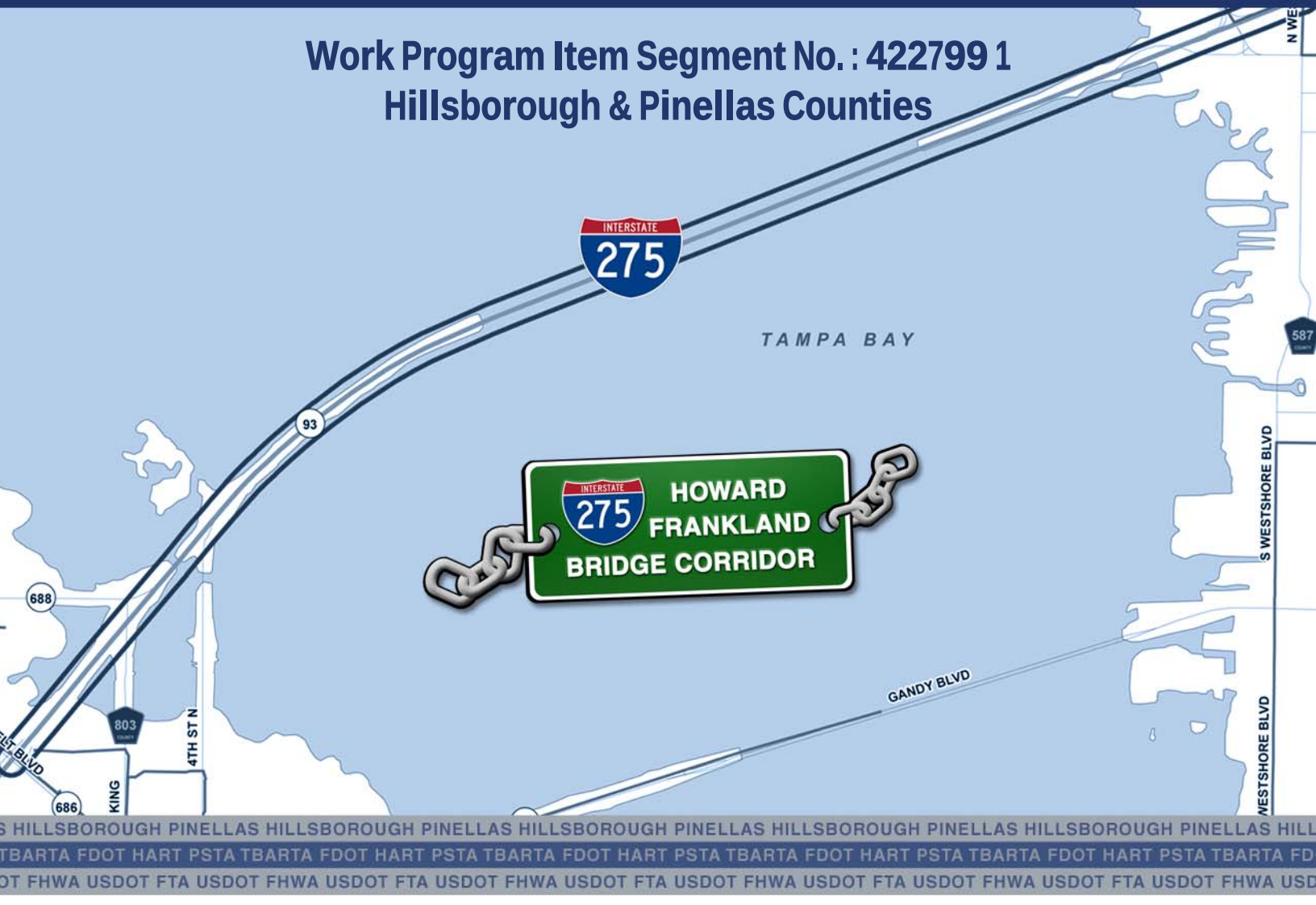
Project Development & Environment (PD&E) Study for Replacement of the Northbound Howard Frankland Bridge (I-275/SR 93) and Regional Transit Corridor Evaluation

