HIGHWAY SAFETY IMPROVEMENT PROGRAM GUIDELINES

Traffic Safety Division
2026

Texas Department of Transportation

2026 HSIP Highlights

2026 HSIP Timeline

September 3, 2025	TRF hosts 2026 HSIP Webinar and issues Program Call
Immediately upon identification	District Submits New Project Proposals for FY 26
December 19, 2025	District Project Proposals for FY 29 and District Requests for Changes to Existing Projects (scope, estimate, date) Due

District Communications – Category 8

The Traffic Safety Division (TRF) will coordinate quarterly with districts to verify that all Category 8 Safety projects, including State Systemic Widening (SSW) and Highway Safety Improvement Program (HSIP), are current in TxDOTCONNECT and TRF's systems, verifying project information such as letting date, project limits, scope, cost estimate, construction start and end dates, and final construction cost. Any project changes MUST be reviewed by the Traffic Engineering (TE) section of TRF for approval based on program requirements and funding. No changes may be made in TxDOTCONNECT until TRF approves them.

District HSIP Project Proposals

Associated with the TxDOT Unified Transportation Program (UTP) update, the District's total programming levels for FY 26 through FY 29 will be provided on TRF's HSIP SharePoint Site. Districts should look to fill any funding gaps for FY 26 – FY 29 and submit new projects for FY 29.

By December 19, 2025, each district should submit an FY 2026 – FY 2029 HSIP project list including all projects already approved for HSIP funding and those being submitted for HSIP funding review. Each new project submission must include a complete packet of items required for review as detailed under Project Submission Guidelines. It is important that districts fully program each FY.

If a District identifies a new (not previously reviewed and approved) safety improvement project for FY 2026, it may be submitted for consideration as soon as the required project proposal documentation is prepared. Districts do not need to wait for the December 19th deadline. TRF will prioritize the review of projects with an FY 2026 estimated letting date.

Changes to Project Submission Process

To streamline the submission process, an integrated Excel-based submission file will now replace the previous PDF HSIP Submission Form. This consolidated file incorporates multiple tools, including the HSIP Project Submission Form, the Safety Improvement Index (SII) Calculator, and a newly developed Work Code Combination Calculator.

Contacts

Local Governments should reach out to their TxDOT HSIP District Coordinator. Contact TRF_TE_Safety@txdot.gov for additional questions.

Table of Contents

2026 HSIP Highlights i

Overview 4

Introduction 4

Texas Highway Safety Improvement Program 4

HSIP Project Eligibility 5

Confidentiality of Data 5

Program Funding 6

Project Identification 10

Systemic Approach 10

Targeted Approach 14

Annual Priority Approach 18

Design 19

Introduction 19

Design Guidelines 19

HSIP Project Submission Guidelines 20

TRF Responsibilities 20

HSIP Participant Responsibilities 21

Project Documentation 22

Submittal Instructions 23

Post-Programming Activities 25

Letting Deadline, Changes and Cancellations 25

Changes in Scope 25

Requests for Additional Funds 25

Overruns 26

Change Orders 26

Cancellations 26

Reporting 27

Crash Data 28

Overview 28

Crash Cost 28

Appendix A – Definitions 29

Appendix B - HSIP Work Codes Table 30

100 - Signing and Signals 31

200 - Roadside Obstacles and Barriers 38

300 - Resurfacing and Roadway Lighting 40

400 - Pavement Markings 41

500 - Roadway Work 43

Work Codes in MicroStrategy 51

Work Code Combinations in MicroStrategy 53

Appendix C – Preventable Crash Decoding 60

Preventable Crash Criteria by WC 65

Appendix D – Estimating Guidance 77

Appendix E – Change Log 78

Overview

Introduction

Texas has approximately 324,000 miles of highways and streets. The Texas Department of Transportation (TxDOT) maintains approximately 81,000 of those miles, according to TxDOT's 2023 Roadway Inventory Annual Report published by TxDOT's Transportation Planning and Programming (TPP) Division.

According to projections from the Texas Demographic Center, the population in Texas is expected to grow from 31,290,831 in 2024 to 42,598,048 by 2060, assuming migration patterns remain consistent with those observed over the past two decades. The citizens, visitors, and businesses depend on the state to provide facilities that safely and efficiently transport people and goods throughout Texas. This is emphasized in TxDOT's Goals and Objectives, "Promote Safety: Champion a culture of safety. Reduce crashes and fatalities by continuously improving guidelines and innovations along with increased targeted awareness and education."

Texas Highway Safety Improvement Program

The Department considers the needs of the citizens as TxDOT plans, designs, constructs, operates, and maintains transportation facilities. However, a road segment or intersection may experience crashes due to many factors.

In compliance with Title 23 U.S.C., the Texas Highway Safety Improvement Program (HSIP) is a federally mandated program managed by TxDOT. The HSIP, directed by Texas's Strategic Highway Safety Plan (SHSP), aims to significantly reduce traffic fatalities and serious injuries on all public roads by providing a standardized approach for identifying and reviewing specific traffic safety concerns throughout the state. Texas's SHSP identifies the Emphasis Areas and strategies that the HSIP will focus on to meet the state's objectives of reducing fatal and serious injury crashes in Texas.

The program requires a data-driven, strategic, results-focused approach to improving highway safety on all public roads, consistent with the SHSP. The HSIP implements the priorities identified in the SHSP, and the goal is to significantly reduce fatalities and serious injuries on Texas roadways, including on-system and off-system roads. The vision of zero deaths on Texas roadways is based on the belief that everyone, no matter how they travel, should be able to arrive at their destinations safely. The plan lists eight Emphasis Areas that have the greatest potential for reducing fatalities and injuries. The Emphasis Areas are roadway and lane departures, speed-related, intersection safety, occupant protection, impaired driving, distracted driving, vulnerable road users, and post-crash care. Younger and older drivers are incorporated into the eight Emphasis Areas to avoid duplication.

Projects must address one of the eight Emphasis Areas and logically flow from the appropriate countermeasure(s) specified in the Texas SHSP.

Emphasis Areas from the SHSP	
Roadway & Lane Departure	Distracted Driving
Speed Related	Vulnerable Road Users
Intersection Safety	Post-Crash Care
Occupant Protection	Younger Drivers (subsidiary to other EA's)
Impaired Driving	Older Drivers (subsidiary to other EA's)

Funds are provided for construction and operational improvements for projects on and off the state highway system (on- or off-system).

Projects funded under the HSIP are also required to be evaluated for cost-effectiveness. Completed projects are subject to cost/benefit analysis using three to five years of before and after crash data, average annual daily traffic for the years before and after the improvement, and actual construction costs.

Planning, implementing, and evaluating HSIP projects requires partnering with all state and local stakeholders to maximize the cost-benefit of a safety improvement project.

HSIP Project Eligibility

All Texas public roadways are eligible for participation under HSIP provided the proposed highway safety improvement project addresses Emphasis Areas identified in the most current Texas SHSP. Some work items may address a serious crash type but are not eligible for HSIP funding. Some examples include bridge replacements and general maintenance projects of roadways, signs, signals, pavement markings, etc.

Consider the following when selecting HSIP projects:

- Is the strategy, activity, or project consistent with the priorities of Texas's SHSP?
- Does the project address a serious crash risk such as a hot spot, systemic risk factor, road segment, or crash type that has been identified through a data-driven process?
- Is the project likely to contribute to a significant reduction in fatalities and serious injuries?
- Is this project consistent with the District's Annual Safety Plan?

Confidentiality of Data

Federal statutes 23 U.S.C. 148(h)(4) and 23 U.S.C. 407 make data and reports confidential if they are compiled to evaluate the safety of federal-aid highways. Data used in the HSIP should not be released. Any written request must be routed through the TxDOT General Counsel Division (GCD).

Program Funding

The HSIP is federally funded. Program funds are eligible to cover 90 percent of project construction costs. State or local participation must cover the remaining 10 percent of project construction costs. Certain safety projects may qualify for increased federal share, Title 23, United States Code (23 U.S.C.), Section 120(c)(1), as designated by TRF. The HSIP is legislated under Section 148 of Title 23, United States Code (23 U.S.C. 148) and regulated under Part 924 of Title 23, Code of Federal Regulations (23 CFR Part 924).

The Texas HSIP provides funding for construction and operational safety improvements for locations on and off the state highway system. It is administered by the Texas Department of Transportation (TxDOT) Traffic Safety Division (TRF) and is part of the Unified Transportation Program (UTP – Funding Category 8). When a potential highway safety project location is identified, it is important to work with your TxDOT HSIP District Coordinator.

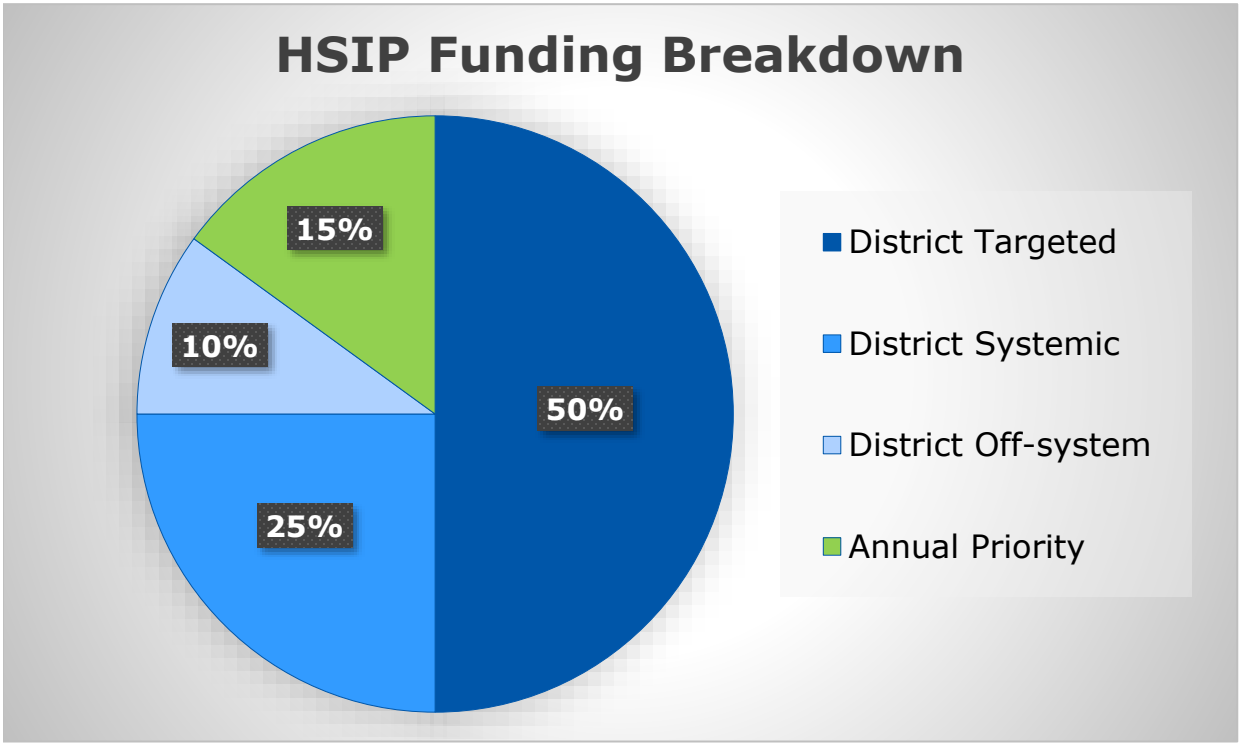
HSIP funds are only eligible to cover construction (i.e., only the funding line in the Construction grid of the Funding Tab in TxDOTCONNECT). Examples of commonly excluded costs include:

- Environmental permits
- Right of Way (ROW)
- Additional contingencies
- Design/engineering costs
- Additional work not covered by the scope of approved safety countermeasures

TRF will provide districts with 4 years of projected funding levels each year. Districts should aim to program each FY fully and work closely with TRF if a project does not meet the requirements, if an awarded project is let at a lower cost than estimated, if a project is canceled, or if additional funding becomes available. Projects with total contract costs (sum of all CSJs letting together) under $20,000 may not qualify for HSIP funds.

Each District will receive a proposed HSIP programming level for which they should plan to spend each FY towards safety countermeasures aimed at reducing fatal and serious injury crashes. The programmed funds are based on the previous three years of KA (Fatal and Severe) crashes (2022, 2023, and 2024) that occurred in each District.

Figure 1: Breakdown of Funding Programming



The program's UTP allocation will be programmed according to the following guidelines:

50% District Targeted Subprogram

The District Targeted component is the traditional approach used in safety analysis in which "hotspot" locations are identified based on crash history, and appropriate countermeasures are implemented to reduce crashes. Targeted projects typically identify specific locations, and targeted funding would provide for these "hotspot" on-system locations using KA on-system crash data.

25% District Systemic Subprogram

Systemic or "system-based" projects take a broader view and evaluate risks across the district's roadway system. A systemic approach does not solely look at crash data, particularly in low-volume and/or rural roadways where crash densities are lower or inconsistent. Systemic funding provides each District a set amount toward district-wide systemic improvement projects using proven safety countermeasures to reduce the risk of fatal and serious injury crashes.

15% Annual Priority Subprogram

Each FY TRF will advance a specific statewide systemic countermeasure, such as median barriers. Projects will be submitted by the districts for consideration and selected based on need, existing conditions, and available funding.

This subprogram was previously referred to as the Statewide Systemic but has been renamed to reduce confusion with the HSIP District Systemic subprogram and the State Systemic Widening program, a state-funded program separate from HSIP.

10% District Off-System Subprogram

Off-system funds will be programmed by the district in the same manner as the On-System Targeted but using KA off-system crash data. If you are a new off-system partner, please get in touch with your TxDOT HSIP District Coordinator regarding options for additional assistance with Design, ROW, and other construction-related costs.

Funding for Off-system HSIP Projects

The construction costs for eligible Off-system HSIP projects may be fully covered (100%) by federal funding, up to the authorized Category 8 amount, through Increased Federal Share (G match) or State Transportation Development Credits (TDCs). Bid overruns will be covered by Category 3 "Non-Traditionally Funded Transportation Projects" funding. After project approval, requests for additional authorized funding may be considered if there is adequate time to amend the Advance Funding Agreement (AFA) prior to 100% PS&E submittal.

Increased Federal Share (G Match)

The Traffic Safety Division is continuing efforts to encourage local participation in the HSIP program. To that end and following 23 U.S.C. §120(c)(1): Federal share payable, Increased Federal Share for Certain Safety Projects, TRF and FHWA have evaluated the HSIP countermeasures for eligibility for 100% federal funding for construction dollars. All projects must conform to the guidelines for HSIP projects (e.g., meeting minimum SII). TRF will consider off-system projects a priority for this increased share. A complete list of G Match eligible HSIP countermeasures is available in Appendix B.

Examples of potentially eligible projects include:

- traffic control signalization,
- roundabouts,
- pavement markings, or,
- installation of signs, safety lighting, guardrails, impact attenuators, or median barrier.

This section is a guideline to assist local governments in selecting safety projects that may qualify. G-match project selections will be communicated when the district's program is approved. Note that G-match funds will not cover project overruns.

State Transportation Development Credits (TDCs)

Transportation Development Credits (TDCs) are a financial tool approved by the Federal Highway Administration that allows states to use federal obligation authority without the requirement of providing matching dollars. TxDOT has allocated State TDCs to cover the local 10 percent project construction costs and minimize the financial resources needed for safety improvement projects from Local Governments and encourage participation in the HSIP program. Note that TDCs will not cover

project overruns. Any countermeasure that is not listed as G match eligible in appendix B, will be eligible for state TDCs.

Local (Off-system) Road Safety Plans

Local Governments play a critical role in addressing crash risks. The SHSP can assist local practitioners in addressing safety on local rural roads. Still, a focused plan is often needed to assist local entities in making informed, data-driven safety investment decisions. A Local Road Safety Plan (LRSP) provides a framework for local practitioners to proactively identify the specific or unique conditions that contribute to crashes within their jurisdictions. To encourage local participation in the HSIP program, TRF encourages districts to collaborate with local governments to help facilitate the development of an LRSP. Please refer to the FHWA website for Local Road Safety Plans Guidance and the Manual for Developing Safety Plans for Local Rural Road Owners for additional information and resources on developing an LRSP.

Development Authority (8DA)

TxDOT's Administration established a safety development authority category in the Unified Transportation Program. The development authority category (Category 8DA) allows districts to design the PS&E, purchase ROW if necessary, relocate utilities, and obtain environmental clearance for planned safety projects. Category 8DA does not fund the construction of these safety projects. The District needs to continue to pursue construction funding from other categories including STP, Category 8 HSIP, the Energy Sector, etc.

Requests for 8DA funding should be those projects that are expected to meet HSIP criteria once ready to let but take significantly longer for planning; in general, larger projects like interchanges are unlikely to be eligible. Category 8DA funding lines are reviewed and approved by TRF; however, 8DA approval does not guarantee Category 8 construction funds, nor does the project have to be funded with Category 8 funds.

Project Identification

Through a data-driven decision-making process, the Department aims to identify and prioritize projects with the greatest potential for reducing deaths and serious injuries on all public roadways. Each TxDOT District has unique needs for identifying and planning safety improvements. TRF and the districts have many tools at their disposal to analyze crash data and trends for project screening and selection. Districts employ a comprehensive approach to project selection, analyzing road inventory, crash trends, and crash heat maps, to identify high-risk areas. Additionally, districts solicit input from the District's Traffic Operations office, transportation planning teams, area offices, and maintenance sections to ensure a thorough understanding of local safety needs. Once those needs have been identified, safety projects can be selected through two primary approaches: systemic and targeted. By integrating both systemic and targeted approaches, the Department ensures a balanced and effective strategy for enhancing road safety across Texas.

Systemic Approach

A systemic approach involves widely implementing improvements based on high-risk roadway features correlated with specific severe crash types. This approach provides a more comprehensive method for safety planning and implementation. It is an approach that broadens traffic safety efforts by considering risk and crash history when identifying where to make low-cost safety improvements. A systemic approach helps to identify sites for potential safety improvements that typically would not be identified using a traditional site analysis approach. Districts can also refer to the FHWA's Systemic Safety Project Selection Tool as a resource, or TxDOT staff may visit TRF's HSIP SharePoint to review the FHWA Systemic Safety Webinar files.

