

6 Conceptual Alternatives

Ten distinct Conceptual Alternatives were developed based on the concepts resulting from the evaluation of the Preliminary Alternatives. The following sections describe the Conceptual Alternatives and their evaluation results.

6.1 Description of Conceptual Alternatives

The Conceptual Alternatives listed in **Table 6-1** and shown in **Figure 6-1** through **Figure 6-10** encompass all of the different limits, typical sections, and options described in the previous chapter within the Preliminary Alternatives.



US 190 West of Madisonville

The remainder of the US 190/I-10 Feasibility Study primarily focused on the evaluation of the Conceptual Alternatives and localized transportation improvements.



US 190 toward Milano



Table 6-1 Conceptual Alternatives

Alternative	Description
Total Freeway – Option 1	Freeway from I-10 to US 277 to US 190 to the Louisiana state line.
Total Freeway – Option 2	Freeway from I-10 to US 83 to US 190 and continues to the Louisiana state line using options along FM 93, SH 30, and SH 63.
Total Four-Lane Highway – Option 1	Follows I-10 to the US 190 split and considers a four-lane divided highway along US 190 to the Louisiana state line.
Total Four-Lane Highway – Option 2	Follows I-10 to US 277, and continues from US 277 to US 190 as a four-lane divided highway. From its intersection at US 190 it continues eastward as a four-lane divided facility utilizing FM 93 (south of Temple), SH 30 (between Bryan and Huntsville), and SH 63 to the Louisiana state line.
Total Four-Lane Highway – Option 3	Follows I-10 to US 83, and continues from US 83 to US 190 as a four-lane divided highway. From its intersection at US 190 it continues eastward as a four-lane divided facility utilizing FM 93 (south of Temple), SH 30 (between Bryan and Huntsville), and SH 63 to the Louisiana state line.
Fort to Port – Option 1	Follows I-10 to US 277, is a freeway along US 277 to US 190, and continues along US 190 as a freeway until I-45. East of I-45, it is a four-lane highway along US 190 and utilizes SH 63 to the Louisiana state line.
Fort to Port – Option 2	Same as Fort to Port – Option 1 except that it extends as a freeway until US 69.
Evacuation	Follows I-10 to the US 190/I-10 split. From this point to Constitution Drive outside Killeen it is a four-lane highway, and east of Constitution Drive it is a freeway and utilizes SH 63 to the Louisiana state line.
Mobility/Safety – Option 1	Follows US 190 from its split with I-10 to Constitution Drive outside Killeen as a four-lane highway, east of Constitution Drive it extends as a freeway to US 69, and east of US 69 it is a four-lane highway utilizing SH 63 to the Louisiana state line.
Mobility/Safety – Option 2	Same as Mobility/Safety – Option 1 except that it extends to US 281 as a four-lane highway, east of US 281 it extends as a freeway facility to US 69, and east of US 69 it is a four-lane highway utilizing SH 63 to the Louisiana state line.



Figure 6-1 Total Freeway – Option 1



Figure 6-2 Total Freeway – Option 2



Figure 6-3 Total Four-Lane Highway – Option 1



Figure 6-4 Total Four-Lane Highway – Option 2



Figure 6-5 Total Four-Lane Highway – Option 3



US 190 West near Split with I-10



Figure 6-6 Fort to Port – Option 1



Figure 6-7 Fort to Port – Option 2



Figure 6-8 Evacuation



Figure 6-9 Mobility/Safety – Option 1



Figure 6-10 Mobility/Safety – Option 2



Alternative Segments

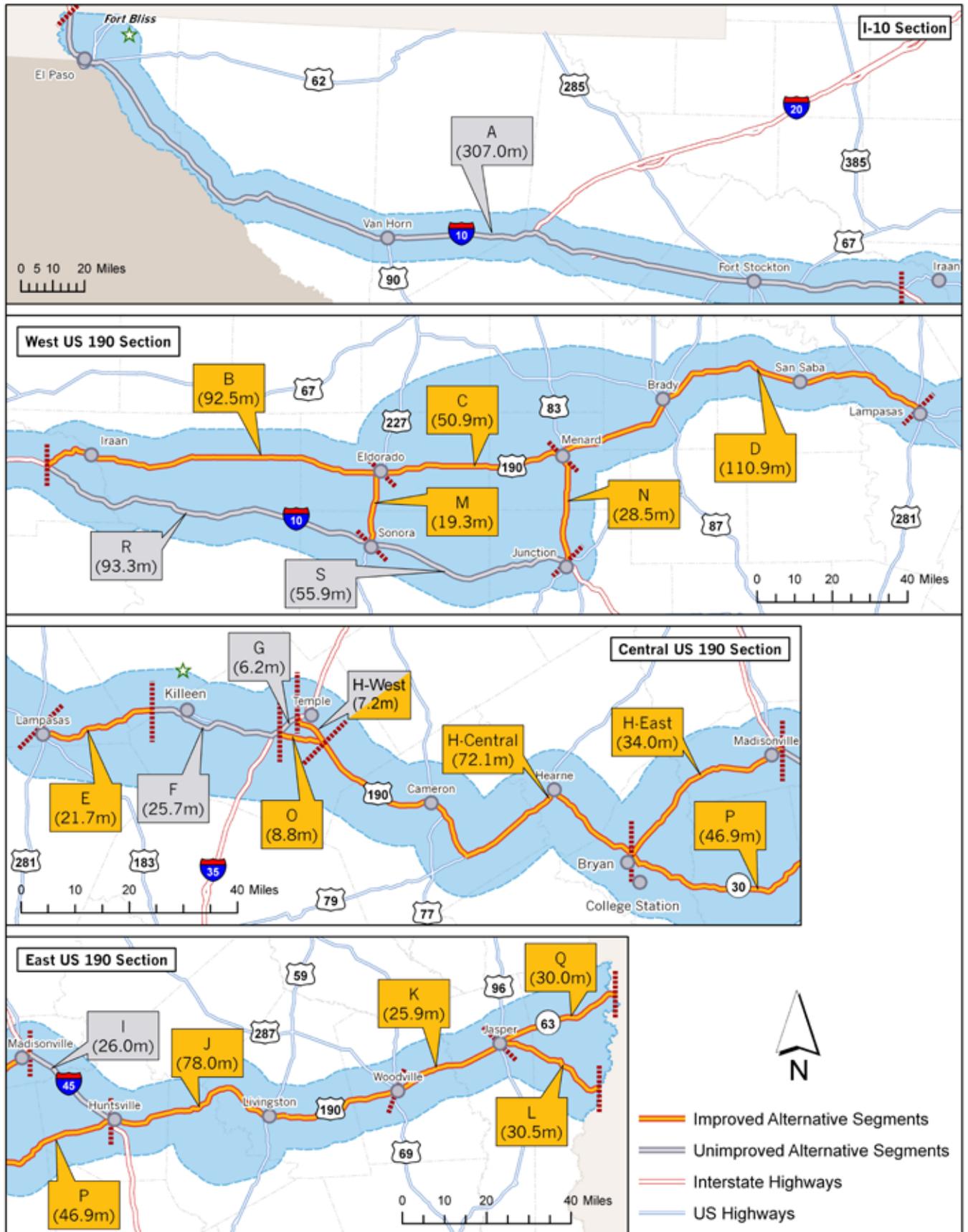
For evaluation purposes the four corridor sections were further divided into segments. These segments and their lengths are shown in Figure 6-11 and listed in Table 6-2.



