

An aerial photograph of a city grid. A yellow highlight is applied to a vertical street on the left side of the image. A yellow arrow points from this street towards the right side of the image. The text is overlaid on the center of the image.

# APPENDIX H

## VE STUDY RECOMMENDATIONS DESIGN TEAM COMMENTS

## ATTACHMENT "A"

### Interstate 95 interchange at Ellis Road PD&E Study Value Engineering Draft Report Design Team Comments – 05/24/2012

#### **Recommendation No 2: Consider ramps on MSE walls and pull it tight within the right of way for the southbound exit and entrance.**

VE Recommendation: Construct the I-95 southbound on and off ramps as close as practical to the I-95 mainline (approximately 150 feet east of the currently proposed location) through the use of MSE walls in an effort to minimize impacts to utilities located on the west side of I-95.

Designer comment: The recommendation warrants consideration. Unquestionably, a reduction in the potential impacts to the Florida Gas transmission lines will be achieved, which will result in a major reduction in utility relocation costs. However it is doubtful that the proposed reduction in costs due to conflicts with the Florida Power utility lines would result. This is due to the vertical conflict that will occur due to the St. Johns Heritage Parkway overpass of I-95 at this location. The additional approximate 25 foot vertical adjustment will affect almost all of the transmission poles that the ramp horizontal geometry would have impacted.

The VE recommendation also notes that the distance between the northbound ramps and the southbound ramps will be reduced. This will require extending the westbound to southbound left turn storage lane farther to the east, for which there is sufficient distance; however, it reduces the opportunity to gain additional storage length in the future, should it be required. In addition the southbound ramps must allow for the future 4-laning (each direction) of I-95 as identified in the traffic report. The VE recommendation will require mechanical walls on both sides of the ramp, thereby constraining the potential for future widening (double left turn lane) of the southbound exit ramp as it approaches the crossroad, should traffic volumes increase beyond the current projections. Both of the ramp gore will need to be extended farther from the crossroad as the flatter angle of the connection to I-95 coupled with the barrier may obscure the sight distance for the merging traffic.

*"Figures A and B Titled Alignment Alt 1 W/MSE Wall Ramps/VE Meeting Concept"* depict a shifted ramp condition that maintains good geometry for the ramp proper and at the gore areas. The mechanical walls are depicted by the bold orange lines. The mechanical walls adjacent to the outside shoulder are set a minimum distance of 10 feet inside the current limited access line, and are therefore outside the utility easements. The end bent for the structure over I-95 will need to be a full face abutment and can provide sufficient clearance for an ultimate widening of I-95 to a four lane directional facility with a full shoulder, but will require barrier protection for the abutment and entire length of mechanical wall. The

right turn deceleration lane approach to the loop ramp has been removed from the bridge, but is sufficient for the 30 mph loop ramp design speed.

*“Figures C and D Titled Alignment Alt 1 W/MSE Wall Ramps/VE Meeting Concept”* also depict a shift in the ramp termini; however a slightly improved geometric condition exists as the reverse horizontal curves are eliminated from the ramp proper. However, the as the ramps approach the crossroad, they will infringe into one of the Florida Gas easements (denoted by the yellow limited access right of way lines). Near the crossroad the mechanical walls have been set no closer than 16 feet to the smaller of the two gas lines.

We recommend the incorporation of the VE recommendation into the Alternative #1 and Alternative #2 interchanges. However, VE Design Suggestion No. 1 (a parclo configuration in the southwest quadrant) will likely be a more cost effective and value added alternative).

## **Recommendation No. 5: Construct the 45 MPH concept and use a concrete box culvert drainage system.**

VE Recommendation: Utilize a 4-lane divided urban typical section with a design speed of 45 mph. This alternative uses a closed drainage system shifted closer to the roadway via a concrete box culvert, instead of the canal and therefore reduces the right of way requirements by approximately 64 feet.

Designer comment: The VE recommendation addresses two distinct items that are best separately addressed, namely; (1) the typical section that results from the 45 mph design speed, and (2) the treatment of the L-15 Canal that extends through 2/3<sup>rd</sup>s of the project.

