LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Highway Safety Improvement Program Infrastructure Project Selection Guide for State Routes

September 2017

DESTINATION ZERO DEATHS

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I. FOREWORD

The purpose of this document is to outline Louisiana's processes for analyzing safety data, conducting engineering studies, and establishing priorities for the Highway Safety Improvement Program (HSIP) in accordance with Title 23 of the Code of Federal Regulations Subchapter J Part 924.

This document provides guidance to project requestors for identifying, selecting, and prioritizing infrastructure projects located on state routes with the goal of reducing fatalities and serious injury crashes in Louisiana. All projects must meet the criteria outlined in this document to be considered for HSIP funding.

Separate manuals/guidelines have been developed for HSIP infrastructure projects focused on local roads and/or reducing crashes with non-motorized road users:

- Local Road Safety Program Guidelines and Application
- Safe Routes to Public Places Program Guidelines and Application

See Appendix A for links to these documents.

II. HIGHWAY SAFETY PROGRAM BACKGROUND

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program with the goal to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including locally owned public roads and public roads on tribal lands. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on crash performance which is outlined in the Strategic Highway Safety Plan (SHSP).

While safety has long been a consideration in transportation project development, the role and significance of safety in transportation policy has evolved over time. In 2005, under SAFETEA-LU the HSIP was created as a core federal aid program for the first time. The HSIP continued as a standalone federal aid program with two most recent transportation bills, Moving Ahead for Progress in the 21st Century (MAP-21) and the FAST Act which was signed into law in on December 4, 2015.

> The FAST Act, the Fixing America's Surface Transportation Act, is the first law enacted in over ten years that provides long-term funding certainty for surface transportation.
> *Federal Highway Administration website*

Specific provisions pertaining to the HSIP were defined in Section 1112 of MAP-21, which amended Section 148 of Title 23, *United States Code* (23 USC 148 (h) and 23 CFR 924). Some of the changes to the HSIP included:

- The Strategic Highway Safety Plan (SHSP) is required to be updated and evaluated every five years;
- Annual reports will be posted on FHWA's website; and
- Performance measures must be established to assess progress in reducing the number and rate of fatalities and serious injuries including non-motorized users.

The FAST Act kept the same performance measure framework that was detailed under MAP-21 but eliminated the flexibility to use HSIP funds on non-infrastructure projects.

The Louisiana Department of Transportation and Development (DOTD) is responsible for administering the HSIP in Louisiana; however, DOTD works very closely with federal, state, and local stakeholders such as the Federal Highway Administration (FHWA), Louisiana Highway Safety Commission (LHSC), Louisiana State Police (LSP), Louisiana Local Technical Assistance Program (LTAP) , Louisiana Center for Transportation Safety (LCTS), and Metropolitan Planning Organizations (MPOs) to plan, implement, and evaluate projects/initiatives as part of the SHSP. Through the effective

management of the HSIP, the DOTD demonstrates the agency's commitment to reach Destination Zero Deaths.

Implementation and management of the HSIP includes many components that can be categorized as safety planning or infrastructure focused:

SAFETY PLANNING

Strategic Highway Safety Plan (SHSP) – A five year statewide strategic highway safety plan that identifies key emphasis areas for focusing efforts and resources. Louisiana deploys a two-tier approach to SHSP implementation. Statewide emphasis area teams (Impaired Driving, Occupant Protection, Young Drivers, and Infrastructure and Operations) utilize data and research for implementation of appropriate strategies on a statewide level while nine regional safety coalitions implement SHSP strategies that need local involvement to be successful.

The nine regional safety coalitions are established through the nine Metropolitan Planning Organizations and they are responsible for coordinating efforts with the many partners that include but is not limited to the DOTD Districts, Local Public Agencies, Louisiana State Police Troops, local law enforcement agencies, and the Louisiana Highway Safety Commission. Louisiana finds regional implementation is an effective way to expand the SHSP focus at the local level. Regional safety coalitions are charged with prioritizing their strategies and seeking out funds to implement those strategies.

Louisiana Center for Transportation Safety (LCTS) – Housed at the Louisiana Transportation Research Center (LTRC) and aims to provide a foundation and mechanism to lead statewide efforts in transportation safety workforce development, manage transportation safety related research, and provide support for SHSP implementation which includes leading the Communications Coordinating Council.

Highway Safety Research Group (HSRG) – Responsible for collecting, maintaining, and storing crash data captured from law enforcement and other agencies throughout the state of Louisiana through its contract with the DOTD who is designated the official repository for all crash data by a Memorandum of Understanding with the Department of Public Safety. The support of gathering, processing, and reporting all data pertaining to traffic safety activities in an accurate and timely fashion is the primary objective of the HSRG. The HSRG assists in developing user friendly and easily accessible tools for safety data analysis such as the SHSP Dashboards. The HSRG also provides software development and support

SAFETY PLANNING

for information innovations used by law enforcement agencies around the state. One example is LACRASH, which is a program used to capture crash reporting information electronically.

Traffic Records Coordinating Committee (TRCC) – The TRCC is a group of organizations that coordinates the advancement of Traffic Records data systems for all stakeholders to support decision making. Through the coordinated efforts of its stakeholders, the TRCC provides a forum for the creation, implementation, and management of a traffic records system that provides timely, accurate, complete, uniform, integrated, and accessible traffic records to the State of Louisiana. The six core data systems includes crash, driver, vehicle, roadway, citation/adjudication, and injury surveillance. The TRCC Coordinator works closely with the DOTD Highway Safety Administrator who is the Chair of the TRCC to produce significant crash data improvements.