A systemic approach to safety:

- Identifies a "problem" based on system-wide data, such as rural lane departure crashes, urban pedestrian crashes, or rural unsignalized intersection crashes. These crashes are often spread across the network, with few or no locations experiencing a "cluster" of crashes during a given period of 3-5 years. However, they still present a safety risk to the traveling public.
- Look for characteristics (e.g., geometry, volume, or location) frequently present in severe crashes. These characteristics are referred to as risk factors.
- Focuses on promptly deploying one or more low-cost countermeasures to address the underlying circumstance contributing to crashes on most roads sharing a set of risk factors. By addressing crash types experiencing low densities (crashes per intersection or mile) but high aggregate numbers, program funds can be dedicated toward low-cost solutions deployed across the system, affecting many locations.
- Identifies and prioritizes locations across the roadway network for implementation. Systemic projects should be widely implemented across the system. Projects should be along a roadway corridor/segment or at multiple regional locations.

Additional information about many of the systemic safety countermeasures can be found in the following resources:

- FHWA Proven Safety Countermeasures
- Safer Roads from Safe System Approach
- Pedestrian Safety Action Plan (PSAP)

Systemic projects that address a unique location will not be approved. For example, intersection or curve projects should cover multiple intersections/curves located on the corridor or within a geographical region. Approved systemic safety countermeasures are limited to the table below under the appropriate emphasis area:

Table 1: Approved Systemic Safety Countermeasures

EA	Countermeasure(s)	Eligibility Details	Work Code(s)
Intersections	Implement systemic flashing beacons, signing, and marking improvements at stop-controlled intersections	Includes any combination of doubled-up signs, oversized advance signs, street name signs, enhanced pavement markings, stop ahead warning signs, retroreflective sheeting on signposts, stop lines, sight distance improvements, and two-direction large arrow sign at T intersections.	119, 122, 124, 128, 145, 401
	Low-cost urban intersection improvements	Includes additional low-cost items such as signal heads, protected left-turn signal phases, pavement markings, signing improvements, and signal-ahead warning signs.	108, 111, 118, 138, 401, 510, 550
	Dedicated right and left turn lanes	Particularly helpful at two-way stop-controlled intersections on high-speed mainline roadways. Includes adding right and left turn lanes at intersections along an entire corridor where none existed and lengthening existing turn lanes to provide appropriate deceleration and storage on high-speed roadways (>50mph). Include all intersection standard signing and pavement markings.	509, 519, 520, 521, 522, 526
	Signal head backplates	Signal head backplates with reflective borders.	108
	Leading Pedestrian Intervals	Eligible LPI projects will let to contract with the installation of APS.	109
	Close Median Openings	Close Median Openings (Crossovers)	516, 551

EA	Countermeasure(s)	Eligibility Details	Work Code(s)
Intersections	Rural Intersection Improvements	Includes systemic signing and marking improvements at stop-controlled intersections (see above), safety lighting, rumble strips on stop-controlled approaches, installation of roadside flashers or embedded LEDs for stop signs on controlled approaches and "Intersection Ahead" warning signs along uncontrolled approaches. Where Overhead Flashing Beacons (OFBs) previously funded by the HSIP are removed due to the installation of roadside flashing beacons or embedded LEDs, the OFBs must have met the 10-year service life.	122, 124, 138, 510, 545, 305, 145
	Two-Way Left-Turn Lanes	Two-Way Left-Turn Lanes (TWLTLs / Continuous Turn Lanes)	518
	Single Lane Roundabouts	Roundabouts both in urban and rural areas	547
Roadway Lane Departure	Median Barrier	Installation of concrete or cable median barrier where no barrier of any kind currently exists, placed in the median separating opposing mainlines of traffic. The existing median width must be less than or equal to 70ft. Cable median barriers are for use only on medians greater than 25ft in width; concrete median barriers can be used on all median widths. Locations of projects will be prioritized as follows: - By roadway type (Interstate, non-Interstate freeways, other principal arterials, all others) - 0-45’ median widths in urban and rural areas - Greater than 45ft median widths in rural areas - Greater than 45ft median widths in urban areas	201, 217
	Roadway widening	Rural two-lane, two-way undivided highways with a paved surface width less than or equal to 24ft; Widen to 28ft or more, add rumble strips	502, 503, 504, 536, 537, 541
	Safety Lighting	Continuous safety lighting along a corridor where no lighting is present	304
	Enhanced Delineation on Curves	Systemically treat curves within a geographical area or roadway type, not single locations. Includes pavement markings, raised retroreflective pavement markers, post mounted delineation, larger chevrons/curve warnings signs/advisory speed plaques, or LED chevrons.	113, 123, 125, 130, 137, 136, 139, 401, 402, 404, 532, 533, 534, 542, 543, 544

EA	Countermeasure(s)	Eligibility Details	Work Code(s)
Pedestrian/Vulnerable Road Users	Safety lighting	Safety lighting at urban intersections where pedestrian facilities are present and no lighting is present.	305
	Concrete Barrier Attachments	Installation of attachments to existing concrete barrier systems to deter prohibited pedestrian crossings on divided highways.	225
	Uncontrolled crossing locations	Use the Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations when submitting systemic projects for uncontrolled pedestrian crossing locations. To submit eligible systemic countermeasures specific to pedestrian crossings at uncontrolled locations, follow the guidelines provided in Step 4. Table 1 on page 16 of the linked document must be submitted with project proposals; identify (highlight or circle) the appropriate selection box based on each roadway's configuration, AADT, and speed limit for each roadway being submitted. In summary, the eligible improvements from Figure 1 include: - Crosswalk pavement markings - Lighting at the crosswalk - Raised crosswalks - Signing – parking restrictions, advance crosswalk warning signs, in street pedestrian crossing signs, and stop here for pedestrians signs - Curb extensions - Rectangular Rapid-Flashing Beacon (RRFB)* - Pedestrian Hybrid Beacon (PHB)* *Selections for PHBs and RRFBs must still meet the TxDOT guidelines dated September 11, 2018, and be reviewed by TRF.	110, 114, 115, 131, 133, 134, 143, 144, 403, 304, 305, 203, 409, 523
	Median and crossing islands in urban and suburban areas	Install medians or crossing islands where none existed previously on curb sections of urban and suburban multilane roadways where there is a significant mix of pedestrian and vehicle traffic and intermediate or high travel speeds. Includes mid-block areas, approaches to multi-lane intersections and areas near transit stops or pedestrian-focused corridors.	203, 409

EA	Countermeasure(s)	Eligibility Details	Work Code(s)
Pedestrians/VRU	Sidewalks	Install sidewalks or shared-use paths where none existed previously. Proposed location must be included as a prioritized segment (Low – Very High) identified in the District-specific summary of the Texas Pedestrian Safety Action Plan (PSAP) results. *Districts should follow the recommendations of the PSAP and may utilize the TxDOT PSAP Screening tool to determine the potential risk factors for pedestrian crashes. Refer to the Table 3-10: Statewide Risk factors on pages 33 and 34 of the PSAP.*	407, 408

Project submissions for the use of systemic funds not following the above criteria will not be approved during the regular program review. However, if your district has data to support an additional systemic countermeasure not listed, the district may submit that data to TRF to request approval.

Crash counts and SII calculations are not required for the systemic safety countermeasure project proposals, as these measures are proven effective including on roadways not experiencing clusters of crashes.

Targeted Approach

The Targeted approach is the traditional method for identifying high-crash clusters or "hot spot" locations and recommending adequate countermeasures to reduce crashes at those specific sites. Each safety project proposed under this approach must undergo a benefit-cost analysis to prioritize projects with the greatest potential for crash reduction and improving road safety at identified high-risk locations. This prioritization is guided by the Safety Improvement Index (SII).

SII Formula and Calculation

In its most basic form, the SII represents the ratio of the annual savings in preventable crash costs at a specific location to the cost of constructing the proposed safety improvement. The SII incorporates adjustments to provide additional benefits for:

- locations experiencing increasing traffic over the project life
- improvements that will reduce maintenance costs
- projects expected to have long service lives over which construction costs can be amortized.

The SII formula is as follows:

$S = \frac{R(CfF + CiI)}{Y} - M$	$Q = \left(\frac{Aa - Ab}{Ab} \div L\right) S$
$B = \frac{S + \frac{1}{2}Q}{1.06} + \sum_{i=2}^{L} \left[\frac{\left(S + \frac{1}{2}Q\right) + (i-1)Q}{(1.06)^i}\right]$	
$SII = \frac{B}{C}$	

S	Annual savings in preventable crash costs (equal to crash cost savings per year minus annual maintenance costs), as determined by the above formula
R	Crash reduction factor (see Table 2 for explanation)
F	Number of preventable fatal and incapacitating injury crashes (see Table 2 for explanation)
Cf	Cost of a fatal or incapacitating injury crash (see Table 2 for explanation)
I	Number of preventable non-incapacitating injury crashes (see Table 2 for explanation)
Ci	Cost of a non-incapacitating injury crash (see Table 2 for explanation)
Y	Number of years of crash data
M	Change in annual maintenance costs for the proposed project relative to the existing situation
Q	Annual change in crash cost savings, as determined by the above formula
Aa	Projected average annual Average Daily Traffic (ADT) at the end of the project service life
Ab	Average annual ADT during the year before the project is implemented
L	Project service life (see Table 2 for explanation)
B	Present worth of project benefits over its service life, as determined by the above formula
C	Initial cost of the project

Obtaining SII Data

Before calculating the SII, the "Proposed Corrective Action" or safety countermeasure(s) must be translated into "work codes." The HSIP Work Codes Table (see Appendix B) is a comprehensive list of applicable safety countermeasures, each uniquely identified with a work code corresponding to the description of work. The table provides definitions, reduction factors, service lives, applicable maintenance costs, and preventable crash codes (see the following explanation).

The data necessary to calculate each project's SII can be obtained from the sources shown in the following table.

Table 2: Sources for SII Data

Data Item	How It Is Obtained
R — Crash Reduction Factor NOTE: The reduction factor represents the percentage reduction in crash costs or severity of the applicable crash types that can be expected as a result of the improvement.	From the Highway Safety Improvement Program (HSIP) Work Codes Table (Appendix B). NOTE: If the scope of work includes more than one work code, TRF program administrators derive a composite reduction factor.
F — Number of fatal and incapacitating injury crashes *I* — Number of non-incapacitating injury crashes	The HSIP Work Codes Table lists "Preventable Crash" codes. Preventable crashes are those with defined characteristics that may be affected by the proposed improvement as described by the work code. The codes correspond to numeric codes assigned in the Crash Records Information System (CRIS) for the indicated variable. Information is collected from the peace officer's crash report and converted into a coded format. Use the Preventable Crash Decoding Table (Appendix C) to interpret the codes and determine the preventable number of each type of crash, using three years of preventable crash data, determined by the program call.
Cf — Cost of a fatal or incapacitating injury crash *Ci* — Cost of a non-incapacitating injury crash	The average cost of each type of crash is based on the comprehensive cost figures provided by the National Safety Council. The program call provides the cost figures used each year.
L — Project service life	From the HSIP Work Codes Table found in Appendix B of this manual. NOTE: If the project is represented by more than one work code, TRF program administrators base the project service life on the primary work.

SII Results

All targeted projects, both on and off system, must have an SII report submitted as part of the supporting documentation. Off-system projects will use CRIS and the SII calculator; on-system projects must use the MicroStrategy reports, whenever available.

NOTE: The SII does not establish the need or lack of a need for a project. The SII formula is a mathematical representation of the ratio of the historical costs of preventable crashes to costs of construction; it provides no evaluation of the appropriateness of the type of construction.

A project with an SII greater than or equal to 1.0 is considered cost-effective. Projects with an SII of less than 1.0 will not be considered for funding through the HSIP program.

SII Calculator Available

The HSIP Project Submission file includes the SII calculator that can be used to create the SII report for Off-system projects, or On-System projects with work code combinations that are not in MicroStrategy. This file is available on TxDOT's Highway Safety Engineering website and in the TRF Highway Safety Improvement Program Tools folder in SharePoint. All submissions using this calculator to establish a qualifying SII must include Crash IDs on the form for verification.

SII Report using MicroStrategy (On-System only) on CRIS

MicroStrategy is a resource within the Crash Records Information System (CRIS) that can generate an On-System SII Safety Project Submission Report. The information required to run an SII report includes safety work code(s), year group, project total cost, annual maintenance cost, highway(s), and project limits (DFOs). For step-by-step instructions on how to run an SII report in MicroStrategy, please refer to the *How to use CRIS to calculate SII's* instructions available on TRF's HSIP SharePoint.

If a proposed work code combination is not available on MicroStrategy, a new work code combination calculator is available in the HSIP Project Submission file. For assistance on how to use this new tool, please contact TRF_TE_Safety@txdot.gov for assistance.

Work codes with a reduction factor of "TBD" require additional information and cannot be found in MicroStrategy. To obtain an SII for these work codes, send project information and work codes to TRF_TE_Safety@txdot.gov.

SII Report using CRIS SII Calculator

To generate SII reports for Off-System projects, districts can use the CRIS map query builder. They are expected to utilize this tool to identify relevant, preventable crash IDs (See Appendix C) and then calculate the SII using the Excel-based SII calculator in the HSIP Project Submission File. Additional instructions for locating off-system crashes using the CRIS query tool are available on TRF's HSIP SharePoint.

AASHTOWare Safety

AASHTOWare Safety provides tools for data analysis, visualization, and decision-making aimed at reducing traffic accidents and enhancing overall roadway safety. Districts may use AASHTOWare Safety tools to identify high-crash locations and prioritize them for safety improvements, identify trends, patterns, and high-risk areas and use the visualization tools to support their decision-making process. At this time, the AASHTOWare Safety Software will not replace the reports required for benefit-cost analysis documentation for HSIP projects. TRF will continue to require CRIS and MicroStrategy reports for HSIP project submittals.

Please contact TRF_CRASH@txdot.gov to obtain access or any questions related to the AASHTOWare Safety tool.

Acceleration of Targeted projects

TRF supports project acceleration for Targeted locations where crash rates have increased since initial submission. The Design Division (DES) may also advance projects to meet letting volume targets, as well as level letting efforts. If contacted by DES with a request to accelerate projects, districts should prioritize those with elevated K crash occurrences where possible.

Annual Priority Approach

The Annual Priority Subprogram is a focused initiative within the Highway Safety Improvement Program designed to reduce traffic fatalities and serious injuries on all public roads through low-cost safety improvements.

Each year, TRF identifies a specific emphasis area, such as Roadway Departure (RwD) crashes, and allocates 15% of HSIP funds to address it through proven systemic countermeasures. For fiscal years 2026, 2027 and 2028, low-cost safety countermeasures at horizontal curves and at tangents/straightaway have been selected to mitigate single-vehicle run-off-road and head-on crashes.

The Annual Priority Subprogram operates through a competitive selection process. Districts are encouraged to participate in this subprogram to submit projects that align with the designated emphasis area and meet eligibility criteria. Projects are evaluated and ranked based on data-driven factors such as crash history (locations with K or A crashes prioritized), traffic volume, functional classification, posted speed, advisory speed and geometric characteristics of the roadway. Selected projects are prioritized for funding through a structured scoring methodology that evaluates their potential to reduce severe and fatal crashes.

This subprogram was formerly known as the “Statewide Systemic” but was renamed to avoid confusion with other HSIP and state-funded initiatives, such as the District Systemic Subprogram and the State Systemic Widening program.

This portion of funding gives the state the flexibility to quickly shift resources toward low-cost, systemic safety countermeasures on roadway segments that present the highest risk, allowing for a more responsive and data-driven approach to improving safety across Texas.

Design

Introduction

The design guidelines presented in this section are intended to aid in planning HSIP projects. Work types are assigned based on the information provided by the district during the project proposal process. Only work types programmed for the safety project will be considered "the scope." The design guidelines reference portions of the Roadway Design Manual (RDM) and establish items of work not eligible for HSIP funding. These guidelines offer sufficient flexibility while maintaining safety as the essential element of all HSIP projects.

Design Guidelines

Freeway, Non-Freeway "New Location or Reconstruction," or Texas Highway Freight Network (THFN) Projects

All roadway elements affected by the scope of the approved HSIP safety improvement must comply with 4R Design Criteria found in the RDM. Enhancements to features outside the scope of the HSIP project are at the district's option and are to be funded using district funds under a separate Control-Section Job (CSJ).

Non-Freeway "Rehabilitation or Restoration" Projects

All roadway elements affected by the scope of the approved HSIP safety improvement must comply with 3R Design Criteria found in the RDM. Enhancements to features outside the scope of the HSIP project are at the district's option and are to be funded using district funds under a separate CSJ.

"Safety Treat Fixed Objects" Projects

Projects whose primary scope of work is "Safety Treat Fixed Objects" must comply with the Clear Zone criteria found in the RDM. The designer should provide clearance greater than that required whenever reasonably practicable.

Other Projects

All projects not included in the above categories must retain the existing roadway conditions (lane widths, shoulder widths, etc.) as a minimum.

Design Considerations

At the beginning of the HSIP project proposal process, highway designers should analyze crash data to identify the specific safety problems that might be corrected and follow the suggested design process in the RDM and the Traffic and Safety Analysis Procedures Manual (TSAP). When the HSIP design guidelines cannot be met, the current design exception or design waiver process established in the RDM must be followed.

HSIP Project Submission Guidelines

As a condition of obligating Federal Highway Safety Improvement Program (HSIP) funds, a state is required to submit an annual report to the Federal Highway Administration (FHWA) that describes the progress on safety improvement projects and their contribution to reducing roadway fatalities, injuries, and crashes. To comply with these requirements and to maintain the integrity of the program-selection process, the following must be adhered to and considered before project proposal submission:

HSIP projects are not eligible for local letting. All HSIP projects must be let by TxDOT's competitive bid process. TRF is evaluating the progress of a Local Let pilot program initiated with the 2022 Program Call. At this time, no additional projects will be added to the local letting pilot. Off-system project proposals are required to be submitted through the local district office.

TRF Responsibilities

Table 3: TRF Responsibilities

Step	Action
1.	Leverage the most current SHSP to define the HSIP program safety emphasis areas, eligible scopes of work and safety improvement countermeasures.
2.	Conduct an informative webinar outlining the steps and requirements of the HSIP program call.
3.	Provide districts with HSIP guidance and funding allocations.
4.	Analyze the proposed highway safety improvement projects for eligibility, data accuracy, and overall conformance with program requirements.
5.	Calculate the District's requests for reduction factors for new work code combinations.
6.	Analyze each targeted/hot spot project's Safety Improvement Index (SII) and review systemic projects for eligibility.
7.	Conduct district-level meetings to review their TRF HSIP Program and provide comments.
8.	Issue final funding decisions and communicate selected projects.
9.	Monitor project progress through letting, ensuring any changes in scope or schedule are addressed and overseeing overruns of project authorized funds at the divisional PS&E review stage in accordance with the current TxDOT policy. >> See Commission Minute Order 109864, November 18, 2004, or subsequent revisions.