Evaluation Methodology Technical Memorandum



August 2011

Project Development & Environment (PD&E) Study for Replacement of the Northbound Howard Frankland Bridge (I-275/SR 93) and Regional Transit Corridor Evaluation

Evaluation Methodology Technical Memorandum

Work Program Item Segment No. : 422799 1
Hillsborough & Pinellas Counties

Prepared for:

Florida Department of Transportation
District Seven

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SECTION 1 INTRODUCTION

The purpose of this project is to conduct a Project Development and Environment (PD&E) study for replacement of the northbound I-275 Howard Frankland Bridge (HFB) and a Regional Corridor Transit Evaluation for the I-275 HFB corridor between Gateway area in Pinellas County to Westshore area in Hillsborough County.

1.1 DESCRIPTION OF PROJECT STUDY AREA

The study limits for the PD&E study include the I-275 bridge over Old Tampa Bay and bridge approaches. The study limits for the transit evaluation are from the Pinellas County Gateway area to the Hillsborough County Westshore area. **Figure 1-1** illustrates the project study area.

1.2 PURPOSE OF THIS TECHNICAL MEMORANDUM

The purpose of this technical memorandum is to explain the methodology through which the evaluation and comparison of transit alternatives will be accomplished. The evaluation of alternatives will be based on a wide range of criteria developed during the course of the study, and supported through the comprehensive stakeholder and public involvement efforts to be undertaken during the HFB regional transit corridor evaluation activities. The goal of the evaluation is to determine the Locally Preferred Alternative (LPA) to be carried forward into the next step in transit project development process for the HFB Corridor.

1.3 OVERVIEW OF EVALUATION PROCESS

The proposed evaluation process will be accomplished in three steps. First, during the development of conceptual options, a fatal flaws analysis will be conducted to ensure that only viable candidate alternatives are carried into the Level I screening process.

Second, once a set of potentially viable conceptual options has been identified and screened by the fatal flaws analysis, Level I screening of the conceptual options will take place. The evaluation process herein under suggests a framework identifying and evaluating transit alternatives in the HFB PD&E and Regional Transit Corridor Evaluation Study. The basis for the proposed evaluation is the overarching Statement of Purpose and Need, or corridor transportation improvements translated to a set of goals and objectives. The evaluation criteria take the form of six (6) generalized goals for transportation system improvement in the HFB Corridor; each generalized goal is further defined by a set of specific performance objectives. A metric (quantitative performance score) or a qualitative performance score is then defined for a set of performance measures (evaluation criteria) related to each specific objective.

Scoring of proposed transit alternatives, against each performance objective, establishes the extent to which a given alternative supports or does not support an objective and its related goal. Based upon the HFB Corridor's draft purpose and need and the project goals and objectives, appropriate evaluation measures are then developed and each conceptual alternative is then evaluated relative to the procedures described below. In the example presented subsequently in this document, the relationship of performance measures to the specific related performance objectives is illustrated. The relationship of performance objectives to the generalized goals also is defined.

Finally, in step three, after alternatives advancing from the Level I screening process are further refined, the Level II screening process will be conducted.

Howard Frankland Bridge (I-275/SR 93)
Replacement PD&E Study
Regional Transit Corridor Evaluation
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Study Area Map

Figure 1-1

SECTION 2 DEVELOPMENT OF PERFORMANCE MEASURES

A preliminary list of performance measures will be identified based on the project's goals and objectives. The intent is that each of the performance measures will provide a relative indication of how well an option performs with respect to a particular goal and relative to the other alternatives under consideration. Performance measures will be defined, ideally, so that a quantitative metric may be established; however, some measures must be qualitative (e.g., good, moderate, poor) requiring the use of professional judgment by stakeholders and by project planners and engineers. The set of performance measures will constitute one axis of the evaluation matrix, with the transit alternatives that are being considered constituting the other axis. This matrix is a tool used to evaluate the performance of each of the alternatives relative to the goals and objectives. Typically, one or more performance measures will be used to score an alternative relative to each objective.

