Additional Project-Specific Liquidated Damages (APSLD) Handbook

November 2019

Construction and Design Divisions

Acknowledgements

This process and the statewide tool were developed through a joint effort of the following TxDOT Districts and Divisions.

Beaumont District	Dallas District	Houston District
Corpus Christi District	San Angelo District	Construction Division
Design Division	Compliance Division	General Counsel Division
Transportation Planning and Programming Division		

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1. Introduction

Process Overview

Implementation of Statutory Requirements

Texas Transportation Code §223.012 and Title 43, Texas Administrative Code (TAC) §9.22 require TxDOT to provide additional disincentives to help ensure the timely completion of projects identified as having a significant impact on the traveling public. To implement the requirements, TxDOT developed criteria for District staff to consider when determining whether a project has a significant impact on the traveling public and a tool to determine the amount of the additional disincentives specific to the individual project, to be included in the contract.

The following are items to consider when evaluating a project for Additional Project-Specific Liquidated Damages (APSLD).

- The District must evaluate every project for APSLD except for Preventative Maintenance (PM) and Non-Freeway Resurfacing or Restoration (2R) projects. APSLD evaluation is optional on PM and 2R projects.
- Projects that already include lane rental fees, A + B bidding, milestones, lane assessment fees, or other incentive / disincentive clauses use Road User Costs (RUC) for determining value of time. The District should ensure any APSLD do not conflict with these other contracting techniques.
- The RUC calculator, Handbook, and the WebEx Training are available on the Design Division's webpage at https://www.txdot.gov/inside-txdot/division/design.html.

Process for Determining Additional Project-Specific Liquidated Damages (APSLDs)

During PS&E development, the project designer or Project Manager (including consultant designers or PMs) will take the following actions.

- Consider the criteria given on Form 2699 (Determination of Additional Project-Specific Liquidated Damages) to determine whether APSLDs are required for the project.
- Determine relevant Annual Average Daily Traffic (AADT) for the project, as outlined in Appendix A.
- Using the RUC Calculator, AADT, and other project-specific data, calculate the amount of APSLDs, as outlined in Chapter 4.
- Enter the calculated APSLD on Form 2699, and file the form with the supporting documentation for the final PS&E submittal.
- Enter the calculated APSLD from Form 2699 into Form 1002, "PS&E Transmittal Data."
- Include the APSLDs under Item 8 of the General Notes, in accordance with Special Provision 000-658. (See Chapter 2 for more information.)

2. Liquidated Damages

Overview

Administrative Liquidated Damages

Administrative Liquidated Damages (LDs) are monetary damages recovered from the contractor to compensate the agency's additional construction oversight costs associated with the contractor's failure to complete the project on time.

For highway improvement contracts that entered the design phase prior to September 1, 2018, in accordance with Special Provision (SP) 000-001, only administrative liquidated damages must be assessed.

000-001

Special Provision to Item 000
Schedule of Liquidated Damages

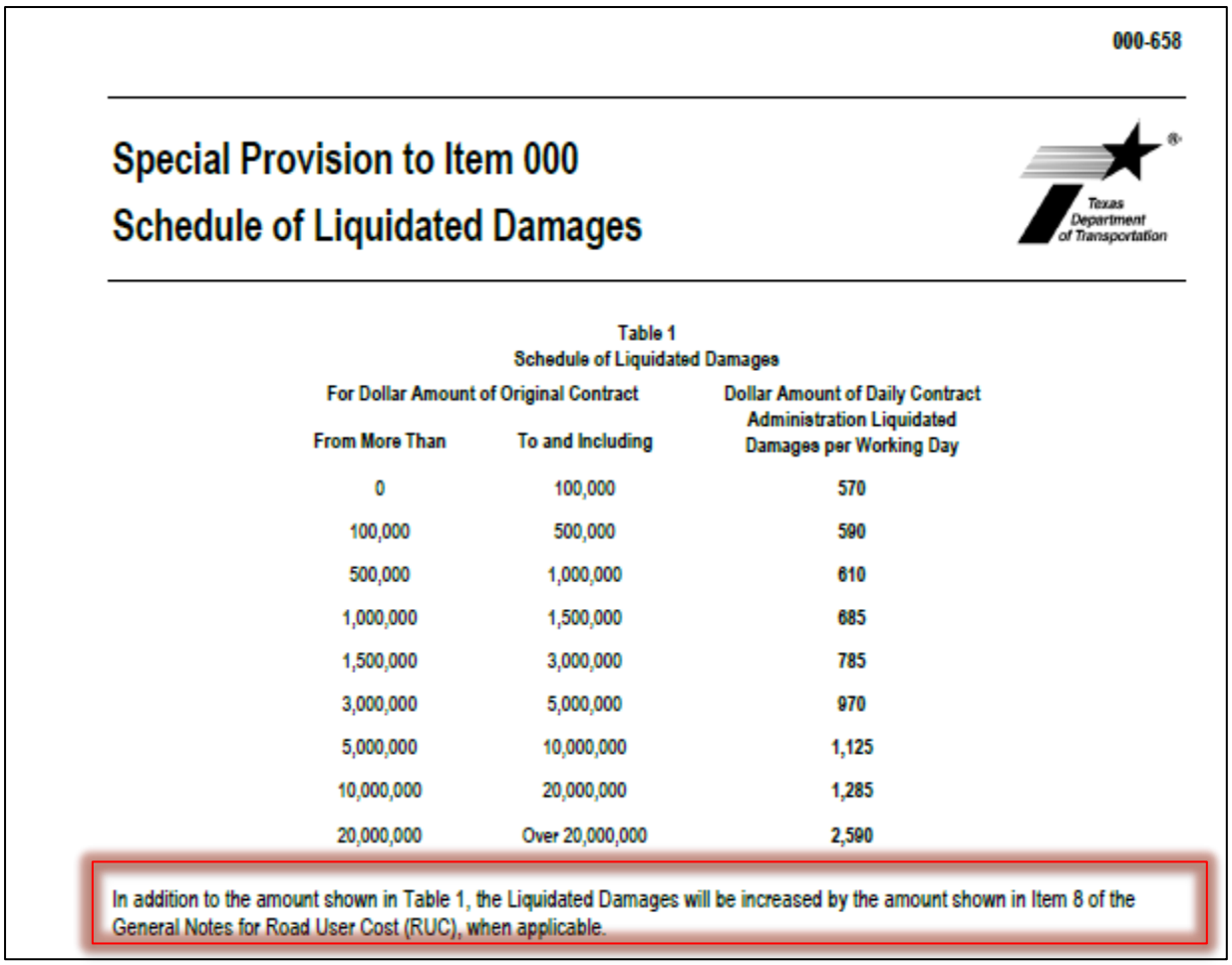
Texas Department of Transportation

Table1
Schedule of Liquidated Damages

For Dollar Amount of Original Contract		Dollar Amount of Daily Contract Administration Liquidated Damages per Working Day
From More Than	To and Including	
0	100,000	570
100,000	500,000	590
500,000	1,000,000	610
1,000,000	1,500,000	685
1,500,000	3,000,000	785
3,000,000	5,000,000	970
5,000,000	10,000,000	1125
10,000,000	20,000,000	1285
20,000,000	Over 20,000,000	2590

Additional Project-Specific Liquidated Damages (APSLDs)

SP 000-658 replaced SP 000-001 for all highway improvement contracts that entered the design phase after September 1, 2018. The schedule of administrative damages remains the same, but SP 000-658 indicates that the increased amount of APSLDs will be shown under Item 8 of the General Notes, when applicable.



000-658

Special Provision to Item 000
Schedule of Liquidated Damages

Table 1
Schedule of Liquidated Damages

For Dollar Amount of Original Contract		Dollar Amount of Daily Contract Administration Liquidated Damages per Working Day
From More Than	To and Including	
0	100,000	570
100,000	500,000	590
500,000	1,000,000	610
1,000,000	1,500,000	685
1,500,000	3,000,000	785
3,000,000	5,000,000	970
5,000,000	10,000,000	1,125
10,000,000	20,000,000	1,285
20,000,000	Over 20,000,000	2,590

In addition to the amount shown in Table 1, the Liquidated Damages will be increased by the amount shown in Item 8 of the General Notes for Road User Cost (RUC), when applicable.

Allocation of Funds Retained as Liquidated Damages

Texas Transportation Code §223.007 requires the Department to track information on LDs, including APSLDs, determine the dollar amount retained by each District, and in addition to other amounts, annually allocate those funds to be used on TxDOT projects in the Districts in which the penalties were assessed.

In order for the Construction Division (CST) to accurately capture these dollar amounts for reporting to the Financial Management Division (FIN), it is essential that Districts set projects up correctly prior to activation in SiteManager.

Reference Appendix B, “SiteManager Project Setup,” for further information.

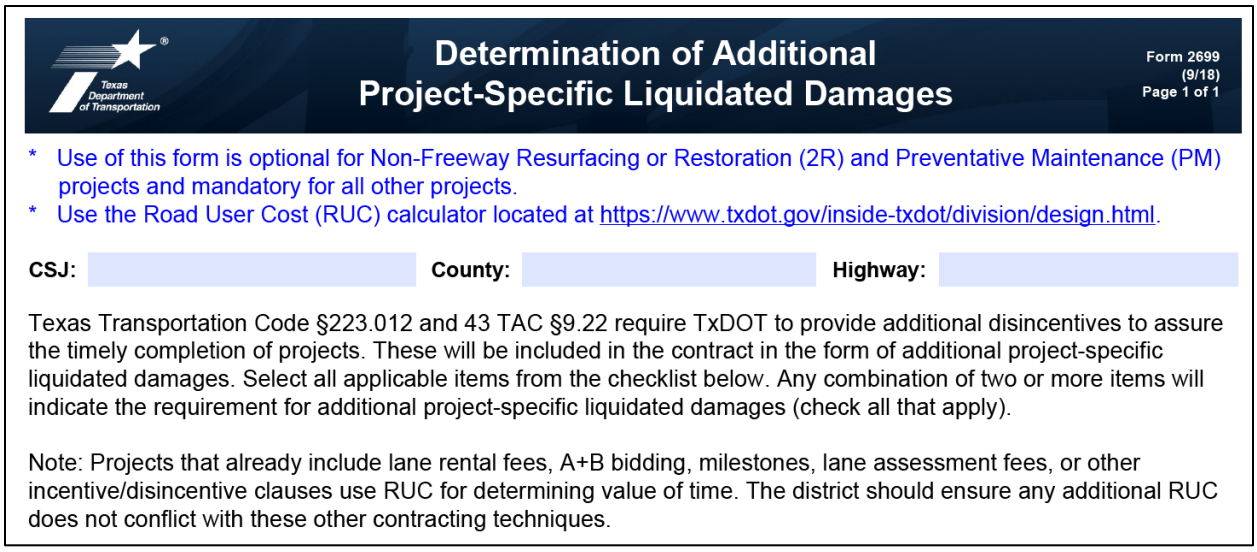
3. Project Selection Criteria (Form 2699)

Form Overview and Explanation of Criteria

Form 2699, "Determination of Additional Project-Specific Liquidated Damages"

Evaluate APSLDs using Form 2699 for every project, except for PM and 2R projects, for which evaluation is optional.

A minimum of 2 applicable criteria selected, from anywhere on the form, will require the project to include APSLDs. For example, if a rural District has one box checked under Statewide criteria and one box checked under Rural criteria, the project would qualify for APSLDs.



Texas Department of Transportation

Determination of Additional Project-Specific Liquidated Damages

Form 2699 (9/18) Page 1 of 1

* Use of this form is optional for Non-Freeway Resurfacing or Restoration (2R) and Preventative Maintenance (PM) projects and mandatory for all other projects.
* Use the Road User Cost (RUC) calculator located at https://www.txdot.gov/inside-txdot/division/design.html.

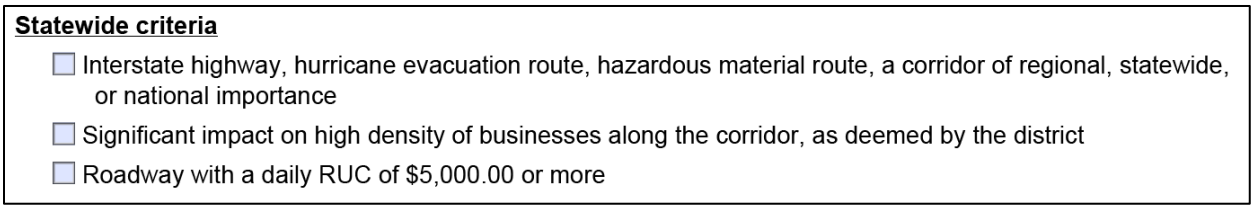
CSJ: **County:** **Highway:**

Texas Transportation Code §223.012 and 43 TAC §9.22 require TxDOT to provide additional disincentives to assure the timely completion of projects. These will be included in the contract in the form of additional project-specific liquidated damages. Select all applicable items from the checklist below. Any combination of two or more items will indicate the requirement for additional project-specific liquidated damages (check all that apply).

Note: Projects that already include lane rental fees, A+B bidding, milestones, lane assessment fees, or other incentive/disincentive clauses use RUC for determining value of time. The district should ensure any additional RUC does not conflict with these other contracting techniques.

Statewide Criteria

Statewide criteria apply to all TxDOT Districts (Rural, Urban, and Metro).



Statewide criteria

- ☐ Interstate highway, hurricane evacuation route, hazardous material route, a corridor of regional, statewide, or national importance
- ☐ Significant impact on high density of businesses along the corridor, as deemed by the district
- ☐ Roadway with a daily RUC of $5,000.00 or more

Rural District Criteria

TxDOT classifies the following Districts as rural: Abilene, Amarillo, Atlanta, Brownwood, Childress, Lufkin, Odessa, Paris, San Angelo, Wichita Falls, and Yoakum.

In addition to the Statewide criteria, rural Districts should select applicable criteria from the rural list.

Rural district criteria

- ☐ Project on roadway with a minimum 25% truck traffic
- ☐ Project that reconstructs the primary thoroughfare in a community
- ☐ Project with signed detour which adds travel time and/or distance

Urban District Criteria

TxDOT classifies the following Districts as urban: Beaumont, Bryan, Corpus Christi, El Paso, Lubbock, Laredo, Pharr, Tayler, and Waco.

Urban district criteria

- ☐ Construction phasing decreases lane capacity on major corridor
- ☐ Ramp closure and/or detour
- ☐ Eliminating or decreasing turn movement

In addition to the Statewide Criteria, urban Districts should select applicable criteria from the urban list.

Metro District Criteria

TxDOT classifies the following Districts as metro: Austin, Dallas, Fort Worth, Houston, and San Antonio. In addition to the Statewide Criteria, metro Districts should select applicable criteria from the metro list.

Metro district criteria

- ☐ Lane and/or ramp closure
- ☐ Reduction in posted speed during the construction phase
- ☐ Project that involves reduction in lane width or shoulder reduction

District Engineer Criteria

The District Engineer (DE) has the discretion to designate a project as having a significant impact to the traveling public even if the project does not meet the above criteria. For example, the DE may elect to apply APSPLDs to projects that affect schools or hospitals, affect the response times of emergency vehicles, or result in added travel time for the traveling public on or around a major national or state holiday.

The DE also has the discretion to exempt a project that has otherwise been deemed to qualify for APSLDs.

In either case, the DE must document the reasoning on Form 2699.

If a project is not deemed to have a significant impact to the traveling public by the above criteria, a District Engineer may deem the project as needing additional project-specific liquidated damages by checking the box below and specifying the reason.

☐ Roadway deemed to need additional project-specific liquidated damages by the District Engineer (please specify):

Document APSLD Determination

At the bottom of Form 2699, indicate whether, through any combination of criteria, the project qualifies for APSLDs, and document the cost per day as calculated as described in the following chapter.

Additional Liquidated Damages: ☐ No ☐ Yes $ _____ per day

4. Road User Cost (RUC) Estimation Tool

Traffic Data

Overview of Traffic Data and Sources

The following overview contains the same information that is provided in the "Traffic_Data" tab of the RUC Calculator (Excel document). It is provided here as a brief summary. For a comprehensive overview of traffic data considerations and detailed instructions for obtaining traffic data, please refer to Appendix A - Obtaining Traffic Data for RUC Calculations.

When performing a Road User Cost (RUC) calculation, an Average Daily Traffic (ADT) input is required. The Transportation Planning and Programming Division (TPP) recommends using Annual Average Daily Traffic (AADT) data for the ADT input, as this represents the certified and annualized traffic data. TPP recommends obtaining AADT from the Statewide Planning Map or STARS II system.

The Statewide Planning Map is an easy-to-use resource for obtaining bi-directional (two-way) traffic data, as well as traffic data for frontage roads. It would therefore be sufficient for performing Road User Cost (RUC) calculations where directionality is not a requirement. Projects that require traffic data for a single direction could instead utilize the STARS II system. Sources of AADT data other than the Statewide Planning Map or STARS II could have other considerations or limitations that may not be suitable for RUC calculations.

In some cases, AADT from the Statewide Planning Map or STARS II may prove to be insufficient for RUC calculations. If traffic modeling or simulations are deemed necessary, users should contact personnel within their relevant District or Division. If no internal personnel are available, consult with the relevant District about using a consultant to produce traffic models and simulations.

Comparing Traffic Data Sources

A quick comparison of the two primary traffic data sources is noted in Table 1.

- ***Statewide Planning Map*** – Presents traffic data in a linear format. Appropriate for use where directionality on the main lanes is not a consideration. Examples: A segment of a highway where the work zone involves traffic in both directions, or a work zone that only involves a frontage roadbed.

- ***STARS II*** – Presents traffic data in a point format. Appropriate for use where directionality is needed on the main lanes or where data is needed for specific traffic stations. Examples: A segment of a highway where the work zone only involves the southbound roadbed, or a work zone at an intersection where individual traffic stations need to be identified.

- ***Traffic Modeling*** from District staff or a consultant – Appropriate when the Statewide Planning Map or STARS II is not sufficient to determine the traffic data within the work zone limits. Example: A

complex interchange of two highways in a metro area. Numerous connectors and ramps make a simple analysis impossible.

Table 1: Comparison of Two Primary Data Sources

	Statewide Planning Map	STARS II
Traffic Data in Linear Format (Traffic Counts Applied to Linework Segments	**YES**	NO
Traffic Data in Point Format (Displays Each Traffic Station Location)	NO	**YES**
Bi-Directional Traffic Data for Mainlanes	**YES**	**YES**
Direction-Specific Traffic Data Available for *Some* Mainlanes	NO	**YES**
Direction-Specific Traffic Data Available for *All* Mainlanes	NO	NO
Roadbed-Specific Traffic Data for Frontage	**YES**	**YES**
Traffic Data for Supplemental Mainlanes or Supplemental Frontage	NO	**YES**
Traffic Data for Ramps and Connectors	NO	**YES**
Advanced Traffic Modeling, Analysis of Turning Movements, etc.	NO	NO

Overview of Statewide Planning Map

The Statewide Planning Map is available online. The "AADT" overlay on the Statewide Planning Map is not recommended for the purpose of RUC calculation because it combines mainlanes and frontage AADT into a single value. Furthermore, data are presented in point format (based on traffic stations), and additional analysis is required to determine the correct AADT value between any two given points.

The Roadway Inventory – On-System Roadbeds overlay is recommended for the purpose of RUC calculation instead of the AADT overlay. The certified annual Roadway Inventory file is the source of data for this overlay.

Using the Roadway Inventory – On-System Roadbeds Overlay

Traffic data are presented in a linear format (coded to TxDOT linework). With the Roadway Inventory – On-System Roadbeds overlay selected, any On-System roadbed can be selected in the map. The resulting pop-up displays multiple Roadway Inventory data items for the extent of the highlighted linework segment. These include the necessary AADT figure (the most current year available) and Truck Percent.

AADT is combined across mainlanes (bi-directional). Selecting the right or left roadbed of a divided highway will display the total AADT for both directions on the mainlanes. If AADT is needed for a single direction only, an analysis of traffic data in the STARS II system will be necessary. Please see the next section, "STARS II Overview and Traffic Data Support."

Right and left frontage roads have unique AADT values in the Roadway Inventory – On-System Roadbeds overlay and can be evaluated separately from the mainlanes, if relevant to a construction project.

To calculate the AADT of trucks only, multiply AADT by the Truck Percent for a given segment. The resulting Truck AADT can be subtracted from the total AADT to derive the Car AADT as required for the RUC calculation.

NOTE: A construction project may include multiple Roadway Inventory segments within its limits. If there are multiple AADT values to consider within the project limits, professional judgement will be necessary to determine the most appropriate value. One option is to use the predominant AADT value, based on length, within the project limits. If there is no clear predominant value, a simple approach is to use the highest AADT value within the project limits. There may also be instances in which an average, weighted by segment length, could be considered; however, due to the complexities associated with the overlap of Roadway Inventory traffic segments, multiple AADT assignments, and project-specific limits, a weighted average method might be more challenging to use.

STARS II Overview and Traffic Data Support

The STARS II system is necessary for obtaining directional traffic data. This is because the Statewide Planning Map only represents bi-directional (two-way) traffic data on the mainlanes.

STARS II is available at the following URL: txdot.ms2soft.com/tcds. (URL may require manual entry; bookmark for ease of access.)

Traffic data are presented in a point format (based upon traffic stations). Using the STARS II system and correctly interpreting traffic data requires training beyond the scope of this overview; however, STARS II training and support are available. Please contact the TPP Traffic Analysis Section, System Support Data Liaison at TPP_RUCLD.AADT@txdot.gov.

As stated earlier, TPP recommends using the certified annual AADT figures for RUC calculations. Other volume data available within STARS II may not reflect the certified and published AADT figures. Seasonal factors in STARS II are specifically applied to annualize short-term counts, and time factors do not exist in STARS II; therefore, neither is recommended for the purpose of RUC calculations.

Reduced Speed Overview

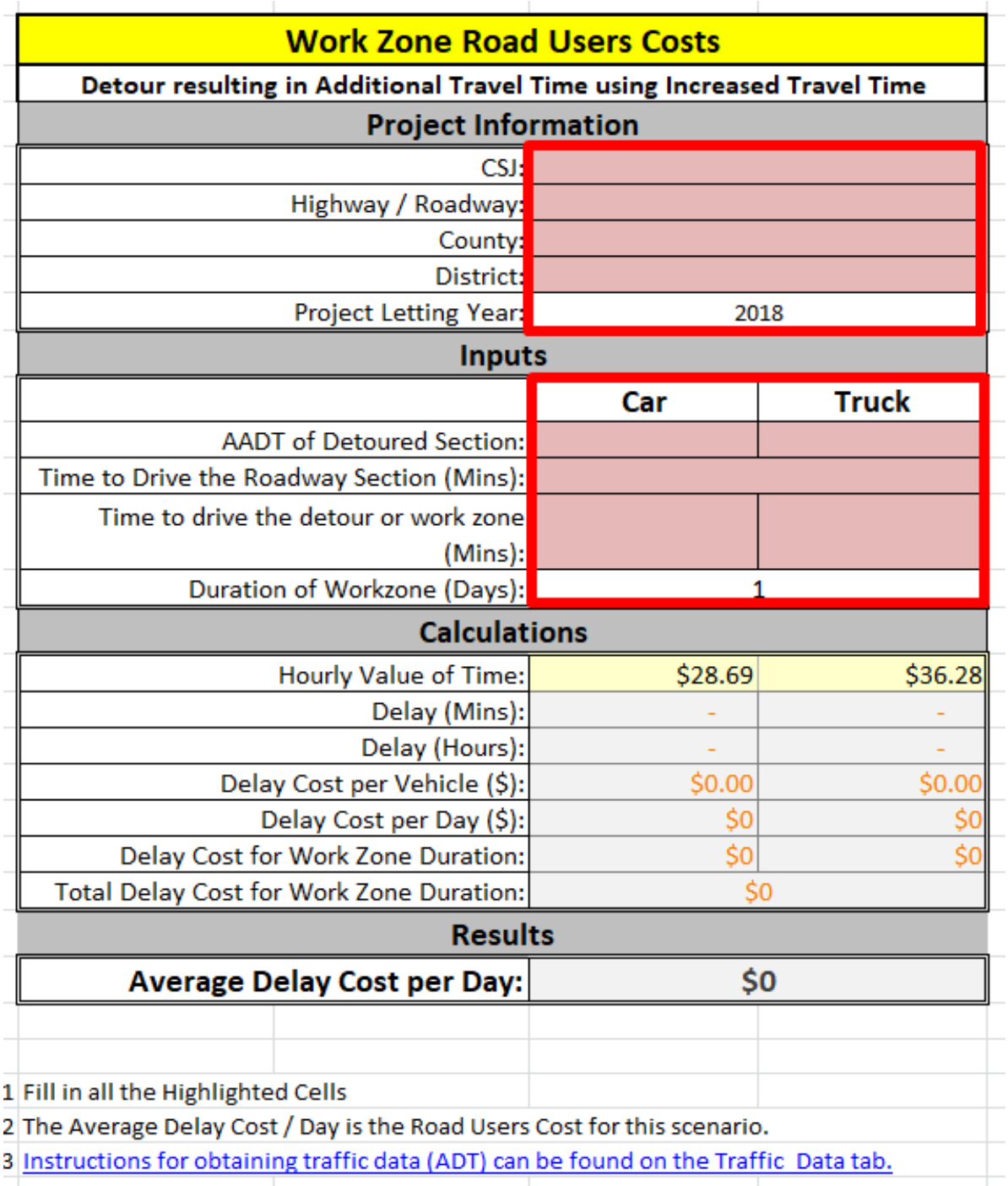
To calculate the Road User Cost for projects that require a reduction in speed, fill out all cells under the Project Information and Inputs headings. Hourly Values of Time will be automatically generated from the VOT tab. The Department will update these values annually.

Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:		
Highway / Roadway:		
County:		
District:		
Project Letting Year:	2018	
Inputs		
	Car	**Truck**
AADT of Section:		
Length of the Work Zone (Miles):		
Original Posted Speed (MPH):	65	65
Work Zone Speed (MPH):	65	65
Duration of Workzone (Days):	1	
Calculations		
Hourly Value of Time:	$28.69	$36.28
Travel Time Posted Speed (Secs):	-	-
Travel Time Work Zone Speed (Secs):	-	-
Additional Travel Time (Secs):	-	-
Additional Travel Time (Hours):	-	-
Delay Cost per Vehicle:	$0.00	$0.00
Delay Cost per Day:	$0	$0
Delay Cost for Work Zone Duration:	$0	$0
Total Delay Cost for Work Zone Duration:	$0	
Results		
Average Delay Cost per Day:	**$0**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost / Day is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Increased Travel Time Overview

To calculate the Road User Cost for projects that require an increase in travel time, fill out all cells under the Project Information and Inputs headings. Hourly Values of Time will be automatically generated from the VOT tab. The Department will update these values annually.



Work Zone Road Users Costs		
Detour resulting in Additional Travel Time using Increased Travel Time		
Project Information		
CSJ:		
Highway / Roadway:		
County:		
District:		
Project Letting Year:	2018	
Inputs		
	Car	**Truck**
AADT of Detoured Section:		
Time to Drive the Roadway Section (Mins):		
Time to drive the detour or work zone (Mins):		
Duration of Workzone (Days):	1	
Calculations		
Hourly Value of Time:	$28.69	$36.28
Delay (Mins):	-	-
Delay (Hours):	-	-
Delay Cost per Vehicle ($):	$0.00	$0.00
Delay Cost per Day ($):	$0	$0
Delay Cost for Work Zone Duration:	$0	$0
Total Delay Cost for Work Zone Duration:	$0	
Results		
Average Delay Cost per Day:	**$0**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost / Day is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Detour Distance Overview

To calculate the Road User Cost for projects that contain a detour, fill out all cells under the Project Information and Inputs headings. Hourly Values of Time will be automatically generated from the VOT tab. The Department will update these values annually.

Work Zone Road Users Costs		
Detour resulting in Additional Distance and Different Speed		
Project Information		
CSJ:		
Highway / Roadway:		
County:		
District:		
Project Letting Year:	2018	
Inputs		
	Car	**Truck**
AADT of Detoured Section:		
Length of the normal route (Miles):	1	1
Length of the detour route (Miles):	1	1
Posted speed on normal route (MPH):	60	60
Posted speed on detour route (MPH):	60	60
Duration of Workzone (Days):	1	
Calculations		
Hourly Value of Time:	$28.69	$36.28
Travel time along normal route (Secs):	60.00	60.00
Travel time along detour route (Secs):	60.0	60.0
Delay (Secs):	-	-
Delay (Hours):	-	-
Delay Cost per vehicle ($):	-	-
Delay Cost per Day ($):	$0	$0
Delay Cost for Work Zone Duration:	$0	$0
Total Delay Cost for Work Zone Duration:	$0	
Vehicle Operating Costs ($/miles):	$0.58	$1.04
Additional Miles from detour (Veh-Miles):	-	-
Additional Vehicle Operating Costs ($):	$0	$0
Additional Vehicle Operating Costs ($):	$0	
Results		
Average Road Users Cost per Day ($):	**$0**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost / Day is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Example 1 – Rural Scenario/Reduced Speed

Asphaltic Concrete Overlay with Work Zone Speed Reduction

CSJ: 0069-07-105
Roadway: US 87
County: Tom Green
District: San Angelo
Type of Work: Construction of asphalt concrete pavement (ACP) overlay and safety improvements consisting of metal beam guard fence, bridge railing, and safety end treatments.

Description of General Project Scope

This project is primarily for the removal and replacement (mill and fill) of the ACP surface of US 87 northwest of San Angelo. Additional items of work include the removal and replacement of the existing metal beam guard fence, bridge railing, and culvert safety end treatments. The existing roadway consists of a four-lane divided section throughout the project.

General Impacts during Construction

The construction work is performed in two major phases: milling and paving the northbound roadbed and milling and paving the southbound roadbed. The metal beam guard fence, bridge railing, and safety end treatment work items are typically performed outside of the milling and paving operations. During construction one lane remains open in each direction, and temporary paving is provided to smooth out transitions. The current speed limit is 75 mph, and a 65 mph regulatory work zone speed limit as approved by Transportation Minute Order will be implemented during construction.

Traffic Data

The 2016 AADT for this section of road is 12,531 cars and 1,270 trucks.

Construction Year and AADT Year

The AADT data is for the year 2016, and the construction work and traffic-impacting speed reduction will occur during 2017 and 2018. The traffic modeler inflated the 2016 AADT of 12,531 cars and 1,270 trucks to 12,907 cars and 1,308 trucks using a 3% annual growth factor; this requires additional expertise, therefore is considered an optional step.

Work Zone RUC Estimation

The traffic modeler assessed the impacts on travel time (increased) from the reduction in speed (75 mph to 65 mph), assuming that the work zone speed limit would be in place the entire duration of construction.