HSIP Participant Responsibilities

Table 4: HSIP Project Submittal Guidelines

Step	Action
1.	Use the latest SHSP to learn about the safety Emphasis Areas.
2.	Conduct safety studies to identify potential project locations eligible for improvements within the designated program Emphasis Areas, using the most recent three years of crash data for a targeted/hotspot approach and applying proven systemic safety countermeasures for a systemic selection approach.
3.	Evaluate each location for feasibility and verify that appropriate countermeasures addressing the location's safety needs are not already completed or scheduled.
4.	Collaborate with stakeholders to collect additional location details, incomplete or inaccurate crash data and identify high-risk areas that may have been overlooked.
5.	Perform a field evaluation to determine **existing** conditions at the proposed project site. This will avoid the submission of work that has already been constructed and provide the information necessary for a complete and accurate estimate.
6.	**Consult with the district's planning office prior to submitting project proposals** to determine if the proposed improvement or another is already scheduled for construction under this program or any other.
7.	For feasible projects, determine the appropriate safety countermeasure or combination of countermeasures, and develop a detailed cost estimate for the entire construction cost of the project. Leveraging of project estimate is not allowed. NOTE: Districts are discouraged from adding district funds to the requested amount to "leverage" the cost of the project. All bid items must be included in the submitted estimate.
8.	Work is assigned based on the information provided. Only work programmed will be considered "in scope," and is the only work that can be done as part of the HSIP project. Work considered incidental to the primary work type will not have a separate work code assigned, but the work will be allowed (e.g., widening a roadway to install a left-turn lane or extend drainage structures or re-striping to accompany an overlay). If additional non-incidental work is required or desired, it will be considered "out of scope" and will be funded by the district under a separate CSJ.
9.	Project selection is based on the crash history, traffic volumes, and roadway geometrics at the specified location. Accurately identify project parameters for the project to be programmed correctly. When defining project parameters, consideration should be given to including distance for project approaches and tapers, as necessary. Non-site-specific contracts are not eligible for HSIP funding.
10.	Complete and submit HSIP project proposals containing requested data to TxDOT's Traffic Safety Division, Traffic Engineering Section, Safety Engineering branch, through the TxDOT HSIP District Coordinator, along with the necessary backup data (typical sections, layouts, maps, photographs of existing site conditions, etc.) in response to the program call. To submit projects for consideration, set projects up in TxDOTCONNECT (Except annual priority projects).

11.	Notify TRF of potential overrun of an HSIP project's authorized funds prior to Plans, Specifications and Estimates (PS&E) submittal.
12.	Submit PS&E for HSIP projects to TRF in accordance with standard PS&E submission schedule.

Project Documentation

The HSIP project proposals will be submitted electronically through TxDOTCONNECT, with supporting documentation to be submitted through Box.com.

An HSIP Project Submission Form Excel File is required for each project. Detailed instructions for using the new format are available on the first tab of the file. All related fields are expected to be filled out completely and accurately. The form is to be submitted along with the rest of the supporting documentation for each project. Please submit each project as a PDF portfolio, or zip file – not as multiple files. The supporting documentation includes:

- Project Layout - Specify project limits to verify location in TxDOTCONNECT. Location map (satellite image or CAD) cannot replace the in-person field evaluation (Table 4, Step 5). Project layout shall identify locations of the work codes (safety countermeasures) proposed.
- Bid Item Estimate – The estimate must be for the entire cost of constructing the project and must include **all** items, priced using the bid item averages dashboard published by TxDOT. A detailed set of instructions on how funding should be entered into TxDOTCONNECT can be found on TRF's HSIP SharePoint Site (Tools folder in 2026 HSIP Program) to ensure letting estimate, inflation and funding lines correlate. If a detailed estimate is not provided, the project may not be considered for funding and may be eliminated from the call. Each bid item must include:
    - Complete Bid Item Codes
    - Quantities
    - Bit Item Average Unit Prices
    - Total Price for Each Item

  Commonly overlooked bid items:

    - Item 100 Series: Prep ROW, Excavation, Embankment, Blading, Pavement Removal
    - Item 200 & 300 Series: Pavement items (and related Special Specs); even projects where a district has attempted to include pavement bid items, the final design sometimes ends up being much more expensive. TRF may require review of pavement bid items by the District Pavement Engineer prior to project approval.
    - Item 400 Series, Drainage and Hydraulics: modify or reconstruct culverts, pipes, SET's, headwalls, wingwalls, backfill, shoring, riprap, etc.
    - Required Items 500 Mobilization & Item 502 Barricades, Signs, and Traffic Handling (no longer a lump sum on the submittal form); also consider 503 Portable Changeable Message Signs, 505 Truck Mounted Attenuators and Trailer Attenuators, and 662 Work Zone Pavement Markings

- Item 506 Erosion Control (plus some related items in the 100's: Sodding, Seeding, Watering)

- For projects with multiple CSJ's in one submittal: as PS&E development is progressing to 100% and the need arises to re-balance Authorized Amounts with Bid Item Estimates, please contact TRF TE Safety with these requests as far in advance of 100% PS&E Submittal as possible.
- SII Report - All crash data used in the SII calculation will be queried using Beginning and Ending Distance From Origins (DFO's). The majority of the required SII reports are located in the MicroStrategy component of CRIS at the following location:

  CRIS -TX DOT > Shared Reports > HSIP Call > On-System SII Submission Reports

  Detailed instructions on how to run the SII reports for on-system projects are available in the *How to use CRIS to calculate SII's* file located in TRF's HSIP SharePoint. Off-system projects will use the SII calculator tab in the 2026 HSIP Project Submission File also available on TxDOT's Highway Safety Engineering website the Highway Safety Improvement Program. Districts must include SII reports for BOTH on- and off-system projects.
- For projects covering multiple locations, such as signal interconnects or systemic projects, quantities must be broken down by intersection or roadway segment. For example, improving a corridor might show 3 backplates at 1st street, 2 at 2nd street, etc. This is to facilitate completion of the annual report to FHWA.
- Existing and Proposed Typical Sections – Existing and proposed typical sections are required for any projects that involve widening the roadway, installing median barriers, refuge islands, adding shared used path or adding lanes.
- Intersection Layouts – Intersection layouts are required for any intersection improvement project, including traffic signals, RRFBs, signing & pavement markings, channelization, pedestrian improvements, or RCUTs.
- Warrants – Traffic signal warrants are required for WC 107 – Install Traffic Signal.

Submittal Instructions

Districts will enter all the projects to be submitted for approval into TxDOTCONNECT. For each project, prepare the additional documentation required; all supporting documentation will be uploaded to the District's HSIP folder in Box.com. Please submit each project as a PDF portfolio, or zip file; not as multiple files.

After all the projects have been entered into TxDOTCONNECT, including the off-system projects, districts must notify TRF_TE_Safety@txdot.gov that their submissions are ready to be reviewed. TRF will review submissions and meet with each District to provide comments. Once all changes have been reviewed and approved, TRF will coordinate with Financial Management Division (FIN) to approve Category 8 Construction funding lines.

Districts should ensure that all HSIP projects being submitted appear within the Candidate Projects Grid, within the Traffic Safety subprogram, within the current UTP Program. The following fields are required to be filled in the Program screen of TxDOTCONNECT:

- Selection Method
- Work Codes
- Crash Information (K, A, B, SII)
- SHSP Emphasis Area

Please keep the TRF subprogram in district control until TRF requests the program to be sent to Statewide control after all funding lines have been approved by FIN.

Post-Programming Activities

After projects have been adequately programmed and approved, the districts will move on to project development and any changes will need to be submitted and approved by TRF.

Letting Deadline, Changes and Cancellations

Due to the nature of HSIP projects (safety), projects must be let to contract in a timely manner. Ensure the estimated let date entered in TxDOTCONNECT is achievable. Once a project is approved for letting in a fiscal year, every effort must be made to meet this date.

TRF reviews and approves all letting fiscal year changes. Projects requesting a delay in letting past the following three fiscal years from the time it was approved for funding will require an updated project submittal for review and approval (highest priority will be targeted projects requiring updated crash data).

After the letting change has been approved by TRF, a Letting Schedule Modification (LSM) should be submitted in TxDOTCONNECT if applicable.

Changes in Scope

A request for a change in scope must be submitted as soon as the change is known and prior to PS&E submittal. Submit an email request to TRF_TE_Safety@txdot.gov for approval concerning changes in scope. Provide a detailed explanation for the change being requested and update the required documentation that was included in the original project submission, as applicable. TRF will review the request and notify the District if the request has been approved.

Note: Requests for changes in scope that result in redefining the project location or deviating from the emphasis area or countermeasures specified in the original project proposal may result in the request being denied.

Requests for Additional Funds

For off-system projects, the local government is responsible for bid overruns in excess of the Category 8 authorized amount. Bid overruns will be covered by the Category 3 "Non-Traditionally Funded Transportation Projects" funding. After project approval, requests for additional authorized funding may be considered if there is adequate time to amend the Advance Funding Agreement (AFA) prior to 100% PS&E submittal.

If an on-system project requires additional funding, the district should submit a request upon identification as far in advance of 100% PS&E submittal as possible. TRF Safety will evaluate the request on a case-by-case basis.

Overruns

No later than the time of 100% PS&E submittal, notify TRF_TE_Safety@txdot.gov when the engineer's final estimate exceeds the project's authorized funds by including the Cat 8 Overrun Justification Form, available to TxDOT staff on TRF's HSIP SharePoint. TRF will review the request and notify the District if additional information is needed for approval.

If the whole contract is funded by Category 8, and the engineer's final estimate is under the total authorized amount for the contract, an overrun justification is not required. However, if the engineer's final estimate for the whole contract exceeds the total authorized amount, then an overrun justification form must be filled out and submitted. A justification is needed for each CSJ with an overrun on the form.

If the contract includes additional funding besides Category 8, and one or more of the HSIP CSJs has an overrun, an overrun justification form will need to be filled out and submitted for each HSIP CSJ with an overrun.

TRF tracks all overruns in a monthly budget table available to districts in the 2026 HSIP Program folder in TRF SharePoint. For any overruns over $250,000, the districts should reach out to TRF via email as early as possible prior to PS&E submittal to resolve any known funding issues, and to submit a request for approval for additional safety funds as needed for a project. An updated project estimate and detailed justification for the overrun should be included in the request.

Change Orders

Submit an email request to TRF_TE_Safety@txdot.gov and include a copy of the Change Order Report from Site Manager along with all supporting documentation (including any additional plan set sheets). TRF will review the request and notify the District if the request has been approved.

Districts may not submit a change order to add or modify project scope to an existing HSIP contract. All HSIP projects must be submitted for review and approval in accordance with our guidelines and undergo TxDOT's competitive bid process once approved.

Cancellations

Districts must promptly notify TRF if an HSIP project needs to be canceled. This will allow TRF to assess the impact on allocated funds and determine if any further action is necessary. TRF will inform the district if any additional steps are required. Cancellations of projects classified under FHWA Special Rules (VRU or HRRR) may require a substitute project to maintain program targets for these Special Rules.

Reporting

TRF submits a statewide HSIP report for the prior federal fiscal year to FHWA by August 31st of each year. The report addresses intersections and segments as required under 23 U.S.C. Section 148(g). The report includes sections on progress in implementing HSIP projects; program effectiveness; project evaluation; a narrative addressing methodology and effectiveness; and an explanation of how HSIP projects link to Texas' Strategic Highway Safety Plan.

TRF will analyze the crash reduction data from completed projects and use the results to adjust the factors for the following year's HSIP.

Crash Data

Overview

The Crash Records Information System (CRIS) is the official state database for traffic crashes occurring in Texas. CRIS contains spatial and reporting components designed to be used by TxDOT personnel to obtain and analyze crash data. Each district has personnel licensed to have access to CRIS. TxDOT district offices are encouraged to work closely with TxDOT area offices and local governments to identify locations with the highest need for safety improvements. Crash data for the past 3 calendar years will be used for an HSIP Program Call and any crashes occurring in years other than these years will not be used in the SII calculation.

The crash reports that are provided for each district contain fatal (K) and severe injury (A) crashes only. Non-incapacitating (B) crashes are still used in the Safety Improvement Index (SII) calculation, but for screening purposes only. The following crash reports will be provided to each district:

- On-System KA Crashes by Control-Section
- On-System KA Crashes on Curves
- On-System KA Crashes on Rural 4-Lane Undivided Highways without Paved Shoulders
- On-System KA Crashes Work Code 541 Preventable Rural 2-Lane Highways < 24ft and ≥ 400 ADT
- Pedestrian Involved KA Crashes

The Texas A&M Transportation Institute has provided individual District CAVS data to enhance the process of selecting safety projects to submit for HSIP funding consideration. Crash data and crash attributes for all K, A, and B crashes will be compiled into a spreadsheet, analyzed for each crash to determine whether that crash could be prevented by the type of work, and then mapped. The maps can be filtered to only show crashes that apply to a particular type of work. Additionally, Crash Tree Diagrams and Comprehensive Dashboards may be used to assist districts during their project selection.

Crash Cost

For the 2026 HSIP Program Call, the cost per crash will be $4,290,000 for K or A crashes and $360,000 for B crashes. Only preventable KAB crashes from years 2022-2024 addressed by the project countermeasures are used to calculate each proposal's SII for projects programmed for Fiscal Year 2029. Please refer to the current program call (if applicable) to verify the current crash costs.

Appendix A – Definitions

Terminology	Definition
A Crash	Crash resulting in one or more Suspected serious injuries as the most serious outcome.
B Crash	Crash resulting in one or more Non-incapacitating injuries as the most serious outcome.
C Crash	Crash resulting in one or more Possible injuries as the most serious outcome.
CAVS Data	Computer Aided Visualization data set compiled for use by TxDOT to identify hot spots as well as possible locations for specific countermeasures across a District.
Change Orders	Work that is added or deleted during construction from the original PS&E, cost, or timeline of a contract.
Countermeasure	A roadway-based strategy intended to reduce risk at a site
Crash	A set of events that results in injury or property damage due to the collision of at least one motorized vehicle and may involve a collision with another motorized vehicle, bicyclist, a pedestrian or an object
Crash frequency	The basic measure of crashes in the Highway Safety Manual (HSM): number of crashes occurring at a particular site, facility, or network per year (expressed for a location/site or per mile depending on the context)
CRIS	Crash Records Information System
FHWA	Federal Highway Administration
District	A geographical area managed by a district engineer, in which TxDOT conducts its primary work activities
Emphasis Area	A collection of safety concerns identified in the state SHSP, sharing common characteristics such as users affected, types of transportation involved, or other data points.
Highway Safety Improvement Project	A project on a public road that implements countermeasures consistent with the Texas SHSP and improves road conditions or roadway features.
Highway Safety Improvement Program (HSIP)	The collection of projects on public roads which implement countermeasures consistent with the SHSP and which is funded by a specific category of federal dollars.
K Crash	Crash resulting in one or more Fatalities as the most serious outcome.
O Crash	Crash resulting in Property Damage Only as the most serious outcome.
Off-system Roadways	Roadway not designated on the State Highway System and not maintained by TxDOT (i.e., city street or county road).
On-system Roadways	Roadway designated on the State Highway System and maintained by TxDOT.
Overruns	The difference between the engineer's final estimate and the original amount programmed for a specific HSIP project, when the engineer's final estimate is greater.
Preventable Crash	Crashes with defined characteristics that may be affected by the proposed improvement (work code).
Road User	A motorist, passenger, public transportation operator or user, truck driver, bicyclist, motorcyclist, or pedestrian, including a person with disabilities.
SII	Safety Improvement Index
Safety Study	An analysis of roadway, traffic, and crash-related data to determine the probable cause of an identified crash patter. It provides alternative countermeasures meant to mitigate predominate crash pattern(s).
Strategic Highway Safety Plan (SHSP)	Federally mandated document compiled at the State level addressing areas of greatest concern to the state and which identifies strategies and countermeasures to address those Emphasis Areas.
Systemic Safety Improvement	An improvement that is widely implemented based on high-risk roadway features that are correlated with particular crash types, rather than crash frequency.
Traffic Engineering Section (TE)	A section in the Traffic Safety Division (TRF) whose primary responsibility relates to traffic engineering.
Traffic Safety Division (TRF)	The division within the Texas Department of Transportation, headquartered in Austin, whose primary responsibility relates to traffic operations.
TxDOTCONNECT (TxC)	Project & Portfolio management tool developed for use at TxDOT

Appendix B - HSIP Work Codes Table

The work codes are grouped into five categories, as shown in the following table.

Code	Item
100	Signing and Signals
200	Roadside Obstacles and Barriers
300	Resurfacing and Roadway Lighting
400	Pavement Markings
500	Roadway Work

Work codes are listed by number within each group. Preventable Crash Decoding is in Appendix C of this document.

100 - Signing and Signals

101	**Install Warning/Guide Signs**		
Definition:	Provide advance signing for unusual or unexpected roadway features where no signing existed previously.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	15	G-Match:	Y
Preventable Crash:	(Vehicle Movements/Manner of Collision = 20-22 or 30) OR (Roadway Related = 2, 3 or 4)		
Required Documents:			
107	**Install Traffic Signal**		
Definition:	Provide a traffic signal where none existed previously. This does not include the installation of flashing beacons. SPICE and CAP-X analyses are required for all intersection related HSIP project submittals. See TxDOT Chief Engineer June 24, 2024 memo.		
Reduction Factor (%):	20%	Maintenance Cost:	$3,400 (Isolated) $3,900 (Interconnected) $5,400 (Diamond Interchange)
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	[(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 10-39)] OR (First Harmful Event = 1 or 5)		
Required Documents:	Overhead Intersection Layout, Traffic Signal Warrants, SPICE and CAP-X analyses.		
107R	**Install Traffic Signal (Rural)**		
Definition:	Provide a traffic signal where none existed previously. Only for Rural installation. This does not include the installation of flashing beacons. Reduction Factor not available in MicroStrategy, for use with SII calculator only. SPICE and CAP-X analyses are required for all intersection related HSIP project submittals. See TxDOT Chief Engineer June 24, 2024 memo.		
Reduction Factor (%):	35%	Maintenance Cost:	$3,400 (Isolated) $3,900 (Interconnected) $5,400 (Diamond Interchange)
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	[(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 10-39)] OR (First Harmful Event = 1 or 5)		
Required Documents:	Overhead Intersection Layout, Traffic Signal Warrants, SPICE and CAP-X analyses.		
108	**Improve Traffic Signals (Hardware)**		
Definition:	Improve existing intersection signals to current design standards. Can include replacement of signal heads with retroreflective backplates, as well as upgrading wire signals with mast arms. May also include adding and realigning curb ramps, as well as enhancements to pavement markings. SPICE and CAP-X analyses are required for all intersection related HSIP project submittals. See TxDOT Chief Engineer June 24, 2024 memo.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Intersection Related = 1 or 2) AND [(Vehicle Movements/Manner of Collision = 10-39) OR (First Harmful Event = 1 or 5)]		
Required Documents:	Overhead Intersection Layout, SPICE and CAP-X analyses.		

