        J1B(75) (WRKDONBY)= 0      L2 (COMMENT2)=
 H2B       (METHCALC)= 2        J2(76)  (LENGIMPT)= 0
 H3        (IMPFACTR)= 30       J3(94)  (BRIMPCST)= 0
 H4A       (SINTRK2 )= 30       J4(95)  (RDIMPCST)= 0        MISC DATA
 H4B       (SINTRK3 )= 39       J5(96)  (TOIMPCST)= 0
 H4C       (SINTRK4 )= 36       J6(97)  (YRIMPEST)=          EFFECTIVE UPDATE          (EFFCTDTE)= 08JAN1997
 H4D       (COMTRK3 )= 50       J7(114) (FUTURADT)= 60423    BID STATUS                (BMISTAT )= A
 H4E       (COMTRK4 )= 43       J8(115) (YRFUTADT)= 2018     BID STATUS DATE           (BMISTADT)= 28DEC1989
 H4F       (COMTRK5 )= 48       J9A     (REPAIRYR)=          BRIDGE DELETE             (BRDGDLET)= N
 H4G       (COMTRKTR)= 57       J9B *** (REPAIRPR)=          BRIDGE DELETE DATE        (BRDLETDT)=
 H5A       (SINTRKWT)= 99       J9C     (REHABYR )=          SUFFICIENT RATING         (SUFFRATG)= 55.9
 H5B       (COMTRKWT)= 99       J9D *** (REHABPR )=          SUFFICIENT RATING FLAG    (SUFFESTF)=
 H5C       (COMTRWT )= 99       J9E     (REPLACYR)=          STATUS = FUNCTIONALLY OBSOLETE
 H6A       (SPEDRESN)= N        J9F *** (REPLACPR)=
 H6B       (SPEDLIMT)= 999      J10A    (REHABCNC)=
 H7(31)    (DESNLOAD)= 0        J10B    (REHABSTC)=
 H8(41)    (STROPER )= A        J10C    (REPLCCNC)=
 H9A(63)   (RATEMETH)= 1        J10D    (REPLCSTC)=
 H9B(64)   (WEIGHT  )= 45.3
 H10A(65)  (RATEMTHI)= 1                INSPECTION
 H10B(66)  (INVWEGHT)= 27.2
 H11(70)   (BRDGPOST)= 5          K1(90)  (BRINSPDT)= 06-1996
                                  K2(91)  (INSPFREQ)= 24
    APPRAISAL                     K3A(92) (FRACCRIT)= Y12
                                  K3B(92) (UNDRWATR)= Y24
 I1A(36)   (BRGRAILG)= 0          K3C(92) (OTHRSPEC)= Y12
 I1B(36)   (TRANSITN)= 0          K4A(93) (FRACRIDT)= 06-1996
 I1C(36)   (APPGRDRL)= 1          K4B(93) (UNDRWADT)= 05-1996
 I1D(36)   (APPGREND)= 1          K4C(93) (OTHRSPDT)= 04-1995
 I2(67)    (STRUAPPR)= 6          K5A     (INSPTIME)= 0
 I3(68)    (DECKGEOM)= 2          K5B     (DIVEOPER)= A
 I4(69)    (VERHORCL)= N          K5C     (TRCONREQ)= 1
 I5(71)    (WTRYADEQ)= 8          K5D     (SNOOPER )= D
 I6(72)    (APPRDALN)= 8          K6A     (SPECEQ1 )= N
 I7(113)   (SCRCRITL)= 6          K6B     (SPECEQ2 )= N
                                  K7A     (INSPZONE)=
                                  K7B     (INSPTEAM)=
                                  K8A     (TRAVTIME)= 20
                                  K8B     (FELDTIME)= 20
                                  K8C     (DIVETIME)= 8
                                  K8D     (OFICTIME)= 16
                                  K9      (WATRQUAL)= 1
                                  K10     (MAXDEPTH)= 5.5
                                  K11     (BOTOMCON)= 2
                                  K12A    (CONFINSP)= N
                                  K12B    (AIRQUALD)= N
                                  K12C    (VENTEQUI)= N
                                  K12D    (RESPIRAT)= N

 PAGE 3 OF 3
```

State of Florida Department of Transportation

BRIDGE RECORD



BRIDGE NUMBER 150044

BRIDGE NAME CLEARWATER DRAW

Sec. No. 15220 **S.R.** 60 **M.P.** 1.508

BRIDGE RECORD CONTENTS

I. Inspection Reports - This section contains periodic bridge inspection reports, bridge repair work orders, and accident reports.

II. Inventory - Contained in this section is the following bridge information: Photographs, location map, detailed data, history, load carrying capacity, inspection preparation, and drawings.

III. Communications - Correspondence such as letters, memorandums, and notices directly related to this bridge are contained in this section.

FLORIDA DEPARTMENT OF TRANSPORTATION

Form 850-010-14-a
Replaces 571-26
MAINTENANCE
04/91

BRIDGE INSPECTION REPORT
FIXED & MOVABLE

CONTENTS OF REPORT

* This section is not included in this report.

REPORT IDENTIFICATION

Bridge No.: 150044 Bridge Name: Clearwater Draw

Location: .5 km West of SR 595

Section No. 15220
US R.
S.R. 60
M.P. 1.508
RD. SYS. 901

NO	YES	
[ ]	[X]	This bridge contains fracture critical components?
[X]	[ ]	This bridge is scour critical?
[X]	[ ]	This report identifies deficiencies which require prompt corrective action?

Type of inspection: [X] Routine [ ] Interim [ ] Special _____

Field Inspection Date: Above Water 06-30-96 Under Water: 05-08-96

Name of Inspector/Diver	Initials	Engineering Registration Number	Certified Bridge Inspection No.
D.R. Geiger(fixed spans) (Senior Inspector In Charge)	DRD		00299
J. Perez			00276
D.S. Klaus (movable)			00295
C.A. Faxon (SHEO)	CAF		00302
A.M. Birriel			00308
V.L. Griswold (Senior Diving Inspector/Diver)			00030
A.T. Biblehauser			
W.A. McCarthy			

Reviewing Bridge Inspection Supervisor

Name: J.E. Dunton PE or CBI Number: 00168 Initials: JED

Confirming Registered Professional Engineer

Name: Jose Garcia P.E. Number: 34238

Signature _____

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

CONDENSED INSPECTION REPORT
FIXED SPANS

FORM 850-010-08-a
REPLACES 571-30
MAINTENANCE
04/91

BRIDGE NUMBER 150044

INSPECTION DATE 06-30-96

DECK COMPONENT

BMIS NO.	ELEMENT TITLE	NCR **
G1.00 (58)	Deck Overall Rating	7
G1.01	Deck(Top)/Surfacing	*7
G1.02	Deck(Underside)	*7
G1.03	Expansion Joints	7
G1.04	Construction Joints	7
G1.05	Drainage System	7
G1.06	Curbs/Medians/Sidewalks	7
G1.07	Handrails/Barriers/Parapets	7

APPROACH ROADWAY MAJOR FEATURE

BMIS NO.	ELEMENT TITLE	NCR **
G4.00	Approach Roadway Overall Rating	7
G4.01	Approach Slabs	7
G4.02	Retaining Walls/Approach Slopes/Embankments/Shoulder	7
G4.03	Roadway-Bridge Transition	N
G4.04	Guardrails	7
G4.05	Roadway Alignment	7

SUPERSTRUCTURE COMPONENT

BMIS NO.	ELEMENT TITLE	NCR **
G2.00 (59)	Superstructure Overall Rating	7
G2.01	Bearings	*5
G2.02	Beams/Stringers/Box& Plate Girders/Flat Slabs/Arches	7
G2.03	Floor Beams	N
G2.04	Main Girders	N
G2.05	Diaphragms/Sway Bracing	*7
G2.06	Lateral Bracing	N
G2.07	Upper Chords	N
G2.08	Lower Chords	N
G2.09	Verticals	N
G2.10	Diagonals	N
G2.11	Portals	N
G2.12	Fracture Critical Members	7

CHANNEL- MAJOR FEATURE

BMIS NO.	ELEMENT TITLE	NCR **
G5.00 (61)	Channel and Channel Protection Overall Rating	7
G5.01	Fender System	*5
G5.02	Navigation Lights and Aids	7
G5.03	Embankments/Slopes/ Bulkheads	*5
G5.04	Degradation/Aggregation	7
G5.05	Alignment	8
G5.06	Flow	8

SUBSTRUCTURE COMPONENT

BMIS NO.	ELEMENT TITLE	NCR **
G3.00 (60)	Substructure Overall Rating	7
G3.01	Piling/Shafts	*7
G3.02	Footings/Caissons	N
G3.03	Columns/Wall Piers	N
G3.04	Intermediate Caps (Bent & Pier)	*7
G3.05	Bracing/Struts/Web Walls	N
G3.06	Abutements/End Bents	7
G3.07	Slope Protection/Slope	7

NON-STRUCTURAL FEATURES

BMIS NO.	ELEMENT TITLE	NCR **
G6.01	Lighting Systems	3
G6.02	Signs	4
G6.03	Striping (Roadway Reflective)	2
G6.04	Reflectors	3
G6.05	Utility Attachements	3
G6.06	Fishing Walks	N
G6.07	Attenuators	N
G6.08	Traffic Control and Monitoring Systems	N
G6.09	Deck Cleanness	3
G6.10	Superstructure Cleanness	3
G6.11	Substructure Cleanness	3
G6.12	Fences and Glare Screens	

Deficiencies exist in this element that warrant written and/or sketched descriptions that are provided in section B of this report.

* - NCR is an abbreviation for Numerical Condition Rating, the definitions of which can be found on the back of this page.

621-526

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATI

CONDENSED INSPECTION REPORT MOVABLE SPANS

FORM 850-010-08-a
REPLACES 571-30
MAINTENANCE
04/91

BRIDGE NUMBER 150044 INSPECTION DATE 06-30-96

MECHANICAL COMPONENTS

BMIS NO.	ELEMENT TITLE	NCR **
G8.00	Mechanical Condition Overall Rating	3
G8.01	Open Gearing	*3
G8.02	Racks/Rack Pinions	*3
G8.03	Speed Reducers	*3
G8.04	Bearings	3
G8.05	Couplings	*3
G8.06	Shafts	3
G8.07	Trunnions	3
G8.08	Machinery Supports	3
G8.09	Brakes	*1
G8.10	Span Locks	3
G8.11	Emergency Drives	4
G8.12	Live Load Shoes and Strike Plates	*3
G8.13	Curved/Straight Tracks	N
G8.14	Hydraulic Power Units	N
G8.15	Hydraulic Piping System	N
G8.16	Hydraulic Cylinders/Motors	N
G8.17	Buffer Cylinders/ Strike Plates	3
G8.18	Hopkins Frame	3
G8.19	Wedge Machinery/ Centering Machinery	N
G8.20	Center Bearing	N
G8.21	Balance Wheels and Tracks	N
G8.22	Sheaves/Drums	N
G8.23	Wire Ropes	N
G8.24	Span Guides	N
G8.25	Balance Chains	N
G8.26	Traffic Controls	3
G8.27	Tail Stops/Locks	N

ELECTRICAL COMPONENTS

BMIS NO.	ELEMENT TITLE	NCR **
G9.00	Electrical Condition Overall Rating	3
G9.01	Span Drive Electric Motors	4
G9.02	Lock Electric Motors	4
G9.03	Motor Controls/Control Centers/Disconnect Switch	4
G9.04	Transformers	4
G9.05	Circuit Breakers/Fuses	4
G9.06	Wire and Cable	3
G9.07	Submarine Cable	3
G9.08	Conduit and Junction Boxes	*3
G9.09	Generator Set/ Transfer Switch	3
G9.10	Control Relays	3
G9.11	Programmable Logic Controllers	N
G9.12	Control Consoles	*4
G9.13	Limit Switches	4
G9.14	Seisyns/Resolvers/Encoders	4
G9.15	General Lighting	3
G9.16	Traffic Signals	4
G9.17	Traffic Gates	*3
G9.18	Traffic Barriers	N
G9.19	Navigation Lights	4
G9.20	Emergency Drive Motor/Clutch	4

GENERAL COMPONENTS

BMIS NO.	ELEMENT TITLE	NCR **
G10.01	Access Ladders and Platforms/Catwalks	4
G10.02	Tender Facilities/ Control House	*3
G10.03	Sanitary/Water Systems	4

STRUCTURAL COMPONENTS

BMIS NO.	ELEMENT TITLE	NCR **
	DECK	
G11.00	Decking	*7
G11.01	Joint (Expansion Traffic Plate)	7
G11.02	Drainage System	7
G11.03	Curbs/Median/Sidewalks	*7
G11.04	Handrail/Barriers/Parapets	*7
	SUPERSTRUCTURE	
G12.00	Superstructure Overall Rating	6
G12.01	Beams/Stringers/Girder	*5
G12.02	Floor Beams	*7
G12.03	Main Girders	*7
G12.04	Sway Bracing	N
G12.05	Lateral Bracing	7
G12.06	Upper Chords	N
G12.07	Lower Chords	N
G12.08	Verticals	N
G12.09	Portals	N
G12.10	Miscellaneous Members	7
G12.11	Counterweight	*7
	SUBSTRUCTURE	
G13.00	Substructure Overall Rating	7
G13.01	Piling/Shafts	N
G13.02	Footings/Caissons	N
G13.03	Caps (Bent, Pier)	N
G13.04	Columns/Piers (Wall, Pivot, Rest, Bascule)	7

- Deficiencies exist in this element that warrant written and/or sketched descriptions that are provided in section B of this report.

** - NCR is an abbreviation for Numerical Condition Rating, the definitions of which can be found on the back of this page.

621-527

APPENDIX A
Bridge Malfunction Data, July 1994 - September 1996

DATE	Road Closure Duration	Boat Closure Duration	Malfunction/Action
07/5/94	0		Navigational light repaired
07/12/94	0		"No Problem Found"
08/3/94	0		Navigational light repaired
08/20/94	0		Sump pump repaired/replaced
08/21/94	0		Repaired toilet
08/22/94	0	7 hours	Gate wouldn't drop
08/30/94	0		Adjusted position of gate
09/16/94	0	2 hours	Gate hit and broken by a car
09/20/94	0		Two lights out on one gate
09/20/94	10 min		Parts lubricated, etc.