INFRASTRUCTURE SAFETY PROJECTS

State Highway Safety Program – Focuses on infrastructure and operations projects to reduce roadway departure, intersection crashes as outlined in the SHSP. This program is focused on state routes and is highly dependent on project submittals from DOTD District offices. ***The focus of this document is to highlight the processes and procedures in place for developing these types of HSIP projects.***

Local Road Safety Program (LRSP) – Intended to increase local community participation in roadway safety and to develop and implement road safety improvements to reduce fatalities and injuries on locally owned roads. There is no mandated set aside for locally owned roads; however, all public roads are eligible for funding under the HSIP and the SHSP focuses on all public roads. The Louisiana LTAP facilitates project application development and offers technical assistance to local public agencies in identifying safety priorities in their city and/or parish.

Safe Routes to Public Places Program (SRTPPP) – The SRTPPP replaces the Safe Routes to School Program (SRTS) which was eliminated as a federal set aside in 2012. The development of the SRTPPP as part of the HSIP is a result of the recognition that the transportation network is utilized by motorists and non-motorists, such as pedestrians, bicyclists, and transit users of all ages and abilities. The SRTPPP aims to address the safety needs of the non-motorists evidenced in fatality and serious injury data, which is also reflected in the SHSP. On average, 107 pedestrians and 19 bicyclists are killed and 149 pedestrians and 34 bicyclists are seriously injured on Louisiana's public roads each year (Source: LADOTD Crash Database, 2011-2015). This represents 15% of the overall annual fatalities

and serious injuries and roughly 41% of those occur on local roads. A program guide is located on the LADOTD Highway Safety website.

As noted above, the regional safety coalitions are charged with prioritizing their strategies and seeking out funds to implement those strategies. Typically, non-infrastructure projects are focused on influencing driver behavior to reduce fatalities and injuries. As indicated previously, the non-infrastructure projects will ***not*** be eligible for HSIP funds that are allocated to states under the FAST Act. However, it is important to note that there are other funding sources to implement non-infrastructure projects identified through the SHSP Regional Coalitions.

HSIP infrastructure projects are programmed according to funding available and state fiscal year (July 1 through June 30).

Figure 1 below summarizes the HSIP funding history in Louisiana. Infrastructure projects fall within the Highway Safety Program. Within this portion, the DOTD Highway Safety Program Manager typically has a budget of $65 million/year for pre-construction and construction tasks associated with infrastructure projects on state routes.

Other items included in the Highway Safety program include safety planning, LRSP and SRTPPP. Safe Routes to School (SRTS) is an expired federal program no longer being funded. SRTPPP was initiated in 2017, and therefore no data is yet available for this program.

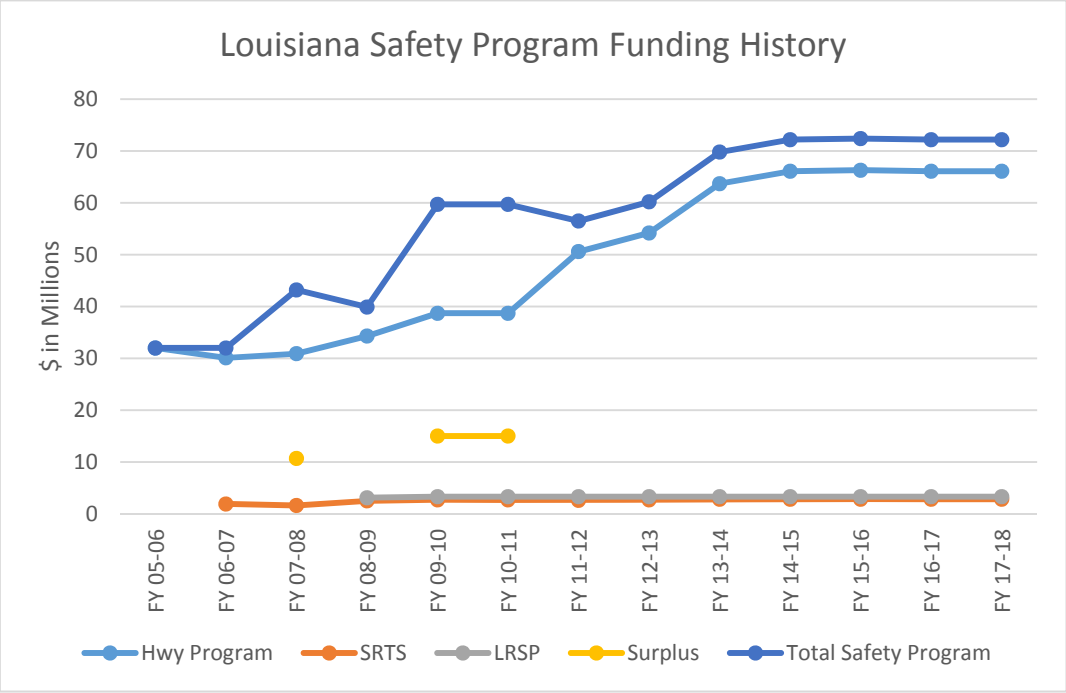

Figure 1: Louisiana Safety Program Funding History

This guide has been written and organized to parallel the logical flow of activities leading to the development of an HSIP infrastructure project on a state owned route. See Figure 2 for a flowchart of these activities.

This document will focus on project site development through project selection and prioritization. It is noted that data collection (roadway characteristics, traffic volumes, and crash data) is an ongoing activity along with post-evaluations. These are vital to the success of the HSIP and the development of meaningful safety projects.

Typically, the submitter for proposed projects on state owned routes is the DOTD District. MPOs, Regional Safety Coalitions, and/or LPAs can initiate a proposed project but we request all submittals be sent through the DOTD District offices. For statewide initiatives/projects developed by the DOTD Highway Safety Section, the DOTD Highway Safety section will work closely with the district offices impacted to develop a proposed project.