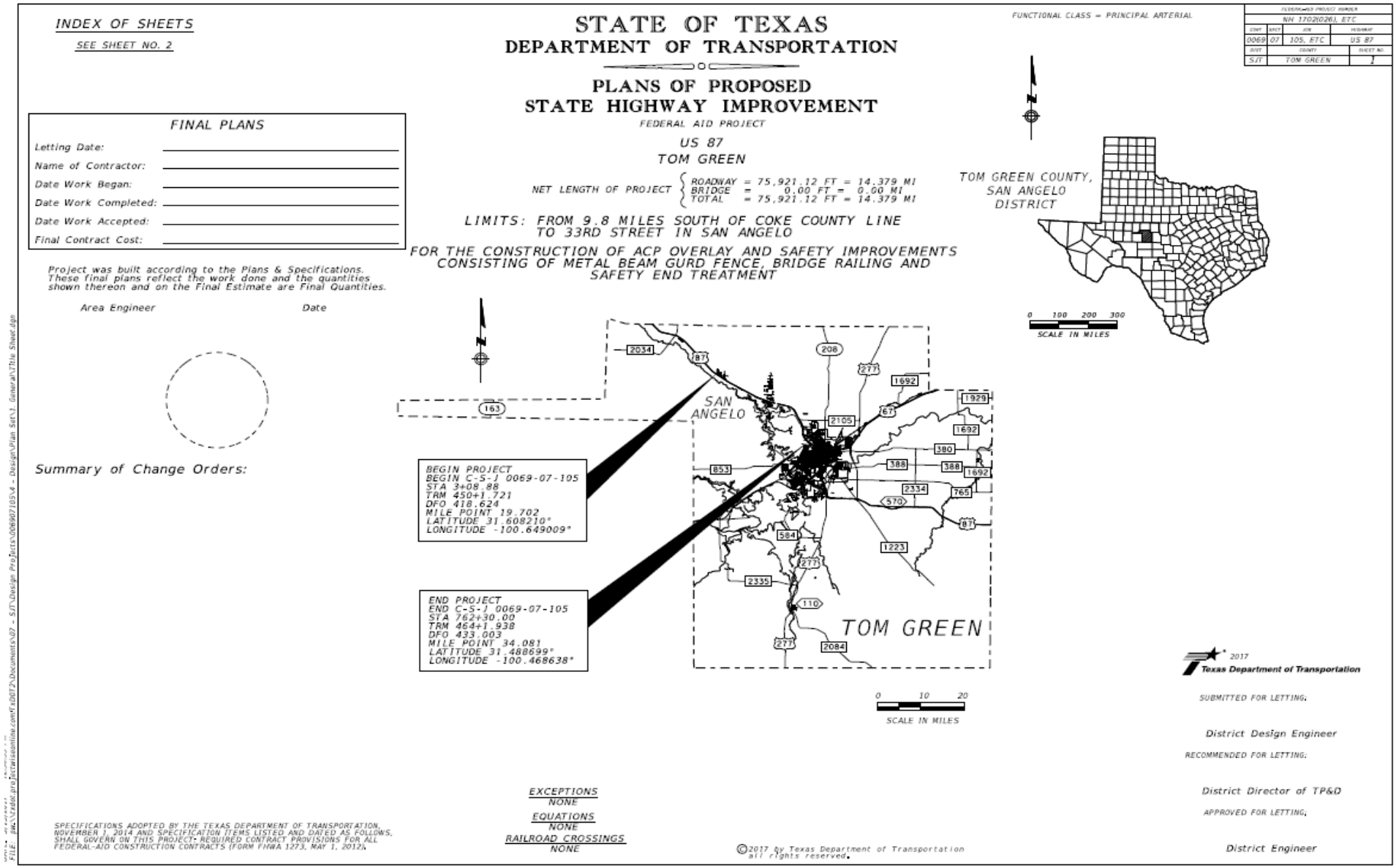


Figure 1.1. Project Title Sheet (US 87, Tom Green County)

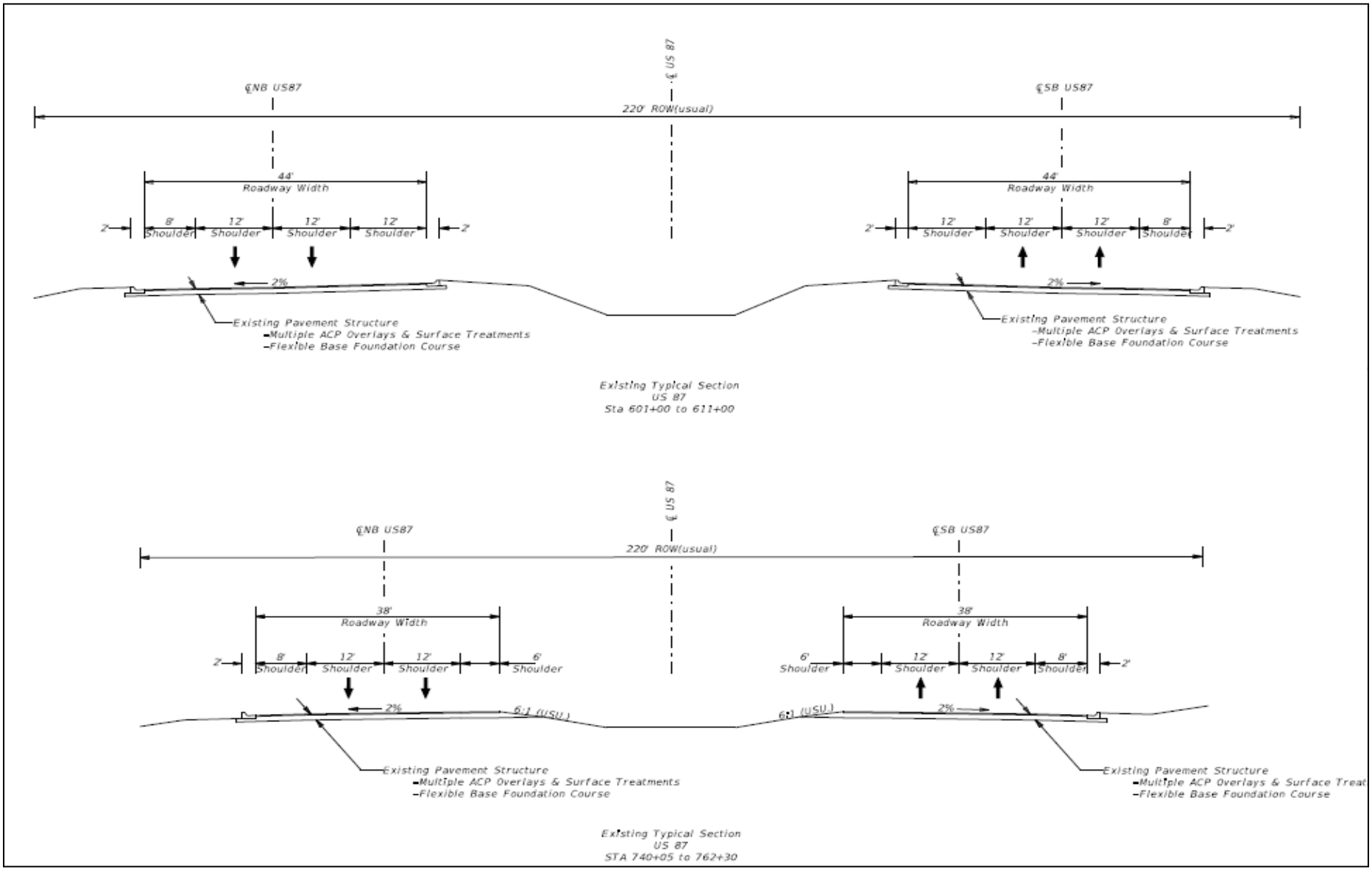


Figure 1.2. Existing Typical Sections (US 87, Tom Green County)

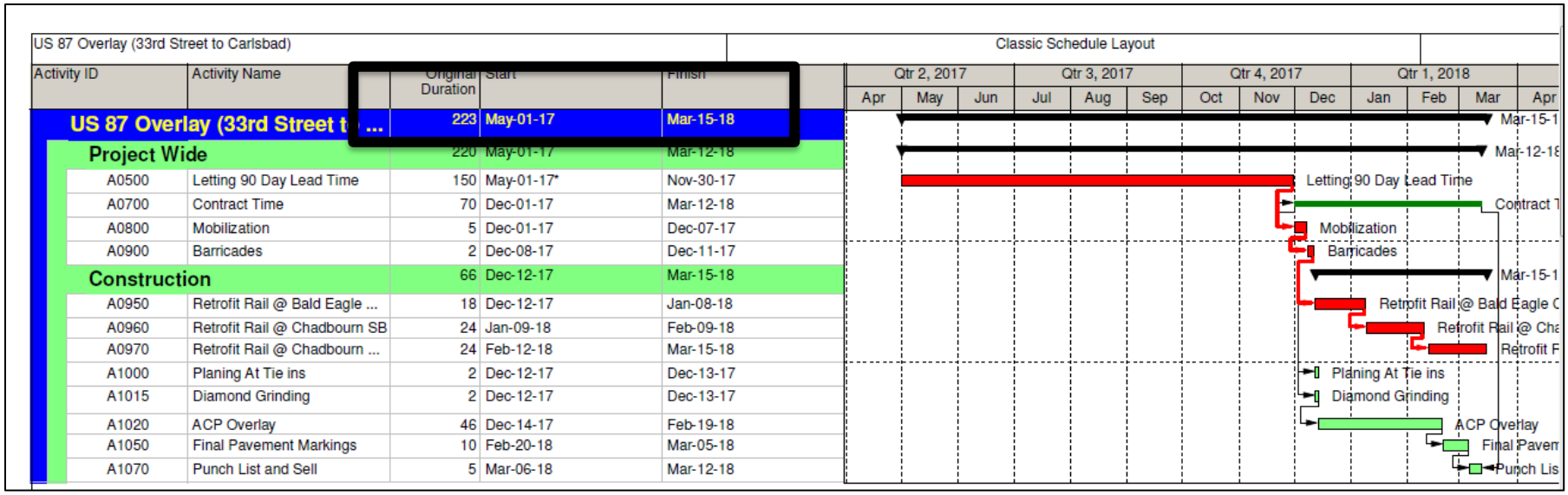
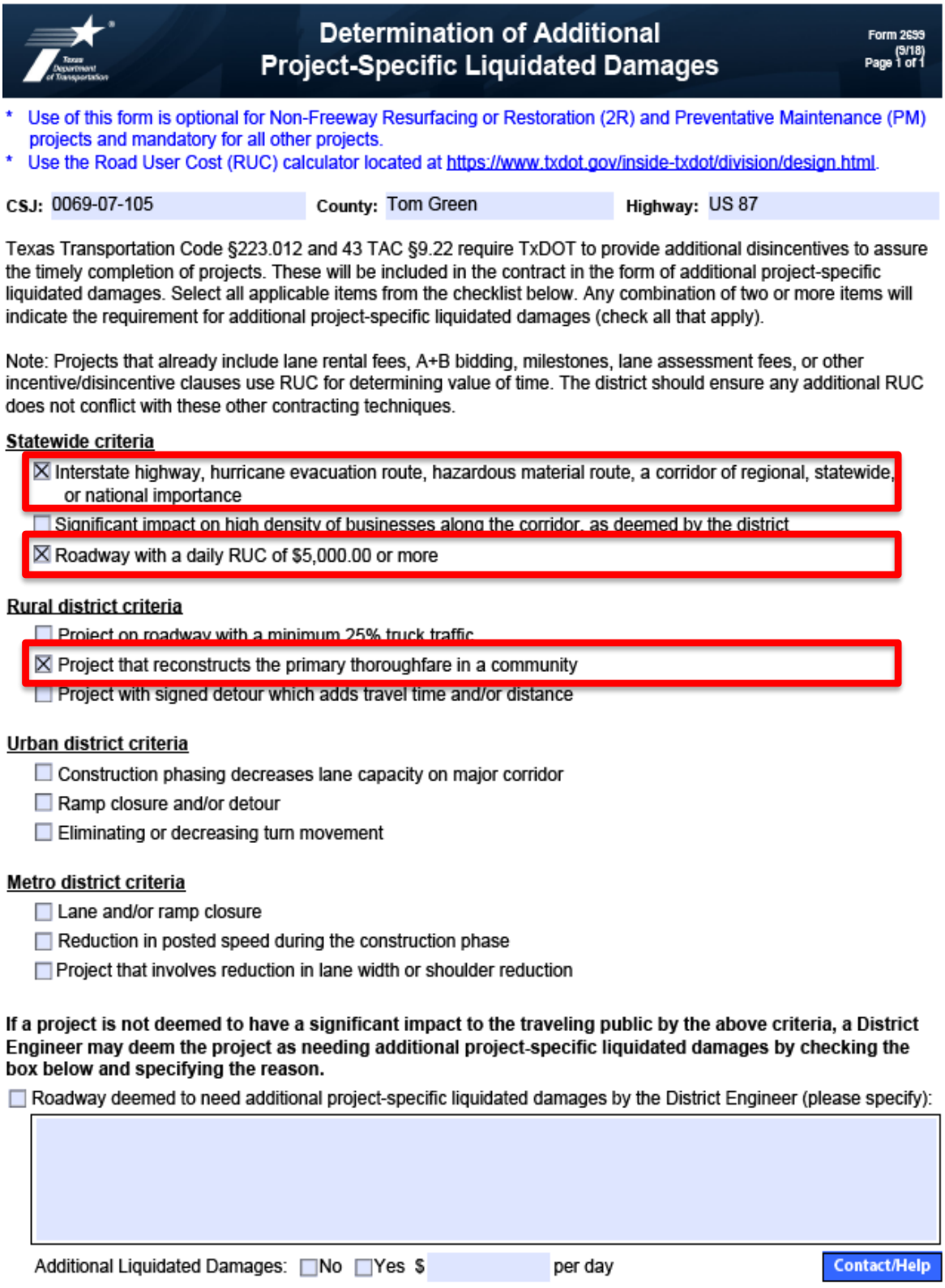


Figure 1.3. Project Schedule (US 87, Tom Green County)



Determination of Additional Project-Specific Liquidated Damages

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* Use of this form is optional for Non-Freeway Resurfacing or Restoration (2R) and Preventative Maintenance (PM) projects and mandatory for all other projects.
* Use the Road User Cost (RUC) calculator located at https://www.txdot.gov/inside-txdot/division/design.html.

CSJ: 0069-07-105 **County:** Tom Green **Highway:** US 87

Texas Transportation Code §223.012 and 43 TAC §9.22 require TxDOT to provide additional disincentives to assure the timely completion of projects. These will be included in the contract in the form of additional project-specific liquidated damages. Select all applicable items from the checklist below. Any combination of two or more items will indicate the requirement for additional project-specific liquidated damages (check all that apply).

Note: Projects that already include lane rental fees, A+B bidding, milestones, lane assessment fees, or other incentive/disincentive clauses use RUC for determining value of time. The district should ensure any additional RUC does not conflict with these other contracting techniques.

Statewide criteria

- ☒ Interstate highway, hurricane evacuation route, hazardous material route, a corridor of regional, statewide, or national importance
- ☐ Significant impact on high density of businesses along the corridor, as deemed by the district
- ☒ Roadway with a daily RUC of $5,000.00 or more

Rural district criteria

- ☐ Project on roadway with a minimum 25% truck traffic
- ☒ Project that reconstructs the primary thoroughfare in a community
- ☐ Project with signed detour which adds travel time and/or distance

Urban district criteria

- ☐ Construction phasing decreases lane capacity on major corridor
- ☐ Ramp closure and/or detour
- ☐ Eliminating or decreasing turn movement

Metro district criteria

- ☐ Lane and/or ramp closure
- ☐ Reduction in posted speed during the construction phase
- ☐ Project that involves reduction in lane width or shoulder reduction

If a project is not deemed to have a significant impact to the traveling public by the above criteria, a District Engineer may deem the project as needing additional project-specific liquidated damages by checking the box below and specifying the reason.

☐ Roadway deemed to need additional project-specific liquidated damages by the District Engineer (please specify):

Additional Liquidated Damages: ☐ No ☐ Yes $ _____ per day

Contact/Help

Figure 1.4. Form 2699 (US 87, Tom Green County)

Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0069-07-105	
Highway / Roadway:	US 87	
County:	Tom Green	
District:	SJT	
Project Letting Year:	2018	
Inputs		
	Car	**Truck**
AADT of Section:	12907	1308
Length of the Work Zone (Miles):	14.379	
Original Posted Speed (MPH):	75	75
Work Zone Speed (MPH):	65	65
Duration of Work Zone (Days):	223	
Calculations		
Hourly Value of Time:	$28.69	$36.28
Travel Time Posted Speed (Secs):	690.19	690.19
Travel Time Work Zone Speed (Secs):	796.38	796.38
Additional Travel Time (Secs):	106.18	106.18
Additional Travel Time (Hours):	0.029	0.029
Delay Cost per Vehicle:	$0.85	$1.07
Delay Cost per Day:	$10,922	$1,400
Delay Cost for Work Zone Duration:	$2,435,649	$312,129
Total Delay Cost for Work Zone Duration:	$2,747,778	
Results		
Average Delay Cost per Day:	**$12,322**	
Fill in all the Highlighted Cells		
The Average Delay Cost / Day is the Road Users Cost for this scenario.		
Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.		

Figure 1.5. Reduced Speed Scenario – Additional Travel Time

Complete the bottom section of Form 2699.

Additional Liquidated Damages: ☐ No ☒ Yes $ 12,322 per day

Example 2 – Urban Scenario/Reduced Speed

Ramp Reversal

CSJ: 0617-01-170, etc.
Roadway: SH 358
County: Nueces
District: Corpus Christi
Type of Work: Construction of: grading, paving, drainage, bridges, retaining walls, landscaping, traffic control, SW3P, signals, ITS, signing, illumination, barrier, and pavement markings.

Description of General Project Scope

This project is for reversing the ramps on eastbound SH 358 from Ayers Street to Nile Drive.

General Impacts during Construction

The construction work is performed in ten phases, and each phase is divided into different work units (WU). This project has eight different conditions that will warrant incentive credits and disincentive penalties.

This example will analyze condition number one, which is constructed in phase 3 (WU 15); this phase consists of constructing the Kostoryz bridge widening and adjacent retaining walls, and main lane rehab and widening. The current posted speed for the main lanes is 60 mph, and the work zone speed will be 55 mph.

Traffic Data

The STARS II system was used to obtain directional traffic data. The 2017 AADT for this section of SH 358 is 156,736 (66,441 traveling eastbound) with 3% trucks.

Construction Year and AADT Year

The AADT data is for the year 2017, and the construction work and traffic impacting closures will occur during 2018 and beyond. The traffic modeler inflated the 2017 AADT of 66,441 to 68,334 using a 3% annual growth factor; this requires additional expertise, therefore is considered an optional step.

Work Zone RUC Estimation

The traffic modeler assessed the impacts on travel time (increased) from the reduction in speed (Advisory Speed) for Phase 3 (WU 15).

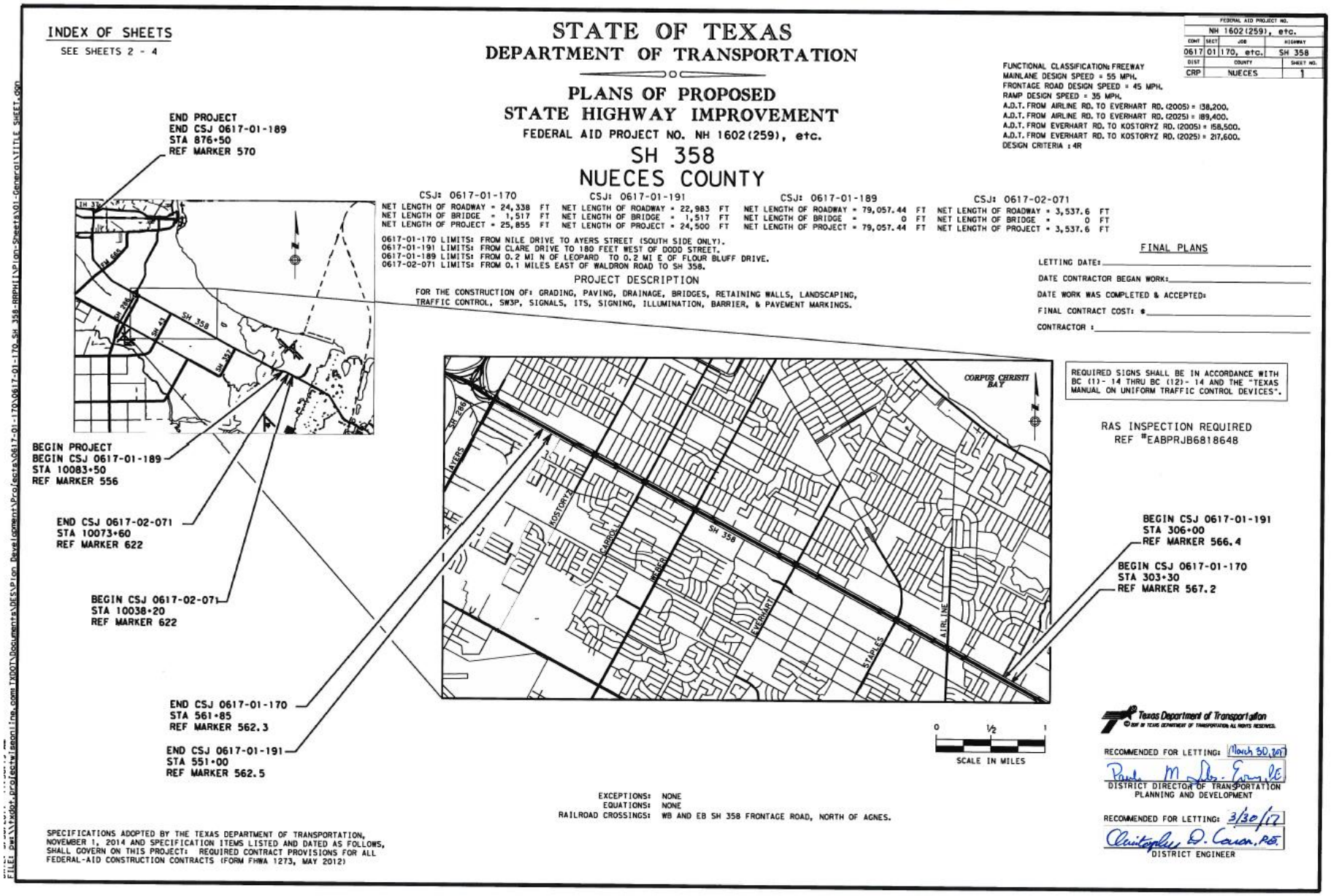


Figure 2.1. Project Title Sheet (SH 358, Nueces County)

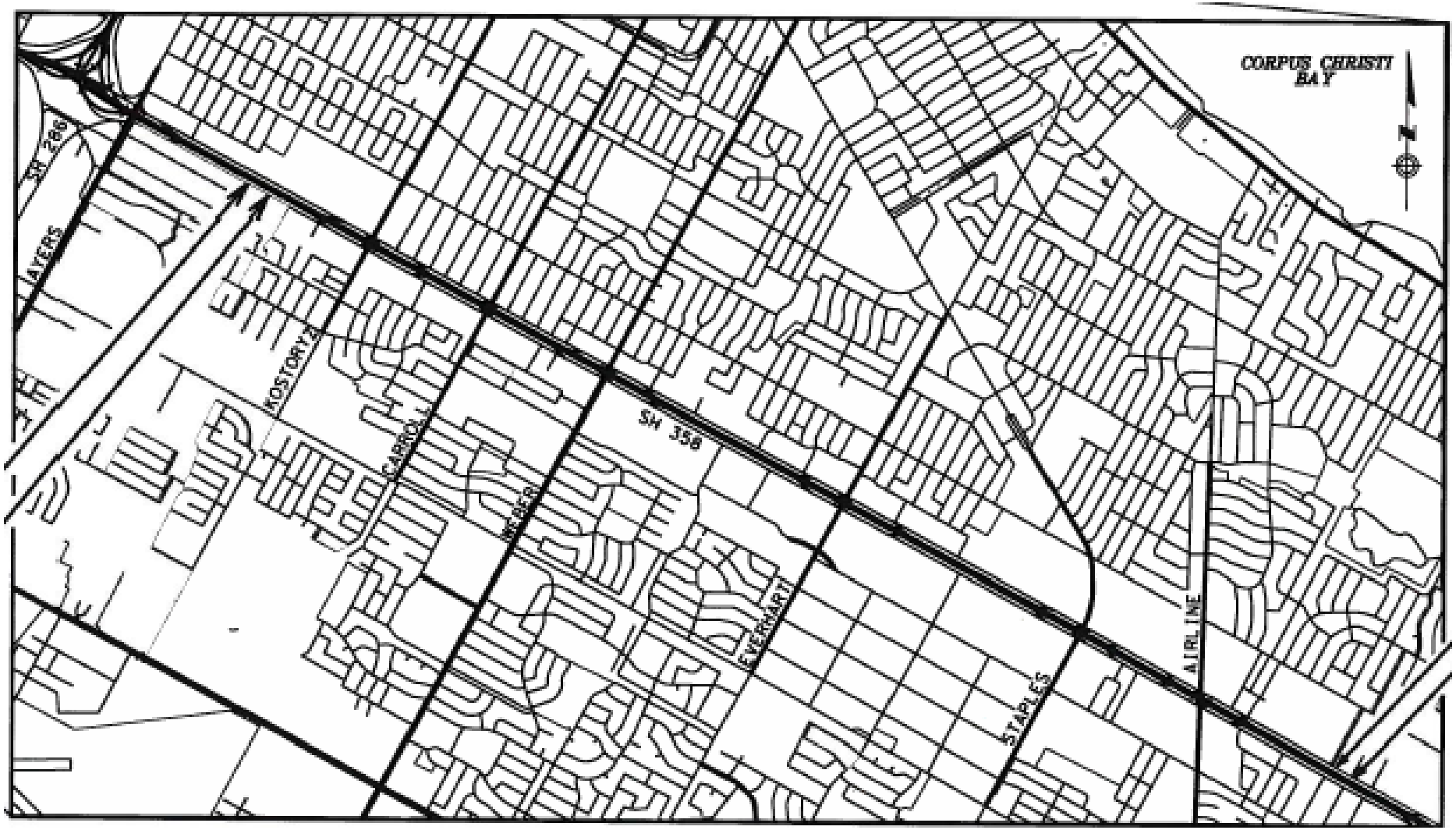


Figure 2.2. Project Title Sheet (SH 358, Nueces County)

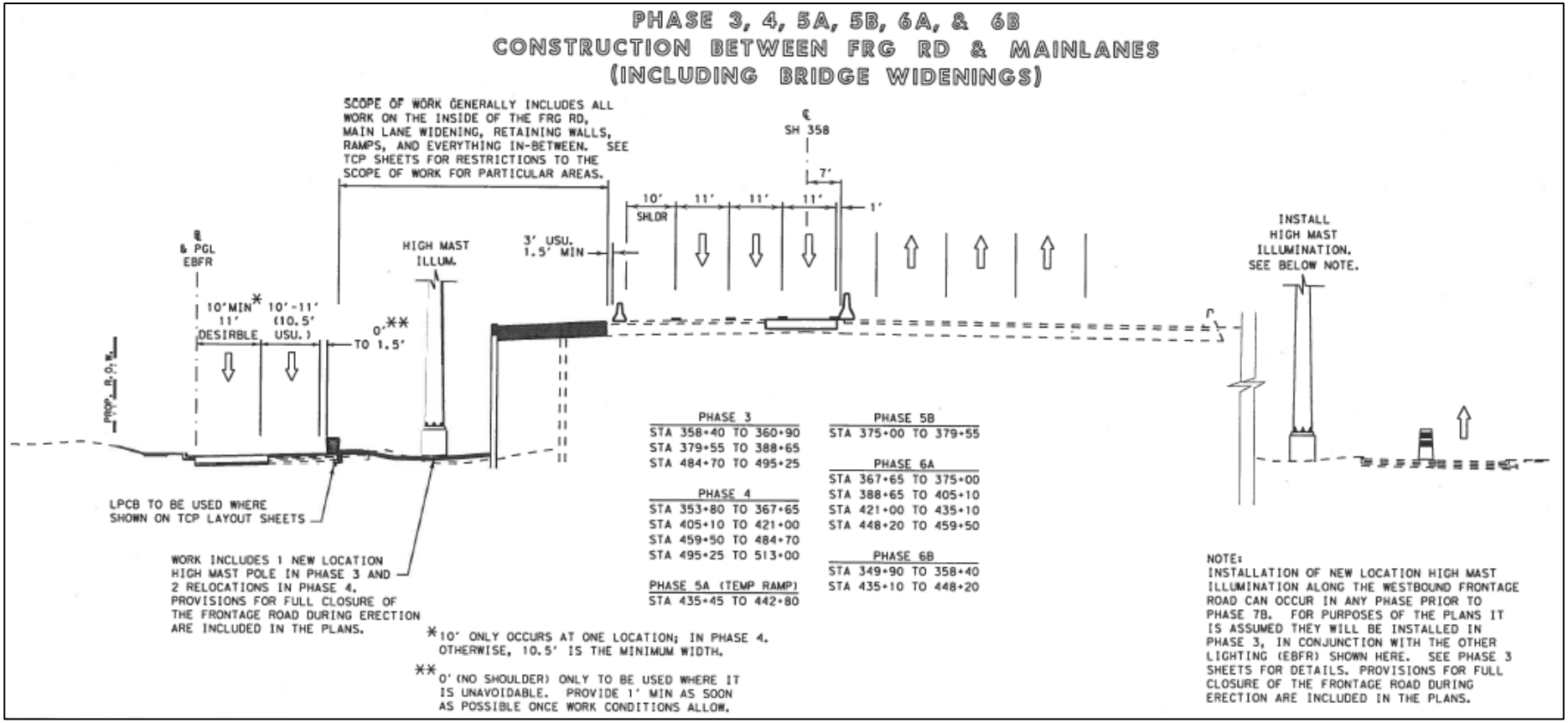


Figure 2.3. Phase Profile (SH 358, Nueces County)

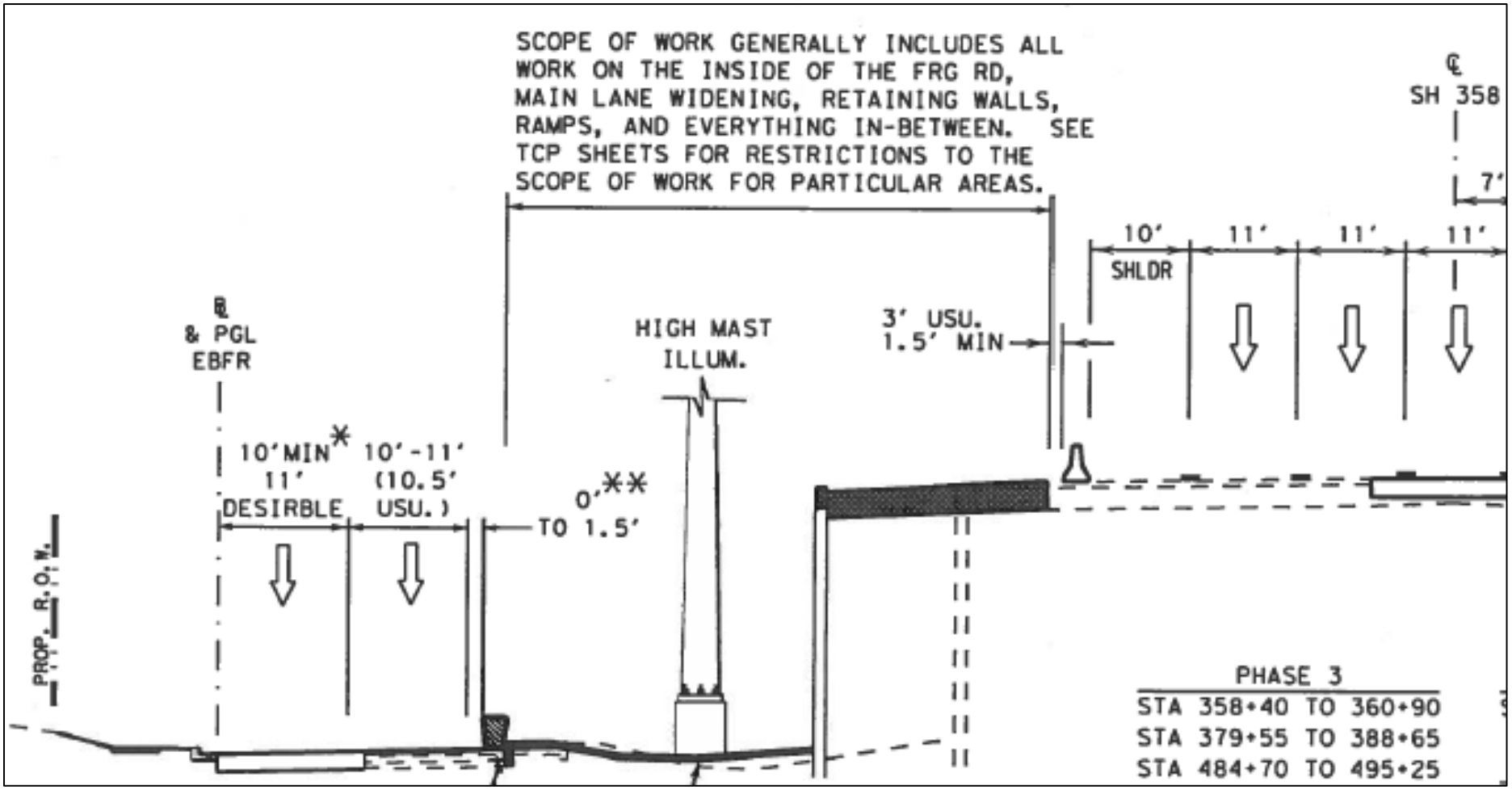
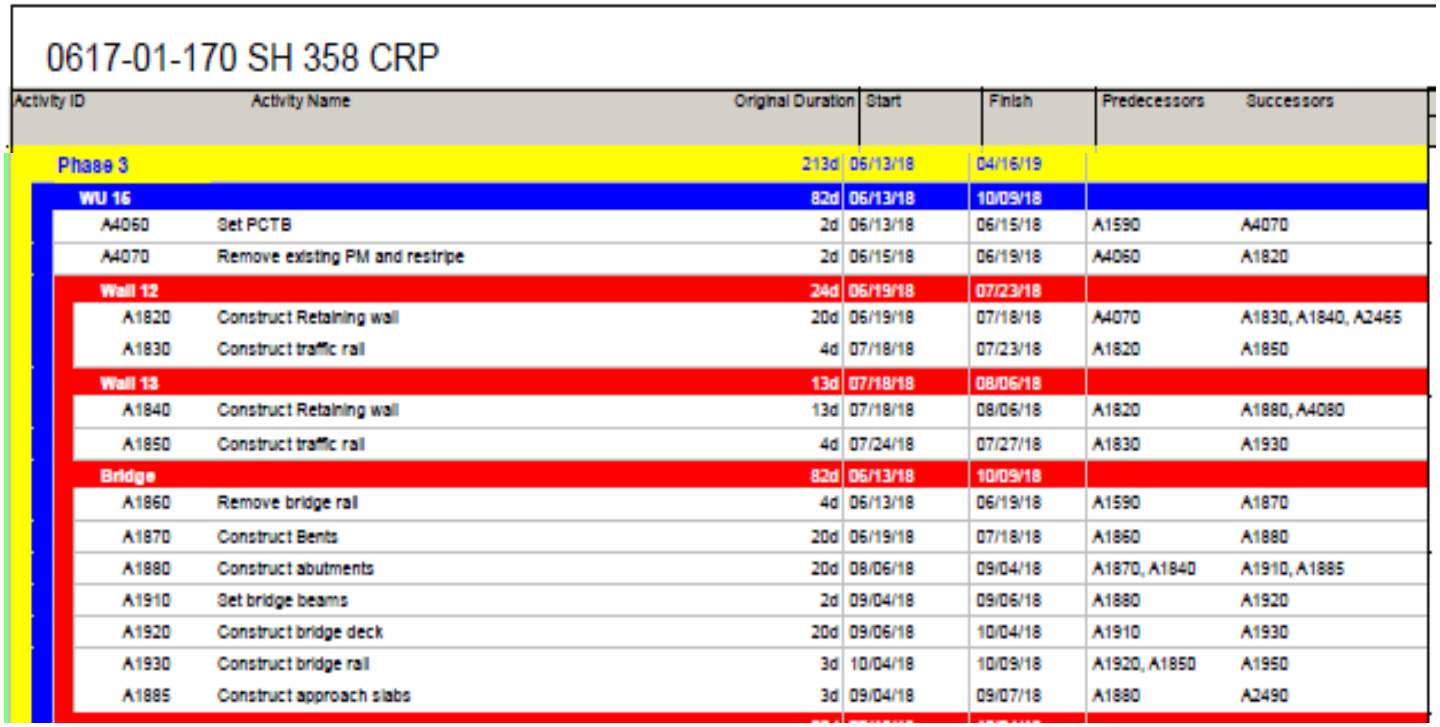


Figure 2.4. Phase 3 Profile (SH 358, Nueces County)



0617-01-170 SH 358 CRP

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors	Successors
Phase 3		213d	06/13/18	04/16/19		
WU 15		82d	06/13/18	10/09/18		
A4060	Set PCTB	2d	06/13/18	06/15/18	A1590	A4070
A4070	Remove existing PM and restripe	2d	06/15/18	06/19/18	A4060	A1820
Wall 12		24d	06/19/18	07/23/18		
A1820	Construct Retaining wall	20d	06/19/18	07/18/18	A4070	A1830, A1840, A2465
A1830	Construct traffic rail	4d	07/18/18	07/23/18	A1820	A1850
Wall 13		13d	07/18/18	08/06/18		
A1840	Construct Retaining wall	13d	07/18/18	08/06/18	A1820	A1880, A4080
A1850	Construct traffic rail	4d	07/24/18	07/27/18	A1830	A1930
Bridge		82d	06/13/18	10/09/18		
A1860	Remove bridge rail	4d	06/13/18	06/19/18	A1590	A1870
A1870	Construct Bents	20d	06/19/18	07/18/18	A1860	A1880
A1880	Construct abutments	20d	08/06/18	09/04/18	A1870, A1840	A1910, A1885
A1910	Set bridge beams	2d	09/04/18	09/06/18	A1880	A1920
A1920	Construct bridge deck	20d	09/06/18	10/04/18	A1910	A1930
A1930	Construct bridge rail	3d	10/04/18	10/09/18	A1920, A1850	A1950
A1885	Construct approach slabs	3d	09/04/18	09/07/18	A1880	A2490

Figure 2.5. Phase 3 WU15 Schedule (SH 358, Nueces County)

Texas Department of Transportation

Determination of Additional Project-Specific Liquidated Damages

Form 2699 (9/18) Page 1 of 1

* Use of this form is optional for Non-Freeway Resurfacing or Restoration (2R) and Preventative Maintenance (PM) projects and mandatory for all other projects.
* Use the Road User Cost (RUC) calculator located at https://www.txdot.gov/inside-txdot/division/design.html.

