# Purpose and Need
# Final Technical Report

## I-35 Capital Express Central Project
## I-35 from US 290 East to US 290 West/SH 71

Texas Department of Transportation, Austin District

**CSJ Number(s):** 0015-13-388

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The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated 12-9-2019, and executed by FHWA and TxDOT.

# Table of Contents



## List of Tables

# 1. Introduction

The Texas Department of Transportation (TxDOT) proposes to construct improvements to Interstate Highway 35 (I-35) from US Highway 290 (US 290) East to US 290 West/State Highway (SH) 71, and add direct connectors at I-35/US 290 East, in Austin, Travis County, Texas (referred to as the I-35 Capital Express Central project). The proposed project measures approximately 8 miles.

I-35 has been the north-south transportation backbone of personal, business and freight transportation in Texas since 1962. It connects Central Texas to the rest of the United States, Mexico and Canada, serving as a major thoroughfare for inter- and intrastate traffic. I-35 is critical to local, state and national security, economic vitality and overall mobility. Many Texans are familiar with I-35 as a local route for their work commute and other personal travel.

The existing I-35 study limits from US 290 East to US 290 West/SH 71 are located in an urban area with adjacent commercial, residential, institutional, governmental, and parks/open space properties. Within the proposed project limits, I-35 is an access-controlled interstate highway. Beginning at the southern limit, US 290 West/SH 71, the roadway typically has three to four, 12-foot-wide mainlanes (concrete barrier-separated) with 4- to 12-foot-wide inside shoulders, 10- or 12-foot-wide outside shoulders, and two to three, 11- or 12-foot-wide frontage road lanes with curb and gutter in each direction. From Lady Bird Lake to 15th Street, I-35 generally includes three 12-foot-wide mainlanes in each direction with auxiliary lanes between some of the ramps. North of 15th Street, the roadway has four mainlanes in each direction and includes the upper/lower deck split just north of MLK Jr. Boulevard with a continuation of the upper decks to north of Airport Boulevard. From Airport Boulevard to US 290 East, I-35 includes four barrier-separated mainlanes in each direction. The roadway here typically has 2- to 6-foot-wide inside shoulders, 10-foot-wide outside shoulders, and two to four, 11- or 12-foot-wide frontage road lanes with curb and gutter in each direction. Sidewalks exist in most, but not all locations throughout the project area, and shared-use paths are located within the project area in "downtown" Austin, defined as between MLK Jr. Boulevard and Holly Street. Drainage along the roadway (mainlanes and frontage roads) is provided by storm sewer networks and some open ditches. The existing right of way (ROW) width is typically 200 to 350 feet but is wider at the interchanges. Existing permanent drainage easements are located at creek crossings. The posted speed limit along I-35 in the proposed project area is 60 mph on the mainlanes and 35 to 50 mph on the frontage roads.

# 2. Need for the Proposed Project

The proposed project is needed because I-35 between US 290 East and US 290 West/SH 71 does not adequately accommodate current and future travel demand and does not meet current federal and state design standards, which has resulted in safety and operational deficiencies and can impact crash rates and peak period travel times for all users, including emergency response vehicles and transit.

## *2.1 Design Standards*

Because I-35 within the project limits was designed under old standards and has been retrofitted over time, it does not meet current roadway design standards based on TxDOT's *Roadway Design Manual* (TxDOT 2020), their *Hydraulic Design Manual* (TxDOT 2019), American Association of State Highway and Transportation Officials' *A Policy on Geometric Design of Highways and Streets* (AASHTO 2018), and the *Texas Manual of Uniform Traffic Control Devices* (TxDOT 2011). There is a need to improve design

deficiencies along I-35 within the project limits, including narrow lane widths, nonexistent or narrow shoulders, low vertical clearances, substandard horizontal and vertical geometry, and outdated drainage systems.