09/29/96	0		Radio at bridge tender's house fixed
10/11/94	0		Changed light socket and bulb
10/24/94	0		Light repaired on one of the gates
10/24/94	0		Plank on bridge fender came loose "no problem"
11/01/94	0		A board on the fender walking were missing
11/13/94	0		No problem found with gate as reported
11/27/94	5 min		Problem w/ one of the gates not going all way up
12/05/94	0		Problem w/ one septic tank in basement of tender house
12/09/94	0		Worked on pump for septic tank
12/29/94	0		Lens replaced for a gate light
12/31/94	0	1 hour	"No power"to gates...bridge wouldn't open "No problem found"
01/06/95	0		"Toilet backing up"
01/10/95	0		Two navigational lights replaced
01/28/95	1 hr 50 min		"Pin jammed"
03/30/95	50 min		"Locking Pins would not drive"..."No problem found
04/10/95	0	2 hours	"Pins would not drive"

DATE	Road Closure Duration	Boat Closure Duration	Malfunction/Action
04/13/95	0	2 hours 14 minutes	"Gates and lights would not work"
04/28/95	0	2 hours 49 minutes	Bridge closed due to accident- kid on bike hit
05/02/95	0		Light bulb replaced on gate
05/15/95	0		Navigational light bulb and socket replaced
05/22/95	0	1 hour 15 minutes	Problem with pins
05/25/95	0		Light replaced
07/13/94	0		Re-wired gate light
07/17/95	0		Check phone - no incoming calls
07/28/95	0		Wind broke inward section of east window
08/01/95	0		Repaired socket-SW hanging light
08/02/95	0		Fixed cable on gate
08/03/95	0		Fixed hand rail, replaced rail-broken due to auto accident
08/05/95	0		Temp. Repairs to Eastbound gate hit by car
08/07/95	0		Permanently fixed hand rail and replaced rail
08/10/95	0		Replaced sockets-navigation lights
08/11/95	0		Replaced two gate lights
08/30/95	0	3 hours	"Far leaf jammed"
09/09/95	0		Replaced navigation light on fender system
09/25/96	0		Replaced light socket-NE
09/17/95	0	3 hours	Gate malfunctioned
10/04/95	0	19 hours	Replaced oncoming gate
12/03/95	2 hours		SW gate would not raise, replaced 12/4
12/06/95	0	20 minutes	"Pin would not pull"
12/07/95	0		Clean contactors for gates and pins
12/08/95	0	10 hours	Pin failed to pull all the way out
12/10/95	7 minutes		Locking pins would not drive or pull upon closing
12/10/95	0		Pins not pulling-reseal bypass key, reset light on gates
12/13/95	0		Adjust & clean limits on E. Bound gate
DATE	**Road Closure Duration**	**Boat Closure Duration**	**Malfunction/Action**

01/08/96	0		Replace lt socket in SW hanging Nav Lt.
04/04/96	0		Replaced lt bulb WB gate
04/06/96	0		Worked on pin contracts
05/04/96	1 hour		WB gate would not go up
05/05/96	0		Gate would not go up-adjust limits on E band gate
05/18/96	55 minutes	55 minutes	Bridge stuck in up position
05/20/96	1 hour 10 min.	10 hours	Bridge stuck in up position
05/23/96	0		Pins would not pull, adjust gate limits
06/17/96	0		Replaced socket in hanging Nav. light
06/24/96	0		Rewire S.E. hanging Nav. light repair socket and fender system
07/06/96	0		Reset limits on gate
07/07/96	0		Gate would not close, reset limits
07/08/96	0		Gate would not lower, reset limits
07/14/96	0		Gate would not lower, reset limits
07/15/96	0		Gate would not lower, reset limits
07/24/96	0		Gate would not close, replaced limit switch & adjusted gates
07/30/96	0		W. gate would not lower, adjusted limits
08/01/96	0		Replaced socket in hanging Nav lt
08/01/96	0		Planks missing from SE Fender
08/04/96	0		Gate would not lower, adjust gate
08/08/96	0		Heater malfunctioned, repair broken wire to heater
08/08/96	0		Gate would not lower, reset limits
08/11/96	0	1 hour	Pins failed to drive
08/16/96	0		Gate would not lower
09/30/96	0		Replace necessary fixtures and bulbs

1995 total down time: Vehicular traffic 7 hrs +36 minutes; Marine traffic 35 hrs +20 minutes
1996 thru September total down time: Vehicular traffic 3 hrs + 5 minutes; Marine traffic 12 hrs

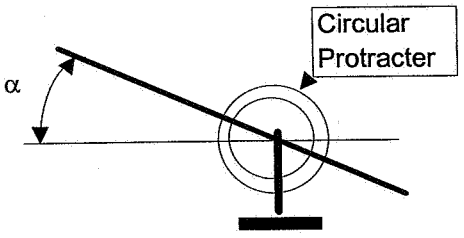
APPENDIX B

Boat Height Survey Data

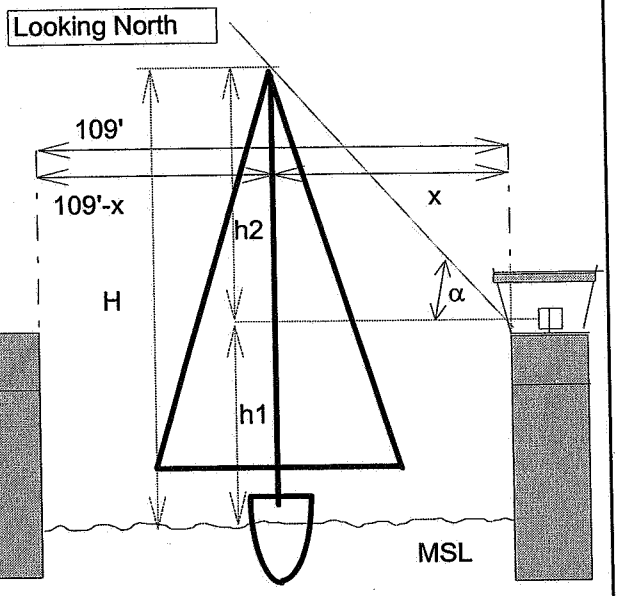
TABLE FOR ESTIMATING MAST HEIGHTS AT CLEARWATER HARBOR BRIDGE

Total Height = H = h1 + h2 est. h1 = 43.1 ft. h2 =x tan α (see diagram below)

		Estimated Mast Heights (ft) Position in Channel		
		West	Center	East
α (deg.)	tan α	(x=81.8')	(x=54.5')	(x=27.3')
7	0.123	53	50	46
8	0.141	55	51	47
9	0.158	56	52	47
10	0.176	58	53	48
11	0.194	59	54	48
12	0.213	60	55	49
13	0.231	62	56	49
14	0.249	63	57	50
15	0.268	65	58	50
16	0.287	67	59	51
17	0.306	68	60	51
18	0.325	70	61	52
19	0.344	71	62	52
20	0.364	73	63	53
21	0.384	74	64	54
22	0.404	76	65	54
23	0.424	78	66	55
24	0.445	79	67	55
25	0.466	81	69	56
26	0.488	83	70	56
27	0.510	85	71	57
28	0.532	87	72	58
29	0.554	88	73	58
30	0.577	90	75	59
31	0.601	92	76	59
32	0.625	94	77	60
33	0.649	96	78	61
34	0.675	98	80	61
35	0.700	100	81	62
36	0.727	102	83	63
37	0.754	105	84	64
38	0.781	107	86	64
39	0.810	109	87	65
40	0.839	112	89	66
41	0.869	114	90	67



Survey Instrument



Memorial Causeway Bridge PD&E Study

BOATFRM2.XLS

BOAT HEIGHT SURVEY FORM FOR MEMORIAL CAUSEWAY SR 60 BRIDGE AT CLEARWATER HARBOR

Date	Approx. Time of Opening	Total No. of Boats Less than 50 ft	Measured Angle from Horiz. for Boats > or = 50' Height * — Approximate Position in Channel			Mast Ht*, According To the Boat Operator	Reading** on Vertical Clearance Gauge	Bridge Tenders Initials	Name or Description of Taller (greater than 50') Boats, If Available and/or Comments
			West (Beach side)	Centered (in channel)	East Side				

**Only fill this out if you have boats over 50' in height

*Angle (or height) to top of mast, not antenna

For further information, call Larry Weatherby at HDR Engineering 813-282-2369

Rev. 3/18/97

Memorial Causeway Bridge
Boat Height Survey Results
(June 3, 1996 - December 11,1996)

Boat Name	Recorded Heights	Average Height (Feet)	Height According to The Boat Operator (**Bold** = Ross Yacht Info)
Long Legs	90	90	**73**
Domani	75	75	
Goddeassa	70,70	70	
No Name	70	70	
Beautiful Class	69	69	
Able Lady	65	67	
Plastique	66	66	**70**
Rhon x Andy	66	66	
Yesterday's Dream	65	65	
Homefree	66,63,61,65	64	
Promise	63,66,66,59,63	63	65
Beauttie	63	63	
Jolly Mon	63	63	
Looney Tunes	63	63	
Marker	63	63	**57**
No name	63	63	
No Name	63	63	
No Name	63	63	
Ophelia	58,63,64	62	**70**
Godessey	61,61	61	64
Lady in Red	61	61	55
No Name	61	61	
No Name	61	61	
Penelope	61	61	60
Whipsaw III	58,64	61	60
Wingate	61	61	65
Geodesic	56,63,63	61	63,60
Echo	61,60	61	**65**
Astral	57,58,66	60	**67**
Discovery	56,56,69	60	**45**
? two	60	60	
Andiamo	60	60	64
Patsy	60	60	
Reality	60	60	60
Restless	60,60	60	63
Sand Piper	71, 58,55,56	60	**70**
Native Girl	56,60,62,57,60,59,61,60	59	60
Jacarde	59	59	
Foxy Lady	61,58,57,59,59	59	
Misty Sholes	58,59	59	
Amanda	58,58	58	
Gladiator	58	58	58
Independense	58	58	

Jenny	58	58	
Kailani	58	58	
Kyrie	58	58	
Lady Kathryn	58	58	
Mandragora	59, 57	58	
Poco Loco	55,59,60,67,53,57,55,54,54,53,58	58	60, **60**,62
Poco Loco	55,60,59,61,62,62,58,58	58	
Spinthrift	58	58	58
Unruhly	58	58	
Whisper	58,58	58	
Windchime	58	58	
Lion's Paw	58,57	58	
Heaven	50	57	57
Koja	57	57	
No Name	57	57	
Win Win	55,59	57	
Windfall	57	57	
Whipsaw	54,56,58,58,56,56,56,58	57	
Argent	56	56	
Buckeye	56,56	56	
Cozy	54,58	56	
Hobo	56	56	
Imagine	56	56	
No Name	56	56	
Outa Pocket	56	56	
Russian Princess	59,53	56	
Shamroga	56	56	
Vesula III	56	56	
Southern Cross	55,53,51,55,51,60,59,57,55,57,57,61	56	60
Lady Sonja	51,60	56	
Schedar	56,55	56	
Care Bear	58,56,52	55	52
Olive IV	50,63,53	55	
Coral Reefer	55	55	
Hoot	55	55	
Hooter VI	55	55	
Hozro	55	55	
Laganiappe	55	55	
MeDoc	55	55	65
Miller Time	55,55	55	
Mixty Motions	58,53,54	55	
Nepenthe	55	55	55
No Name	55	55	
No Name	55	55	55
Sortilege	55	55	
Free Will	57,57,54,51	55	
Integrity	54, 54,56,55	55	
Dolly	51,60,53	55	
Carpe Diem	57,55,51,55	55	

Morining Star	58,51	55	
Alice	53,53,53,51,58,54,53,57,54,54	54	
No Name	54	54	
Peace	56,52	54	
Rubaiyat	54	54	
Southern Comfort	52,53,57	54	
Starduster	54	54	60
Third Party	55,53	54	
Tradewind	55,53,55,53,53,53,53	54	
Cosmos	56,51	54	54
Simplicity	54,53	54	
Solstice	56,51	54	55
Vega	53,53,54,53	53	
EZ Does it	53	53	
FL2604 FL	53	53	
Foot Loose	53	53	
Free Bird	53	53	
Harmony	51,55	53	55
Jolly Tar	52,54,54,52,52,53	53	
Joy Ride	53	53	
Lady Kate	53	53	
Loverly	53	53	
Missek	53	53	55
Mon Ami	53	53	
No I.D.	53	53	
No Name	53	53	
No Name	53	53	
No Name	53	53	
No Name	53	53	
Rainbow Chaser	53	53	
Revenge	53	53	
Royal Patricia II	53	53	
Spirit	53	53	
Sunrise	53	53	
Take Five	53	53	
Waterhog	53	53	
Zia	53	53	
Almost Heaven	53,53,51,54,53,53,53	53	
Carribean Soul	53,52,53,53	53	
Anemophilious	51,53,51,51,56,54	53	
Adagio	51,54	53	
Taloa	51,54	53	52
Manana	53,51,51,53,53,53,53,51	52	54
FL0024JR	52	52	
Peaches	52	52	
Shaymayme	52,52	52	
Sleepwalker	52	52	53
Cirrus	52,52,52,50	52	
Exposure	51,51,51,50,51,51,51,58,51,50	52	**45**

Manyana	52,50,52	51
Aisance	51	51
Almost Heaven II	51	51
Beauty Class	51	51
Nautilus	51	51
No Name	51	51
OPA	51	51
Rascal	51	51
Rendezvous	50,52	51
Sand Key	51	51
Tsunami	51,51,50,50	51
Anna Virgina	50	50
Anthie	50	50
Beaujolois	50	50
Bonnie Mood	50,50	50
CAT	50	50
Cat Pause	50	50
Genesis	50,50	50
Salty Dog	50	50
Solitude	50	50
Solo	50	50
Success	50	50 52
Sundance	50	50 49
Touch Stone	50	50
Vesper	50	50 50
Windancer	50,50	50
Hazy Moon	49	49
Gullivar	48	48 49
Elishae	47	47 47

APPENDIX C

Location Hydraulic Report

LOCATION HYDRAULIC REPORT
and
STORMWATER MANAGEMENT SUMMARY

for

Memorial Causeway Bridge (S.R. 60)
Project Development & Environmental Study

State Project No. 15220-1599
W.P.I. No. 7117181
Pinellas County, Florida

Prepared
for

City of Clearwater
and
Florida Department of Transportation

By:
HDR Engineering, Inc.