**Typical Section:** The St. Johns Heritage Parkway connection is a high speed rural facility that will extend from the Palm Bay interchange through the Ellis Road Interchange and connect to John Rodes Boulevard, a distance of some 21 miles. The rural section is designed for 50 mph. When the interchange with I-95 is completed and the improvement of the roadway between John Rodes Boulevard and Wickham Road occurs, the project will be placed on the Florida Strategic Intermodal System (SIS). The SIS requires a minimum design speed of 50 mph for urban areas. The 45mph typical section does not meet the criteria.

The segment of roadway between I-95 and John Rodes Boulevard is rural in nature and the preferred alternative does not require land from any residence or business. Therefore, there is no value added to this segment of the project by the use of the 45 mph typical section.

While several businesses between John Rodes Boulevard and Wickham Road will be impacted to a greater degree by the preferred alternative, there are substantial benefits of the wider typical section:

- The SIS typical includes a raised median that will require U-turns and more left turns. While trucks may require a “bulb-out” in order to make the U-turn, all passenger vehicles (95% of the traffic) will be able to make the U-turn move within the travel way. This is due to the additional pavement width provided by the bicycle lane, the curb and gutter, and the inside shoulder of the opposing travel lanes.
- The wider median will be an advantage with respect to the mix of trucks and cars that will utilize the roadway in that it separates the opposing directions of traffic more than the 45 mph typical section.
- The inside shoulder and the wider bicycle lane provide additional recovery area for errant vehicles, thereby providing increased safety and better operational conditions.

The difference in required right of way between the 45 mph typical section and the preferred alternative is only 18 feet when the canal is considered as a separate item. Therefore, the anticipated monetary savings in right of way costs due to the roadway elements will not be as great as that indicated by the VE evaluation as it relates to a 64 foot reduction.

Based upon the above discussion we recommend continuing with the preferred alternative for the roadway related elements (travel lanes, bike lanes, shoulders, median width, and clear zone).

**L-15 Canal:** The design team preferred alternative (SIS typical) and the 45 mph typical treated the L-15 canal in accordance with FDOT canal criteria. The VE proposal is to enclose the L-15 canal in a box culvert. The right of way impacts due to the canal criteria were recognized by the design team earlier in the study and a special L-15 canal treatment white paper was produced. A closed system alternative was one of the alternatives that were examined. The closed system was deemed undesirable for a number of reasons:

- The L-15 canal is an equalizing canal that continuously has standing water, with many instances of no flow in either direction. Sedimentation is certain and cleaning a fully enclosed system will not only be costly but also poorly functioning due to the sediment
- A closed system will restrict the ability to allow for the ponding (spreading) of significant event storm water from the canal to adjacent low level open areas and wetlands that assist in diminishing the flooding of adjacent buildings.
- The closed system will not function in a fashion similar to the current canal with respect to its equalizing effects on both upstream and downstream conditions, which can result in higher risk conditions and the potential liability thereto.
- There are other alternative treatments to the canal that will reduce the width of the overall typical section, and will function in a more similar fashion to the trapezoidal ditch system (SEE VE RECOMMENDATIONS #11 and #12)

We assume that the VE recommendation is for the segment of the project east of John Rodes Boulevard. The segment of Ellis Road west of John Rodes Boulevard is primarily open land with natural vegetation. The trapezoidal canal section would be the least costly to construct, would be the easiest to maintain, and would best replicate how the overall Crane Creek canal system functions. The right of way cost benefits of the closed system alternatives would appear to be marginal in comparison to the benefits of the open ditch section.

We recommend that the concrete box system be dismissed from further consideration.

## **Recommendation No 7: Construct a five-lane typical section with center bi-directional left turns.**

VE Recommendation: From John Rodes Boulevard to Wickham Road, replace the standard 22-ft median (curb and grass area) with a 12-ft. bi-directional left turn lane increasing the 4-ft bike lane to a 6.5-ft lane for the entire length of the project.

Designer comment: Upon completion, the project will be designated as an SIS Connector. The connector is expected to link Melbourne International Airport (the HUB) with I-95 (the SIS Corridor), and while Ellis Road serves a number of local businesses (primarily industrial), the purpose of the connector is to provide mobility between the HUB and the SIS Corridor. By removing the raised median with a five lane (scramble) section, side street and driveway interference (approximately 50 connections in 8000 feet) will diminish the operational capacity and safety of the facility. In addition, the segment to the east connecting to the HUB is a four lane divided roadway with a non-traversable median and the 21 mile segment of the St. Johns Heritage Parkway to the west will have a wide non-traversable median. The five lane scramble section is not compatible with the approach roadway. The SIS connector will also provide intermodal connections for the existing intercity bus facility, and potentially with a passenger rail facility.

