Project Summary

Johnson County Bus-on-Shoulder

Johnson County is an economic engine for the Kansas City metropolitan area and the State of Kansas. It's the fastest growing county in the state of Kansas and has the nation's third-highest disposable income. Three of its largest cities are ranked in Top 100 Best Cities by CNN. But future growth and quality of life are threatened by growing congestion and crash delays along one of the most heavily traveled corridors in the state – Interstate 35. Given funding constraints at the local, state, and federal levels, complete reconstruction and expansion of I-35 in the near future is not likely. Therefore, a faster, more cost effective way to reduce travel time, build transit use, increase transit user benefits, and rally support was proposed: **I-35 Xpress freeway bus-on-shoulder (BOS) service.** Johnson County Transit (JCT) and the Kansas Department of Transportation (KDOT) partnered with HNTB to create an innovative, phased transportation solution that combines technical excellence, financial restraint and community support forged from extensive **public engagement**, **safety analysis**, and **transportation planning**.

Bus Rapid Transit and Freeway Bus-On-Shoulder

Bus Rapid Transit – or BRT – is bus service that includes enhanced travel ways, stations and equipment. BRT offers passengers faster, more reliable service than traditional bus service by giving BRT vehicles priority over general traffic. This type of service can be implemented faster and less expensively than rail transit while still offering many of the same attributes and benefits as rail transit. Because the public is relatively unfamiliar with BRT, public education and marketing are very important to the success of this type of service. Early and frequent communication with transit users, supporters and funders can help transit providers overcome stereotypes and misperceptions regarding bus usage, speed and reliability that can hinder BRT or freeway BOS implementation.

Freeway BOS is a technique to provide transit priority on freeways. Just as bus rapid transit often includes running-way priority via urban and suburban street dedicated lanes and signal priority, bus-on-shoulder achieves priority by allowing bus operations on highway shoulders. Transit vehicles are allowed to travel on the shoulder when speeds decrease below a speed threshold on the mainline (typically 35 mph). Buses can then travel faster than the mainline traffic, improving service reliability and making buses more competitive with personal automobiles. This improved overall corridor efficiency increases ridership and builds and strengthens positive perceptions of bus transit and its provider.

Public Engagement

Understanding the transportation problems affecting I-35 from the perspective of the driving public, business interests and community leaders was critical in developing a solution that the community could embrace. That's why the project team emphasized public engagement in its decision-making process for I-35 Xpress BOS service. Two key activities informed the transportation planners and engineers of the public's concerns, including focus groups and media engagement.

Focus Groups

The team conducted three focus groups, with 26 participants randomly selected from the public representing a statistically valid sample of Johnson County residents who either commute on I-35 or who use transit. Participants were interviewed in a controlled group environment regarding the public's view of I-35 issues such as perceptions of bus on shoulder concept, reactions to specific issues related to the concept of buses using the shoulders, reactions to proven safety information related to BOS operations and perceptions of public transit in Johnson County. During the sessions, attendees viewed video of bus on shoulder operation in other cities and then were asked to provide feedback regarding the safety of driving through the I-35 corridor with bus on shoulder operations. The benefit of the focus groups was confirmation that the project team was addressing the public's concerns. Engineers and planners heard first hand feedback about the bus on shoulder perceptions related to safety from the driving public.

Media Engagement

A detailed public education plan was developed to serve as a guide for educating and informing the public on this innovative approach to moving people more efficiently along I-35. Media engagement occurred in several stages. Transportation planners and engineers reached out to the community and I-35 Xpress stakeholders through a variety of tools, to inform them of the upcoming service. Information presentations were made at Mid-America Regional Council (MARC) to inform community leaders of the upcoming BOS operations, an informational fact sheet and frequently asked questions (FAQ) were sent to all community leaders along the corridor, provided to transit riders. An educational video was produced and placed on YouTube, http://youtu.be/s0hT-qPdsOo. KDOT utilized their Twitter accounts and Facebook pages to promote the video and the upcoming service. The project website also housed additional information about the BOS operations and links to transit information. A media day was held so reporters could learn more about the upcoming service. Finally, paid radio spots ran for three weeks promoting the new service coming to the area.

Media Coverage

The media ran several stories about the transit service prior to its rollout. The most notable coverage occurred during the on-route driver training in December 2011. Over twenty stories - either print, television or radio presented information on the bus on shoulder service.

Conclusions

In conclusion, the public engagement effort used innovative ways to reach the public in a cost-effective and productive way. The public engagement provided the study team with powerful information that set the course for the study and feedback that confirmed the study team was headed in the right direction.