CSJ: 0617-01-170, etc. **County:** Nueces **Highway:** SH 358

Texas Transportation Code §223.012 and 43 TAC §9.22 require TxDOT to provide additional disincentives to assure the timely completion of projects. These will be included in the contract in the form of additional project-specific liquidated damages. Select all applicable items from the checklist below. Any combination of two or more items will indicate the requirement for additional project-specific liquidated damages (check all that apply).

Note: Projects that already include lane rental fees, A+B bidding, milestones, lane assessment fees, or other incentive/disincentive clauses use RUC for determining value of time. The district should ensure any additional RUC does not conflict with these other contracting techniques.

Statewide criteria

- ☐ Interstate highway, hurricane evacuation route, hazardous material route, a corridor of regional, statewide, or national importance
- ☒ Significant impact on high density of businesses along the corridor, as deemed by the district
- ☐ Roadway with a daily RUC of $5,000.00 or more

Rural district criteria

- ☐ Project on roadway with a minimum 25% truck traffic
- ☐ Project that reconstructs the primary thoroughfare in a community
- ☐ Project with signed detour which adds travel time and/or distance

Urban district criteria

- ☒ Construction phasing decreases lane capacity on major corrido
- ☐ Ramp closure and/or detour
- ☐ Eliminating or decreasing turn movement

Metro district criteria

- ☐ Lane and/or ramp closure
- ☐ Reduction in posted speed during the construction phase
- ☐ Project that involves reduction in lane width or shoulder reduction

If a project is not deemed to have a significant impact to the traveling public by the above criteria, a District Engineer may deem the project as needing additional project-specific liquidated damages by checking the box below and specifying the reason.

☐ Roadway deemed to need additional project-specific liquidated damages by the District Engineer (please specify):

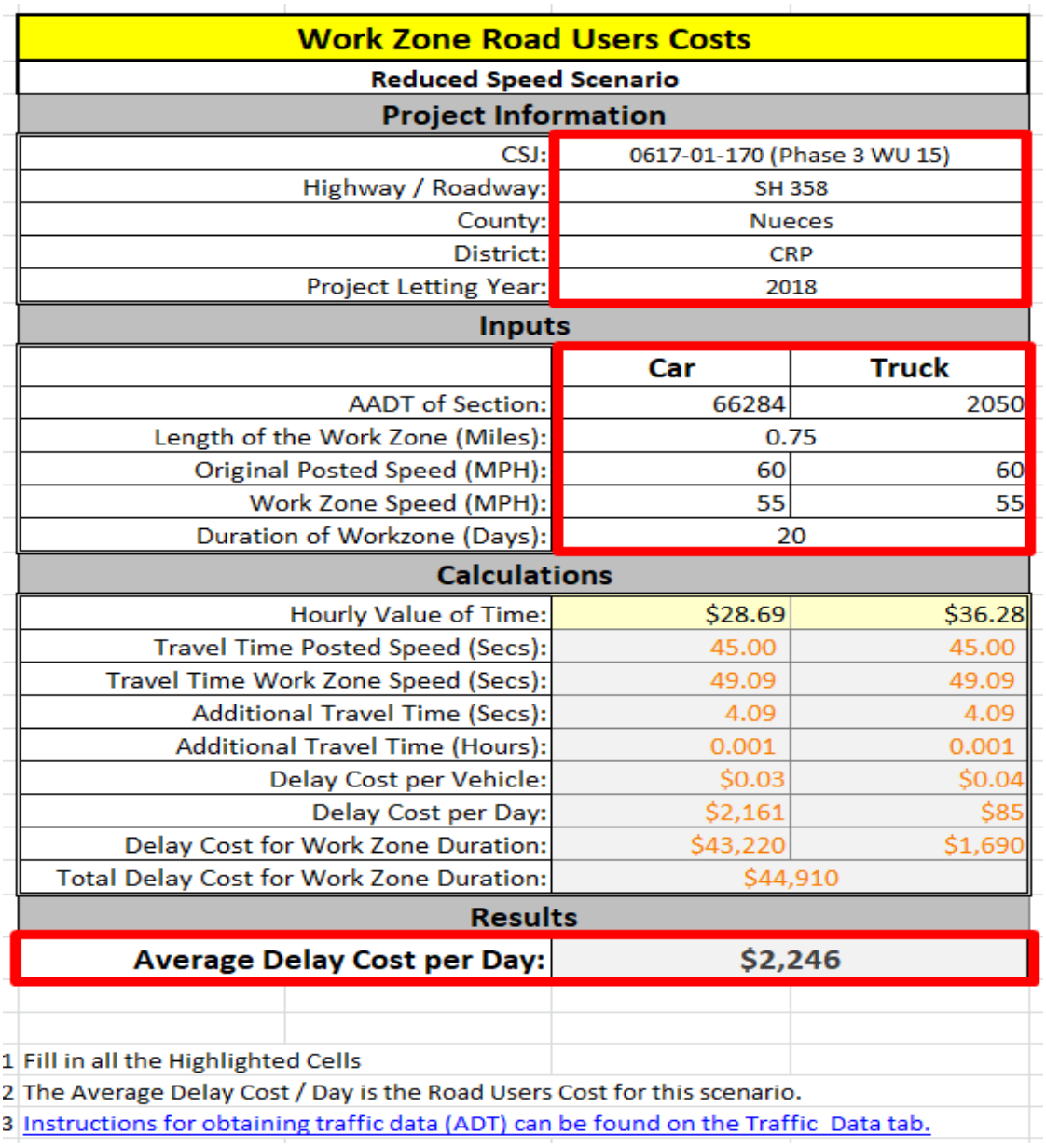
Additional Liquidated Damages: ☐ No ☐ Yes $ _____ per day

Contact/Help

Figure 2.6. Form 2699 (SH 358, Nueces County)

To calculate the Road User Cost for projects that require a reduction in speed, fill out all cells under the Project Information and Inputs headings. Hourly Values of Time will be automatically generated from the VOT tab. The Department will update these values annually.

Note: The Duration of Work Zone (Days) comes from the project's Contract Time Determination (CTD).

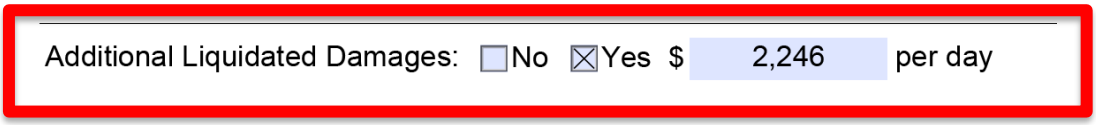


Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0617-01-170 (Phase 3 WU 15)	
Highway / Roadway:	SH 358	
County:	Nueces	
District:	CRP	
Project Letting Year:	2018	
Inputs		
	Car	**Truck**
AADT of Section:	66284	2050
Length of the Work Zone (Miles):	0.75	
Original Posted Speed (MPH):	60	60
Work Zone Speed (MPH):	55	55
Duration of Workzone (Days):	20	
Calculations		
Hourly Value of Time:	$28.69	$36.28
Travel Time Posted Speed (Secs):	45.00	45.00
Travel Time Work Zone Speed (Secs):	49.09	49.09
Additional Travel Time (Secs):	4.09	4.09
Additional Travel Time (Hours):	0.001	0.001
Delay Cost per Vehicle:	$0.03	$0.04
Delay Cost per Day:	$2,161	$85
Delay Cost for Work Zone Duration:	$43,220	$1,690
Total Delay Cost for Work Zone Duration:	$44,910	
Results		
Average Delay Cost per Day:	**$2,246**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost / Day is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Figure 2.7. Additional Travel Time during Phase 3 WU 15

Complete the bottom section of Form 2699.



Example 3 – Metro Scenario/Reduced Speed/Detour

Bridge Replacement with TCP

CSJ: 0092-13-024, etc.
Roadway: BI-45F
County: Navarro
District: Dallas District
Type of Work: For the construction of replacing bridges and approaches, signing, and pavement markings.

Description of General Project Scope

This project is for replacing existing bridges carrying Business 45 over creeks on the north side of Corsicana. The existing roadway (BI-45F) consists of two lanes in each direction, and each direction is provided separate bridges.

General Impacts during Construction

The construction work is performed in two major phases. During construction one lane remains open in each direction, and temporary paving is provided to smooth out transitions. The current speed limit is 65 mph. During Phase 1 there will be a 50 mph advisory speed for one direction due to an alignment change only impacting that direction of travel. Additionally, an adjacent street is closed and detoured during this phase. During Phase 2 there will be a 40 mph advisory speed for the other direction due to an alignment change only impacting that direction of travel.

Traffic Data

From the Statewide Planning Map, 2016 AADT for this section of road is 9,428. Obtained from STARS II, an actual count of traffic conducted on May 25, 2016 was 10,946, with northbound peak hour (4:45–5:45 pm) having 446 vehicles and the southbound peak hour (3:45–4:45pm) having 509 vehicles. While one lane in each direction will be closed during construction, the remaining lane in each direction is expected to carry these volumes without delay, particularly as there are no nearby traffic signals.

Construction Year and AADT Year

The AADT data is for the year 2016, and traffic-impacting construction will occur during 2019 and beyond. The traffic modeler inflated the 2016 AADT of 9,428 using a 3% annual growth factor to estimate the volume during 2019; 10% of the vehicles were taken to be trucks, and an overall 50/50 directional traffic volume split was applied. These steps require additional expertise, therefore are considered optional.

Work Zone RUC Estimation

In order to model this project, the traffic modeler split it into three components: two for Phase 1 and one for Phase 2.

- Phase 1:
  - Assessment of the impacts on travel time (increased) from the reduction in speed (Advisory Speed) impacting one direction of travel (thus impacting half of the 2019 estimated AADT) – $492 per day.
  - Calculation of additional travel time due to the street closed at the northwest corner of the project – $506 per day.
- Phase 2: Assessment of the impacts on travel time (increased) from the reduction in speed (Advisory Speed) impacting one direction of travel (thus impacting half of the 2019 estimated AADT) – $1,025 per day.

The Phase 1 impacts are obtained by combining $492 for the speed reduction and $506 from the street closure, yielding $998 per day. The Phase 2 impacts are $1,025 per day. Given the similar results and likely similar durations for each phase, these values could be averaged to determine a daily road user cost for the entirety of the project. Thus, the calculated road user cost for the project is $1,012 per day.

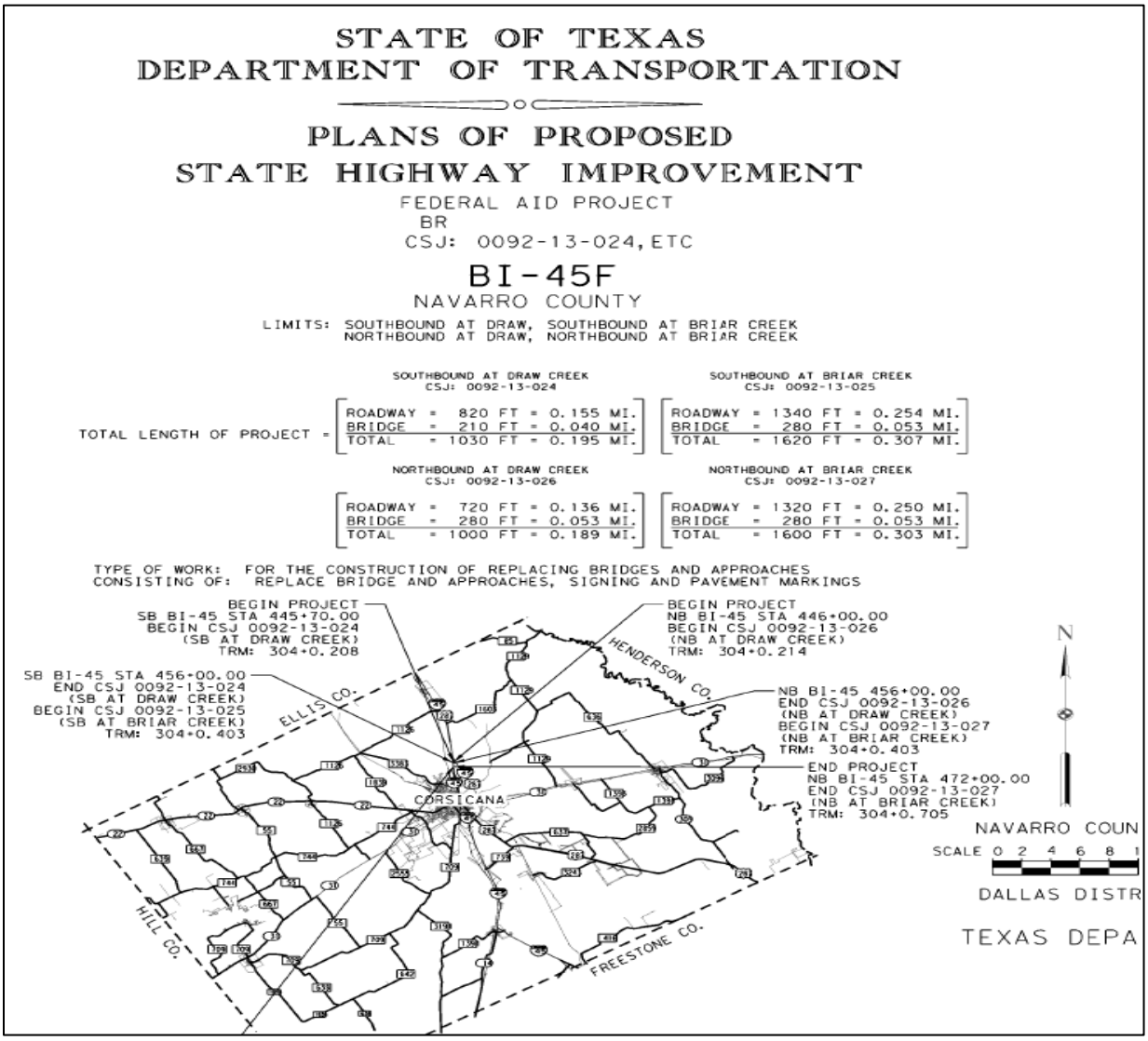


Figure 3.1.Project Title Sheet (BI-45F, Navarro County)

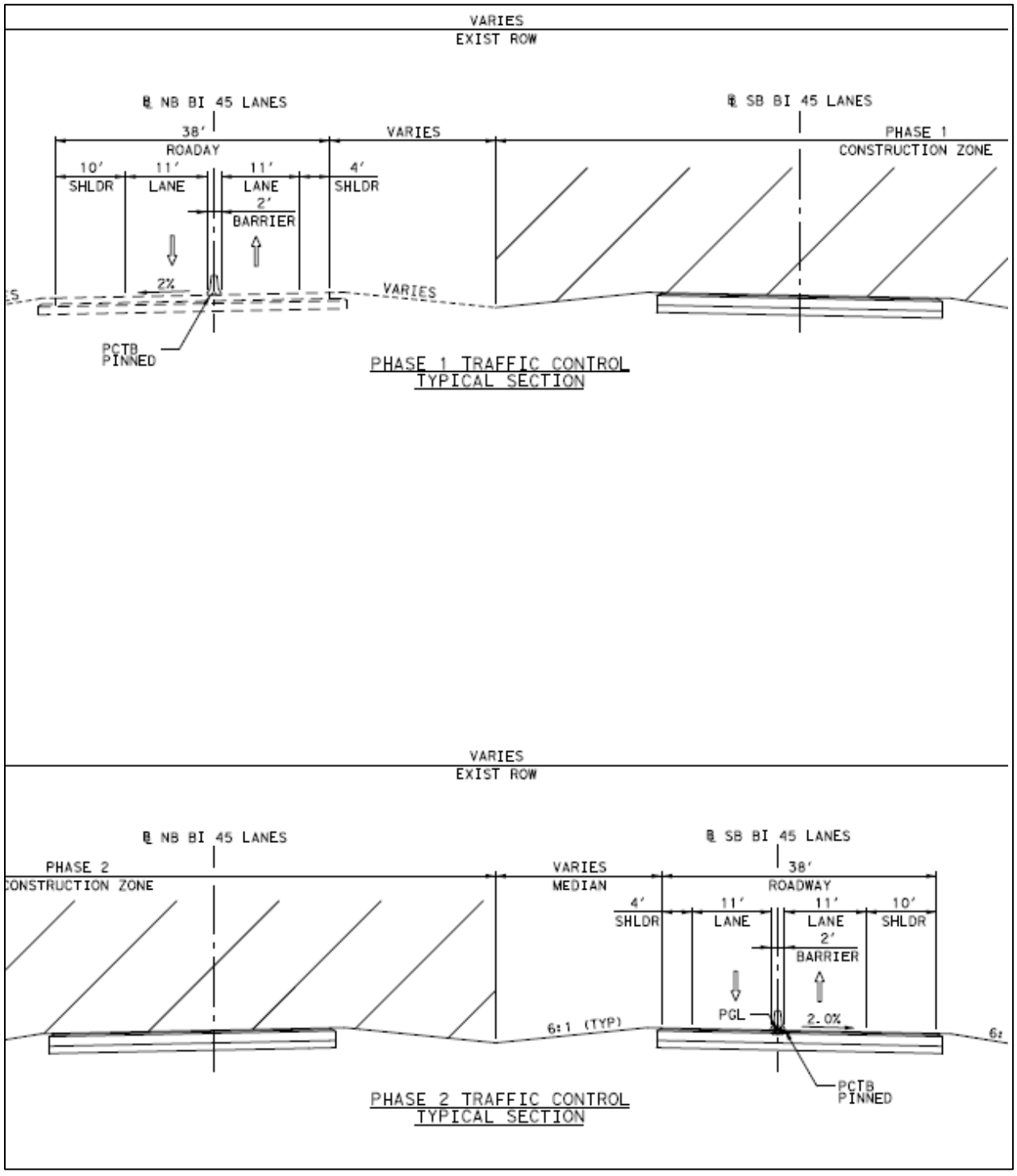


Figure 3.2. Phase 1 and Phase 2 Traffic Control Typical Sections (BI-45F, Navarro County)

Texas Department of Transportation

Determination of Additional Project-Specific Liquidated Damages

Form 2699 (9/18) Page 1 of 1

* Use of this form is optional for Non-Freeway Resurfacing or Restoration (2R) and Preventative Maintenance (PM) projects and mandatory for all other projects.
* Use the Road User Cost (RUC) calculator located at https://www.txdot.gov/inside-txdot/division/design.html.

CSJ: 0092-13-024, etc. **County:** Navarro **Highway:** BI-45

Texas Transportation Code §223.012 and 43 TAC §9.22 require TxDOT to provide additional disincentives to assure the timely completion of projects. These will be included in the contract in the form of additional project-specific liquidated damages. Select all applicable items from the checklist below. Any combination of two or more items will indicate the requirement for additional project-specific liquidated damages (check all that apply).

Note: Projects that already include lane rental fees, A+B bidding, milestones, lane assessment fees, or other incentive/disincentive clauses use RUC for determining value of time. The district should ensure any additional RUC does not conflict with these other contracting techniques.

Statewide criteria

- ☐ Interstate highway, hurricane evacuation route, hazardous material route, a corridor of regional, statewide, or national importance
- ☐ Significant impact on high density of businesses along the corridor, as deemed by the district
- ☐ Roadway with a daily RUC of $5,000.00 or more

Rural district criteria

- ☐ Project on roadway with a minimum 25% truck traffic
- ☐ Project that reconstructs the primary thoroughfare in a community
- ☐ Project with signed detour which adds travel time and/or distance

Urban district criteria

- ☐ Construction phasing decreases lane capacity on major corridor
- ☐ Ramp closure and/or detour
- ☐ Eliminating or decreasing turn movement

Metro district criteria

- ☒ Lane and/or ramp closure
- ☒ Reduction in posted speed during the construction phase
- ☐ Project that involves reduction in lane width or shoulder reduction

If a project is not deemed to have a significant impact to the traveling public by the above criteria, a District Engineer may deem the project as needing additional project-specific liquidated damages by checking the box below and specifying the reason.

☒ Roadway deemed to need additional project-specific liquidated damages by the District Engineer (please specify):

Achieve schedule savings through A+B bidding method.

Additional Liquidated Damages: ☐ No ☐ Yes $ _____ per day

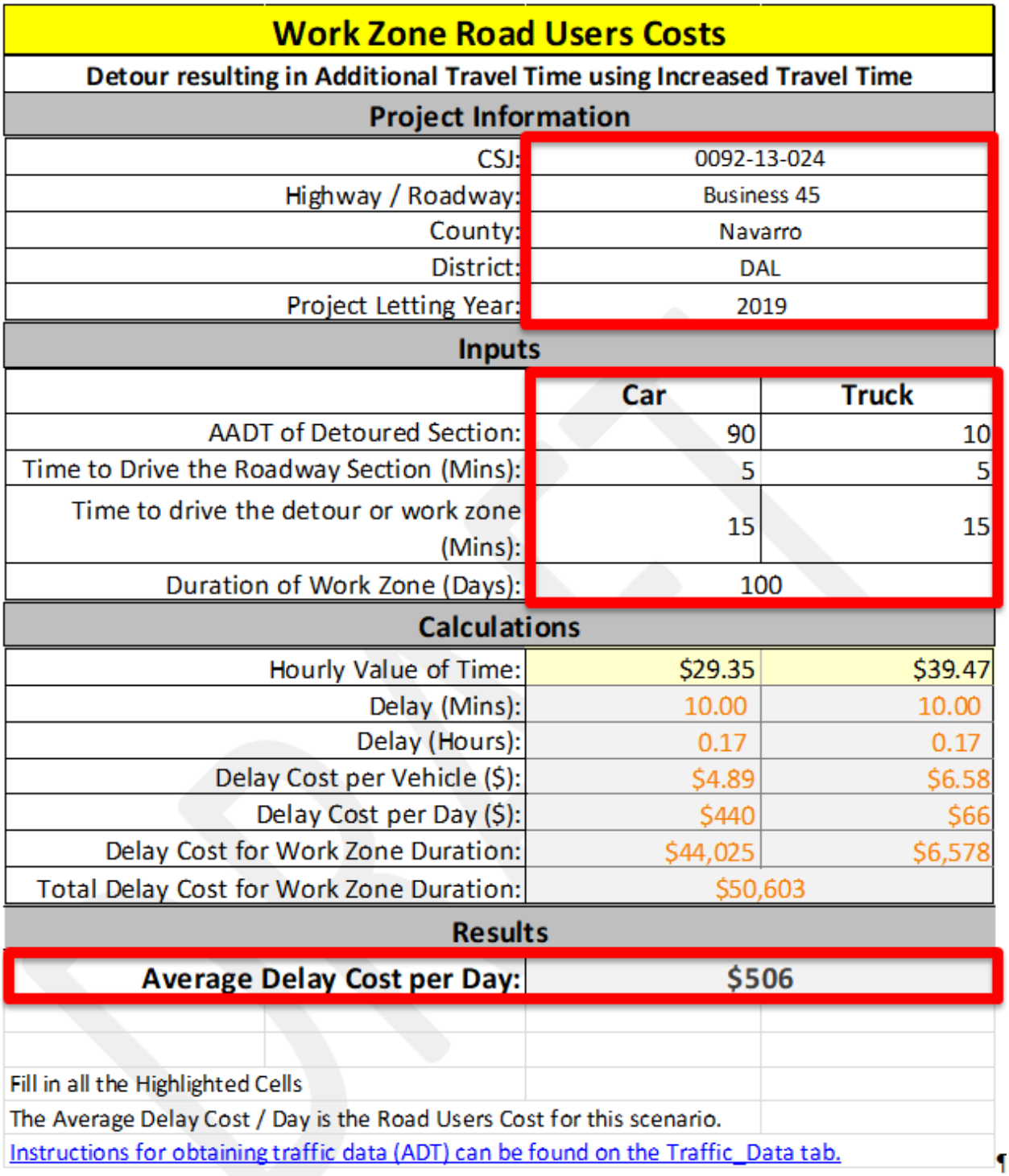
Figure 3.3. Form 2699 (BI-45F, Navarro County)

Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0092-13-24 (Phase 1-1)	
Highway / Roadway:	Business 45	
County:	Navarro	
District:	DAL	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
AADT of Section:	4636	515
Length of the Work Zone (Miles):	0.6818	
Original Posted Speed (MPH):	65	65
Work Zone Speed (MPH):	50	50
Duration of Work Zone (Days):	100	
Calculations		
Hourly Value of Time:	$29.35	$39.47
Travel Time Posted Speed (Secs):	37.76	37.76
Travel Time Work Zone Speed (Secs):	49.09	49.09
Additional Travel Time (Secs):	11.33	11.33
Additional Travel Time (Hours):	0.003	0.003
Delay Cost per Vehicle:	$0.09	$0.12
Delay Cost per Day:	$428	$64
Delay Cost for Work Zone Duration:	$42,817	$6,396
Total Delay Cost for Work Zone Duration:	$49,213	
Results		
Average Delay Cost per Day:	**$492**	
Fill in all the Highlighted Cells		
The Average Delay Cost / Day is the Road Users Cost for this scenario.		
Instructions for obtaining traffic data (ADT) can be found on the Traffic_Data tab.		

Figure 3.4. Additional Travel Time during Phase 1

Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0092-13-24 (Phase 2)	
Highway / Roadway:	Business 45	
County:	Navarro	
District:	DAL	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
AADT of Section:	4636	515
Length of the Work Zone (Miles):	0.6818	
Original Posted Speed (MPH):	65	65
Work Zone Speed (MPH):	40	40
Duration of Work Zone (Days):	100	
Calculations		
Hourly Value of Time:	$29.35	$39.47
Travel Time Posted Speed (Secs):	37.76	37.76
Travel Time Work Zone Speed (Secs):	61.36	61.36
Additional Travel Time (Secs):	23.60	23.60
Additional Travel Time (Hours):	0.007	0.007
Delay Cost per Vehicle:	$0.19	$0.26
Delay Cost per Day:	$892	$133
Delay Cost for Work Zone Duration:	$89,202	$13,326
Total Delay Cost for Work Zone Duration:	$102,528	
Results		
Average Delay Cost per Day:	**$1,025**	
Fill in all the Highlighted Cells		
The Average Delay Cost / Day is the Road Users Cost for this scenario.		
Instructions for obtaining traffic data (ADT) can be found on the Traffic_Data tab.		

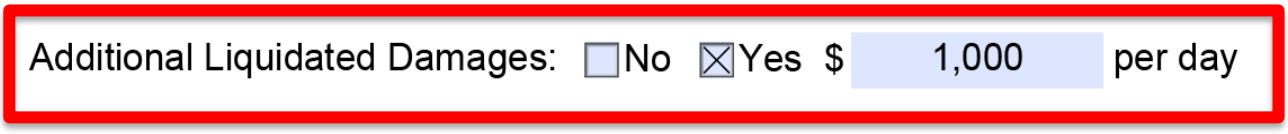
Figure 3.5. Additional Travel Time during Phase II

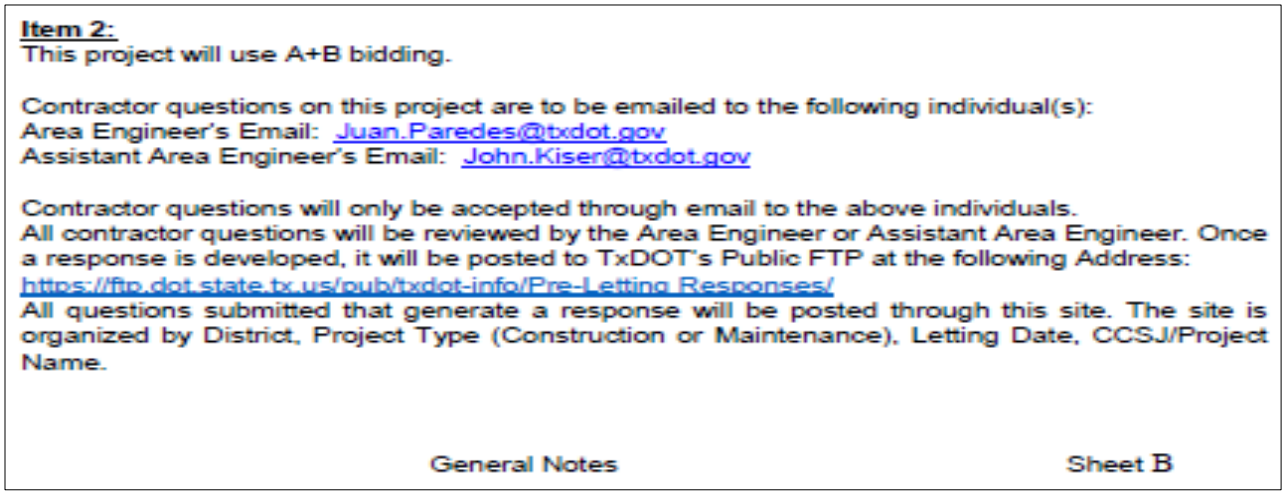


Work Zone Road Users Costs		
Detour resulting in Additional Travel Time using Increased Travel Time		
Project Information		
CSJ:	0092-13-024	
Highway / Roadway:	Business 45	
County:	Navarro	
District:	DAL	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
AADT of Detoured Section:	90	10
Time to Drive the Roadway Section (Mins):	5	5
Time to drive the detour or work zone (Mins):	15	15
Duration of Work Zone (Days):	100	
Calculations		
Hourly Value of Time:	$29.35	$39.47
Delay (Mins):	10.00	10.00
Delay (Hours):	0.17	0.17
Delay Cost per Vehicle ($):	$4.89	$6.58
Delay Cost per Day ($):	$440	$66
Delay Cost for Work Zone Duration:	$44,025	$6,578
Total Delay Cost for Work Zone Duration:	$50,603	
Results		
Average Delay Cost per Day:	$506	
Fill in all the Highlighted Cells		
The Average Delay Cost / Day is the Road Users Cost for this scenario.		
Instructions for obtaining traffic data (ADT) can be found on the Traffic_Data tab.		

Figure 3.6. Additional Detour Travel Time from Closed Street

Complete the bottom section of Form 2699.





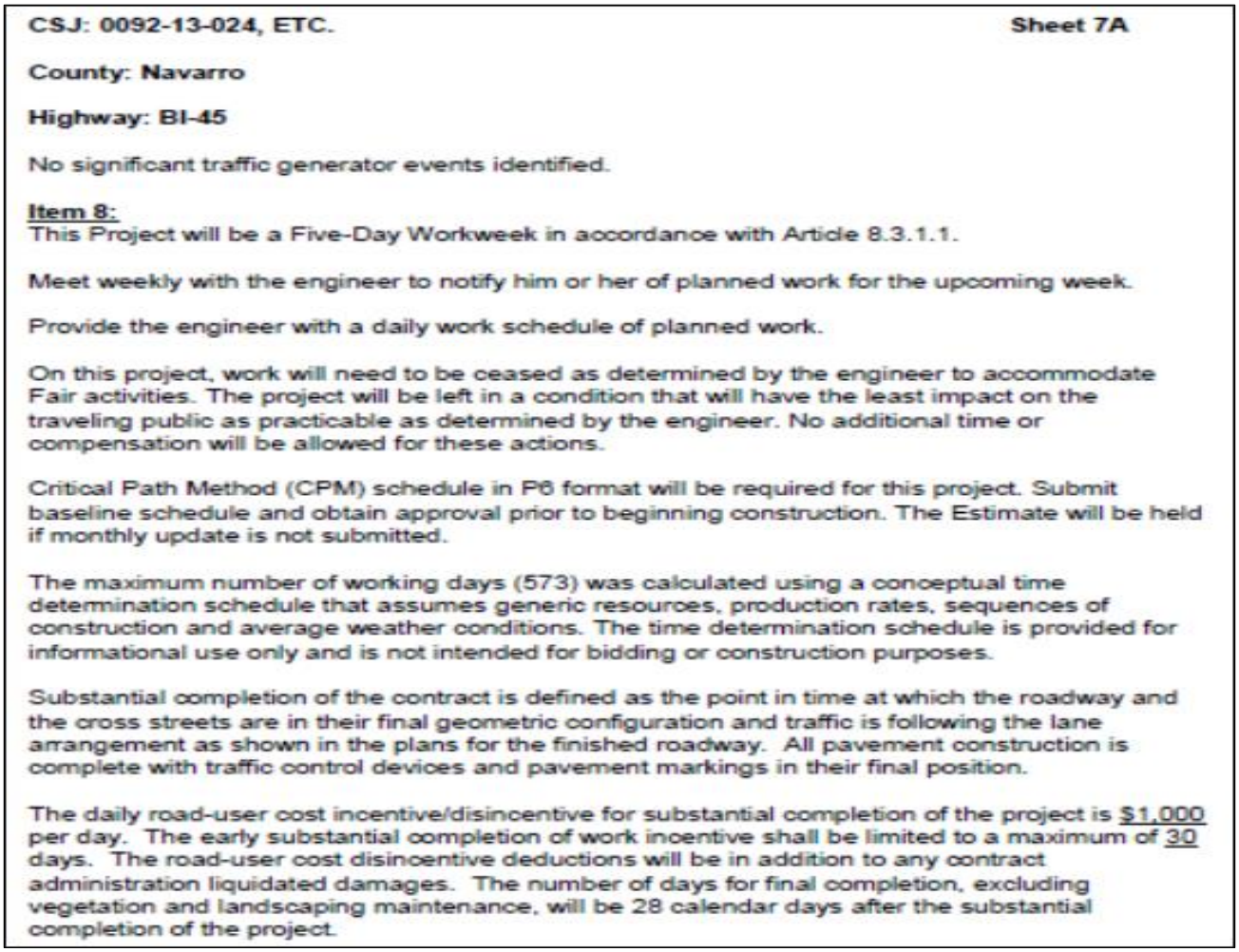
Item 2:
This project will use A+B bidding.