109	Implement Leading Pedestrian Interval (LPI) Timing		
Definition:	Adjust signal timing to allow pedestrians to enter crosswalk at intersection before vehicles are given a green indication.		
Reduction Factor (%):	16%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	First Harmful Event = 1		
Required Documents:	None.		
110	**Install Pedestrian Signal**		
Definition:	Provide a pedestrian signal at an existing signalized location where no pedestrian phase exists, but pedestrian crosswalks are existing, or in conjunction with WC 403. Use default RF of 34% for SII calculation. If SII < 3.0, a project-specific RF can be calculated.		
Reduction Factor (%):	34%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	First Harmful Event = 1		
Required Documents:	Overhead Intersection Layout.		
111	**Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals)**		
Definition:	Provide signal coordination; a communication link between two or more adjacent signals in a corridor. This WC can be used as an approved systemic countermeasure along a corridor when combined with WC 108.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	All		
Required Documents:	List and drawing of all signalized intersections to be included in the interconnection.		
113	**Install Delineators**		
Definition:	Install post-mounted delineators to provide guidance.		
Reduction Factor (%):	12%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	N
Preventable Crash:	(Roadway Related = 2 , 3 or 4) AND (Light Condition = 3, 4 or 6)		
Required Documents:	None.		
114	**Install School Zones**		
Definition:	Place school zones to include signing, flashing beacons and/or pavement markings where none existed previously. Refer to WC 403 for pedestrian crosswalk markings.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	Y
Preventable Crash:	All		
Required Documents:	None.		

115	Install Pedestrian Countdown Timer		
Definition:	Add pedestrian countdown timer to existing pedestrian signals.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	First Harmful Event = 1		
Required Documents:	None.		
118	**Replace Flashing Beacon with a Traffic Signal**		
Definition:	Replace an existing flashing beacon at an intersection with a traffic signal. Districts to verify existing Overhead Flashing Beacon has exceeded its 10 yr service life.		
Reduction Factor (%):	25%	Maintenance Cost:	$1,300
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Intersection Related = 1 or 2) AND [(Vehicle Movements/Manner of Collision = 10-39) OR (First Harmful Event = 1 or 5)]		
Required Documents:	Overhead Intersection Layout.		
119	**Install Overhead Signs**		
Definition:	Install overhead advance regulatory, warning or guide signing for unusual or unexpected roadway features where no signing existed previously.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-29		
Required Documents:	None.		
122	**Install Advanced Warning Beacons (Intersection - Existing Warning Signs)**		
Definition:	Provide warning beacons as supplemental emphasis to warning signs in advance of an intersection where none previously existed but where advance warning signs already exist.		
Reduction Factor (%):	10%	Maintenance Cost:	$1,300 per approach
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	None.		
123	**Install Advanced Warning Beacons (Curve - Existing Warning Signs)**		
Definition:	Provide warning beacons as supplemental emphasis to warning signs in advance of a curve where none previously existed but where advance warning signs already exist.		
Reduction Factor (%):	10%	Maintenance Cost:	$1,300 per approach
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision= 20-24 or 30)		
Required Documents:	None.		

124	Install Advanced Warning Beacons and Signs (Intersection)		
Definition:	Provide warning beacons and signs in advance of an intersection where none previously existed. It is now recommended to include retroreflective strips on sign posts.		
Reduction Factor (%):	25%	Maintenance Cost:	$1,300 per approach
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	None.		
125	**Install Advanced Warning Beacons and Signs (Curve)**		
Definition:	Provide warning beacons and signs in advance of a curve where none previously existed. It is now recommended to include retroreflective strips on sign posts.		
Reduction Factor (%):	15%	Maintenance Cost:	$1,300 per approach
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20-24 or 30)		
Required Documents:	None.		
128	**Install Advanced Warning Signs (Intersection)**		
Definition:	Provide signs in advance of an intersection (including flashing signs) where none previously existed. It is now recommended to include retroreflective strips on sign posts.		
Reduction Factor (%):	15%	Maintenance Cost:	0
Service Life (Years):	15	G-Match:	Y
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	None.		
130	**Install Advanced Warning Signs (Curve)**		
Definition:	Provide signs in advance of a curve where none previously existed. It is now recommended to include retroreflective strips on sign posts.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	15	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20-24 or 30)		
Required Documents:	None.		
131	**Improve Pedestrian Signals**		
Definition:	Bring existing pedestrian signal units into conformance with current standards.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	First Harmful Event = 1		
Required Documents:	None.		

132	Install Advance Warning Beacons and Signs		
Definition:	Provide warning beacons and signs in advance of hazard where none previously existed. It is now recommended to include retroreflective strips on sign posts.		
Reduction Factor (%):	10%	Maintenance Cost:	$1,300 per approach
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20-24 or 30)		
Required Documents:	None.		
133	**Improve School Zone**		
Definition:	Improve an existing school zone by upgrading signing, pavement markings or signals.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	Y
Preventable Crash:	All		
Required Documents:	None.		
134	**Install Advanced Pedestrian Crossing Signage**		
Definition:	Install pedestrian crossing warning signs in advance of a pedestrian crosswalk where none previously existed. It is now recommended to include retroreflective strips on sign posts. For signing within school zones, see WC 114 and 133.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	15	G-Match:	Y
Preventable Crash:	First Harmful Event = 1 or 5		
Required Documents:	None.		
136	**Install LED Flashing Chevrons (Curve)**		
Definition:	Install LED flashing chevrons on curve to provide guidance. May include Dynamic LED Chevron System.		
Reduction Factor (%):	35%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3, or 4) OR (Vehicle Movements/Manner of Collision = 20 - 24, or 30)		
Required Documents:	None.		
137	**Install Chevrons (Curve)**		
Definition:	Install chevrons on curve to provide guidance. It is now recommended to include retroreflective strips on sign posts.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	15	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3, or 4) OR (Vehicle Movements/Manner of Collision = 20 - 24, or 30)		
Required Documents:	None.		

138	Install Flashing Yellow Arrow		
Definition:	Improve existing intersection signals by adding a flashing yellow arrow indication and install the LEFT TURN YIELD ON FLASHING YELLOW ARROW (R10-17T) sign. Refer to WC 108 for improvement of traffic signal.		
Reduction Factor (%):	40%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 29, 34, 36)		
Required Documents:	None.		
139	**Install Surface Mounted Delineators on Centerline**		
Definition:	Install surface mounted delineators on centerline.		
Reduction Factor (%):	12%	Maintenance Cost:	0
Service Life (Years):	7	G-Match:	Y
Preventable Crash:	(Vehicle Movements/Manner of Collision = 21 or 30) OR (Roadway Related = 2, 3 or 4)		
Required Documents:	None.		
140	**Wrong Way Driver Warning Signs**		
Definition:	Provide warning signs to warn wrong way drivers at freeway exit ramps (e.g., Oversized and Flashing LED "Wrong Way" and "Do Not Enter" signs with red retroreflective strip on sign supports). For Flashing LED signs, use SS6066 and bid code 6066-7001. For retroreflective strip, refer to D&OM(SIGN)-25; Recommended bid code is 658-7080. Systemic only.		
Reduction Factor (%):	35%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	Contributing factor = 71		
Required Documents:	None.		
141	**Wrong Way Driver Warning Markings**		
Definition:	Provide markings (wrong way arrows using striping or raised pavement markers) to warn wrong way drivers at freeway exit ramps. Refer to FPM(1)-25 and SHSD Section 12. Systemic only.		
Reduction Factor (%):	40%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	Y
Preventable Crash:	Contributing factor = 71		
Required Documents:	None.		
142	**Wrong Way Driver Advanced Technologies**		
Definition:	Provide advanced technologies to detect and warn wrong way drivers at freeway exit ramps. (e.g., exit ramp detection systems and upstream DMS alerts). Requires a One Time Use Special Specification. Refer to SS6028, SS6038, SS6056, and SS6087 for examples. Systemic only.		
Reduction Factor (%):	35%	Maintenance Cost:	$25,000
Service Life (Years):	5	G-Match:	N
Preventable Crash:	Contributing factor = 71		
Required Documents:	None.		

143	Pedestrian Hybrid Beacon		
Definition:	Provide pedestrian hybrid beacon at established crosswalk or in conjunction with installation of new crosswalk (403). Requires TRF-P&S approval.		
Reduction Factor (%):	30%	Maintenance Cost:	2100
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	First Harmful Event = 1		
Required Documents:	None.		
144	**Install Rectangular Rapid Flashing Beacon (RRFB)**		
Definition:	Install pedestrian activated rectangular rapid flashing beacon (RRFB) at existing or in conjunction with installation of new crosswalk (403). Requires TRF-P&S approval. Systemic only.		
Reduction Factor (%):	45%	Maintenance Cost:	$1,300 per roadside assembly
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	First Harmful Event = 1		
Required Documents:	Overhead layout.		
145	**Flashing Stop Beacon or LED-embedded Stop Signs**		
Definition:	Install LED stop signs or stop beacons on existing stop signs at intersections where only standard stop signs are present.		
Reduction Factor (%):	10%	Maintenance Cost:	$1,300 per roadside assembly
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	[(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 10-19)]		
Required Documents:	None.		
150	**Dynamic Speed Feedback Signs**		
Definition:	Install permanent dynamic message speed display signs related to a regulatory speed limit or advisory speed for unexpected roadway features (curves, school zones, etc.).		
Reduction Factor (%):	5%	Maintenance Cost:	0
Service Life (Years):	10Estimated based on signage life	G-Match:	Y
Preventable Crash:	Part of Roadway No. 1 Involved = 1		
Required Documents:	Overhead layout.		
151	**Variable Speed Limit (VSL)**		
Definition:	Provide Variable Speed Limits where none existed previously.		
Reduction Factor (%):	30%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	N
Preventable Crash:	Part of Roadway No. 1 Involved = 1, 3-5		
Required Documents:	TRF-TM concurrence for proposed VSL location and limits required.		

200 - Roadside Obstacles and Barriers

201 Install Median Barrier			
Definition:	Construct a concrete or cable safety system median barrier where none existed previously. Consider existing median width, percent truck traffic, cable post spacing, material availability, maintenance cost, and inside shoulder widening when selecting CTB versus steel cable.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	25	G-Match:	Y
Preventable Crash:	Vehicle Movements/Manner of Collision = 30		
Required Documents:	Existing and Proposed Typical Sections.		
203 Install Raised Median			
Definition:	Install a roadway divider using barrier curb. If local access is impacted, approval from the Chief Engineer is required prior to advertisement & publishing the job for letting. See the DES Proposed Raised Median Projects SOP.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Part of Roadway No. 1 Involved = 1) AND (Vehicle Movements/Manner of Collision = 10, 14, 20-22, 24, 26, 28-30, 34, 36, or 38)		
Required Documents:	Overhead layout.		
204 Flatten Side Slope			
Definition:	Provide an embankment side slope of 6:1 or flatter.		
Reduction Factor (%):	5%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Roadway Related = 3		
Required Documents:	None.		
209 Safety Treat Fixed Objects			
Definition:	Remove, relocate, or safety treat all fixed objects including the installation of guardrail for safety treatment of a fixed object or drainage structures within the project limits, to include both point and continuous objects.		
Reduction Factor (%):	45%	Maintenance Cost:	0
Service Life (Years):	15	G-Match:	C
Preventable Crash:	(Roadway Related = 2 or 3) OR (Object Struck = 20-26, 29-36, 40-42, 56-58, 60, 62, or 63)		
Required Documents:	None.		
217 Install Impact Attenuation System			
Definition:	Provide any of a variety of impact attenuators where none existed previously.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Object Struck = 20, 30, 40, or 42)		
Required Documents:	None.		

218 Widen Bridge			
Definition:	Provide additional width across an existing structure, either by rehabilitation or replacement. Specify existing bridge width, existing approach roadway width and roadway type (2 lane, 4 lane undivided, etc.)		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	30	G-Match:	N
Preventable Crash:	(Bridge Detail is not blank) OR (Vehicle Movements/Manner of Collision = 20, 21, or 30) OR (Roadway Related = 2, 3 or 4)		
Required Documents:	Existing & Proposed Typical Sections.		
220 Truck Parking Facilities			
Definition:	Construct, expand, upgrade, or re-purpose existing roadside facilities for truck parking that are eligible for funding under section 1401 of the MAP–21. Systemic only.		
Reduction Factor (%):	TBD	Maintenance Cost:	
Service Life (Years):	20	G-Match:	N
Preventable Crash:			
Required Documents:	Prposed rest stop layout including entrances and exits.		
225 Pedestrian Crossing Deterrent			
Definition:	Install attachments to existing concrete barrier systems to deter prohibited pedestrian crossings on divided highways. Systemic only.		
Reduction Factor (%):	TBD	Maintenance Cost:	TBD
Service Life (Years):	10	G-Match:	N
Preventable Crash:	First Harmful Event = 1		
Required Documents:	None.		

300 - Resurfacing and Roadway Lighting

303 Resurfacing			
Definition:	Provide a new roadway surface to increase pavement skid numbers on all the lanes.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	N
Preventable Crash:	Surface Condition = 2, 5, 6, or 9 (Skid Value must be less than 20)		
Required Documents:	Skid Numbers.		
304 Safety Lighting (Non-Intersection)			
Definition:	Provide roadway lighting, either partial or continuous, where either none existed previously or major improvements are being made. Refer to WC 305 for intersection lighting.		
Reduction Factor (%):	30%	Maintenance Cost:	$300 per Luminaire
Service Life (Years):	15	G-Match:	Y
Preventable Crash:	Light Condition = 3, 4 or 6		
Required Documents:	None.		
305 Safety Lighting (Intersection)			
Definition:	Install lighting at an intersection where either none existed previously or major improvements are proposed. Refer to WC 304 for general lighting.		
Reduction Factor (%):	13%	Maintenance Cost:	$300 per Luminaire
Service Life (Years):	15	G-Match:	Y
Preventable Crash:	Light Condition = 3, 4 or 6 AND Intersection Related = 1 or 2		
Required Documents:	Overhead Intersection Layout.		

400 - Pavement Markings

401	Install Pavement Markings		
Definition:	Place complete pavement markings, excluding crosswalks, in accordance with the TMUTCD where either no markings or nonstandard markings exist. This work code includes items such as turn arrows, stop lines, lane markings, raised pavement markers,etc. Refer to WC 402 for edgeline markings, WC 403 for pedestrian crosswalks, WC 404 for centerline markings.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	5(Product used must meet 4 year service life.)	G-Match:	Y
Preventable Crash:	(Roadway Related = 1) OR (Vehicle Movements/Manner of Collision = 21 or 30)		
Required Documents:	Preliminary layout.		

402	Install Edgeline Marking		
Definition:	Place edge lines where none existed previously.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	5(Product used must meet 4 year service life.)	G-Match:	Y
Preventable Crash:	Roadway Related = 2, 3 or 4		
Required Documents:	Preliminary layout.		

403	Install Pedestrian Crosswalk		
Definition:	Place pedestrian crosswalk markings where none existed previously. Refer to WC 114 for school zones, and WC 110 for pedestrian signal.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	5(Product used must meet 4 year service life.)	G-Match:	Y
Preventable Crash:	First Harmful Event = 1		
Required Documents:	Preliminary layout.		

404	Install Centerline Marking		
Definition:	Provide centerline marking where either no markings or nonstandard markings existed previously. Adding centerline buffer in accordance with Standard CLB(1)-23, CLB(2)-23 may be approved under WC404 without pavement widening. Refer to WC 401 for complete pavement markings.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	5(Product used must meet 4 year service life.)	G-Match:	Y
Preventable Crash:	Vehicle Movements/Manner of Collision = 30		
Required Documents:	Preliminary layout.		

407	Install Sidewalks		
Definition:	Install new sidewalks where none currently exist including the extension of existing sidewalks. Widening existing sidewalks is not eligible.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	First Harmful Event = 1 or 5		
Required Documents:	None.		
408	**Add Shared Use Path**		
Definition:	Provide a shared used path (sidepath) adjacent to roadway physically separated from motorized vehicular traffic.		
Reduction Factor (%):	25%	Maintenance Cost:	
Service Life (Years):	20	G-Match:	N
Preventable Crash:	First Harmful Event = 1 or 5		
Required Documents:	Existing & Proposed Typical Sections.		
409	**Install Pedestrian Refuge Islands**		
Definition:	Install pedestrian median or refuge island where none existed previously.		
Reduction Factor (%):	34%	Maintenance Cost:	
Service Life (Years):	25	G-Match:	N
Preventable Crash:	First Harmful Event = 1 or 5		
Required Documents:	Existing & Proposed Typical Sections; Overhead Intersection Layout.		
410	**Install Dedicated Bicycle Lanes**		
Definition:	Restripe existing pavement to provide dedicated space for bike lanes. If widening is needed use in combination with WC's 502-504		
Reduction Factor (%):	27%	Maintenance Cost:	0
Service Life (Years):	4Estimated based on other pavement marking WCs	G-Match:	C
Preventable Crash:	First Harmful Event = 5		
Required Documents:	Proposed typical section.		

500 - Roadway Work

502 Widen Lane(s)			
Definition:	Provide additional width to the lane(s). A Refer to WC 517 if adding a through lane. Consider Standard CLB(1)-23, CLB(2)-23 for adding centerline buffer for undivided facilities.		
Reduction Factor (%):	15%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 21, 30)		
Required Documents:	Typical Section.		
503 Widen Paved Shoulder (to 5 ft. or less)			
Definition:	Extend the existing paved shoulder to achieve desirable shoulder width. Refer to WC 504 or 537 for constructing a paved shoulder.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (First Harmful Event = 4)		
Required Documents:	Typical Section.		
504 Construct Paved Shoulders (1-4 ft.)			
Definition:	Provide paved shoulders of 1- to 4-foot width where no shoulders existed previously. Refer to WC 503 or 536 for widening paved shoulders.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20, 23-24 or 30) OR (First Harmful Event = 4)		
Required Documents:	Typical Section.		
505 Improve Vertical Alignment			
Definition:	Reconstruct the roadway to improve sight distance.		
Reduction Factor (%):	35%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 13-14, 20-24, 30, 32 or 34)		
Required Documents:	None.		
506 Improve Horizontal Alignment			
Definition:	Flatten existing curves. Refer to WC 507 for providing superelevation, and WC 508 for intersection realignment.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20-24 or 30)		
Required Documents:	None.		