US 190 East of Jasper



Figure 6-11 Alternative Segments



6.2 Evaluation Criteria

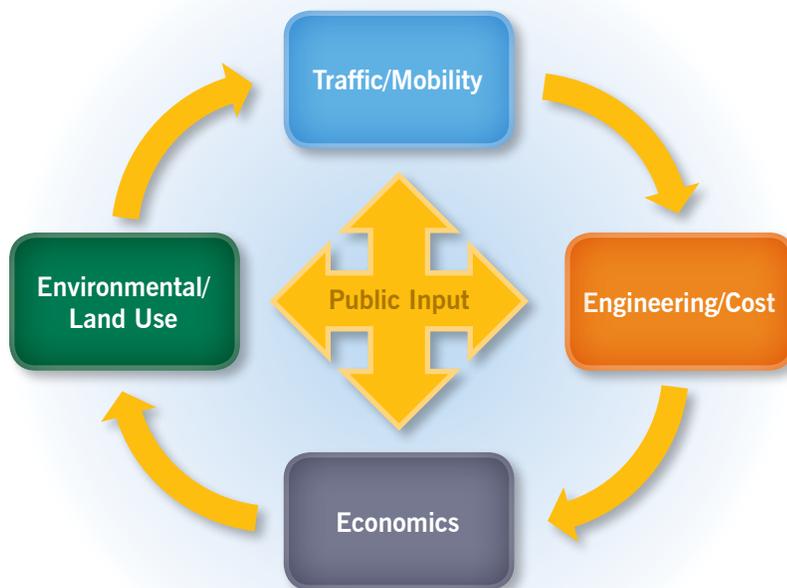
Criteria were developed for the evaluation of Conceptual Alternatives which adhered to the following three guidelines.

- The criteria were developed to be appropriate to the study in terms of coverage, complexity, and public concern.
- The criteria are capable of being measured (quantitatively or qualitatively) with current technology, process limitations, and resources available.
- The evaluation process would result in producing objective and fair analyses and conclusions.

The Conceptual Alternatives were also developed based on corridor needs as discussed in *Chapter 5 Section 5.2 – Preliminary Alternatives*. Criteria were developed for the detailed evaluation of Conceptual Alternatives using five major categories as shown in **Figure 6-12**.

These criteria used for the evaluation of Conceptual Alternatives were similar but more detailed than the initial screening criteria used for Preliminary Alternatives documented in the previous chapter.

Figure 6-12 Evaluation Criteria



All Conceptual Alternatives were rated based on the five major evaluation categories. The rankings ranged from 1 (least favorable) to 5 (most favorable). The rankings were done by the four corridor sections as well as the end-to-end alternative.

6.2.1 Traffic/Mobility Criteria

The traffic/mobility category was divided into four evaluation criteria as described below.

Travel Demand – Each Conceptual Alternative was evaluated based on the amount of traffic the alternative attracted. Travel demand is based on vehicle miles traveled (VMT) which is computed by multiplying average daily traffic volume on a roadway section with the distance (in miles) of that section. Travel demand is expected to increase when capacity improvements are considered, particularly along the statewide corridor as travelers seek routes providing better mobility (i.e., speed). Also, typically travelers will utilize a longer route if it optimizes their overall travel time. This results in increased VMT along the corridor but reduces it from other roadways, which in turn improves the overall mobility in the region. Therefore, increased travel demand, or VMT, was considered a positive factor in evaluating the alternatives. It was assumed that alternatives yielding higher VMT, compared to No-Build, indicated higher demand for travel and thereby received better rating. A rating of 3 indicated no significant increase in VMT over No-Build, a rating of 4 indicated a moderate increase, and the highest rating of 5 indicated the most increase in VMT compared to the No-Build scenario. A rating of 1 and 2 indicated least favorable ratings with VMT values lower than No-Build conditions

Travel Time – Travel time measures the effectiveness of the alternative to accommodate the travel demand. It is calculated in hours, based on the model outputs and represents the average time to travel under congested travel conditions. Alternatives resulting in lower travel times compared to the No-Build condition indicate positive performance and were given a rating of 4 or 5 depending on the magnitude of their travel time savings. A rating of 3 indicates no significant change in travel time compared to the No-Build and ratings of 1 or 2 indicates deterioration in travel time compared to No-Build, with 1 being the least favorable.