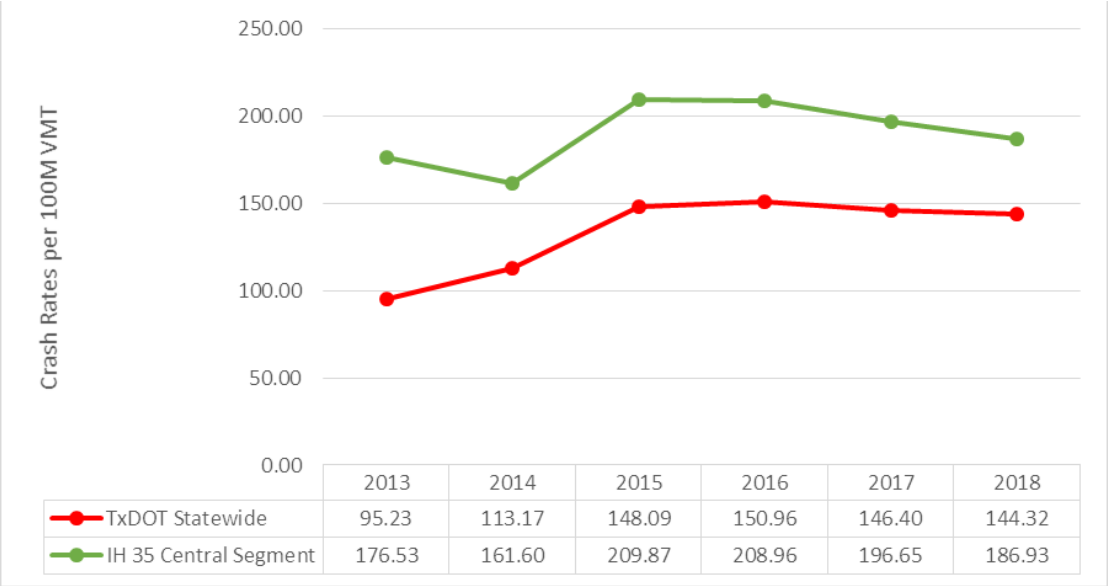
Ingress and egress to I-35 is hindered by closely-spaced ramps, narrow lane widths, and narrow or nonexistent shoulders, which could contribute to slow traffic and collisions. For example, the existing lower lanes on I-35 between Airport Boulevard and Manor Road do not have inside shoulders. When collisions occur on ramps and narrow lanes, travelers may be delayed without the opportunity to bypass the collision, resulting in reduced traffic flow. There is a need to add auxiliary lanes and revise ramp geometry and spacing according to current design standards to improve traffic operations along the corridor.

Multiple bridges within the project limits are under the current standard height requirements: the mainlane underpasses through the upper deck area, between Airport Boulevard and MLK Jr. Boulevard, have vertical clearances that vary from 13.25 to 15.25 feet; the underpasses through the downtown area have vertical clearances of less than 15 feet; the southbound mainlane underpass beneath Cesar Chavez Street has a vertical clearance of 14 feet, and the bridge has evidence of vehicle strikes. There is a need to increase vertical clearance for underpasses to current design standards to improve overall safety and operations for this heavily traveled area.

Substandard horizontal and vertical geometry along the project limits does not meet optimum design speeds and can result in compromised driver's sight distance and reduced traffic flow. Additionally, there is a need to upgrade the storm drainage system and evaluate the existing systems with respect to new rainfall data contained in the *National Oceanic and Atmospheric Administration Atlas 14* (Perica et al. 2018) which could reduce areas of flooding and improve overall driver safety.

## *2.2 Crash Data/Safety*

To analyze safety within the project limits, crash data from years 2013 through 2018 were obtained from the TxDOT *Crash Records Information System* (TxDOT 2020a). A total of 6,747 crashes were reported during the six-year period, with 58% of the crashes occurring on the mainlanes, 40% on the frontage roads, and 2% on the ramps and connectors of the system. Figure 1 shows the crash rates within the project limits compared to the average for urban Interstate facilities in Texas. Overall, the project limits experienced a total of 17 crashes per year on average over the six-year period. This increase is mostly due to the increase in mainlane traffic congestion from year to year. Over the six-year period, the project limits have an average crash rate of 190.09 crashes per 100 million VMT and is consistently higher than the statewide average.




