Benefit/Cost Methodology

Section 1 of 3
Analysis Narrative
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**Benefit/Cost Analysis Narrative**

In order to calculate the safety and mobility benefits of the proposed improvements the HGAC methodology to calculate crash and delay benefits template spreadsheets were utilized. The spreadsheets contain all standardized assumptions to determine present value benefits. The following sections summarize how the input data in the HGAC template spreadsheets were calculated.

The Texas Department of Transportation Highway Safety Improvement Program (HSIP) Work Codes Table shows several categories that fits the type of improvements proposed by this project. The following list summarizes the category numbers definition and reduction factors that are applicable to the proposed project.

- 111 Interconnect Signals - Provide a communication link between two or more adjacent signals in a corridor. Specify all signalized intersections to be included in the interconnection - Reduction Factor 10%
- 131 Improve Pedestrian Signals - Bring existing pedestrian signal units into conformance with current standards - Reduction Factor 10%
- 403 Install Pedestrian Crosswalk - Place pedestrian crosswalk markings where none existed previously - Reduction Factor 10%
- 407 Install Sidewalks - Install sidewalks where none existed previously - Reduction Factor 20%
- 509 Channelization - Install islands and/or pavement markings to control or prohibit vehicular movements Reduction Factor Varies
- 520 Lengthen Left Turn Lane - Provide additional length to an existing exclusive left turn lane. Affected intersection approaches must be specified - Reduction Factor 40%
- 524 Increase Turning Radius - Provide an increased turning radius at an existing intersection - Reduction Factor 10%

Since there are several safety items being proposed that will ultimately improve safety to pedestrians and vehicular traffic, a conservative 25% reduction factor was assumed to calculate the safety benefit/cost analysis. We believe the cumulative effect of all the improvements will have such an impact.

Similarly, using the delay outputs for AM and PM peak periods; a link travel time was obtained from the SYNCHRO model. Then a two hour Vehicle Hour Traveled (VHT) was calculated for each link using the peak-hour volumes used in the analysis. Then a K-factor for the peak periods was utilized to determine the daily VHT for each link, and the total VHT for the 2018 build and no-build were completed. Then this total VHT was used in the benefit calculation template spreadsheets provided by HGAC. The output from the HGAC spreadsheet were used to calculate the benefit cost analysis. Table 7 shows the Benefit/Cost calculations with a construction cost estimate of $19.5 million for the proposed project.

| | 3% | | 7% | |
|---|---|---|---|---|
| Table 7 Benefit/Cost Analysis | | | | |
| | Benefit ($) | B/C | Benefit ($) | B/C |
| Mobility | $ 11,380,000 | 0.58 | $ 7,322,000 | 0.38 |
| Safety | $ 13,349,000 | 0.68 | $ 8,103,000 | 0.42 |

Benefit/Cost Methodology

Section 2 of 3
Safety Benefit Results
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## INPUTS

| Project Identification | |
|---|---|
| Name: | FM 2920 |
| Application ID Number: | 300840 |
| Sponsor ID Number (CSJ, etc.): | |

**Import from Crash History Data Tab?**

| Improvement Information | |
|---|---|
| Year Open to Traffic? **(Must be >=2018)** | 2020 |
| Appropriate Crash Reduction Factor (%): | 25% |
| Service Life (years): | 20 |

| Daily Travel Demand | With Project |
|---|---|
| 2018 Volume | 27,000 |
| 2018 Capacity | 32,000 |
| *2025 Volume* | *31,000* |
| *2025 Capacity* | *32,000* |
| 2040 Volume | 37,000 |
| 2040 Capacity | 32,000 |

| Preventable Crash History | Year 1 | Year 2 | Year 3 | Average |
|---|---|---|---|---|
| Death_Cnt | 0 | 0 | 0 | *0.00* |
| Incap_Injry_Cnt | 2 | 1 | 3 | *2.00* |
| Nonincap_Injry_Cnt | 2 | 6 | 17 | *8.33* |
| Poss_Injry_Cnt | 19 | 11 | 16 | *15.33* |
| Non_Injry_Cnt | 93 | 90 | 124 | *102.33* |
| Unkn_Injry_Cnt | 4 | 0 | 2 | *2.00* |

## OUTPUTS

| Benefit Results | |
|---|---|
| Discounted Safety Benefits @ 7% (2015 $, '000s) | $8,103 |
| Discounted Safety Benefits @ 3% (2015 $, '000s) | $13,349 |

Benefit/Cost Methodology

Section 3 of 3
Delay Benefit Results
(1 Page)

## INPUTS

| Project Information | |
|---|---|
| Name: | FM 2920 |
| Application ID Number: | 300840 |
| Sponsor ID Number (CSJ, etc.): | |
| Year Open to Traffic? **(Must be >=2018)** | 2018 |

| Daily Travel Demand | With Project | Without Project |
|---|---|---|
| 2018 VHT | 2,875 | 2,988 |
| 2018 Volume | 27,000 | |
| 2018 Capacity | 32,000 | |
| *2025 Volume* | *31,000* | |
| *2025 Capacity* | *32,000* | |
| 2040 Volume | 37,000 | |
| 2040 Capacity | 32,000 | |

## OUTPUTS

| Benefit Results | |
|---|---|
| Discounted Delay Benefits @ 7% (2015 $, '000s) | $7,322 |
| Discounted Delay Benefits @ 3% (2015 $, '000s) | $11,380 |