Speed – Speed was used as a measure to determine the impact of congestion on the alternatives. Speed in miles per hour (mph) was calculated by using a ratio of VMT over the vehicle hours traveled (VHT), which is the number of vehicle-hours spent by travelers. The speeds for each alternative were compared with the speeds under No-Build conditions to evaluate the productivity of the alternatives under congested traffic conditions. Alternatives resulting in higher speeds compared to the No-Build



condition indicate high productivity and received a rating of 4 or 5 depending on the magnitude of the improvement. A rating of 3 indicates no significant change. Ratings of 1 or 2 indicate reduction in speed compared to No-Build, with 1 indicating the most reduction and therefore the worst condition.

Congestion – LOS was used as a measure to evaluate congestion along the US 190 sections. To evaluate the congestion along US 190 for the alternatives, VMT in 2040 at LOS E and F was computed for each alternative. Alternatives resulting in a lower VMT in congestion (LOS E or F) compared to the No-Build scenario received the highest ratings of 4 or 5, alternatives yielding no significant change, positive or negative received a neutral rating of 3, and those resulting in higher VMT than the No-Build were given poor ratings of 1 or 2 indicating unfavorable performance.

6.2.2 Engineering/Costs Evaluation Criteria

The Engineering and cost evaluation category was divided into five evaluation criteria:

Design/Construction Cost – Construction costs were estimated on a per mile basis for the freeway and four-lane divided highway typical sections developed for the corridor study. The most recent Statewide TxDOT low bid unit prices were applied to these typical sections. Due to unknown design variables, a 20 percent construction contingency was applied to the assumed segments along the existing roadway alignment. In addition to the per mile roadway costs, unit costs were estimated for bridges, interchanges and variations in earthwork costs based on terrain. Additional project costs were estimated based on a percentage of the construction costs and included planning and environmental (5 percent); design (10 percent); utility relocation (6 percent); and construction engineering and inspection (11 percent). ROW and Operations and Maintenance (O&M) costs were evaluated separately and not included in the overall design/construction costs.

The potential locations of relief routes were also identified in some instances when constructing a freeway or four-lane highway through a town would not be reasonable due to the limited ROW and existing development adjacent to the roadway. The only difference in the estimates was that a 30 percent contingency was applied for the potential relief routes rather than the 20 percent that was used for the improvements along existing roadways. For the freeway alternatives, the relief routes were estimated to be constructed as a four-lane divided highway. For the four-lane alternatives, the relief routes were estimated to be constructed as a two-lane highway with adequate ROW for an ultimate four-lane facility. Overall estimates per alternative were developed based on the sum of the appropriate segments and relief



routes. Due to the preliminary nature of this analysis, the alternatives were scored based on their relative costs prorated among the 10 alternatives with the most costly alternative receiving a rating of 1 and the least costly receiving a rating of 5.

Right-of-Way Costs – Potential ROW needs for each alternative were quantified based on the proposed typical section and the existing ROW included in the RHINO database. ROW costs were estimated per acre based on recent (June 2011) property transactions within the project area counties. The estimation did not include all costs associated with acquiring ROW such as condemnation, relocation assistance, appraisal fees, title company fees, closing costs, and property management costs. Overall estimates per alternative were developed based on the sum of the appropriate segments and relief routes. Due to the preliminary nature of this analysis, the alternatives were scored based on their relative costs prorated among the 10 alternatives with the most costly alternative receiving a rating of 1 and the least costly receiving a rating of 5.

Operations and Maintenance – O&M costs were estimated on a per mile per year basis for freeway and four-lane sections. Costs varied with rural and urban classifications and concrete and asphalt pavement. **Table 6-3** shows projected 2011 O&M prices for rural concrete, rural asphalt, urban concrete, and urban asphalt for two- and four-lane roadway sections. Unit costs were based on Florida DOT 2002 Transportation Costs and inflated to reflect 2011 O&M unit costs using a 3.5 percent annual inflation rate. Overall estimates per alternative were developed based on the sum of the appropriate segments and relief routes. Due to the preliminary nature of this analysis, the alternatives were scored based on their relative costs prorated among the 10 alternatives with the most costly alternative receiving a rating of 1 and the least costly receiving a rating of 5.

Table 6-3 Current O&M Unit Costs

2011 Annual Dollars for O&M				
Lanes	Rural Asphalt	Rural Concrete	Urban Asphalt	Urban Concrete
2	\$29,600	\$22,200	\$136,300	\$102,200
4	\$55,500	\$41,600	\$272,600	\$204,400



Safety – A safety analysis was conducted by calculating potential percent crash reductions using the three year average of the most recent crash rates for the existing facilities and applying the 2009 TxDOT rural/urban accident rates by highway system and road type for the proposed roadway section. The same 1 to 5 rating scale was applied across all sections of all alternatives. The rankings were prorated based on the section with the overall highest potential for reduction in accidents (55 percent) and the section with the overall lowest potential for reduction in accidents (12 percent), excluding the I-10 Section as no improvements were proposed within that section.

Utilities – Each alternative was evaluated based on the amount of existing major utility crossings (oil and gas pipelines and electricity transmission lines) which may be affected; the greater the length of crossings, the more potential for conflicts to exist. Utility location information was provided by the Railroad Commission of Texas (RRC) and the Electric Reliability Council of Texas (ERCOT) and was not independently verified. Overall length of crossings per alternative were developed based on the sum of the appropriate segments and relief routes. Due to the preliminary nature of this analysis, the alternatives were scored based on their relative crossing lengths prorated among the 10 alternatives with the most costly alternative receiving a rating of 1 and the least costly receiving a rating of 5.