5100 W. Kennedy
Tampa, Florida

June 7, 1996

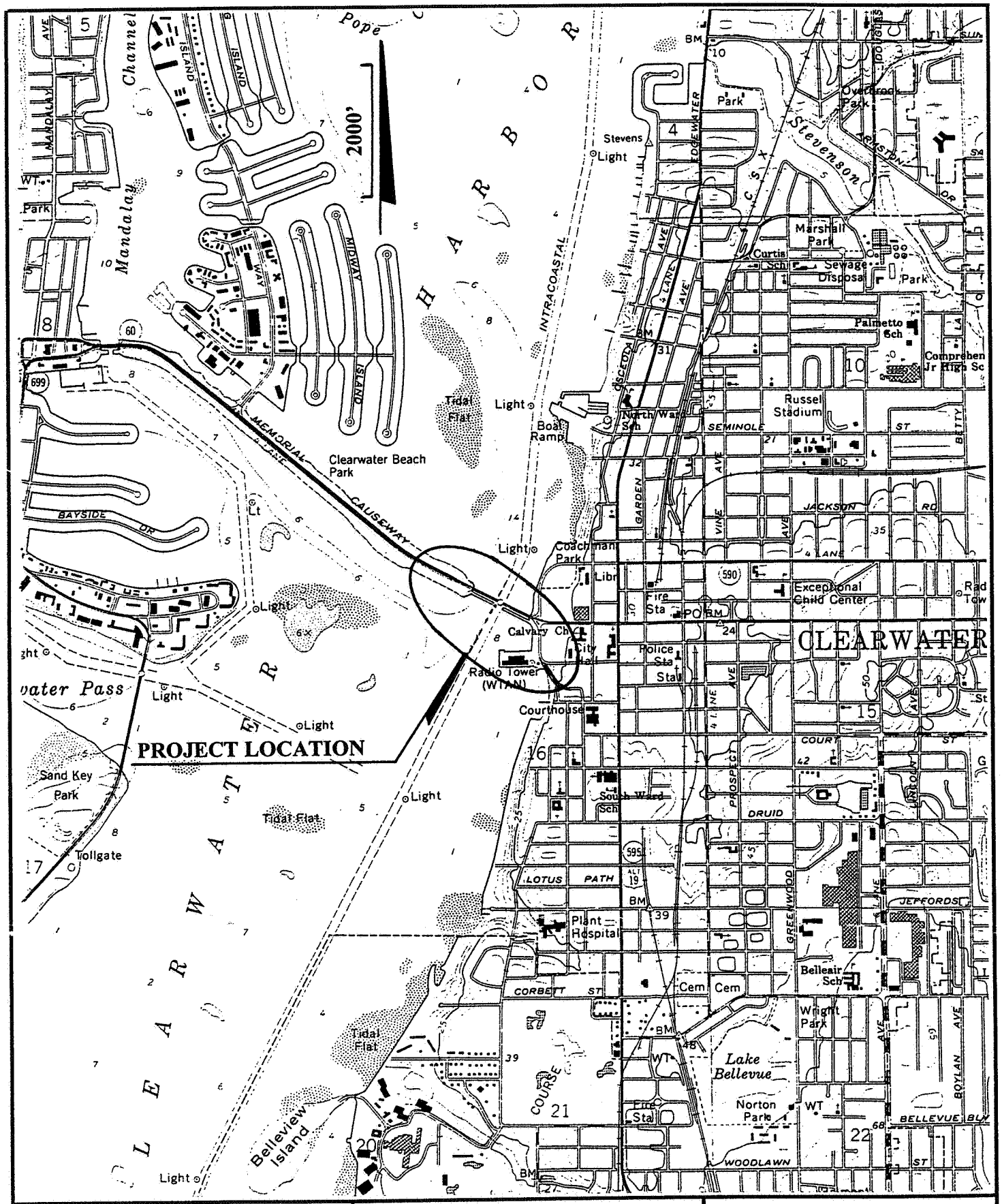
HDR

LOCATION HYDRAULIC REPORT
and
STORMWATER MANAGEMENT SUMMARY

Memorial Causeway Bridge (S.R. 60)
Project Development & Environmental Study

State Project No. 15220-1599
W.P.I. No. 7117181
for
City of Clearwater
and
Florida Department of Transportation

TABLE OF CONTENTS



Memorial Causeway (S.R. 60) Bridge PD&E Study

PROJECT LOCATION MAP

HDR

LOCATION HYDRAULIC REPORT

LOCATION HYDRAULIC REPORT

Purpose

This report was completed in accordance with Part 2 Chapter 24 of the FDOT PD&E Manual as well as with the requirements set forth in the Federal-Aid Policy Guide 23 CFR 650A, Section 650.111 and provides preliminary information on existing drainage characteristics and floodplains and their impacts due to the construction of the proposed replacement of the State Road 60 Memorial Causeway Bridge over the Clearwater Harbor of the Intracoastal Waterway.

Project Description

This PD&E study involves the evaluation of alternative corridors for the replacement of the existing four-lane Memorial Causeway bascule bridge with a new four-lane high-level fixed bridge. The existing bridge (no. 150044) is located within Section 16, Township 29 south, Range 15 east in Pinellas County, situated along the City of Clearwater's downtown waterfront. The reason for bridge replacement involves vehicular traffic flow problems due to frequent opening of the drawbridge, and is not related to any bridge hydraulic issues. The existing bridge tidal water crossing consists of a 312 m (1024 ft) long fixed span and bascule structure with 7.6 m (25 ft) navigational clearance above mean high tide. The bridge and causeway approaches cross a tidal surge floodplain of the Gulf of Mexico. Typically, the proposed bridge alternatives involve a four-lane high-level fixed bridge, with structure lengths on the average of 823 m (2700 ft.), and navigational clearances in the range of 19.8 m (65.0 ft) to 22.6 m (74.0 ft). The proposed bridge alignment alternatives tend to parallel offset the existing bridge at the Intracoastal Waterway crossing. However, the high level vertical clearance requirements necessitate longer bridge lengths than the existing bridge in order to achieve bridge approach connections within allowable longitudinal roadway grades. The additional bridge lengths tend to be positioned landward over the existing roadway corridor. In addition, all proposed bridge alternatives will maintain the 30.5 m (100ft) horizontal navigational clearance for the Intracoastal Waterway passage. Therefore, no additional reduction in waterway width is anticipated to occur with any of the alternatives.

The State Road 60 Memorial Causeway is an east-west arterial highway serving as a hurricane evacuation route to the mainland for the island communities of Clearwater Beach, Sand Key and Island Estates. Clearwater Beach and the downtown Clearwater waterfront vicinity represent popular recreational destinations which are served by the Memorial Causeway Bridge.

Location Hydraulic Evaluation

The following information is provided in the format of the Location Hydraulic issues in Part 2, Chapter 24 of the FDOT PD&E manual:

1. No impacts to drainage areas are anticipated to occur with any of the Memorial Causeway Bridge replacement alternatives. Flows through the bridge crossing are a result of tidal fluctuation and flushing of the coastal harbor, and are not subject to backwater conditions. Landward alignment alternatives for the new bridge will not block existing drainage patterns due to the new bridge spanning over areas subject to storm water surface runoff and conveyance. Any proposed bridge storm water collector system connections to existing storm water pipe systems will be evaluated and sized to minimize any additional backwater conditions. In reference to areas of potential flooding, the FEMA Flood Insurance Study for the City of Clearwater identifies the flooding source as the Gulf of Mexico which tidally circulates harbor flows both upstream and downstream of the bridge crossing. Consequently, the bridge crossing hydraulic effects on areas of potential flooding are considered to be negligible.

Location Hydraulic Evaluations (continued)

2. The existing bascule bridge was built in 1963, making it 33 years old in 1996. The bridge has proved adequate to handle the water flows associated with the harbor while requiring only routine maintenance of the structure. The bridge was inspected on August 8, 1994 and although it was rated as functionally obsolete, the bridge's channel, channel protection, and scour assessment was given a rating of 6, or "satisfactory condition". The proposed bridge alignment alternatives will maintain as a minimum the pre-existing harbor crossing width.

3. The frequency of traffic interruption due to flooding is controlled primarily by the elevation of the existing causeway beyond the limits the existing or proposed bridge. Table 3 of the FEMA flood study outlines still water flood stages for 10 year through 500 year reoccurrence storms. It is noted that the existing causeway (west bridge approach) elevation 2.44m (8.0 NGVD) would be over topped by the 50 year still water flood stage 2.71 m (8.9NGVD). In addition, based on these FEMA flood stages, similar flood conditions would occur at the mainland approach of the existing bridge. It is noted all proposed bridge alternatives include a mainland approach above the floodplain, thereby reducing facility flooding to the extent practicable. Since the existing causeway and barrier island destinations are below the base floodplain elevation, improvement of these flood conditions are beyond the scope of this bridge replacement project.

4. All proposed bridge alignment alternatives will maintain as a minimum the pre-existing harbor crossing width. The existing bascule bridge has proven to provide adequate hydraulic performance . Due to the tidal nature of the harbor crossing bridge hydraulics, no significant change in discharge capacity, backwater or surface water elevation is likely to occur with any of the proposed bridge alignment alternatives.

5. The proposed bridge replacement improvements are perceived to not cause any flood water related impacts on emergency services or evacuation by virtue of increased vertical clearance and mainland spanning of the base floodplain.

6. This project is located in a Tidal Influenced area which has a storm surge associated with the 100 Year Flood within harbor waters of the Gulf of Mexico. Therefore, there is very little likelihood of flood risk or overtopping as a result of any of the proposed bridge replacement alternatives.

7. Quantifying encroachment for floodplain compensation is not required since this project is located in a tidal storm surge Floodplain. However, the bridge approaches associated with the proposed alternatives are anticipated to generate on the average no more than 1.0 hectare (2.5 acres) of embankment fill area. Most of this fill quantity would be situated on the mainland bluff areas and out of the "still water" base flood elevation 3.17 m (10.4 NGVD).

8. Since the floodplain associated with this project is based on tidal surge and does not involve any regulatory floodways, this project's floodplain scenario does not conform to the identification of being a transverse or a longitudinal encroachment.

9. No known impacts to any regulated floodways would occur as a result of any of the bridge replacement alternatives proposed with this study.

Location Hydraulic Evaluations (continued)

10. The known floodplain category within the limits of all proposed bridge replacement alternatives is the 100 year flood storm surge elevation defined by FEMA as zone VE, 3.96 m (13.0 NGVD). In addition, the FEMA flood study identifies the 100 year still water base flood stage at elevation 3.17 m (10.4 NGVD).

11. Proposed bridge drainage measures were outlined as being in compliance with the water management district during the project's pre-application meeting. The proposed drainage measures common to all bridge replacement alternatives include waterward bridge drainage scuppers and landward bridge deck storm water collector drains and pipe systems. In addition, bridge deck drainage systems at the causeway approach will discharge into spreader swales situated along the causeway roadsides providing attenuated broadflow discharge to Clearwater Harbor. The bridge deck drainage systems at the mainland approach will discharge into existing or improved storm water pipe systems discharging in to scour abatement dissipater pools proposed at the pipe outfalls along the Clearwater Harbor waterfront. The Memorial Causeway Bridge replacement project is considered in the City of Clearwater's Downtown Redevelopment plan. It is noted that the Memorial Causeway Bridge replacement project is not consistent with the MPO's Year 2015 Long Range Transportation Plan by date of this report. However proposed amendments regarding this issue will be submitted to the MPO during this PD&E study.

12. Based on the fact that the both the island communities and downtown Clearwater are already developed within their base floodplain areas, the proposed Memorial Causeway Bridge replacement is not considered to be a catalyst for encouraging further development.

13. Since this project is not within any regulated floodways, no coordination with FEMA regarding this issue is required. The disposition of this project's exemption from encroachment compensation in a tidal surge floodplain was addressed during the pre-application meeting with the Southwest Florida Water Management District.

14. Based on determinations outlined in the above engineering information, the flood risk associated with the Memorial Causeway Bridge replacement alternatives is considered not to be of any significant impact to floodplain issues involving risks to highway users, facility interruption, properties and development, and beneficial floodplain values.

Therefore, in light of the fact the bridge replacement alternatives are basically maintaining the existing waterway crossing corridor (to the extent allowable due to traffic control use of the existing bridge during new bridge construction), and that no previous history of drainage problems are evident, the Memorial Causeway Bridge replacement project is considered to be a Floodplain Evaluation Category 4.

Therefore, this project's summary statement of categorical floodplain evaluation is as follows:

" The proposed structure will perform hydraulically in a manner equal or greater than the existing structure, and backwater surface elevations are not expected to increase. As a result, there will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant."

STORM WATER MANAGEMENT

STORM WATER MANAGEMENT

Existing Drainage Characteristics

The existing land use and drainage characteristics on the mainland side of Memorial Causeway Bridge are comprised of urban development, served by curbed roadways and piped storm water collector systems which discharge non attenuated into Clearwater harbor. Topography along the waterfront exhibits coastal bluffs with elevations varying from 9.75m (32.0 NGVD) at the top of the bluff to 1.52m (5.0 NGVD) at the water front sea walls. In accordance with the SCS Soil Survey for Pinellas County, the mainland soil conditions within the project corridor consists of "Made Land" (consisting of transported and placed sand, shell, clay and rock), "Urban Land" and "Urban Land - Astatula complex" (consisting of areas where the original soil has been effected my manmade modifications). Consequently no valid estimates of these soil characteristics are made by the SCS Soil Survey.

The drainage for the causeway side of Memorial Causeway Bridge involves the four lane roadway with grassed shoulders and depressed median. The roadway is drained mainly by lateral overland sheetflow and occasional median drain pipes discharging directly into Clearwater Harbor. The roadside areas of the causeway are comprised of minimal graded grassed areas and recreational trails, exhibiting elevations within the range of 2.44m (8.0 NGVD). In accordance with the SCS Soil Survey for Pinellas County, the causeway soil conditions within the project corridor consists of "Made Land" (consisting of transported and placed sand, shell, clay and rock). Consequently no valid estimates of these soil characteristics are made by the SCS Soil Survey.

Drainage of the existing bridge is accomplished by scuppers in the bridge deck discharging directly into Clearwater Harbor. Clearwater Harbor encompasses that portion of the Gulf of Mexico situated between the barrier islands of Clearwater Beach / Sand Key and the mainland. The Intracoastal Waterway parallels the coastline and transverses the harbor and the Memorial Causeway Bridge crossing. It is noted that Clearwater Harbor is not a regulated floodway. Flows through the bridge crossing are a result of tidal fluctuation and flushing of the coastal harbor. The mean high tide within the harbor has been established at elevation 0.402 m (1.32 NGVD).

Proposed Drainage Characteristics

Proposed bridge drainage measures for all alternatives will maintain the overall pre-existing drainage flow patterns evident in the existing drainage characteristics in addition to the following: The proposed bridge spans include waterward bridge drainage scuppers and landward bridge deck storm water collector drains and pipe systems. In addition, bridge deck drainage systems at the causeway approach will discharge into spreader swales situated along the causeway roadsides providing attenuated broadflow discharge to Clearwater Harbor. The bridge deck drainage systems at the mainland approach will discharge into existing or improved storm water pipe systems discharging in to scour abatement dissipater pools proposed at the pipe outfalls along the Clearwater Harbor waterfront.

Flood Plain Designations

This project is located in a Tidal Influenced area which has a storm surge associated with the 100 Year Flood. Therefore, there will be no need to compensate for encroachment. The 100 year flood defined by FEMA results from the hurricane storm surge elevation estimated at 3.96 m (13.0 NGVD). FIRM maps for the City of Clearwater, panels no. 8, 14 and 15 show the flood zone areas of the bridge corridor vicinity. A constant 100 year floodplain elevation of 3.96 m (13.0 NGVD) is shown for the project site, designated as zone VE. FEMA identifies zone VE as areas of coastal flood with velocity hazard attributed to tidal surge wave action. In addition, the FEMA flood study identifies the 100 year still water base flood stage at elevation 3.17 m (10.4 NGVD).

Water Quality Considerations

During the Pre-application meeting which took place on March 20, 1996 with the Southwest Florida Water Management District, the following project-specific water quality requirements were outlined:

1. In accordance with the SWFWMD Environmental Resource Permitting Information Manual, Part B Section 5.7a3, the Memorial Causeway Bridge replacement project is exempt from water quality requirements due to the fact that the project represents an "In-kind bridge replacement" occurring within class III waters.

2. It was noted that the proposed bridge replacement alternatives should allow for improved water quality conditions due to the fact that traffic flow should no longer be halted on the harbor crossing as is presently occurring with the existing bascule bridge. Presently, static bridge traffic resulting from the frequent bridge openings is perceived to allow increased concentrations of oil and heavy metal deposits to drip into the harbor.