Since the segment from John Rodes Boulevard to Wickham Road will remain a non state highway, recently adopted procedures allow the use of the Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways. The minimum standards were not developed for use on the SIS. We do not recommend their use in this particular instance.

We recommend that the five lane typical section be dismissed from further consideration.

**Recommendation No. 10: Consider adding right turn lanes for northbound and southbound traffic at John Rodes Boulevard, northbound at West Drive, East Drive, Greensboro Drive, and Distribution Drive (west).**

VE Recommendation: This VE alternative includes the addition of turn lanes at select intersections as follows:

- Ellis Road/John Rodes Blvd – westbound to northbound and northbound to eastbound right turns
- Ellis Road/West Drive – westbound to northbound right turn
- Ellis Road/East Drive – westbound to northbound right turn
- Ellis Road at Greensboro Drive – eastbound to southbound right turn
- Ellis Road at Distribution Drive (west) – eastbound to northbound and southbound to westbound right turns

Additionally, the VE alternative includes designing the I-95 ramp intersections at Ellis Road to provide for potential widening to accommodate dual left turns;

- Ellis Road/I-95 Southbound Ramps – southbound to eastbound and westbound to southbound
- Ellis road/I-95 Northbound Ramps – westbound to northbound and northbound to westbound

Designer comment: As documented in the approved traffic report, all of the intersections identified in the VE alternative will operate at the adopted level of service without the additional turning lanes.

- Ellis Road Segment: The design team does not oppose the recommendations to include additional right turn lanes at several of the intersections along the Ellis Road section of the project. However, additional right of way will be required to provide the right turn lanes and consideration of right of way impacts may substantially diminish the added value of the right turn lane. If provided, the length of right turn lane will be designed to meet the requirements for que length and speed reduction.

Recommend that the right turn lane recommendations along the Ellis Road portion of the project be retained for consideration and evaluated through the remaining portion of the PD&E study and in the final design phase.

- I-95 Interchange Southbound Ramps: Westbound to Southbound movement will require additional storage lane on the bridge over I-95. It will also require additional width on the entrance ramp to I-95 southbound. Similarly the southbound to eastbound movement will require extra width on the southbound I-95 exit ramp terminus. This is the area where there are conflicts with Florida Gas and Florida Power utilities. VE recommendation #2 shifts this ramp terminal location some 160 feet to the east to avoid the utilities. Additional ramp width for the terminals will require the shift even closer to the I-95 bridge, reducing the length of the westbound to southbound left turn storage lane, and the length available for the development of the westbound to northbound right turn lane that

feeds the loop ramp in the southeast quadrant of the interchange. . *“Figures A and B Titled Alignment Alt 1 W/MSE Wall Ramps/VE Meeting Concept”* present geometry that, if shifted any further to the east would prohibit the widening of I-95 in the future. The traffic report prepared for the project indicates that in 2034, the design year for the project, I-95 should be widened to four lanes in order to meet the traffic demand. Adding additional ramp width will create more encroachment into the Florida Gas Easement and additional conflict with the gas line.

- The additional westbound to southbound storage lane will require shifting the alignment of Ellis Road to the south to avoid encroachment into Lamplighter Village. This will require re-design of the current bridge design plans being completed for Brevard County

Recommendation: Retain the current lane configurations as currently designed since the ramp terminal signalized intersection are projected to operate at LOS B and C in the AM and PM peak hours in the design year.

I-95 Interchange Northbound Ramps: Westbound to Northbound movement is a westbound left turn movement from Ellis Road to the southeast loop ramp. To provide a second left turn lane the approach to the interchange will require additional fill material. In order to avoid encroachment into Lamplighter Village the Ellis Road alignment will require a shift to the south. The shift to the south will require more fill into the existing borrow pit. The shift would be required for either interchange alternative. This will require re-design of the current bridge design plans being completed for Brevard County. The loop ramp is a 30mph design speed in order to avoid the northbound to eastbound ramp from a major fill into the borrow pit. The double left turn into the tight loop ramp will not be a desirable condition as one of the lanes will need to merge into the other very quickly.

Northbound to westbound movement is a single lane left turn into a two lane Ellis Road westbound receiving condition. Provisions for a second left turn on the ramp can be made.