6.2.3 Environmental Evaluation Criteria

The Environmental Evaluation quantified the potential impacts to the human and natural resources along or adjacent to the corridor. Resources evaluated included:

- Land Use
- Natural Resources
- Cultural Resources
- Hazardous Materials
- Human Environment

Potential ROW for each alternative was overlaid on the baseline GIS model and environmental impacts associated with each were quantified. Potential ROW limits used in this evaluation are shown in **Table 6-4**.



Table 6-4 Right-of-Way Limits by Facility Type

Facility Type	Typical Section	Potential ROW (ft.)
Rural	Freeway	300-400
	Four-lane highway	250
Urban	Freeway	350
	Four-lane highway	150

The 1 to 5 ranking scale was again utilized where 1 would have the highest impact (most unfavorable), and 5 would have the lowest impact (most favorable).

6.2.4 Economic Evaluation Criteria

There were two major categories for the economic evaluation of Conceptual Alternatives:

- Travel efficiency feasibility perspective – compared the costs of the transportation improvement to the benefits that society would receive. This comparison is referred to as the benefit-cost analysis; if the benefits are equal to or exceeds the costs then the project is considered feasible.
- Economic impact perspective – this analysis compared how the infrastructure expenditures and societal benefits translate into economic impacts such as the number of projected jobs, income, etc.

Sensitivity testing was also conducted on particular segments (primarily in the Central and East Sections of US 190) of the alternatives to understand how the implementation of the potential 14th Amendment Highway would affect travel demand along portions of the corridor.

6.2.5 Public Input Evaluation Criteria

Public input was included in the evaluation by considering comments received from the public on the Conceptual Alternatives. Comments were received at the final series of public meetings via comment forms, on the project website, and from the telephone hotline. The public indicated support in varying degrees for all the Conceptual Alternatives. Primarily the support was indicated by the entire end-to-end alternative and not by section (I-10, West US 190, Central US 190, and East US 190) and therefore it was not possible to provide public input evaluation of the alternatives by sections.



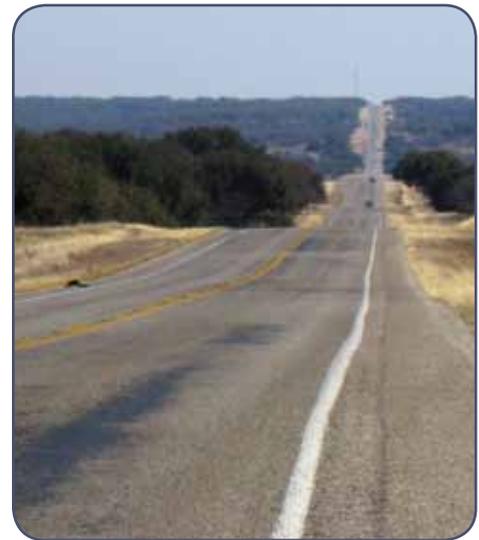
6.3 Evaluation Results

The primary results of the detailed evaluation of Conceptual Alternatives are discussed first by section of the corridor and then the end-to-end results are presented. The I-10 Section of the corridor was not evaluated since no major widening or upgrade improvements were considered in this section.

6.3.1 West US 190

The following discusses the results of evaluation for the Conceptual Alternatives in the West US 190 Section.

Traffic/Mobility – The Freeway Options 1 and 2 and the Fort to Port Options 1 and 2 received the best ratings (which were closely followed by the Mobility/Safety Options 1 and 2) for the West US 190 Section. These alternatives considered a freeway in this section which resulted in better mobility (travel time and speed) compared to the other alternatives. However, this section carries very low traffic volumes and the projected 2040 volumes continue to remain nominal, even when the alternative consisted of a freeway configuration.



US 190 West of Brady

Engineering/Costs – Within the West US 190 Section, the Total Four-Lane Option 3 alternative received the top rating of 5. This was the top rated alternative for this section for each individual criterion except for O&M as it was the shortest improvement corridor, utilizing existing I-10 to US 83, and consisted of only four-lane highway typical section. Total Four-Lane Option 2 received an overall Engineering/Cost rating of 4. It again only utilized a four-lane highway section, but assumed a slightly longer total improvement length by assuming improvements along US 277 rather than US 83. Total Four-Lane Option 1, Evacuation and Mobility/Safety Options 1 and 2 all received an overall Engineering/Cost rating of 3. All of these alternatives assumed a four-lane highway typical section from the I-10/US 190 Junction to US 281. The remaining alternatives, Total Freeway Options 1 and 2 and Fort to Port Options 1 and 2, assumed a freeway typical section within the limits of the West US 19 Section. The only difference being that Total Freeway Option 2 assumed the use of US 83 rather US 277, which was assumed to be used in the other three alternatives. This shorter length of freeway resulted in Total Freeway Option 1 receiving a rating of 2 while the others received the lowest rating of 1.



Environmental – Within the West US 190 Section, the Total Four-Lane Highway Option 3 received the best rating of 5. This alternative utilized US 83, which is the furthest east option to connect I-10 to US 190, and therefore avoiding potential impacts along US 190 between Iraan and the junction with US 83. The four-lane highway typical section also has a smaller footprint compared to the freeway section. Overall, the impacts between the remaining alternatives were very similar to each other and they all received ratings of 4. The exception to this was the cultural resource impacts which had more impacts on the Total Freeway Option 2 which were primarily along the US 83 corridor.