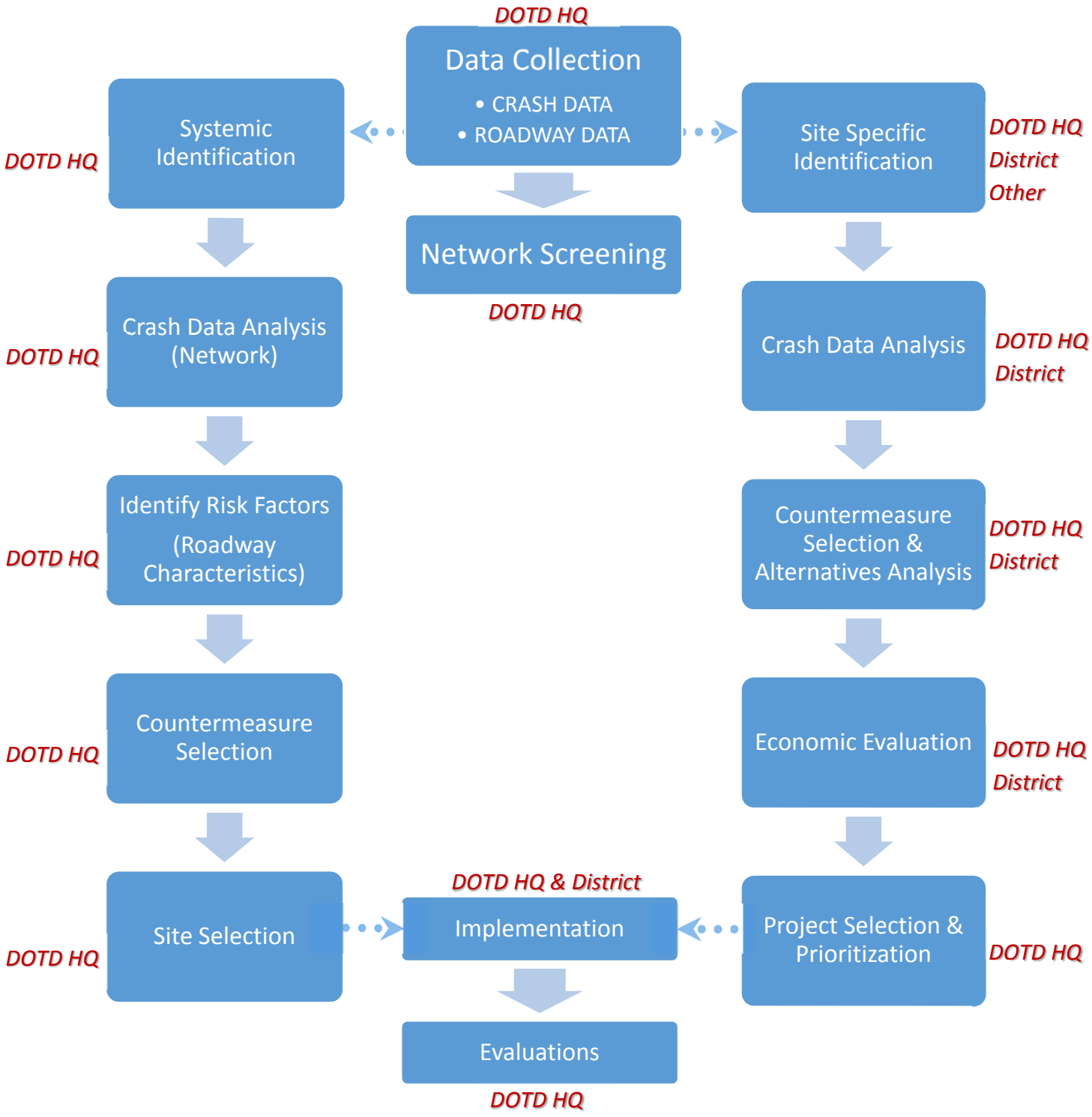

Figure 2: HSIP Infrastructure Project Development Process for State Owned Routes

III. SITE IDENTIFICATION / NETWORK SCREENING FOR STATE ROUTES

Together, the site specific and systemic approaches complement each other to identify project sites that form a comprehensive safety program.

The network screening methodology for each approach is very different yet both are equally important. Site specific and systemic projects do not compete against each other for HSIP funds.

In the medical field, the site specific approach would be similar to treating patients with a diagnosed condition. The systemic approach would be similar to preventive measures taken by patients who are at-risk for the condition.

A. Site Specific Identification

The site specific identification approach is used to determine a list of specific locations that have the highest potential for safety improvement so that resources can be directed to those locations. Methodologies for determining the locations vary from state to state, ranging from simple to highly complex. In Louisiana, three methods are currently used for identifying potential safety improvement sites depending on facility type (see Table 1):

1. Frequency Method

This method is currently only used for network screening on locally-owned roadways due to the lack of traffic volume estimates. The Louisiana Local Technical Assistance Program (LTAP) office conducts this analysis and uses the results in the development of parish-wide crash data profiles, which include a prioritized listing of routes in the parish and corresponding analysis that indicates prevalent crash types at each identified site.

2. Number-Rate Method

This method is currently used for state-owned control-of-access segments and state intersections (due to the lack of geometric attributes of intersections and interchanges) to create a prioritized ranking of sites for consideration of safety improvements. DOTD Highway Safety Section conducts this analysis and provides the information to the DOTD District offices.

A state intersection or spot is placed on the list if the location has at least 5 crashes per year and the location's crash rate is at least twice the statewide average crash rate for its highway classification. The list is developed by the

DOTD Highway Safety Section on an annual basis using the most recently quality controlled three calendar years of crash data. This methodology is described in detail in the document entitled ***"Guidelines for Conducting a Crash Data Analysis using the Number-Rate Method and Over-representation"*** (See Appendix A).