3. In addition, a certain degree of water quality pre-treatment will result from bridge deck drainage systems at the causeway approach discharging into grassed spreader swales situated along the causeway roadsides providing attenuated broadflow prior to discharge into Clearwater Harbor.

Water Quantity Considerations

As outlined during the Pre-application meeting with the Southwest Florida Water Management District, the Memorial Causeway Bridge replacement project will not require any storm water quantity rate attenuation due to the fact that all storm water runoff is received by the open waters of the Gulf of Mexico.

FEMA FLOOD STUDY

FOR

PINELLAS COUNTY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and supersedes a previous Flood Insurance Study for the City of Clearwater, Pinellas County, Florida (Reference 1). This information will be used by the community to update existing floodplain regulations as part of the regular phase of the National Flood Insurance Program. The information will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence, and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for Alligator Creek Channels A, B, C, E, G and H were performed by Gee and Jenson, Inc. (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-87-C-2459. This study was completed in September 1988.

The hydrologic and hydraulic analyses for Stevenson Creek, upstream of Palmetto Street, were taken from a Summary Report for Stevenson Creek (Reference 2).

The hydrologic and hydraulic analyses for the remaining flood sources were completed in June 1979.

1.3 Coordination

On November 24, 1986, the initial coordination meeting was held with representatives of FEMA, the community, and the Study Contractor. Coordination with community officials, and Federal, state, and regional agencies produced a variety of information

pertaining to floodplain regulations, available maps, topography, and flood history.

The agencies contacted to obtain hydrographic data, flood hazard data, data supporting previous studies, and coordinate discharge data were: U.S. Army Corps of Engineers (COE), Jacksonville District; U.S. Geological Survey (USGS); Pinellas County; City of Clearwater; National Weather Service; Florida Department of Environmental Regulation; Florida Department of Transportation; Florida Department of Natural Resources; Division of State Planning; Southwest Florida Water Management District (SFWMD); U.S. Department of Agriculture, Soil Conservation Service (SCS); Florida Department of Community Affairs; Greater Clearwater Chamber of Commerce; National Oceanic and Atmospheric Administration (NOAA); Pinellas County Planning Council; Pinellas Suncoast Chamber of Commerce; Post, Buckley, Schuh, and Jernigan, Inc.; CSX railroad; and Tampa Bay Regional Planning Council.

On September 24, 1990, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Clearwater. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Stevenson Creek, upstream of Palmetto Street, Alligator Lake, and Alligator Creek Channels A, B, C, E, G, and H were studied in detail.

A detailed coastal flooding analysis was performed on the complete coastline of the City of Clearwater, where the flooding sources are the Gulf of Mexico and Tampa Bay.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through September 1993. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Clearwater.

2.2 Community Description

The City of Clearwater is in central Pinellas County in west-central Florida. The City of Tampa, Florida, is about 20 miles

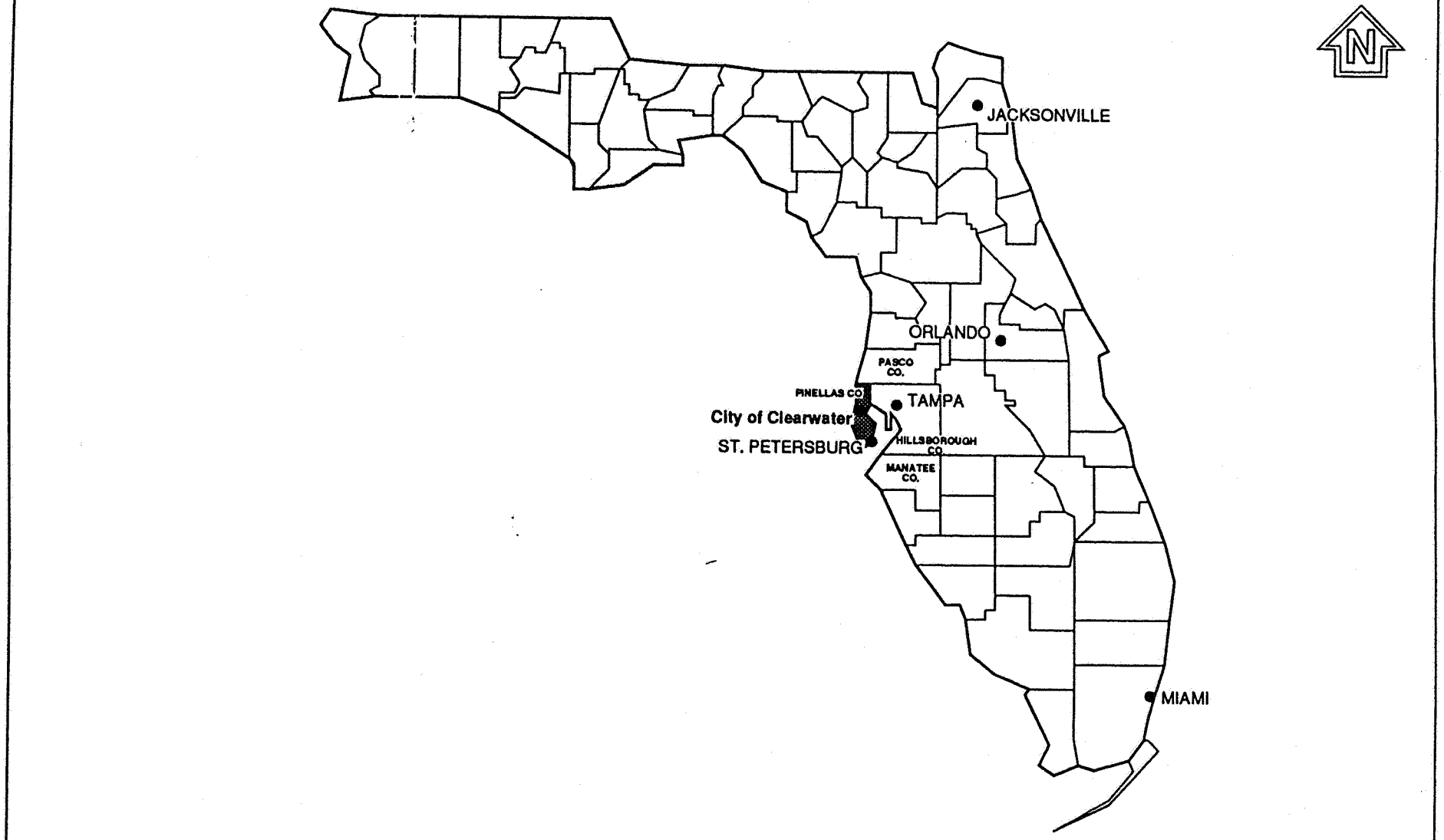


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CLEARWATER, FL

(PINELLAS CO.)

VICINITY MAP

east and the City of St. Petersburg, Florida, is about 20 miles south southeast of the city. The city is bordered by the Cities of Dunedin and Safety Harbor, Florida, on the north; the Town of Belleair, and the Cities of Belleair Beach and Largo, Florida, on the south; and the Gulf of Mexico on the west. The unincorporated areas of Pinellas County, Florida, border the city on the north, east and west. The City of Clearwater, the county seat of Pinellas County, is served by U.S. Routes 19 and Alternate 19; State Road 60; and CSX railroad. The city is also served by State Roads 233, 321, 501, 576, 580, 590, 611, 686, and 693. The 1980 population was reported to be 85,528 (Reference 3).

Much of the City of Clearwater is developed residentially, commercially, and industrially. Tourism is the major factor in the economy and primarily centered on Clearwater Beach. Retail trade and service has grown dramatically to serve the many tourists and growing resident population. Industries include the manufacture of boats, computer products and electronic components.

The topography of the City of Clearwater is nearly level to gently sloping terrain with highest areas centrally located in the study area. The shoreline is characterized by high coastal bluffs and white sandy beaches. Low areas exist along the Alligator Creek floodplain. Elevations are generally from sea level to 75 feet National Geodetic Vertical Datum of 1929 (NGVD). The city is characterized by an urban landscape, with 75 percent of the ground impervious. The vegetation is typical of urban land in a subtropical climate zone.

The city has a subtropical climate characterized by mild, dry winters and warm, wet summers. The wet season extends from June through September and coincides with the hurricane season. During this four-month period, the study area receives nearly two-thirds of its annual precipitation. The average annual precipitation in the city is 53 inches, and the average annual temperature is approximately 72.5 degrees Fahrenheit (Reference 4).

2.3 Principal Flood Problems

Flooding in the area of the City of Clearwater results primarily from tropical storms and hurricanes that cause intense rainfall, excessive runoff, and tidal surge (and associated wave action) in coastal area. Although somewhat protected from the Gulf of Mexico by the offshore islands, the coastline at the city is subject to abnormally high storm tides. Not all storms that pass close to the study area produce extremely high tides. Similarly, storms that produce extreme conditions in one area may not necessarily produce critical conditions in other parts of the study area.

Stevenson and Allen Creeks are coastal creeks that drain an area several miles inland and, under certain conditions, tidewaters generated at their mouths can intrude far upstream. Rainfall which usually accompanies hurricanes can aggravate the tidal flood situation, particularly in areas where the secondary drainage system is poorly developed.

Storms passing in the vicinity of the city have produced a number of major floods causing significant damage. A brief description of several significant tropical storms provides historic information to which riverine and tidal flood hazards and the projected flood depths can be compared (References 5-10).

October 21-31, 1921

This storm originated in the western Caribbean Sea and entered Florida north of the City of Tarpon Springs. The minimum barometric pressure at the City of Dunedin was 28.34 inches; wind speed at the nearby City of Tarpon Springs was estimated at 70 to 90 knots. The coast from the City of Tarpon Springs south to the City of Fort Myers experienced tides from 7 to 10 feet. The keys from the City of Anna Maria to Clearwater Beach experienced severe damage. Many cottages at Clearwater Beach were damaged, and 500 feet of bridge were destroyed. The City of Clearwater sustained an estimated $80,000 in damage to houses, piers, and boats. The north end of Old Tampa Bay was badly damaged by a bore described as being 7 to 10 feet high. Flooding conditions were prolonged because of the slow forward movement of the storm.

August 31-September 8, 1935

This storm, called the "Labor Day Hurricane," was one of the most severe tropical disturbances ever recorded. The storm was first located east of Turks Island, traveled toward the Florida Straits, recurved across the Florida Keys, then passed up the west coast of Florida on a broad recurve that brought it inland near Cedar Key. Along the beach areas from the City of Sarasota northward to Clearwater Beach, homes were undermined and badly damaged. Mass evacuation of those areas was accomplished before the storm.

September 1-7, 1950

This hurricane originated over the western Caribbean Sea, passed northward over Cuba and the Gulf of Mexico, then moved north-northwestward parallel to the Florida coastline. It made two loops near Cedar Key, moved inland southeastward, passed approximately 30 miles north of the City of Tampa, recurved, and traveled northward. Pinellas County beach areas sustained heavy damage, principally from the long duration of high tides and waves that caused considerable erosion and recession of the shoreline. In turn, that erosion was responsible for major

structural damage along the beaches. This small, but severe hurricane was also accompanied by intense rainfall. A total of 12.7 inches of rain in two days was reported in the City of Clearwater.

June 4-14, 1966

This storm, Hurricane Alma, originated in the Gulf of Honduras, passed between Dry Tortugas and Key West, and landed in the Apalachee Bay area, causing variable tides ranging up to 10 feet above normal on the west coast of Florida. Besides structural damage in west Florida, the mango crop in the southwestern portion of the state and the grapefruit crop around Pinellas County were severely damaged.

June 19, 1972

Hurricane Agnes originated on the northeastern tip of the Yucatan Peninsula and traveled westward. The storm was of large diameter, and, although the center of this storm passed approximately 150 miles west of the Florida Peninsula, it produced a high, damaging tidal surge. In Pinellas County, tides averaged 3 to 6 feet above normal in the coastal areas. Beaches and causeways were flooded. Flooding conditions of extreme magnitude occurred in Tampa Bay and caused a influx of saltwater through the outlet canal into Lake Tarpon. Damage in Pinellas County from this storm was estimated at $12.5 million.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area. Nonstructural, floodprone measures in the form of local ordinances are used to control development in floodplain areas.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater one year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (one-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Hydraulic analyses, considering storm characteristics and the shoreline and bathymetric characteristics of the flooding sources studied, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the shorelines.

The FEMA storm surge model was utilized to simulate the hydrodynamic behavior of the surge generated by the various synthetic storms. This model utilizes a grid pattern approximating the geographical features of the study area and the adjoining areas. Surges were computed utilizing grids of 5 nautical miles by 1 nautical miles, and 2,000 feet, depending on the resolution required.

Underwater depths and land heights for the model grid systems were obtained from nautical charts (References 31-33) and topographic maps (Reference 14).

The methodology for analyzing the effects of wave heights associated with coastal storm surge flooding is described in a report prepared by the National Academy of Sciences (NAS) (Reference 34). This method is based on the following major concepts. First, depth-limited waves in shallow water reach a maximum breaking height that is equal to 0.78 times the stillwater depth. The wave crest is 70 percent of the total wave height above the stillwater level. The second major concept is that wave height may be diminished by dissipation of energy due to the presence of obstructions, such as sand dunes, dikes and seawalls, buildings, and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined by NAS procedures (Reference 34). The third major concept is that wave height can be regenerated in open fetch areas due to the transfer of wind energy to the water. This added energy is related to fetch length and depth.

Wave heights were computed along transects (cross-section lines) that were located along the coastal areas, as illustrated in Figure 2, Transect Location Map. The transects were located with consideration given to the physical and cultural characteristics of the land so that they would closely represent conditions in their locality. Transects were spaced close together in areas of

complex topography and dense development. In areas having more uniform characteristics, they were spaced at large intervals. It was also necessary to locate transects in areas where unique flooding existed and in areas where computed wave heights varied significantly between adjacent transects.

Each transect was taken perpendicular to the shoreline and extended inland to a point where wave action ceased. Along each transect, wave heights and elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. The stillwater elevations for the 100-year flood were used as the starting elevations for these computations. Wave heights were calculated to the nearest 0.1 foot, and wave elevations were determined at whole-foot increments along the transects. The location of the 3-foot breaking wave for determining the terminus of the V zone (area with velocity wave action) was computed at each transect. Also, along the open coast, the V zone designation applies to all areas seaward of the heel of the primary dune system.

Figure 3 represents a sample transect that illustrates the relationship between the stillwater elevation, the wave crest elevation, the ground elevation profile, and the location of the V/A zone boundary.