507	Increase Superelevation		
Definition:	Provide increased superelevation on an existing curve. Use default RF of 20% for SII calculation. If SII < 3.0, a project-specific RF can be calculated.		
Reduction Factor (%):	20%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 30)		
Required Documents:	None.		
508	**Realign Intersection**		
Definition:	Improve an existing intersection by partial or complete relocation of the roadway(s). Refer to WC 509 for channelization, and WC 506 for improving horizontal alignments.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	N
Preventable Crash:	[(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 10-39)] OR (First Harmful Event = 1 or 5)		
Required Documents:	Proposed Overhead Intersection View.		
509	**Channelization**		
Definition:	Install islands and/or pavement markings to control or prohibit vehicular movements. A sketch of the proposed channelization should be provided. Refer to WC 508 for intersection realignment.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	C
Preventable Crash:	(Intersection Related ≠ 4) AND (Vehicle Movements/Manner of Collision = 10-39)		
Required Documents:	Proposed Overhead View.		
510	**Construct Turn Arounds**		
Definition:	Provide turnarounds at an intersection where none existed previously.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 12, 14, 18, 20, 22, 24, 26, 28, 29, or 34)		
Required Documents:	Overhead Intersection View.		
515	**Construct Interchange**		
Definition:	Construct vertical separation of intersecting roadways to include interconnecting ramps.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	30	G-Match:	N
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	Overhead View.		

516 Close Crossover			
Definition:	Permanently close an existing crossover.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Part of Roadway Involved = 1) AND (Vehicle Movements/Manner of Collision = 10, 14, 20-22, 24, 26, 28-30, 34 or 38)		
Required Documents:	None.		
517 Add Through Lane			
Definition:	Provide an additional travel lane.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	C
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-24, 26-27, 29-30		
Required Documents:	Typical Section.		
518 Install Continuous Turn Lane			
Definition:	Provide a continuous two-way left turn lane where none existed previously.		
Reduction Factor (%):	30%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-22, 24, 26, 28-30, 34 or 38		
Required Documents:	Typical Section.		
519 Add Left Turn Lane			
Definition:	Provide an exclusive left turn lane where none existed previously. The affected intersection approaches must be specified.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-22, 24, 26, 28-30, 34 or 38 AND Intersection Related ≠ 4		
Required Documents:	Typical Section; overhead proposed layout.		
520 Lengthen Left Turn Lane			
Definition:	Provide additional length to an existing exclusive left turn lane. Affected intersection approaches must be specified.		
Reduction Factor (%):	40%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-22 AND Intersection Related ≠ 4		
Required Documents:	None.		

521	Add Right Turn Lane		
Definition:	Provide an exclusive right turn lane where none existed previously. Affected intersection approaches must be specified.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-23, 25-27, 33 or 36 AND Intersection Related ≠ 4		
Required Documents:	Typical Section; overhead proposed layout.		
522	**Lengthen Right Turn Lane**		
Definition:	Provide additional length to an existing exclusive right turn lane. Affected intersection approaches must be specified.		
Reduction Factor (%):	30%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-22 AND Intersection Related ≠ 4		
Required Documents:	None.		
523	**Construct Pedestrian Over/Under Pass**		
Definition:	Construct a pedestrian crossover where none existed previously.		
Reduction Factor (%):	90%	Maintenance Cost:	0
Service Life (Years):	30	G-Match:	N
Preventable Crash:	First Harmful Event = 1		
Required Documents:	None.		
524	**Increase Turning Radius**		
Definition:	Provide an increased turning radius at an existing intersection.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	C
Preventable Crash:	[(Vehicle Body Style = 87 or 91) AND (First Harmful Event = 7)] OR (Vehicle Movements/Manner of Collision = 13, 20-21, 30 or 33)		
Required Documents:	Overhead Intersection View.		
525	**Convert to One Way Frontage Roads**		
Definition:	Convert two-way frontage roads to one-way operation. If a district elects to maintain two-way frontage road operation within the limits of an HSIP project, approval through Design Division will be required.		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	C
Preventable Crash:	Part of Roadway Involved = 2		
Required Documents:	None.		

526 Positive Offset Left-turn Lanes			
Definition:	Add positive offset to existing left-turn lane(s) at an intersection.		
Reduction Factor (%):	30%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Vehicle Movements/Manner of Collision = 20-22, 24, 26, 28-30, 34 or 38 AND Intersection Related = (1 or 2)		
Required Documents:	Proposed Intersection Layout.		
532 Milled Edgeline Rumble Strips			
Definition:	Install continuous milled depressions (rumble stripes or rumble strips) along the edgeline. Stand-alone rumble strip project proposals will not be accepted.		
Reduction Factor (%):	15%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 30)		
Required Documents:	None.		
533 Profile Edgeline Markings			
Definition:	Install profile edgeline markings. Stand-alone rumble strip project proposals will not be accepted.		
Reduction Factor (%):	7%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 30) OR (Surface Condition = 2, 5, 6 or 9)		
Required Documents:	None.		
534 Raised Edgeline Rumble Strips			
Definition:	Install non-reflective raised traffic buttons (yellow or white) along the edgeline. Stand-alone rumble strip project proposals will not be accepted.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	Y
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 30) OR (Surface Condition = 2, 5, 6 or 9)		
Required Documents:	None.		
536 Widen Paved Shoulders (to >5 ft.)			
Definition:	Extend the existing paved shoulder to greater than 5 ft. Refer to WC 504 or 537 for constructing a paved shoulder.		
Reduction Factor (%):	30%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (First Harmful Event = 4)		
Required Documents:	Typical Section.		

537	Construct Paved Shoulders (>= 5ft.)		
Definition:	Provide paved shoulders 5 feet or greater where no shoulders existed previously. Refer to WC 503 or 536 for widening paved shoulders.		
Reduction Factor (%):	40%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20, 23-24 or 30) OR (First Harmful Event = 4)		
Required Documents:	Typical Section.		
538	**Convert 2 Lane Facility to 4 Lane Divided**		
Definition:	Convert an existing 2-lane facility to a 4-lane divided facility.		
Reduction Factor (%):	45%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	C
Preventable Crash:	(Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 10, 13, 14, 20, 21, 22, 24 or 30)		
Required Documents:	Typical Section.		
540	**Install Passing Lanes on 2 Lane Road**		
Definition:	Widen roadway to install passing lanes on a 2-lane roadway where none currently exist.		
Reduction Factor (%):	25%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 1, 2, or 3) AND (Vehicle Movements/Manner of Collision = 20-24 or 30)		
Required Documents:	Typical Section.		
541	**Provide Additional Paved Surface Width**		
Definition:	Provide additional paved surface width with appropriate subsurface to each side of two lane, two-way roadways with existing paved surface width less than 24' to a maximum width of 28'. (Existing widths of 24+ feet in need of widening, and additional pavement width beyond 28 feet may be considered on a case-by-case basis in accordance with requirements in the Roadway Design Manual)		
Reduction Factor (%):	30%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	(Roadway Related = 2, 3, or 4) OR (Vehicle Movements/Manner of Collision = 21 or 30) OR First Harmful Event = 10)		
Required Documents:	Typical Section.		
542	**Milled Centerline Rumble Strips**		
Definition:	Install milled centerline rumble strips along the centerline. Stand-alone rumble strip project proposals will not be accepted.		
Reduction Factor (%):	15%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	Y
Preventable Crash:	(Vehicle Movements/Manner of Collision = 30) OR (Roadway Related = 3 or 4)		
Required Documents:	None.		

543	Profile Centerline Markings		
Definition:	Install profile centerline markings and preformed thermoplastic strips along the centerline. Stand-alone centerline rumble strip project proposals will not be accepted.		
Reduction Factor (%):	7%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	Y
Preventable Crash:	(Vehicle Movements/Manner of Collision = 30) OR (Roadway Related = 3 or 4) OR (Surface Condition = 2, 5, 6 or 9)		
Required Documents:	None.		
544	**Raised Centerline Rumble Strips**		
Definition:	Install non-reflective raised traffic buttons (yellow or black) and preformed thermoplastic strips along the centerline. Stand-alone centerline rumble strip project proposals will not be accepted.		
Reduction Factor (%):	10%	Maintenance Cost:	0
Service Life (Years):	5	G-Match:	Y
Preventable Crash:	(Vehicle Movements/Manner of Collision = 30) OR (Roadway Related = 3 or 4) OR (Surface Condition = 2, 5, 6 or 9)		
Required Documents:	None.		
545	**Transverse Rumble Strips**		
Definition:	Install transverse or in-lane rumble strips in advance of a high incident and special geometric location.		
Reduction Factor (%):	15%	Maintenance Cost:	0
Service Life (Years):	10	G-Match:	N
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	None.		
547	**Construct a Single-Lane Roundabout**		
Definition:	Convert an existing intersection to a single lane roundabout design		
Reduction Factor (%):	50%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	Y
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	Overhead intersection layout.		
550	**Restricted Crossing U-Turn (RCUT)**		
Definition:	Convert intersection to restricted crossing U-turn (RCUT) intersection.		
Reduction Factor (%):	40%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	Overhead intersection layout.		

551 Median U-Turn (MUT)			
Definition:	Convert intersection to median U-Turn (MUT) intersection that replaces direct left turns at an intersection with indirect left turns using a U-turn movement in a wide median. Refer to RDM Appendix E: Section 4		
Reduction Factor (%):	30%	Maintenance Cost:	0
Service Life (Years):	20	G-Match:	N
Preventable Crash:	Intersection Related = 1 or 2		
Required Documents:	Overhead intersection layout.		

Work Codes in MicroStrategy

Work codes listed with a Reduction Factor of "TBD" require evaluation by a TRF Safety engineer.

Work Code	Description	Reduction Factor	Service Life
101	Install Warning/Guide Signs	20%	15
107	Install Traffic Signal	20%	10
108	Improve Traffic Signals (Hardware)	10%	10
109	Implement Leading Pedestrian Interval (LPI) Timing	16%	10
110	Install Pedestrian Signal	34%	10
111	Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals)	10%	10
113	Install Delineators	12%	5
114	Install School Zones	20%	5
115	Install Pedestrian Countdown Timer	50%	10
118	Replace Flashing Beacon with a Traffic Signal	25%	10
119	Install Overhead Signs	20%	10
122	Install Advanced Warning Beacons (Intersection - Existing Warning Signs)	10%	10
123	Install Advanced Warning Beacons (Curve - Existing Warning Signs)	10%	10
124	Install Advanced Warning Beacons and Signs (Intersection)	25%	10
125	Install Advanced Warning Beacons and Signs (Curve)	15%	10
128	Install Advanced Warning Signs (Intersection)	15%	15
130	Install Advanced Warning Signs (Curve)	10%	15
131	Improve Pedestrian Signals	10%	10
132	Install Advance Warning Beacons and Signs	10%	10
133	Improve School Zone	10%	5
134	Install Advanced Pedestrian Crossing Signage	25%	15
136	Install LED Flashing Chevrons (Curve)	35%	10
137	Install Chevrons (Curve)	20%	15
138	Install Flashing Yellow Arrow	40%	10
139	Install Surface Mounted Delineators on Centerline	12%	7
140	Wrong Way Driver Warning Signs	35%	10
141	Wrong Way Driver Warning Markings	40%	5
142	Wrong Way Driver Advanced Technologies	35%	5
143	Pedestrian Hybrid Beacon	30%	10
144	Install Rectangular Rapid Flashing Beacon (RRFB)	45%	10
145	Flashing Stop Beacon or LED-embedded Stop Signs	10%	10
150	Dynamic Speed Feedback Signs	5%	10
151	Variable Speed Limit (VSL)	30%	10
201	Install Median Barrier	50%	25
203	Install Raised Median	25%	20
204	Flatten Side Slope	5%	20
209	Safety Treat Fixed Objects	45%	15
217	Install Impact Attenuation System	50%	10
218	Widen Bridge	50%	30
303	Resurfacing	20%	10
304	Safety Lighting (Non-Intersection)	30%	15

Work Code	Description	Reduction Factor	Service Life
305	Safety Lighting (Intersection)	13%	15
401	Install Pavement Markings	20%	5
402	Install Edgeline Marking	20%	5
403	Install Pedestrian Crosswalk	10%	5
404	Install Centerline Marking	20%	5
407	Install Sidewalks	50%	20
408	Add Shared Use Path	25%	20
409	Install Pedestrian Refuge Islands	34%	25
410	Install Dedicated Bicycle Lanes	27%	4
502	Widen Lane(s)	15%	20
503	Widen Paved Shoulder (to 5 ft. or less)	20%	20
504	Construct Paved Shoulders (1-4 ft.)	25%	20
505	Improve Vertical Alignment	35%	20
506	Improve Horizontal Alignment	50%	20
507	Increase Superelevation	20%	20
508	Realign Intersection	50%	10
509	Channelization	25%	10
510	Construct Turn Arounds	25%	20
515	Construct Interchange	50%	30
516	Close Crossover	50%	20
517	Add Through Lane	25%	20
518	Install Continuous Turn Lane	30%	20
519	Add Left Turn Lane	25%	20
520	Lengthen Left Turn Lane	40%	20
521	Add Right Turn Lane	25%	20
522	Lengthen Right Turn Lane	30%	20
523	Construct Pedestrian Over/Under Pass	90%	30
524	Increase Turning Radius	10%	10
525	Convert to One Way Frontage Roads	50%	20
526	Positive Offset Left-turn Lanes	30%	20
532	Milled Edgeline Rumble Strips	15%	10
533	Profile Edgeline Markings	7%	5
534	Raised Edgeline Rumble Strips	10%	5
536	Widen Paved Shoulders (to >5 ft.)	30%	20
537	Construct Paved Shoulders (>= 5ft.)	40%	20
538	Convert 2 Lane Facility to 4 Lane Divided	45%	20
540	Install Passing Lanes on 2 Lane Road	25%	20
541	Provide Additional Paved Surface Width	30%	20
542	Milled Centerline Rumble Strips	15%	10
543	Profile Centerline Markings	7%	5
544	Raised Centerline Rumble Strips	10%	5
545	Transverse Rumble Strips	15%	10
547	Construct a Single-Lane Roundabout	50%	20
550	Restricted Crossing U-Turn (RCUT)	40%	20
551	Median U-Turn (MUT)	30%	20

Work Code Combinations in MicroStrategy

WC Combo	Description	Reduction Factor	Service Life
101, 136, 533, 543	Install Warning/Guide Signs, Install LED Flashing Chevrons (Curve), Profile Edgeline Markings, Profile Centerline Markings	35%	15
101, 137, 401	Install Warning/Guide Signs, Install Chevrons (Curve), Install Pavement Markings	30%	15
101, 401	Install Warning/Guide Signs, Install Pavement Markings	30%	15
107, 111	Install Traffic Signal, Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals)	30%	10
107, 122	Install Traffic Signal, Install Advanced Warning Beacons (Intersection - Existing Warning Signs)	23%	10
107, 124	Install Traffic Signal, Install Advanced Warning Beacons and Signs (Intersection)	32%	10
107, 124, 138	Install Traffic Signal, Install Advanced Warning Beacons and Signs (Intersection), Install Flashing Yellow Arrow	40%	10
107, 128	Install Traffic Signal, Install Advanced Warning Signs (Intersection)	27%	15
107, 203, 403	Install Traffic Signal, Install Raised Median, Install Pedestrian Crosswalk	28%	20
107, 305	Install Traffic Signal, Safety Lighting (Intersection)	25%	15
107, 519	Install Traffic Signal, Add Left Turn Lane	32%	20
107, 521	Install Traffic Signal, Add Right Turn Lane	32%	20
108, 110, 407	Improve Traffic Signals (Hardware), Install Pedestrian Signal, Install Sidewalks	50%	20
108, 111	Improve Traffic Signals (Hardware), Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals)	20%	10
108, 111, 122	Improve Traffic Signals (Hardware), Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Install Advanced Warning Beacons (Intersection - Existing Warning Signs)	22%	10
108, 111, 138	Improve Traffic Signals (Hardware), Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Install Flashing Yellow Arrow	40%	10
108, 111, 203	Improve Traffic Signals (Hardware), Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Install Raised Median	26%	20
108, 111, 305	Improve Traffic Signals (Hardware), Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Safety Lighting (Intersection)	23%	15
108, 111, 403	Improve Traffic Signals (Hardware), Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Install Pedestrian Crosswalk	22%	10
108, 113, 131, 305	Improve Traffic Signals (Hardware), Install Delineators, Improve Pedestrian Signals, Safety Lighting (Intersection)	23%	15
108, 122, 138	Improve Traffic Signals (Hardware), Install Advanced Warning Beacons (Intersection - Existing Warning Signs), Install Flashing Yellow Arrow	40%	10
108, 124	Improve Traffic Signals (Hardware), Install Advanced Warning Beacons and Signs (Intersection)	26%	10
108, 128	Improve Traffic Signals (Hardware), Install Advanced Warning Signs (Intersection)	20%	15
108, 128, 305	Improve Traffic Signals (Hardware), Install Advanced Warning Signs (Intersection), Safety Lighting (Intersection)	24%	15
108, 128, 403	Improve Traffic Signals (Hardware), Install Advanced Warning Signs (Intersection), Install Pedestrian Crosswalk	23%	15
108, 131	Improve Traffic Signals (Hardware), Improve Pedestrian Signals	17%	10
108, 131, 138	Improve Traffic Signals (Hardware), Improve Pedestrian Signals, Install Flashing Yellow Arrow	40%	20

