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KLJ

Leveraging VISSIM into a BUILD Grant Application

Quantifying the Operations and Safety Benefits of the 11th Street Grade Separation in Moorhead, MN

Speaker: Joe DeVore, PE, PTOE
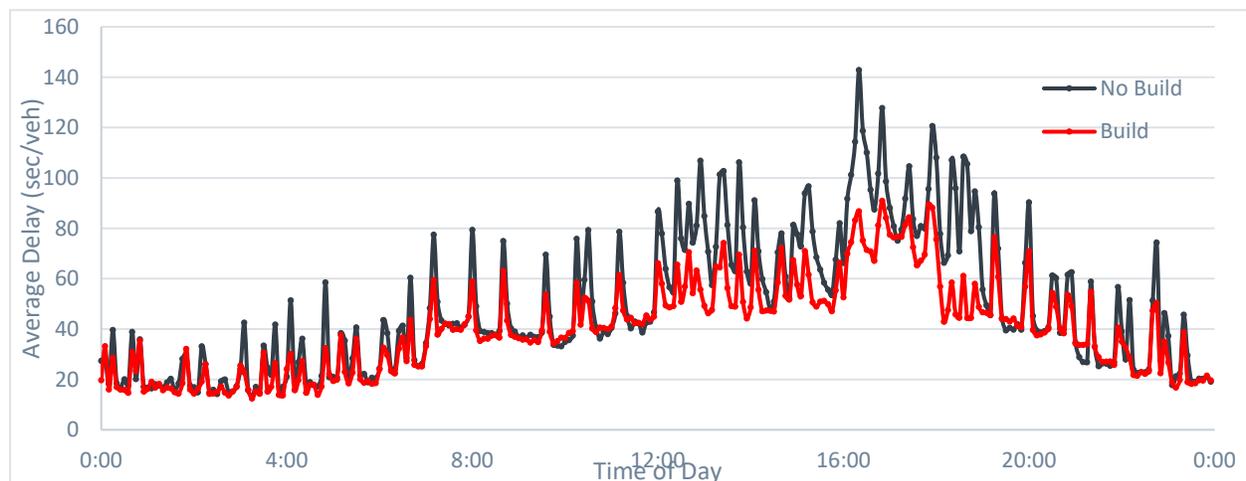**Traffic Engineer | KLJ – St Paul**

There can be many factors that can be quantified into a BUILD application or other grants, but the major factors that need to be quantified correctly are the safety and traffic operations analysis. These benefits usually make up most of the project benefits and maximizing both the quantifiable safety and traffic operations improvements is key to securing these limited funds. The City of Moorhead, MN has sought Federal discretionary funding 4 times over the last 4 years with the previous 3 times being unsuccessful due to BCA ratios showing a limited benefit. However, the BUILD application in 2019 saw major increases in the amount of safety and operational benefits thanks in part to a city wide VISSIM model which included numerous coding challenges to capture the network wide benefit of the 11th Street Grade Separation project.
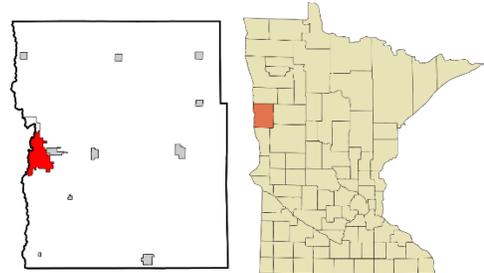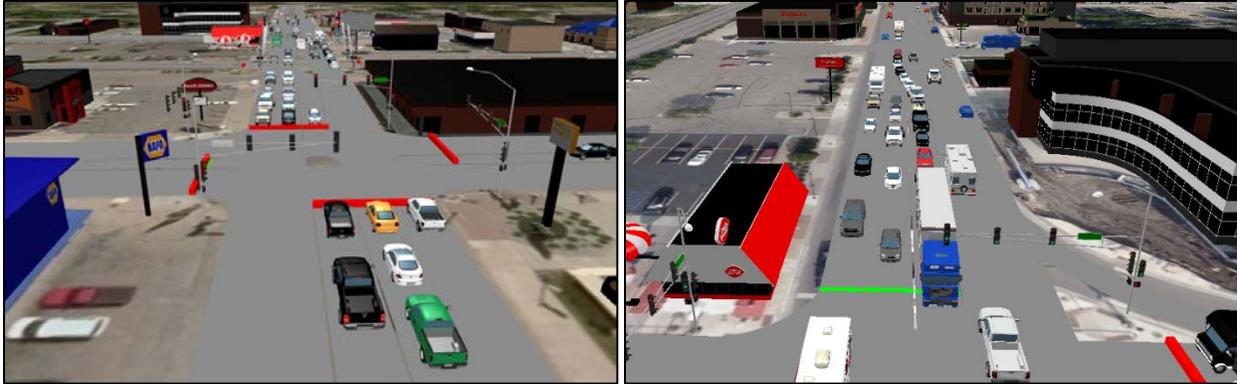
The modeling assumptions that went into quantifying the delay caused by 60-70 daily existing trains on two separate alignments crossing 9 unique at-grade crossing locations was not an easy task. Queuing and delays were witnessed to extend up to half a mile during the busiest times of the day and both traffic volumes and train volumes are expected to continue to increase into the future. Unique modeling assumptions included in this project included:

➢ 24-hour traffic operations analysis including 24-hour RBC signal timing files
➢ SSAM Safety/Conflict Analysis to quantify future safety benefit
➢ Streetlight Data to create static origin-destination routing
➢ Dynamic traffic rerouting for grade separation analysis
➢ 3D Signals and Buildings

24-Hour Network delay comparison between the No Build and Build 11th Street Grade Separation alternative.

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This modeling effort was not without its struggles. Queuing by train events routinely caused complete blocks to lock up and completely tank model runs. Signal timing for build scenarios was also an extensive challenge to create dynamic splits that could respond to increased traffic during train events. Balancing Streetlight Origin-Destination Data with traffic counts was also a complex process to limit the difference between data sources. Model runs averaged about 2-hours to complete the daily runs so troubleshooting and QAQC was a very time-consuming task.

The results were worth the effort showing 4,355,000 hours of time saved and 575 crashes reduced over the 20-year BCA period. This process allowed for a BCA to be quantified of 1.48 : 1 even with a 7% discount rate as stipulated for the BUILD grant process. Traffic operations improvements and conflict reductions made up just under 50% of this total benefit and constituted the largest modeling effort that the City of Moorhead has completed in it's downtown area.

This project included a large amount of modeling and technical data leading into creating the VISSIM models and evaluating the outputs. This presentation can be a longer 45 minutes – 1 hour presentation or can be summarized into a more condensed 30 minute presentation. Looking forward for the opportunity to present again in 2019!

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Speaker Bio and Headshot

Joe has over 8 years of experience in traffic operations and safety analysis specializing in the simulation and visualization of 4D multimodal traffic simulations. This experince has led to clients being able to better visualize alternative transportation designs and quantify their benefits. Joe's experience includes leading operations and safety tasks on the Minnesota Freeway and MnPASS analysis, Metro Transit LRT projects, the Minnesota United Stadium multimodal and transit analysis, and the I-35W Autonomous Vehicle impacts study.

Joe has been an active member of ITE throughout his career and is currently serving as the 2019 director for NCITE. Joe is an avid Minnesota sports fan, having played baseball at the University of Minnesota, and continues to mentor civil engineering students interested in traffic and transportation engineering through the UMN Civil Engineering Capstone Design course.