Economic – Construction of the entire West US 190 Section is not economically feasible for any alternative. For an alternative to be considered economically feasible, the Net Present Value (NPV) should be positive and the benefit-cost ratio should exceed 1.0 (i.e. benefits exceed costs). Net Present Values in the West US 190 Section range from a best-case of negative \$267 million for Four-Lane Highway Option 3 to a worst-case of negative \$858 million Fort to Port Option 1. Also, none of the individual segments in the West section are economically feasible. The benefit-cost ratios are very low, with the highest benefit-cost ratio of 0.53 estimated for the four-Lane Option 3, Segment N.

The ratings of the alternatives for the West US 190 Section are shown in **Table 6-5**. It should be noted that the public involvement evaluation criteria is not included in these tables as there was not enough information provided on comment forms and other public involvement venues to indicate support for a specific alternative by section (i.e., I-10, West US 190, Central US 190, and East US 190). Considering all evaluation criteria, Total Four-Lane Options 2 and 3, and Mobility/Safety Options 1 and 2 had the highest ranking.

Table 6-5 West US 190 Evaluation Results

	Traffic	Engineering	Environmental	Economics	Overall
Total Freeway Option 1	●	○	◐	○	◐
Total Freeway Option 2	●	◐	◐	◐	◐
Total Four-Lane Hwy Option 1	◐	◐	◐	◐	◐
Total Four-Lane Hwy Option 2	◐	◐	◐	◐	◐
Total Four-Lane Hwy Option 3	◐	●	●	◐	◐
Fort to Port Option 1	●	○	◐	○	◐
Fort to Port Option 2	●	○	◐	○	◐
Evacuation	◐	◐	◐	◐	◐
Mobility/Safety Option 1	●	◐	◐	◐	◐
Mobility/Safety Option 2	●	◐	◐	◐	◐

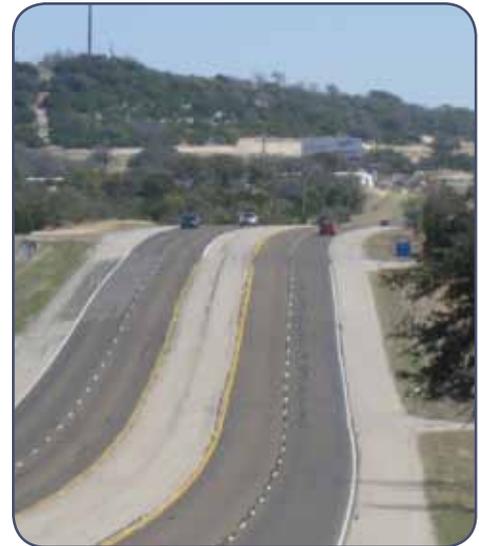
● = Most Favorable (5) ◐ = Favorable (4) ◑ = Neutral (3) ◒ = Unfavorable (2) ○ = Most Unfavorable (1)



6.3.2 Central US 190

The following discusses the results of the evaluation for the Conceptual Alternatives in the Central US 190 Section.

Traffic/Mobility – The Total Four-Lane Options 2 and 3 received the top ratings of 5 in this section. Both of these alternatives utilized options FM 93 (in the Temple area) and SH 30 (roadway facility between Bryan and Huntsville). This in turn diverted traffic from the already congested areas on US 190 near Killeen/Temple and I-45 near Madisonville. This section had the most traffic along US 190 and when a four-lane highway was considered, it attracted volumes that the facility could accommodate. However, when a freeway was considered in the Central US 190 Section, the projected traffic volumes the freeway carried were very high and in turn created more congestion than was already there.



US 190 West of Killeen

Engineering/Costs – The Total Four-Lane Option 1 was the highest rated alternative within the Central US 190 Section, receiving a rating of 5. This alternative was the highest rated alternative for each of the individual criterion within the Engineering/Cost evaluation. The next highest rated alternatives receiving a rating of 4 were the Total Four-Lane Options 2 and 3. The differences in these alternatives were that Option 1 utilized existing US 190 and I-45 between Bryan and Huntsville, while Options 2 and 3 utilized SH 30 in this area. Evacuation and Mobility/Safety Option 1 alternatives received a rating of 3. These alternatives assumed a four-lane highway from US 281 to the existing freeway east of Killeen, and a freeway between I-35 and I-45 along the existing US 190 corridor. Total Freeway Option 1, Fort to Port Options 1 and 2, and Mobility/Safety Option 2 received a rating of 2. These options assumed a freeway typical section for all portions of the existing US 190 corridor which were not already a freeway. The Total Freeway Option 2 received the lowest rating of 1. The differentiating factor between this alternative and those receiving a rating of 2 was that this alternative utilized SH 30 between Bryan and Huntsville.

Environmental – In the Central US 190 Section, the Total Four-Lane Option 1 received the best rating of 5. This alternative follows the US 190 corridor through the entire section. All of the other alternatives received a rating of 4 with the exception of Total



Freeway Option 2, which received a rating of 3. The majority of the impacts were associated with Total Freeway Option 2 and Total Four-Lane Options 2 and 3 which utilized alternative routes (i.e., US 83, FM 93, and SH 30).

Economic – The Central US 190 Section was the only section where most of the alternatives are considered economically feasible (yield positive NPV results and benefit-cost ratios exceeding 1.0). Clearly the relatively superior results are seen in Four-Lane Highway Option 1 with a NPV of \$649 million, and with the next closest, Mobility/Safety Option 1, at nearly half that amount (\$332 million). Of the ten alternatives, the only alternative for the Central US 190 Section not considered economically feasible is Total Freeway Option 2 (negative \$410 million). The benefit-cost ratios for most of the individual improved segments are feasible in the Central Section. The only infeasible segments are Segment P (SH 30 between and Bryan and Huntsville) under Total Freeway Option 2, Total Four-Lane Highway Option 2, and Total Four-Lane Option 3; and Segment O (FM 93 south of Temple) under Total Freeway Option 2. Segments E (from US 281 to Constitution Drive), H-West (from I-35 to FM 93), and H-East (from Bryan to Madisonville) yield the highest BCRs across the alternatives.