WC Combo	Description	Reduction Factor	Service Life
108, 131, 305	Improve Traffic Signals (Hardware), Improve Pedestrian Signals, Safety Lighting (Intersection)	23%	15
108, 131, 305, 407	Improve Traffic Signals (Hardware), Improve Pedestrian Signals, Safety Lighting (Intersection), Install Sidewalks	50%	20
108, 131, 403	Improve Traffic Signals (Hardware), Improve Pedestrian Signals, Install Pedestrian Crosswalk	22%	10
108, 131, 407	Improve Traffic Signals (Hardware), Improve Pedestrian Signals, Install Sidewalks	50%	20
108, 138	Improve Traffic Signals (Hardware), Install Flashing Yellow Arrow	40%	10
108, 138, 305	Improve Traffic Signals (Hardware), Install Flashing Yellow Arrow, Safety Lighting (Intersection)	40%	15
108, 138, 407	Improve Traffic Signals (Hardware), Install Flashing Yellow Arrow, Install Sidewalks	50%	20
108, 138, 521	Improve Traffic Signals (Hardware), Install Flashing Yellow Arrow, Add Right Turn Lane	40%	20
108, 203	Improve Traffic Signals (Hardware), Install Raised Median	26%	20
108, 203, 305	Improve Traffic Signals (Hardware), Install Raised Median, Safety Lighting (Intersection)	27%	10
108, 305	Improve Traffic Signals (Hardware), Safety Lighting (Intersection)	19%	15
108, 401, 403	Improve Traffic Signals (Hardware), Install Pavement Markings, Install Pedestrian Crosswalk	25%	10
108, 403	Improve Traffic Signals (Hardware), Install Pedestrian Crosswalk	17%	10
108, 509	Improve Traffic Signals (Hardware), Channelization	35%	10
108, 517, 518	Improve Traffic Signals (Hardware), Add Through Lane, Install Continuous Turn Lane	30%	20
108, 519	Improve Traffic Signals (Hardware), Add Left Turn Lane	26%	20
108, 519, 521	Improve Traffic Signals (Hardware), Add Left Turn Lane, Add Right Turn Lane	29%	20
108, 520, 522	Improve Traffic Signals (Hardware), Lengthen Left Turn Lane, Lengthen Right Turn Lane	40%	10
108, 521	Improve Traffic Signals (Hardware), Add Right Turn Lane	26%	20
110, 403	Install Pedestrian Signal, Install Pedestrian Crosswalk	34%	10
111, 138	Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Install Flashing Yellow Arrow	50%	10
111, 518	Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Install Continuous Turn Lane	40%	20
111, 519	Install Signal Coordination or Adaptive Signal Timing (Interconnect Signals), Add Left Turn Lane	35%	20
113, 533	Install Delineators, Profile Edgeline Markings	16%	5
122, 305	Install Advanced Warning Beacons (Intersection - Existing Warning Signs), Safety Lighting (Intersection)	19%	15
122, 519	Install Advanced Warning Beacons (Intersection - Existing Warning Signs), Add Left Turn Lane	35%	20
123, 136	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Install LED Flashing Chevrons (Curve)	35%	10
123, 136, 537	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Install LED Flashing Chevrons (Curve), Construct Paved Shoulders (>= 5ft.)	40%	20
123, 137	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Install Chevrons (Curve)	23%	15
123, 137, 533, 543	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Install Chevrons (Curve), Profile Edgeline Markings, Profile Centerline Markings	23%	15
123, 401	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Install Pavement Markings	23%	10

WC Combo	Description	Reduction Factor	Service Life
123, 533	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Profile Edgeline Markings	15%	10
123, 533, 543	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Profile Edgeline Markings, Profile Centerline Markings	18%	10
123, 543	Install Advanced Warning Beacons (Curve - Existing Warning Signs), Profile Centerline Markings	15%	10
124, 145	Install Advanced Warning Beacons and Signs (Intersection), Flashing Stop Beacon or LED-embedded Stop Signs	26%	10
124, 305	Install Advanced Warning Beacons and Signs (Intersection), Safety Lighting (Intersection)	27%	15
124, 401, 545	Install Advanced Warning Beacons and Signs (Intersection), Install Pavement Markings, Transverse Rumble Strips	31%	10
125, 136	Install Advanced Warning Beacons and Signs (Curve), Install LED Flashing Chevrons (Curve)	35%	10
125, 136, 533	Install Advanced Warning Beacons and Signs (Curve), Install LED Flashing Chevrons (Curve), Profile Edgeline Markings	35%	10
125, 137	Install Advanced Warning Beacons and Signs (Curve), Install Chevrons (Curve)	27%	15
125, 137, 402	Install Advanced Warning Beacons and Signs (Curve), Install Chevrons (Curve), Install Edgeline Marking	30%	15
128, 145, 305	Install Advanced Warning Signs (Intersection), Flashing Stop Beacon or LED-embedded Stop Signs, Safety Lighting (Intersection)	24%	15
128, 305	Install Advanced Warning Signs (Intersection), Safety Lighting (Intersection)	23%	15
128, 519	Install Advanced Warning Signs (Intersection), Add Left Turn Lane	40%	20
130, 136	Install Advanced Warning Signs (Curve), Install LED Flashing Chevrons (Curve)	35%	15
130, 136, 533	Install Advanced Warning Signs (Curve), Install LED Flashing Chevrons (Curve), Profile Edgeline Markings	35%	15
130, 137	Install Advanced Warning Signs (Curve), Install Chevrons (Curve)	23%	15
130, 137, 304	Install Advanced Warning Signs (Curve), Install Chevrons (Curve), Safety Lighting (Non-Intersection)	30%	15
131, 403	Improve Pedestrian Signals, Install Pedestrian Crosswalk	17%	20
131, 403, 407	Improve Pedestrian Signals, Install Pedestrian Crosswalk, Install Sidewalks	50%	20
131, 407	Improve Pedestrian Signals, Install Sidewalks	50%	20
131, 521	Improve Pedestrian Signals, Add Right Turn Lane	35%	20
132, 133, 203	Install Advance Warning Beacons and Signs, Improve School Zone, Install Raised Median	45%	20
133, 407	Improve School Zone, Install Sidewalks	60%	20
136, 533	Install LED Flashing Chevrons (Curve), Profile Edgeline Markings	35%	10
136, 533, 543	Install LED Flashing Chevrons (Curve), Profile Edgeline Markings, Profile Centerline Markings	35%	10
136, 542	Install LED Flashing Chevrons (Curve), Milled Centerline Rumble Strips	35%	10
137, 304	Install Chevrons (Curve), Safety Lighting (Non-Intersection)	50%	15
137, 503, 507	Install Chevrons (Curve), Widen Paved Shoulder (to 5 ft. or less), Increase Superelevation	33%	20
137, 504	Install Chevrons (Curve), Construct Paved Shoulders (1-4 ft.)	32%	20
137, 507	Install Chevrons (Curve), Increase Superelevation	30%	20
137, 533, 543	Install Chevrons (Curve), Profile Edgeline Markings, Profile Centerline Markings	22%	15
137, 541	Install Chevrons (Curve), Provide Additional Paved Surface Width	30%	20

WC Combo	Description	Reduction Factor	Service Life
137, 543	Install Chevrons (Curve), Profile Centerline Markings	21%	15
140, 141, 142	Wrong Way Driver Warning Signs, Wrong Way Driver Warning Markings, Wrong Way Driver Advanced Technologies	40%	10
143, 403, 407	Pedestrian Hybrid Beacon, Install Pedestrian Crosswalk, Install Sidewalks	50%	20
201, 204	Install Median Barrier, Flatten Side Slope	55%	25
201, 303	Install Median Barrier, Resurfacing	50%	25
201, 303, 532	Install Median Barrier, Resurfacing, Milled Edgeline Rumble Strips	50%	25
201, 304	Install Median Barrier, Safety Lighting (Non-Intersection)	50%	25
201, 516	Install Median Barrier, Close Crossover	50%	25
201, 532	Install Median Barrier, Milled Edgeline Rumble Strips	50%	25
201, 533	Install Median Barrier, Profile Edgeline Markings	50%	25
203, 304, 407	Install Raised Median, Safety Lighting (Non-Intersection), Install Sidewalks	50%	20
203, 407	Install Raised Median, Install Sidewalks	75%	20
203, 517	Install Raised Median, Add Through Lane	35%	20
203, 533	Install Raised Median, Profile Edgeline Markings	24%	20
203, 533, 542	Install Raised Median, Profile Edgeline Markings, Milled Centerline Rumble Strips	25%	20
203, 533, 543	Install Raised Median, Profile Edgeline Markings, Profile Centerline Markings	23%	20
209, 218	Safety Treat Fixed Objects, Widen Bridge	50%	30
209, 218, 541	Safety Treat Fixed Objects, Widen Bridge, Provide Additional Paved Surface Width	50%	30
209, 303, 503	Safety Treat Fixed Objects, Resurfacing, Widen Paved Shoulder (to 5 ft. or less)	45%	20
209, 303, 504	Safety Treat Fixed Objects, Resurfacing, Construct Paved Shoulders (1-4 ft.)	45%	15
209, 304	Safety Treat Fixed Objects, Safety Lighting (Non-Intersection)	75%	20
209, 502	Safety Treat Fixed Objects, Widen Lane(s)	45%	20
209, 502, 503	Safety Treat Fixed Objects, Widen Lane(s), Widen Paved Shoulder (to 5 ft. or less)	45%	20
209, 502, 503, 533, 543	Safety Treat Fixed Objects, Widen Lane(s), Widen Paved Shoulder (to 5 ft. or less), Profile Edgeline Markings, Profile Centerline Markings	24%	20
209, 502, 504	Safety Treat Fixed Objects, Widen Lane(s), Construct Paved Shoulders (1-4 ft.)	45%	20
209, 502, 536	Safety Treat Fixed Objects, Widen Lane(s), Widen Paved Shoulders (to >5 ft.)	45%	20
209, 503	Safety Treat Fixed Objects, Widen Paved Shoulder (to 5 ft. or less)	65%	20
209, 503, 518	Safety Treat Fixed Objects, Widen Paved Shoulder (to 5 ft. or less), Install Continuous Turn Lane	45%	20
209, 503, 532	Safety Treat Fixed Objects, Widen Paved Shoulder (to 5 ft. or less), Milled Edgeline Rumble Strips	45%	20
209, 503, 540	Safety Treat Fixed Objects, Widen Paved Shoulder (to 5 ft. or less), Install Passing Lanes on 2 Lane Road	45%	20
209, 504	Safety Treat Fixed Objects, Construct Paved Shoulders (1-4 ft.)	45%	20
209, 504, 532, 542	Safety Treat Fixed Objects, Construct Paved Shoulders (1-4 ft.), Milled Edgeline Rumble Strips, Milled Centerline Rumble Strips	30%	20
209, 504, 542	Safety Treat Fixed Objects, Construct Paved Shoulders (1-4 ft.), Milled Centerline Rumble Strips	45%	20

WC Combo	Description	Reduction Factor	Service Life
209, 506	Safety Treat Fixed Objects, Improve Horizontal Alignment	50%	20
209, 516	Safety Treat Fixed Objects, Close Crossover	50%	20
209, 517	Safety Treat Fixed Objects, Add Through Lane	70%	20
209, 518	Safety Treat Fixed Objects, Install Continuous Turn Lane	75%	20
209, 518, 536	Safety Treat Fixed Objects, Install Continuous Turn Lane, Widen Paved Shoulders (to >5 ft.)	45%	20
209, 519	Safety Treat Fixed Objects, Add Left Turn Lane	70%	20
209, 519, 521	Safety Treat Fixed Objects, Add Left Turn Lane, Add Right Turn Lane	45%	20
209, 532	Safety Treat Fixed Objects, Milled Edgeline Rumble Strips	60%	15
209, 532, 541	Safety Treat Fixed Objects, Milled Edgeline Rumble Strips, Provide Additional Paved Surface Width	45%	20
209, 532, 541, 542	Safety Treat Fixed Objects, Milled Edgeline Rumble Strips, Provide Additional Paved Surface Width, Milled Centerline Rumble Strips	30%	20
209, 532, 542	Safety Treat Fixed Objects, Milled Edgeline Rumble Strips, Milled Centerline Rumble Strips	45%	20
209, 533, 541, 543	Safety Treat Fixed Objects, Profile Edgeline Markings, Provide Additional Paved Surface Width, Profile Centerline Markings	30%	15
209, 533, 542	Safety Treat Fixed Objects, Profile Edgeline Markings, Milled Centerline Rumble Strips	45%	15
209, 533, 543	Safety Treat Fixed Objects, Profile Edgeline Markings, Profile Centerline Markings	45%	25
209, 536	Safety Treat Fixed Objects, Widen Paved Shoulders (to >5 ft.)	45%	20
209, 537	Safety Treat Fixed Objects, Construct Paved Shoulders (>= 5ft.)	45%	20
209, 540	Safety Treat Fixed Objects, Install Passing Lanes on 2 Lane Road	45%	20
209, 541	Safety Treat Fixed Objects, Provide Additional Paved Surface Width	45%	20
209, 541, 542	Safety Treat Fixed Objects, Provide Additional Paved Surface Width, Milled Centerline Rumble Strips	45%	20
209, 542	Safety Treat Fixed Objects, Milled Centerline Rumble Strips	45%	15
303, 503, 542	Resurfacing, Widen Paved Shoulder (to 5 ft. or less), Milled Centerline Rumble Strips	55%	20
303, 518, 533	Resurfacing, Install Continuous Turn Lane, Profile Edgeline Markings	30%	20
303, 519, 533	Resurfacing, Add Left Turn Lane, Profile Edgeline Markings	27%	20
303, 532	Resurfacing, Milled Edgeline Rumble Strips	35%	10
303, 532, 540	Resurfacing, Milled Edgeline Rumble Strips, Install Passing Lanes on 2 Lane Road	31%	20
303, 533	Resurfacing, Profile Edgeline Markings	21%	10
303, 533, 536	Resurfacing, Profile Edgeline Markings, Widen Paved Shoulders (to >5 ft.)	30%	20
303, 533, 543	Resurfacing, Profile Edgeline Markings, Profile Centerline Markings	22%	10
303, 542	Resurfacing, Milled Centerline Rumble Strips	35%	10
304, 407	Safety Lighting (Non-Intersection), Install Sidewalks	50%	20
305, 515	Safety Lighting (Intersection), Construct Interchange	50%	30
305, 519	Safety Lighting (Intersection), Add Left Turn Lane	38%	20
305, 519, 521	Safety Lighting (Intersection), Add Left Turn Lane, Add Right Turn Lane	31%	20
305, 547	Safety Lighting (Intersection), Construct a Single-Lane Roundabout	50%	15

WC Combo	Description	Reduction Factor	Service Life
401, 532, 536	Install Pavement Markings, Milled Edgeline Rumble Strips, Widen Paved Shoulders (to >5 ft.)	30%	20
403, 407	Install Pedestrian Crosswalk, Install Sidewalks	50%	10
502, 503	Widen Lane(s), Widen Paved Shoulder (to 5 ft. or less)	35%	20
502, 503, 518	Widen Lane(s), Widen Paved Shoulder (to 5 ft. or less), Install Continuous Turn Lane	65%	20
502, 503, 542	Widen Lane(s), Widen Paved Shoulder (to 5 ft. or less), Milled Centerline Rumble Strips	29%	20
502, 504	Widen Lane(s), Construct Paved Shoulders (1-4 ft.)	29%	20
502, 504, 518	Widen Lane(s), Construct Paved Shoulders (1-4 ft.), Install Continuous Turn Lane	30%	20
502, 504, 542	Widen Lane(s), Construct Paved Shoulders (1-4 ft.), Milled Centerline Rumble Strips	30%	20
502, 518	Widen Lane(s), Install Continuous Turn Lane	45%	20
502, 537	Widen Lane(s), Construct Paved Shoulders (>= 5ft.)	40%	20
503, 518	Widen Paved Shoulder (to 5 ft. or less), Install Continuous Turn Lane	50%	20
503, 532	Widen Paved Shoulder (to 5 ft. or less), Milled Edgeline Rumble Strips	27%	20
503, 532, 542	Widen Paved Shoulder (to 5 ft. or less), Milled Edgeline Rumble Strips, Milled Centerline Rumble Strips	29%	20
503, 540	Widen Paved Shoulder (to 5 ft. or less), Install Passing Lanes on 2 Lane Road	45%	20
503, 542	Widen Paved Shoulder (to 5 ft. or less), Milled Centerline Rumble Strips	35%	20
504, 506	Construct Paved Shoulders (1-4 ft.), Improve Horizontal Alignment	50%	20
504, 506, 507	Construct Paved Shoulders (1-4 ft.), Improve Horizontal Alignment, Increase Superelevation	50%	20
504, 507	Construct Paved Shoulders (1-4 ft.), Increase Superelevation	32%	20
504, 518	Construct Paved Shoulders (1-4 ft.), Install Continuous Turn Lane	30%	20
504, 519	Construct Paved Shoulders (1-4 ft.), Add Left Turn Lane	35%	20
505, 516	Improve Vertical Alignment, Close Crossover	50%	20
506, 507, 537	Improve Horizontal Alignment, Increase Superelevation, Construct Paved Shoulders (>= 5ft.)	50%	20
506, 532, 540	Improve Horizontal Alignment, Milled Edgeline Rumble Strips, Install Passing Lanes on 2 Lane Road	50%	15
507, 532	Increase Superelevation, Milled Edgeline Rumble Strips	27%	20
507, 536	Increase Superelevation, Widen Paved Shoulders (to >5 ft.)	30%	20
507, 537	Increase Superelevation, Construct Paved Shoulders (>= 5ft.)	40%	20
508, 509	Realign Intersection, Channelization	50%	10
517, 518	Add Through Lane, Install Continuous Turn Lane	30%	20
517, 518, 533	Add Through Lane, Install Continuous Turn Lane, Profile Edgeline Markings	30%	20
517, 522	Add Through Lane, Lengthen Right Turn Lane	30%	20
518, 532	Install Continuous Turn Lane, Milled Edgeline Rumble Strips	45%	20
518, 532, 540	Install Continuous Turn Lane, Milled Edgeline Rumble Strips, Install Passing Lanes on 2 Lane Road	30%	20
518, 533	Install Continuous Turn Lane, Profile Edgeline Markings	37%	20
518, 533, 543	Install Continuous Turn Lane, Profile Edgeline Markings, Profile Centerline Markings	30%	25

WC Combo	Description	Reduction Factor	Service Life
518, 536	Install Continuous Turn Lane, Widen Paved Shoulders (to >5 ft.)	60%	20
518, 537	Install Continuous Turn Lane, Construct Paved Shoulders (>= 5ft.)	40%	20
519, 521	Add Left Turn Lane, Add Right Turn Lane	35%	20
519, 521, 524	Add Left Turn Lane, Add Right Turn Lane, Increase Turning Radius	29%	20
519, 532	Add Left Turn Lane, Milled Edgeline Rumble Strips	29%	20
532, 536, 542	Milled Edgeline Rumble Strips, Widen Paved Shoulders (to >5 ft.), Milled Centerline Rumble Strips	30%	20
532, 537	Milled Edgeline Rumble Strips, Construct Paved Shoulders (>= 5ft.)	40%	20
532, 537, 542	Milled Edgeline Rumble Strips, Construct Paved Shoulders (>= 5ft.), Milled Centerline Rumble Strips	40%	20
532, 540	Milled Edgeline Rumble Strips, Install Passing Lanes on 2 Lane Road	29%	20
532, 540, 542	Milled Edgeline Rumble Strips, Install Passing Lanes on 2 Lane Road, Milled Centerline Rumble Strips	30%	20
532, 541	Milled Edgeline Rumble Strips, Provide Additional Paved Surface Width	30%	20
532, 541, 542	Milled Edgeline Rumble Strips, Provide Additional Paved Surface Width, Milled Centerline Rumble Strips	30%	20
532, 542	Milled Edgeline Rumble Strips, Milled Centerline Rumble Strips	24%	10
533, 537	Profile Edgeline Markings, Construct Paved Shoulders (>= 5ft.)	40%	20
533, 537, 543	Profile Edgeline Markings, Construct Paved Shoulders (>= 5ft.), Profile Centerline Markings	40%	10
533, 540, 543	Profile Edgeline Markings, Install Passing Lanes on 2 Lane Road, Profile Centerline Markings	23%	20
533, 541, 543	Profile Edgeline Markings, Provide Additional Paved Surface Width, Profile Centerline Markings	30%	20
533, 542	Profile Edgeline Markings, Milled Centerline Rumble Strips	18%	10
533, 543	Profile Edgeline Markings, Profile Centerline Markings	13%	5
533, 544	Profile Edgeline Markings, Raised Centerline Rumble Strips	15%	5
534, 544	Raised Edgeline Rumble Strips, Raised Centerline Rumble Strips	17%	5
541, 542	Provide Additional Paved Surface Width, Milled Centerline Rumble Strips	30%	20

Appendix C – Preventable Crash Decoding

The Preventable Crash Decoding Table in this section can be used to interpret the codes in the Highway Safety Improvement Program (HSIP) Work Codes Table.