## Figure 1 Capital Express Central Crash Rates per 100M VMT

Sources: TxDOT 2020a; TxDOT 2020b

Table 1 shows crash severity data within the project limits using the KABCO injury scale (FHWA 2012), which categorizes injuries by level of severity, as defined in Table 1. Of the 6,747 KABCO injury scale crashes recorded within the project limits between 2013 and 2018, there were 27 (0.4%) fatality crashes (K), 180 (2.7%) incapacitating injury crashes (A), 1,357 (20.1%) non-incapacitating injury crashes (B), 1,639 (24.3%) possible injury crashes (C), 3,436 (50.9%) non-injury crashes (O), and an additional 108 (1.6%) crashes with no reported severity.

## Table 1: Capital Express Central Crash Severity Summary

| Year | Fatal Crashes (K*) | Severe Incapacitating Crashes (A*) | Moderate Non-Incapacitating Crashes (B*) | Minor Possible Injury Crashes (C*) | No Fatality or Injury Crashes (O*) | Unknown Severity Crashes | Total Crashes |
|---|---|---|---|---|---|---|---|
| 2013 | 2 | 32 | 252 | 247 | 484 | 19 | 1,036 |
| 2014 | 2 | 22 | 214 | 234 | 432 | 6 | 910 |
| 2015 | 2 | 35 | 239 | 327 | 617 | 21 | 1,241 |
| 2016 | 11 | 28 | 218 | 333 | 659 | 23 | 1,272 |
| 2017 | 3 | 26 | 224 | 243 | 653 | 19 | 1,168 |
| 2018 | 7 | 37 | 210 | 255 | 591 | 20 | 1,120 |
| Avg/Yr | 5 | 30 | 226 | 273 | 573 | 18 | 1,125 |
| Totals | 27 | 180 | 1,357 | 1,639 | 3,436 | 108 | **6,747** |
| % | 0.4% | 2.7% | 20.1% | 24.3% | 50.9% | 1.6% | |

Source: TxDOT 2020a; FHWA 2012

*KABCO Injury Scale = "K" – Fatal injuries including deaths which occur within 30 days following an injury in a motor vehicle crash. "A" – Severe injuries including skull fractures, internal injuries, broken or distorted limbs, unconsciousness, severe lacerations, severe burns, and unable to leave the scene without assistance. "B" – Moderate injuries including viable injuries such as a "lump" on the head, abrasions, and minor lacerations. "C" – Minor injuries including hysteria, nausea, momentary unconsciousness, and complaint of pain without visible signs of injury. "O" – Property damage only.

Table 2 shows crash type, including bicycle and pedestrian accidents. The data indicates that of the 6,747 total recorded crashes within the project limits, there were:

- 2,134 (31.6 percent) rear end crashes
- 2,067 (30.6 percent) same direction crashes other (not sideswipes or rear ends)
- 830 (12.3 percent) single vehicle fixed object/overturn/turning
- 737 (10.9 percent) angle/other crashes
- 724 (10.7 percent) sideswipe crashes
- 163 (2.4 percent) opposite direction crashes
- 92 (1.4 percent) single vehicle pedestrian/bicycle crashes

Of the 92 crashes involving a pedestrian or cyclist, 35 (38 percent) of them occurred between 7th Street and Cesar Chavez Street. Twenty-eight of these 35 crashes within this section of the project limits occurred at intersections.

## Table 2: Capital Express Central Crash Type Summary

| | Single Vehicle (Fixed Object / Overturn / Turning) | Single Vehicle (Pedestrian / Bicycle) | 2+ Same Direction (Sideswipe) | 2+ Same Direction (Rear End) | 2+ Same Direction (Other) | 2+ Opposite Direction | 2+ Angle/ Other | Total |
|---|---|---|---|---|---|---|---|---|
| 2013 | 156 | 16 | 116 | 281 | 326 | 34 | 107 | 1,036 |
| 2014 | 128 | 13 | 81 | 271 | 290 | 26 | 101 | 910 |
| 2015 | 168 | 12 | 120 | 399 | 377 | 29 | 136 | 1,241 |
| 2016 | 132 | 22 | 152 | 398 | 409 | 23 | 136 | 1,272 |
| 2017 | 118 | 12 | 139 | 384 | 352 | 21 | 142 | 1,168 |
| 2018 | 128 | 17 | 116 | 401 | 313 | 30 | 115 | 1,120 |
| Avg/Yr | 138 | 15 | 121 | 356 | 345 | 27 | 123 | 1,125 |
| Totals | 830 | 92 | 724 | 2,134 | 2,067 | 163 | 737 | 6,747 |
| % | 12.3% | 1.4% | 10.7% | 31.6% | 30.6% | 2.4% | 10.9% | |