A one-for-one relationship exists between each performance measure, and the specific objective associated with that performance measure. In the evaluation methodology, this relationship of performance measures and the objective associated with each grouping of performance measures is clear. The performance measures (that collectively provide the quantitative scores for evaluating the performance of a given alternative) permit the assessment of the extent to which that alternative solves defined corridor mobility issues. Such metrics span the range of concerns (such as environmental justice, improvement of air quality, access to disadvantaged communities, travel times, and financial feasibility) for comparing and evaluation the alternatives.

A listing of each of the proposed goals and objectives is found below in **Table 2-1**.

Table 2-1 Goals and Objectives

Goal	Objective
1. Maximize Regional Connectivity - Establish a feasible transit connection between Pinellas and Hillsborough Counties.	• Create linkage to allow direct (non-transfer) transit movements from St. Petersburg/Clearwater area (proposed Gateway station) to Downtown Tampa and through Westshore (proposed Westshore station) and vice versa. • Minimize travel time on the transit linkage. • Minimize adverse impacts on users of existing facility. • Maximize compatibility of connections (mode technology & transfers).
2. Maximize Future Transportation Facility Benefits.	• Improve reliability and service quality on HFB/I-275 travel corridor by reducing travel times for auto & transit users. • Maximize use of and integration with regional transportation system. • Support and ensure consistency with regional plans and goals established by FDOT, TBARTA, LRTPs, HART, & PSTA. • Maximize access to disadvantaged communities / populations. • Maximize mobility benefits for passengers, freight, and emergency operations. • Maximize opportunity for incremental phasing to provide mobility options.
3. Minimize Adverse Environmental and Community Impacts.	• Ensure that the project contributes to the region-wide effort to meet air quality standards established for the Tampa Bay air-shed. • Avoid / minimize adverse impacts to wetlands, floodplains, and critical habitats. • Minimize operating noise and vibration. • Avoid / minimize impacts to sensitive land uses. • Minimize adverse socioeconomic impacts. • Minimize negative impacts on environmental justice communities / populations. • Minimize land acquisition and displacements • Minimize adverse / visual impacts. • Minimize loss of existing roadway capacity and parking.
4. Maximize Engineering Feasibility and Public Safety.	• Optimize alignment routings and physical feasibility of station connections. • Provide adequate operating clearances for vehicles and vessels. • Maximize vehicular safety.
5. Maximize Transit Service Efficiency and Integration.	• Maximize regional transit system integration. • Ensure reliable operations. • Provide optimal service speeds, comfort, convenience, and quality of ride. • Maximize potential transit ridership.
6. Maximize Financial Feasibility.	• Minimize project facility / capital costs. • Maximize potential revenue sources. • Ensure compatibility with existing, local, state, and federal funding sources.

SECTION 3 FATAL FLAWS ANALYSIS

It is conceivable that an almost unlimited number of alternatives could be defined for the HFB corridor. Responding to the purpose and need will be the subject of early alternatives feasibility planning and engineering investigations in the field, having as their purpose the definition of new conceptual alternatives to meet unmet needs. To ensure that a set of potentially investment-worthy alternatives are taken into Level I screening, all such potential options will be subjectively evaluated relative to the extent to which they support purpose and need and relative to whether or not they possess a fatal flaw which would likely block their implementation.

SECTION 4 APPLICATION OF EVALUATION METHODOLOGY

Quantitative procedures for conducting the multi-criteria evaluation of alternatives are described in sub-sections 4.1 and 4.2.

