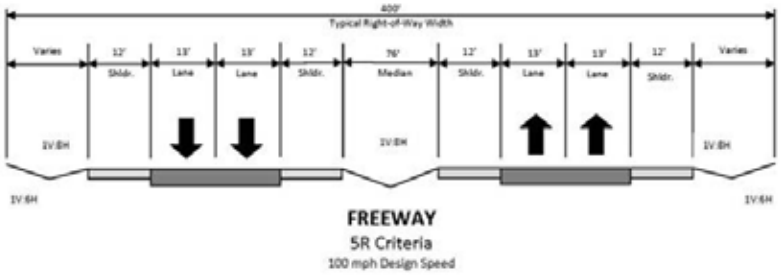
5 Preliminary Alternatives

Preliminary Alternatives were developed based on the identified corridor needs. The following sections discuss the development and evaluation of these alternatives.

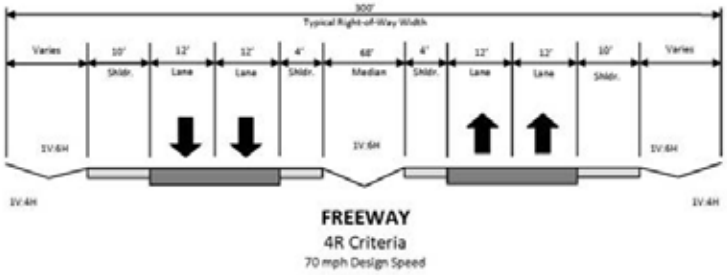
5.1 Alternative Development

The Preliminary Alternatives were initially developed based on the concept of upgrading the entire corridor to a freeway or four-lane divided highway as required by the study scope. Upgrading the existing freeway sections along I-10, and the common segments of US 190 along I-35 and I-45 were not considered. The alternatives included various limits of 5R freeway, 4R freeway, and four-lane highway typical sections, as shown in **Figure 5-1**. The 16 Preliminary Alternatives listed in **Table 5-1** and shown in **Figures 5-2 to 5-17** were evaluated to determine Conceptual Alternatives to carry forward for more detailed study, which is discussed in the next chapter.

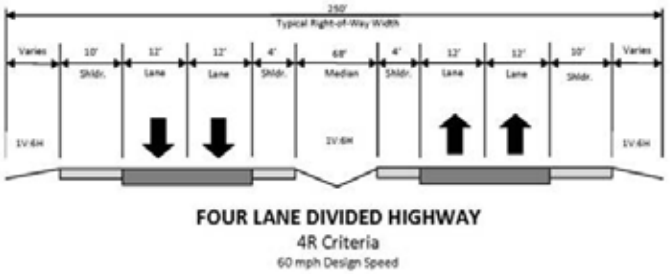
Figure 5-1 Typical Sections



FREEWAY
5R Criteria
100 mph Design Speed



FREEWAY
4R Criteria
70 mph Design Speed



FOUR LANE DIVIDED HIGHWAY
4R Criteria
60 mph Design Speed

Table 5-1 Preliminary Alternatives

Preliminary Alternative		Roadways Utilized	Figure
1	Total Freeway 5R	I-10 to US 190, US 190	Figure 5-2
2A	Total Freeway 4R	I-10 to US 190, US 190	Figure 5-3
2B	Total Freeway 4R via US 277	I-10 to US 277, US 277, US 190, SH 63	Figure 5-4
2C	Total Freeway 4R via US 83	I-10 to US 83, US 190, SH 63	Figure 5-5
2D	Total Freeway 4R via FM 93	I-10 to US 190, US 190, FM 93, SH 63	Figure 5-6
2E	Total Freeway 4R via SH 30	I-10 to US 190, US 190, SH 30, SH 63	Figure 5-7
2F	Total Freeway 4R via Livingston North*	I-10 to US 190, US 190, Livingston North, SH 63	Figure 5-8
2G	Total Freeway 4R via Livingston South**	I-10 to US 190, US 190, Livingston South, SH 63	Figure 5-9
2H	Total Freeway 4R via SH 63	I-10 to US 190, US 190, SH 63	Figure 5-10
3	Four-Lane Highway	I-10 to US 190, US 190, SH 63	Figure 5-11
4	Fort-to-Fort Freeway	I-10 to US 190, US 190, SH 63	Figure 5-12
5A	Fort-to-Port Freeway to I-45	I-10 to US 190, US 190, SH 63	Figure 5-13
5B	Fort-to-Port Freeway to US 69	I-10 to US 190, US 190, SH 63	Figure 5-14
6	Evacuation Freeway	I-10 to US 190, US 190, SH 63	Figure 5-15
7A	Mobility/Safety Freeway via US 190	I-10 to US 190, US 190, SH 63	Figure 5-16
7B	Mobility/Safety Freeway via SH 30	I-10 to US 190, US 190, SH 30, SH 63	Figure 5-17