Source: TxDOT 2020a

Additionally, four mainlane crashes (one fatal, two serious injury) in which the contributing factor was "pedestrian failed to yield Right-of-Way to vehicle" occurred just north of the 51st Street interchange during the six-year study period. All four crashes occurred between 10:00 PM and 2:00 AM. No physical barriers to prevent pedestrians from walking onto the highway exist at this location. Pedestrian access to travel across I-35 at this location is limited. There is a need for preventing potential crashes involving pedestrians by investigating appropriate crash reduction options.

## 2.3 *Travel Demand*

### 2.3.1 Traffic Congestion and Operational Deficiencies

I-35 within Travis County is located in a heavily urbanized area that consistently ranks within the "Top 3 Most Congested Roadways in Texas." It is currently ranked #1, as measured by Texas Transportation Institute (TTI), and is among the roadways with the highest annual congestion costs, at more than $200M (TTI 2020). Due to existing north-south travel demand and the limited number of alternative parallel controlled-access routes through Austin, I-35 is presently subject to severe traffic congestion for substantial periods of time each day. As population and employment growth continue, current congestion levels along I-35 are anticipated to worsen. The annual average daily traffic (AADT) for the portion of I-35 between US 290 East and US 290 West/SH 71 was 207,215 vehicles per day (vpd) in 2019 (TxDOT 2019a). By 2045, traffic is expected to reach 303,700 vpd, an increase of approximately 47% over 2019, according to traffic projections based on TxDOT-approved 2030 and 2050 AADT forecasts.

Population increases have occurred over the last several decades within the city of Austin, Austin-Round Rock Metropolitan Statistical Area (Austin-Round Rock MSA), and Travis County, with all three areas more than doubling in population between 1980 and 2010 (Table 3). Subsequently, 10-year growth rates for Austin and Travis County were significantly higher than 10-year growth rates at the state level, except for the city of Austin's 2000-2010 growth rate, which was slightly less than the state average. Population forecasts for the regions surrounding the study area (Table 4) predict continued growth for the city of Austin and Travis County through 2045.

### Table 3: Historical Population Data

| Jurisdiction | 1980[1] | 1990[1] | 2000[2] | 2010[2] |
|---|---|---|---|---|
| State of Texas | 14,229,191 | 16,986,510 | 20,851,820 | 25,145,561 |
| Austin-Round Rock MSA | 536,688 | 781,572 | 1,249,763 | 1,716,289 |
| Travis County | 419,573 | 576,407 | 812,280 | 1,024,266 |
| City of Austin | 345,890 | 465,622 | 656,562 | 790,390 |

Sources: [1]Texas Demographic Center 2020; [2]USCB 2000 and 2010 (Tables SF1, DP1)

### Table 4: Population Forecasts

| Jurisdiction | 2018 | Projected 2045 | Projected Percent Change |
|---|---|---|---|
| State of Texas[1] | 27,885,195 | 43,866,965 | +74.5% |
| Travis County[1] | 1,203,166 | 1,884,155 | +84.0% |
| City of Austin[2] | 935,755 | 1,367,879 | +73.1% |

Sources: [1]Texas Demographic Center 2020; [2]City of Austin 2017

## Table 5: CAMPO Employment Forecast

| Region/Year | 2015 | 2045 | Projected Percent Change |
|---|---|---|---|
| Travis County | 600,322 | 1,199,239 | +99.7% |
| CAMPO Region | 988,712 | 2,367,070 | +139.4% |

Source: CAMPO 2020
*Note: The CAMPO Region includes Bastrop, Burnet, Caldwell, Hays, Travis and Williamson Counties.*