Safety Analysis

Due to the initial phases of the public engagement and in the course of implementing the Miami MDX bus-on-shoulder (highlighted in yellow on the following page), HNTB found that public and stakeholder feedback centered around safety of operating bus-on-shoulder on interstates. Therefore it was determined that one of the most important factors in determining the success of I-35 Xpress bus-on-shoulder was the safety of the improvements and operations. HNTB was able to assure JCT, KDOT, the legislature, and the public that I-35 Xpress bus-on-shoulder operations would be an incredibly safe operation. Safety was maximized through four main items: 1.) engineering analysis of safety, 2.) driver training, 3.) research of other bus-on-shoulder operations, and 4.) a six month follow up evaluation of the bus-on-shoulder implementation.

1.) Engineering Analysis

Bus-on-shoulder operation is safe from an engineering perspective because buses only operate when general purpose lane traffic is moving at low speeds (35 mph or less on I-35), the speed differential between passenger cars and the buses is low (less than 10 mph).

I-35 Xpress Concept Engineering Example

2.) Driver Training

Prior to allowing bus drivers to operate on I-35 shoulders, every bus driver at JCT was trained on a closed road course mimicking bus-on-shoulder constraints. After the drivers completed the closed road course, drivers were expected to log several hours of driving on the actual I-35 shoulder while accompanied by Kansas Highway Patrol (KHP). In addition, safety-focused operating procedures are mandated for bus drivers and the bus drivers are allowed discretion as to when to operate on the shoulder.

3.) Research

Prior to HNTB proposing bus-on-shoulder in the I-35 corridor, extensive research was completed on this topic. The figure on the next page summarizes other bus-on-shoulder projects in the United States. The longest running example of bus-on-shoulder, in Minneapolis, has only reported 20 property damage only crashes since starting service in 1992.