4.1 LEVEL I SCREENING

The screening of conceptual transit alternatives will be conducted through an objective evaluation process coupled with a goal weighting process utilizing the Evaluation Committee (FDOT, TBRATA, and other stakeholders as identified by FDOT). A number of data sources will be utilized to provide the necessary information to complete the evaluation. These sources include but are not limited to: existing Geographic Information System (GIS) data, US Census Bureau data, and the professional expertise of project engineers and planners. Field reconnaissance will supplement these existing data sources where additional information is necessary.

Where quantitative evaluation is possible (i.e. a metric exists such as the number of displacements required by an alternative or the ridership numbers), evaluations will be based on the relative difference between the score for each conceptual alternative within each performance measure. The relative differences between the conceptual alternatives will be converted to a 1.0 - 10.0 scale by interpolating the evaluation measure based on the best and worst performers, and then correlating that interpolated value to a rating between 1.0 and 10.0. The poorest performer (or performers) for each performance measure will be given a rating of 1.0 and the best performer(s) will be given a rating of 10.0. The remaining alternatives will be assigned an interpolated rating based upon how well each performs relative to the best and worst performers.

Where quantitative evaluation is not possible, a qualitative evaluation approach will be utilized. This methodology includes performance measures generating a relative response of “Good,” “Moderate” or “Poor.” “Good” responses will be given a rating of 10.0, “moderate” responses a 5.0, and “poor” responses a 1.0. For example, a high level of engineering feasibility or constructability, indicating that an alternative can be built with relative ease, would be given a “good” or 10.0, whereas a significant level of (negative) impacts on street capacity would result in a designation of “poor” or a score of 1.0.

As the evaluations are completed and tabulated, the average overall scores for each of the objectives will be calculated. Then the average scores for all objectives will be calculated, which will yield an average score for the goal. Should the Evaluation Committee seek to assign differing priorities to each goal, a “weighting factor” may be utilized to weight the results relative to the overall evaluation of each goal. The “weighting factor,” which expresses the Committee’s judgment of the relative importance of each goal, is established as follows: each participating member of the Committee will be simply asked to rank order the goals, each must be given a discreet rank of 1-to-n. Alternatively, members of the Committee may wish to rate each of the goals on a scale of 1-to-100, permitting judgments that reflect that some of the goals may be of equal or near equal value, a judgment not permitted when discreet ranks are recorded. Simple techniques from utility theory translate the judgments recorded by the two techniques to an aggregate utility value or weight for each goal. The average score for each goal will be multiplied by the weighting factor, which establishes the importance of that goal, resulting in a weighted scoring for each alternative for each of the goals. These weighted scores will be summed (the maximum possible score will be 10.0) and the conceptual alternatives with the highest overall weighted scores will be recommended for more refined analysis in the Level II screening of detailed alternatives.

4.2 LEVEL II SCREENING

The Level II screening process employs precisely the same methodology described in Section 4.1 for Level I screening. The detailed alternatives being evaluated in Level II screening will be defined and analyzed in much greater detail than that possible for the more numerous set of conceptual alternatives in the Level I screening. Accordingly, metrics quantifying the performance of these detailed alternatives will be more refined than the metrics employed in the Level I screening process. The procedure for translating qualitative evaluation into a score for use in the evaluation matrix is the same for Level II screening as described above in Level I screening.

This process of evaluating each detailed alternatives with respect to each performance measure will be replicated for each of the goals and the resulting weighted scores will be summarized for each detailed alternative. The highest overall weighted scores will reflect the best performing detailed alternative. The best of the detailed alternatives will either be a) further refined or b) recommended to FDOT's Evaluation Committee as the preliminary LPA for advancing into the Alternatives Analysis (AA) phase of the study.

SECTION 5 EXAMPLE EVALUATION OF ALTERNATIVES

An example of the evaluation of six fictional alternatives: A, B, C, X, Y, and Z, is presented below. Each alternative is evaluated with respect to the six objectives that comprise Goal No. 2, "Maximize Future Transportation Facility Benefits." The example dataset and results are shown in **Table 5-1**. The best performers in each performance measure are highlighted in yellow for clarity.