Table 5 illustrates the forecast for employment in the CAMPO counties from 2015 to 2045. The Austin metropolitan area added 22,700 net new jobs, or 2.1%, in the 12 months ending in March 2019, according to releases of preliminary payroll jobs numbers by the Texas Workforce Commission (TWC) and the U.S. Bureau of Labor Statistics (BLS) (Kerr 2019). Austin's 2.1% growth makes it the 16th highest growth rate among the 50 largest metro areas during the March 2018-2019 year. According to the Capital Area Metropolitan Planning Organization (CAMPO) Baseline 2045 Demographic Forecast (CAMPO 2020), the CAMPO region anticipates an additional 2.7 million in population and over one million new jobs by 2045 (over the baseline year of 2015). Employment in the Austin-Round Rock MSA increased nearly 31% between 2007 and 2017. The region's most highly concentrated industries primarily include technology and administration (Texas Comptroller 2018). All population and employment resources analyzed identified the continued growth of the Austin metropolitan area now and in the future.

There is a need to improve the project corridor and increase capacity based on the projected population growth, employment, and travel demand increases. In addition, the projected population increases in the region will further the need for improvements to the bicycle and pedestrian accommodations throughout the corridor.

### 2.3.2 Travel Time

I-35 is the only interstate highway connecting Mexico, the United States, and Canada through the central part of the United States and is one of two north-south interstate highways traversing Texas. According to the American Transportation Research Institute (ATRI) American Highway Users Alliance 2015 study "Unclogging America's Arteries Prescriptions for Healthier Highways" (ATRI 2015), the portion of I-35 in downtown Austin ranks number 10 on the list of top bottleneck highways in the country. The study estimates that the "annual total delays from this bottleneck amount to 3 million hours at a lost value of time of about $73 million a year."

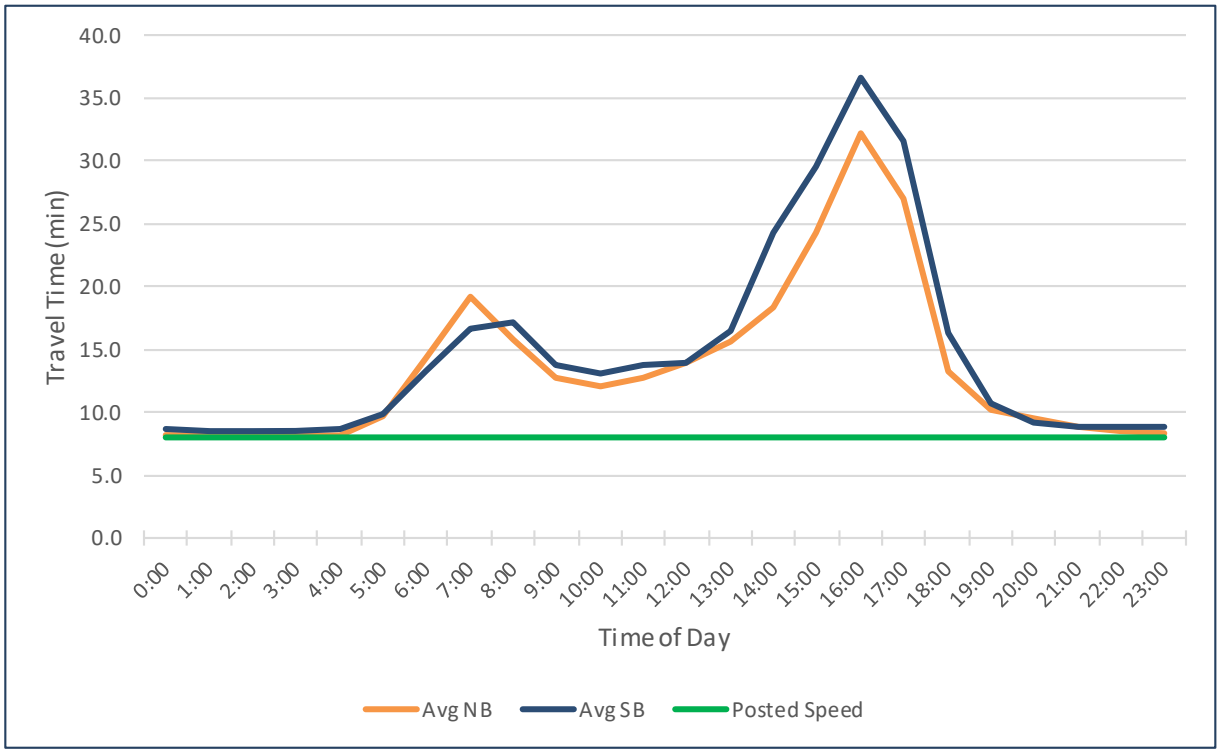
Travel times were collected for the project limits for the year 2019 INRIX data provided by TXDOT, and projected for the years 2025 and 2045 based on traffic microsimulation models for the corridor. Table 4 shows the existing (2019) AM and PM peak hour travel times, and 2025 and 2045 forecasts along I-35, between US 290 East and US 290 West/SH 71. Peak hours are defined as 7:30 AM to 8:30 AM, and 4:30 PM to 5:30 PM. As Table 6 shows, based on the current projections (2025 and 2045), mobility within the project limits in the near future will become unmanageable without substantive improvements. Figure 2 provides a comparison of corridor travel time at the posted speed limit with actual (2019) travel times throughout a typical weekday.

