

4.0 TIER 1 ANALYSIS

4.1 BACKGROUND

The Master Plan alternatives analysis is centered around the “Tier Selection Process”. The process involves the steps of alternative identification, screening, evaluation, and integrating various alternatives into the final master plan. Using a matrix evaluation approach, the comprehensive and rapid evaluation of many alternatives through a two-level screening and refinement process is accomplished.

The Tier 1 mainline analysis focuses on the development and evaluation of CMEA. The I-10 Master Plan – Tier 1 CMEA Evaluation Report, Segment 2 (May 2004) was published as a separate document and is herein referred to as the Tier 1 Report.

4.2 PURPOSE

The primary focus of CMEAs at the Tier 1 stage of analysis is on the identification and characterization of alternatives that address mobility options along the mainline of I-10. This will include options that relate to vehicular capacity, multimodal services, goods movement capabilities and ITS. Subsidiary elements, such as interchange improvements, remediation of various physical deficiencies and other additional features of the corridor will be addressed specifically in the Tier 2 level of analysis.

The mobility performance criteria are tied to the study goals and objectives described in Section 3.3. For this Master Plan, the five key elements of the policy goals include:

- Mobility,
- Regional Commerce,
- Land Use,
- Environment, and
- Affordability & Constructibility.

4.3 TIER 1 ALTERNATIVES

The development of CMEAs is designed to address basic mobility needs and opportunities across the length of the overall study corridor. The formulation of these CMEAs is based on the completed analysis of current and anticipated corridor deficiencies, as well as potential regional transportation, intermodal access, air quality, applicable long-range transportation plans and other factors.

Two CMEA’s are examined to meet the future travel demands along the I-10 mainline corridor. Each alternative includes travel lanes for use by all vehicles, which are defined as General Purpose Lanes (GPL). The two CMEAs under consideration for the mainline are listed below.

4.3.1 CMEA No. 1: General Purpose Lanes

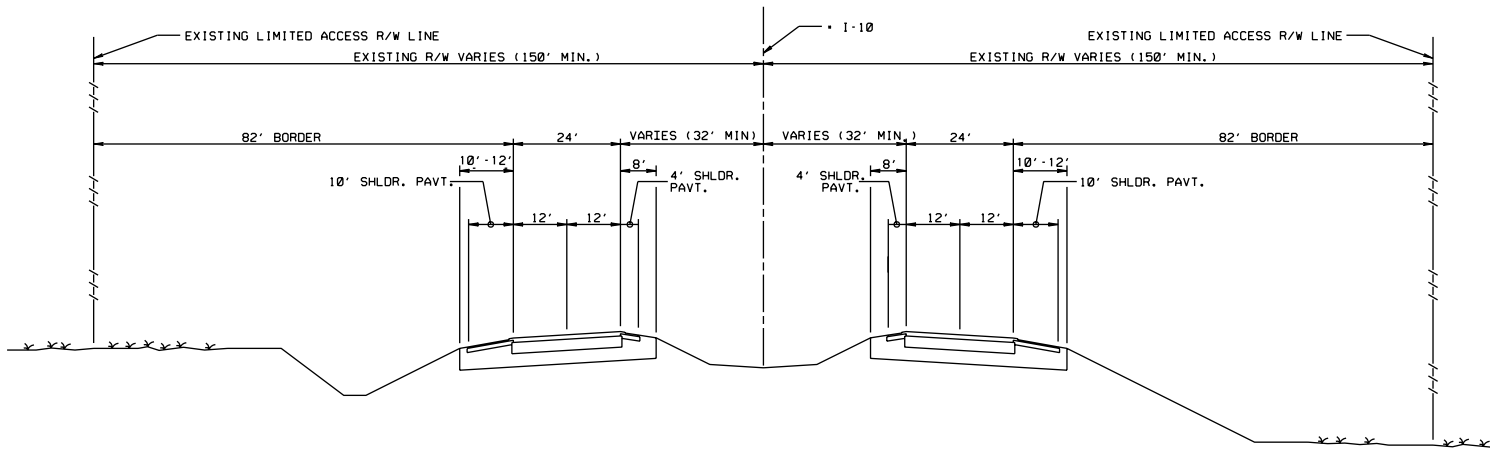
The CMEA No.1 improvement alternative for Segment 2 of the I-10 mainline maintains the four existing GPL throughout the segment. Traffic service analysis indicated that the LOS B standard on the mainline would not be achieved in 2030 between CR 229 and CR 125. However, since the incursion into LOS C is relatively small, it was considered prudent to examine this situation more closely, and CMEA No. 1 was defined without additional travel lanes to address the LOS issue. The typical section for CMEA No. 1 is illustrated on Figure 4-1.