Contractor questions on this project are to be emailed to the following individual(s):
Area Engineer's Email: Juan.Paredes@txdot.gov
Assistant Area Engineer's Email: John.Kiser@txdot.gov

Contractor questions will only be accepted through email to the above individuals.
All contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

General Notes Sheet B

Figure 3.7. Project General Note – Item 2 (BI-45F, Navarro County)



CSJ: 0092-13-024, ETC. **Sheet 7A**

County: Navarro

Highway: BI-45

No significant traffic generator events identified.

Item 8:
This Project will be a Five-Day Workweek in accordance with Article 8.3.1.1.

Meet weekly with the engineer to notify him or her of planned work for the upcoming week.

Provide the engineer with a daily work schedule of planned work.

On this project, work will need to be ceased as determined by the engineer to accommodate Fair activities. The project will be left in a condition that will have the least impact on the traveling public as practicable as determined by the engineer. No additional time or compensation will be allowed for these actions.

Critical Path Method (CPM) schedule in P6 format will be required for this project. Submit baseline schedule and obtain approval prior to beginning construction. The Estimate will be held if monthly update is not submitted.

The maximum number of working days (573) was calculated using a conceptual time determination schedule that assumes generic resources, production rates, sequences of construction and average weather conditions. The time determination schedule is provided for informational use only and is not intended for bidding or construction purposes.

Substantial completion of the contract is defined as the point in time at which the roadway and the cross streets are in their final geometric configuration and traffic is following the lane arrangement as shown in the plans for the finished roadway. All pavement construction is complete with traffic control devices and pavement markings in their final position.

The daily road-user cost incentive/disincentive for substantial completion of the project is $1,000 per day. The early substantial completion of work incentive shall be limited to a maximum of 30 days. The road-user cost disincentive deductions will be in addition to any contract administration liquidated damages. The number of days for final completion, excluding vegetation and landscaping maintenance, will be 28 calendar days after the substantial completion of the project.

Figure 3.8. Project General Note – Item 8 (BI-45F, Navarro County)

Example 4 – Urban Scenario/Reduced Speed

Interstate Widening with Reduced Speed

CSJ: 0015-01-243, etc.
Roadway: I-35 – Section 4B
County: McLennan
District: Waco District
Limits: 12th Street to North Loop 340
Type of Work: For the construction of the widened freeway consisting of widening, grading, structures, and surfacing.

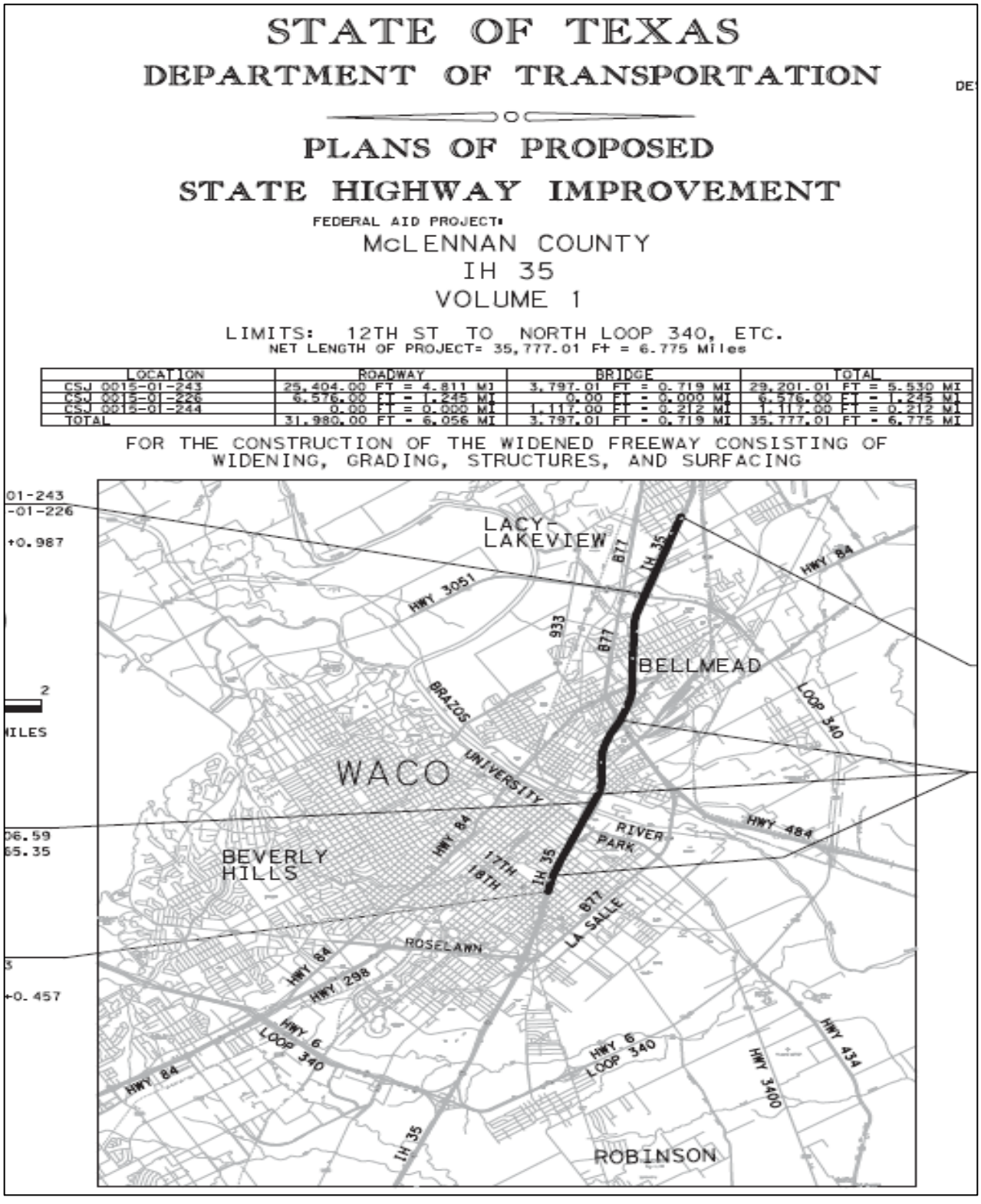
Description of General Project Scope

This project is for adding capacity to IH-35 through the construction of one additional mainlane in both northbound (NB) and southbound (SB) directions from 12th Street to North Loop 340 in McLennan County. The existing roadway consists of three mainlanes in each direction. The length of the project is 6.775 miles, as shown in Figure 4.1. The project scope includes reconstruction of frontage road sections and cross streets.

General Impacts during Construction

The construction work is performed in four major phases and several intermediate steps. During these phases, various temporary lane closures and detours are needed. General description of the phasing is given in the Traffic Control Plan Narrative shown in Figure 4.2. One of the most significant impacts of the construction phase will be the reduction of mainlane capacity from three lanes in each direction to two. See Figure 4.3 for general mainlane traffic control criteria. Figure 4.4 shows the current typical section for this segment of IH-35, and Figure 4.5 depicts the typical section during the construction phase.

Based on past experience with similar reductions in capacity on IH-35 mainlanes, the District estimates an average operating speed of 44 mph through the construction work zone. In addition, during the construction phase, the posted work zone speeds will be 55 mph. The posted speeds through this section of IH-35 are currently 65 mph.



STATE OF TEXAS

DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED

STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT:

McLENNAN COUNTY

IH 35

VOLUME 1

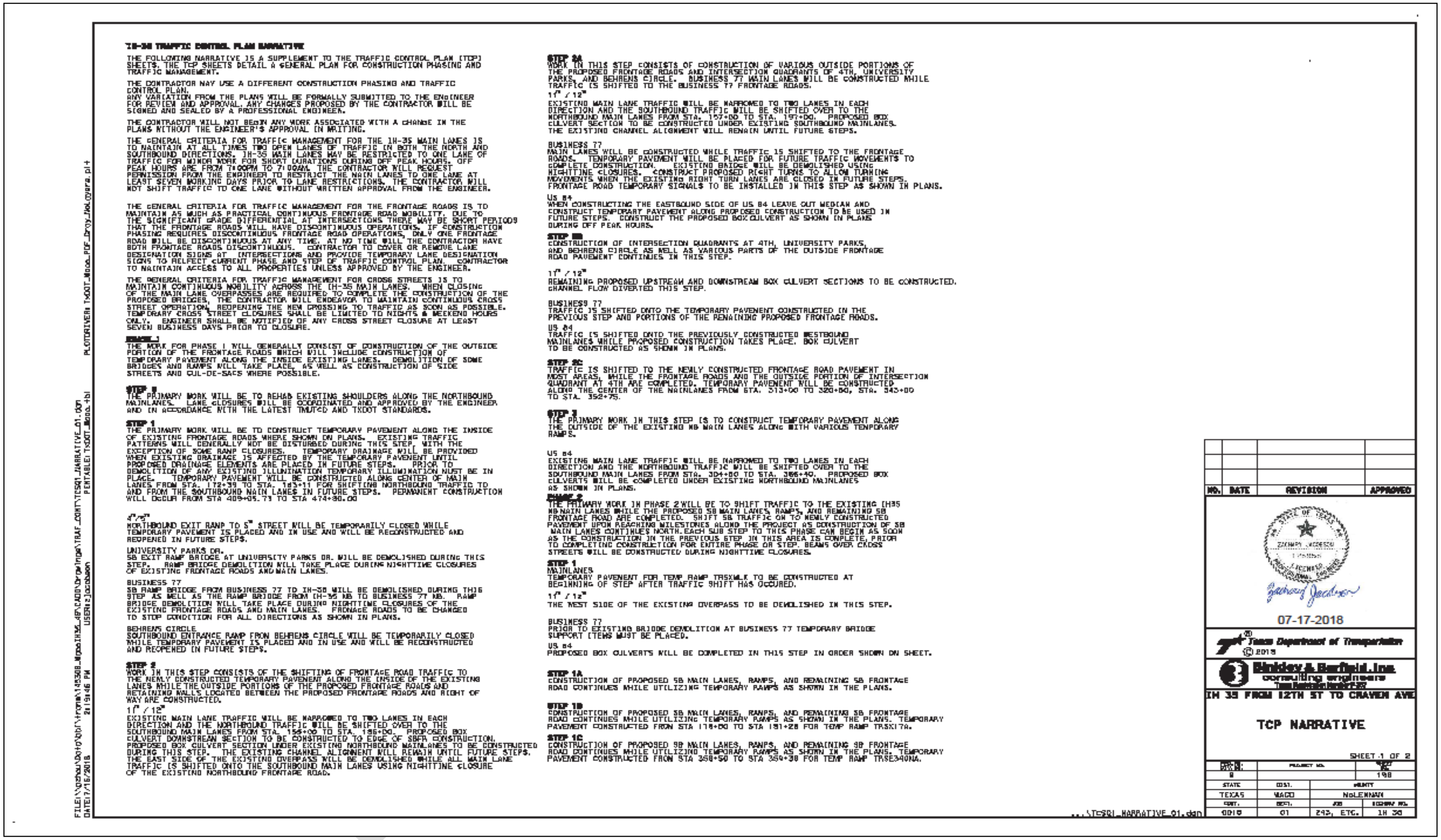
LIMITS: 12TH ST TO NORTH LOOP 340, ETC.

NET LENGTH OF PROJECT= 35,777.01 Ft = 6.775 Miles

LOCATION	ROADWAY	BRIDGE	TOTAL
CSJ 0015-01-243	25,404.00 FT = 4.811 MI	3,797.01 FT = 0.719 MI	29,201.01 FT = 5.530 MI
CSJ 0015-01-226	6,576.00 FT = 1.245 MI	0.00 FT = 0.000 MI	6,576.00 FT = 1.245 MI
CSJ 0015-01-244	0.00 FT = 0.000 MI	1,117.00 FT = 0.212 MI	1,117.00 FT = 0.212 MI
TOTAL	31,980.00 FT = 6.056 MI	3,797.01 FT = 0.719 MI	35,777.01 FT = 6.775 MI

FOR THE CONSTRUCTION OF THE WIDENED FREEWAY CONSISTING OF WIDENING, GRADING, STRUCTURES, AND SURFACING

Figure 4.1.Project Title Sheet (I-35 Section 4B, McLennan County)



IH-35 TRAFFIC CONTROL PLAN NARRATIVE

THE FOLLOWING NARRATIVE IS A SUPPLEMENT TO THE TRAFFIC CONTROL PLAN (TCP) SHEETS. THE TCP SHEETS DETAIL A GENERAL PLAN FOR CONSTRUCTION PHASING AND TRAFFIC MANAGEMENT.

THE CONTRACTOR MAY USE A DIFFERENT CONSTRUCTION PHASING AND TRAFFIC CONTROL PLAN.
ANY VARIATION FROM THE PLANS WILL BE FORMALLY SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL. ANY CHANGES PROPOSED BY THE CONTRACTOR WILL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

THE CONTRACTOR WILL NOT BEGIN ANY WORK ASSOCIATED WITH A CHANGE IN THE PLANS WITHOUT THE ENGINEER'S APPROVAL IN WRITING.

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT FOR THE IH-35 MAIN LANES IS TO MAINTAIN AT ALL TIMES TWO OPEN LANES OF TRAFFIC IN BOTH THE NORTH AND SOUTHBOUND DIRECTIONS. IH-35 MAIN LANES MAY BE RESTRICTED TO ONE LANE OF TRAFFIC FOR MINOR WORK FOR SHORT DURATIONS DURING OFF PEAK HOURS. OFF PEAK HOURS ARE FROM 7:00PM TO 7:00AM. THE CONTRACTOR WILL REQUEST PERMISSION FROM THE ENGINEER TO RESTRICT THE MAIN LANES TO ONE LANE AT LEAST SEVEN WORKING DAYS PRIOR TO LANE RESTRICTIONS. THE CONTRACTOR WILL NOT SHIFT TRAFFIC TO ONE LANE WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT FOR THE FRONTAGE ROADS IS TO MAINTAIN AS MUCH AS PRACTICAL CONTINUOUS FRONTAGE ROAD MOBILITY. DUE TO THE SIGNIFICANT GRADE DIFFERENTIAL AT INTERSECTIONS THERE MAY BE SHORT PERIODS THAT THE FRONTAGE ROADS WILL HAVE DISCONTINUOUS OPERATIONS. IF CONSTRUCTION PHASING REQUIRES DISCONTINUOUS FRONTAGE ROAD OPERATIONS, ONLY ONE FRONTAGE ROAD WILL BE DISCONTINUOUS AT ANY TIME. AT NO TIME WILL THE CONTRACTOR HAVE BOTH FRONTAGE ROADS DISCONTINUOUS. CONTRACTOR TO COVER OR REMOVE LANE DESIGNATION SIGNS AT INTERSECTIONS AND PROVIDE TEMPORARY LANE DESIGNATION SIGNS TO RELFECT CURRENT PHASE AND STEP OF TRAFFIC CONTROL PLAN. CONTRACTOR TO MAINTAIN ACCESS TO ALL PROPERTIES UNLESS APPROVED BY THE ENGINEER.

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT FOR CROSS STREETS IS TO MAINTAIN CONTINUOUS MOBILITY ACROSS THE IH-35 MAIN LANES. WHEN CLOSING OF THE MAIN LANE OVERPASSES ARE REQUIRED TO COMPLETE THE CONSTRUCTION OF THE PROPOSED BRIDGES, THE CONTRACTOR WILL ENDEAVOR TO MAINTAIN CONTINUOUS CROSS STREET OPERATION, REOPENING THE NEW CROSSING TO TRAFFIC AS SOON AS POSSIBLE. TEMPORARY CROSS STREET CLOSURES SHALL BE LIMITED TO NIGHTS & WEEKEND HOURS ONLY. ENGINEER SHALL BE NOTIFIED OF ANY CROSS STREET CLOSURE AT LEAST SEVEN BUSINESS DAYS PRIOR TO CLOSURE.

PHASE 1
THE WORK FOR PHASE 1 WILL GENERALLY CONSIST OF CONSTRUCTION OF THE OUTSIDE PORTION OF THE FRONTAGE ROADS WHICH WILL INCLUDE CONSTRUCTION OF TEMPORARY PAVEMENT ALONG THE INSIDE EXISTING LANES. DEMOLITION OF SOME BRIDGES AND RAMPS WILL TAKE PLACE, AS WELL AS CONSTRUCTION OF SIDE STREETS AND CUL-DE-SACS WHERE POSSIBLE.

STEP 0
THE PRIMARY WORK WILL BE TO REHAB EXISTING SHOULDERS ALONG THE NORTHBOUND MAINLANES. LANE CLOSURES WILL BE COORDINATED AND APPROVED BY THE ENGINEER AND IN ACCORDANCE WITH THE LATEST TMUTCD AND TXDOT STANDARDS.

STEP 1
THE PRIMARY WORK WILL BE TO CONSTRUCT TEMPORARY PAVEMENT ALONG THE INSIDE OF EXISTING FRONTAGE ROADS WHERE SHOWN ON PLANS. EXISTING TRAFFIC PATTERNS WILL GENERALLY NOT BE DISTURBED DURING THIS STEP, WITH THE EXCEPTION OF SOME RAMP CLOSURES. TEMPORARY DRAINAGE WILL BE PROVIDED WHEN EXISTING DRAINAGE IS AFFECTED BY THE TEMPORARY PAVEMENT UNTIL PROPOSED DRAINAGE ELEMENTS ARE PLACED IN FUTURE STEPS. PRIOR TO DEMOLITION OF ANY EXISTING ILLUMINATION TEMPORARY ILLUMINATION MUST BE IN PLACE. TEMPORARY PAVEMENT WILL BE CONSTRUCTED ALONG CENTER OF MAIN LANES FROM STA. 172+39 TO STA. 183+11 FOR SHIFTING NORTHBOUND TRAFFIC TO AND FROM THE SOUTHBOUND MAIN LANES IN FUTURE STEPS. PERMANENT CONSTRUCTION WILL OCCUR FROM STA 409+05.73 TO STA 474+80.00

4th/5th
NORTHBOUND EXIT RAMP TO 5th STREET WILL BE TEMPORARILY CLOSED WHILE TEMPORARY PAVEMENT IS PLACED AND IN USE AND WILL BE RECONSTRUCTED AND REOPENED IN FUTURE STEPS.

UNIVERSITY PARKS DR.
SB EXIT RAMP BRIDGE AT UNIVERSITY PARKS DR. WILL BE DEMOLISHED DURING THIS STEP. RAMP BRIDGE DEMOLITION WILL TAKE PLACE DURING NIGHTTIME CLOSURES OF EXISTING FRONTAGE ROADS AND MAIN LANES.

BUSINESS 77
SB RAMP BRIDGE FROM BUSINESS 77 TO IH-35 WILL BE DEMOLISHED DURING THIS STEP AS WELL AS THE RAMP BRIDGE FROM IH-35 NB TO BUSINESS 77 NB. RAMP BRIDGE DEMOLITION WILL TAKE PLACE DURING NIGHTTIME CLOSURES OF THE EXISTING FRONTAGE ROADS AND MAIN LANES. FRONAGE ROADS TO BE CHANGED TO STOP CONDITION FOR ALL DIRECTIONS AS SHOWN IN PLANS.

BEHRENS CIRCLE
SOUTHBOUND ENTRANCE RAMP FROM BEHRENS CIRCLE WILL BE TEMPORARILY CLOSED WHILE TEMPORARY PAVEMENT IS PLACED AND IN USE AND WILL BE RECONSTRUCTED AND REOPENED IN FUTURE STEPS.

STEP 2
WORK IN THIS STEP CONSISTS OF THE SHIFTING OF FRONTAGE ROAD TRAFFIC TO THE NEWLY CONSTRUCTED TEMPORARY PAVEMENT ALONG THE INSIDE OF THE EXISTING LANES WHILE THE OUTSIDE PORTIONS OF THE PROPOSED FRONTAGE ROADS AND RETAINING WALLS LOCATED BETWEEN THE PROPOSED FRONTAGE ROADS AND RIGHT OF WAY ARE CONSTRUCTED.
11th / 12th
EXISTING MAIN LANE TRAFFIC WILL BE NARROWED TO TWO LANES IN EACH DIRECTION AND THE NORTHBOUND TRAFFIC WILL BE SHIFTED OVER TO THE SOUTHBOUND MAIN LANES FROM STA. 156+00 TO STA. 196+00. PROPOSED BOX CULVERT DOWNSTREAM SECTION TO BE CONSTRUCTED TO EDGE OF SBFR CONSTRUCTION. PROPOSED BOX CULVERT SECTION UNDER EXISTING NORTHBOUND MAINLANES TO BE CONSTRUCTED DURING THIS STEP. THE EXISTING CHANNEL ALIGNMENT WILL REMAIN UNTIL FUTURE STEPS. THE EAST SIDE OF THE EXISTING OVERPASS WILL BE DEMOLISHED WHILE ALL MAIN LANE TRAFFIC IS SHIFTED ONTO THE SOUTHBOUND MAIN LANES USING NIGHTTIME CLOSURE OF THE EXISTING NORTHBOUND FRONTAGE ROAD.

STEP 2A
WORK IN THIS STEP CONSISTS OF CONSTRUCTION OF VARIOUS OUTSIDE PORTIONS OF THE PROPOSED FRONTAGE ROADS AND INTERSECTION QUADRANTS OF 4TH, UNIVERSITY PARKS, AND BEHRENS CIRCLE. BUSINESS 77 MAIN LANES WILL BE CONSTRUCTED WHILE TRAFFIC IS SHIFTED TO THE BUSINESS 77 FRONTAGE ROADS.
11th / 12th
EXISTING MAIN LANE TRAFFIC WILL BE NARROWED TO TWO LANES IN EACH DIRECTION AND THE SOUTHBOUND TRAFFIC WILL BE SHIFTED OVER TO THE NORTHBOUND MAIN LANES FROM STA. 157+00 TO STA. 197+00. PROPOSED BOX CULVERT SECTION TO BE CONSTRUCTED UNDER EXISTING SOUTHBOUND MAINLANES. THE EXISTING CHANNEL ALIGNMENT WILL REMAIN UNTIL FUTURE STEPS.

BUSINESS 77
MAIN LANES WILL BE CONSTRUCTED WHILE TRAFFIC IS SHIFTED TO THE FRONTAGE ROADS. TEMPORARY PAVEMENT WILL BE PLACED FOR FUTURE TRAFFIC MOVEMENTS TO COMPLETE CONSTRUCTION. EXISTING BRIDGE WILL BE DEMOLISHED USING NIGHTTINE CLOSURES. CONSTRUCT PROPOSED RIGHT TURNS TO ALLOW TURNING MOVEMENTS WHEN THE EXISTING RIGHT TURN LANES ARE CLOSED IN FUTURE STEPS. FRONTAGE ROAD TEMPORARY SIGNALS TO BE INSTALLED IN THIS STEP AS SHOWN IN PLANS.

US 84
WHEN CONSTRUCTING THE EASTBOUND SIDE OF US 84 LEAVE OUT MEDIAN AND CONSTRUCT TEMPORARY PAVEMENT ALONG PROPOSED CONSTRUCTION TO BE USED IN FUTURE STEPS. CONSTRUCT THE PROPOSED BOX CULVERT AS SHOWN IN PLANS DURING OFF PEAK HOURS.

STEP 2B
CONSTRUCTION OF INTERSECTION QUADRANTS AT 4TH, UNIVERSITY PARKS, AND BEHRENS CIRCLE AS WELL AS VARIOUS PARTS OF THE OUTSIDE FRONTAGE ROAD PAVEMENT CONTINUES IN THIS STEP.

11th / 12th
REMAINING PROPOSED UPSTREAM AND DOWNSTREAM BOX CULVERT SECTIONS TO BE CONSTRUCTED. CHANNEL FLOW DIVERTED THIS STEP.

BUSINESS 77
TRAFFIC IS SHIFTED ONTO THE TEMPORARY PAVEMENT CONSTRUCTED IN THE PREVIOUS STEP AND PORTIONS OF THE REMAINING PROPOSED FRONTAGE ROADS.

US 84
TRAFFIC IS SHIFTED ONTO THE PREVIOUSLY CONSTRUCTED WESTBOUND MAINLANES WHILE PROPOSED CONSTRUCTION TAKES PLACE. BOX CULVERT TO BE CONSTRUCTED AS SHOWN IN PLANS.

STEP 2C
TRAFFIC IS SHIFTED TO THE NEWLY CONSTRUCTED FRONTAGE ROAD PAVEMENT IN MOST AREAS, WHILE THE FRONTAGE ROADS AND THE OUTSIDE PORTION OF INTERSECTION QUADRANT AT 4TH ARE COMPLETED. TEMPORARY PAVEMENT WILL BE CONSTRUCTED ALONG THE CENTER OF THE MAINLANES FROM STA. 313+00 TO 320+00, STA. 343+00 TO STA. 352+75.

STEP 3
THE PRIMARY WORK IN THIS STEP IS TO CONSTRUCT TEMPORARY PAVEMENT ALONG THE OUTSIDE OF THE EXISTING NB MAIN LANES ALONG WITH VARIOUS TEMPORARY RAMPS.

US 84
EXISTING MAIN LANE TRAFFIC WILL BE NARROWED TO TWO LANES IN EACH DIRECTION AND THE NORTHBOUND TRAFFIC WILL BE SHIFTED OVER TO THE SOUTHBOUND MAIN LANES FROM STA. 304+00 TO STA. 366+40. PROPOSED BOX CULVERTS WILL BE COMPLETED UNDER EXISTING NORTHBOUND MAINLANES AS SHOWN IN PLANS.

PHASE 2
THE PRIMARY WORK IN PHASE 2 WILL BE TO SHIFT TRAFFIC TO THE EXISTING IH35 NB MAIN LANES WHILE THE PROPOSED SB MAIN LANES, RAMPS, AND REMAINING SB FRONTAGE ROAD ARE COMPLETED. SHIFT SB TRAFFIC ON TO NEWLY CONSTRUCTED PAVEMENT UPON REACHING MILESTONES ALONG THE PROJECT AS CONSTRUCTION OF SB MAIN LANES CONTINUES NORTH. EACH SUB STEP TO THIS PHASE CAN BEGIN AS SOON AS THE CONSTRUCTION IN THE PREVIOUS STEP IN THIS AREA IS COMPLETE, PRIOR TO COMPLETING CONSTRUCTION FOR ENTIRE PHASE OR STEP. BEAMS OVER CROSS STREETS WILL BE CONSTRUCTED DURING NIGHTTIME CLOSURES.

STEP 1
MAINLANES
TEMPORARY PAVEMENT FOR TEMP RAMP TRSXMLK TO BE CONSTRUCTED AT BEGINNING OF STEP AFTER TRAFFIC SHIFT HAS OCCURED.

11th / 12th
THE WEST SIDE OF THE EXISTING OVERPASS TO BE DEMOLISHED IN THIS STEP.

BUSINESS 77
PRIOR TO EXISTING BRIDGE DEMOLITION AT BUSINESS 77 TEMPORARY BRIDGE SUPPORT ITEMS MUST BE PLACED.

US 84
PROPOSED BOX CULVERTS WILL BE COMPLETED IN THIS STEP IN ORDER SHOWN ON SHEET.

STEP 1A
CONSTRUCTION OF PROPOSED SB MAIN LANES, RAMPS, AND REMAINING SB FRONTAGE ROAD CONTINUES WHILE UTILIZING TEMPORARY RAMPS AS SHOWN IN THE PLANS.

STEP 1B
CONSTRUCTION OF PROPOSED SB MAIN LANES, RAMPS, AND REMAINING SB FRONTAGE ROAD CONTINUES WHILE UTILIZING TEMPORARY RAMPS AS SHOWN IN THE PLANS. TEMPORARY PAVEMENT CONSTRUCTED FROM STA 178+00 TO STA 181+28 FOR TEMP RAMP TRSX17A.

STEP 1C
CONSTRUCTION OF PROPOSED SB MAIN LANES, RAMPS, AND REMAINING SB FRONTAGE ROAD CONTINUES WHILE UTILIZING TEMPORARY RAMPS AS SHOWN IN THE PLANS. TEMPORARY PAVEMENT CONSTRUCTED FROM STA 358+50 TO STA 359+38 FOR TEMP RAMP TRSE340NA.

NO.	DATE	REVISION	APPROVED

07-17-2018

Texas Department of Transportation
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Binkley & Barfield, Inc.
consulting engineers

IH 35 FROM 12TH ST TO CRAVEN AVE

TCP NARRATIVE

SHEET 1 OF 2

STATE	DIST.	COUNTY	
TEXAS	WACO	McLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0015	01	243, ETC.	IH 35

Figure 4.1. TCP Narrative (I-35 Section 4B, McLennan County)

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT FOR THE IH-35 MAIN LANES IS TO MAINTAIN AT ALL TIMES TWO OPEN LANES OF TRAFFIC IN BOTH THE NORTH AND SOUTHBOUND DIRECTIONS. IH-35 MAIN LANES MAY BE RESTRICTED TO ONE LANE OF TRAFFIC FOR MINOR WORK FOR SHORT DURATIONS DURING OFF PEAK HOURS. OFF PEAK HOURS ARE FROM 7:00PM TO 7:00AM. THE CONTRACTOR WILL REQUEST PERMISSION FROM THE ENGINEER TO RESTRICT THE MAIN LANES TO ONE LANE AT LEAST SEVEN WORKING DAYS PRIOR TO LANE RESTRICTIONS. THE CONTRACTOR WILL NOT SHIFT TRAFFIC TO ONE LANE WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.

Figure 4.3. General Criteria for Mainlane Traffic Control (I-35 Section 4B, McLennan County)

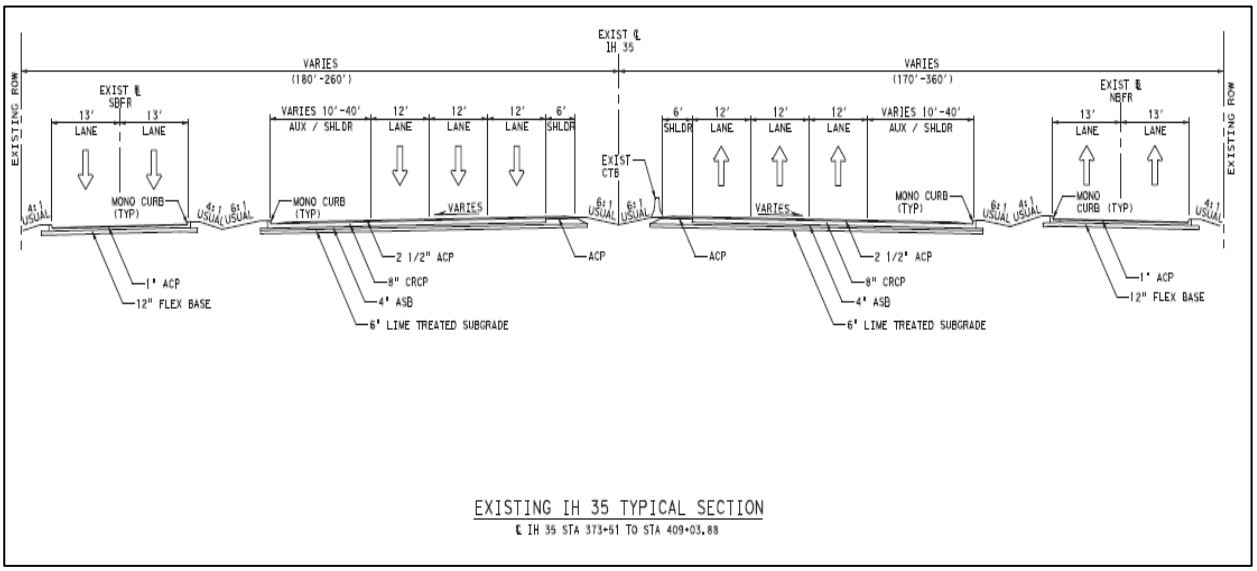


Figure 4.4. Existing Typical Section (I-35 Section 4B, McLennan County)

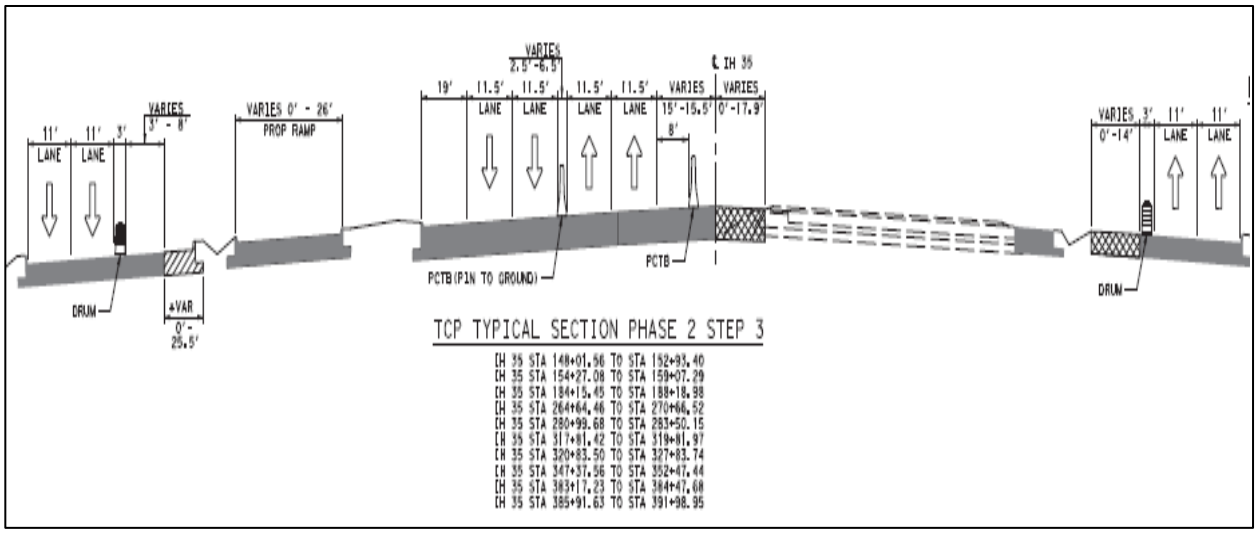


Figure 4.5. TCP Typical Section (I-35 Section 4B, McLennan County)

Traffic Data

The length of this project is 6.775 miles. Due to its length and location, the project has the potential to significantly impact traffic during the construction phase. The Statewide Planning Map provides a 2016 AADT of 132,225, as shown in Figure 4.6. The truck percentage for this segment is 20.3%.