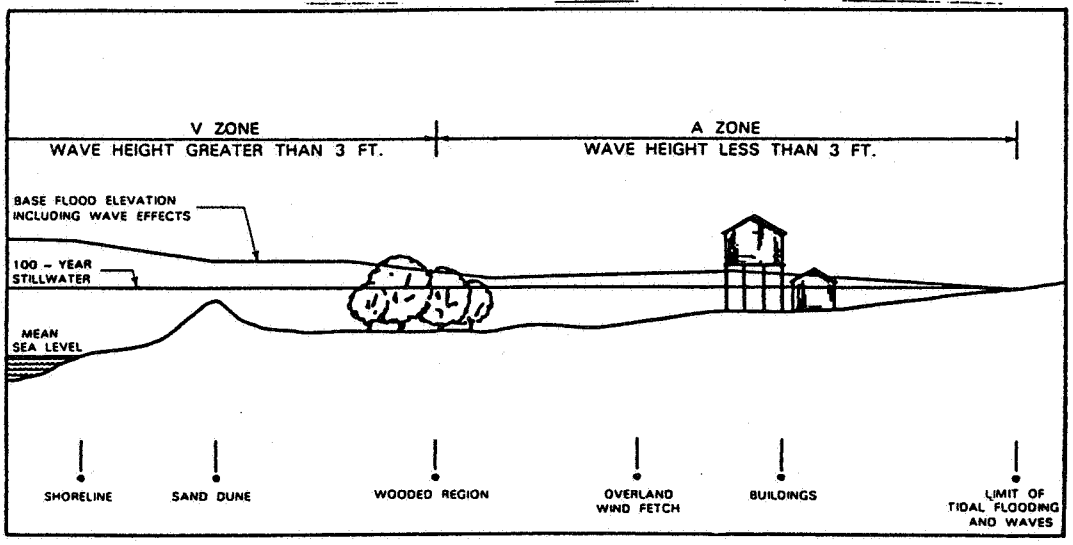
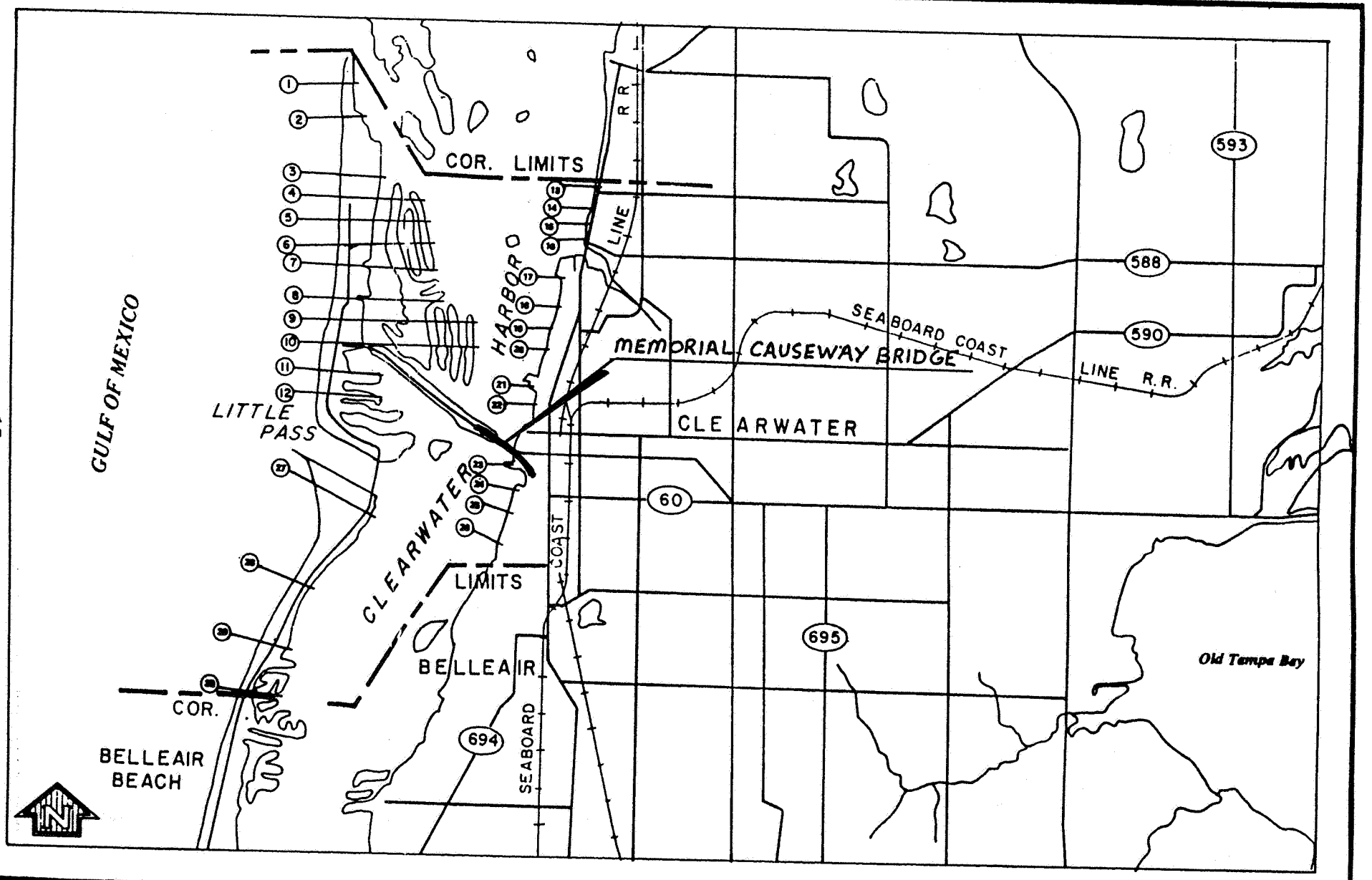


FIGURE 3 - Transect Schematic

After analyzing wave heights along each transect, wave elevations were interpolated between transects. Various source data were used in the interpolation, including topographic maps (Reference 14), beach profiles (Reference 35), aerial photographs (References 36 and 37), and engineering judgment. Controlling features affecting the elevations were identified and considered in relation to their positions at a particular transect and their variation between transects.



15

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CLEARWATER, FL
(PINELLAS CO.)

APPROXIMATE SCALE
0 1 2 3 4MILES

TRANSECT LOCATION MAP

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10-YEAR	50-YEAR	100-YEAR	500-YEAR		
GULF OF MEXICO							
CLEARWATER HARBOR 1–26	0003,0007,0008 0015	5.6	8.9	10.4	13.4	VE AE	12–16 10–13
27–30	0014,0021	5.4	8.8	10.0	13.3	VE AE	12–16 10–12
TAMPA BAY							
(TRANSECTS N/A)	0011,0012,0013 0017,0018,0019 0020	5.3	8.3	9.6	12.5	VE AE	10 10
ALLIGATOR LAKE							
(TRANSECTS N/A)	0011	7.5	8.5	9.9	12.9	AE	10

[1]ROUNDED TO NEAREST FOOT AND MAY INCLUDE EFFECT OF WAVE ACTION. DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CLEARWATER, FL.
(PINELLAS CO.)

SUMMARY OF STILLWATER ELEVATIONS

GULF OF MEXICO—TAMPA BAY—ALLIGATOR LAKE

FEMA / FIRM

INSURANCE RATE MAP

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 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 flood plain.
- **ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zone.

567 — Base Flood Elevation Line; Elevation in Feet*

A — A — Cross Section Line

(EL 19) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM5 × — Elevation Reference Mark

M3.0 • — Mile Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NATIONAL FLOOD INSURANCE PROGRAM

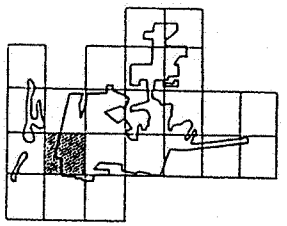
FIRM

FLOOD INSURANCE RATE MAP

CITY OF
CLEARWATER,
FLORIDA
PINELLAS COUNTY

PANEL 15 OF 23
(SEE MAP INDEX FOR PANELS NOT PRINTED)

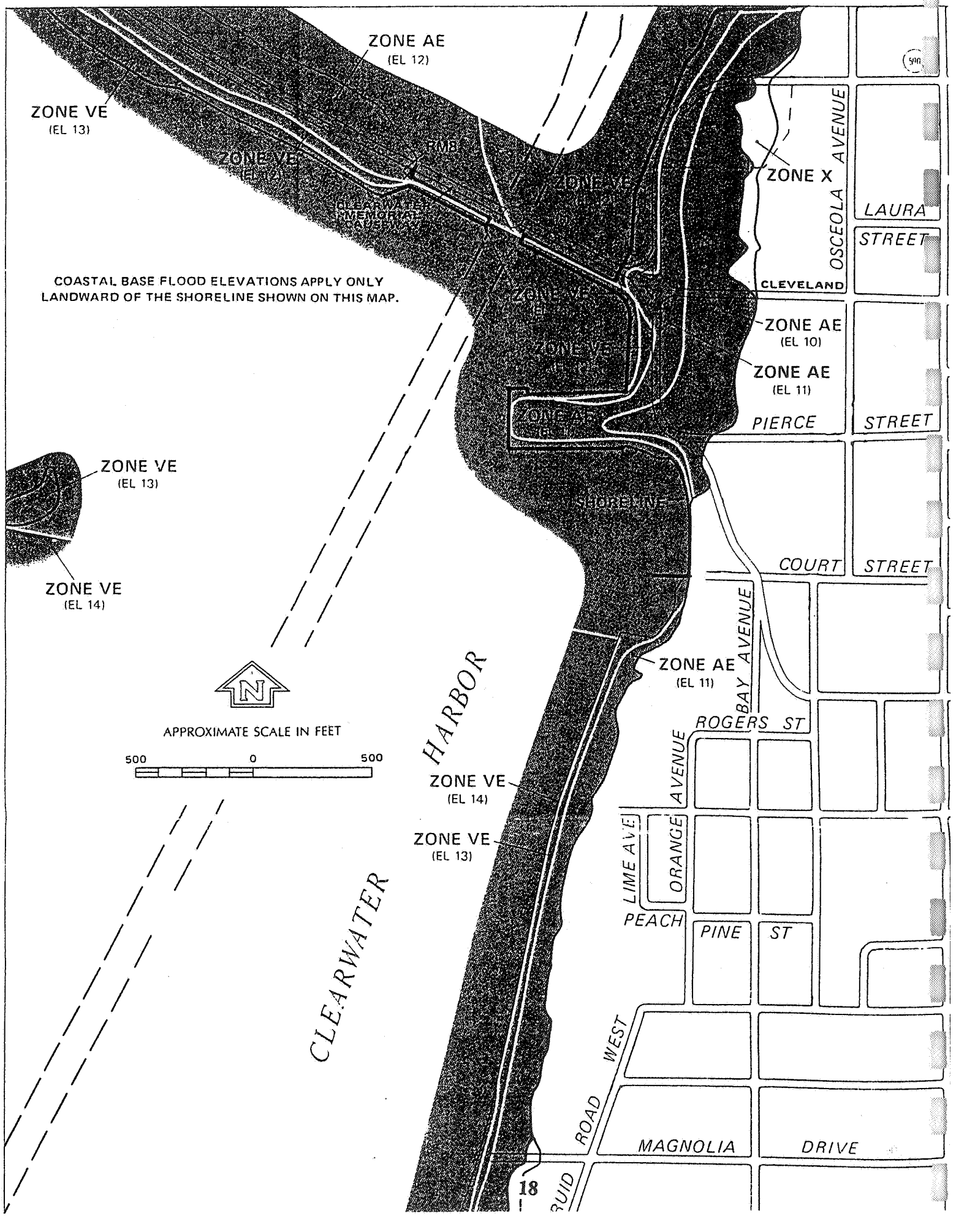
PANEL LOCATION



COMMUNITY–PANEL NUMBER:
125096 0015 D

MAP REVISED:
AUGUST 19, 1991

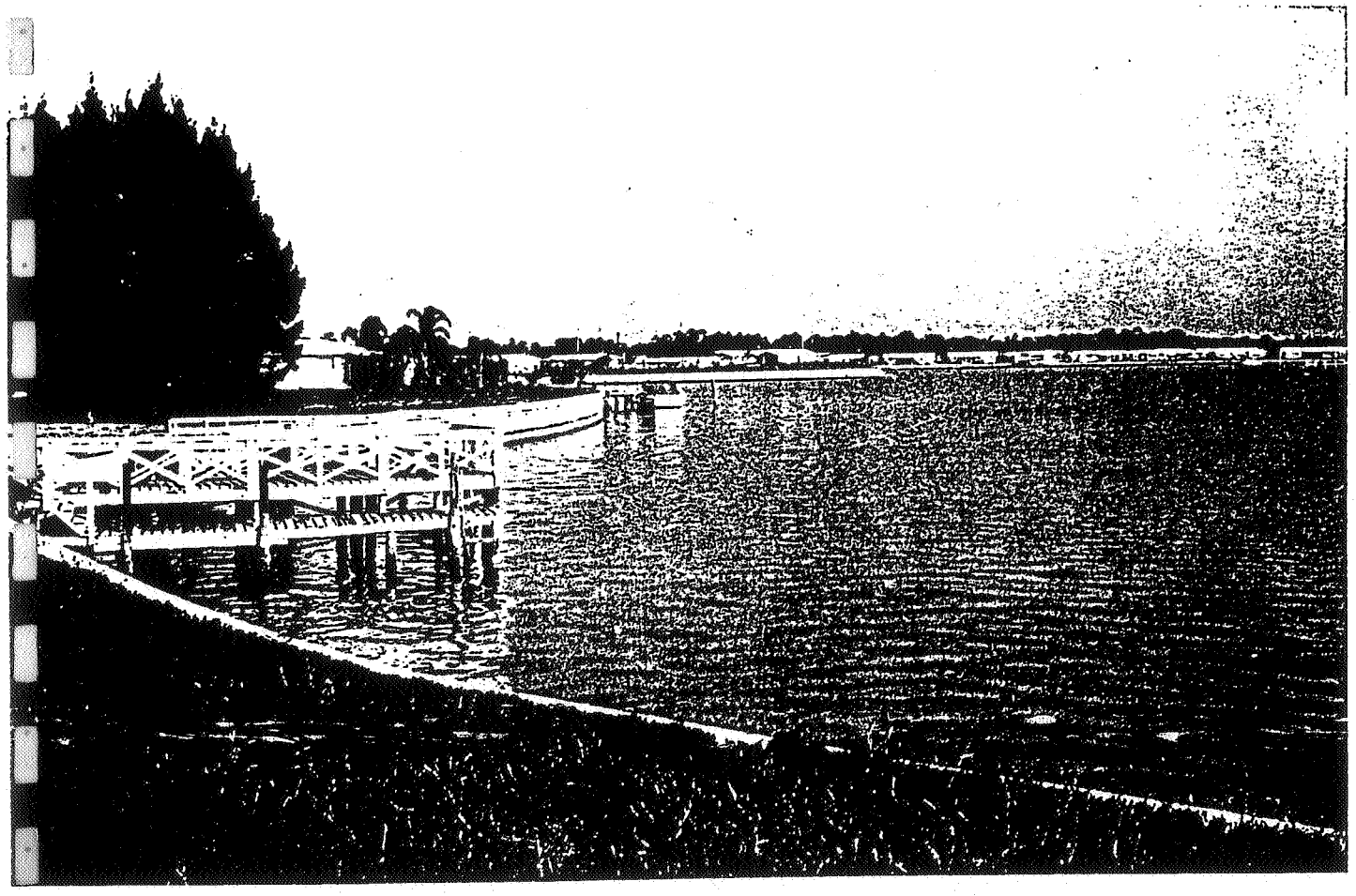
Federal Emergency Management Agency


ZONE AE
(EL 12)
ZONE VE
(EL 13)
ZONE VE
(EL 12)
RM8
ZONE VE
CLEARWATER MEMORIAL CAUSEWAY
COASTAL BASE FLOOD ELEVATIONS APPLY ONLY LANDWARD OF THE SHORELINE SHOWN ON THIS MAP.
