

PLANNING AND ENVIRONMENTAL LINKAGES STUDY

Alternatives Screening Methodology

STUDY LIMITS

SH 225
I-610 TO SH 146

I-610E
TELEPHONE ROAD TO
GELLHORN DRIVE

CSJ 0502-01-228



ENTECH
CIVIL ENGINEERS, INC



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1. INTRODUCTION

The purpose of the Alternatives Screening Methodology Report is to establish performance measures, screening criteria, and screening process for evaluating and analyzing alternatives. The screening process will determine a recommended alternative or alternatives that can be carried forward into the National Environmental Policy Act (NEPA) process.

1.1 Study Description

The Texas Department of Transportation (TxDOT) is conducting a Planning and Environmental Linkages (PEL) Study for both State Highway (SH) 225 and Interstate (I)-610 East (SH 225 and I-610E PEL) in Harris County, TX. This PEL study is a high-level, early planning study that helps to identify the following aspects:

- Existing environmental and socio-economic conditions
- Transportation issues and deficiencies
- Development of a purpose and need
- Evaluation of corridor alternatives

1.2 Goals of the PEL Study

The goal of this PEL study is to develop a more seamless decision-making process that minimizes the duplication of effort, promotes environmental stewardship, and streamlines project delivery. The reports, analyses, and information obtained for the SH 225 and I-610E PEL Study can be used to help document planning information and decisions for the subsequent environmental review (i.e., NEPA) process. This PEL study will streamline the process by providing a purpose and need, studying the corridor and surrounding communities in-depth, identifying recommended alternative(s), and eliminating unreasonable and infeasible alternatives. This study provides an early opportunity for stakeholders and the public to provide meaningful input on potential future projects identified through the study's progression.

2. PEL STUDY LIMITS

This PEL study is comprised of two roadways, SH 225 and I-610E. The limits along SH 225 begin at I-610 and end at SH 146 (approximately 14.6 miles). The limits along I-610E begin at Telephone Road and end at Gellhorn Drive (approximately 8 miles). The limits of the SH 225 and I-610E PEL Study are represented in **Figure 1**.



Figure 1 SH 225 and I-610E PEL Study Limits

3. PURPOSE AND NEED

The purpose and need statement describes the underlying needs to be met and any other factors relevant to the choice between alternatives. TxDOT is developing this study which provides a basis for the development and evaluation of conceptual alternatives for potential future projects. Each alternative proposed throughout this PEL study will be analyzed in terms of the extent to which it would or would not satisfy the identified needs.

3.1 Purpose and Need Statement

Based on the analysis of the existing conditions of the study area, public comments, and stakeholder/agency remarks, the needs of the SH 225 and I-610E corridor are:

1. Safety Issues
2. Inadequate multimodal movement of people
3. Inefficient movement of freight and maritime cargo
4. Inefficient emergency evacuation
5. Aging infrastructure

The above needs will be the precursor to moving forward with any potential alternative(s) and ultimately identify the recommended alternative(s). The full purpose and need statement can be found in the *SH 225 and I-610E PEL Purpose and Need Report*.

4. ALTERNATIVE SCREENING FRAMEWORK

The alternative screening methodology is established before any alternatives are developed to ensure consistent and unbiased evaluation of the alternatives. The effectiveness of each alternative will be measured by a range of criteria guided by the purpose and need. Each level of screening will have the following two-step process:

- Step 1 – qualitative and/or quantitative analysis of alternatives
- Step 2 – consideration of input from stakeholders, agencies, and the public

The alternatives at each screening level that meet the established criteria will be advanced to the next screening level for further evaluation, while those that do not will be eliminated from further consideration.

The three screening levels will be:

- Level 1 – Identify Conceptual Alternatives
- Level 2 – Identify Viable Alternatives
- Level 3 – Identify Recommended Alternative(s)

4.1 Level 1 Screening: Identify Conceptual Alternatives

The Level 1 Screening involves the evaluation of the Universe of Alternatives to identify the Conceptual Alternatives for the next level of screening. The Universe of Alternatives are developed by the study team based on a preliminary assessment of the existing conditions and environmental constraints within the study area.

The initial qualitative screening is a pass or fail system based on whether the alternative meets one out of the five needs identified as part of the purpose and need. If the alternative does not meet at least one of the needs, it is eliminated.

The alternatives that meet at minimum one out of the five needs will be divided into the following categories:

- Primary Alternative
 - An alternative that can be applied to the entire corridor.
- Supplemental Alternative
 - An alternative that can be applied to certain sections of the corridor can be paired with a primary alternative and may be implemented in the short or interim term.