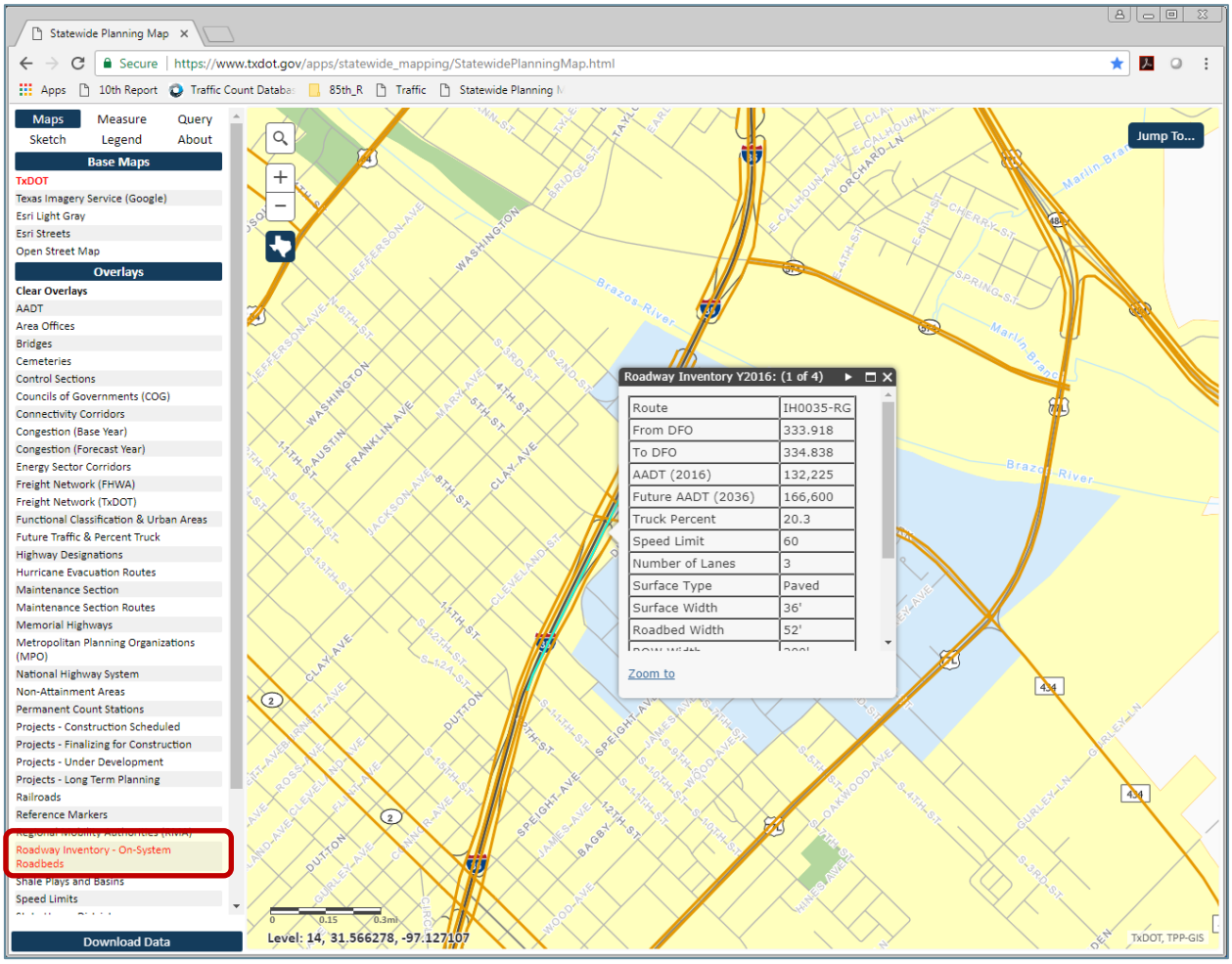


Figure 4.6. AADT from Statewide Planning Map (I-35 Section 4B, McLennan County)

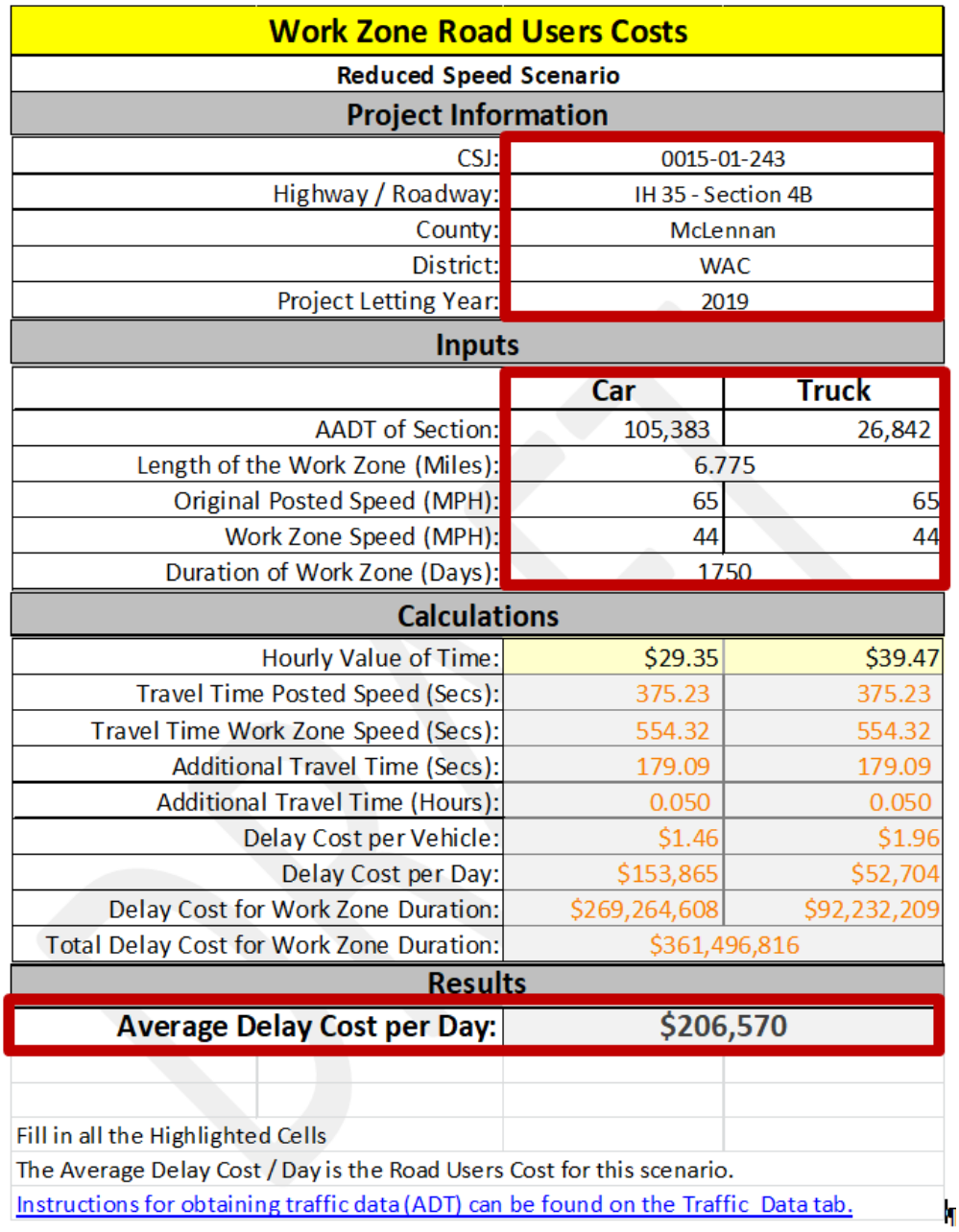
Work Zone RUC Estimation using the Statewide Calculator

The traffic modeler performed the following steps.

1. Reviewed the construction plans and identified significant sources of construction impacts on the traveling public. Reduction in operating speed will be one of the biggest sources of travel time impacts, based on the District's experience with similar reductions in capacity.

2. Obtained 2016 AADT from the Statewide Planning Maps along with the truck percentage.

3. Assessed the impacts on travel time (increase) from reduction in operational speed for the duration of the project. The daily RUC value estimates from this analysis are shown in Figure 4.7.



Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0015-01-243	
Highway / Roadway:	IH 35 - Section 4B	
County:	McLennan	
District:	WAC	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
AADT of Section:	105,383	26,842
Length of the Work Zone (Miles):	6.775	
Original Posted Speed (MPH):	65	65
Work Zone Speed (MPH):	44	44
Duration of Work Zone (Days):	1750	
Calculations		
Hourly Value of Time:	$29.35	$39.47
Travel Time Posted Speed (Secs):	375.23	375.23
Travel Time Work Zone Speed (Secs):	554.32	554.32
Additional Travel Time (Secs):	179.09	179.09
Additional Travel Time (Hours):	0.050	0.050
Delay Cost per Vehicle:	$1.46	$1.96
Delay Cost per Day:	$153,865	$52,704
Delay Cost for Work Zone Duration:	$269,264,608	$92,232,209
Total Delay Cost for Work Zone Duration:	$361,496,816	
Results		
Average Delay Cost per Day:	**$206,570**	
Fill in all the Highlighted Cells		
The Average Delay Cost / Day is the Road Users Cost for this scenario.		
Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.		

Figure 4.7. Daily RUC from Reduction in Operational Speeds

4. Assessed the impacts on travel time (increase) from reduction in posted speed for the duration of the project. This step was performed to identify the range of impacts. This may be the only information available for some projects, in the absence of operational speed estimates based on past experience or through traffic simulation and modeling. The daily RUC value estimates from this analysis are shown in Figure 4.8.

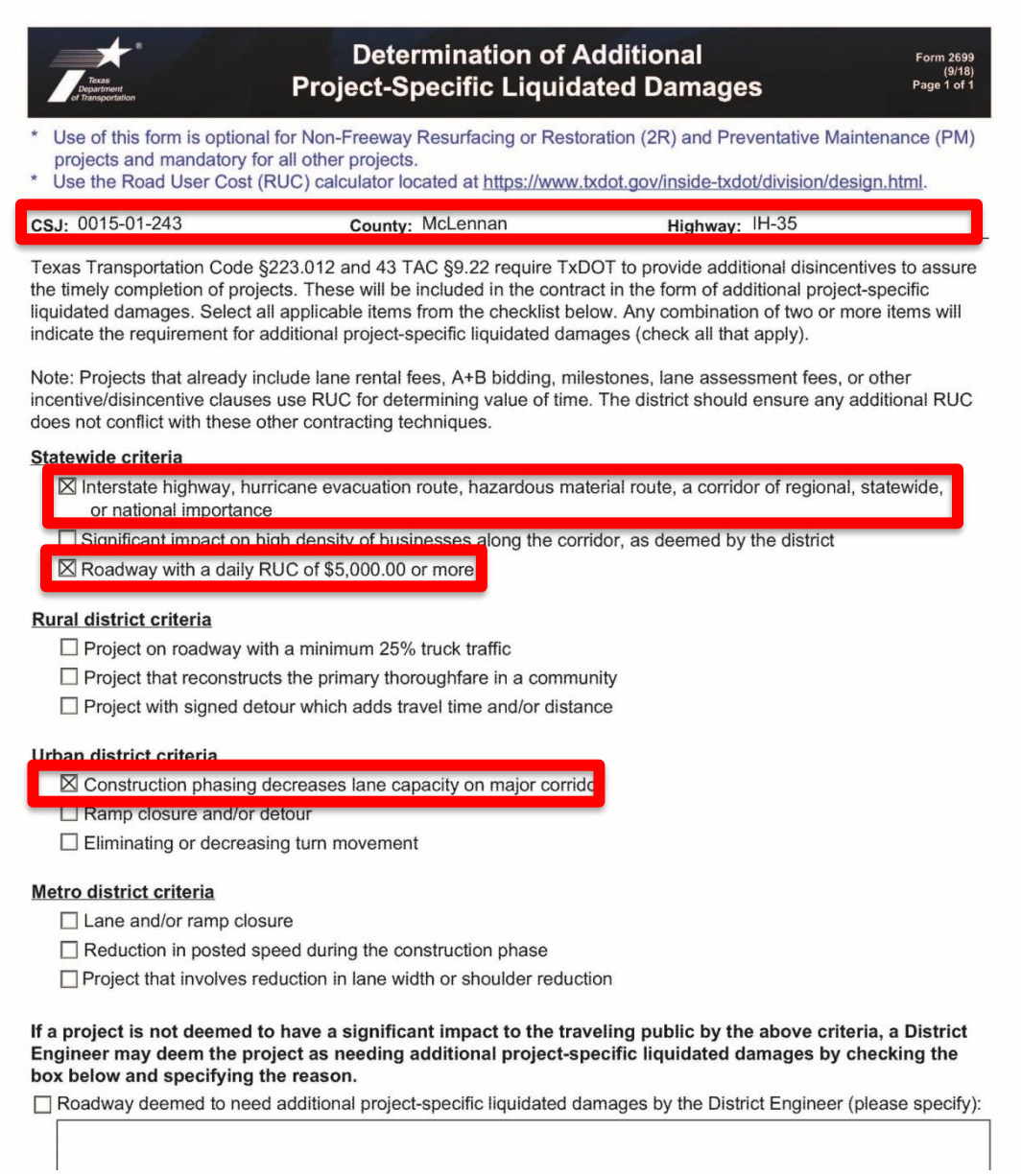
Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0015-01-243	
Highway / Roadway:	IH 35 - Section 4B	
County:	McLennan	
District:	WAC	
Project Letting Year:	2019	
Inputs		
	Car	Truck
AADT of Section:	105,383	26,842
Length of the Work Zone (Miles):	6.775	
Original Posted Speed (MPH):	65	65
Work Zone Speed (MPH):	55	55
Duration of Work Zone (Days):	1750	
Calculations		
Hourly Value of Time:	$29.35	$39.47
Travel Time Posted Speed (Secs):	375.23	375.23
Travel Time Work Zone Speed (Secs):	443.45	443.45
Additional Travel Time (Secs):	68.22	68.22
Additional Travel Time (Hours):	0.019	0.019
Delay Cost per Vehicle:	$0.56	$0.75
Delay Cost per Day:	$58,615	$20,078
Delay Cost for Work Zone Duration:	$102,576,993	$35,136,079
Total Delay Cost for Work Zone Duration:	$137,713,073	
Results		
Average Delay Cost per Day:	**$78,693**	
Fill in all the Highlighted Cells		
The Average Delay Cost / Day is the Road Users Cost for this scenario.		
Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.		

Figure 4.8. Daily RUC from Reduced Posted Speed

Project Road User Costs (RUC)

This corridor of IH-35 through the heart of Waco carries significant daily traffic. The IH-35 sections to the North and South of project limits consist of three mainlanes in each direction. During the construction phase, the segment from 12th Street to North Loop 340 will typically maintain two main lanes for travel in the NB and SB direction. This reduction in capacity has the potential to impact travel time through the work zone by reducing operating speeds significantly. In addition, the posted speeds through the construction work zone will be for 55 mph. The District estimates that operating speeds from the reduction in capacity will be around 44 mph.

Therefore, the project RUC can be between a minimum value of $78,693 and the maximum value of $206,570 per day. The actual value will be significantly dependent on the operating speeds through the corridor during the construction phase. The District plans on using APSLD of $50,000 per day for this project, as approved by the District Engineer and documented on the memo requesting concurrence for a reduced rate.



Determination of Additional Project-Specific Liquidated Damages

Form 2699 (9/18) Page 1 of 1

* Use of this form is optional for Non-Freeway Resurfacing or Restoration (2R) and Preventative Maintenance (PM) projects and mandatory for all other projects.
* Use the Road User Cost (RUC) calculator located at https://www.txdot.gov/inside-txdot/division/design.html.

CSJ: 0015-01-243 **County:** McLennan **Highway:** IH-35

Texas Transportation Code §223.012 and 43 TAC §9.22 require TxDOT to provide additional disincentives to assure the timely completion of projects. These will be included in the contract in the form of additional project-specific liquidated damages. Select all applicable items from the checklist below. Any combination of two or more items will indicate the requirement for additional project-specific liquidated damages (check all that apply).

Note: Projects that already include lane rental fees, A+B bidding, milestones, lane assessment fees, or other incentive/disincentive clauses use RUC for determining value of time. The district should ensure any additional RUC does not conflict with these other contracting techniques.

Statewide criteria

- ☒ Interstate highway, hurricane evacuation route, hazardous material route, a corridor of regional, statewide, or national importance
- ☐ Significant impact on high density of businesses along the corridor, as deemed by the district
- ☒ Roadway with a daily RUC of $5,000.00 or more

Rural district criteria

- ☐ Project on roadway with a minimum 25% truck traffic
- ☐ Project that reconstructs the primary thoroughfare in a community
- ☐ Project with signed detour which adds travel time and/or distance

Urban district criteria

- ☒ Construction phasing decreases lane capacity on major corrido
- ☐ Ramp closure and/or detour
- ☐ Eliminating or decreasing turn movement

Metro district criteria

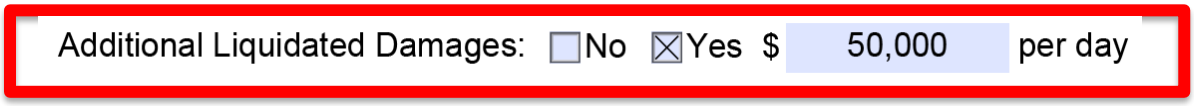
- ☐ Lane and/or ramp closure
- ☐ Reduction in posted speed during the construction phase
- ☐ Project that involves reduction in lane width or shoulder reduction

If a project is not deemed to have a significant impact to the traveling public by the above criteria, a District Engineer may deem the project as needing additional project-specific liquidated damages by checking the box below and specifying the reason.

☐ Roadway deemed to need additional project-specific liquidated damages by the District Engineer (please specify):

Figure 4.9. Form 2699 (I-35 Section 4B, McLennan County)

Complete the bottom section of Form 2699.



Additional Liquidated Damages: ☐ No ☒ Yes $ 50,000 per day

Example 5 – Rural Scenario/Reduced Speed

Interstate Widening

CSJ: 0271-02-055, etc.
Roadway: I-10
County: Austin
District: Yoakum
Type of Work: Construction of a freeway facility consisting of one additional main lane in each direction.

Description of General Project Scope

This project is for adding capacity to I-10 through construction of one additional mainlane in both eastbound (EB) and westbound (WB) directions from west of FM 3538 to east of Brazos River in Austin County. The existing roadway consists of two mainlanes in each direction. The length of the project is 10.178 miles, as shown in Figure 5.1. The project scope also includes conversion of two-way frontage roads sections to one way.

General Impacts during Construction

The construction work is performed in three phases. During these phases, various temporary closures and detours are needed. A general description of the Phasing is shown in Figure 5.2. In addition, during the construction phase, the posted speed for the main lanes will be reduced from 75 mph to 65 mph; the District completed a request for regulatory construction speed zone, as shown in Figure 5.3.

Traffic Data

The length of this project is 10.178 miles. Due to its length, the traffic volume varies across various segments of the corridor. The Statewide Planning Map provides 2016 AADT data for various segments of this project, as shown in Figure 5.4.

Construction Year and AADT Year

The latest AADT data at the time of estimating RUC is for the year 2016. The Statewide Planning Map also provides forecast 2036 AADT. Since the construction work and traffic impacting closures and speed reduction will occur during 2019 and beyond, the traffic modeler used a linear growth approach to account for potential impacts on increased traffic, as shown in Figure 5.5. This step requires additional expertise, therefore is considered optional.

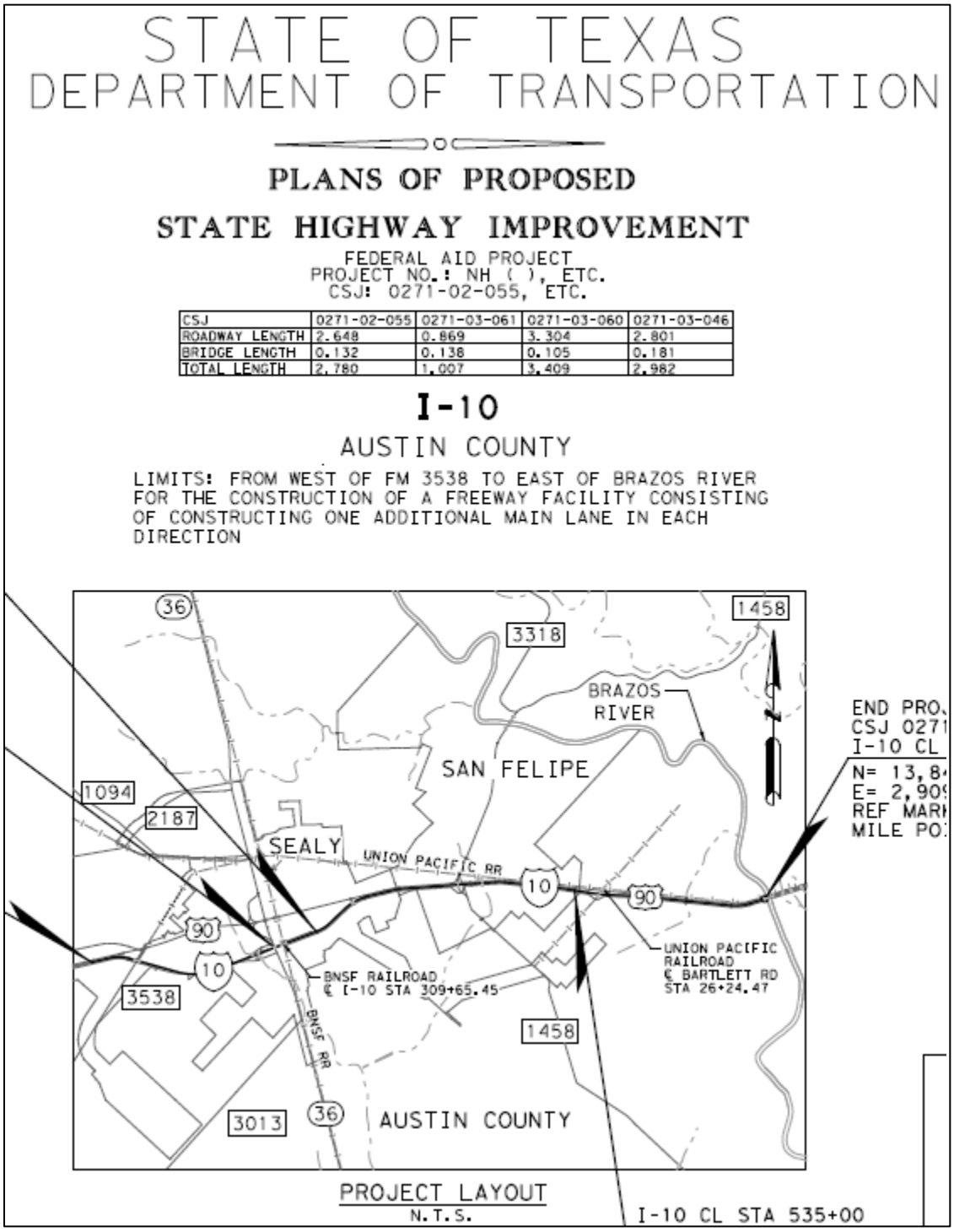


Figure 5.1. Project Title Sheet (I-10, Austin County)

	Step	Task
Phase 1	1A & 1B	New frontage road construction, cross street construction at US90 and Rexville Road,
	1C	Frontage road conversion from two-way traffic flow to one-way traffic flow (temporary signing and striping)
	1D-F	Miscellaneous prep work for median main lane construction
	2A	Main lane construction in the median, partial width construction of westbound frontage road in specific locations
	2B-F	Miscellaneous constructions tasks to be completed before Phase 2
Phase 2	1A	Main lane construction of remaining westbound main lanes, partial width re- construction of westbound frontage road
	1B	Completion of westbound main lane work in specific locations
	1C	Miscellaneous constructions tasks to be completed before Phase 3
Phase 3	1A	Main lane construction of the remaining eastbound main lanes, partial width construction of eastbounc frontage road
	1B	Completion of eastbound main lane work in specific locations, miscellaneous constructions tasks to be completed before installation of majority of median barrier
	2A	Partial width construction of eastbounc frontage road, installation of median barrier
	2B	Remaining main lane construction in specific locations, remaining installation of median barrier in, final striping and rumble strips
	3A-3F	Completion of SH 36 and FM 3538

Figure 5.2. General Phasing Description

Section	Section 1	Section 2	Section 3	Section 4
County	Austin	Austin	Austin	Austin
Highway	I-10	I-10	I-10	I-10
City Name (or Rural)	Sealy	Sealy	Sealy, San Felipe	San Felipe
Pre-construction Posted Speed	75 mph	75 mph	75 mph	75 mph
Proposed Construction Speed	65 mph	65 mph	65 mph	65 mph
Control-Section-Job	0271-02-055	0271-03-061	0271-03-060	0271-03-046
Beginning Mile Point	6.157	8.901	9.550	12.943
Ending Mile Point	8.901	9.550	12.943	15.916
Length	2.948 miles	0.840 miles	3.438 miles	2.968 miles
Project Number	NH ( )	NH ( )	NH ( )	NH ( )

Figure 5.3. Request for Regulatory Construction Speed Zone

From DFO	To DFO	Segment Length (miles)	AADT (2016)	AADT (2036)	Truck Percent
714.658	716.609	1.951	45,202	60,570	24.60%
716.609	716.648	0.039	45,202	60,570	24.60%
716.648	717.000	0.352	43,444	53,870	25.10%
717.000	719.041	2.041	43,444	53,870	25.10%
719.041	719.049	0.008	43,444	53,870	25.10%
719.049	720.733	1.684	51,263	69,720	23.10%
720.733	720.744	0.011	51,263	69,720	23.10%
720.744	720.869	0.125	56,752	74,910	22.10%
720.869	721.025	0.156	56,752	74,910	22.10%
721.025	721.566	0.541	56,752	74,910	22.10%
721.566	721.629	0.063	56,752	74,910	22.10%
721.629	721.891	0.262	56,752	74,910	22.10%
721.891	721.950	0.059	56,752	74,910	22.10%
721.950	722.433	0.483	56,752	74,910	22.10%
722.433	723.531	1.098	56,200	78,680	22.30%
723.531	726.160	2.629	56,200	78,680	22.30%
726.160	726.225	0.065	56,200	78,680	22.30%
726.225	726.285	0.06	56,200	73,060	22.30%
726.285	728.784	2.499	56,200	73,060	22.30%

Figure 5.4. Traffic Data from the Statewide Planning Map

Segme	From DFO	To DI	Segment Length (miles	AADT (2016)	AADT (2036)	Truck Percen	Est. 2019 Traffic Demand	Est. 2019 Traffic Demand (Cars)	Est. 2019 Traffic Demand (Trucks
A	714.658	716.65	0.239	45202	60570	0.246	47,507	35,820	11687
B	716.648	719.05	2.401	43444	53870	0.251	45,008	33,711	11297
C	719.049	720.74	1.695	51263	69720	0.231	54,032	41,550	12481
D	720.744	722.43	1.689	56752	74910	0.221	59,476	46,332	13144
E	722.433	726.23	3.792	56200	78680	0.223	59,572	46,287	13285
F	726.225	728.78	0.362	56200	73060	0.223	58,729	45,632	13097

Figure 5.5. Forecast 2019 Traffic Demand

Work Zone RUC Estimation

The traffic modeler performed the following steps.

1. Reviewed the construction plans and identified significant sources of construction impacts on the traveling public. Reduction in speed will be one of the biggest sources of travel time impacts.

2. Obtained 2016 AADT from the Statewide Planning Maps along with 2036 demand forecast and truck percentages for various segments of the construction corridor.

3. Used linear growth factors to forecast 2019 demand.

4. Assessed the impacts on travel time (increased) from the reduction in speed (Regulatory Construction Speed) for the duration of the project.

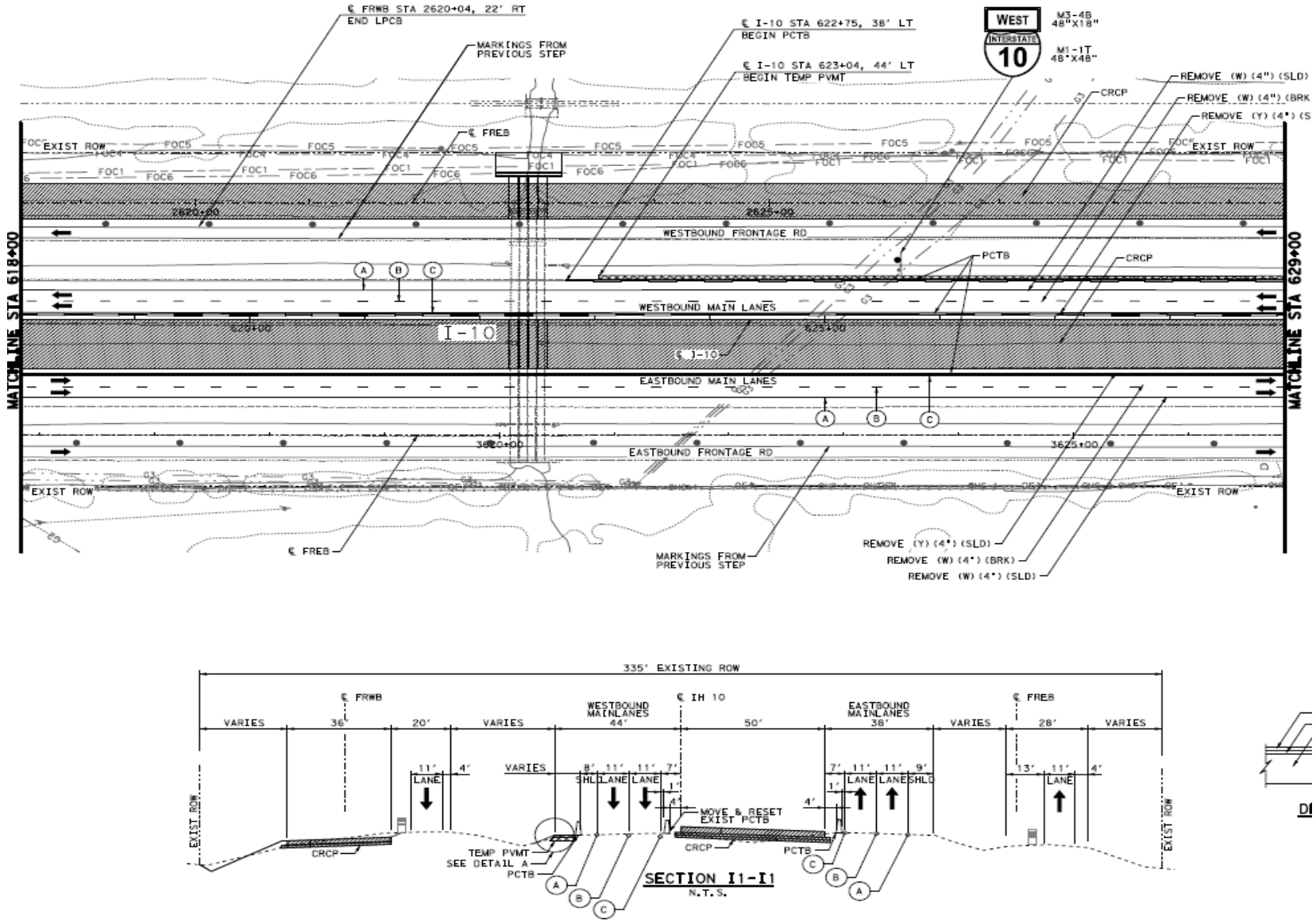


Figure 5.6. Traffic Control Plan – Phase 1

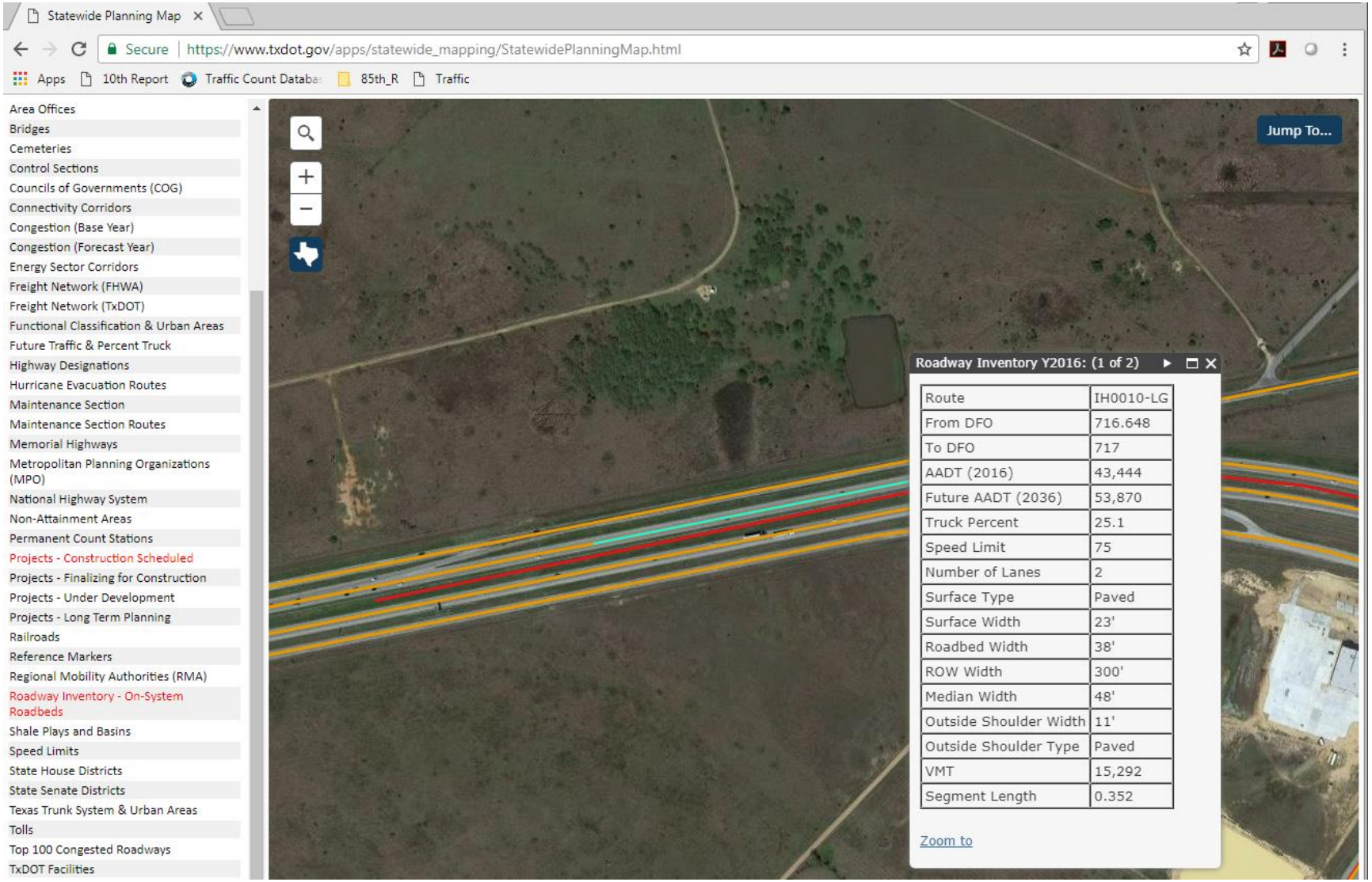


Figure 5.7. Statewide Planning Map with Two Overlays

Texas Department of Transportation

Determination of Additional Project-Specific Liquidated Damages

Form 2699 (9/18) Page 1 of 1

* Use of this form is optional for Non-Freeway Resurfacing or Restoration (2R) and Preventative Maintenance (PM) projects and mandatory for all other projects.
* Use the Road User Cost (RUC) calculator located at https://www.txdot.gov/inside-txdot/division/design.html.