ZONE VE
ZONE VE
ZONE AE
ZONE X
OSCEOLA AVENUE
LAURA
STREET
CLEVELAND
ZONE AE
(EL 10)
ZONE AE
(EL 11)
PIERCE
STREET
ZONE VE
(EL 13)
ZONE VE
(EL 14)
SHORE DR
COURT
STREET
ZONE AE
(EL 11)
BAY AVENUE
ROGERS ST
APPROXIMATE SCALE IN FEET
500
0
500
HARBOR
ZONE VE
(EL 14)
ZONE VE
(EL 13)
AVENUE
ORANGE
LIME AVE
PEACH
PINE
ST
CLEARWATER
WEST
ROAD
MAGNOLIA
DRIVE
18

SCS SOIL SURVEY

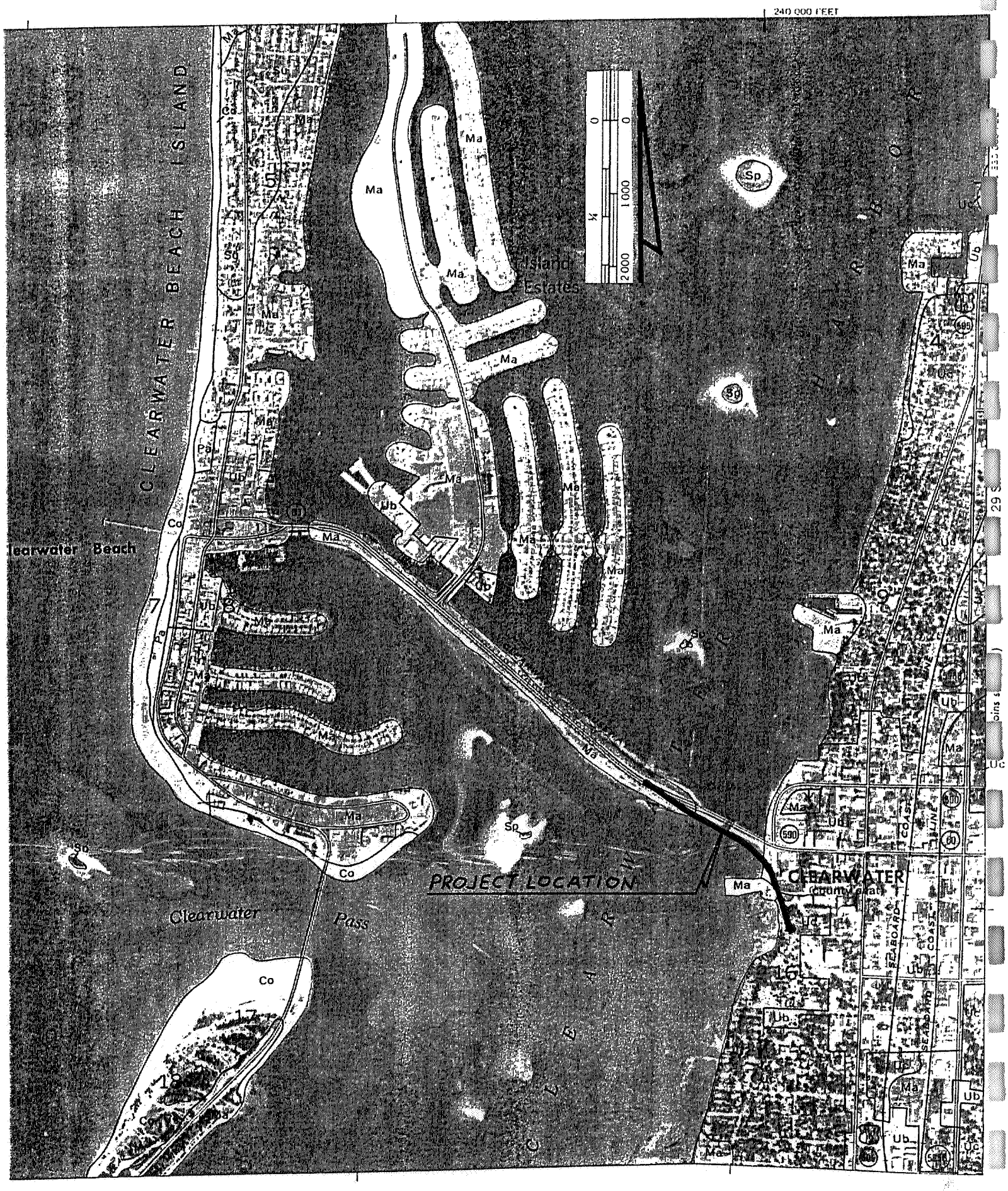
SOIL SURVEY OF

Pinellas County, Florida



United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of Florida
Agricultural Experiment Stations

19 Issued September 1972


240 000 FEET
CLEARWATER BEACH ISLAND
Island Estates
Clearwater Beach
PROJECT LOCATION
Clearwater Pass
CLEARWATER
INTRACOASTAL WATERWAY
GULF OF MEXICO
0
1/4
1,000
2,000

Made Land

Two types of Made land are mapped in Pinellas County. They are described in the following paragraphs.

Made land (Ma) 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. Coarser sludge materials are deposited near the outlet of discharge pipes and finer materials settle in more distant positions. Rocks ½ inch to 12 inches in diameter are common. Numerous silicified oyster shells and some animal fossils occur in these materials. Stratification is apparent in the water-transported material. Materials transported by truck are similar but they usually are sandier and do not contain silicified shells and fossils.

Made land is underlain at a depth of 2 to 8 feet by various kinds of material. In some areas it is underlain by the sandy bay bottom, and in others by Tidal swamp that has layers of fibrous peat 20 inches or less thick. Some of the material transported by truck has been deposited over solid rubble consisting of chunks of concrete, discarded appliances, and broken asphalt.

Made land occurs mainly in urban areas, along the coast and keys, and as manmade islands built in shallow water. In coastal areas it has been built up to provide desirable locations for residential development. Recently deposited material shows very little profile development and has severe limitations for plants. Topsoil, irrigation, and special fertilizers are needed for good growth of lawns and ornamental plants. (No capability classification; woodland group 9)

Made land, sanitary fill (Md) consists of sand, clay, shells, and shell fragments in varying proportions deposited over refuse and garbage. Holes 12 to 36 feet deep are filled with refuse and garbage and then topped with 3 to 6 feet of soil material. The surface material is reworked and leveled. This mass of mixed material is highly compacted in the surface layer but is very loose in the underlying refuse. Most of these holes have been dug in soils that have a high water table, and most of the refuse is below water. The waterlogged refuse has low bearing capacity. (No capability classification; woodland group 9)

Urban Land

Much of Pinellas County has been developed for urban uses. Use of heavy earth-moving equipment to prepare building sites has altered much of the original soil material. Buildings and pavement cover parts of this reworked soil material. Other parts have been leveled or shaped. Only small remnants of the original soils are interspersed with areas covered by buildings and pavement and areas of reworked soil material. In older residential areas the proportion of undisturbed soil is larger.

Where very little of the original soil remains undisturbed, the areas are mapped as Urban land. Where enough remains to make identification of the original soil possible, the areas are mapped as a complex of Urban land and the identified soil.

Urban land (Ub).—This land type consists of areas where the original soil has been modified through cutting, grading, filling, and shaping or has been generally altered for urban development. Major soil properties that originally limited urban uses have been overcome to an acceptable extent. Urban facilities, including paved parking areas, streets, industrial buildings, houses, other structures, and underground utilities, have been constructed on 75 percent or more of these altered areas. Areas not covered by urban facilities generally have been altered. Identification of soils within these areas is not feasible.

Urban land occurs primarily in downtown areas, shopping districts, industrial parks, and along main traveled throughways of cities and towns. It also occurs in isolated shopping centers and small business areas at intersections of primary roads. Included in places are small, less intensively developed areas and small areas of identifiable soils. (No capability or woodland classification)

Urban land-Astatula complex (Uc).—This complex is about 30 to 70 percent Astatula fine sand, of which 10 to 20 percent has been modified by cutting, grading, and shaping. About 25 to 40 percent of this complex is Urban land that is covered with houses, industrial buildings, other structures, and pavement.

Soil material left after grading and leveling has been used to fill low wet areas. In a few places it has been shaped. In these small areas slopes are 5 to 8 percent.

Included in mapping are small areas of St. Lucie soils, small areas of poorly drained soils, and a few small areas that are more than 75 percent covered with urban facilities. These inclusions make up no more than 15 percent of any mapped area. (No capability or woodland classification)

SWFWMD CORRESPONDENCE

Southwest Florida Water Management District

PRE-APPLICATION MEETING NOTES

Date: March 28, 1996

Project Name: Memorial Causeway Bridge

Attendees:
Paul Hermann
Charlie Samuels
Alberto Martinez
Alba Mas
George Eliason

29-15-16.mem

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.

- In kind bridge replacement but will have to build an adjacent bridge before the old one is removed.
- Once the new bridge is in the old one will be removed.
- Water quantity will not be an issue.
- Outstanding Florida Waters. There will have to be overriding public interest justification submitted with the application. Submit alternatives and why they don't work. We will have to field verify and visit preferably prior to application. Compensation: shading effects may be able to be compensated by removal of old bridge. We need to establish any wetland vegetation impact or impacts to communities of fauna.
- Need to give us a picture of what's going on in the benthic communities.
- Water quality: replacement in kind so no water quality required. I asked if they could take the drainage back to land and add skimmers. No but the bridge will not open so there won't be cars idling dripping oil.
- During construction need to have a mixing zone area, have to take samples and give us reports. We are also concerned about manatees. Charlie said the specs address that.
- Environmental Resource Permit standard general permit if less than 1 acre of wetland impacts.

APPENDIX D

Cost Estimates

- Construction
- Right-of-Way

CONSTRUCTION COST ESTIMATES FOR CONCRETE SEGMENTAL BOX ALTERNATIVES

	Estimated		Estimated Quantities by Alternative										Estimated Costs ($1,000s)									
		Unit																				
Cost Item	Units	Cost	P4A-65	P4A-74	P4AN65	P4AN74	P4S65	P4S74	C4WS65	C4WS74	P4NE-65	P4NE-74	P4A-65	P4A-74	P4AN65	P4AN74	P4S65	P4S74	C4WS65	C4WS74	P4NE-65	P4NE-74
New Bridge																						
Construction	FT	width:	104	104	104	104	104	104	104	104	104	104										
	FT	length:	2350	2550	2700	2850	3000	3100	3200	3300	2200	2200										
1000's of	SF	area:	244	265	281	296	312	322	333	343	229	229										
74' channel clearanc	SF	$77		265		296		322		343		229		20420		22823		24825		26426		17618
65' channel clearanc	SF	75	244		281		312		333		229		18330		21060		23400		24960		17160	
Existing Bridge																						
Removal [1]	SF	12	77390	77390	77390	77390	77390	77390	77390	77390	77390	77390	929	929	929	929	929	929	929	929	929	929
Roadway																						
Approaches																						
New (Perm.) Pavemer	SY	20.70	11500	11500	12615	12615	8905	8905	7000	8535	15600	15600	238	238	261	261	184	184	145	177	323	323
Shoulder Pavement	SY	10.85	4300	4000	2745	2700	2930	2930	1600	2200	4200	4200	47	43	30	29	32	32	17	24	46	46
Pavement Removal	SY	5.00	3760	3760	21450	21450	14000	14000	14400	16000	15310	15310	19	19	107	107	70	70	72	80	77	77
Conc. Barrier Wall	LF	60.00	1550	1350	1350	1200	650	650	2700	3000	2000	2000	93	81	81	72	39	39	162	180	120	120
Conc. Appr. Slab (inc steel)	SF	35.0	3960	3960	3960	3960	3960	3960	3960	3960	3960	3960	139	139	139	139	139	139	139	139	139	139
Earthwork (Embankme	CY	4.50	44550	35000	63000	58000	30000	36000	44800	66000	1E+05	1E+05	200	158	284	261	135	162	202	297	459	522
MSE Wall	SF	15.75	29730	29730	25000	25000	250	250	250	250	5500	7500	468	468	394	394	4	4	4	4	87	118
Culver/vault to protect	LS	400000																			400	400
sewer pump station																						
Chnl Dredging/Excav. [2]	CY	15.00							515000	515000									7725	7725		
Relocate Navig. Device	LS	25000							2	2									50	50		
Remove Signal @ PierceClev.	LS	10000											10	10	10	10	10	10	10	10	10	10
Cleveland St. Extensior	LS	varies											300	300	300	300	400	400	--	--	200	200
with Roundabout																						
Const. Subtotal													20773	22805	23594	25325	25341	26793	34414	36040	19948	20500
Routine MOT (4%)													831	912	944	1013	1014	1072	1377	1442	798	820
Mobilization (4%)													831	912	944	1013	1014	1072	1377	1442	798	820
CEI (10%)													2077	2280	2359	2532	2534	2679	3441	3604	1995	2050
Construction Total													24512	26910	27841	29883	29903	31616	40609	42527	23539	24190
(a) Tot. Construction													24512	26910	27841	29883	29903	31616	40609	42527	23539	24190
(b) Engr. Des. (10% of Const.Total)													2451	2691	2784	2988	2990	3162	4061	4253	2354	2419
(c) Utility Reloc. Costs																						
(d)Totals [3]													$26,963	$29,600	$30,625	$32,871	$32,893	$34,777	$44,669	$46,780	$25,892	$26,609
Notes: 1. Exist. Bridge = 58' x 1024' Assume 100% removal + 450' x 40' (previous bridge) = 77,390 SF											Differences			2638		2247		1884		2111		717