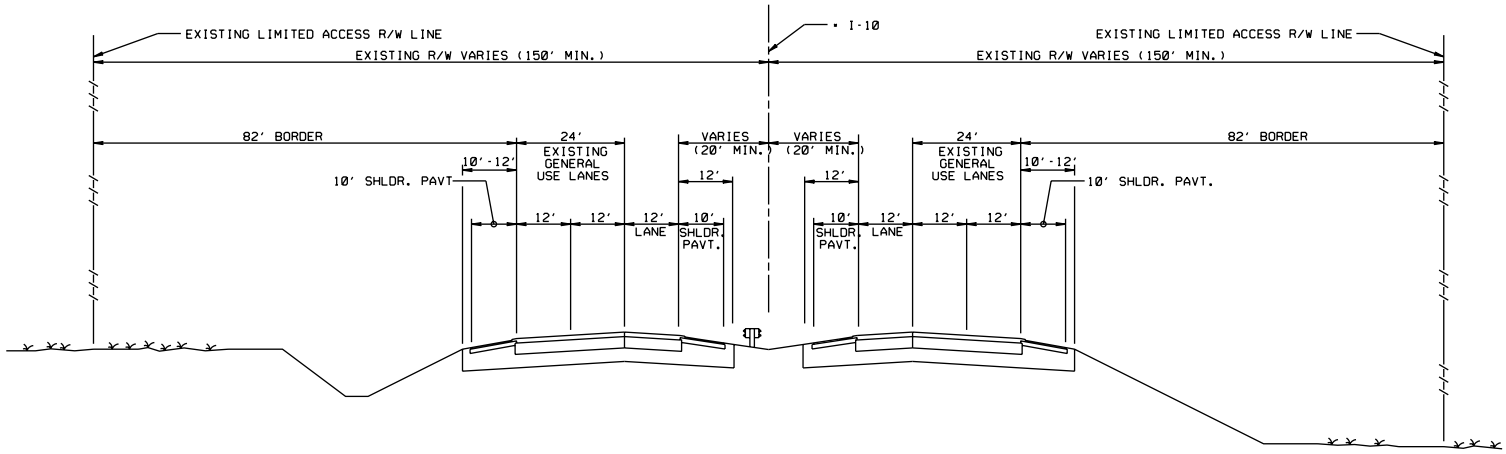
4.3.2 CMEA No. 2: General Purpose Lanes (4 lanes) from I-75 to CR 229, General Purpose Lanes (6 lanes) from CR 229 to CR 125

The CMEA No. 2 improvement alternative for Segment 2 of the I-10 mainline maintains the four existing GPL within the segment from I-75 to CR 229, and introduces additional basic lanes between the interchange pair in which the 2030 traffic marginally exceeds the LOS standard. Specifically, this occurs between CR 229 and CR 125 at the east end of the segment. As noted, this incursion into LOS C is relatively small. The basic lanes would be introduced in the median and would be compatible with the anticipated six-laning of the mainline to the east per analyses for Segment 3 of the study corridor. CMEA No. 2 also includes improvements related to the identified geometric deficiencies. The typical section for CMEA No. 2 is illustrated on Figure 4-2.

The distance between CR 229 and CR 125 is 6.044 miles. Within this subsegment a general use lane is to be constructed on the inside (median) of existing I-10 in both eastbound and westbound directions. Other improvements to the subsegment include the following:

- Widen Bridge Culvert No. 270042,
- Widen Bridge Culvert at CMP 14.163,
- Replace Bridge No. 270067, CR 123 over I-10, and
- Replace Bridge Nos. 270055 and 270044, I-10 over CR 125.





4.4 TIER 1 EVALUATION

4.4.1 CMEA No. 1: General Purpose Lanes

No new capacity will be added to the I-10 mainline in CMEA No. 1; thus, CMEA No. 1 has more of the “Highly Satisfies Criterion” scores than CMEA No. 2, on a relative basis. This is a result of no new capacity construction that would negatively impact MOEs such as Wetland Encroachments or Residential Relocations. The definition of the alternatives included remediation of geometric and safety deficiencies as part of both CMEAs.

The overall results of the evaluation for CMEA No. 1 are provided on the following page in Table 4-1.