The ratings of the alternatives for the Central US 190 Section are shown in **Table 6-6**. Considering all evaluation criteria, Total Four-Lane Highway Option 1 had the highest ranking.

Table 6-6 Central US 190 Evaluation Results

	Traffic	Engineering	Environmental	Economics	Overall
Total Freeway Option 1	●	●	●	●	●
Total Freeway Option 2	●	○	●	●	●
Total Four-Lane Hwy Option 1	●	●	●	●	●
Total Four-Lane Hwy Option 2	●	●	●	●	●
Total Four-Lane Hwy Option 3	●	●	●	●	●
Fort to Port Option 1	●	●	●	●	●
Fort to Port Option 2	●	●	●	●	●
Evacuation	●	●	●	●	●
Mobility/Safety Option 1	●	●	●	●	●
Mobility/Safety Option 2	●	●	●	●	●

● = Most Favorable (5) ● = Favorable (4) ● = Neutral (3) ● = Unfavorable (2) ○ = Most Unfavorable (1)



6.3.3 East US 190

The following discusses the results of the evaluation for the Conceptual Alternatives in the East US 190 Section.

Traffic/Mobility – In this section, the Total Four-Lane Options 1, 2, and 3 and the Fort to Port Option 1 received the best ratings. Upgrading to a four-lane highway did not attract as much travel demand compared to upgrading to a freeway type facility, and therefore was able to accommodate the projected volumes.

Engineering/Costs – Four of the alternatives received an overall Engineering/Cost rating of 5 within the East US 190 Section. These alternatives were Total-Four Lane Options 1, 2, and 3 and Fort to Port Option 1. All of these options assumed a four-lane highway throughout the East US 190 Section, with Four-Lane Highway Option 1 utilizing US 190 east of Jasper while all others utilized SH 63 in this area. No alternatives received the ratings of 3 or 4 within this section, showing there was a great disparity between two groups of alternatives. Total Freeway Option 1 utilized US 190 east of Jasper received a rating of 2. The remaining alternatives; Total Freeway Option 2, Fort to Port Option 1, Evacuation and Mobility/Safety Options 1 and 2 all received a rating of 1. Of these five alternatives, Total Freeway Option 2 and Evacuation assumed a freeway throughout the section utilizing SH 63. The remaining three assumed a freeway between I-45 and US 69 and a four-lane highway from US 69 to Louisiana, utilizing SH 63 east of Jasper.



US 190 Near Point Blank

Environmental – Within the East US 190 Section, the Total Four-Lane Highway Options 1, 2, and 3 rated the best with an overall rating of 5. The remaining alternatives all rated well with a rating of 4. The options that followed US 190 typically had fewer impacts.

Economic – Construction of the entire East US 190 Sections is not economically feasible for any alternative. Overall, the East US 190 Section yielded negative NPVs for all alternatives, ranging from a best-case negative \$67 million for Four-Lane Highway Option 1 to a worst-case of negative \$637 million for Total Freeway



Option 2. The benefit-cost ratios indicate that Segment J (I-45 to US 69) is marginally feasible under Fort to Port Option 1, and close to feasible under the Total Four-Lane alternatives. Segment K (US 69 to SH 63) observes negative Benefit-Cost Ratio (BCR) metrics because the total benefits are actually dis-benefits, reflecting primarily insignificant travel-time and accident benefits relative to the increases in vehicle-operating costs. Interestingly, Segment L (US 63 to Louisiana state line) is feasible under both alternatives under which it is physically improved – Total Freeway Option 1 and particularly Total Four-Lane Highway Option 1 (BCR of 2.07).

The ratings of the alternatives for the East US 190 Section are shown in **Table 6-7**. Considering all evaluation criteria, Total Four-Lane Options 1, 2, and 3 had the highest rankings.

Table 6-7 East US 190 Evaluation Results

	Traffic	Engineering	Environmental	Economics	Overall
Total Freeway Option 1	●	●	●	●	●
Total Freeway Option 2	●	○	●	●	●
Total Four-Lane Hwy Option 1	●	●	●	●	●
Total Four-Lane Hwy Option 2	●	●	●	●	●
Total Four-Lane Hwy Option 3	●	●	●	●	●
Fort to Port Option 1	●	●	●	●	●
Fort to Port Option 2	●	○	●	●	●
Evacuation	●	○	●	●	●
Mobility/Safety Option 1	●	○	●	●	●
Mobility/Safety Option 2	●	○	●	●	●

● = Most Favorable (5) ● = Favorable (4) ● = Neutral (3) ● = Unfavorable (2) ○ = Most Unfavorable (1)

6.3.4 Conceptual Alternatives Overall Rankings

The following sections discuss the results of the end-to-end alternatives by all five major evaluation categories.

Traffic/Mobility – The four individual criteria were combined to develop an overall traffic/mobility rating for the alternatives. Overall, the Total Four-Lane Highway Options received the best ratings of the Conceptual Alternatives.

Engineering/Costs – Similar to the traffic/mobility rankings, the total Four-Lane Highway Alternatives received the most favorable ratings as the estimated costs for



a freeway section was greater than that for a four-lane highway section. The total Freeway Alternatives received the lowest ratings, and those with combinations of freeway and four-lane highway fell in between.

Environmental – In general, the alternatives that consisted of the four-lane highway option and utilized US 190 rather than an optional roadway received higher ratings as the number of potential impacts was less. It should be noted that while the impacts did vary between alternatives, there were no major significant differences in impacts.