3. Level of Service of Safety (LOSS) using State-specific Safety Performance Functions (SPF)

This method is currently used for state-owned non-control-of-access segments. DOTD Highway Safety Section conducts this analysis and provides the information to the DOTD District offices. The SPFs include a total crash SPF and a Fatal/Injury SPF. If a location's crash rate occurs above the 80th percentile line (within the Level of Service of Safety (LOSS) category 4) in Fatal/Injury SPF and at least 3 fatal or serious/moderate injury crashes occur over a 3 year period, it is considered to have a High Potential for Safety Improvement (PSI).

The SPF methodology is described in detail in the document entitled ***"Guidelines for Conducting a Crash Data Analysis using SPFs and Pattern Recognition Analysis"*** (See Appendix A).

It is noted that sites can be missed or falsely identified with the frequency and number rate method because these methodologies do not account for severity. Instead they primarily focus on all crash severities.

For example, an intersection with a high number of crashes may be identified as a potential site on the High PSI list because the crash rate for the intersection is more than 2 times the statewide average for that type of intersection. However, the high number of total crashes may be attributed to a high number of rear end crashes on a low speed congested facility resulting in a majority of property damage only crashes.

An intersection on a high speed facility with a crash rate below the 2 times statewide average threshold may have less crashes and the same vehicular traffic may not be identified by the number rate method although a high percentage of its crashes are right angle or left turn crashes resulting in more fatalities and injuries. The second intersection has a higher potential for severe crashes and may still be considered a candidate for the HSIP.

Highway Classification	Site Specific Identification		
	Segments	Intersection	
		Non-signalized	Signalized
Locally-owned roadways	F	-	-
Rural 2-lane	LOSS	N-R	N-R
Rural 2-lane Continuous Turn Lane	LOSS	N-R	N-R
Rural 4-lane	LOSS	N-R	N-R
Rural 4-lane div	LOSS	N-R	N-R
Rural 4-lane Continuous Turn Lane	LOSS	N-R	N-R
Rural 4-lane Interstate	N-R	N-R	N-R
Rural 6-lane	LOSS	N-R	N-R
Rural 6-lane Interstate	N-R	N-R	N-R
Urban 2-lane	LOSS	N-R	N-R
Urban 2-lane Continuous Turn Lane	LOSS	N-R	N-R
Urban 4-lane	LOSS	N-R	N-R
Urban 4-lane div	LOSS	N-R	N-R
Urban 4-lane Continuous Turn Lane	LOSS	N-R	N-R
Urban 4-lane Interstate	N-R	N-R	N-R
Urban 6-lane	LOSS	N-R	N-R
Urban 6-lane Interstate	N-R	N-R	N-R

Frequency (F)
Number Rate Method (N-R)
Level of Safety Service (LOSS)

Table 1: Network Screening Methods for Site Specific Identification Approach by Roadway Classification

B. Systemic Identification (Risk Based)

The systemic approach is a risk-based assessment of transportation facilities that aims to mitigate crash risk to all road users. Rather than managing risk at certain locations identified through a High PSI approach, a systemic approach takes a broader view and looks at crash risk across the entire system. Geometric conditions (e.g. lane width, shoulder width, speed, curve radius, etc.), vehicular/pedestrian/bicyclist volumes, presence of transit stops, adjacent land use, and other features are correlated with historical crash data. High-risk features are then identified based on crash trends and countermeasures are selected for and implemented at locations that possess those high-risk features, if feasible.

It is important to note that analyzing crash data is not necessary for each location because it is already used to identify characteristics of the roadway that are associated with high crash risk. There may be locations that possess the risk factors identified through the systemic analysis but crash records do not indicate there is an existing safety concern. These locations are still treated under the systemic approach as a proactive or preventive measure.

This approach provides a more comprehensive method for safety planning and implementation that complements the High PSI approach.

C. Other

For rare circumstances, projects that are not identified through the High PSI or systemic approach but are identified through other means such as other federal-aid programs, DOTD district offices, Metropolitan Planning Organizations (MPOs), local/elected officials, regional safety coalitions, media, or general public may still be considered under the HSIP.

For a project to be considered outside of the High PSI or Systemic Approach, safety need and anticipated benefits should be clearly and quantifiably demonstrated and the safety benefit/cost ratio (BCR) should be greater than or equal to 1. The procedure for calculating a BCR is provided in Section V (Alternatives Analysis and Countermeasure Selection).

IV. HIGHWAY SAFETY ENGINEERING STUDIES

A. Site Specific Identification

A ranked list of sites categorized by roadway type (rural, urban, number of lanes, divided, undivided) is produced annually by DOTD Highway Safety Section and distributed to safety stakeholders including but not limited to District Traffic Operations Engineers, HQ Traffic Engineering, HQ Road Design, Metropolitan Planning Organizations, Local Public Agencies, and SHSP Infrastructure and Operations Emphasis Area Team members. The sites are ranked for each roadway type.

DOTD Traffic Operations Engineers are requested to review the top ranked (highest potential for safety improvement) sites for their district in each category and discuss with other district staff (senior leadership, design, and construction) and regional safety coalition infrastructure and operations team leader(s) to determine a short list of project locations with the most potential to investigate further. DOTD Highway Safety encourages the district to have a plan to address any issues with the top 3 ranked sites within a facility type within their District. If a current project is already underway to address safety this should be noted and sent to the DOTD Highway Safety Office for use before the next year's High PSI list is issued.

If the District office decides to pursue a project not on the High PSI list, they should have additional documentation for any reasons it is a higher priority than the other sites on the High PSI list.

Once a short list is prepared by the district for their focus, the following steps should be completed for each site to develop a potential safety project, regardless of how it originated as a site of promise.