4.4.2 CMEA No. 2: General Purpose Lanes (4 lanes) from I-75 to CR 229, General Purpose Lanes (6 lanes) from CR 229 to CR 125

CMEA No. 2 includes additional basic lanes on one subsegment along the I-10 mainline; thus, CMEA No. 2 has fewer of the “Highly Satisfies Criterion” scores than CMEA No. 1, on a relative basis. This is a result of the new capacity construction that would negatively impact MOEs such as Wetland Encroachments or Residential Relocations. The definition of the alternatives included remediation of geometric and safety deficiencies as part of both CMEAs.

The overall results of the evaluation for CMEA No. 2 are provided on the following page in Table 4-2.

Table 4-1: CMEA No. 1 Evaluation Summary

Policy Goal	MOE Tier 1	Rating Scale (See Note)		
Study Objective		○	◉	●
Mobility				
Provide Acceptable LOS	LOS		Marginally Falls Short of LOS Standard in Two Subsections	
Provide for Safe Roadway Environment	Remediation of Geometrics Deficiencies			Bridges Over I-10, Other Bridges That Have Safety Issues, and Other Deficiencies Remediated
Facilitate Corridor Transit Plans	Extent of Non-SOV Travel	<2% Reduction		
Regional Commerce				
Facilitate Freight Movements	Traffic Service and Access for Trucks			LOS and Access are Maintained
	Minimize Conflicts Between Truck and Autos		Some Actions to Minimize Conflicts	
Provide Access to Intermodal Facilities	Adequacy of Access to Intermodal Facilities			Access Maintained and Slightly Improved
Land Use				
Promote Compatibility with Land Uses & Growth Management	Quality of Access to Approved Land Use			No Impact to Access
Minimize Relocations and ROW Acquisitions	Number of Residential Relocations and Acres of ROW Required			No Takings and Relocations
	Number of Business Relocations and Acres of ROW Required			No Takings and Relocations
Environment				
Minimize Wetland Impacts	Extent of Wetland Encroachments			No Encroachments for Drainage
Enhance Air Quality	Effect on Vehicle Miles and/or VHT	<2% Reductions		
Affordability & Constructability				
Minimize Capital Cost	Conceptual Construction Cost			Lowest Cost Option
Facilitate Constructability	Complexity of Maintenance of Traffic and Constructability			Limited Complications, Moderate in Scope, Phases or Duration

Rating Scale

- Minimally Satisfies Criterion
- ◉ Moderately Satisfies Criterion
- Highly Satisfies Criterion

Table 4-2: CMEA No. 2 Evaluation Summary

Policy Goal	MOE Tier 1	Rating Scale (See Note)		
Study Objective		○	⊙	●
Mobility				
Provide Acceptable LOS	LOS			Improvements Enhance LOS Above Standard
Provide for Safe Roadway Environment	Remediation of Geometrics Deficiencies			Bridges Over I-10, Other Bridges That Have Safety Issues, and Other Deficiencies Remediated
Facilitate Corridor Transit Plans	Extent of Non-SOV Travel	<2% Reduction		
Regional Commerce				
Facilitate Freight Movements	Traffic Service and Access for Trucks			LOS and Access and Maintained
	Minimize Conflicts Between Truck and Autos		Some Actions to Minimize Conflicts	
Provide Access to Intermodal Facilities	Adequacy of Access to Intermodal Facilities			Access Maintained and Slightly Improved
Land Use				
Promote Compatibility with Land Uses & Growth Management	Quality of Access to Approved Land Use		Marginal Impact on Land Uses Due to Added Lanes	
Minimize Relocations and ROW Acquisitions	Number of Residential Relocations and Acres of ROW Required		Potential Takings for Drainage Facilities	
	Number of Business Relocations and Acres of ROW Required		Potential Takings for Drainage Facilities	
Environment				
Minimize Wetland Impacts	Extent of Wetland Encroachments			No Encroachments for Drainage
Enhance Air Quality	Effect on Vehicle Miles and/or VHT	<2% Reductions		
Affordability & Constructability				
Minimize Capital Cost	Conceptual Construction Cost		Highest Cost Option	
Facilitate Constructability	Complexity of Maintenance of Traffic and Constructability		Moderate Complications; Moderate in Scope, Phases or Duration, Some New Permanent Facilities	

Rating Scale

- Minimally Satisfies Criterion
- ⊙ Moderately Satisfies Criterion
- Highly Satisfies Criterion

4.5 TIER 1 MATRIX SUMMARY

MOEs indicate whether or not a proposed alternative accomplishes the goals established by the purpose and needs statement and through stakeholder involvement. The policy goals for this master plan as described in Section 3.3 may be summarized into five broad categories: mobility, regional commerce, land use, environment, and affordability and constructability. Objectives are developed for each of the five policy goals; and, in order to test the effectiveness of each transportation option on the goals and objectives of the project, MOE are developed under the direction of the FDOT. These measures are consistent with local government and state adopted plans.