Economic – Four-Lane Highway Option 1 is the most “feasible” alternative, but generates the third-lowest economic impacts. The alternative’s best feasibility metrics reflect the efficiency of comparatively strong travel efficiency benefits relative to the comparatively low infrastructure investment. Simply put, the alternative generates comparable benefits with less-extensive road improvements. However, since the capital investments drive the economic impacts, Four-Lane Highway Option 1 generates the third lowest overall economic impacts as mentioned previously. However, factoring out the capital investment component, this alternative generates the second-highest societal benefit-related impacts, just behind those of Total Freeway Option 1. Conversely, this alternative yields the largest economic impacts, but the third-lowest “feasibility”.

Four-Lane Highway Options 2 and 3 were not far behind Four-Lane Highway Option 1 in terms of economic feasibility results. Further, factoring in the benefits (or dis-benefits) on the unimproved road sections would result in Four-Lane Highway Options 2 and 3 surpassing Four-Lane Highway Option 1.

Figure 6-13 shows the benefit-cost (b/c) ratio of a freeway along US 190. As shown in this figure, it is marginally feasible (b/c ratio between 1.0 to 1.5) between Copperas Cove and the existing freeway section in Killeen, from I-35 to I-45, and along US 190 from Jasper to the Louisiana State line. **Figure 6-14** shows the b/c ratio of a four-lane divided highway along US 190 and this is very feasible (b/c ratio between 1.5 to 4.0) from I-35 to US 59, and between Jasper and the Louisiana state line.

Public Input – The Four-Lane Highway Options 1, 2, and 3 received the most support followed by Total Freeway Option 2 and Mobility/Safety Option 2. The two alternatives that were the least favored were the Total Freeway Option 1 followed by Fort to Port Option 1. **Figure 6-15** shows the varying degrees of support for the Conceptual Alternatives.



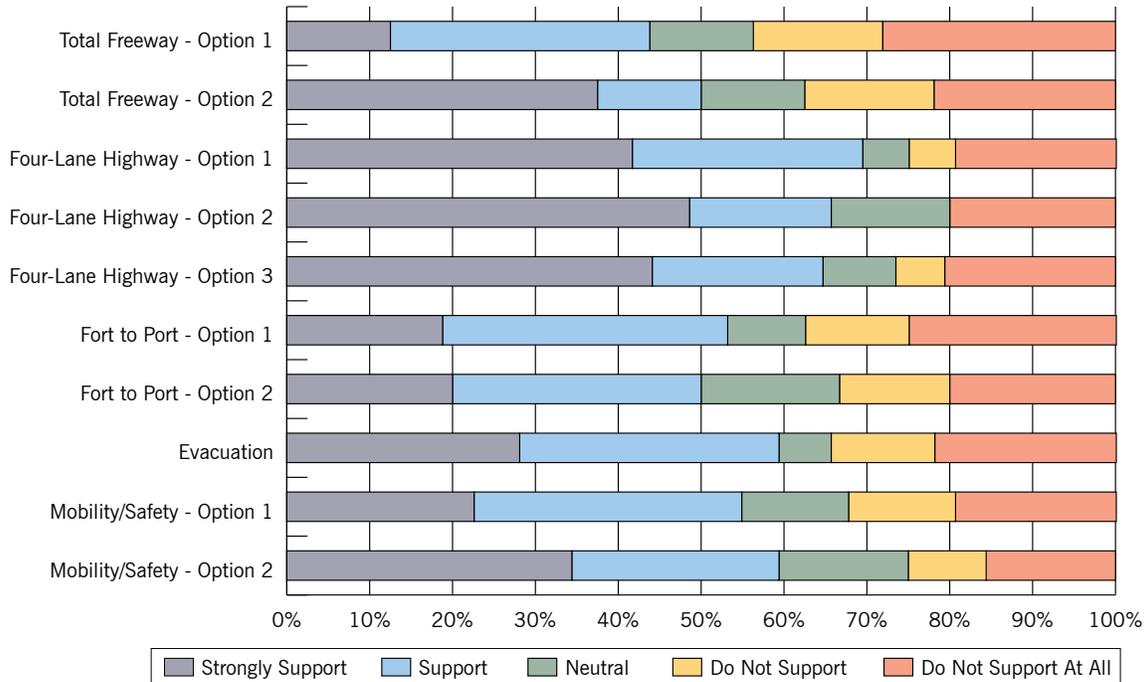
Figure 6-13 Benefit-Cost Ratio of a Freeway



Figure 6-14 Benefit-Cost Ratio of a Four-Lane Divided Highway



Figure 6-15 Public Support for the Conceptual Alternatives



Considering all of the criteria used for the evaluation of the Conceptual Alternatives, the total four-lane highway alternatives were rated most favorably with an overall ranking of 4. The Total Freeway Option 2 received a ranking of 2 and the remaining alternatives received a ranking of 3. **Table 6-8** shows the overall rankings of the Conceptual Alternatives.

Table 6-8 Overall US 190 Evaluation Results

	Traffic	Engineering	Environmental	Economics	Overall
Total Freeway Option 1	☐	☐	☐	☐	☐
Total Freeway Option 2	☐	○	☐	○	☐
Total Four-Lane Hwy Option 1	☐	☐	●	●	☐
Total Four-Lane Hwy Option 2	☐	☐	☐	☐	☐
Total Four-Lane Hwy Option 3	☐	●	☐	☐	☐
Fort to Port Option 1	☐	☐	☐	☐	☐
Fort to Port Option 2	☐	○	☐	☐	☐
Evacuation	☐	☐	☐	☐	☐
Mobility/Safety Option 1	☐	☐	☐	☐	☐
Mobility/Safety Option 2	●	☐	☐	☐	☐

● = Most Favorable (5) ● = Favorable (4) ☐ = Neutral (3) ☐ = Unfavorable (2) ○ = Most Unfavorable (1)



6.4 14th Amendment Highway/Gulf Coast Strategic Highway Corridor

The 14th Amendment Highway was introduced into Federal legislation in 2004 and proposed a interstate highway extend from Augusta, Georgia to Natchez, Mississippi, traversing intermediate cities of Macon and Columbus in Georgia, and Montgomery, Alabama. In recent years, additional legislation was proposed to designate a route from El Paso, Texas to Augusta, Georgia as a federal high priority corridor.