All documents containing the High PSI list, safety data and/or crash analysis must be stamped with the following:

This document and the information contained herein is prepared solely for the purpose of identifying, evaluating and planning safety improvements on public roads which may be implemented utilizing federal aid highway funds; and is therefore exempt from discovery or admission into evidence pursuant to 23 U.S.C. 409.

1. Crash Data Analysis – Problem Identification

A site specific crash data analysis is necessary to help determine the nature and extent of the existing problem. A crash data analysis is a key component of a Stage 0 submitted to DOTD's Highway Safety Section and is used to evaluate the appropriateness of the proposed countermeasures.

The crash data analysis helps to identify which countermeasure(s) to consider and the appropriateness of the proposed countermeasure(s). For example, if you need to nail something, you will need a hammer. Likewise, if you have a right angle crash problem at a signalized intersection, you may need signal back-plates to increase conspicuity of the signal heads.

Existing crash data can be accessed through web-based applications (DOTD Crash 1 database for state road crashes) and is maintained by the DOTD Highway Safety Section. If access to these applications is needed, a request can be submitted to the Crash Data Manager in the DOTD Highway Safety Section. If hands-on training is needed, a request should be made to the DOTD Highway Safety Section Administrator. Crash data is typically used for highway safety and traffic engineering studies. Any special request for crash data concerning non-engineering studies shall be sent to the DOTD Highway Safety Section Administrator.

The problem identification process is different depending on the network screening method that was used to identify the candidate project site. If a location is identified using the number-rate method, an over-represented determination that is described in ***"Guidelines for Conducting a Crash Data Analysis using the Number-rate Method and Over-represented Determination"*** should be used. If a location is identified using the Level of Safety Service method, an approach is described in detail in the document entitled ***"Guidelines for Conducting a Crash Data Analysis using SPFs and Pattern Recognition Analysis"*** (See Appendix A).

A variety of tools are available to assist in collecting and analyzing crash data. Table 2 summarizes the available tools and the resource links are contained in Appendix A for DOTD users.

If training is needed for any of these tools, please submit a request to the DOTD Highway Safety Section Administrator.

For situations where the crash data is not indicative of existing safety issues, it may be beneficial to obtain feedback from local stakeholders (law enforcement officers, coalition coordinators, local leaders) to help identify the potential safety issue. Road Safety Assessments (RSA) are organized for this purpose and may be a useful tool for

assessing the risk for crashes and the feasibility of various countermeasures for complicated or unusual road configurations where involvement from other stakeholders is necessary to gain a better understanding of the situation. The RSA may identify potential risks that may not be apparent from a traditional crash data analysis.

Typically, the regional safety coalition and the DOTD district office collaborate together on organizing and conducting an RSA. The DOTD Highway Safety section is a technical resource for the regional safety coalitions and the district offices and may participate in the RSAs in a supporting role. A link to ***FHWA's Road Safety Audit Guidelines*** can be found in Appendix A.

In addition to crash data, there are many other sources of data that can be used in a data driven analysis. This can include but is not limited to surrogate safety measures (i.e. operating speed, vehicular/pedestrian/bicyclist volumes, citation data, presence of skid marks or evidence of crashes, etc.).

			Focus Area			Level of Crash Data Analysis			Type of Project		
						High-Level	Mid-Level	Rigorous	Behavioral	Small	Large
Tool	**Primary Purpose**	**Manager**	**Region (state, district, coalition, parish)**	**Segment**	**Intersection**	Historical Data Output	Historical Data Trends	Predictive Data using LOSS, SPFs, or Calibration Factors	SHSP Projects	Segment/ Intersection Improvements	Corridor Improvements
SHSP Dashboards	Contains up-to-date crash information related to the SHSP Emphasis Areas within each region and statewide. (Web-based)	LSU/HSRG	X			X	X		X		
CRASH 1	Generates a report of *<u>traffic crashes on Louisiana, US, and interstate highways</u>* that occurred in a certain area (route, control-section, parish, district, statewide) during a certain time frame. (Web-based)	DOTD	X	X	X	X				X	X
CRASH 3	Generates a report of *<u>city and parish road traffic crashes</u>* that occurred in a certain area (parish, troop, statewide) during a certain time frame. There is also a search fields for road name and intersecting street. (Web-based)	DOTD	X	X	X	X				X	X
Roadway Triage Tool	Compiles basic crash data analysis; calculates crash rate and crash type percentages and compares to statewide averages. (Excel based)	DOTD		X	X		X			X	
Roadway Triage Tool V2	Establishes a state-specific SPF to compare crash rate and severity; accounts for regression to the mean bias; pattern recognition. (Excel based)	DOTD		X	X		X	X		X	X
CrashDART	Compiles basic crash data analysis; calculates crash rate and crash type percentages and compares to statewide averages; provides data quality checks and prioritizes crash reports to view. (Excel based)	DOTD		X	X		X			X	
Vision Zero Suite	Establishes a state-specific SPF to compare crash rate and severity; accounts for regression to the mean bias; pattern recognition. (independent software)	DiExSys		X	X		X	X		X	
CrashMagic	Creates collision diagrams for intersection and segment crashes. (Independent software)	Pd'Programming, Inc.			X	X				X	
Highway Safety Manual (HSM) Predictive Method Spreadsheets	Calculates expected safety performance based on the HSM methodologies; accounts for regression to the mean bias. (Excel based)	AASHTO		X	X			X		X	
Interactive Highway Safety Design Model (IHSDM)	Calculates expected safety performance based on the HSM methodologies; accounts for regression to the mean bias. (Independent software)	FHWA		X	X			X			X
Geographic Information System (GIS)	Spatially references and joins data. (Independent software)	Esri	X	X	X	X	X			X	X