The MOEs include:

- Provide Acceptable LOS in the 2030 Design Year,
- Provide for Safe Roadway Environment,
- Facilitate Corridor Transit Plans,
- Facilitate Freight Movements,
- Provide Access to Intermodal Facilities,
- Promote Compatibility with Land Uses and Growth Management,
- Minimize Relocations and ROW Acquisition,
- Minimize Wetland Impacts,
- Enhance Air Quality,
- Minimize Capital Cost, and
- Facilitate Constructability.

The final result of this mainline assessment is a Tier 1 Matrix that rates two CMEAs, ranging from the addition of no new travel lanes to the addition of a third travel lane in each direction between CR 229 and CR 125. The rating scale indicates whether or not the CMEA minimally satisfies the criterion, moderately satisfies the criterion or highly satisfies the criterion.

4.5.1 Mobility

The MOEs associated with mobility are LOS, safety and transit. Both CMEA No. 1 and CMEA No. 2 basically meet or exceed the LOS standards in the design year 2030, with the exception of that CMEA No. 1 falls marginally short of the LOS standard between CR 229 to CR 125. As CMEA No. 2 would add basic lanes between this interchange pair, it would offer a marginally better level of traffic service that would exceed the required standard. Safety is neutralized because there are no significant safety issues and both CMEAs improve or correct geometric deficiencies for those portions of I-10 that do not currently meet FDOT design standards. Because of the rural character of the corridor, the relation to transit is not a real discriminator for these two CMEAs.

The mobility benefits of the two CMEAs differ slightly in that CMEA No. 1 does not add any mainline capacity to I-10. CMEA No. 2 does address the LOS deficiencies found between CR 229 and CR 125 on I-10.

4.5.2 Commerce

The MOEs associated with regional commerce deal with truck access, minimizing conflicts between truck and autos and access to intermodal facilities. The regional commerce benefits of the CMEAs evaluated in Tier 1 are similar. Both CMEAs maintain four GPLs on I-10, with CMEA No. 2 adding basic lanes between the noted interchange pair. The effect of the additional lane improvement is not judged to have a significant effect as an aid in the economic development of the area. Both would basically accommodate the future traffic demand and will also allow the continued efficient movement of people and goods in the corridor.

The difference in economic development benefits associated with the two CMEAs evaluated in Tier 1 are relatively small. CMEA No. 1 will not improve capacity on I-10 even though it does include geometric improvements that address those portions of I-10 that do not currently meet FDOT design standards. CMEA No. 2, which would provide the additional travel lanes on I-10 between CR 229 and CR 125, will incrementally better the traffic service but in a less pronounced way.

4.5.3 Land Use

The MOEs associated with land use focus on compatibility, residential impacts and business impacts. In all cases, the focus is to minimize relocations and ROW acquisitions. CMEA No. 1 and CMEA No. 2 are basically similar in this regard, with no residential and business impacts because no additional ROW is necessary for construction of the mainline improvements, with the potential exception of drainage systems outside of the existing ROW for CMEA No. 2.

4.5.4 Environment

The MOEs associated with the environment include minimizing wetland encroachments or impacts and enhancing air quality by reducing the vehicle miles traveled. Both CMEA No. 1 and CMEA No. 2 have no wetland encroachments or impacts because no additional ROW is necessary for construction of the improvement of the mainline, though CMEA No. 2 will require drainage facilities outside of the existing ROW. It is noted that certain potential interchange area improvements to be evaluated in Tier 2 may have such impacts. The alternatives are equal relative to the vehicle miles traveled.

Since I-10 was constructed in the 1960's, prior to implementation of stormwater management regulations within the state, the roadway was designed with a rural section with side ditches to convey runoff to the nearest waterway or wetland.

The CR 229 to CR 125 segment of the project crosses the St. Johns River Water Management District (SJRWMD), which has regulatory authority in this watershed and is charged with the protection of the state's water resources. Any improvements to the project will be subject to the

water management district criteria that are current at the time of proposed improvement. The FDOT Drainage Manual currently requires that roadway projects comply with the Department's drainage connection rule. Based on existing stormwater regulations of these agencies, any project improvements other than resurfacing would require stormwater quality treatment, attenuation of runoff rate, and limitation of discharge volume (typically closed basins only).