2. Unit cost based on Clearwater Pass Bridge; other costs based on FDOT's statewide or District 7 average bid amounts.																						
3. Does not include costs of improving surface streets adjacent to the bridge approaches																						

CONSTRUCTION COST ESTIMATES FOR FLORIDA BULB TEE ALTERNATIVES

	Estimated		Estimated Quantities by Alternative										Estimated Costs ($1,000s)									
		Unit																				
Cost Item	Units	Cost	P4A-65	P4A-74	P4AN65	P4AN74	P4S65	P4S74	C4WS65	C4WS74	P4NE-65	P4NE-74	P4A-65	P4A-74	P4AN65	P4AN74	P4S65	P4S74	C4WS65	C4WS74	P4NE-65	P4NE-74
New Bridge																						
Construction	FT	width:	104	104	104	104	104	104	104	104	104	104										
	FT	length:	2350	2550	2700	2850	3000	3100	3200	3300	2200	2200										
1000's of	SF	area:	244	265	281	296	312	322	333	343	229	229										
74' channel clearanc	SF	$60		265		296		322		343		229		15912		17784		19344		20592		13728
65' channel clearanc	SF	58	244		281		312		333		229		14175		16286		18096		19302		13270	
Existing Bridge																						
Removal '	SF	12	77390	77390	77390	77390	77390	77390	77390	77390	77390	77390	929	929	929	929	929	929	929	929	929	929
Roadway																						
Approaches																						
New (Perm.) Pavemer	SY	20.70	11500	11500	12615	12615	8905	8905	7000	8535	15600	15600	238	238	261	261	184	184	145	177	323	323
Shoulder Pavement	SY	10.85	4300	4000	2745	2700	2930	2930	1600	2200	4200	4200	47	43	30	29	32	32	17	24	46	46
Pavement Removal	SY	5.00	3760	3760	21450	21450	14000	14000	14400	16000	15310	15310	19	19	107	107	70	70	72	80	77	77
Conc. Barrier Wall	LF	60.00	1550	1350	1350	1200	650	650	2700	3000	2000	2000	93	81	81	72	39	39	162	180	120	120
Conc. Appr. Slab (inc steel)	SF	35.0	3960	3960	3960	3960	3960	3960	3960	3960	3960	3960	139	139	139	139	139	139	139	139	139	139
Earthwork (Embankme	CY	4.50	44550	35000	63000	58000	30000	36000	44800	66000	1E+05	1E+05	200	158	284	261	135	162	202	297	459	522
MSE Wall	SF	15.75	29730	29730	25000	25000	250	250	250	250	5500	7500	468	468	394	394	4	4	4	4	87	118
Culver/vault to protect	LS	400000																			400	400
sewer pump station																						
Chnl Dredging/Excav. [2]	CY	15.00							515000	515000									7725	7725		
Relocate Navig. Device	LS	25000							2	2									50	50		
Remove Signal @ PierceClev.	LS	10000											10	10	10	10	10	10	10	10	10	10
Cleveland St. Extensior	LS	varies											300	300	300	300	400	400	--	--	200	200
with Roundabout																						
Const. Subtotal													16618	18296	18820	20286	20037	21312	28756	30206	16058	16610
Routine MOT (4%)													665	732	753	811	801	852	1150	1208	642	664
Mobilization (4%)													665	732	753	811	801	852	1150	1208	642	664
CEI (10%)													1662	1830	1882	2029	2004	2131	2876	3021	1606	1661
Construction Total													19609	21590	22208	23937	23644	25149	33933	35643	18949	19600
(a) Tot. Construction													19609	21590	22208	23937	23644	25149	33933	35643	18949	19600
(b) Engr. Des. (10% of Const.Total)													1961	2159	2221	2394	2364	2515	3393	3564	1895	1960
(c) Utility Reloc. Costs																						
(d)Totals [3]													$21,570	$23,749	$24,428	$26,331	$26,008	$27,663	$37,326	$39,207	$20,844	$21,560
											Differences			2179		1902		1655		1881		717

Notes: 1. Exist. Bridge = 58' x 1024' Assume 100% removal + 450' x 40' (previous bridge) = 77,390 SF

2. Unit cost based on Clearwater Pass Bridge; other costs based on FDOT's statewide or District 7 average bid amounts.

3. Does not include costs of improving surface streets adjacent to the bridge approaches

Memorial Causeway Bridge PD&E Study | R/W COST ESTIMATE BY HDR ENGINEERING | Date: 12/17/96 **Rev. 1/3/97** | By

Alternative: P4 NE (a.k.a. "Bluff Boulevard") w/ Roundabout | Land Unit Cost $15/SF | Incl. Haz Waste Investig. | Reloc Assist.

Parcel Identification				R/W Land (Phase 31)					R/W OPS (Phase 32)			Business
Side	Parcel Number	Owner	Existing Land Use	Area (SF)	Land Cost	Impvs & Sev Damgs	Comments Code	Bus. Dam.	Appraisal Fees	Bus Dam. CPA Fees	Demolit. Contracts	Move Costs
E	29-15-16-62131-000-0001	Oak Cove Condo. As	Multi-family	14,000	$ 210,000	$ 150,000	1		$ 5,000			
E	29-15-16-62131-000-0010	Oaks Clearwater Inc.			0							
E	29-15-16-62131-000-0020	BEF Inc.			0							
W	29-15-16-6120-000-0010	Oaks Clearwater Inc.	Multi-family	310	4,650		2		5,000			
W	29-15-16-62120-000-0020	BEF Inc.			0							
W	29-15-16-62120-000-0001	Oaks Bluff Condo. As			0							
E	29-15-16-00000-130-1100	Pinellas County	Parking	17,000	255,000	663,000	3		5,000			
E	29-15-16-92574-002-0020	Pinellas County	Parking	21,200	318,000							
			Subtotal	**38,200**								
E	29-15-16-00000-130-1200	Pinellas County	Parking	6,820	102,300	500,000	4		10,000			
E	29-15-16-92574-006-0010	Pinellas County	Parking	4,960	74,400							
E	29-15-16-55332-000-0010	Pinellas County	Parking	5,600	84,000							
E	29-15-16-91116-000-0010	Pinellas County	Parking	2,480	37,200							
			Subtotal	**19,860**								
	City of Clearwater											
E	29-15-16-00000-130-0700	City of Clearwater		17,205								
E	29-15-16-20358-001-0020	City of Clearwater		62,937		150000	5					
E/W	29-15-16-00000-120-0900	City of Clearwater		34,371								
E/W	29-15-16-76482-002-0010	City of Clearwater		30,948								
	29-15-16-92574-005-0010	City of Clearwater	Pin. Arts Council	440			6				10,000	5,000
	Subtotals			218,271	$1,085,550	$1,463,000		$0	$25,000	$0	$10,000	$5,000

Collective Subtotals	$2,588,550
Title searches @ $500 each	$8,000
Subtotal	$2,596,550
Settlements & Litigation at 50%	$1,298,275
Total	$3,894,825
Rounded Total	$3.9 Mill.

Comments

1 Large area at the western end of the parcel. May be some impact to building's utilities or foundation, therefore "damages" included
2 Tiny corner clip
3 Loss of approx. 45 parking spaces north of Court St. (10 up & 10 under deck + 25 surface lot spaces). Can expand deck up one more level and/or extend deck eastward to Osceola. Need approx. 45 x 300 SF/space, say 14,000 SF. Const cost = 14,000 x $25/SF + 15% cont + $60,000 design = $463,000, plus cost to rebuild ramp of $200,000.
4 These are areas south of Court Street. Existing parking lot to be reconfigured including using existing R/W to be vacated.
5 Mitigation for loss of parking due to pier placement in Harborview Center parking lot
6 Land is leased to the Arts Council --may have to break a lease; relocation is assumed for now but may not be required

Memorial Causeway Bridge PD&E Study — R/W COST ESTIMATE BY HDR ENGINEERING — Date Prepared 12/17/96 — By

Alternative: P4A w/ Cleveland St. Extension & Roundabout — Land Unit Cost $15/SF — Incl. Haz Waste Investig. — Reloc Assist.

Parcel Identification				R/W Land (Phase 31)					R/W OPS (Phase 32)			Business
Side	Parcel Number	Owner	Existing Land Use	Area (SF)	Land Cost	Impvs & Sev.Damgs	Comments Code	Bus. Dam.	Appraisal Fees	Bus.Dam. CPA Fees	Demolit. Contracts	Move Costs
W	29-15-16-68823-000-0010	Pierce 100 Condominiums	Multi-family	620	$ 9,300		1		$ 5,000			
W	29-15-16-00000-240-0100	WAGI Radio Station	Commercial	2,790	41,850	$ 75,000	2		5,000		$ 10,000	$ 120,000
W	29-15-16-00000-240-0200	Melanie H. Cordes, Truste	Vacant	1,550	23,250				2,000			
E	29-15-16-62131-000-0001	Oak Cove Condo Assoc.	Multi-family	2,170	32,550		3		5,000			
	29-15-16-62131-000-0010	Oaks Clearwater Inc.			0							
	29-15-16-62131-000-0020	BEF Inc.			0							
W	29-15-16-62120-000-0001	Oak Bluff Condo Assoc.	Multi-family	155	2,325		4		5,000			
	29-15-16-62120-000-0010	Oaks Clearwater			0							
	29-15-16-62120-000-0020	BEF Inc.			0							
E	29-15-16-92574-002-0020	Pinellas County	Parking	2,790	41,850	100,000	5					
E	29-15-16-92574-006-0010	Pinellas County	Parking	4,495	67,425	500,000	6		10,000			
E	29-15-16-00000-130-1200	Pinellas County	Parking	5,580	83,700							
E	29-15-16-55332-000-0010	Pinellas County	Parking	4,392	65,880							
E	29-15-16-91116-000-0010	Pinellas County	Parking	1,240	18,600							
	City of Clearwater											
E	29-15-16-76485-002-0010	City of Clearwater	Public /Semi Pub	6,768								
E	29-15-16-00000-120-0900	City of Clearwater	Rec/ Open Spac	20,693								
E	29-15-16-20358-001-0020	City of Clearwater	Public/ Semi Pub	44,059								
E	29-15-16-00000-130-0700	City of Clearwater	Rec/ Open Spac	9,661								
W	29-15-16-00000-240-0300	City of Clearwater	Vacant	22,604								
W	29-15-16-92574-005-0010	City of Clearwater	Pin Arts Council	465			7				10,000	5,000
	Subtotals			130,032	$386,730	$675,000		$0	$32,000	$0	$20,000	$125,000

Collective Subtotals	$1,238,730
Title searches @ $500 each	$10,000
Subtotal	$1,248,730
Settlements & Litigation at 50%	$624,365
Total	$1,873,095
Rounded Total	$1.9 Mill.

Comments

1 Tiny corner clip of land at east end of their property
2 Relocation of radio station required; uneconomical remainder ($25,000); building value $50,000; relocate tower and equipment
3 Small corner clip at NW part of property; multiple ownership
4 Tiny corner clip; multiple ownership
5 Loss of approx. 10 parking spaces; est $10,000 cost to cure per space
6 Parking to be reconfigured including using existing R/W to be vacated; cost includes redesign & reconstruction
7 Land is leased to the Arts Council --may have to break a lease; relocation is assumed for now but may not be required

Memorial Causeway Bridge PD&E Study | R/W COST ESTIMATE BY HDR ENGINEERING | Date Prepared 12/17/96 | By

Alternative: P4A North w/ Cleveland St Extension & Roundabout

Land Unit Cost $15/SF | Incl. Haz Waste Investig. | Reloc Assist.

Parcel Identification				R/W Land (Phase 31)					R/W OPS (Phase 32)				Business Move Costs
Side	Parcel Number	Owner	Existing Land Use	Area (SF)	Land Cost	Impvs & Sev.Damgs	Comments Code	Bus. Dam.	Appraisal Fees	Bus.Dam. CPA Fees	Demolit. Contracts	
W	29-15-16-68823-000-0010	Pierce 100 Condo.	Multi-family	620	$ 9,300		1		$ 5,000			
W	29-15-16-00000-240-0100	WAGI Radio	Commercial	2,635	39,525	75,000	2		5,000		$ 10,000	$ 120,000
W	29-15-16-00000-240-0200	Melanie H. Cordes	Vacant	1,240	18,600				2,000			
E	29-15-16-62131-000-0001	Oak Cove Condo. As	Multi-family	2,170	32,550		3		5,000			
E	29-15-16-62131-000-0010	Oaks Clearwater Inc.			0							
E	29-15-16-62131-000-0020	BEF Inc.			0							
W	29-15-16-62120-000-0001	Oaks Bluff Condo. As	Multi-family	155	2,325		4		5,000			
W	29-15-16-62120-000-0010	Oaks Clearwater Inc.			0							
W	29-15-16-62120-000-0020	BEF Inc.			0							
E	29-15-16-92574-002-0020	Pinellas County	Parking	2,790	41,850	100,000	5					
E	29-15-16-92574-006-0010	Pinellas County	Parking	4,495	67,425	500,000	6		10,000			
E	29-15-16-00000-130-1200	Pinellas County	Parking	5,580	83,700							
E	29-15-16-55332-000-0010	Pinellas County	Parking	4,392	65,880							
E	29-15-16-91116-000-0010	Pinellas County	Parking	1,240	18,600							
	City of Clearwater											
E	29-15-16-76482-002-0010	City of Clearwater	Public/Semi-public	6,768								
E	29-15-16-00000-120-0900	City of Clearwater	Public/Semi-public	36,581								
E	29-15-16-20358-001-0020	City of Clearwater	Public/Semi-public	41,501								
E	29-15-16-00000-130-0700	City of Clearwater	Public/Semi-public	9,661								
W	29-15-16-00000-240-0300	City of Clearwater	Public/Semi-public	31,827								
W	29-15-16-92574-005-0010	City of Clearwater	Pin. Arts Council	465			7				10,000	5,000
	Subtotals			145,300	$379,755	$675,000		$0	$32,000	$0	$20,000	$125,000
									Collective Subtotals			$1,231,755
									Title searches @ $500 each			$10,000
									Subtotal			$1,241,755
									Settlements & Litigation at 50%			$620,878
									Total			$1,862,633
	Totals								Rounded Total			$1.9 Mill.

Comments

1 Tiny corner clip of land at east end of their property
2 Relocation of radio station required; uneconomical remainder ($25,000); building value $50,000; relocate tower and equipment
3 Small corner clip at NW part of property; multiple ownership
4 Tiny corner clip; multiple ownership
5 Loss of approx. 10 parking spaces; est $10,000 cost to cure per space
6 Parking to be reconfigured including using existing R/W to be vacated; cost includes redesign & reconstruction
7 Land is leased to the Arts Council --may have to break a lease; relocation is assumed for now but may not be required

Note: Much of the affected land is in the 100 year (coastal) floodplain

Memorial Causeway Bridge PD&E Study

R/W COST ESTIMATE BY HDR ENGINEERING

Date Prepared 12/17/96

By

Alternative: P4S including tie-in to Cleveland St. via Pierce Blvd.

Land Unit Cost $15/SF

Incl. Haz Waste Investig.

Reloc Assist.

Business Move Costs

Parcel Identification				R/W Land (Phase 31)				R/W OPS (Phase 32)					
Side	Parcel Number	Owner	Existing Land Use	Area (SF)	Land Cost	Impvs & Sev.Damgs	Comments Code	Bus. Dam.	Appraisal Fees	Bus.Dam. CPA Fees	Demolit. Contracts	
W	29-15-16-6120-000-0010	Oaks Clearwater Inc.	Multi-family	620	$ 9,300		1		$ 5,000			
W	29-15-16-62120-000-0020	BEF Inc.			-							
W	29-15-16-62120-000-0001	Oaks Bluff Condo. As			-							
E	29-15-16-92574-006-0010	Pinellas County	Public/Semi-public	4,960	74,400	500,000	2		10,000			
E	29-15-16-55332-000-0010	Pinellas County	Public/Semi-public	4,392	65,880							
E	29-15-16-00000-130-1200	Pinellas County	Public/Semi-public	5,270	79,050							
E	29-15-16-91116-000-0010	Pinellas County	Public/Semi-public	1,395	20,925							
					0							
	City of Clearwater				0							
E	29-15-16-76482-002-0010	City of Clearwater		6,768								
E	29-15-16-00000-120-0900	City of Clearwater		16,818								
E	29-15-16-20358-001-0020	City of Clearwater		21,442								
W	29-15-16-92574-005-0010	City of Clearwater	Pin. Arts Council	15,500			3				10,000	5,000
W	29-15-16-00000-240-0300	City of Clearwater		2,790								
	Subtotals			79955	$249,555	$500,000		$0	$15,000	$0	$10,000	$5,000

Collective Subtotals	$779,555
Title searches @ $500 each	$6,000
Subtotal	$785,555
Settlements & Litigation at 50%	$392,778
Total	$1,178,333
Rounded Total	$1.2 Mill.