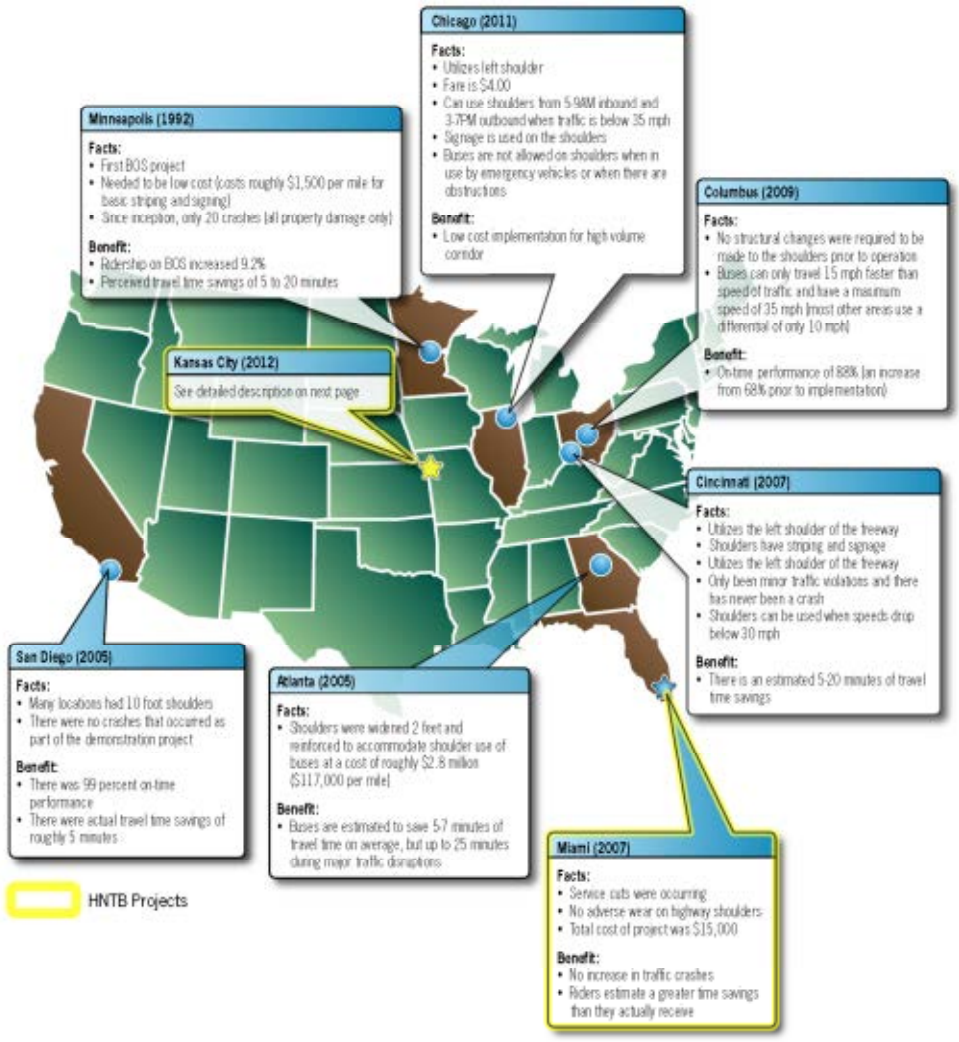
4.) Six Month Evaluation

It was decided that in order to speed the process of acceptance by stakeholders, such as KDOT and the state legislature, a six month evaluation would be conducted to assure the public and stakeholders that bus-on-shoulder operation. Some of the items that will be included in the six month evaluation includes an analysis of crash data, travel time data, and ridership increases. To date, there have been no crashes on I-35 related to bus-on-shoulder operation, travel time has decreased an estimated 3 minutes for buses on average (and more on heavy congestion days), and ridership has increased more than 6%.

Conclusions

In conclusion, the safety analysis provided the project team, the public, and stakeholders with definitive assurances and information regarding the safety of bus-on-shoulders in other corridors and also within the specific application of the I-35 corridor.

Bus-On-Shoulder Projects In the United States



Kansas City bus-on-shoulder (2012)

The most recent implementation of bus-on-shoulders in the U.S. is in the I-35 corridor in Johnson County, Kansas, a suburban corridor in Kansas City. The project began operating in January 2012. Key elements of the project include:

- Bus-on-shoulder was identified in 2009 as the preferred low-cost alternative to commuter rail in the I-35 corridor.
- Shoulders are mostly 11 to 12 foot wide along the corridor but in locations where less than 10-foot shoulders exist next to a barrier, operations are not allowed.
- Project cost was $2.5 million and included station area improvements.
- Shoulder improvements cost $9,250 per mile.
- Shoulders where BOS operates has pavement markings and signing.
- Shoulders can be used when speeds drop below 35 mph, but maximum speed is 35 mph with a maximum 10-mph differential between buses and mainline.
- The right shoulder is used.
- There have been no crashes since inception through February 2012.
- As of February 2012, ridership has increased six percent over the previous February 2011 despite service decreases on the system overall.
- Travel time savings average an estimated 2-7 minutes, but the main goal is travel time reliability even during large incidents.
- Buses must yield to entering and exiting traffic at ramps.
- Buses are not allowed to use shoulders at system-to-system interchanges with multiple lane entry ramps.

Lesson Learned:

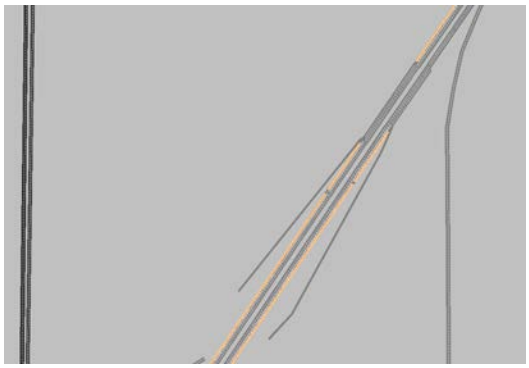
- The most important part of the project is to gain acceptance from the state legislatures and the state highway department of transportation.
- A detailed safety analysis is critical to the success of the project.

Transportation Planning

Reflecting the importance of the I-35 as a regional transportation corridor, the team used a variety of innovative transportation planning techniques, including a unique VISSIM micro-simulation analysis tool and downtown routing evaluation.

VISSIM Analysis

HNTB developed the first comprehensive VISSIM model that replicated bus-on-shoulder operation. HNTB modeled the bus-on-shoulder operation that was calibrated to actual volumes as well as speeds from the KC Scout portal. The model only allowed buses to merge onto the shoulders once speeds fell below 35 mph. In addition, buses were only allowed to travel at speeds that were 10 mph faster than the freeway general purpose lane speeds.



I-35 Xpress VISSIM Model Example

Downtown Routing Evaluation

Service plans for the surface street portion of all JCT routes were also evaluated. Although some adjustments were made to the suburban transit routing, most of the effort focused on the downtown routing. After several alternatives were evaluated, it was determined that a routing along Grand Avenue with reduced turns could save each JCT route roughly 3-5 minutes per trip.

Conclusion

The I-35 Xpress project represents an innovative transportation solution for the I-35 corridor and the Kansas City region. Through the use of public engagement, safety analysis, and transportation planning, a cost-effective transportation solution was provided for I-35 that improves the efficiency and person-throughput of the corridor.