4.5.5 Affordability / Constructability

The MOEs associated with affordability and constructability deal are conceptual construction cost and complexity of maintenance of traffic and constructability. Conceptual construction costs are for mainline improvement elements for comparative evaluation only and do not include the cost of interchange improvements. Costs were estimated using FDOT Office of Policy Planning, 2002 Transportation Costs. Drainage costs are associated with the need to construct drainage ponds. ROW and engineering costs are based on a percentage of the improvements subtotal cost.

CMEA No. 2 involves construction of added basic lanes; there is one location where this is being considered: CR 229 to CR 125. The incremental cost of CMEA No. 2 over CMEA No. 1 at a conceptual level of detail for comparative evaluation purposes is summarized in Table 4-3.

Table 4-3: Construction Cost Estimate – CR 229 to CR 125

Location	Construction Item	Construction Cost
CR 229 to CR 125	Add General-Purpose Lane to Inside	\$19,013,000
Bridge Culvert No. 270042	Widen Culvert	\$32,000
Bridge Culvert (No Number)	Widen Culvert	\$30,000
Bridge No. 270067	Replace Bridge and Approaches	\$1,880,000
Bridge No. 270055 (EB)	Replace Bridge and Approaches	\$2,392,000
Bridge No. 270044 (WB)	Replace Bridge and Approaches	\$2,392,000
CR 229 to CR 125	Offsite Ponds (est. 35 acres)	\$530,000
	Subtotal	\$26,269,000
CR 229 to CR 125	Engineering Costs (36%)	\$9,457,000
	Grand Total	\$35,726,000

All of the side roads from CR 229 to CR 125 crossing over I-10 have deficient bridge vertical clearances, as detailed in the DASR, therefore the cost of replacing each bridge and its approaches was added to the construction cost estimate. To reduce construction costs, each bridge can be replaced offset from the existing bridge and therefore traffic can be maintained on the existing structure.

An evaluation was performed to determine potential costs of providing stormwater management for the proposed improvements. It is expected that the proposed improvements would use roadside ditches to convey the runoff to stormwater facilities, which would be located outside the existing roadway ROW. Any ditches that currently sheet flow away from I-10 would need to be bermed to contain the runoff and direct it to proposed stormwater ponds. The existing roadway ROW appears wide enough to construct the containment berm.

Consistent with District 2's general desire to use wet ponds for stormwater management, these estimates are based on wet ponds constructed outside the existing ROW. The ROW was estimated on a per mile basis. Approximately 5 acres of land will be needed per mile of roadway improvement. Where discharging to an OFW, the size increases to approximately 7 acres per mile. Where discharging to closed basins, 10 acres per mile was assumed to be needed. The criteria for closed basins dictates large storage volumes and it may be reasonable to acquire the low point rather than purchase property to retain the runoff. Contour maps at 1:100,000 scale were used to determine whether the discharge is to a closed basin or to an OFW.

Treatment volume estimates were based on treating 1 inch over a 300-foot wide ROW. The treatment volume was stacked 1 foot high, which then set the area of the control elevation. Areas were added for attenuation volume, freeboard, and berms, and an additional 30 percent safety factor was added to account for uncertainties. The value of 5 acres per mile equates to approximately 14% of the project, which is reasonable to many development projects.

The construction costs for ponds were based on earthwork estimates for 5-acre and 10-acre ponds. The estimates assume 10 drainage structures are needed to convey water to and from the pond. More may be needed near road superelevation to get the runoff from the median to the outside ditches. Jacking and boring of new culverts should be expected in superelevated sections. Cross drain extension costs were covered in the 2002 Transportation Costs estimate. Cost estimates do not include contingency, mitigation or floodplain compensation.

4.6 RECOMMENDATIONS FOR TIER 2 CMEA DEVELOPMENT

The Tier 1 matrix, which rates the evaluation summary for each CMEA, indicates that there is very little difference between CMEA No. 1 and CMEA No. 2. The principal difference relates to LOS between the noted pair of interchanges, and the associated marginal benefits for mobility, at the expense primarily of the associated cost and the potential impacts of additional drainage requirements.

The recommendation for the I-10 mainline of Segment 2 is to conduct more detailed evaluations of both CMEA No. 1 and CMEA No. 2 in the next study phase. Further evaluation of both should be pursued in more detail, in conjunction with potential interchange improvements in the Tier 2 phase. This will allow for a more complete evaluation of the improvement options available and in the development of the appropriate long-term improvement program for I-10.

In the Tier 2 process, each alternative will be further defined and evaluated as a system for operational performance, safety, surrounding corridor impacts, and cost. Interchange concepts that are compatible with the mainline CMEA No. 1 and mainline CMEA No. 2 will also be developed.