* Livingston North looked at a new location route north of Lake Livingston.
** Livingston South looked at improving an existing route south of Lake Livingston.

Figure 5-2 1 Total Freeway 5R

Figure 5-3 2A Total Freeway 4R

Figure 5-4 2B Total Freeway 4R via US 277

Figure 5-5 2C Total Freeway 4R via US 83

Figure 5-6 2D Total Freeway 4R via FM 93

Figure 5-7 2E Total Freeway 4R via SH 30

Figure 5-8 2F Total Freeway 4R via Livingston North

Figure 5-9 2G Total Freeway 4R via Livingston South

Figure 5-10 2H Total Freeway 4R via SH 63

Figure 5-11 3 Four-Lane Highway

Figure 5-12 4 Fort-to-Fort Freeway

Figure 5-13 5A Fort-to-Port Freeway to I-45

Figure 5-14 5B Fort-to-Port Freeway to US 69

Figure 5-15 6 Evacuation Freeway

Figure 5-16 7A Mobility/Safety Freeway via US 190

Figure 5-17 7B Mobility/Safety Freeway via SH 30

5.2 Alternatives Evaluation

Evaluation criteria for the Preliminary Alternatives were developed based on the identified corridor needs discussed in Section 1.3, and the potential impacts of the improvements along the corridor.

Evaluation criteria established for the initial evaluation of Preliminary Alternatives were grouped into five major categories:

- **Traffic/Mobility**
- **Engineering/Cost**
- **Environmental/Land Use**
- **Socioeconomic**
- **Public Input**

All Preliminary Alternatives were rated based on how well they addressed the criteria for each of these categories. The basis for the range of ratings from 1 to 5 (with 5 being the most favorable and 1 being the least favorable) used for each criteria are described within their respective sections.

5.2.1 Traffic/Mobility

The Traffic/Mobility analysis was further subdivided into four evaluation criteria: Mobility, Connectivity, Safety, and Consistency with Transportation Plans. Alternatives 7A and 7B were the top ranked alternatives in terms of Traffic/Mobility because they focused improvements in areas currently experiencing or projected to experience traffic congestion and areas where geometric and operational deficiencies were identified.

Mobility

Under the mobility criteria, each Preliminary Alternative was evaluated to determine effective utilization of the improved US 190 in meeting the existing and future travel demand needs. The evaluation process involved determining the length of the US 190 Sections currently operating or projected to operate (by 2040) at an unacceptable LOS C-D or worse. For each alternative, effective utilization of an improved US 190 was determined based on a percentage of the length of US 190/I-10 Sections with unacceptable LOS divided by the total length of improvements for the corresponding freeway and four-lane highway sections. Alternatives resulting in a higher percentage showed better utilization of improvements to meet existing and future traffic and mobility needs, and thus received a higher rating. The Preliminary Alternative ratings for mobility are shown in **Table 5-2**.