Table 2: Safety Analysis Tools Available for Problem Identification

2. Countermeasure Selection & Alternatives Analysis

Once the apparent safety issue has been identified through data analysis, corresponding countermeasures are identified and included within proposed alternative(s) for the selected site. Common countermeasures for reducing crashes may include but are not limited to the following:

- Intersection safety improvement (i.e. signal upgrades, protected turn lanes)
- Pavement and shoulder widening
- Shoulder or centerline rumble strips/stripes
- High friction surface treatment
- Sidewalks and/or bike lanes
- Traffic calming feature
- Elimination of roadside obstacle or roadside hazard
- Improvement of signage and pavement markings
- Installation of guardrails, barriers, and crash attenuators
- Roundabout
- Access management (i.e. R-cuts, center median barriers, driveway consolidation)
- Geometric modifications (i.e. minor widening, slope adjustments, improve alignment/grade)
- Road Diets
- Pedestrian Crossing Islands
- Pedestrian Hybrid Beacons

A complete list of eligible HSIP infrastructure projects is contained in U.S. Code Title 23 Highways Section 148.

There are various tools available to compare proposed alternatives to one another and to the no-build alternative (existing condition) to determine which alternative has the highest potential to minimize future crashes at a specific project location. The tools used to compare alternatives from a safety perspective vary depending on the complexity of the project, the site, and available information/research at the time of the study.

Documentation for the countermeasure selection and alternatives analysis should be included in the Stage 0 along with the support information for eliminating alternatives and recommending an alternative to move forward.

Below is a summary of the types of alternative safety analysis that can be performed to help determine a recommended alternative for inclusion within the HSIP.

a. Highway Safety Manual (HSM) Predictive Method

The HSM predictive method is the most rigorous method for alternative analysis because it involves estimating the expected change in crash performance anticipated by implementing a proposed alternative. In order to perform this type of alternatives analysis, a large amount of roadway geometric data is required for this application including specific horizontal and vertical geometry.

State-specific HSM spreadsheets are maintained and available on the DOTD Highway Safety website under the Highway Safety Analysis Toolbox (see Appendix A). These spreadsheets are updated from their original versions to reflect Louisiana-specific conditions and include calibration factors. The spreadsheets can be used to compare alternatives under consideration for a project in terms of relative crash reductions.

*This methodology is recommended for projects with a **high** level of complexity and/or a construction cost greater than or equal to $5,000,000.*

Also, in conjunction with the HSM Part C predictive methods, the following software tools have been developed to evaluate the safety and operational effects of geometric design decisions on roadways based on crash predictions.

- Interactive Highway Safety Design Model (IHSDM)
- Interchange Safety Analysis Tool Enhanced (ISATe)

See Table 2 for more information on applications for these tools. Links to resources related to IHSDM and ISATe are contained in Appendix A.

b. Crash Modification Factors or Functions (CMF)

For smaller projects, it may be more appropriate to compare CMFs for the proposed alternatives. This option may also be used for projects where specific SPFs or calibration factors are not available for performing the HSM predictive method. A CMF provides a value that quantifies the expected reduction in crashes at a site as a result of implementing a specific countermeasure or treatment. FHWA's CMF Clearinghouse is continually updated based on new research and studies. See Appendix A for a link. Documentation for the CMFs used to evaluate safety effectiveness of alternatives is required with the submittal of a Stage 0.

*This methodology is recommended for projects with a **low** level of complexity and/or a construction cost less than $5,000,000.*

c. Other Countermeasure Resources

FHWA has developed Pedestrian and Bicycle Safety Guides and Countermeasure Selection Systems (PEDSAFE & BIKESAFE) to provide practitioners with the latest information available for improving the safety and mobility of those who walk and bike. These online tools give users a list of possible engineering, education, and/or enforcement treatments to improve pedestrian and bicycle safety and/or mobility based on user input about a specific location.

At times, there is little definitive research on the countermeasure under consideration. Any research or report that can be provided regarding the effectiveness of the proposed project will help in justifying the use of safety funds. Louisiana specific research is conducted on an as-needed basis by the DOTD Highway Safety Section, LCTS, and Louisiana Transportation Research Center (LTRC) and can be requested at any time to the DOTD Highway Safety Section Administrator. If research has been done locally, please include this evaluation with the Stage 0 for review by the DOTD Highway Safety Section.

3. Economic Evaluation

An economic evaluation is necessary to complete the safety analysis for proposed HSIP projects. The economic evaluation is a critical component and is useful in determining if and how the project is programmed.

a. Cost Estimating

Cost estimates are a vital piece of information in the decision-making process. It is recommended to thoroughly investigate potential utilities and right-of-way impacts prior to the submittal of Stage 0. Also, consider design costs (i.e. engineering, topographic survey) within the overall breakout. It is recommended that a contingency of 10%-25% be included within the cost estimate due to the unknowns that may exist during the feasibility analysis.

*The **implementation cost** should include costs associated with preconstruction (engineering/design, topographic survey, ROW, utilities, and maintenance costs) as well as construction, mitigation, and maintenance costs.*

If the project cost estimate changes significantly (**deviating more than 30% from the original estimate**), the Stage 0 will need to be updated and resubmitted to the Program Manager for re-evaluation. Depending on the status of the HSIP, the increase in cost may or may not be accommodated.

b. Calculating Safety Benefits

Where feasible, the safety benefit shall be determined by estimating the reduction in crashes and translating the reduction into a cost of crash savings in dollars. The Highway Safety Manual, Part C Predictive Methods should be used to quantify the safety impacts of a proposed change and a relative comparison of existing condition versus proposed condition should demonstrate the net benefit in terms of crashes reduced.