CSJ: 0271-02-055, etc. **County:** Austin **Highway:** IH-10

Texas Transportation Code §223.012 and 43 TAC §9.22 require TxDOT to provide additional disincentives to assure the timely completion of projects. These will be included in the contract in the form of additional project-specific liquidated damages. Select all applicable items from the checklist below. Any combination of two or more items will indicate the requirement for additional project-specific liquidated damages (check all that apply).

Note: Projects that already include lane rental fees, A+B bidding, milestones, lane assessment fees, or other incentive/disincentive clauses use RUC for determining value of time. The district should ensure any additional RUC does not conflict with these other contracting techniques.

Statewide criteria

- ☒ Interstate highway, hurricane evacuation route, hazardous material route, a corridor of regional, statewide, or national importance
- ☐ Significant impact on high density of businesses along the corridor, as deemed by the district
- ☒ Roadway with a daily RUC of $5,000.00 or more

Rural district criteria

- ☒ Project on roadway with a minimum 25% truck traffic
- ☐ Project that reconstructs the primary thoroughfare in a community
- ☐ Project with signed detour which adds travel time and/or distance

Urban district criteria

- ☐ Construction phasing decreases lane capacity on major corridor
- ☐ Ramp closure and/or detour
- ☐ Eliminating or decreasing turn movement

Metro district criteria

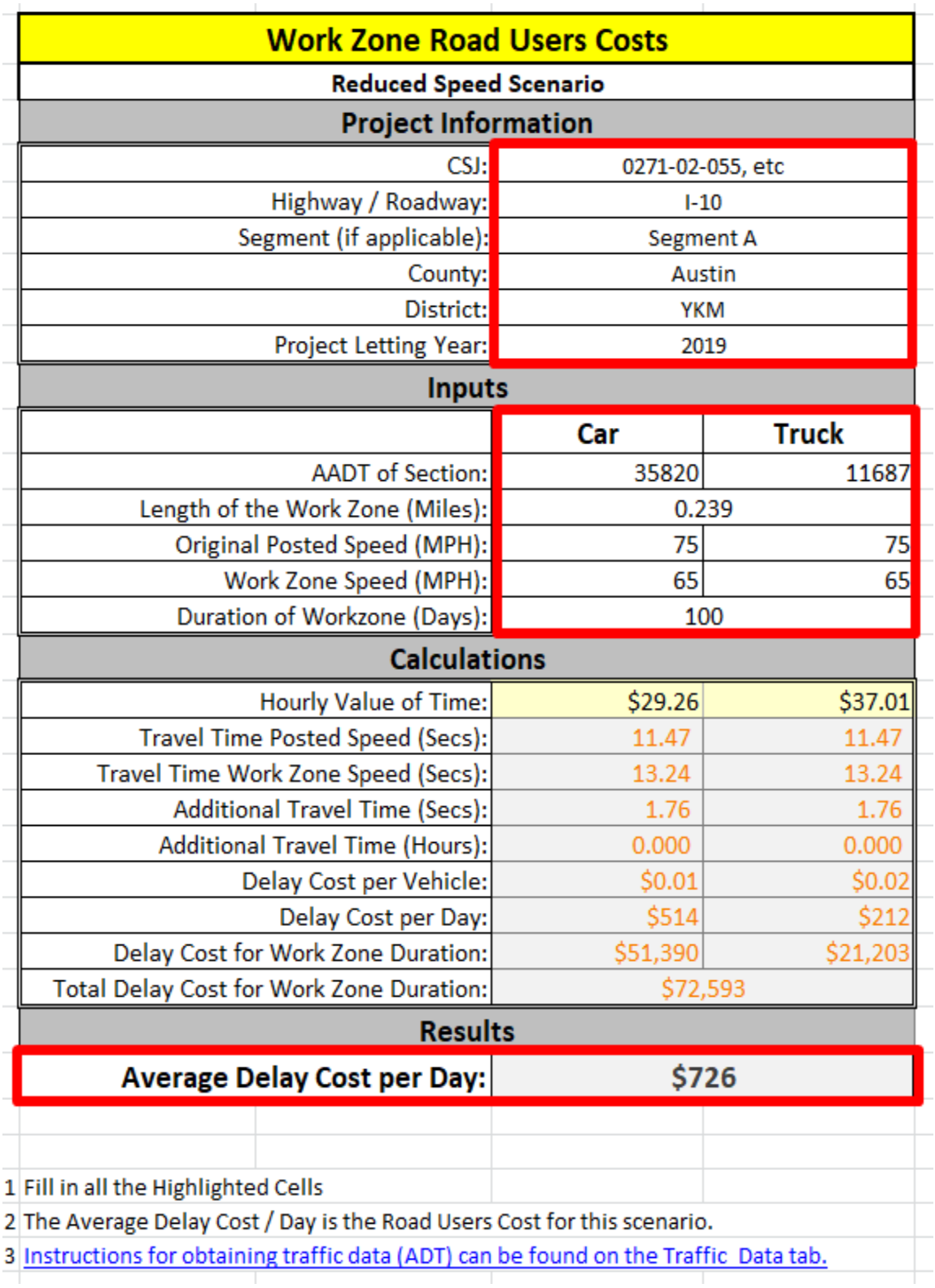
- ☐ Lane and/or ramp closure
- ☐ Reduction in posted speed during the construction phase
- ☐ Project that involves reduction in lane width or shoulder reduction

If a project is not deemed to have a significant impact to the traveling public by the above criteria, a District Engineer may deem the project as needing additional project-specific liquidated damages by checking the box below and specifying the reason.

☐ Roadway deemed to need additional project-specific liquidated damages by the District Engineer (please specify):

Additional Liquidated Damages: ☐No ☐Yes $ _____ per day

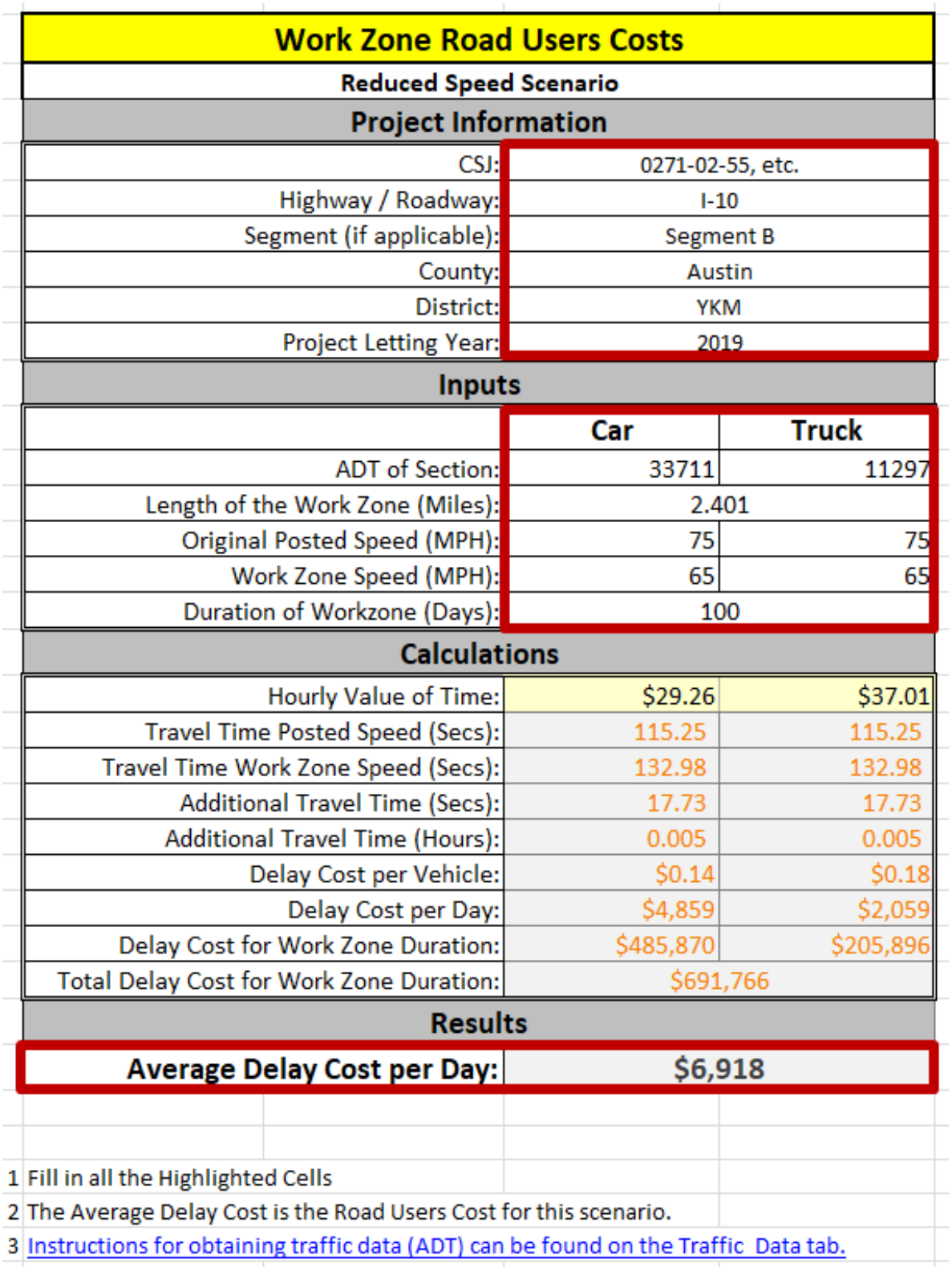
Figure 5.8. Form 2699 (I-10, Austin County)



Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0271-02-055, etc	
Highway / Roadway:	I-10	
Segment (if applicable):	Segment A	
County:	Austin	
District:	YKM	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
AADT of Section:	35820	11687
Length of the Work Zone (Miles):	0.239	
Original Posted Speed (MPH):	75	75
Work Zone Speed (MPH):	65	65
Duration of Workzone (Days):	100	
Calculations		
Hourly Value of Time:	$29.26	$37.01
Travel Time Posted Speed (Secs):	11.47	11.47
Travel Time Work Zone Speed (Secs):	13.24	13.24
Additional Travel Time (Secs):	1.76	1.76
Additional Travel Time (Hours):	0.000	0.000
Delay Cost per Vehicle:	$0.01	$0.02
Delay Cost per Day:	$514	$212
Delay Cost for Work Zone Duration:	$51,390	$21,203
Total Delay Cost for Work Zone Duration:	$72,593	
Results		
Average Delay Cost per Day:	**$726**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost / Day is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

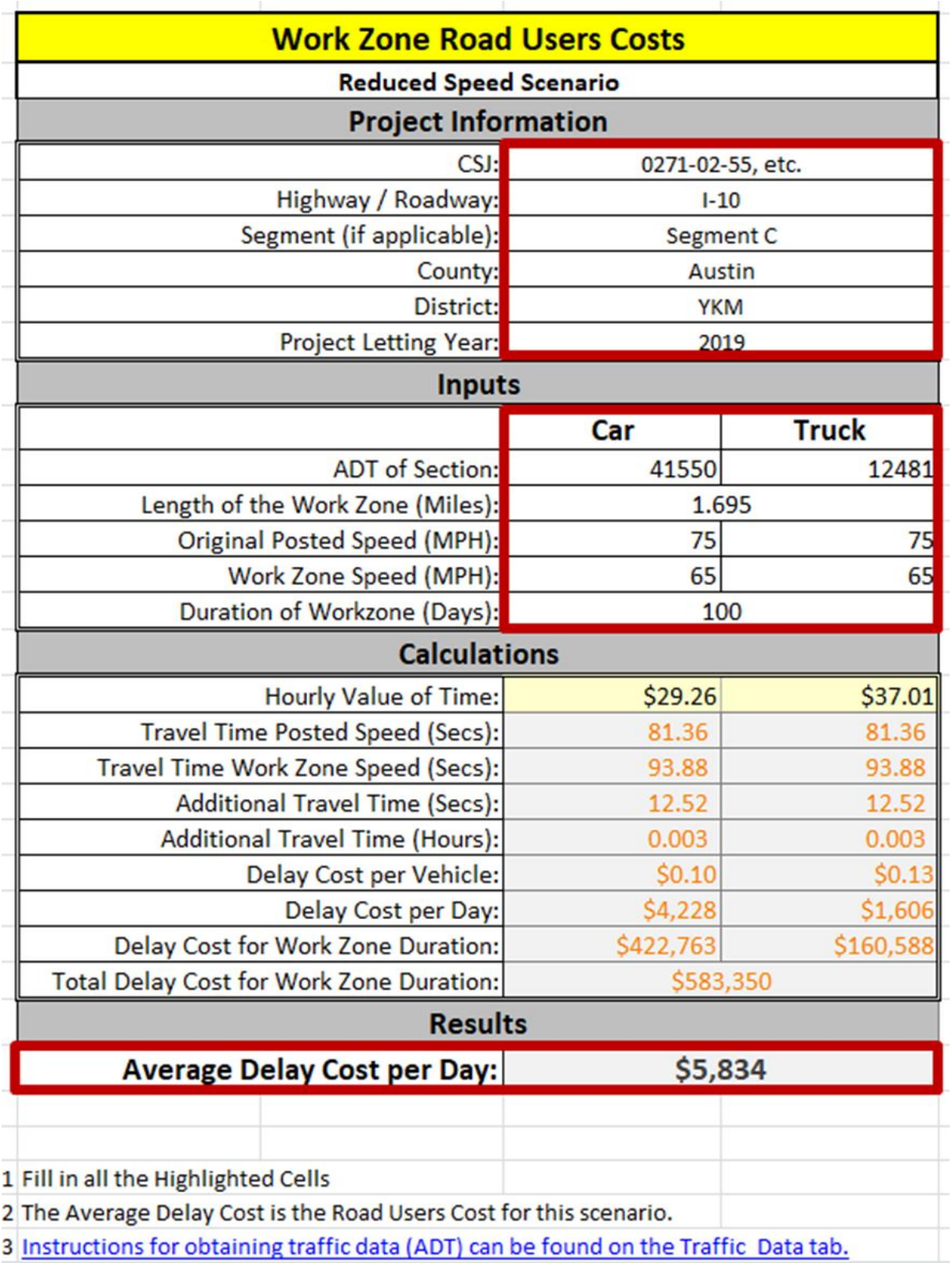
Figure 5.9. Additional Travel Time from Speed Reduction (Segment A)



Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0271-02-55, etc.	
Highway / Roadway:	I-10	
Segment (if applicable):	Segment B	
County:	Austin	
District:	YKM	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
ADT of Section:	33711	11297
Length of the Work Zone (Miles):	2.401	
Original Posted Speed (MPH):	75	75
Work Zone Speed (MPH):	65	65
Duration of Workzone (Days):	100	
Calculations		
Hourly Value of Time:	$29.26	$37.01
Travel Time Posted Speed (Secs):	115.25	115.25
Travel Time Work Zone Speed (Secs):	132.98	132.98
Additional Travel Time (Secs):	17.73	17.73
Additional Travel Time (Hours):	0.005	0.005
Delay Cost per Vehicle:	$0.14	$0.18
Delay Cost per Day:	$4,859	$2,059
Delay Cost for Work Zone Duration:	$485,870	$205,896
Total Delay Cost for Work Zone Duration:	$691,766	
Results		
Average Delay Cost per Day:	**$6,918**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Figure 5.10. Additional Travel Time from Speed Reduction (Segment B)



Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0271-02-55, etc.	
Highway / Roadway:	I-10	
Segment (if applicable):	Segment C	
County:	Austin	
District:	YKM	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
ADT of Section:	41550	12481
Length of the Work Zone (Miles):	1.695	
Original Posted Speed (MPH):	75	75
Work Zone Speed (MPH):	65	65
Duration of Workzone (Days):	100	
Calculations		
Hourly Value of Time:	$29.26	$37.01
Travel Time Posted Speed (Secs):	81.36	81.36
Travel Time Work Zone Speed (Secs):	93.88	93.88
Additional Travel Time (Secs):	12.52	12.52
Additional Travel Time (Hours):	0.003	0.003
Delay Cost per Vehicle:	$0.10	$0.13
Delay Cost per Day:	$4,228	$1,606
Delay Cost for Work Zone Duration:	$422,763	$160,588
Total Delay Cost for Work Zone Duration:	$583,350	
Results		
Average Delay Cost per Day:	**$5,834**	

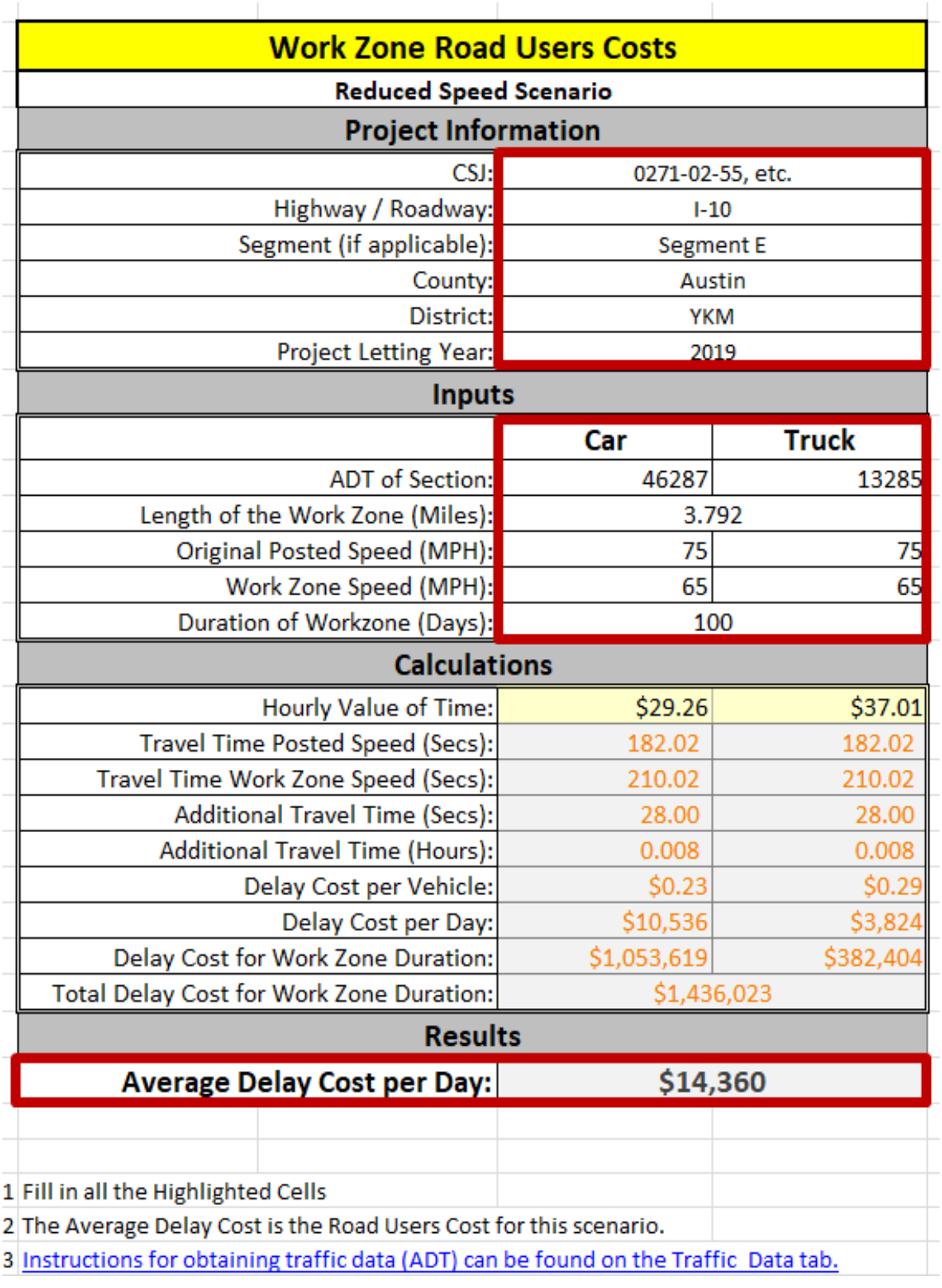
1 Fill in all the Highlighted Cells
2 The Average Delay Cost is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Figure 5.11. Additional Travel Time from Speed Reduction (Segment C)

Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0271-02-55, etc.	
Highway / Roadway:	I-10	
Segment (if applicable):	Segment D	
County:	Austin	
District:	YKM	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
ADT of Section:	46332	13144
Length of the Work Zone (Miles):	1.689	
Original Posted Speed (MPH):	75	75
Work Zone Speed (MPH):	65	65
Duration of Workzone (Days):	100	
Calculations		
Hourly Value of Time:	$29.26	$37.01
Travel Time Posted Speed (Secs):	81.07	81.07
Travel Time Work Zone Speed (Secs):	93.54	93.54
Additional Travel Time (Secs):	12.47	12.47
Additional Travel Time (Hours):	0.003	0.003
Delay Cost per Vehicle:	$0.10	$0.13
Delay Cost per Day:	$4,698	$1,685
Delay Cost for Work Zone Duration:	$469,750	$168,519
Total Delay Cost for Work Zone Duration:	$638,269	
Results		
Average Delay Cost per Day:	**$6,383**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

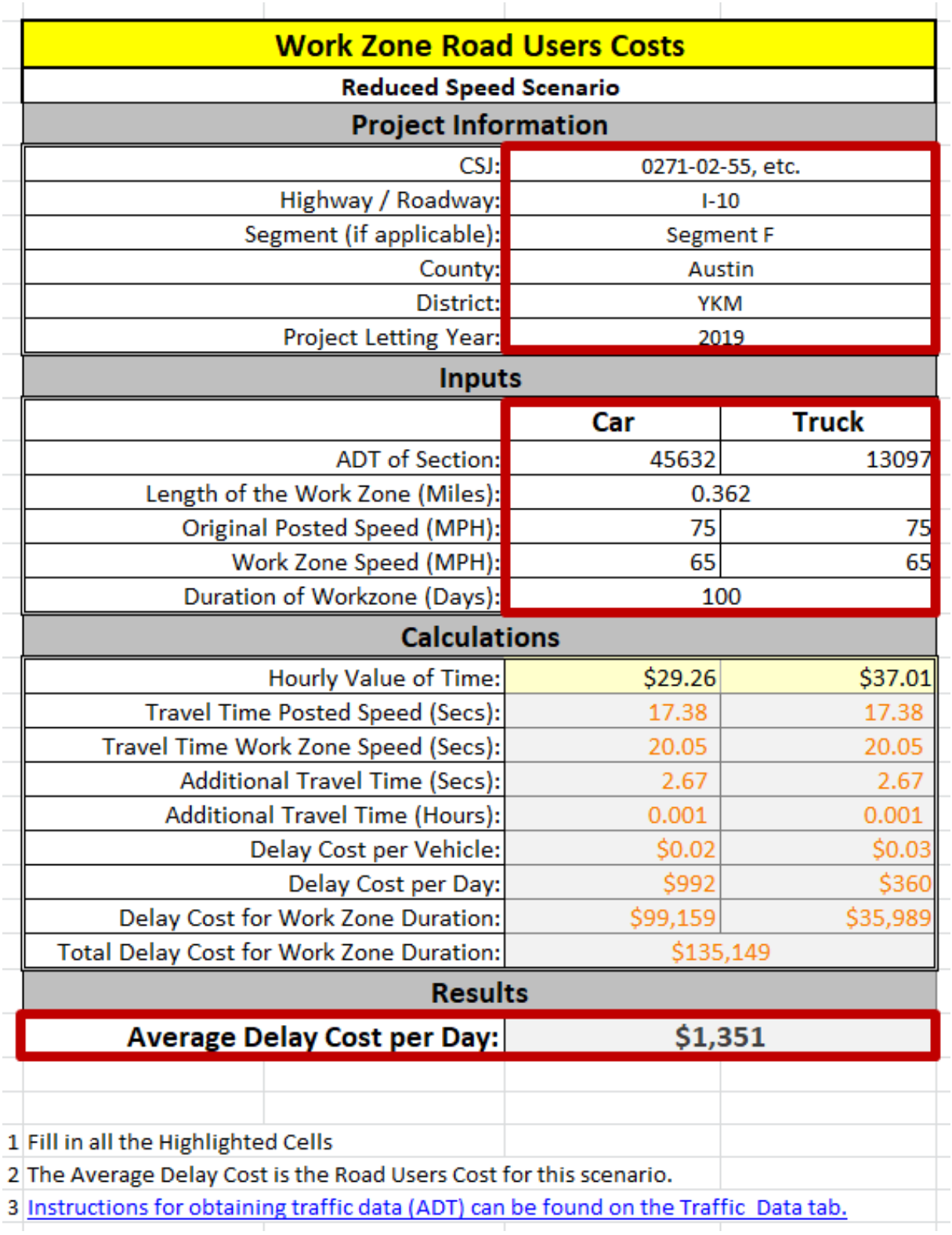
Figure 5.12. Additional Travel Time from Speed Reduction (Segment D)



Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0271-02-55, etc.	
Highway / Roadway:	I-10	
Segment (if applicable):	Segment E	
County:	Austin	
District:	YKM	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
ADT of Section:	46287	13285
Length of the Work Zone (Miles):	3.792	
Original Posted Speed (MPH):	75	75
Work Zone Speed (MPH):	65	65
Duration of Workzone (Days):	100	
Calculations		
Hourly Value of Time:	$29.26	$37.01
Travel Time Posted Speed (Secs):	182.02	182.02
Travel Time Work Zone Speed (Secs):	210.02	210.02
Additional Travel Time (Secs):	28.00	28.00
Additional Travel Time (Hours):	0.008	0.008
Delay Cost per Vehicle:	$0.23	$0.29
Delay Cost per Day:	$10,536	$3,824
Delay Cost for Work Zone Duration:	$1,053,619	$382,404
Total Delay Cost for Work Zone Duration:	$1,436,023	
Results		
Average Delay Cost per Day:	**$14,360**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Figure 5.13. Additional Travel Time from Speed Reduction (Segment E)



Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:	0271-02-55, etc.	
Highway / Roadway:	I-10	
Segment (if applicable):	Segment F	
County:	Austin	
District:	YKM	
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
ADT of Section:	45632	13097
Length of the Work Zone (Miles):	0.362	
Original Posted Speed (MPH):	75	75
Work Zone Speed (MPH):	65	65
Duration of Workzone (Days):	100	
Calculations		
Hourly Value of Time:	$29.26	$37.01
Travel Time Posted Speed (Secs):	17.38	17.38
Travel Time Work Zone Speed (Secs):	20.05	20.05
Additional Travel Time (Secs):	2.67	2.67
Additional Travel Time (Hours):	0.001	0.001
Delay Cost per Vehicle:	$0.02	$0.03
Delay Cost per Day:	$992	$360
Delay Cost for Work Zone Duration:	$99,159	$35,989
Total Delay Cost for Work Zone Duration:	$135,149	
Results		
Average Delay Cost per Day:	**$1,351**	

1 Fill in all the Highlighted Cells
2 The Average Delay Cost is the Road Users Cost for this scenario.
3 Instructions for obtaining traffic data (ADT) can be found on the Traffic Data tab.

Figure 5.14. Additional Travel Time from Speed Reduction (Segment F)

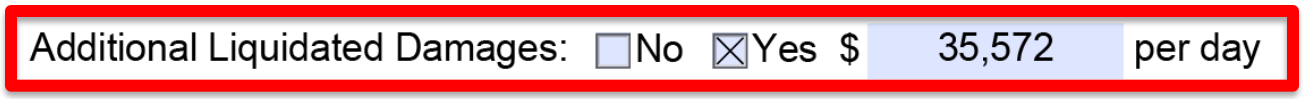
Work Zone RUC Estimation

The project RUC can be calculated by summing up the segment RUC values shown in Table 5.4. The daily RUC for this construction project based on increased travel time due to the reduction in speed is $35,572 and can be used in the construction contract for additional liquidated damages.

Segme	From DFO	To DI	Segment Length (miles	AADT (2016)	AADT (2036)	Truck Percen	Est. 2019 Traffic Demand	Est. 2019 Traffic Demand (Cars)	Est. 2019 Traffic Demand (Trucks	Segment RUC
A	714.658	716.65	0.239	45202	60570	0.246	47,507	35,820	11687	$726
B	716.648	719.05	2.401	43444	53870	0.251	45,008	33,711	11297	$6,918
C	719.049	720.74	1.695	51263	69720	0.231	54,032	41,550	12481	$5,834
D	720.744	722.43	1.689	56752	74910	0.221	59,476	46,332	13144	$6,383
E	722.433	726.23	3.792	56200	78680	0.223	59,572	46,287	13285	$14,360
F	726.225	728.78	0.362	56200	73060	0.223	58,729	45,632	13097	$1,351

Figure 5.15. Segment RUC Values

Complete the bottom section of Form 2699.



Example 6 – Imprecise Application of the Tool

This example highlights the significant variables in the tool and potential sources of calculation errors caused by incorrect application.

IH 18 is a rural interstate highway consisting of two lanes in each direction. TxDOT is preparing to let a contract to mill and overlay the full width of each direction on a fifteen-mile section and needs to determine the road user cost due to delay. The general notes specify that two lanes must be open in each direction between 6:00 am and 7:00 pm. During all other times, one lane may be closed in each direction.

To analyse this, the modeler obtained AADT (40,000) and truck percentage (20%) for the roadway. The existing speed for the road is 70 mph, and the modeler determined that lane closure would likely cause speed to decrease to 55 mph. Using the Reduced Speed Scenario worksheet, the modeler determined that the Average Delay Cost per Day would be $73,342, as shown in Figure 6.1.

A value exceeding $70,000 per day is very large for a project of this type. Upon further review, the modeler realized that using the full traffic volume and full project length may not be reasonable. With lane closure hours limited to the overnight period, only overnight motorists will be impacted by the project. The modeler obtained hourly count data and discovered that only 25% of the daily traffic volume is during the 7:00pm to 6:00am period. Additionally, due to the nature of this project, the lane closure would never be for the full length of both directions of the freeway; it is much more likely that the lane closure would only occur in one direction at a time and for a much shorter distance. As such, the modeler reduced the work zone length from 15 miles to 2 miles and reduced the traffic volume from the full AADT for both directions to half of the AADT (to account for only one direction being impacted at a time) multiplied by 25% so that it would represent the overnight volume.

With the revised inputs, the modeler obtained a more modest result of $1,222 per day, shown in Figure 6.2. This revised figure better estimates the impacts that road users will experience as a result of this particular project.

Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:		
Highway / Roadway:		
County:		
District:		
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
AADT of Section:	32000	8000
Length of the Work Zone (Miles):	15	
Original Posted Speed (MPH):	70	70
Work Zone Speed (MPH):	55	55
Duration of Work Zone (Days):	200	
Calculations		
Hourly Value of Time:	$29.35	$39.47
Travel Time Posted Speed (Secs):	771.43	771.43
Travel Time Work Zone Speed (Secs):	981.82	981.82
Additional Travel Time (Secs):	210.39	210.39
Additional Travel Time (Hours):	0.058	0.058
Delay Cost per Vehicle:	$1.72	$2.31
Delay Cost per Day:	$54,888	$18,454
Delay Cost for Work Zone Duration:	$10,977,662	$3,690,701
Total Delay Cost for Work Zone Duration:	$14,668,364	
Results		
Average Delay Cost per Day:	**$73,342**	

Figure 6.1 Additional Travel Time from Speed Reduction

Work Zone Road Users Costs		
Reduced Speed Scenario		
Project Information		
CSJ:		
Highway / Roadway:		
County:		
District:		
Project Letting Year:	2019	
Inputs		
	Car	**Truck**
AADT of Section:	4000	1000
Length of the Work Zone (Miles):	2	
Original Posted Speed (MPH):	70	70
Work Zone Speed (MPH):	55	55
Duration of Work Zone (Days):	200	
Calculations		
Hourly Value of Time:	$29.35	$39.47
Travel Time Posted Speed (Secs):	102.86	102.86
Travel Time Work Zone Speed (Secs):	130.91	130.91
Additional Travel Time (Secs):	28.05	28.05
Additional Travel Time (Hours):	0.008	0.008
Delay Cost per Vehicle:	$0.23	$0.31
Delay Cost per Day:	$915	$308
Delay Cost for Work Zone Duration:	$182,961	$61,512
Total Delay Cost for Work Zone Duration:	$244,473	
Results		
Average Delay Cost per Day:	**$1,222**	

Figure 6.2 Additional Travel Time from Speed Reduction

5. Memorandum – Request for Concurrence - Reduced Rate of APSLD

Overview

When using a dollar amount lower than the RUC calculated dollar amount, prepare a memorandum recommending a reduced rate of APSLD based on comparison with projects of a similar magnitude and scope. Include the applicable sheet(s) from the RUC estimation tool as an attachment.

Districts may modify the sample memorandum as needed. The District Engineer should sign the memorandum to authorize use of the reduced rate, but signature authority can be delegated to the Director of Construction and to Transportation Planning and Programing Director.

The memorandum serves as documentation of the District's efforts to ensure sufficient competitive bidding as required by Texas Transportation Code §223.001.

If you have questions regarding the memorandum, contact the Design Division at: 512/416-2051 or DES_PD_WEBHELP@TXDOT.gov.

6. Appendix A – Obtaining Traffic Data for RUC Calculations

Overview of Traffic Data and Sources

The Transportation Planning and Programming Division (TPP) recommends obtaining Annual Average Daily Traffic (AADT) data from the Statewide Planning Map or STARS II.

The Statewide Planning Map is an easy-to-use resource for obtaining bi-directional (two-way) traffic data, as well as traffic data for frontage roads. It would therefore be sufficient for performing Road User Cost (RUC) calculations where directionality is not a requirement.