Table 5-2 Preliminary Alternative Mobility Ratings

Rating	Existing Traffic Needs	Future Traffic Needs
2	Alternatives 1, 2A, 2B, 2E-2H, 3, and 5B	Alternatives 1, 2A-2H, and 3
3	Alternatives 2C, 2D, and 5A	Alternatives 5A and 5B
4	Alternatives 4 and 6	Alternatives 4 and 6
5	Alternatives 7A and 7B	Alternatives 7A and 7B

Connectivity

Each Preliminary Alternative was evaluated for connectivity based on the following criteria:

1. **Connectivity to military forts:** The US 190/I-10 corridor directly connects to Fort Bliss in El Paso and Fort Hood in Killeen and also provides connectivity to other military facilities such as Goodfellow Air Force Base in San Angelo via US 277, Fort Polk in western Louisiana via SH 63, and Lackland Air Force Base in San Antonio via I-35. Alternatives that connect to a fort/base via a freeway were given twice the benefit (weight) compared to connecting the facility via a highway.
2. **Connectivity to intermodal facilities:** Intermodal facilities (airports and railroads) were identified along the corridor. If an alternative connects to an intermodal facility via a freeway, it was given twice the benefit (weight) compared to connecting the facility via a highway.
3. **Connectivity to major highways:** The US 190/I-10 study corridor intersects with three interstates and 15 U.S. highways. If an alternative connects to a major highway via a freeway, it was given twice the benefit (weight) compared to connecting to the facility via a highway.
4. **Connectivity to highways serving Gulf ports:** Alternatives received a rating of 5 if they connect to the Gulf ports (Port of Corpus Christi, Port of Houston, and Port of Beaumont). All the alternatives received a rating of 5 in this category as they connect as a freeway facility to at least two of the three roadways serving the ports (I-35, I-45, and US 69).
5. **Connectivity between cities:** The US 190/I-10 corridor connects to five cities with populations greater than 20,000 and six cities with populations between 5,000 and 20,000. As such, connectivity to cities was evaluated for two population categories: 1) greater than 20,000 and 2) between 5,000 and 20,000. If an alternative connects to a city via a freeway it was given twice the benefit (weight) compared to connecting via a highway. All alternatives received a 5 with the exception of Alternative 3 which is a four-lane divided highway in its entirety.

The Preliminary Alternative ratings for connectivity are shown in **Table 5-3**.

Table 5-3 Preliminary Alternative Connectivity Ratings

Rating	Military Forts and Bases	Intermodal Facilities	Major Highways	Highways Serving Gulf Ports	Between Cities
4	Alternatives 1, 2A, 3, 6, 7A, and 7B	Alternative 3	Alternative 3		Alternative 3
5	Alternatives 2B-2H, 4, 5A, 5B	Alternatives 1, 2A-2H, 4, 5A, 5B, 6, 7A, and 7B	Alternatives 1, 2A-2H, 3, 4, 5A, 5B, 7, 7A, and 7B	All alternatives	All other alternatives

Safety

Safety was evaluated using the following criteria:

1. **Evacuation Route:** Preliminary Alternatives that provide improved access to and from a designated major evacuation route (US 79, US 77, SH 6, SH 146, FM 92, and US 96) were rated favorably. Alternatives were rated based on whether they provided improved access to an evacuation route via a freeway or a highway. Alternatives providing improved access via a freeway were given twice the benefit (weight) compared to connecting via a highway.
2. **Improved Safety:** Each Preliminary Alternative was evaluated based on its ability to improve safety along US 190 within sections with high accident rates and/or geometric deficiencies. The following parameters were determined for the US 190/I-10 corridor:
    a) the length that exceeds the statewide accident rate for a similar highway facility
    b) the length that exceeds twice the statewide accident rate for a similar highway facility
    c) the length with geometric deficiencies that create safety concerns, such as rolling vertical alignments, limited sight distances, or no shoulders.

Each alternative was evaluated based on the percentage of proposed improved freeway and/or four-lane sections of US 190 that overlay with all existing sections experiencing high accident rates and geometric deficiencies. Freeway improvements were given twice the benefit (weight) compared to the four-lane highway sections since the fully access-controlled freeway is expected to provide higher safety benefits. Alternatives yielding higher percentages received higher ratings.