Part of Roadway No. 1 Involved:			
1	Main Proper Lane	5	Connector/Flyover
2	Service/Frontage Road	6	Detour
3	Entrance/On Ramp	7	Transitway
4	Exit/Off Ramp	8	Transitway Ramp
Roadway Related:			
1	On roadway	3	Shoulder
2	Off roadway	4	Median
Intersection Related:			
1	Intersection	3	Driveway access
2	Intersection related	4	Non-intersection

First Harmful Event			
Collision of a motor vehicle with:			
1	Pedestrian	5	Pedalcyclist
2	Another motor vehicle in transport	6	Animal
3	RR train	7	Fixed object
4	Parked car	8	Other object
Other than a collision:			
9	Other non-collision	10	Overturn

Vehicle Movements & Manner of Collision			
Two motor vehicles approaching at an angle:			
10	Both going straight	15	Both right turn
11	One straight, one backing	16	One right turn, one left turn
12	One straight, one stopped	17	One right turn, one stopped
13	One straight, one right turn	18	Both left turn
14	One straight, one left turn	19	One left turn, one stopped

Two motor vehicles going same direction:			
20	Both going straight - rear end	25	Both right turn
21	Both going straight - sideswipe	26	One right turn, one left turn
22	One straight, one stopped	27	One right turn, one stopped
23	One straight, one right turn	28	Both left turn
24	One straight, one left turn	29	One left turn, one stopped
Two motor vehicles going opposite directions:			
30	Both going straight	35	One backing, one stopped
31	One straight, one backing	36	One right turn, one left turn
32	One straight, one stopped	37	One right turn, one stopped
33	One straight, one right turn	38	Both left turn
34	One straight, one left turn	39	One left turn, one stopped
Two motor vehicles – other:			
40	One straight, one entering or leaving parking space		
41	One right turn, one entering or leaving parking space		
42	One left turn, one entering or leaving parking space		
43	One entering or leaving parking space, one stopped		
44	Both entering or leaving parking space		
45	Both vehicles backing		
46	All others		
Movement of Vehicle in Other Than Motor-with-Motor Crashes:			
1	Vehicle going straight		
2	Vehicle turning right		
3	Vehicle turning left		
4	Vehicle backing		
5	Other		

Object Struck			
0	No code shown is applicable	40	Vehicle hit end of bridge (abutment or rail end)
1	Vehicle overturned	41	Vehicle hit side of bridge (bridge rail)
2	Vehicle hit hole in road	42	Vehicle hit pier or support at underpass, tunnel or overhead sign bridge
3	Vehicle jackknifed	43	Vehicle hit top of underpass or tunnel
4	Person fell or jumped from vehicle	44	Vehicle hit bridge crossing gate
9	Vehicle hit train on tracks parallel to road - no crossing	45	Vehicle hit attenuation device
10	Vehicle hit train moving forward	49	Vehicle hit by falling/blowing rocks from a truck
11	Vehicle hit train backing	50	Vehicle hit fallen trees or debris on road
12	Vehicle hit train standing still	51	Vehicle hit object from another vehicle in road
13	Vehicle hit train - action unknown	52	Vehicle hit previously wrecked vehicle
20	Vehicle hit highway sign	53	Vehicle hit toll booth
21	Vehicle hit curb	54	Vehicle hit other machinery
22	Vehicle hit culvert - headwall	55	Vehicle hit other object
23	Vehicle hit guardrail	56	Vehicle hit concrete traffic barrier
24	Vehicle hit railroad signal pole or post	57	Vehicle hit delineator or marker post
25	Vehicle hit railroad crossing gates	58	Vehicle hit retaining wall
26	Vehicle hit traffic signal pole or post	59	Vehicle hit HOV lane gate
27	Vehicle hit overhead signal light, wires, sign, etc.	60	Vehicle hit guard post
28	Vehicle hit work zone barricade, cones, signs or material	61	Fire hydrant
29	Vehicle hit luminaire pole	62	Ditch (long narrow excavation dug in earth)
30	Vehicle hit utility pole	63	Embankment (a raised strip of land or berm)
31	Vehicle hit mailbox	64	Not Applicable
32	Vehicle hit tree or shrub	65	Not Reported
33	Vehicle hit fence		
34	Vehicle hit house, building or building fixture		
35	Vehicle hit commercial sign		
36	Vehicle hit other fixed object		
37	Vehicle hit bus stop structure		
38	Vehicle hit work zone machinery or stockpiled materials		
39	Vehicle hit median barrier		
Bridge Detail:			
1	Vehicle retained on bridge or overpass	6	Structure not hit
2	Vehicle went through rail	7	Result Unknown
3	Vehicle went over rail	8	Not Applicable
4	Crash involved underpass	9	Not Reported
5	Vehicle went between parallel structures		

Other Factors:			
0	No code shown is applicable	10	One car parked improper location
1	Lost control or skidded (icy or slick road, etc.)	11	One car forward from parking
2	Passenger interfered with driver	12	One car backward from parking
3	Attention diverted from driving (delayed perception or lack of alertness)	13	One car entering driveway
4	Open door or object projecting from vehicle	14	One car leaving driveway
5	Foot slipped off clutch or brake	54	Not Applicable
6	Gusty winds	55	Not Reported
7	Vehicle passing or attempting to pass on left	56	Road rage
8	Vehicle passing or attempting to pass on right		
9	Vehicle changing lanes		
Vision obstructed by:			
16	Standing or parked vehicle	21	Headlight or sun glare
17	Moving vehicle	22	Hillcrest
18	Embankment or ledge	23	Trees, shrubs, weeds, etc.
19	Commercial sign	24	Other visual obstructions
20	Highway sign		
Vehicle swerved or veered from intended course:			
25	Reason not specified	31	Avoiding vehicle stopped or moving slowly in traffic lane
26	For surface or visibility	32	Avoiding vehicle entering road
27	For officer, watchman, flagman, or traffic control device (unable to stop, etc.)	33	Avoiding vehicle from opposite direction in wrong lane
28	Avoiding pedestrian, pedal cyclist, etc. in road	34	Avoiding previous crash
29	Avoiding animal in road	35	Avoiding vehicle passing, changing lanes
30	Avoiding object in road		
Vehicle slowing, stopping, or stopped on road:			
36	Reason not specified		
37	Because of surface or visibility		
38	For officer, watchman, flagman, or traffic control device		
39	For pedestrian, pedalcyclist, etc. in road		
40	For animal in road		
41	For object in road		
42	For traffic		
43	To avoid vehicle entering road		
44	To avoid vehicle from opposite direction in wrong lane		
45	To avoid previous crash		
46	To make right turn		
47	To make left turn		
School bus related crash:			

48	School bus related crash		
Construction related:			
49	Within posted road construction zone (not related to crash)		
50	Within posted road construction zone (related to crash)		
51	In other construction maintenance area (not related to crash)		
52	In other construction maintenance area (related to crash)		
Beach related:			
53	Crash occurred on a beach		
Light Condition:			
0	Unknown	4	Darkness - lighted
1	Daylight	5	Dusk
2	Dawn	6	Darkness, unknown lighting
3	Darkness - not lighted	8	Other
Surface Condition:			
0	Unknown	6	Ice
1	Dry	7	Muddy
2	Wet	8	Other
3	Standing Water	9	Snow
4	Snow/Icy	10	Sand, Mud, Dirt
5	Slush		
Vehicle Body Style:			
87	Truck - tractor	91	Semitrailer

Preventable Crash Criteria by WC

The next section in Appendix C list the HSIP Work Codes and corresponding Preventable Crash Criteria

- Preventable Crash Criteria is specific to each HSIP Work Code, and based on values from various fields on the CR-3 Crash Report form.
- The Preventable Crash Criteria values are represented as both numeric and verbal descriptions.
- Most Work Codes have OR logic, meaning only 1 code value shown must be present in the CR-3 Crash Report to qualify as a preventable crash.
- Some Work Codes have AND logic, meaning 2 fields must have specific code values to qualify as a preventable crash.

OR Example:

WORK CODE	OR
304 Safety Lighting	Light Condition = 3 Dark, Not Lighted Light Condition = 4 Dark, Lighted Light Condition = 6 Dark, Unknown Lighting

In this example, a crash would count as preventable for adding Safety Lighting if the Light Condition field on the CR-3 Crash Report is coded as **3** "Dark, Not Lighted", **4** "Dark, Lighted", OR **6** "Dark, Unknown Lighting"

AND Example:

WORK CODE	OR	AND
305 Safety Lighting at Intersection	Light Condition = 3 Dark, Not Lighted Light Condition = 4 Dark, Lighted Light Condition = 6 Dark, Unknown Lighting	Intersection Related = 1 Intersection Intersection Related = 2 Intersection Related

In this example, a crash would count as preventable for adding Safety Lighting at an Intersection if any of the following combinations are present in the crash report:

- Light Condition = 3 AND Intersection Related = 1
- Light Condition = 3 AND Intersection Related = 2
- Light Condition = 4 AND Intersection Related = 1
- Light Condition = 4 AND Intersection Related = 2
- Light Condition = 6 AND Intersection Related = 1
- Light Condition = 6 AND Intersection Related = 2

AND + OR Example:

WORK CODE	OR	AND
524 Increase Turning Radius	First Harmful Event = 7 Fixed Object	Vehicle Body Style = 87 Truck - tractor Vehicle Body Style = 91 Semitrailer
	Vehicle Movements/Manner of Collision = 13 Two Vehicles, Angle, One Straight, One Right Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight Vehicle Movements/Manner of Collision = 33 Two Vehicles, Opposite, One Straight, One Right	

A few Work Codes have combinations of AND + OR crash criteria, separated by the black line as shown above
In this example, a crash would count as preventable for Increasing Turning Radius if any of the following combinations or values are present in the crash report:

- First Harmful Event = 7 AND Vehicle Body Style = 87
- First Harmful Event = 7 AND Vehicle Body Style = 91
- Vehicle Movements/Manner of Collision = 13 OR 20 OR 21 OR 30 OR 33

Preventable Crash Criteria by WC

WORK CODE	OR	AND
101 Install Warning / Guide Signs	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	**AND**
107 Install Traffic Signals	Intersection Related = 1 Intersection Intersection Related = 2 Intersection Related	Vehicle Movements/Manner of Collision = 10-19 Two Vehicles, Angle Crash Vehicle Movements/Manner of Collision = 20-29 Two Vehicles, Same Direction Crash Vehicle Movements/Manner of Collision = 30-39 Two Vehicles, Opposite Direction Crash
	First Harmful Event = 1 Pedestrian First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	**AND**
108 Improve Traffic Signals	Intersection Related = 1 Intersection Intersection Related = 2 Intersection Related	Vehicle Movements/Manner of Collision = 10-19 Two Vehicles, Angle Crash Vehicle Movements/Manner of Collision = 20-29 Two Vehicles, Same Direction Crash Vehicle Movements/Manner of Collision = 30-39 Two Vehicles, Opposite Direction Crash
	First Harmful Event = 1 Pedestrian First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	
109 Implement Leading Pedestrian Interval (LPI) Timing	First Harmful Event = 1 Pedestrian	
WORK CODE	**OR**	
110 Install Pedestrian Signal	First Harmful Event = 1 Pedestrian	
WORK CODE	**OR**	
111 Interconnect Signals	ALL	
WORK CODE	**OR**	**AND**
113 Install Delineators	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median	Light Condition = 3 Dark, Not Lighted Light Condition = 4 Dark, Lighted Light Condition = 6 Dark, Unknown Lighting
WORK CODE	**OR**	
114 Install School Zones	ALL	
WORK CODE	**OR**	
115 Install Pedestrian Countdown Timer	First Harmful Event = 1 Pedestrian	
WORK CODE	**OR**	**AND**
118 Replace Flashing Beacon with a Traffic Signal	Intersection Related = 1 Intersection Intersection Related = 2 Intersection Related	Vehicle Movements/Manner of Collision = 10-19 Two Vehicles, Angle Crash Vehicle Movements/Manner of Collision = 20-29 Two Vehicles, Same Direction Crash Vehicle Movements/Manner of Collision = 30-39 Two Vehicles, Opposite Direction Crash
	First Harmful Event = 1 Pedestrian First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	
119 Install Overhead Signs	Vehicle Movements/Manner of Collision = 20-29 Two Vehicles, Same Direction Crash	
WORK CODE	**OR**	
122 Install Advanced Warning Signals (Intersection - Existing Warning Signs)	Intersection Related = 1 Intersection Intersection Related = 2 Intersection Related	

Preventable Crash Criteria by WC

WORK CODE	OR
123	Roadway Related = 2 Off Roadway
Install Advanced Warning Signals (Curve- Existing Warning Signs)	Roadway Related = 3 Shoulder
	Roadway Related = 4 Median
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
WORK CODE	**OR**
124	Intersection Related = 1 Intersection
Install Advanced Warning Signals and Signs (Intersection)	Intersection Related = 2 Intersection Related
WORK CODE	**OR**
125	Roadway Related = 2 Off Roadway
Install Advanced Warning Signals and Signs (Curve)	Roadway Related = 3 Shoulder
	Roadway Related = 4 Median
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
WORK CODE	**OR**
128	Intersection Related = 1 Intersection
Install Advanced Warning Signs (Intersection)	Intersection Related = 2 Intersection Related

WORK CODE	OR
130	Roadway Related = 2 Off Roadway
Install Advanced Warning Signs (Curve)	Roadway Related = 3 Shoulder
	Roadway Related = 4 Median
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
WORK CODE	**OR**
131	First Harmful Event = 1 Pedestrian
Improve Pedestrian Signals	
WORK CODE	**OR**
132	
Install Advance Warning Signals and Signs	
WORK CODE	**OR**
133	ALL
Improve School Zones	
WORK CODE	**OR**
134	
Install Advanced Crossing Signage	

Preventable Crash Criteria by WC

WORK CODE	OR	
136 Install LED Flashing Chevrons (Curve)	Roadway Related = 2 Off Roadway	
	Roadway Related = 3 Shoulder	
	Roadway Related = 4 Median	
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
137 Install Chevrons (Curve)	Roadway Related = 2 Off Roadway	
	Roadway Related = 3 Shoulder	
	Roadway Related = 4 Median	
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	**AND**
138 Install Flashing Yellow Arrow	Intersection Related = 1 Intersection	Vehicle Movements/Manner of Collision = 29 Two Vehicles, Straight, One Left, One Stopped
	Intersection Related = 2 Intersection Related	Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left
		Vehicle Movements/Manner of Collision = 36 Two Vehicles, Opposite, One Right, One Left
WORK CODE	**OR**	
139	Roadway Related = 2 Off Roadway	
	Roadway Related = 3 Shoulder	
	Roadway Related = 4 Median	
Install Surface Mounted Delineators on Centerline	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
140 Wrong Way Driver Warning Signs	Contributing Factor = 71 Wrong Way - One Way Road	
WORK CODE	**OR**	
141 Wrong Way Driver Warning Markings	Contributing Factor = 71 Wrong Way - One Way Road	
WORK CODE	**OR**	
142 Wrong Way Driver Advanced Technologies	Contributing Factor = 71 Wrong Way - One Way Road	
WORK CODE	**OR**	
143 Pedestrian Hybrid Beacon	First Harmful Event = 1 Pedestrian	
WORK CODE	**OR**	
144 Install Rectangular Rapid Flashing Beacon (RRFB)	First Harmful Event = 1 Pedestrian	
WORK CODE	**OR**	**AND**
145 Flashing or LED Stop Sign	Intersection Related = 1 Intersection	Vehicle Movements/Manner of Collision = 10-19 Two Vehicles, Angle Crash
	Intersection Related = 2 Intersection Related	
WORK CODE	**OR**	
150 Dynamic Speed Feedback Sign		

Preventable Crash Criteria by WC

WORK CODE	OR	
201 **Install Median Barrier**	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	**AND**
203 **Install Raised Median**	Part of Roadway = 1 Mainlane	Vehicle Movements/Manner of Collision = 10 Two Vehicles, Angle, Straight Vehicle Movements/Manner of Collision = 14 Two Vehicles, Angle, One Straight, One Left Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 22 Two Vehicles, One Straight, One Stopped Vehicle Movements/Manner of Collision = 24 Two Vehicles, One Straight, One Left Vehicle Movements/Manner of Collision = 26 Two Vehicles, One Right, One Left Vehicle Movements/Manner of Collision = 28 Two Vehicles, Straight, Both Left Vehicle Movements/Manner of Collision = 29 Two Vehicles, Straight, One Left, One Stopped Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left Vehicle Movements/Manner of Collision = 36 Two Vehicles, Opposite, One Right, One Left Vehicle Movements/Manner of Collision = 38 Two Vehicles, Opposite, Both Left
WORK CODE	**OR**	
204 **Flatten Side Slope**	Roadway Related = 3 Shoulder	
WORK CODE	**OR**	
209 **Fixed Objects**	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Object Struck = 20 Highway Sign 21 Curb 22 Culvert 23 Guardrail 24 RR Signal Pole Object Struck = 25 RR Crossing Gate 26 Traffic Signal Pole/Post 29 Luminaire Pole Object Struck = 30 Utility Pole 31 Mailbox 32 Tree/Shrub 33 Fence 34 House/Building Object Struck = 35 Commercial Sign 36 Other Fixed Object 40 Bridge End Object Struck = 41 Bridge Side 42 Pier/Support at Underpass 56 CTB 57 Delineator/OM Object Struck = 58 Retaining Wall 60 Guard Post 62 Ditch 63 Embankment	
WORK CODE	**OR**	
217 **Install Impact Attenuation System**	Object Struck = 20 Highway Sign 30 Utility Pole Object Struck = 40 Bridge End 42 Pier/Support at Underpass	
WORK CODE	**OR**	
218 **Widen Bridge**	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Bridge Detail ≠ 8 Not applicable Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
220 **Truck Parking Facilities**		
WORK CODE	**OR**	
225 **Pedestrian Crossing Deterrent**	First Harmful Event = 1 Pedestrian	
WORK CODE	**OR**	**AND**
303 **Resurfacing**	Surface Condition = 2 Wet Surface Condition = 5 Slush Surface Condition = 6 Ice Surface Condition = 9 Snow	*Skid Value less than 20*