Recommendation: Do not provide for double left turn for westbound to northbound movement. Provide for potential widening of the slip ramp for the northbound to westbound movement.



## **Recommendation No. 11: Construct the 45 MPH concept with guardrail along the canal.**

VE Recommendation: Utilize a 4-lane divided urban typical section with a design speed of 45 mph. This alternative utilizes guardrail along the canal to reduce the offset distance between the roadway and the canal, and therefore reduces right of way requirements by approximately 45 feet.

Designer comment: The VE recommendation addresses two distinct items that are best separately addressed, namely; (1) the typical section that results from the 45 mph design speed, and (2) the treatment of the L-15 Canal that extends through 2/3<sup>rd</sup>s of the project.

**Typical Section:** The St. Johns Heritage Parkway connection is a high speed rural facility that will extend from the Palm Bay interchange through the Ellis Road Interchange and connect to John Rodes Boulevard, a distance of some 21 miles. The rural section is designed for 50 mph traffic speed. When the interchange with I-95 is completed and the improvement of the roadway between John Rodes Boulevard and Wickham Road occurs, the project will be placed on the Florida Strategic Intermodal System (SIS). The SIS requires a minimum design speed of 50 mph for urban areas. The 45mph typical section does not meet the criteria.

The segment of roadway between I-95 and John Rodes Boulevard is rural in nature and the preferred alternative does not require land from any residence or business. Therefore, there is no value added to this segment of the project by the use of the 45 mph typical section.

While several businesses between John Rodes Boulevard and Wickham Road will impacted to a greater degree by the preferred alternative, there are substantial benefits of the wider typical section:

- The SIS typical includes a raised median that will require U-turns and more left turns. While trucks may require a “bulb-out” in order to make the U-turn, all passenger vehicles (95% of the traffic) will be able to make the U-turn move within the travel way. This is due to the additional pavement width provided by the bicycle lane, the curb and gutter, and the inside shoulder of the opposing travel lanes.
- The wider median will be an advantage with respect to the mix of trucks and cars that will utilize the roadway in that it separates the opposing directions of traffic more than the 45 mph typical section.
- The inside shoulder and the wider bicycle lane provide additional recovery area for errant vehicles, thereby providing increased safety and better operational conditions.

The difference in required right of way between the 45 mph typical section and the preferred alternative is only 18 feet when the canal is considered as a separate item. Therefore, the anticipated monetary savings in right of way costs due to the roadway elements will not be as great as that indicated by the VE evaluation as it relates to a 64 foot reduction.

Based upon the above discussion we recommend continuing with the preferred alternative for the roadway related elements (travel lanes, bike lanes, shoulders, median width, and clear zone).

**L-15 Canal:** The design team preferred alternative (SIS typical) and the 45 mph typical treated the L-15 canal in accordance with FDOT canal criteria. The VE proposal is to reduce the offset distance to the canal by introducing a guardrail system as a protective barrier between the canal and the travel lanes. The right of way impacts due to the canal criteria were recognized by the design team earlier in the study and a special L-15 canal treatment white paper was produced. A reduced offset with guard rail protection was one of the alternatives that were examined in the white paper. It appears that substantial right of way cost savings may result from the trapezoidal ditch with guard rail alternative. Disadvantages would be the more restrictive maintenance activities due to the guard rail and the reduced clear zone for the westbound direction of travel.

The design team recommends further consideration for the adoption of the trapezoidal ditch with guard rail, but only after a comparison of its advantages and disadvantages and potential cost savings with the advantages and disadvantages and potential cost savings that may be realized by utilizing VE Recommendation #12, which reduces the right of way required by an additional 17 feet (approximately).

## **Recommendation No.12: Reduced Section with sheet wall canal.**

VE Recommendation: Utilize a 4-lane divided urban typical section with a design speed of 45 mph. This alternative maintains the open drainage system utilizing steel sheet piling in order to reduce the offset distance between the roadway and the canal and eliminate the sloped sides of the canal, and therefore reduces right of way requirements by approximately 61 feet.

Designer comment: The VE recommendation addresses two distinct items that are best separately addressed, namely; (1) the typical section that results from the 45 mph design speed, and (2) the treatment of the L-15 Canal that extends through 2/3<sup>rd</sup>s of the project.