The Preliminary Alternative ratings for safety are shown in **Table 5-4**.

Table 5-4 Preliminary Alternative Safety Ratings

Rating	Evacuation Route	Safety
3	Alternatives 3 and 4	Alternatives 3 and 4
4	Alternative 5A	Alternative 5A
5	Alternatives 1, 2A-2H, 5B, 6, 7A, and 7B	Alternatives 1, 2A-2H, 5B, 6, 7A, and 7B

Consistency with Transportation Plans

Regional and statewide transportation plans in the vicinity of the US 190/I-10 corridor were reviewed and evaluated based on their compatibility with the Preliminary Alternatives. Plans reviewed included Texas Trunk System, I-69 Corridor, I-35 Corridor, Ports to Plains, US 69, Bryan-College Station MTP, and Killeen-Temple MTP. Each alternative was given 1 point if it was consistent with a particular plan and 0 points if it was not. If an alternative was consistent with 6 or 7 plans it received a 5, if it was consistent with 5 plans it received a 4, and consistent with less than 5 plans it received a 3. All alternatives were at least consistent with 3 or more plans. The Preliminary Alternative ratings for consistency with transportation plans are shown in **Table 5-5**.

Table 5-5 Preliminary Alternative Consistency with Transportation Plans Ratings

Rating	Consistency with Transportation Plans
3	Alternatives 3 and 4
4	Alternative 5A
5	Alternatives 1, 2A-2H, 5A, 5B, 6, 7A, and 7B

5.2.2 Engineering/Cost

The Engineering/Cost analysis was evaluated based on relative project costs and potential ROW needs for each alternative. Alternative 3 was the least costly because the four-lane highway typical section would have a lower project cost and require less ROW than alternatives with a freeway section. Alternative 1 was the most costly since the 5R freeway would have the highest project cost and require the most ROW. The remaining alternatives fell between these two, mostly based on the amount of 4R freeway versus four-lane highway sections.

Relative Cost

Cost estimates were developed for each alternative based on per-mile costs for the 5R freeway, 4R freeway, and four-lane divided highway typical sections. The costs for all alternatives were rated based on relative costs between each of the alternatives. The estimated project costs ranged from $4 to $9 billion. The most costly alternative received a rating of 1, and the least costly alternative received a rating of 5.

ROW

The potential amount of additional ROW needed per alternative was estimated based on proposed typical sections developed for the 5R Freeway, 4R Freeway, and four-lane highway, and the existing ROW along the existing roadways from the RHINO database. Unit costs were estimated for urban and rural ROW by corridor county and applied to the potential additional ROW needed. The ROW costs for all alternatives ranged from $350 to $780 million. Alternatives were rated based on relative costs between each of the alternatives.

The Preliminary Alternative ratings for engineering and costs are shown in **Table 5-6**.

Table 5-6 Preliminary Alternative Engineering/Cost Ratings

Rating	Relative Cost	ROW
1	Alternative 1	Alternative 1
2	Alternatives 2A and 2D-2H	Alternatives 2A-2H
3	Alternatives 2B, 2C, 4, 5A, 5B, and 7B	Alternatives 5A and 5B
4	Alternatives 6 and 7A	Alternatives 4, 6, 7A, and 7B
5	Alternative 3	Alternative 3

5.2.3 Environmental/Land Use

Due to the size of the study area and the scope of the study, the preliminary environmental analysis relied on Geographic Information System Screening Tool (GISST) data. The GISST data is an environmental assessment tool developed by the Region 6 U.S. Environmental Protection Agency (EPA). GISST data is represented by a 1/4-kilometer grid superimposed over the study area. Each 1/4-kilometer grid is given a value ranging from 1 to 5 for each of the separate categories of environmental concern. A value of 1 represents a low potential for impact, and a value of 5 represents a high potential for impact based on available data sets and expert input.