Preventable Crash Criteria by WC

WORK CODE	OR	AND
304 **Safety Lighting**	Light Condition = 3 Dark, Not Lighted Light Condition = 4 Dark, Lighted Light Condition = 6 Dark, Unknown Lighting	
WORK CODE	**OR**	**AND**
305 **Safety Lighting at Intersection**	Light Condition = 3 Dark, Not Lighted Light Condition = 4 Dark, Lighted Light Condition = 6 Dark, Unknown Lighting	Intersection Related = 1 Intersection Intersection Related = 2 Intersection Related
WORK CODE	**OR**	
401 **Install Pavement Markings**	Roadway Related = 1 On Roadway Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
402 **Install Edge Markings**	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median	
WORK CODE	**OR**	
403 **Install Pedestrian Crosswalk**	First Harmful Event = 1 Pedestrian	
WORK CODE	**OR**	
404 **Install Centerline Striping**	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
407 **Install Sidewalks**	First Harmful Event = 1 Pedestrian First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	
408 **Add Shared Use Path**	First Harmful Event = 1 Pedestrian First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	
409 **Install Pedestrian Refuge Islands**	First Harmful Event = 1 Pedestrian First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	
410 **Install Dedicated Bicycle Lanes**	First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	
502 **Widen Lanes**	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
503 **Widen Paved Shoulder (to 5 ft. or less)**	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median First Harmful Event = 4 Parked Car	
WORK CODE	**OR**	
504 **Construct Paved Shoulders (1-4 ft.)**	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight First Harmful Event = 4 Parked Car	

Preventable Crash Criteria by WC

WORK CODE	OR	AND
505	Roadway Related = 2 Off Roadway	
	Roadway Related = 3 Shoulder	
Improve Vertical Alignment	Roadway Related = 4 Median	
	Vehicle Movements/Manner of Collision = 13 Two Vehicles, Angle, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 14 Two Vehicles, Angle, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
	Vehicle Movements/Manner of Collision = 32 Two Vehicles, Opposite, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left	
WORK CODE	**OR**	
506	Roadway Related = 2 Off Roadway	
Improve Horizontal Alignment	Roadway Related = 3 Shoulder	
	Roadway Related = 4 Median	
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
507	Roadway Related = 2 Off Roadway	
Increase Superelevation	Roadway Related = 3 Shoulder	
	Roadway Related = 4 Median	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	**AND**
508	Intersection Related = 1 Intersection	Vehicle Movements/Manner of Collision = 10-19 Two Vehicles, Angle Crash
Realign Intersection	Intersection Related = 2 Intersection Related	Vehicle Movements/Manner of Collision = 20-29 Two Vehicles, Same Direction Crash
		Vehicle Movements/Manner of Collision = 30-39 Two Vehicles, Opposite Direction Crash
	First Harmful Event = 1 Pedestrian	
	First Harmful Event = 5 Pedalcyclist	
WORK CODE	**OR**	**AND**
509	Intersection Related ≠ 4 Non-Intersection	Vehicle Movements/Manner of Collision = 10-19 Two Vehicles, Angle Crash
Channelization		Vehicle Movements/Manner of Collision = 20-29 Two Vehicles, Same Direction Crash
		Vehicle Movements/Manner of Collision = 30-39 Two Vehicles, Opposite Direction Crash
WORK CODE	**OR**	**AND**
510	Intersection Related = 1 Intersection	Vehicle Movements/Manner of Collision = 12 Two Vehicles, Angle, One Straight, One Stopped
Construct Turn-Arounds	Intersection Related = 2 Intersection Related	Vehicle Movements/Manner of Collision = 14 Two Vehicles, Angle, One Straight, One Left
		Vehicle Movements/Manner of Collision = 18 Two Vehicles, Angle, Both Left
		Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End
		Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped
		Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left
		Vehicle Movements/Manner of Collision = 26 Two Vehicles, Same, One Right, One Left
		Vehicle Movements/Manner of Collision = 28 Two Vehicles, Same, Both Left
		Vehicle Movements/Manner of Collision = 29 Two Vehicles, Same, One Left, One Stopped
		Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left
WORK CODE	**OR**	
514	Intersection Related = 1 Intersection	
Grade Separation	Intersection Related = 2 Intersection Related	

Preventable Crash Criteria by WC

WORK CODE	OR	
515	Intersection Related = 1 Intersection	
Construct Interchange	Intersection Related = 2 Intersection Related	

WORK CODE	OR	AND
516	Part of Roadway = 1 Mainlane	Vehicle Movements/Manner of Collision = 10 Two Vehicles, Angle, Straight
Close Crossover		Vehicle Movements/Manner of Collision = 14 Two Vehicles, Angle, One Straight, One Left
		Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End
		Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
		Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped
		Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left
		Vehicle Movements/Manner of Collision = 26 Two Vehicles, Same, One Right, One Left
		Vehicle Movements/Manner of Collision = 28 Two Vehicles, Same, Both Left
		Vehicle Movements/Manner of Collision = 29 Two Vehicles, Same, One Left, One Stopped
		Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
		Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left
		Vehicle Movements/Manner of Collision = 38 Two Vehicles, Opposite, Both Left

WORK CODE	OR
517	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End
Add Through Lane	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left
	Vehicle Movements/Manner of Collision = 26 Two Vehicles, One Right, One Left
	Vehicle Movements/Manner of Collision = 27 Two Vehicles, One Right, One Stopped
	Vehicle Movements/Manner of Collision = 29 Two Vehicles, Same, One Left, One Stopped
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight

WORK CODE	OR
518	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End
Install Continuous	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
Turn Lane	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left
	Vehicle Movements/Manner of Collision = 26 Two Vehicles, One Right, One Left
	Vehicle Movements/Manner of Collision = 28 Two Vehicles, Same, Both Left
	Vehicle Movements/Manner of Collision = 29 Two Vehicles, Same, One Left, One Stopped
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
	Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left
	Vehicle Movements/Manner of Collision = 38 Two Vehicles, Opposite, Both Left

WORK CODE	OR	AND
519	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	Intersection Related **NOT EQUAL TO** 4 Non Intersection
Add Left Turn Lane	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 26 Two Vehicles, One Right, One Left	
	Vehicle Movements/Manner of Collision = 28 Two Vehicles, Same, Both Left	
	Vehicle Movements/Manner of Collision = 29 Two Vehicles, Same, One Left, One Stopped	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
	Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 38 Two Vehicles, Opposite, Both Left	

WORK CODE	OR	AND
520	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	Intersection Related **NOT EQUAL TO** 4 Non Intersection
Lengthen Left Turn Lane	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	

Preventable Crash Criteria by WC

WORK CODE	OR	AND
521	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	Intersection Related **NOT EQUAL TO** 4 Non Intersection
Add Right Turn Lane	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 25 Two Vehicles, Same, Both Right	
	Vehicle Movements/Manner of Collision = 26 Two Vehicles, One Right, One Left	
	Vehicle Movements/Manner of Collision = 27 Two Vehicles, One Right, One Stopped	
	Vehicle Movements/Manner of Collision = 33 Two Vehicles, Opposite, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 36 Two Vehicles, Opposite, One Right, One Left	
WORK CODE	**OR**	**AND**
522	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	Intersection Related **NOT EQUAL TO** 4 Non Intersection
Lengthen Right Turn Lane	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
WORK CODE	**OR**	
523	First Harmful Event = 1 Pedestrian	
Construct Pedestrian Over/Underpass		
WORK CODE	**OR**	**AND**
524	First Harmful Event = 7 Fixed Object	Vehicle Body Style = 87 Truck - tractor
Increase Turning Radius		Vehicle Body Style = 91 Semitrailer
	Vehicle Movements/Manner of Collision = 13 Two Vehicles, Angle, One Straight, One Right	
	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	
	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
	Vehicle Movements/Manner of Collision = 33 Two Vehicles, Opposite, One Straight, One Right	
WORK CODE	**OR**	
525	Part of Roadway = 2 Service/Frontage Road	
Convert to One-Way Frontage Road		
WORK CODE	**OR**	**AND**
526	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End	Intersection Related = 1 Intersection
Positive Offset Left-Turn Lane	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe	Intersection Related = 2 Intersection Related
	Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped	
	Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 26 Two Vehicles, Same, One Right, One Left	
	Vehicle Movements/Manner of Collision = 28 Two Vehicles, Same, Both Left	
	Vehicle Movements/Manner of Collision = 29 Two Vehicles, Same, One Left, One Stopped	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
	Vehicle Movements/Manner of Collision = 34 Two Vehicles, Opposite, One Straight, One Left	
	Vehicle Movements/Manner of Collision = 38 Two Vehicles, Opposite, Both Left	
WORK CODE	**OR**	
532	Roadway Related = 2 Off Roadway	
Milled Edgeline Rumble Strips	Roadway Related = 3 Shoulder	
	Roadway Related = 4 Median	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	
533	Roadway Related = 2 Off Roadway	
Profile Edgeline Markings	Roadway Related = 3 Shoulder	
	Roadway Related = 4 Median	
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
	Surface Condition = 2 Wet	
	Surface Condition = 5 Slush	
	Surface Condition = 6 Ice	
	Surface Condition = 9 Snow	

Preventable Crash Criteria by WC

WORK CODE	OR	AND
534 Raised Edgeline Rumble Strips	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight Surface Condition = 2 Wet Surface Condition = 5 Slush Surface Condition = 6 Ice Surface Condition = 9 Snow	
WORK CODE	**OR**	
536 Widen Paved Shoulder (> 5 ft)	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median First Harmful Event = 4 Parked Car	
WORK CODE	**OR**	
537 Construct Paved Shoulder (>= 5ft)	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight First Harmful Event = 4 Parked Car	
WORK CODE	**OR**	
538 Convert 2-Lane Facility to 4-Lane Divided	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 10 Two Vehicles, Angle, Straight Vehicle Movements/Manner of Collision = 13 Two Vehicles, Angle, One Straight, One Right Vehicle Movements/Manner of Collision = 14 Two Vehicles, Angle, One Straight, One Left Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	
WORK CODE	**OR**	**AND**
540 Install Passing Lanes on 2-Lane Road (Super 2)	Roadway Related = 1 On Roadway Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder	Vehicle Movements/Manner of Collision = 20 Two Vehicles, Same Straight, Rear End Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 22 Two Vehicles, Same, One Straight, One Stopped Vehicle Movements/Manner of Collision = 23 Two Vehicles, Same, One Straight, One Right Vehicle Movements/Manner of Collision = 24 Two Vehicles, Same, One Straight, One Left Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
WORK CODE	**OR**	
541 Provide Additional Paved Surface Width	Roadway Related = 2 Off Roadway Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight First Harmful Event = 10 Overturn	
WORK CODE	**OR**	
542 Milled Centerline Rumble Strips	Roadway Related = 3 Shoulder Roadway Related = 4 Median Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight	

Preventable Crash Criteria by WC

WORK CODE	OR
543	Roadway Related = 3 Shoulder
	Roadway Related = 4 Median
Profile Centerline Markings	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
	Surface Condition = 2 Wet
	Surface Condition = 5 Slush
	Surface Condition = 6 Ice
	Surface Condition = 9 Snow

WORK CODE	OR
544	Roadway Related = 2 Off Roadway
Raised Centerline Rumble	Roadway Related = 3 Shoulder
Strips	Vehicle Movements/Manner of Collision = 21 Two Vehicles, Same Straight, Side Swipe
	Vehicle Movements/Manner of Collision = 30 Two Vehicles, Opposite Straight
	Surface Condition = 2 Wet
	Surface Condition = 5 Slush
	Surface Condition = 6 Ice
	Surface Condition = 9 Snow

WORK CODE	OR
545	Intersection Related = 1 Intersection
Transverse Rumble Strips	Intersection Related = 2 Intersection Related

WORK CODE	OR
547	Intersection Related = 1 Intersection
Construct a Roundabout	Intersection Related = 2 Intersection Related

WORK CODE	OR
550	Intersection Related = 1 Intersection
Restricted Crossing	Intersection Related = 2 Intersection Related
U-Turn (RCUT)	

WORK CODE	OR
551	Intersection Related = 1 Intersection
Median U-Turn (MUT)	Intersection Related = 2 Intersection Related

Appendix D – Estimating Guidance

Although HSIP project approvals occur prior to 30% PS&E, it is critical to develop a 100% bid item estimate (or as close as possible) to ensure proper funding is allocated to each project and minimize the chance of a significant cost overrun during 100% PS&E submittal.
To assist districts with ensuring estimates are complete, TRF has reviewed recent estimates that had significant cost overruns at 100% PS&E submittal, and it has been determined that the following bid items are commonly overlooked (regardless of the type of project) when initial estimates are being prepared for the annual HSIP program calls:

<table>
<tr>
<td>Item 100 Series Earthwork & Landscape:

• 100 Prep ROW
• 104, 105 Pavement Removal
• 110 Excavation
• 132 Embankment
• 150 Blading</td>
<td rowspan="2">Item 200 & 300 Series Pavement (and related Special Specs): Even on projects where a district has included pavement bid items on the initial estimate, the final design sometimes ends up being much more costly. TRF may require review of pavement bid items by the District Pavement Engineer prior to project approval.

If the condition of the current pavement is not known, it is recommended to request pavement core samples to determine the extent of needed rehab* or reconstruction* of existing pavement.

*within the scope of the HSIP project (e.g., add shoulders or add turn lanes).</td>
</tr>
<tr>
<td>Item 400 Series Drainage & Hydraulics (recommend reviewing as-builts with district hydraulics team):

• 400, 401 Backfill
• 403 Shoring
• 432 Riprap
• 462, 464, 468, 472 Modify or Reconstruct Culverts
• 466 Headwalls & Wingwalls
• 467 Safety End Treatments</td>
</tr>
<tr>
<td>Item 500 Series Miscellaneous:

• 500* Mobilization
• 502* Barricades Signs & Traffic Handling
  ○ 662 Work Zone Pavement Markings (and other work zone items not covered under 502)
  ○ 677 Pavement Marking Removal
• 503 (old 6001) Portable Changeable Message Signs
• 505 (old 6185) Truck Mounted Attenuators

* please include 500 & 502 as individual bid items instead of a lump sum. When programming multiple CSJ's as a single HSIP submittal, provide bid item estimates for each CSJ and include item 500 & 502 with each CSJ.</td>
<td>Item 506 Erosion Control:

• Sediment Control Fence
• Erosion Control Logs
• Rock Filter Dams
• Sandbags

Also consider:

• 160 Topsoil
• 161 Compost
• 162 Sodding
• 164 Seeding
• 166 Fertilizer
• 168 Vegetative Watering</td>
</tr>
<tr>
<td colspan="2">Item 600 Series Traffic:
• 644 Small Roadside Sign Assemblies: it is also recommended to use Reflective Strips on sign posts (paid under spec 658). See also new standard D&OM(SIGN)-25.</td>
</tr>
</table>

TRF has created a list of CSJ's covering the Top 25 most common types of HSIP projects. Districts may use the estimates and plan sets for these projects as a reference to ensure that the most complete set of applicable bid items is included in each HSIP project: TRF SharePoint Cost Estimating Guidance.

Appendix E – Change Log

Date of Release	*Changes*
September 2021	Updated timeline to reflect new program call dates. Added section “Increased Federal Funding (G Match).” Added approved systemic countermeasures. Revised “Submission Instructions” to reflect upcoming guidance about process changes as a result of TxDOTCONNECT improvements. Revised SII instructions. Removed WC 105 Install Overhead Flashing Beacon, and associated Combinations. Added approved countermeasures to Work Codes tables.
August 2022	Updated timeline to reflect new program call dates Incorporated 15% extra funding into new programming levels Updated Emphasis Areas Updated “Project Documentation” to include Submittal Form and how funding lines need to be entered into TxDOTCONNECT. Updated “Submission Instructions” to include Box.com submittal location Updated crash costs Added work codes: ”150 – Install Dynamic Speed Feedback Signs” & “537 – Install off-set left turn lane” Updated Reduction Factors for WC “144 - RRFB”, “145 – Flashing or Embedded Stop Signs”, “225 – Pedestrian Crossing Deterrent”, “550 – Median U-Turn” Removed combo code “107, 124, 138”
August 2023	Updated timeline to reflect 2023 Program Call dates. Updated citations relating to Confidentiality of Data. Updated Project Submission Guidelines with a discussion of Local Letting as a pilot program. Updated Project Documentation with a note to discourage contingency or “lump sum” line items in estimates. Updated Crash Costs to reflect current expected values. Updated Appendix A with additional definitions and clarifications. Updated Work Code tables to reflect current countermeasures, definitions, and preventable crash types.
August 2024	Updated timeline to reflect 2025 Program Call dates and renamed program to align with UTP Program naming conventions. Updated Guidelines document with new TxDOT template. Added Project Identification section with Targeted and Systemic Approaches Moved Calculating SII section to Targeted Approach section. Added Sidewalks and Roundabouts as a district systemic qualifying countermeasure. Added the systemic qualifying countermeasures into a table. Added Pedestrian Safety Action Plan screening tool link. Added LRSP and State TDC information. Renamed “State Systemic” to “Annual Priority” subprogram. Removed Instructions on how to run SII report on CRIS and linked on separate document. Removed 15% extra funding from Programming levels. Added six new VRU work codes. Added Appendix D – Estimating Guidance
August 2025	Updated timeline for 2026 program call. Added Annual Priority Approach section. Updated HSIP Project Submission Guidelines section. Work Code Updates: Removed WC 514. Added SPICE and CAP-X requirements for intersection projects in alignments with DES. Reviewed and/or Updated all Reduction Factors of all HSIP Eligible Work Codes. Updated WC title and/or description for 108, 111, 304, 305, 402, 404 . Updated Preventable Crash Codes for WC 502, 542, 543, 544. Updated the Reduction Factors for Work Code Combinations and eliminated unused WC combos. Added List of Preventable Crash Criteria by Work Code to Appendix C.