## Table 6: Current and Projected Travel Times on I-35 from US 290 East to US 290 West/SH 71

| | 2019 | | 2025 | | 2045 | |
|---|---|---|---|---|---|---|
| Direction | AM Peak Hour (7:30 AM to 8:30 AM) (mins) | PM Peak Hour (4:30 PM to 5:30 PM) (mins) | AM Peak Hour (7:30 AM to 8:30 AM) (mins) | PM Peak Hour (4:30 PM to 5:30 PM) (mins) | AM Peak Hour (7:30 AM to 8:30 AM) (mins) | PM Peak Hour (4:30 PM to 5:30 PM) (mins) |
| NB | 19.2 | 32.2 | 19.8 | 131.6 | 33.6 | 223.2 |
| SB | 16.6 | 36.6 | 16.4 | 78.3 | 19.5 | 208.6 |

Note: Travel time data for 2019 was obtained from TxDOT, INRIX. Travel time data for 2025 and 2045 were calculated using traffic microsimulation model projections.

## Figure 2: Capital Express Central Existing (2019) Travel Times During a Typical Weekday




Note: Travel time data for 2019 was obtained from TxDOT/INRIX

According to Figure 2, a one-way trip traversing the project area should take approximately 8 minutes, northbound or southbound. Currently, travel within the project limits on a typical weekday takes between approximately 20 minutes in the morning peak period (approximately 6 AM to 9 AM) traveling northbound, and about 17 minutes traveling southbound. In the evening peak period (approximately 1PM to 6PM), the average trip rises to 32 minutes traveling northbound and over 36 minutes traveling southbound. Based on these current estimates, the average commuter's daily round-trip within the project limits can take nearly an hour of time in traffic, more with crashes. The measured current travel times show that the facility has reduced mobility during a majority of the day---not just during the peak

hours of 7:30 AM to 8:30 AM and 4:30 PM to 5:30 PM---demonstrating the need to increase capacity.

### *2.4 Bicycle and Pedestrian Plans*

According to the City of Austin's *Bicycle Master Plan* (City of Austin 2014), updated in 2019, approximately three-quarters of the streets that cross this corridor have been identified as being in the Bicycle Priority Network. Per the Bicycle Plan, the City of Austin will use guidance from the National Association of City Transportation Officials, *Urban Bikeway Design Guideline* for the selection of bicycle accommodations that meet an all ages and abilities level of comfort (NATCO 2014). The existing bicycle paths for most cross streets is either a shared lane or a wide curb lane. There is a need to provide safer and more continuous accommodations for bicyclists and pedestrians. TxDOT will also comply with federal guidelines, including AASHTO's *Guide for the Development of Bicycle Facilities* (AASHTO 2012); *Guide for the Planning, Design, and Operation of Pedestrian Facilities* (AASHTO 2004); and the United States Access Board *Public Rights-of-Way Accessibility Guidelines* (United States Access Board 2011).

## 3. Purpose of the Proposed Project

The purpose of the proposed project is to improve this critical local, regional, national, and international thoroughfare by enhancing safety within the corridor; addressing demand by prioritizing the movement of people, goods, and services through and across the corridor; improving operational efficiency; and creating a more dependable and consistent route for the traveling public including bicyclists, pedestrians, emergency responders, and transit.

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