The environmental and land use evaluation was based on each Preliminary Alternative's potential to impact natural resources. This potential was based on the GISST data using a 5,000 foot buffer to quantify the GISST data for all alternatives. Ratings for each criterion were determined based on number grids rated 4 or 5 within each alternative. The following GISST datasets were quantified for the environmental analysis of the Preliminary Alternatives:

- **Ecologically Significant Streams** – ecologically significant rivers include, but are not limited, to the Pecos River, the Colorado River, and the Neches River.
- **Wetlands** – Very few wetlands are located west of I-35. Wetlands in the eastern portion of the state are concentrated along the rivers and streams.
- **Wildlife Habitat** – Nearly all of the study area west of I-35 and east of I-45 is considered wildlife habitat, with the section between I-35 and I-45 being less dense.
- **Federal and State Threatened and Endangered Species** – Potential locations of concern would be near Junction, around Fort Hood, the Gibbons Creek Reservoir east of College Station, and east of Huntsville.
- **Hazardous Waste** – Very few potential sites are located along the corridor.
- **Managed Lands** – include Sam Houston National Forest.
- **Agricultural Land**s – primarily located south of Lake Livingston.
- **Indian Reservations** – the Alabama-Coushatta Indian Reservation near Livingston.

The top ranked alternative with regard to environment and land use was Alternative 2F. This alternative included an alternative alignment around Livingston and Onalaska north of Lake Livingston. This alignment was the highest ranked (having the least impact) for threatened and endangered species and managed lands. The second highest ranked alternative was Alternative 2C, this 4R freeway option utilizes US 83 to connect I-10 and US 190. This alternative ranked highly as it utilized the longest portion of existing I-10 and did not propose improvements along either this portion of I-10 or the portion of US 190 between I-10 and US 83. The Preliminary Alternative ratings for environmental and land use constraints are shown in **Table 5-7**.

Table 5-7 Preliminary Alternative Environmental/Land Use Ratings

Rating	Ecologically Significant Streams	Wetlands	Wildlife Habitat	Federal & State T&E	Hazardous Waste	Managed Lands	Agricultural Lands	Indian Reservations
1	All alternatives	All alternatives	All other alternatives	Alternatives 2E and 7B	All alternatives	Alternative 2G	All alternatives	All alternatives
2			Alternative 2C					
3				Alternatives 1, 2A-2D, 2G, 2H, 3, 4, 5A, 5B, 6, and 7A		Alternatives 1, 2A-2E, 2H, 3, 4, 5A, 5B, 6, 7A, and 7B		
4				Alternative 2F				
5						Alternative 2F		

5.2.4 Socioeconomic

The socioeconomic evaluation was based on each Preliminary Alternative's potential to impact minority populations and economically stressed households. Alternatives 1 and 2A ranked the lowest and all other alternatives ranked the highest with regard to socioeconomics. The only differentiation between all alternatives in this category was that Alternatives 1 and 2A utilize US 190 east of Jasper, thus not providing access to the minority populations along SH 63 east of Jasper. The Preliminary Alternative ratings for socioeconomics are shown in **Table 5-8**.

Table 5-8 Preliminary Alternative Socioeconomic Ratings

Rating	Minority Population	Economically Stressed Households
4	Alternatives 1 and 2A	Alternative 5A
5	All other alternatives*	All alternatives**

*Alternative 2D has the most potential to positively impact minority populations.
**There was very little differentiation between the alternatives with the percentages ranging from 94 to 100 percent. Alternative 2F has the most potential to positively impact economically stressed households.

For the socioeconomic evaluation, potential corridor improvement was considered a positive impact to minority populations or economically stressed households since it would connect these populations to economic centers.

5.2.5 Public Comments

The first series of Public and Local Outreach Group meetings was held from February 28 through March 10, 2011, at eight locations along the US 190/I-10 corridor. The purpose of these meetings was to introduce and receive feedback on the overall

project and preliminary corridor alternatives, as well as to identify additional corridor issues and needs to assist in future planning. The comment period extended through April 10, 2011.