*The **safety benefit cost** is calculated based on the expected reduction in fatal, injury, and PDO crashes over the life of the project with an adjustment for inflation.*

The average cost of crashes based on the severity is available in the DOTD Highway Safety Analysis Toolbox (see Appendix A for link). These costs are developed by the Highway Safety Research Group and updated periodically.

c. Benefit-Cost Ratio (BCR)

The BCR shall be determined as the ratio of the present-value calculated safety benefits of a project to the implementation cost of the project. This method is used to determine the most financially viable alternative or countermeasure for a specific site and also to evaluate whether a project is economically justified, but is not the only factor used when prioritizing projects. See Section VII (Project Selection & Prioritization).

$$BCR = \frac{\text{Safety Benefit (\$)}}{\text{Implementation Cost (\$)}}$$

Items to take into consideration when preparing a BCR include the following:

- Documentation for crash reductions (i.e. CMF references for crash type, severity, area type, and star quality)
- Crash severity breakdown (statewide averages for roadway classification is recommended, see Guidelines for Conducting a Crash Data Analysis)
- Maintenance costs (varies)
- Service life of proposed improvement (varies)
- Inflation percentage (typically 2-4% per year)

Benefit-cost analysis is required for potential safety projects that were not identified from the statewide network screening process. As stated previously, a BCR equal to or greater than 1 is acceptable and greater than 2 is desirable.

If the BCR is less than 1, HSIP funding may still be used but may not fully fund the proposed project. A BCR of 1 should be used to determine the cost that is considered economically justifiable.

B. Systemic Identification (Risk Based)

Through the systemic approach, multiple locations can be identified based on certain characteristics that have been associated with crash risk factors. The engineering studies and safety analysis can be done on the national, state, regional, parish, or municipal level. The difficulty in drilling down to geographically smaller areas is that as the data-set becomes smaller the potential for errors magnify. It is recommended to use the largest data-set for the target area.

For example, an estimated 400 roadway departure fatalities occur each year in Louisiana. Yet the locations of those 400 fatalities change from year to year and rarely occur at the same locations. Therefore, the fatalities would be reviewed to identify any

commonalities among the fatal crashes such as but not limited to curvature, shoulder width, lane width, speed limit, tangent length prior to horizontal curve, etc. If roadway departure fatalities were reviewed on a parish level, the sample size would be much smaller (20 or so) and most likely not statistically significant.

The DOTD Highway Safety Section is primarily responsible for the statewide systemic engineering studies and will review any systemic studies submitted by others for HSIP funding. They should follow a similar process as the site specific projects (i.e. crash analysis, countermeasure selection & alternatives analysis, economic evaluation), however will be more focused on routes with potential based on risk factors instead of historical observed crash data at a specific site. Roadway data can be obtained from the DOTD Data Collection and Management Section in the DOTD Office of Planning.

V. PROJECT SELECTION & PRIORITIZATION

HSIP projects compete only with other HSIP projects and do not compete with other DOTD projects across DOTD's other main budget partitions (i.e. system preservation, operations, and capacity).

The DOTD Highway Safety Section requires a DOTD Stage 0 for each proposed HSIP project. See Appendix A for links to the DOTD Stage 0 Manual.

The information contained in the Stage 0 allows the DOTD Highway Safety Section an opportunity to review the project purpose and need, scope, and budget along with engineering studies before determining whether the project is a good HSIP candidate project.

The following items are ***requirements*** for potential HSIP projects before the Stage 0 document is reviewed:

- ✓ Purpose and need is focused on safety
- ✓ Project is aligned with the SHSP and is focused on a specific emphasis area
- ✓ Project location was identified through one of the following:
  - o High PSI Network Screening Method
  - o Systemic Analysis
  - o Other (BCR $\geq$ 1)
- ✓ Safety Effectiveness (Does the recommended alternative address crash history and/or potential for crashes?)

Note that the High PSI (site specific) and systemic approaches are complementary and resulting projects should not be compared to one another, and therefore, do not compete against each other for funding. Both types of projects are deemed necessary as part of the HSIP to minimize fatalities and serious injuries on all public roads.

The Stage 0 application will then be graded on specific evaluation factors. Higher value (i.e. weight) is given to safety improvement potential and/or data driven factors. The weight is multiplied by the evaluation factor grade and then summed to achieve a total score. For all evaluation forms, a rating from 0 to 4 (0 is the least desirable for a safety project and 4 is the most desirable) is given to each evaluation factor based on the information presented in the Stage 0. The ratings are used to compare projects to one another and prioritize projects. Projects with less than 50% of the total points for safety category are not considered a priority for the HSIP program. As more projects are submitted for the program this minimum score will be reassessed and adjusted as competition increases for safety funds. These ratings will also be used as documentation to support a decision for the Highway Safety Project Selection Committee. A sample Highway Safety Stage 0 evaluation form is contained in Appendix B.

As a back-check for the Stage 0 evaluation process, the Highway Safety Program Manager and DOTD Highway Safety Administrator review the Stage 0 and evaluation form to ensure that federal and DOTD requirements are met and the project meets the scoring criteria set forth in this document. If they both agree and recommendation to include in the program, the Highway Safety Program Manager prepares a formal memo for Highway Safety Administrator's approval. The memo includes a summary of scope and budget with the stage 0 and evaluation form attached. After the preliminary approval is given by the DOTD Highway Safety Administrator, the Highway Safety Program Manager tentatively programs the project into the HSIP and works with the sponsor to determine project manager and optimal letting date for the project. Once these items are determined a copy of the memo is forwarded to various DOTD sections who will be assisting with the project delivery and implementation. This typically includes:

- Environmental section
- Road design section
- Utilities and permits section
- District Administrator
- District Traffic Operations Engineer
- Transportation Planning Section
- Highway Rail Safety Section
- Right of Way Section

Also, at this time, the Highway Safety Project Manager logs the evaluation score, safety benefit cost ratio, and the project improvement type based on the categories listed in the HSIP Annual report. These will be used to assist with future evaluations as projects are completed.