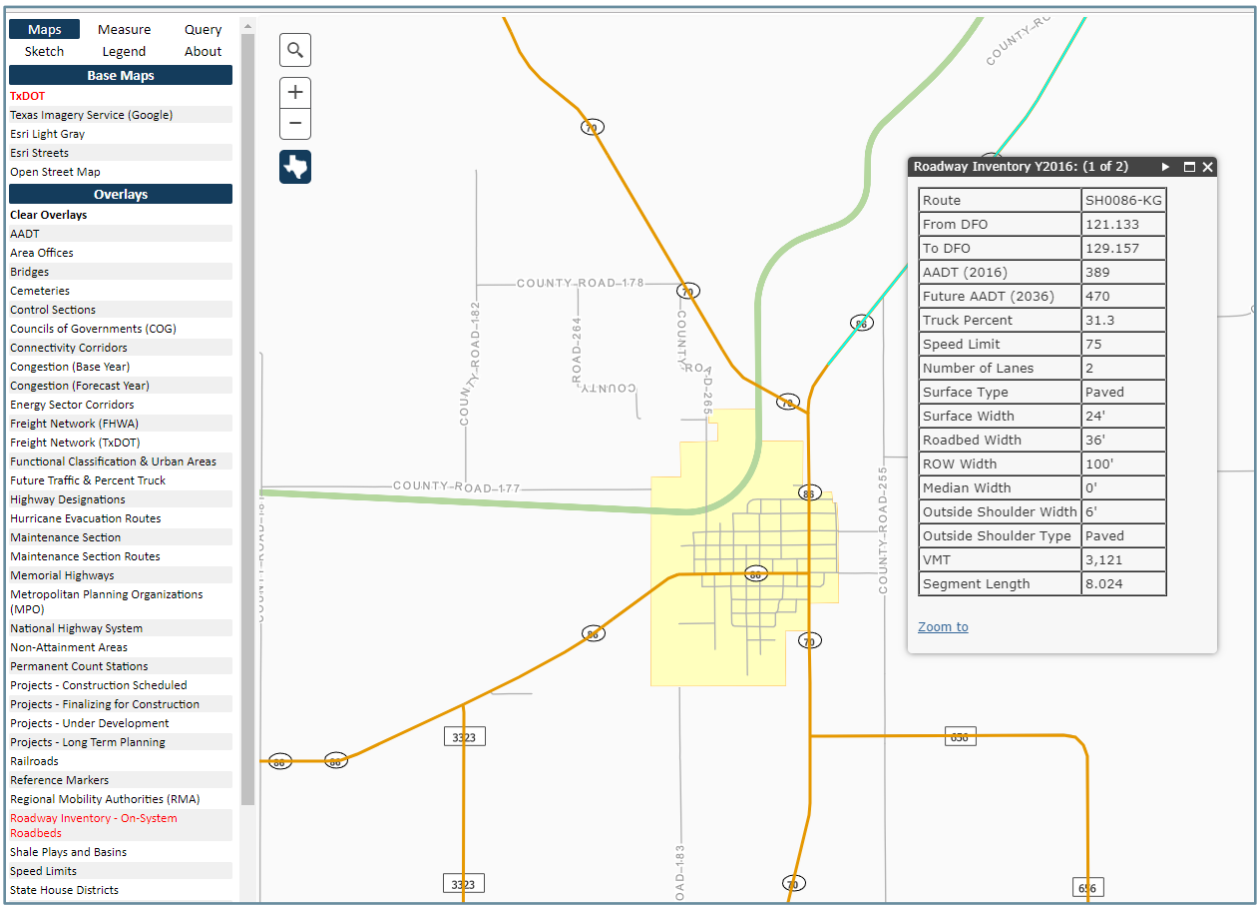


Figure A.1. Statewide Planning Map

Projects that require traffic data for a single direction could instead utilize the STARS II system.

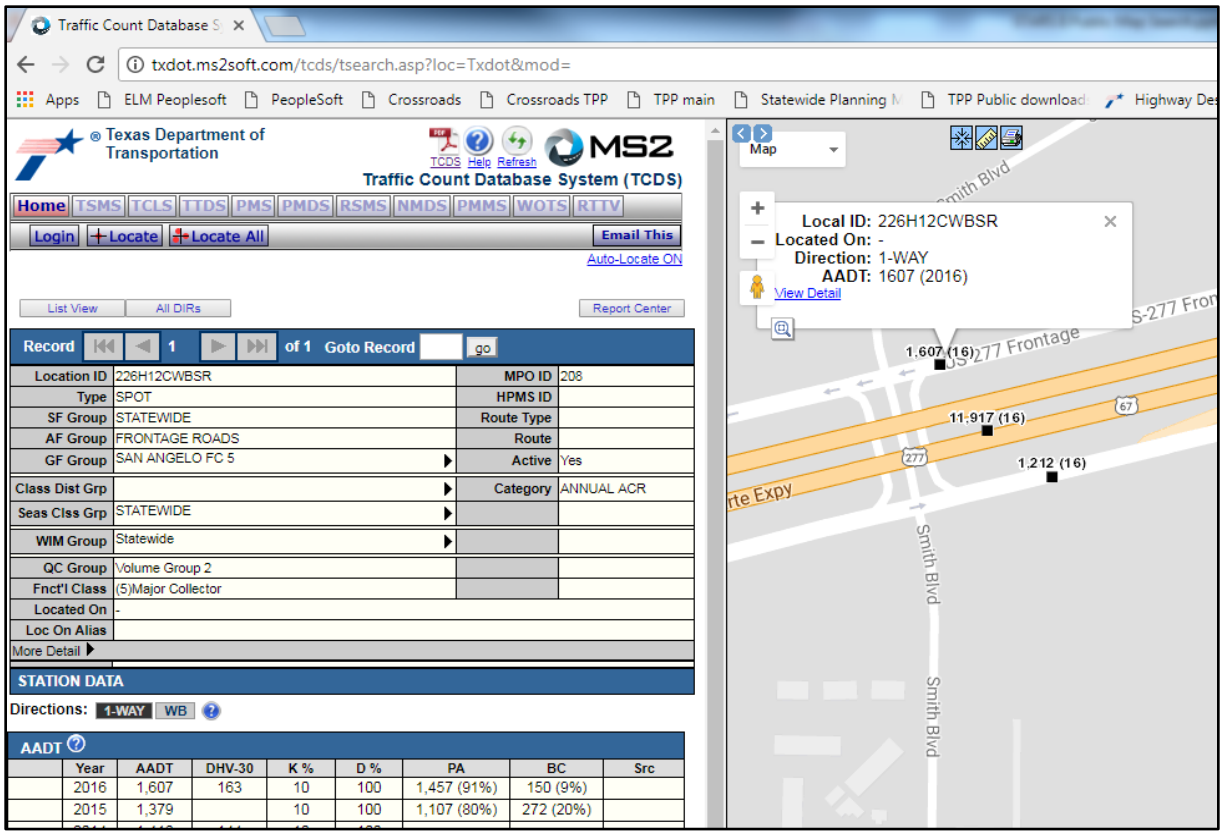


Figure A.2. STARS II

Sources of AADT data other than the Statewide Planning Map or STARS II could have other considerations or limitations that may not be suitable for RUC calculations.

Exceptions to AADT Source Recommendations

In some cases, AADT[1] from the Statewide Planning Map or STARS II may prove to be insufficient for RUC calculations. Exceptions to the recommendations made in this document are possible on a case-by-case basis as applicable. For example, when performing the calculation, a user may need to coordinate special counts, obtain seasonal data, or analyze intersection turning movements.

1. All recommendations within this document pertain to Annual Average Daily Traffic (AADT), which is annualized and certified traffic data. AADT can be considered a type of Average Daily Traffic (ADT). It is possible to use ADT figures for RUC calculations other than these annualized figures, but that would no longer be considered AADT. This is the reason that the calculation tool and other documents make reference to "ADT" broadly instead of "AADT." On the calculation tool, the traffic input must be ADT, and whenever practical it is recommended to use AADT specifically.

Statewide Planning Map User Guide

The Statewide Planning Map is an online map that is available to the public and does not require TxDOT credentials. Familiarity with online maps is beneficial for using the Statewide Planning Map. Features are similar to Google Maps. The Statewide Planning Map includes multiple overlays that allow a user to plot various roadway attributes. One such overlay, Roadway Inventory – On-System Roadbeds, includes certified annual traffic data suitable for RUC calculations.

As stated earlier, the Statewide Planning Map includes bi-directional (two-way) traffic data for the main lanes, as well as traffic data for frontage roads. If the analysis requires traffic data for a single direction on the main lanes, please proceed to the section: STARS II User Guide – Map Search.

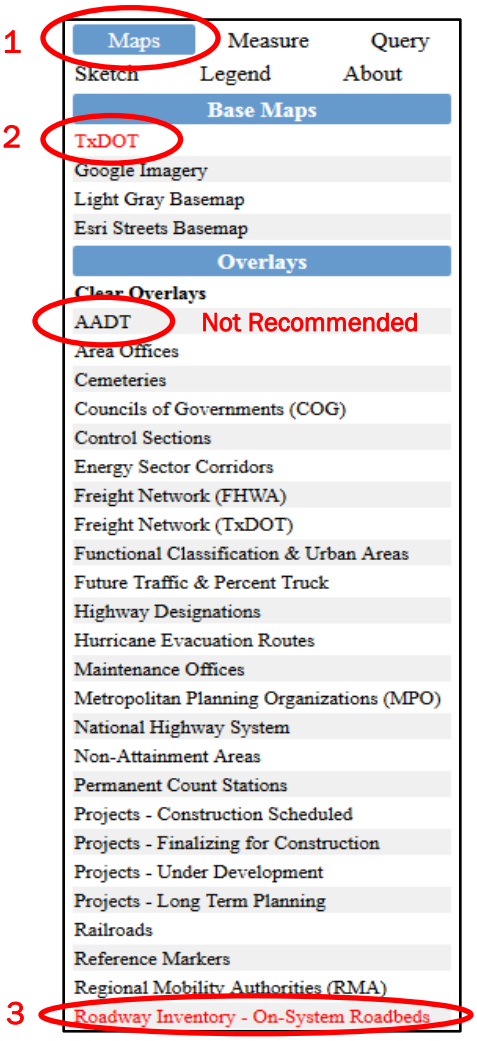
Access, Set the Base Map, and Overlay

Access the Statewide Planning Map website at the following URL:
https://www.txdot.gov/apps/statewide_mapping/StatewidePlanningMap.html

1. In the upper left corner, select **Maps**.
   Note – The "Query" option also allows a user to search for AADT data, but the way the data are presented is not recommended for RUC Calculations.

2. Select the base map. Use the **TxDOT** base map by default, which displays official TxDOT roadway linework along with polygons such as District, County, City, and UZA boundaries. If aerial imagery will help to locate the desired roadway segment, use the **Google Imagery** base map instead.

3. Select the overlay named **Roadway Inventory – On-System Roadbeds**. All roadbeds that include Roadway Inventory data will now be highlighted in orange/brown on the map. Please note that only On-System roadbeds include Roadway Inventory data in the Statewide Planning Map.
   Note – It is important to use the **Roadway Inventory – On-System Roadbeds** overlay and not the overlay named **AADT** for reasons explained in the next section.



Roadway Inventory – On-System Roadbeds Overlay

Before continuing, a description of the **Roadway Inventory - On-System Roadbeds** overlay is necessary. The certified annual Roadway Inventory file is the source of data for this overlay.

Traffic data are presented in a linear format (coded to TxDOT linework).

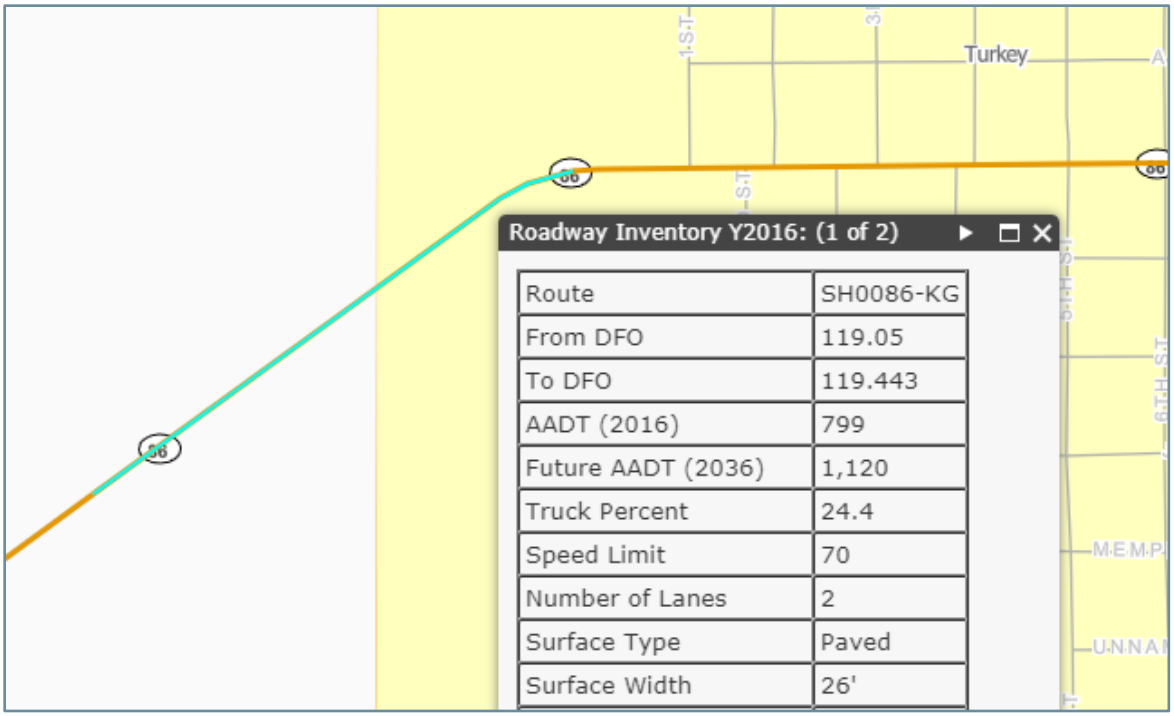


Figure A.3. Roadway Segment Selection

As mentioned earlier, the **AADT** overlay on the Statewide Planning Map is <u>not</u> recommended for the purpose of RUC calculation because it combines mainlanes and frontage AADT into a single value. Furthermore, data are presented in point format (based on traffic stations), and additional analysis is required to determine the correct AADT value between any two given points. When analysis is necessary at the traffic station level, STARS II is the recommended resource.

Zoom to an Area of Interest

There are three options for zooming to an area of interest.

1. Use the search function in the upper left corner of the map panel to search for a specific highway, city, county, or District. After typing the name, wait for the options to auto-populate. (This is often more useful than clicking the magnifying glass.) Keep in mind that you must search highways using the standard naming convention, which includes a two-letter Highway System prefix, a four-digit number with leading zeros if necessary, and a suffix if applicable. Examples include “SH0199” and “IH0035E.”

2. Use the plus and minus buttons on the upper left corner of the map panel to zoom in, then pan by clicking the mouse.

3. Simply double click with the mouse or use the scroll wheel to zoom in or out on the map itself.

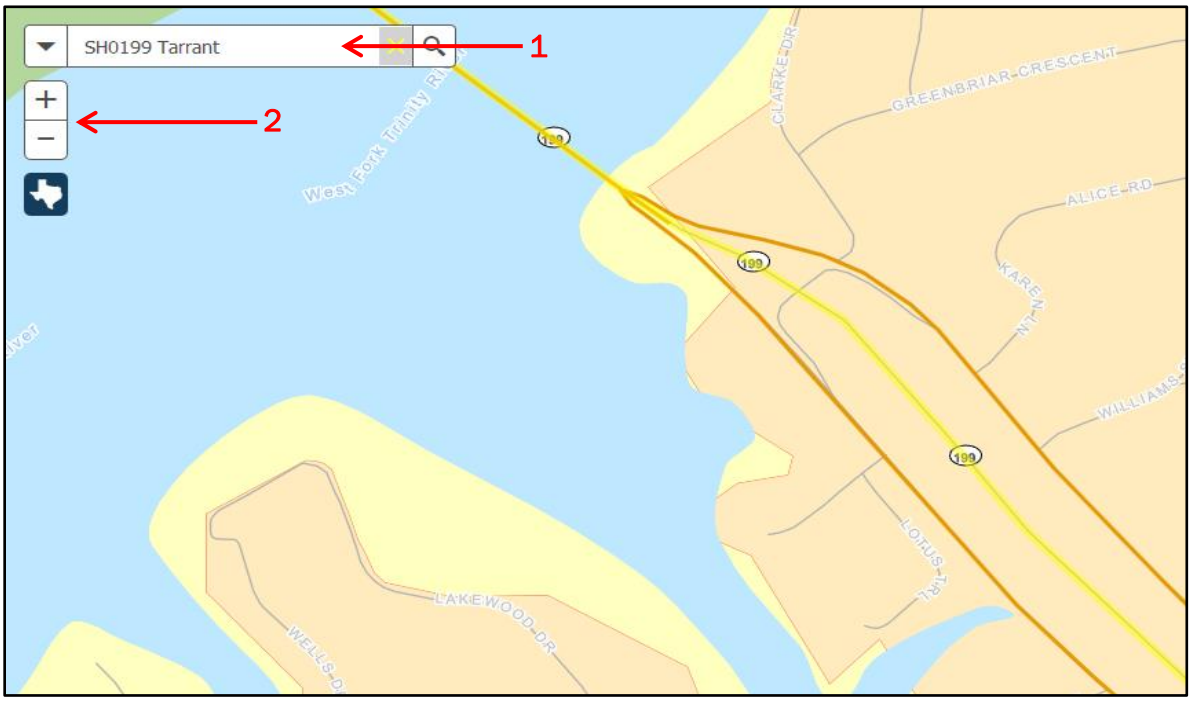


Figure A.4. Options to Zoom to an Area of Interest

Selecting the Roadway Segment and Viewing the AADT

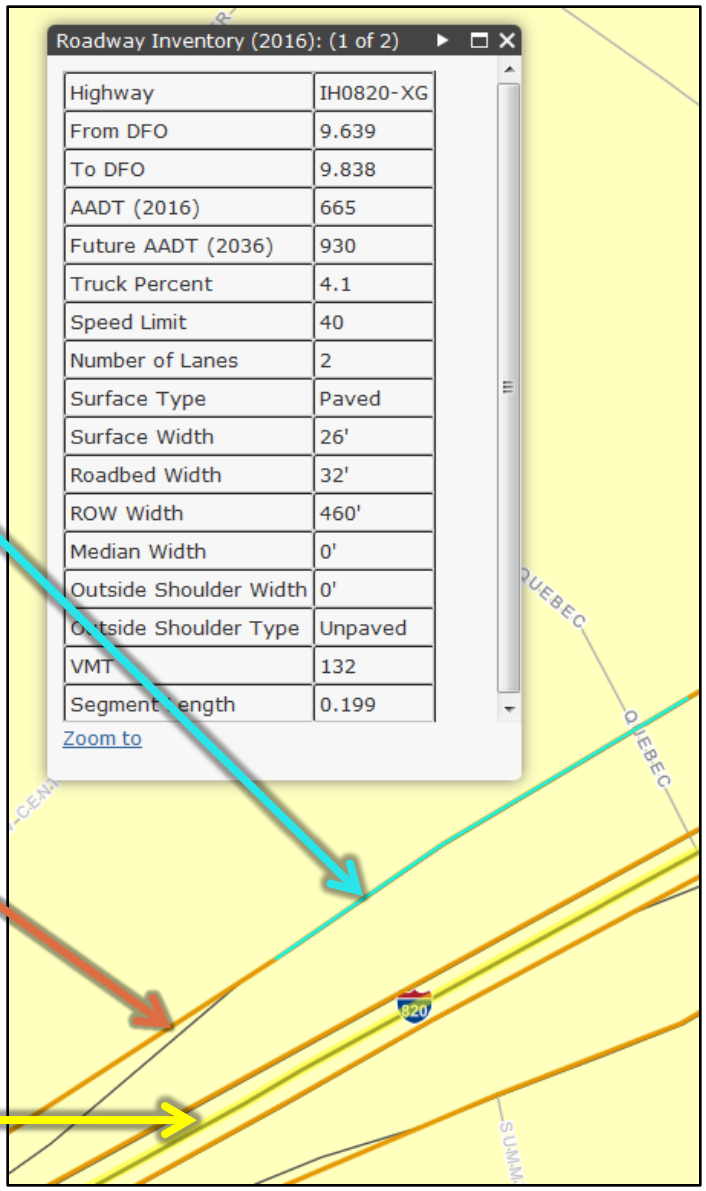
1. When you have identified the desired roadway segment on the map, click the roadbed of interest with the mouse to reveal the Roadway Inventory popup. If the popup obscures the linework, you may click on the popup itself and then move it out of the way. The extent of the segment that you have selected will turn blue/green.

   Linework color-coding: With the **Roadway Inventory – On-System Roadbeds** overlay selected, you will likely see three different types of color-coding on the linework.

BLUE *(appears green on some monitors) – Selecting a roadway segment (clicking it with your mouse) will cause a blue highlight for the extent of the selected segment. The popup corresponds only to the blue segment. In the example to the right, the popup is relevant to the blue segment of the left frontage roadbed (XG).*

ORANGE *(appears brown on some monitors) – With the* ***Roadway Inventory – On-System Roadbeds*** *overlay selected, roadbeds that include Roadway Inventory data are highlighted in orange. When a segment has been selected, segments that remain orange are not included in the selection.*

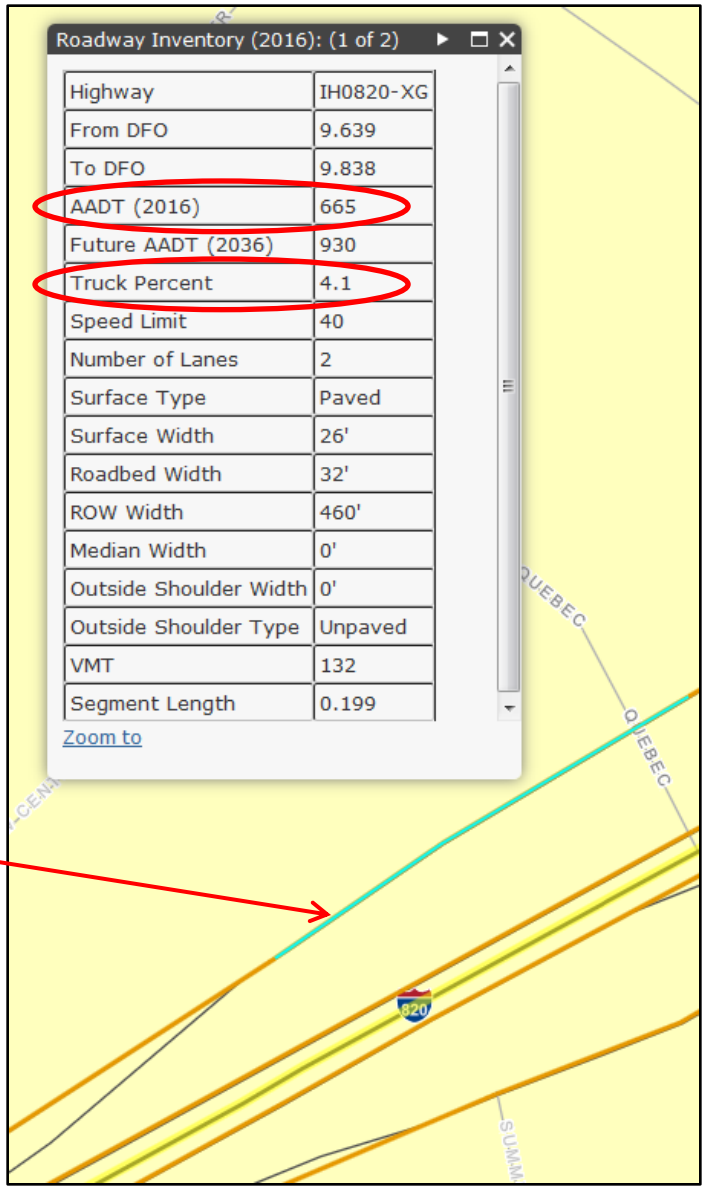
YELLOW *– If the search function was used to identify the highway, the centerline (KG) will be highlighted in yellow. You can eliminate this by clicking the "X" to the right of the search box.*



A Note about Segmentation: Some segments will be long, and others will be short. Segments are a product of the Roadway Inventory, which creates a new segment whenever any of the various attributes change, including attributes that have nothing to do with traffic. The attribute that causes a segment to "break" may not even be included on the popup, as this overlay is only a summary of frequently requested statistics from the much larger Roadway Inventory dataset. **The important thing to remember is that the AADT shown in the popup applies to the entire blue segment**.

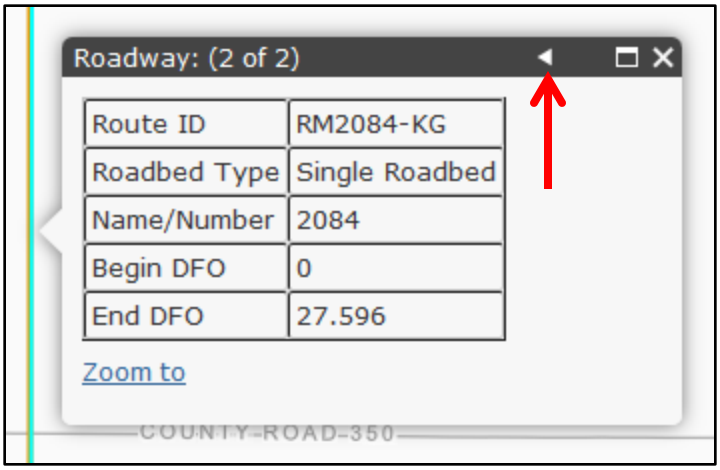
2. After selecting the desired roadway segment, identify the **AADT** field within the Roadway Inventory popup. The year in parenthesis will be the most recent year for which AADT data is available. The **Truck Percent** field will also be necessary for the Road User Cost calculation. This will be discussed in the section *Determining Truck AADT and Passenger Vehicle (Car) AADT*.

   A note about Future AADT: "Future AADT," as shown in the Roadway Inventory popup, is a projected figure and is not recommended for use in RUC calculations in most circumstances, although a user with specific expertise may consider using this figure as part of a linear growth calculation.



Selected segment is highlighted in blue/green

Troubleshooting Tip: Occasionally when you click a segment, you may see a popup that does not include the Roadway Inventory data. When this happens, look for a right or left arrow at the top of the popup. Click this to cycle through the available popups until you get to the Roadway Inventory data. If you are on the KG roadbed of a divided highway, no Roadway Inventory popup will be available because data for the main lanes are attributed to the RG and LG roadbeds instead. More information on roadbed types can be found in the next section.



Determining AADT for Different Roadbed Types

In the Statewide Planning Map, AADT is combined across mainlanes (bi-directional). Direction-specific data is not available for the mainlanes. If AADT is needed for a single direction only, an analysis of traffic data in the STARS II system will be necessary.

A basic understanding of roadbed terminology is necessary to correctly interpret AADT data using the Statewide Planning Map. These same roadbed types and abbreviations also apply to STARS II. Figure A.4 outlines the various roadbed types and their abbreviations.

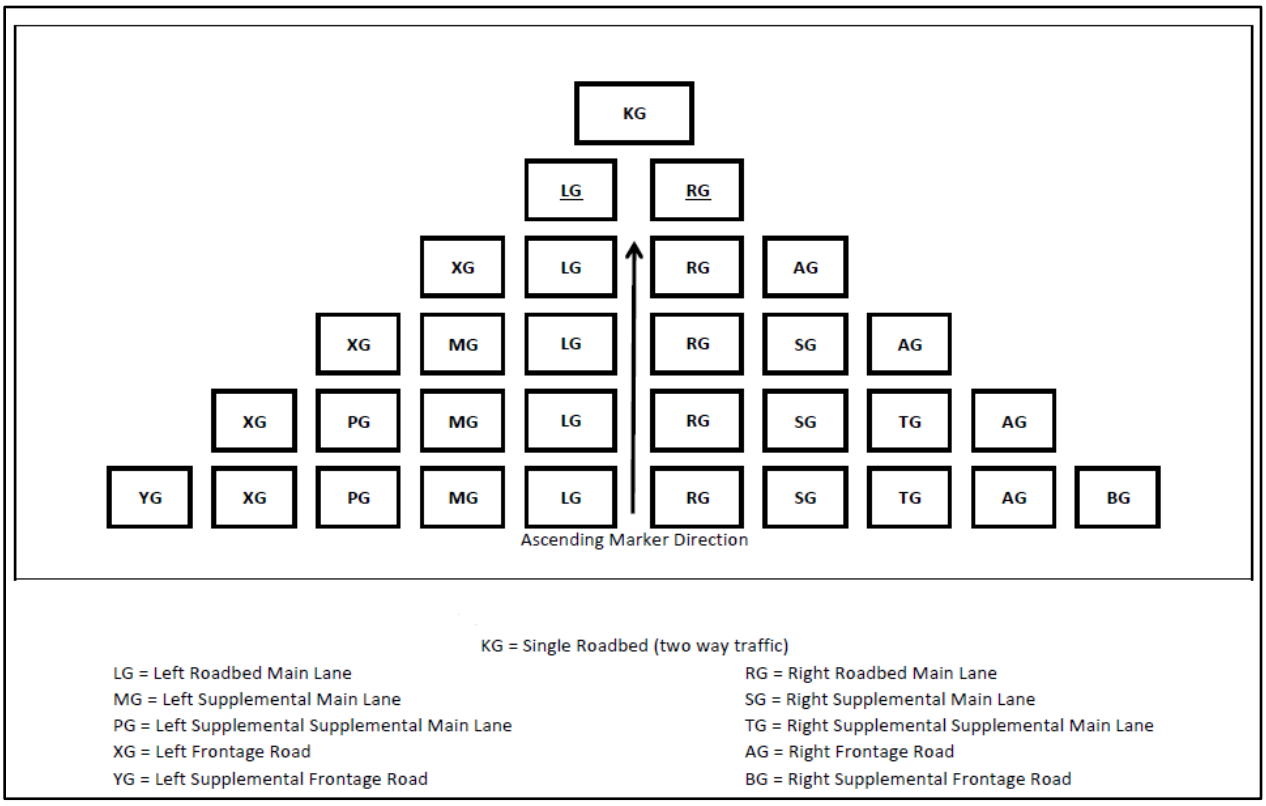


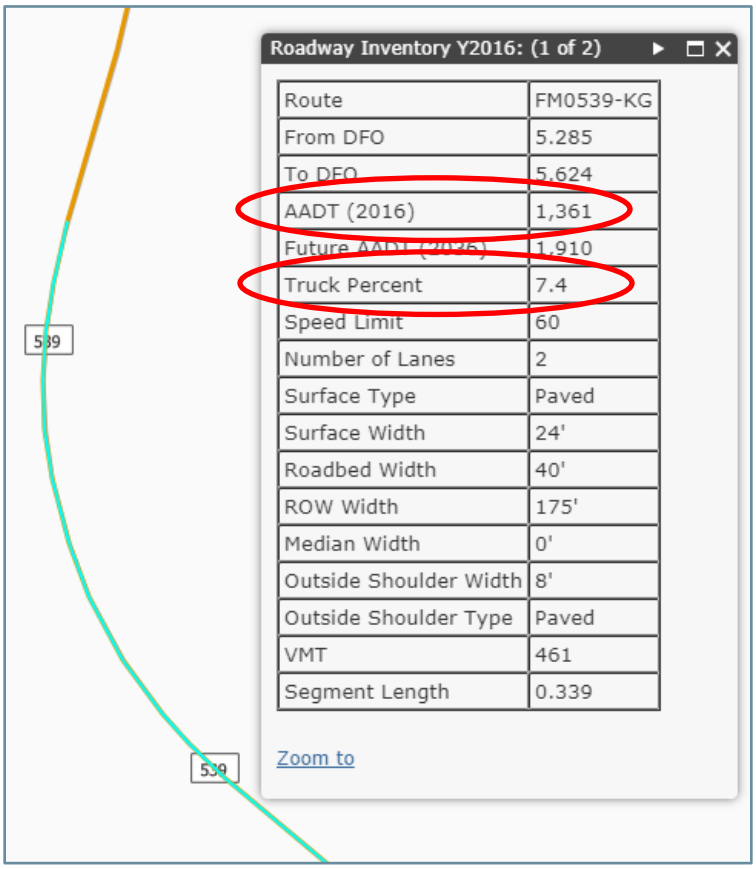
Figure A.5. Roadbed Types

Correctly interpreting AADT data is critical to the RUC calculation effort, so the following three scenarios will help to illustrate how AADT is presented depending on the type of roadbed being analyzed: Mainlanes on a Single Roadbed, Mainlanes on a Divided Roadbed, and Frontage Roads.

Scenario 1 – Mainlanes on a Single Roadbed

In this example, FM0539-KG has been selected. We can determine that this is a single roadbed by examining the linework (only a single line for the mainlanes), and the fact that the KG roadbed is populated with Roadway Inventory data. If this were a divided highway, the data would only be present on the LG and RG roadbeds.

For this single roadbed, the AADT figure (1,361) is a combined total and includes both northbound and southbound directions. Of this AADT figure, 7.4% is comprised of truck traffic.

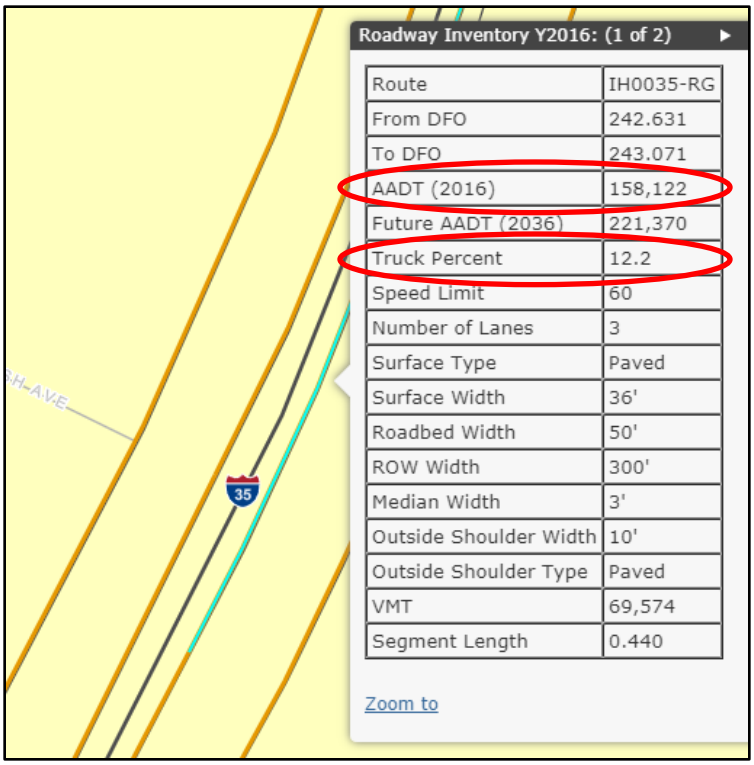


Scenario 2 – Mainlanes, Divided Roadbed

In this example, IH0035-RG has been selected. We can determine that this is a divided roadbed by examining the linework and by the fact that RG and LG roadbeds exist. Because the centerline (KG) does not represent a physical roadbed, selecting it does not yield any data in the popup.