The Universe of Alternatives will be screened against the five needs. If the alternative does not meet at least one need then it will be eliminated. An example of how the alternatives would be evaluated is shown in **Table 1**. The Universe of Alternatives that passed the screening will be presented to stakeholders and agencies for commentary to assist in refining the alternatives. Alternatives that pass the Level 1 screening are carried forward as the Conceptual Alternatives.

Table 1 Example Level 1 Screening

Alternative	Needs					Evaluation
	Need for Enhanced Safety	Need for Multimodal Movement of People	Need for Efficient Movement of Freight and Maritime Cargo	Need for Enhanced Emergency Evacuation	Need to Upgrade Aging Infrastructure	Primary (P) Supplemental (S) Eliminated (E)
Alt #X	Yes	Yes	Yes	No	No	P
Alt #Y	Yes	No	No	No	No	S
Alt #Z	No	No	No	No	No	E

4.2 Level 2 Screening: Identify Viable Alternatives

The Level 2 Screening involves the evaluation of the Conceptual Alternatives to identify the Viable Alternatives for the next level of screening. The Conceptual Alternatives that were developed based on the Level 1 Screening will first be evaluated based on the following criteria shown in **Table 2**.

Table 2 Level 2 Screening Criteria

Need	Criteria	Assessment Type
Safety	Safety	Qualitative
Movement of People	Traffic	Quantitative (Person Trips)
	Bike and Pedestrian Accommodations	Qualitative
	Transit Implementation	Qualitative
Freight and Cargo	Freight Implementation	Quantitative (Truck Volume)
	Maritime Cargo	Qualitative
Emergency Evacuation	Emergency Evacuation	Qualitative
Upgrade Aging Infrastructure	Infrastructure	Qualitative
	Drainage	Qualitative
	Technology	Qualitative

The Conceptual Alternatives will be screened based on qualitative and quantitative variables associated with the outlined criteria then ranked on a 1 (low)-3 (high) point scale. The Conceptual Alternatives will be presented to the stakeholders and agencies to be ranked by their most to least preferred alternative. These rankings will be converted to a 1 (low)-3 (high) point scale.

After the points are totaled the sum of the alternative with the highest number of points would be considered the most preferred with the next highest alternative points proceeding it until all alternatives have been evaluated. The alternative with the lowest number of points would be considered the least preferred. An alternative receiving a “least preferred” ranking does not inherently mean that the alternative is flawed, but rather it least meets the established criteria as compared to the other alternatives. Likewise, if an alternative receives the highest ranking, it may still face issues or obstacles with respect to that criterion.

Table 3 provides an example of the categories, rating scales/descriptions, and category weights that could be used to rank an alternative. Stakeholder and agency input will be weighted equally to the technical data. The top-ranking alternatives based on the points calculated during the Level 2 Screening will be carried forward as the Viable Alternatives.

Table 3 Example Level 2 Screening

Evaluation Category	ALT #1	Weight	Total Points
Safety		17%	0.50
Safety	3	17%	0.50
Movement of People		17%	0.33
Traffic	2	8%	0.17
Transit Implementation	2	8%	0.17
Movement of Freight and Cargo		17%	0.42
Freight Mobility	2	8%	0.17
Cargo Mobility	3	8%	0.25
Emergency Evacuation		17%	0.34
Emergency Evacuation	2	17%	0.34
Aging Infrastructure		17%	0.33
Drainage	2	17%	0.33
Public and Stakeholder Input		17%	0.33
Public and Stakeholder Input	2	17%	0.33
Total Points			2.26

Note: The weight 17% is shown for formatting purposes, the calculation would use 16.66667.

4.3 Level 3 Screening: Identify Recommended Alternative(s)

Viable alternatives will be evaluated based on evaluation criteria shown in Table 4.

Table 4 Level 3 Screening Criteria

Criteria	Assessment Type
Level of Service	Quantitative (FREEVAL ¹)
Constructability	Qualitative
Order of Magnitude Cost Estimate	Quantitative (Dollars)
Environmental Impacts	Quantitative/Qualitative

The Viable Alternatives will be screened based on more detailed qualitative and quantitative variables then ranked on a 1 (low)-3 (high) point scale. The Viable Alternatives will be presented to the public to be ranked by their most to least preferred alternative. These rankings will be converted to a 1 (low)-3 (high) point scale. Public input will be weighted equally to the technical data. The scoring will be calculated similar to the Level 2 screening as shown in Table 2. The top-ranking alternative(s) based on the points calculated during the Level 3 Screening will identify either one or many recommended alternative(s) to conclude the study.

¹ FREEVAL is a macroscopic roadway analysis tool based on the Highway Capacity Manual (HCM). It evaluates planning-level capacity, managed lane analysis, work zone impacts, and travel time reliability analysis for traffic on roadways.