Clam Bayou/Dinkins Bayou Culvert Feasibility Study

Scope of Work

The City of Sanibel is seeking an experienced coastal engineer to fully evaluate the potential for tidally connecting Clam Bayou with Dinkins Bayou via a culvert located under Sanibel-Captiva Road just west of the IWA holding tank. The purpose of the culvert would be to provide increased tidal flow in both bayous, significant mixing of bayou waters with those of Pine Island Sound and potentially the Gulf of Mexico, and the prevention of rainwater impounding and subsequent mangrove and fish kills in Clam Bayou. A feasibility study that investigates the full ramifications of making such a connection is prescribed, including a complete evaluation of the potential for negative unintended consequences. The study will investigate the current bathymetry of the two water bodies and the current and anticipated tidal flows and flow volumes should such a culvert be constructed. An alternative design analyses shall be conducted to determine the effects of alternative project designs on water flows, sediments, storm surge protection and existing navigation channel stability in both bayous. This analysis shall include the advisability of flap gates or other storm protection features for the culvert to prevent storm surge waters from overwhelming the connection or causing flood damage on either side.

Bathymetry and Tidal Flow Analysis

The contractor shall map and analyze the current bathymetry and flow volumes of the two bayous and simulate the anticipated tidal flows, tidal prism, residence and flushing times that would occur with a culvert in place. Analyses should be done for conditions expected if Clam Bayou was open to the Gulf of Mexico via a narrow tidal pass located between Silver Key and Bowman's Beach and for conditions should there be no Clam Bayou connection to the Gulf. Such work shall include, but is not limited to, flushing and residence time studies in Dinkins Bayou using environmentally compatible dyes, physical on-site depth measurements in both bayous, tidal range and duration studies and simulation models assuming a double 60" box culvert connection and a 30' wide channel connecting each bayou both with an invert elevation of -3' NGVD.

The deliverables from this analysis shall be:

1. A bathymetric map of both bayous with depths noted on approximately 50' centers within 300' of the prospective culvert and 100' centers within 1000' of the anticipated culvert location.

2. A report section describing existing and simulated culvert-in-place tidal flows, tidal prism, flushing and residence times for both bayous both with and without a tidal pass connecting Clam Bayou to the Gulf of Mexico. Report should include

methods; results of analyses, including appropriate data tables and graphs; discussion of results and recommendations concerning feasibility of culvert.

Alternatives Analysis

The coastal engineer shall thoroughly evaluate the alternative designs that are available to make such a tidal connection including a design similar or identical to that used for the Squaw Creek connection by Lee County in Estero Bay. Such designs shall include but are not limited to box culverts, oval culverts and water control structures both with and without wing walls, settling basins, concrete aprons and rip rap. All designs analysed should be based on a non-mechanized free-flowing tidal connection. The use of flap gates and self-regulating tidegates (SRTs) that manually or automatically close during storm surge or flood events and other non-motorized water control technology shall be examined as alternatives to determine their advisability to prevent high water damage on either side. The purpose of this analysis is to provide recommendations to the City on the best project design configuration including elevations and dimensions of the structure and channel, and accessory erosion protection features should the project proceed past the drawing board.

The deliverable for this analysis shall be:

A report section providing details of the alternative designs examined, their pros and cons, results of the analysis, and recommendations as to the best design considering the purpose of the proposed project and the need to prevent damage to adjacent property and natural resources.

Evaluation of Unintended Consequences

The engineer shall provide a report section detailing potential negative impacts of the project. In particular, an analysis shall be given of the potential for the project to cause erosion, flood or any other type of damage to public or private property or infrastructure, including the roadway itself; to cause the filling in or altering of any currently used navigational channel in either bayou; to cause negative water quality or long term turbidity impacts (recent and historic water quality data from both bayous is available and will be provided); or to cause any other negative result. This analysis shall include design recommendations, if any are practical, that could minimize or eliminate the potential for such negative impacts.

Final Report

In addition to the bathymetric map, the major deliverable for this feasibility study is a final report that contains report sections as described above as well as overall results, discussion and recommendations. The engineer will provide in

this report a recommendation section that will include a summary analyses of whether as a result of this study the proposal to put a tidal culvert under Sanibel-Captiva Road permanently linking Clam and Dinkins Bayous is advisable and whether it is likely to have the desired results. After carefully considering the potential for negative impacts, If the analysis is favorable for proceeding with the culvert, then a recommended design for the culvert, connecting channel and accessory erosion and maintenance structures shall be provided including preliminary plan view and cross-sectional drawings. The contractor will be available to present the results of this analysis individually to the City manager, City Council members, and at least one public meeting.