A total of 65 respondents provided comments via comment forms, email, project hotline, and website after the first series of public meetings. Thirty four of 38 respondents agreed that transportation improvements were needed along the corridor. With regard to the issue of "Improvements to Consider," the majority of respondents supported widening US 190 to a four-lane highway (either along the entire corridor or in specific locations) followed by constructing relief routes and then upgrading to interstate standards (either along the entire corridor or in specific locations). Respondents ranked the importance of the evaluation criteria in the following order:

1. Promote Economic Development
2. Improve Connectivity
3. Relieve Congestion
4. Enhance Safety
5. Minimize Construction Costs
6. Minimize Environmental/Land Use Impacts

Alternative 3 received the most favorable rating of 5 since it supports widening sections of US 190 that are currently two to four lanes. All complete freeway alternatives (Alternatives 1, 2A–2H) received a rating of 4 as the public favored upgrading US 190 to a freeway in its entirety or in specific areas. Alternatives 4, 5A, 5B, 6, 7A, and 7B received a rating of 3 as they consist of combinations of both the freeway and four-lane highways. The Preliminary Alternative ratings for public comments are shown in **Table 5-9**.

Table 5-9 Preliminary Alternative Public Comments Ratings

Rating	Public Input
3	Alternatives 4, 5A, 5B, 6, 7A, and 7B
4	Alternatives 1, 2A-2H
5	Alternative 3

5.3 Basis of Selection of Conceptual Alternatives

Preliminary Alternatives were ranked based on the evaluation criteria within six scenarios that allowed for varying the importance of each of the five evaluation criteria categories. The eight top-ranked Preliminary Alternatives in each scenario were considered for further evaluation. Based on the rankings, the following three alternatives were dropped from further consideration:

1. **5R Total Freeway** (Preliminary Alternative 1) – was among the lowest ranked for Traffic Needs and ranked 15 or 16 (out of 16) in five of six scenarios.
2. **4R Total Freeway** (Preliminary Alternative 2A-2H) – was among the lowest ranked for Traffic Needs and did not rank above 10 in any of the six scenarios.
3. **Fort-to-Fort Freeway** (Preliminary Alternative 4) – ranked well (3) for Traffic Need, but ranked 15 or 16 overall in five of six scenarios.

Based on the analysis of the Preliminary Alternatives, the concepts shown in **Table 5-10** were used to develop Conceptual Alternatives to undergo a more detailed evaluation.

Table 5-10 Concepts to be Further Evaluated

Concept	Description
No Build	– Considers only committed projects along the corridor
4R Freeway (Modification of Preliminary Alternatives 2A through 2H)	– Considers a 4R freeway for the entire corridor except for the portion of US 190 from I-10 to either US 277 or US 83. – Considers all optional alignments along FM 93, SH 30, and SH 63
Four-Lane Highway (Preliminary Alternative 3)	– Considers a minimum of a four-lane divided roadway along US 190 – Additional lanes at existing four-lane sections currently experiencing congestion or projected to experience congestion – Consideration of the US 190/I-10 connection at the existing junction or utilizing US 277 or US 83 – Considers all optional alignments along FM 93, SH 30, and SH 63
Fort-to-Port (Combination of Preliminary Alternatives 5A and 5B)	– Considers a 4R freeway from I-10 to either I-45 or US 69 – East of I-45 or US 69 would be a four-lane section – Consideration of the US 190/I-10 connection at the existing junction or utilizing US 277 or US 83 – Considers all optional alignments along FM 93, SH 30, and SH 63
Evacuation (Preliminary Alternative 6)	– Considers a 4R freeway from Fort Hood to Louisiana – West of Fort Hood would be a four-lane section – Consideration of the US 190/I-10 connection at the existing junction or utilizing US 277 or US 83 – Considers all optional alignments along FM 93, SH 30, and SH 63
Mobility/Safety (Combination of Preliminary Alternatives 7A and 7B)	– Considers a 4R freeway from either US 281 or Fort Hood to US 69 – West of US 281 or Fort Hood would be a four-lane highway – Consideration of the US 190/I-10 connection at the existing junction or utilizing US 277 or US 83 – Considers all optional alignments along FM 93, SH 30, and SH 63