Comments

1 Very small corner clip at NE part of the property

2 Surface parking lot between Court and Chestnut Streets; parking lot to be reconfigured including using existing R/W to be vacated; cost includes redesign and reconstruction.

3 City land which is leased to Pinellas Arts Council. Relocation required. May have to break lease with the county.

Memorial Causeway Bridge PD&E Study

R/W COST ESTIMATE BY HDR ENGINEERING

Date Prepared 12/17/96

By

Alternative: C4WS

Land Unit Cost $15/SF

Incl. Haz Waste Investig.

Parcel Identification				R/W Land (Phase 31)					R/W CPS (Phase 32)				Reloc Assist. Business Move Costs
Side	Parcel Number	Owner	Existing Land Use	Area (SF)	Land Cost	Impvs & Sev.Damgs	Comments Code	Bus. Dam.	Appraisal Fees	Bus.Dam. CPA Fees	Demolit. Contracts	
W	29-15-16-00000-120-0090	City of Clearwater	Rec/Open Space	1705			1					
	Subtotals			1705	$0	$0		$0	$0	$0	$0	$0

Collective Subtotals	$0
Title searches @ $500 each	$ 500
Subtotal	$ 500
Settlements & Litigation at 50%	N/A
Total	$ 500
Rounded Total	$ 500

Comments

1 City owned-land at the south end of the existing bridge.

Memorial Causeway Bridge PD&E Study — R/W COST ESTIMATE BY HDR ENGINEERING — Date Prepared 10/1/97 — By

Pref Alternative:
P4A w/ Pierce St. Connection

Land Unit Cost $15/SF

Parcel Identification				R/W Land (Phase 31)					R/W OPS (Phase 32)			Incl. Haz Waste Investig.	Reloc Assist. Business Move Costs
Side	Parcel Number	Owner	Existing Land Use	Area (SF)	Land Cost	Impvs & Sev Dmgs	Comm. Code	Bus. Dam.	Appraisal Fees	Bus Dam. CPA Fees	Demolit. Contracts		
W	29-15-16-00000-240-0100	WTAI Radio Station	Commercial	2,790	41,850	$ 250,000	1,2		5,000		$50,000		$ 10,000
W	29-15-16-00000-240-0200	Melanie H. Cordes, Trus	Vacant	1,350	20,250				2,000				
			Subtotal	**4,140**									
E	29-15-16-92574-002-0020	Pinellas County	Parking	5,400	81,000	200,000	3						
E	29-15-16-92574-006-0010	Pinellas County	Parking	5,800	87,000	1,000,000	4		10,000				
E	29-15-16-00000-130-1200	Pinellas County	Parking	9,600	144,000								
E	29-15-16-55332-000-0010	Pinellas County	Parking	6,700	100,500								
			Subtotal	**27,500**									
	City of Clearwater												
E	29-15-16-20358-001-0020	City of Clearwater	Public/ Semi	24,000									
E	29-15-16-00000-130-0700	City of Clearwater	Rec/ Open Sp	17,500									
W	29-15-16-00000-240-0300	City of Clearwater	Vacant	12,800									
W	29-15-16-92574-005-0010	City of Clearwater	Vacant	21,600									
W	29-15-16-00000-240-0600	City of Clearwater	Vacant	13,300									
			Subtotal	**89,200**									
	Subtotals			120,840	$474,600	$1,450,000		$0	$17,000	$0	$50,000		$ 10,000

Collective Subtotals	$2,001,600
Title searches @ $500 each	$6,000
Subtotal	$2,007,600
Settlements & Litigation at 20%	$401,520
Total	$2,409,120
Rounded Total	$2.4 Mill

Comments

1 Total take may be needed due to uneconomical remainder
2 Relocation of radio station required; building value + tower replacement $250,000; demolish tower, move equipment
3 Loss of approx. 20 parking spaces; est $10,000 cost to cure per space
4 Parking to be reconfigured including using existing R/W to be vacated; cost includes redesign & reconstruction + additional land for parking, as needed.

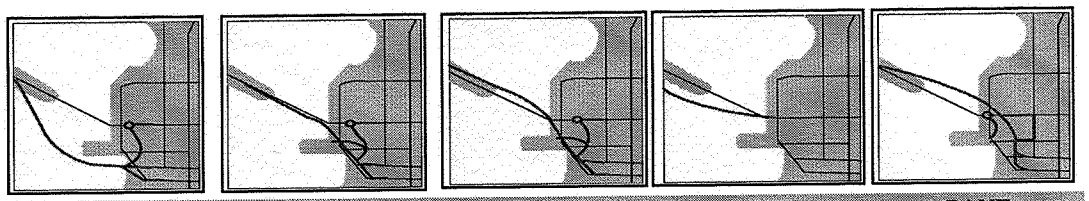
Note: Much of the affected land is in the 100 year (coastal) floodplain

APPENDIX E

Preliminary Evaluation Matrix

EXHIBIT E
Alignment Alternatives Evaluation Matrix

January 1997



Est. Costs ($ Mill.) for Bridge w/ 74' Clearance	P4S	P4A	P4A North	C4WS	P4 NE
Construction, Design, & Const. Supervision[1] (FL Bulb T/Segm. Box)	$31/ $37	$26/ $32	$29/ $35	$40/ $48	$24/ $29
Architectural and Urban Design Elements [2]	$2	$2	$2	$2	$2
Right-of-way and Utility Relocation Costs	1.7	2.4	2.4	0.5	5
Wetlands Mitigation ($50,000/ac. ; 4:1 ratio)	0.05	0.05	0.05	2.4	0.05
Total Capital Costs (to nearest mill.) (FL Bulb T/Segm. Box)	$35/ $41	$30/ $36	$33/ $39	$45/ $53	$31/ $36
Periodic Channel Maintenance Costs to the City	--	--	--	✔	--
Right-of-Way (R/W) Acreages & Relocations					
Net County-Owned Land Required (acres) *	0	0	0	0	0.44
Privately-Owned Land Required (acres)	0.02	0.17	0.16	0	0.33
Business Relocations (WTAN Radio)	--	✔	✔	--	--
Nonprofit Relocations (Arts Council)	✔	✔	✔	--	✔
Environmental Impacts & Navigational Issues					
Channel Relocation Required for 65' or 74' Clearance	N/A	N/A	N/A	✔	N/A
Potential Need to Relocate Minor Channel South of the Causeway	✔	N/A	N/A	N/A	N/A
Sea Grass Impacts (acres)	0.0026 ac.	0	0.0013 ac.	12 ac.	0.0013 ac.
Mangrove Impacts (acres)	0	0	0.0013 ac.	1.6 ac.	0.0013 ac.
Probable Noise Impacts (# receptors >/= 65dBA)	58	86	57	14	57
Potential Cultural Resource Impacts or Involvement					
Harbor Oaks Residential Area Historic District	×	--	--	--	--
Bayfront Tennis Courts (Section 4(f))	✖	✖	✖	--	✖
Fort Harrison Hotel (candidate for *National Register*)	--	×	×	×	×
Pinellas Arts Council Building (candidate for *National Register*)	✖	✖	✖	--	✖
Traffic Flow & Access					
Requires Some Parking Removal	✔	✔	✔	--	✔
Maint. of Traffic (MOT) During Const. (1=Best, 5=Worst)	2	4	5	1	3
Socioeconomic Impacts					
Maintains Downtown Pass-By Trips	--	--	--	✔	--
Potential Avg.% Reduction in Sales to Cleveland St. Bus. west of Myrtle	0 to 5 %	0 to 5 %	0 to 5 %	Not Affected	0 to 5 %
Ability to connect peds & bicyclists, beach to downtown (1=Best)	5	3 **	3 **	1	2
Land Use Changes					
Ability to Expand Coachman Park to the west and south	Excellent	Good	Good	Poor	Poor
Create more opportunity for pedestrian & waterfront uses	Excellent	Good	Good	Poor	Poor

✔= Probable Adverse Impact ×= Potential Effect

[1] Includes roadway approaches ✖= Potential Adverse Effect

[2] Includes railings, overlooks, stairs/elevator, lighting, park extension, pedestrian paving & roundabout

* includes allowance for existing R/W to be vacated, including Drew St. along the waterfront

**pedestrian/bicyclist access could be improved by provision of an elevator/ramp/staircase structure

APPENDIX F

Manatee and Sea Turtle Watch Program

Appendix F
Manatee and Sea Turtle Watch Program

To minimize the potential impacts of bridge demolition and construction on manatees and sea turtles, a continuous Manatee and Sea Turtle Watch Program (MWP) will be established. The following conditions constitute the MWP and shall be included as special provisions.

1. Seven days prior to the first bridge related construction event, the contractors will provide the U.S. Fish and Wildlife Service (USFWS) and the Florida Department of Environmental Protection (FDEP) Office of Protected Species Management a list of the chief and primary observers for the MWP and their qualifications. An outline of the MWP will also be submitted seven days prior to the first such event.

The outline will include time tables for any blasting, dredging, or construction watercraft activity, tide tables for blasting events indicating slack tides; time tables for the MWP (start times for aerial survey as hereinafter required, and other survey positions); observer positions; a copy of the MWP log sheet; and map to record manatee sightings.

2. A formal MWP coordination meeting will be held at least two days prior to the first bridge-related construction event. Attendees will include the MWP chief and primary observers, construction contractors, demolition subcontractors, FDOT, USFWS, FDEP and other interested parties, such as the United States Coast Guard. All will be informed about the possible presence of manatees/sea turtles in the area, and that civil or criminal penalties can result from intentional or negligent annoyance, disturbance, harassment, molestation, capture, collection, injury and/or death of an endangered species or any part thereof. The construction contractors, demolition subcontractors and primary observer will present the protocol and logistics of bridge-related construction activities and the outline specified in condition No. 1.

3. During any blasting event, the manatee/sea turtle watch will consist of a minimum of six observers, one chief observer and five additional observers. In addition to these observers, there will be one MWP coordinator on-site to supervise the watch. Three of the six observers shall have previous experience in observing/spotting manatees and sea turtles and should be documented in the qualifications submitted in Condition #1. One of these observers shall have previous aerial survey experience and shall be the observer conducting the aerial surveys. The four additional observers shall be trained and informed in the methods of surveying and locating manatees and sea turtles. During all other bridge-related construction events. the watch shall consist of at least on observer posted at locations designated by a FDEP manatee specialist.

4. All observers will follow the protocol established for the MWP and will conduct the watch in good faith and to the best of their ability.

5. Each observer will be equipped with a two-way radio that will be dedicated exclusively to the MWP. Observers will also be equipped with polarized sunglasses, binoculars, a red flag for a backup visual communication system, and a sighting log with a map to record sightings at the bridge construction site and vicinity.

6. All blasting events will be scheduled within the period of slack tide to allow form optimum observing conditions. The chief observer will make the decision on optimum observing conditions to initiate the survey for each blast event.

7. A continuous aerial survey will be conducted by helicopter one hour prior to each blasting event in the vicinity of the blast site. In the event a helicopter is not available, FDEP and USFWS will be contacted to determine another suitable method of aerial surveying. The aerial survey area and route will be designed in conjunction with a FDEP manatee specialist. After detonation, the aerial survey crew shall make a complete survey of the safety and buffer zones before landing. The aerial survey crew shall either remain on ground stand-by in the survey area or continue surveillance of the waterway until the end of the blast period in case the need for aerial tracking of an injured manatee arises.

8. The additional primary observers will be located in various positions around the blast site. These positions will be situated to provide maximum visibility of the blasting safety zone and will have unobstructed views underneath the existing bridge. The exact observer locations will be approved by FDEP and USFWS prior to each blast. One observer will conduct a sonar survey (e.g. depth finder, fish locator) starting twenty minutes prior to the blast of a 150 feet radius around pier. The primary observers will begin surveying the blast area one hour (60 minutes) prior to the blast event and continue observing for one-half hour (30 minutes) after the blast event.

9. The blasting safety zone will be clearly marked with highly visible buoys. Using the formula for an uncontrolled blast, the radius in feet of the blasting safety zone = $260\ ^{3}/w$, where w= the weight of explosives to be used (TNT equivalent in pounds).

10. All of the observers will be in close communication with the blasting subcontractor in order to halt the blast event. The blast event will be halted if a manatee/sea turtle is spotted within 300 feet of the safety zone or within the safety zone (radius computed above). The blasting event will be immediately halted at the direction of the primary observers. The blast event will not take place until the animal(s) moves away from the area of its own volition. Manatees must not be herded away or harassed into leaving. If the animal(s) is/are not sighted a second time, the event will not resume until 30 minutes after the initial sighting.

(If manatees are to be guided out of the danger zone, it will be done through an established protocol developed by the USFWS).

11. Any problems encountered during bridge construction events will be evaluated by the observers and contractors and logistical solutions will be presented to the USFWS and FDEP. Corrections to the MWP will be made prior to the next event.

12. If an injured or dead manatee/sea turtle is sighted during construction, an observer will contact the Florida Marine Patrol St. Petersburg office at (813) 893-2221. In any such case, an observer will also call the USFWS Jacksonville Field office at (904) 232-2580. The observer will act according to the situation and will maintain contact with the injured or dead manatee. The foregoing telephone numbers shall be posted at all on-site telephones.

13. If an injured or dead manatee is rescued/recovered within three miles up or down the waterway from the bridge site during construction or if the injury/death of any manatee in the vicinity is documented to be caused by construction activity, that activity will be postponed until cause of injury or mortality can be determined by FDEP and USFWS.

If injuries are substantially documented, all contributing construction activities will be suspended and the principle parties will meet to determine a better way to conduct the activity.

14. Operators of watercraft will be responsible for any collisions with manatees/sea turtles. Vessels associated with the project should operate at slow (no wake) speed while in shallow water, especially where the draft of the boat provides less than 3 feet of clearance with the bottom. Work boats should load and off-load at designated sites. Vessels used to transport personnel shall be shallow-draft vessels of the light displacement category, and shall follow routes of deep water to the maximum extent possible where navigational safety permits.

15. When turbidity barriers are used to prevent or minimize degradation of water quality, the barriers shall be of appropriate dimension to restrict the animals' access to the work area and to allow egress of any manatees/sea turtles which may enter the work area. Under such conditions the barriers should use tangle-resistant or hemp rope when anchoring, or employ surface anchors to prevent entangling manatees. Continuous surveillance will be maintained in order to fee animals which may become trapped in silt or turbidity barriers.

16. Construction debris shall not be discarded into the water.

17. Signs will be posted on-site warning of the presence of manatees/sea turtles, their endangered status, and precautions needed.

18. Within two weeks (14 days) after completion of all bridge-related construction , the chief observer will submit a report to the USFWS and FDEP providing the names of the observers and their positions during the event, number and location of manatees/sea turtles seen and what actions were taken.

19. If any one of the above conditions is not met prior to or during the applicable activity, the chief observer of the MWP will have the authority to terminate the activity. Any liability for a violation of the above protective measures will be assumed by the construction contractors.