**Typical Section:** The St. Johns Heritage Parkway connection is a high speed rural facility that will extend from the Palm Bay interchange through the Ellis Road Interchange and connect to John Rodes Boulevard, a distance of some 21 miles. The rural section is designed for 50 mph traffic speed. When the interchange with I-95 is completed and the improvement of the roadway between John Rodes Boulevard and Wickham Road occurs, the project will be placed on the Florida Strategic Intermodal System (SIS). The SIS requires a minimum design speed of 50 mph for urban areas. The 45mph typical section does not meet the criteria.

The segment of roadway between I-95 and John Rodes Boulevard is rural in nature and the preferred alternative does not require land from any residence or business. Therefore, there is no value added to this segment of the project by the use of the 45 mph typical section.

While several businesses between John Rodes Boulevard and Wickham Road will impacted to a greater degree by the preferred alternative, there are substantial benefits of the wider typical section:

- The SIS typical includes a raised median that will require U-turns and more left turns. While trucks may require a “bulb-out” in order to make the U-turn, all passenger vehicles (95% of the traffic) will be able to make the U-turn move within the travel way. This is due to the additional pavement width provided by the bicycle lane, the curb and gutter, and the inside shoulder of the opposing travel lanes.
- The wider median will be an advantage with respect to the mix of trucks and cars that will utilize the roadway in that it separates the opposing directions of traffic more than the 45 mph typical section.
- The inside shoulder and the wider bicycle lane provide additional recovery area for errant vehicles, thereby providing increased safety and better operational conditions.

The difference in required right of way between the 45 mph typical section and the preferred alternative is only 18 feet when the canal is considered as a separate item. Therefore, the anticipated monetary savings in right of way costs due to the roadway elements will not be as great as that indicated by the VE evaluation as it relates to a 64 foot reduction.

Based upon the above discussion we recommend continuing with the preferred alternative for the roadway related elements (travel lanes, bike lanes, shoulders, median width, and clear zone).

**L-15 Canal:** The design team preferred alternative (SIS typical) and the 45 mph typical treated the L-15 canal in accordance with FDOT canal criteria. The VE proposal is to reduce the offset distance to the canal by introducing a guardrail system as a protective barrier between the canal and the travel lanes. The right of way impacts due to the canal criteria were recognized by the design team earlier in the study and a special L-15 canal treatment white paper was produced. A reduced offset with sheet piling and guard rail protection was one of the alternatives that were examined in the white paper. It appears that substantial right of way cost savings may result from the sheet piled ditch with guard rail alternative. Disadvantages would be the more restrictive maintenance activities due to the guard rail and sheet piling, and the reduced clear zone for the westbound direction of travel.

The design team recommends further consideration for the adoption of the sheet pile with guard rail, but only after a comparison of its advantages and disadvantages and potential cost savings with the advantages and disadvantages and potential cost savings that may be realized by utilizing VE Recommendation #11. This is due to the additional construction cost of the sheet pile system in comparison to its potential right of way cost savings, which at this time are undetermined.

## **Design Suggestion No.1: Revisit the Alternative 2 with Alternative C Ramps (Parclo) to minimize the utility impacts.**

VE Recommendation: At the I-95 interchange construct a partial cloverleaf loop ramp configuration in the southwest quadrant, mirroring the proposed configuration on the southeast quadrant. This avoids any utility impacts (adjustments and relocations) in the northwest quadrant. It also completely avoids impacting the FDEP conservation easement.

Designer comment: In the development of the current alternatives the design team recognized the significance of the utility impacts of both interchange alignment alternatives and proposed that a full parclo interchange be investigated, similar to the recommendation made by the VE team. However, due to funding constraints the parclo was not further investigated. The design team agrees with the advantages and disadvantages identified by the VE team. An additional disadvantage may be a minor impact to additional wetlands, but we do not feel that it would be significant.

The disadvantage regarding the weave between ramp terminals is minimal as the intersection will be signalized and appropriate geometric design can assist in metering the traffic flow from the I-95 exit ramp. While the I-95 southbound exit ramp will shift closer to the US 192 interchange, the interchanges are approximately 1.4 miles apart, which is more than adequate to accommodate the exit ramp following entrance ramp condition.

The design team recommends retaining the parclo alternative as a viable option. Should the parclo become the preferred interchange concept, an Interchange Modification Report (IMR) would be required prior to receipt of FHWA Location and Design Concept Approval. Due to the relatively low volumes forecasted for the ramps, the design team does not view the approval of an IMR as a significant hurdle.