Table 5-1 Example Scoring Matrix
(For illustrative purposes only)

		GOAL No. 2															
		MAXIMIZE FUTURE TRANSPORTATION FACILITY BENEFITS															
		Objective 2.1				Objective 2.2		Objective 2.3		Objective 2.4		Objective 2.5		Objective 2.6		Total Score (not weighted)	Average Score (not weighted)
		Improve reliability and service quality on HFB/I-275 travel corridor by reducing travel times for auto & transit users				Maximize use of and integration with regional transportation system		Support and ensure consistency with regional plans and goals established by FDOT, TBARTA, LRTPs, HART, & PSTA		Maximize access to disadvantaged communities / populations		Maximize mobility benefits for passengers, freight, and emergency operations		Maximize opportunity for incremental phasing to provide mobility options			
		Measure 2.1.1		Measure 2.1.2		Measure 2.2.1		Measure 2.3.1		Measure 2.4.1		Measure 2.5.1		Measure 2.6.1			
		Transit travel time along alternative alignment from Gateway station to Westshore station	Score	Auto travel time along alternative alignment from Gateway station to Westshore station	Score	Number of connections to supporting transportation system network	Score	Consistency with existing plans	Score	Number of transportation disadvantaged/transit dependent persons within ½ mile of alignment	Score	Extent alternative improves travel efficiency & time on key system elements (existing arterials, expressways, and bus services) in the HFB/I-275 travel corridor	Score	Potential for incremental phasing implementation of alternative to provide advanced mobility in the HFB Corridor	Score		
		Minutes		Minutes		Number		Rating: G / M / P		Number		Rating: G / M / P		Rating: G / M / P			
Alternative	A	5.78	10.0	3.98	10.0	3	10.0	Good	10.0	4,602	8.5	Good	10.0	Good	10.0	**68.5**	**9.8**
	B	7.81	6.8	5.11	7.8	2	5.5	Moderate	5.0	3,841	3.1	Moderate	5.0	Moderate	5.0	**38.3**	**5.5**
	C	11.56	1.0	8.65	1.0	1	1.0	Poor	1.0	3,634	1.7	Poor	1.0	Moderate	5.0	**11.7**	**1.7**
	X	9.44	4.3	6.72	4.7	2	5.5	Moderate	5.0	3,542	1.0	Moderate	5.0	Moderate	5.0	**30.5**	**4.4**
	Y	6.78	8.4	4.24	9.5	3	10.0	Good	10.0	4,811	10.0	Good	10.0	Good	10.0	**67.9**	**9.7**
	Z	7.21	7.8	4.89	8.2	3	10.0	Good	10.0	4,811	10.0	Good	10.0	Good	10.0	**66.0**	**9.4**

Best Performers

The score for each of the seven performance measures are summed and averaged for each alternative and then multiplied by the committee's "weighting factor" for Goal No. 2 (assumed to be 0.217 or 21.7% for this example). The results of the sample scoring for Goal No. 2 are shown in **Table 5-2** below.

Table 5-2 Example Scoring Results
(For illustrative purposes only)

Option	Total Score	Average Score	Weighting Factor	Weighted Average	Ranking
A	68.5	9.8	0.217	2.12	1
B	38.3	5.5	0.217	1.19	**4**
C	11.7	1.7	0.217	0.36	**6**
X	30.5	4.4	0.217	0.95	**5**
Y	67.9	9.7	0.217	2.11	**2**
Z	66.0	9.4	0.217	2.05	**3**

This process would be replicated for each of the six project goals and the six resulting weighted averages (if the Committee decides to utilize priority weighting) would be summed. The highest overall total weighted averages would identify the best performing alternatives. These highest performing alternatives will be recommended to the committees for further refinement or for advancing into the Alternatives Analysis (AA) phase of the HFB Regional Transit Corridor study.