Precinct 4 Intersection Capacity Improvements Benefit Cost Analysis Narrative

**Overview -** Harris County staff derived forecasts for annual vehicle-hours of travel savings due to the construction minor capacity improvements at Beltway 8 Frontage Roads and Gessner Road. The following data sources were obtained for this purpose:

1. H-GAC travel demand forecasts for 2015, 2018, 2025 and 2040, made available as ArcGIS shape files – furnished as a linked file from the 2015 TIP Call for Projects web page
2. H-GAC Benefit Analysis Worksheet, Congestion/Delay Reduction – furnished as a linked file from the 2015 TIP Call for Projects web page
3. August 2013 intersection turning movement count data

**Caveat-** Due to the large number of locations included in the grant application, and the lack of traffic volume data and/or modeling tools, the intersection of Beltway 8 and SH 249 was analyzed and is considered to be representative of the cost/benefit ratio for the overall project. Much research has been performed which supports the addition of intersection capacity in reducing motorist delay.

**Context –** Beltway 8 frontage roads are nominally three lanes in each direction. The eastbound and westbound approaches at Gessner flare out to four lanes consisting of a dedicated U-turn lane, an exclusive left turn lane, a shared left/thru lane, and a shared right/thru lane. Gessner Road is a four-lane, median divided thoroughfare running north-south between Fallbrook Drive and Cutten Road. It serves a variety of trip purposes, including through traffic, as well as residential, commercial and industrial traffic for the Willowbrook area.

The nature of the delay problem stems heavy left turning demand on the eastbound frontage road and southbound Gessner approaches. Annual vehicle hours of delay were estimated and input within the Benefit Analysis Worksheet’s “Calculations” tab. The following approach describes how these delay estimates were derived.

**Methodology** – In August 2013, peak hour turning movement counts were gathered for incorporation into a traffic study at the intersection of Beltway 8 and Gessner. The traffic volumes were then grown to 2015, 2018, 2025., and 2040 value using growth factors calculated from HGAC travel demand forecasts. Volumes and current geometry were input into Synchro software to perform a Level of Service analysis based on the Highway Capacity Manual. The models were then re-run for each forecast year with changes made to the model to incorporate the proposed geometry.

STEP 1 – AADT forecast for analysis period

An analysis period of 20 years was determined based on the Texas Guide to Accpeted Mobile Source Emission Reduction Strategies criteria . H-GAC travel demand forecasts for Years 2015, 2018, 2025, and 2040 were used to develop annual growth rates, which were then applied to 2013 traffic count data.

STEP 2 – Synchro Model Runs and Computation of Annual Delay.

Synchro runs were performed on morning and evening peak hour traffic volumes for years 2015, 2018, 2025, and 2040. Both existing and proposed geometries were compared, and the overall delay reduction determined. Only the delay for these two was used to calculate the annual delay reductions based on 260 weekdays.

Step 4 – Cost Benefit Analysis.

The cost benefit analysis for the 20 year period was calculated using only peak hour delay for the two hour analysis period. This B/C ratio was performed using the estimated construction cost for this intersection only due to a lack of data and modeling resources. It can be assumed that similar B/C ratios would apply to all other locations in the grant application.