In the case of a divided roadbed, when either the RG or the LG roadbed is selected, the AADT figure that displays will be the combined (bi-directional) total AADT of <u>both roadbeds</u>.

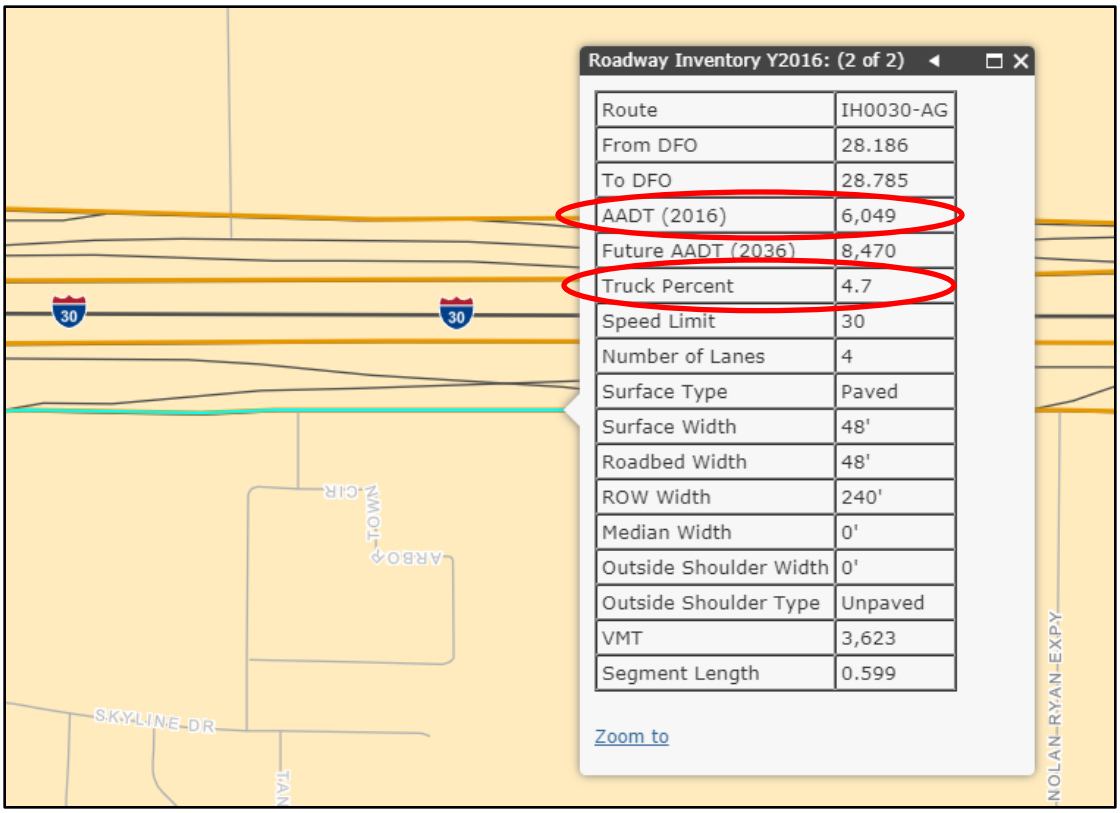
This total AADT figure is therefore repeated in the popup for both RG and LG roadbeds, so it is crucial to understand that these do not represent roadbed-specific or direction-specific AADT values.



In this example, the AADT figure for the RG segment we have selected (158,122) includes the total for both the northbound (RG) roadbed and its corresponding southbound (LG) roadbed. Of this combined AADT figure, 12.2% is comprised of truck traffic.

Scenario 3 – Frontage Roadbed

In this example, IH0030-AG has been selected. This is the right (eastbound) frontage roadbed.



Unlike mainlanes, AADT on frontage is specific to each roadbed. The right frontage AADT will be its own unique figure, as will the left frontage AADT, and neither of these is combined in any way with the mainlanes.

In this example, the AADT figure for the AG segment we have selected (6,049) is unique to that roadbed. Because the directionality of that roadbed happens to be one-way, the AADT figure applies to eastbound traffic only. If we were to select a corresponding segment on the left frontage (XG), we would get a unique westbound AADT. Of this AADT figure, 4.7% is comprised of truck traffic.

Note: In most cases, frontage is one-way, so directionality of the AADT can be easily determined; however, in the case of two-way frontage, the AADT figure will be the combined (bi-directional) total for that frontage roadbed. For example, if the above AG segment happened to be two-way, the AADT figure would include both directions, but it still would not include AADT from the corresponding XG, which is its own roadbed.

Additional Roadbed Types: Grade Separated Connectors, Ramps, Supplemental Roadbeds, etc.
If an analysis is necessary at the connector level, STARS II is the recommended source. Although grade separated connectors are included in the Statewide Planning Map, the **Roadway Inventory – On-System Roadbeds** overlay is best used for data on through lanes only (mainlanes and frontage).

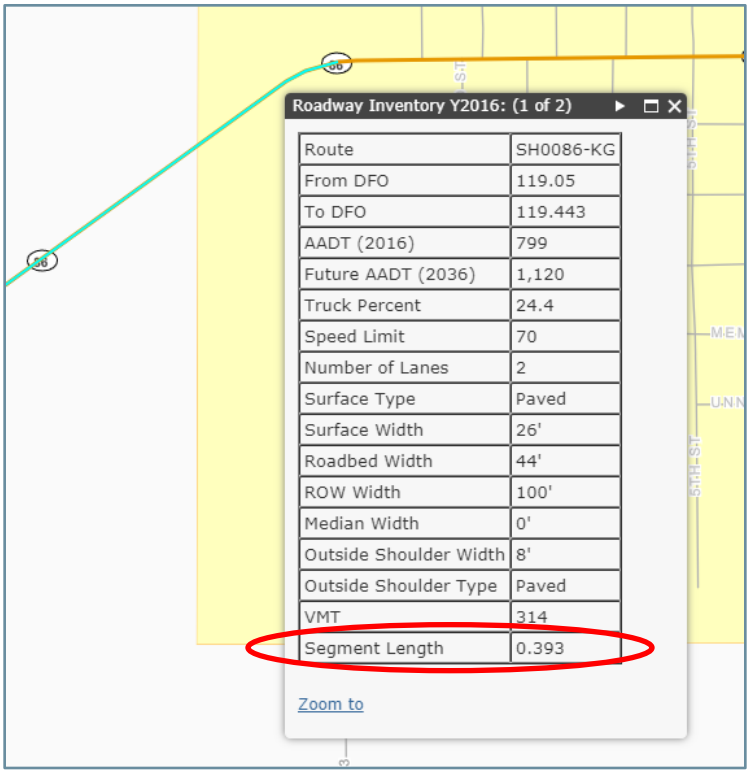
Ramps, turnarounds, and other types of connectors in the Statewide Planning Map do not have data associated with them. Again, STARS II is recommended if the analysis needs to extend beyond the through lanes.

Roadbed-specific data are not available on the Statewide Planning Map for supplemental main lanes (MG, SG, PG, TG) or supplemental frontage (YG, BG). STARS II is the recommended source if AADT is required at the supplemental roadbed level.

Determining an AADT Value for Projects that Include Multiple Roadway Inventory Segments

RUC calculations are based upon the limits of a construction project. A project may include multiple Roadway Inventory segments within its limits. If there are multiple AADT values to consider within the project limits, professional judgement will be necessary to determine the most appropriate value.

One option is to use the predominant AADT value, based on length, within the project limits. If there is no clear predominant value, a simple approach is to use the highest AADT value within the project limits.

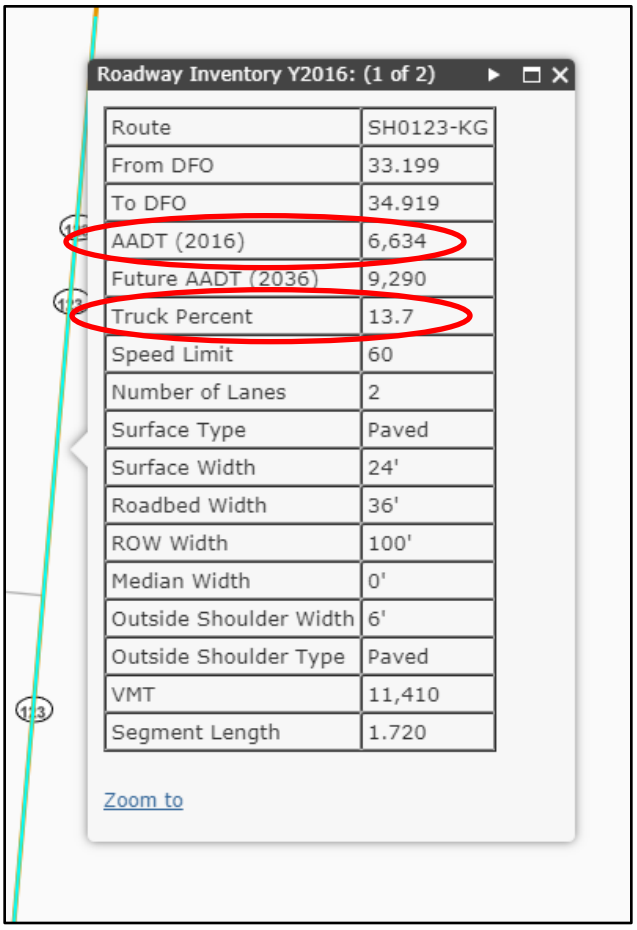


There may also be instances in which an average, weighted by segment length, could be considered. However, due to the complexities associated with the overlap of Roadway Inventory traffic segments, multiple AADT assignments, and project specific limits, a weighted average method might be more challenging to use.

Tip: If a weighted average is ever deemed necessary, "Segment Length" can be found at the bottom of the Roadway Inventory popup. This is the length, in miles, for the extent of the selected segment.

Determining Truck AADT and Passenger Vehicle (Car) AADT

In the previous steps, we identified the AADT for the roadway segment of interest. Now, for the purpose of RUC calculation, we must break this total AADT figure into Truck AADT and Passenger Vehicle AADT. On the RUC calculation tool, "Passenger Vehicle" may be referred to as "Car."



First, identify the **Truck Percent** figure. This percentage will be presented as a whole number, so we need to multiply it by 0.01 to calculate Truck AADT correctly. **Truck AADT = AADT × Truck Percent × 0.01.**

In this example, the AADT is 6,634, and 13.7% of that is truck traffic. Truck AADT = 909 (rounded).

Next, calculate the Passenger Vehicle (Car) AADT by simply subtracting Truck AADT from the total AADT figure. **Passenger Vehicle AADT = AADT - Truck AADT**.

In this example, Passenger Vehicle AADT is 5,725.

STARS II User Guide – Map Search

The Statewide Traffic Analysis and Reporting System (STARS II) is a data analysis and reporting database with detailed traffic data and statistics. Its features are similar to Google Maps. STARS II includes map based searching, which is the focus of this documentation. This feature allows users to find traffic count information based on location. Map searching is available for all STARS II system users, including public users. Familiarity with online maps and different types of TxDOT traffic stations is beneficial for using the map search.

The STARS II system is necessary for obtaining directional traffic data. This is because the Statewide Planning Map only represents bi-directional (two-way) traffic data on the mainlanes, whereas STARS II represents direction-specific traffic data for the mainlanes on many, but not all, roadways. Another difference between the two resources is that, in STARS II, traffic data are presented in a point format (based upon traffic stations). STARS II and the Statewide Planning Map both display frontage road counts separately from the mainlanes.

As stated earlier, TPP recommends using the certified annual AADT figures for RUC calculations. The following instructions therefore demonstrate how to obtain AADT specifically. Other volume data available within

STARS II may not reflect the certified and published AADT figures. Seasonal factors in STARS II are specifically applied to annualize short-term counts, and time factors do not exist in STARS II. Therefore, neither would be recommended for RUC calculations.

STARS II System Support

Using the STARS II system and correctly interpreting traffic data may require training beyond the scope of this document. STARS II training and support are available—please contact the TPP Traffic Analysis Section System Support Data Liaison at TPP_RUCLD.AADT@txdot.gov.

Please note that the TPP Traffic Analysis Section provides support specifically for the STARS II system. For other issues related to traffic data and RUC calculations, including methodology for how traffic data should be interpreted for specific projects, please inquire with the relevant District or Division contact.

Access and Zoom to an Area of Interest

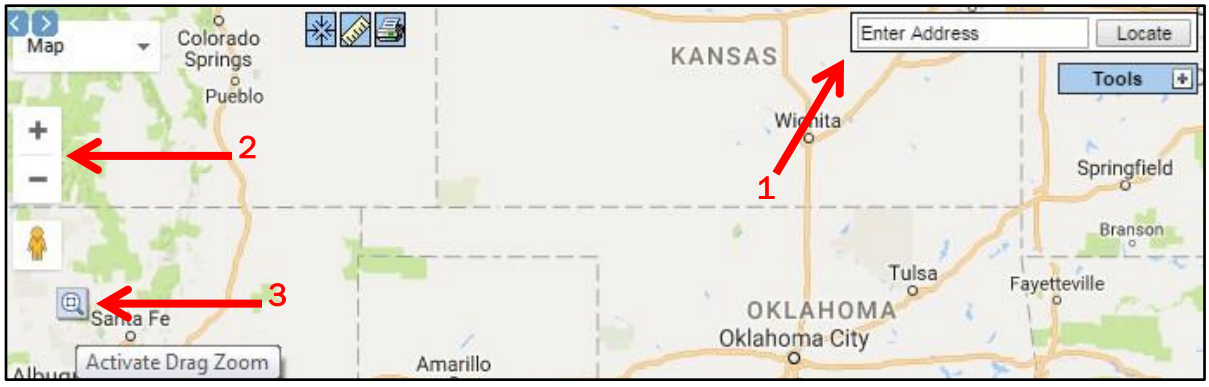
Access the STARS II website at the following URL: txdot.ms2soft.com/tcds (URL may require manual entry; system may not launch correctly from a link. Bookmark for ease of access.)

Zoom in to an area of interest before turning the station layers on. There are several options for zooming to an area of interest.

1. Type a city name in the address locator on the upper right of the map, and click Locate.

2. Use the plus and minus buttons on the upper left of the map to zoom in, then pan by clicking the mouse.

3. Use the magnifier on the upper left of the map to select an area by drawing a rectangle.

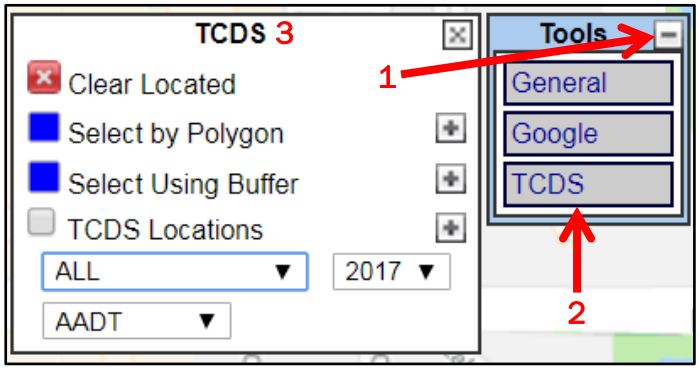


Open the Map Tools

1. On the upper right, click the + sign to expand the **Tools** menu.

2. Click the **TCDS** button at the bottom of the **Tools** menu. Note: TCDS stands for Traffic Count Database System.

3. The **TCDS** menu will open to the left of the **Tools** menu.

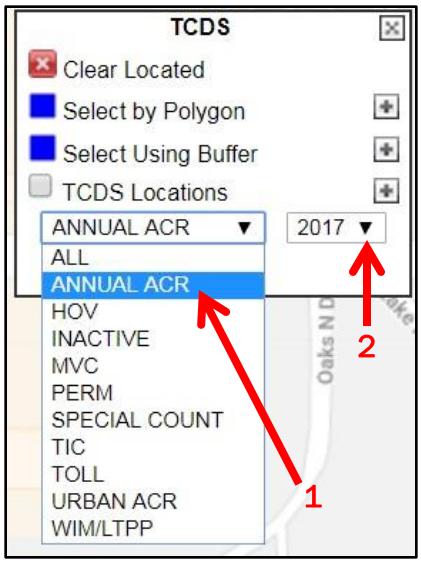


Configure and Display Traffic Stations

Use the drop-down lists at the bottom of the **TCDS** menu to configure the stations that will display.

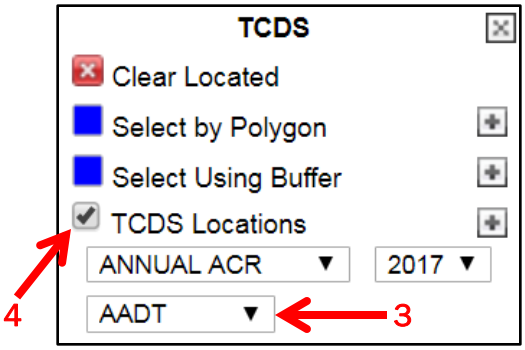
1. The station type drop down is defaulted to **ALL**. Expand this drop down to select a single type of station to display. **Annual ACR** will display the annual cycle counts and is therefore recommended. Click the + sign to the right of **TCDS Locations** for information about the station types.

2. The year drop down is defaulted to the most recently published year. At the time of this documentation, the year is 2017. To view a prior year, select a year from this drop down. Please note that the most recently available published year may differ between STARS II and the Statewide Planning Map, as STARS II will generally be updated each year with the newly available AADT data before that data makes its way into the Statewide Planning Map.

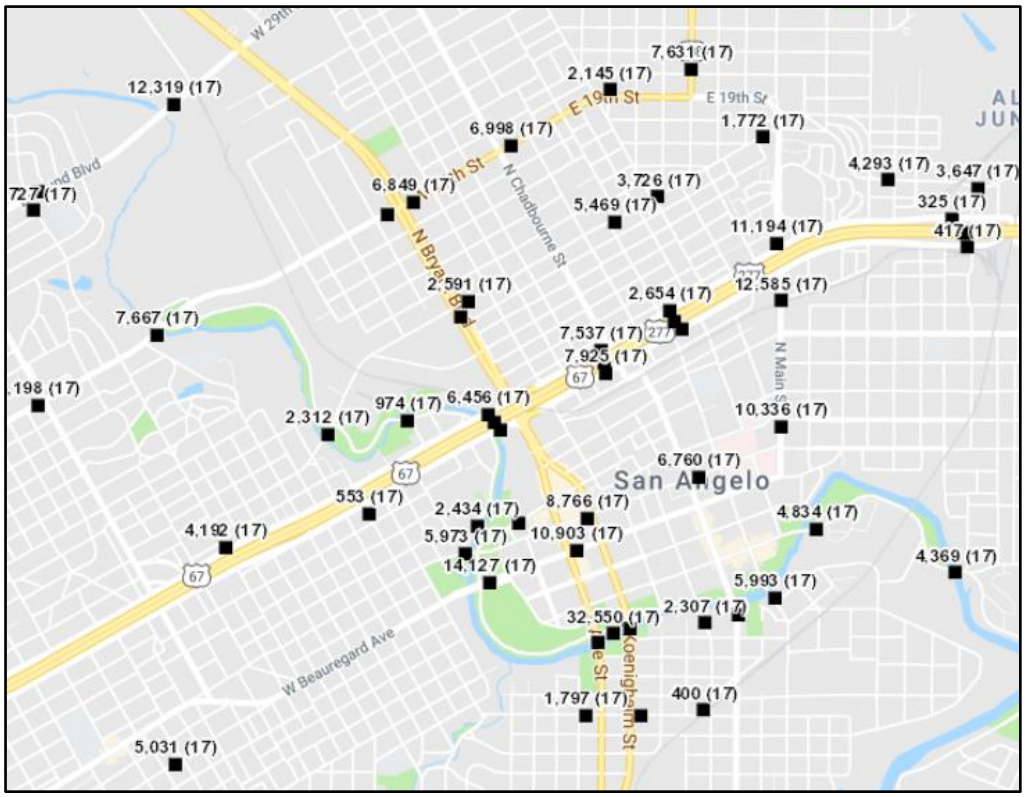


3. Use the station information drop down to display count station names or annual AADTs. This drop down is defaulted to **AADT**, which will display the annual traffic volume, as is recommended.

4. Click the check box to the left of **TCDS Locations** to display the stations. The map should update with traffic stations, as in the image on the next page. The first number is the annual traffic count (AADT), and the second number in parenthesis indicates the count year.

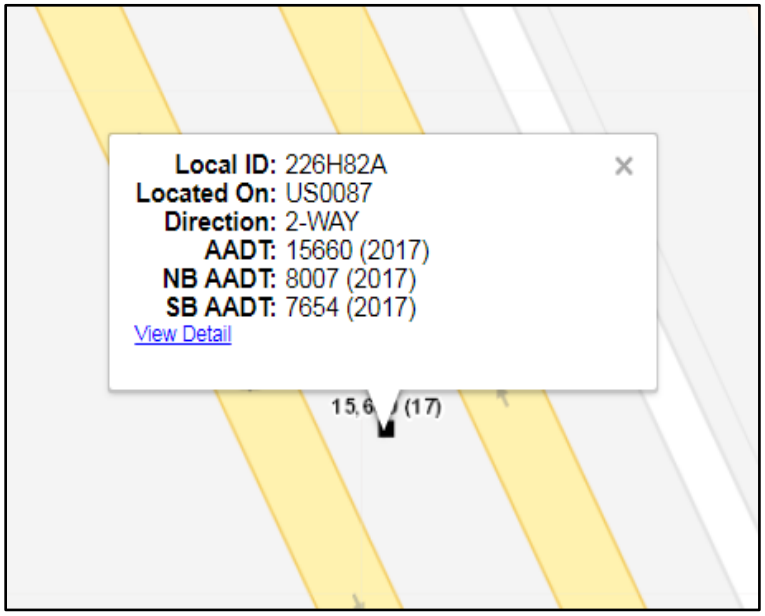


Tip: The farther you are zoomed out, the more information will be displayed. Zooming out to a large extent can slow system response in rendering the image.



Display Directional AADT (if Available)

Click on a traffic station to display additional information. If the Direction is "2-WAY," then the AADT figure displayed will be the combined (bi-directional) total. For some traffic stations, AADT is also available at a directional level: Northbound / Southbound (NB/SB) or Eastbound / Westbound (EB/WB). If these directional values do not display in the popup box, a directional split is not available for that station. Please note that in this example, the selected station is on the main lanes. The frontage roads would each have their own stations and AADT values.

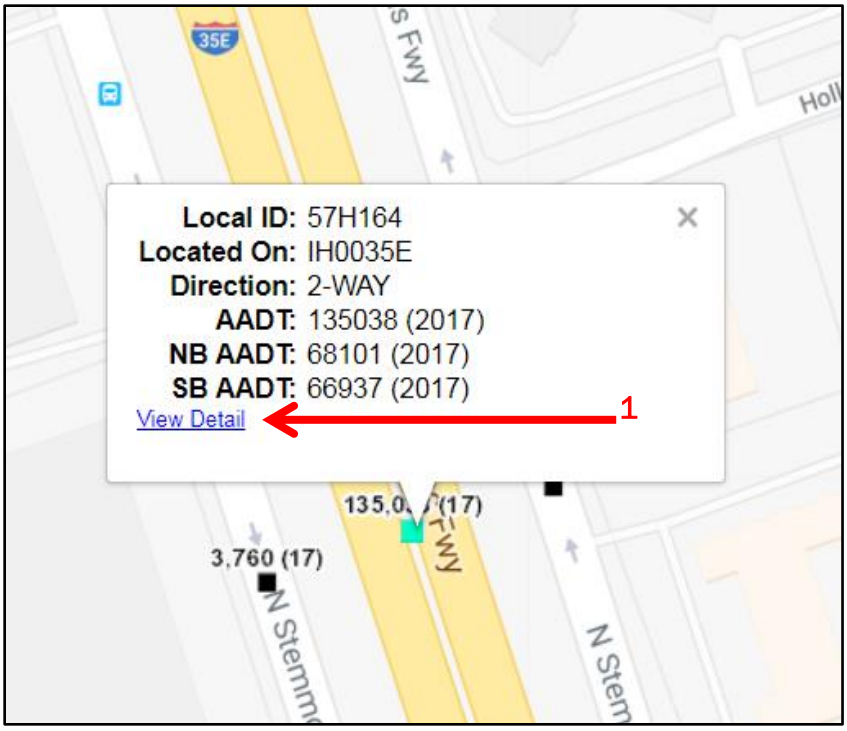


Determining Truck AADT and Passenger Vehicle (Car) AADT

In the previous steps, we identified AADT for the roadway segment of interest. Now, for the purpose of RUC calculation, we must break this total AADT figure into Truck AADT and Passenger Vehicle AADT. On the RUC calculation tool, "Passenger Vehicle" may be referred to as "Car." This process is similar to identifying Truck AADT and Passenger Vehicle AADT in the Statewide Planning Map, as discussed earlier.

Follow the steps in the previous sections to turn on TCDS Locations and select a specific traffic station. After clicking on the station of interest to display its AADT data, follow these steps.

1. On the traffic station popup, below the AADT and Directional AADT (if available), there is a "View Detail" link. Click it to populate station-specific data on the panel to the left, as shown in the below image.



STATION DATA

Directions: 2-WAY | NB | SB

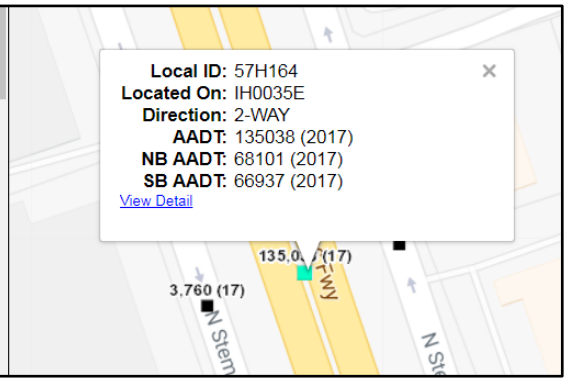
AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2017	135,038[8]				122,746 (91%)	12,292 (9%)	
	2016	139,788[7]				127,932 (92%)	11,856 (8%)	
	2015	142,528[7]			55	131,631 (92%)	10,897 (8%)	
	2014	139,038		8	55	126,292 (91%)	12,602 (9%)	
	2013	134,554[3]		8	56			Grown from 2012

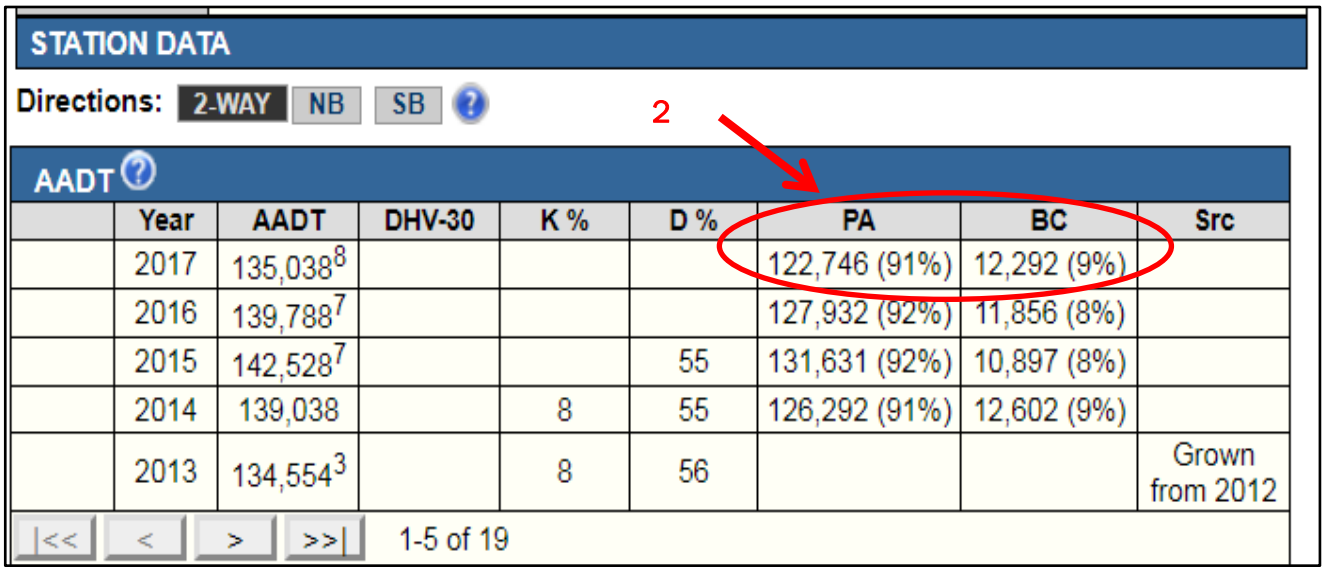
|<< < > >>| 1-5 of 19

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV



2. Passenger Vehicle (Car) AADT can be found in the **PA** column, along with Passenger Vehicle AADT as a percentage of total AADT. PA stands for "Passenger Auto (FHWA Class 1–3)." Truck AADT can be found in the **BC** column, along with Truck AADT as a percentage of total AADT. BC stands for "Business / Commercial Vehicles (FHWA Class 4 and above)."



STATION DATA

Directions: 2-WAY NB SB

2

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2017	135,038[8]				122,746 (91%)	12,292 (9%)	
	2016	139,788[7]				127,932 (92%)	11,856 (8%)	
	2015	142,528[7]			55	131,631 (92%)	10,897 (8%)	
	2014	139,038		8	55	126,292 (91%)	12,602 (9%)	
	2013	134,554[3]		8	56			Grown from 2012

|<< < > >>| 1-5 of 19

Note that these figures are bi-directional (two-way). Passenger Auto and Business / Commercial data is not available at most Annual ACR stations by direction. The two-way combined truck percentage can be applied to the directional AADT to calculate Passenger Auto and Business / Commercial vehicles for a single direction.

In many cases, the two-way truck percentage data is the most detailed available data. If you have knowledge of considerations that may cause truck percentages to vary by directions for the project area, you can contact the TPP Data Liaison for assistance to determine if more detailed directional truck data is available.

Additional Information and Traffic Terms

STARS II Glossary

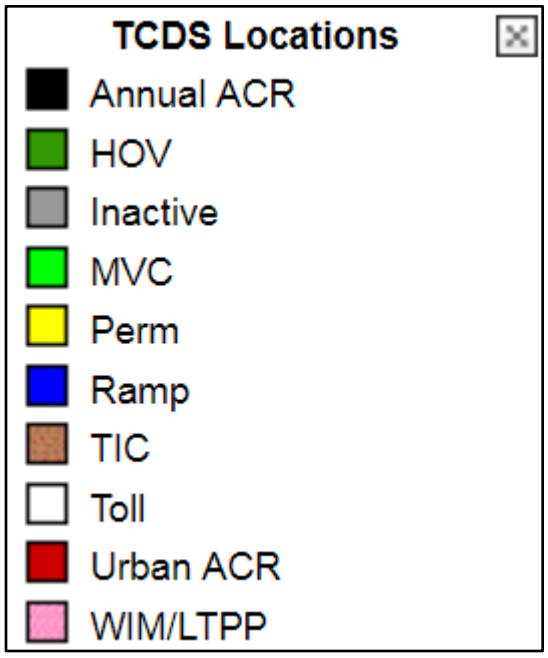
AADT is defined earlier in this manual, but the following expanded definition, which applies specifically to AADT as it is calculated for STARS II, may be useful for users who want a better understanding of traffic data.

Annual Average Daily Traffic (AADT)—This is the annual traffic count representing the average number of vehicles per day for one calendar year, at a traffic count location. This figure includes considerations for seasonal variation and the vehicle classifications that comprise traffic at the count location. AADT is calculated in STARS II according to the AASHTO "average of averages" method.

Traffic Station—A traffic station is a location where a traffic count is taken or derived. The STARS II system displays not only AADTs from Annual ACR stations, which is the source of most traffic data requests; it also displays AADTs from other count station types.

Traffic Station Types, Defined

As noted in the "Configure and Display Traffic Stations" section, the default on the traffic station type dropdown menu will be **ALL**. The instructions specify that **Annual ACR** should be chosen. This is the correct process for viewing only those stations which display the certified annual AADT statistics, as is recommended by TPP. However, it is possible that a user may want to view other types of stations. For that reason, here are definitions for all of the traffic station types.



- **Annual ACR** —Annual traffic counts taken on the National Highway System roadways, and a small set of additional roadways. These are 24-hour counts, which are factored for seasonal variation and vehicle classifications.
- **HOV**—Traffic volume data for various types of managed lanes. Data is provided as it is available.
- **Inactive**—Inactive stations are locations where TPP does not anticipate collecting count data in the future. Inactive stations may have previously been in any other category.
- **MVC**—Manual Vehicle Classification counts are annual 24-hour video-based counts of classification data.
- **PERM**—Permanent Stations count continually, 365 days a year.
- **RAMP**—Ramp counts are 24-hour volume counts on ramp locations. These are 24-hour counts or estimated values, which in the STARS II system are factored for seasonal variation and vehicle classifications.
- **TIC**—Travel Information Centers.
- **TOLL**—Traffic volume on a tolled roadway.
- **Urban ACR**—Saturation counts are conducted on a 5-year cycle on off-system roadways. These are 24-hour counts, which in the STARS II system are factored for seasonal variation and vehicle classifications.
- **WIM/LTPP** – Weigh-In-Motion counts are continuous and collect weight, classification, speed, and volume data.

7. Appendix B – SiteManager Project Setup

Setting Up Milestones

To ensure correct setup of APSLDs as milestones in SiteManager, reference the *SiteManager Contract Administration User Manual*, Chapter 2, Section 7, "Creating Milestones": http://gsd-ultraseek/txdotmanuals/sca/index.htm (internal access only).

If you have questions regarding project setup in SiteManager, contact the Construction Division at 512/416-2553 or CST_SiteManager@txdot.gov.