In 2001, the Gulf Coast Strategic Highway Coalition was formed to promote improvements in deployment routes for Army installations near the Gulf Coast. The proposed Gulf Coast Strategic Highway System facilitates upgrade of existing highways in Texas, Louisiana, and Mississippi to improve connectivity between the forts (including Fort Bliss, Fort Hood, and Fort Polk), and the strategic ports at Corpus Christi and Beaumont.

The 14th Amendment Highway is proposed to extend west from its original western limit at Natchez, Mississippi and and connect to SH 63 at the Louisiana/Texas state line. Through Texas, US 190/I-10 corridor from El Paso to Louisiana border is proposed to serve as the 14th Amendment Highway. The primary focus of this US 190/I-10 Feasibility Study was to evaluate various transportation improvements along the US 190 corridor to accommodate future travel demands. As part of this study, an evaluation of future travel demands with the implementation of the 14th Amendment Highway was conducted to determine capacity needs along the US 190 corridor. The economic impacts along US 190 associated with the proposed 14th Amendment Highway were also evaluated.

With implementation of the 14th Amendment Highway/Gulf Coast Strategic Highway Corridor to the east of Louisiana/Texas state, travel demand along SH 63 and various segments of the US 190 corridor is expected to increase. One of the greatest challenges was to determine the projected traffic volumes the proposed 14th Amendment Highway would carry and impact the US 190 study corridor. To assess this, SAM statewide travel demand model was utilized to determine the future travel demands along east-west highways that would be competing with the proposed 14th Amendment Highway. The 2040 daily traffic volumes along these highways, which are represented by external stations in the model, are presented in **Table 6-9**.



Table 6-9 2040 Daily Traffic Volumes along Major Roadways

Roadways	2040 Daily Traffic Volumes Along Major Roadways
I-10	60,400
US 190	12,300
SH 63	4,600
US 84	12,300
US 79	8,300
I-20	46,600

As seen from the Table 6-9, interstate highways I-10 and I-20, as expected, would carry the most travel demand with 60,400 and 46,600 vpd, respectively, with US 190 and US 83 carrying around 12,300 vpd.

Based on the location of the 14th Amendment Highway with respect to other east-west highways and the future travel demands that these competing highway are carrying, it was estimated that this proposed facility would bring in approximately 20,000 vehicles per day (vpd) onto SH 63 at the Texas/Louisiana state line.

This additional travel demand from the 14th Amendment Highway onto SH 63 will impact mobility along this facility and the adjoining US 190 segments as the traffic moves to the west. SAM model was utilized to estimate the distribution of this additional travel demand on the various segments of US 190. **Table 6-10** summarizes the 2040 traffic volumes for these segments, with and without 14th Amendment Highway, from I-45 to SH 63 at the Louisiana state.

Table 6-10 Traffic Impacts

Roadway	2040 Daily Traffic Volumes without 14th Amendment Highway	2040 Daily Traffic Volumes with 14th Amendment Highway
US 190 from I-45 to US 69	14,800	32,900
US 190 from US 69 to SH 63	6,900	22,800
SH 63 from Jasper to the Louisiana state line	2,600	22,700

With the implementation of 14th Amendment Highway, the traffic volumes along the study corridor are projected to increase from 2,600 vpd to 22,700 vpd along SH



63 and from 14,800 vpd to 32,900 vpd between I-45 and US 69. This increased travel demand will adversely impact the mobility along the study corridor if no capacity improvements are made.

A generalized capacity analysis was conducted to evaluate the additional number of lanes needed along the study corridor to accommodate the additional demand generated due to the 14th Amendment Highway. **Figure 6-16** shows additional number of lanes needed in 2040 along US 190 between I-35 to the Louisiana state line. Similar analysis was conducted to determine future capacity needs along US 190, between the Temple area to US 59 in Livingston, without the 14th Amendment Highway, which is discussed in Chapter 4 of this report.

The impacts of the 14th Amendment Highway were also evaluated from an economic perspective. The benefit-cost ratio was determined for both a freeway and a four-lane divided highway. A benefit-cost ratio of 1.0 or greater indicates that the benefits are equal to or exceeds the cost of implementing the transportation improvement.

Figure 6-17 shows the locations on US 190, with the implementation of the 14th Amendment Highway, where a freeway is marginally feasible (the benefit-cost ratio ranges from 1.0 to 1.5). As seen in this figure, a freeway is feasible between Copperas Cove to the existing freeway section in Killeen, and from I-35 to I-45. However, the benefit-cost ratio of upgrading US 190 to a four-lane divided highway, with the implementation of the 14th Amendment Highway, is very feasible from an economic perspective. As shown in **Figure 6-18**, a four-lane divided highway is very feasible (the benefit-cost ratio ranges from 1.5 to 4.0) along US 190 between I-35 to the Louisiana state line.

Figure 6-16

Additional Lanes Needed in 2040 with the Implementation of the 14th Amendment Highway



Figure 6-17 Benefit-Cost Ratio of a Freeway with 14th Amendment Highway/Gulf Coast Strategic Highway



Figure 6-18 Benefit-Cost Ratio of a Four-Lane Highway with 14th Amendment Highway/Gulf Coast Strategic Highway