If the project is not recommended for approval within the Highway Safety Program, the submitter is notified and the Highway Safety Program Manager and Highway Safety Administrator are copied on the correspondence.

If the Highway Safety Engineer recommends approval but the Highway Safety Administrator and Highway Safety Program Manager do not agree with the stage 0 evaluation rating, documentation is provided to the Highway Safety Engineer for proposed modifications to the form and notification is sent to the submitter.

Follow up meetings with the submitter may be appropriate to explain the reason for not approving within the Highway Safety Program and additional feedback is given to the submitter for future potential safety projects.

Each year the Highway Safety Project Selection Committee meets to review the projects that have been recommended into the HSIP program. Three to five years of programmed projects are reviewed to verify projects and approve the programs.

Modifications to schedule and budget are also made at this time. The pre-evaluation ratings will be used to assist the team in this effort. The list of approved projects is included in the DOTD Highway Program which is submitted to the state legislature by the DOTD Transportation Planning Section. See Louisiana Project Selection Manual for more information on this process.

The HSIP project review, selection, and prioritization process is documented in Figure 3. Tentative timeframes are shown for critical steps.

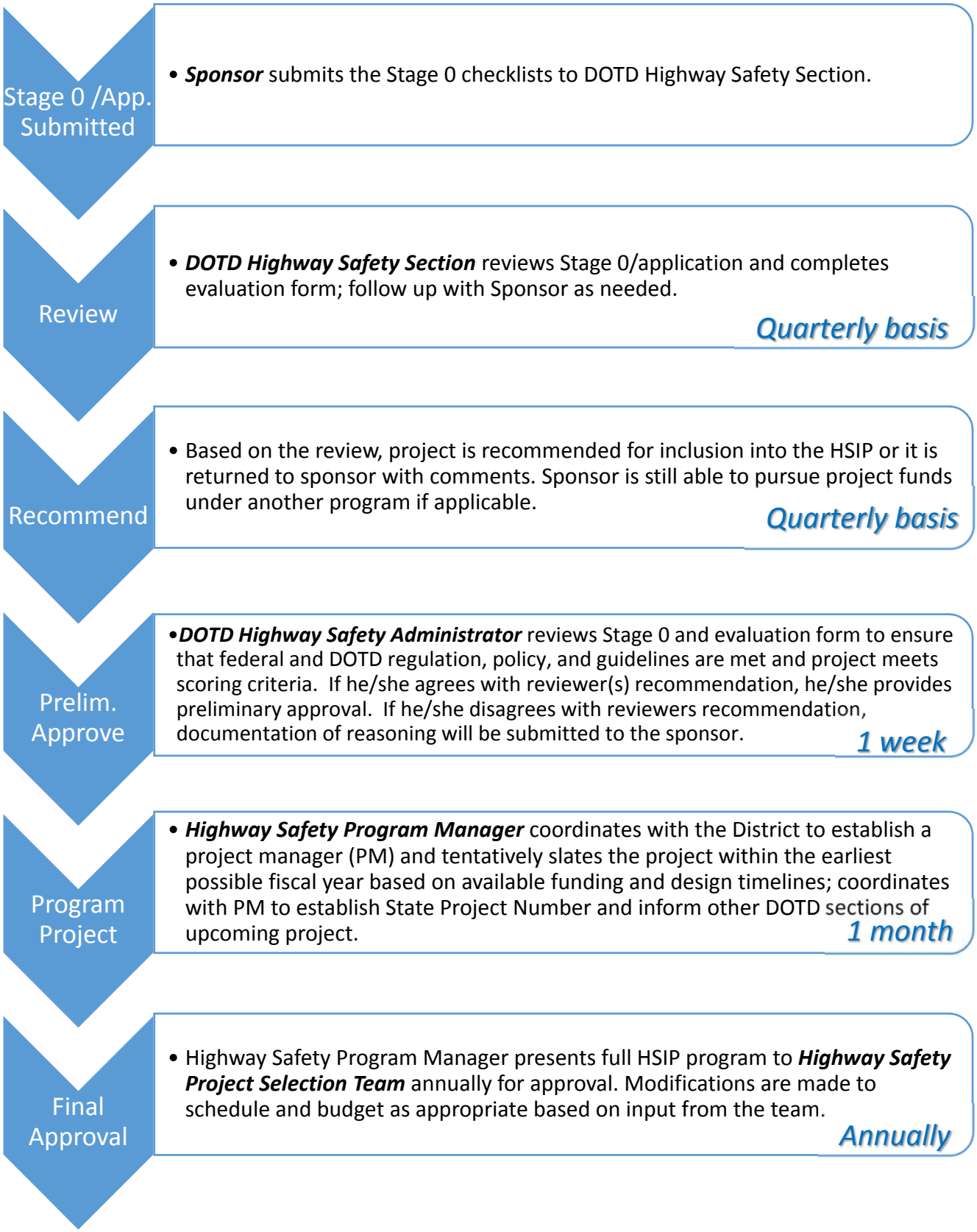

Figure 3: HSIP Project Review, Selection, and Prioritization

Process

VI. IMPLEMENTATION

It is the responsibility of the Highway Safety Program Manager to ensure there is a project manager assigned to each HSIP project. The Project Manager is responsible for monitoring and tracking the progress of the project through the DOTD project delivery process. This includes updating DOTD systems with milestone dates and coordinating the proper approvals to achieve the letting date.

See Appendix A for links to the DOTD Project Delivery Manual and DOTD Project Manager's Manual.

The Project Manager must keep the Highway Safety Program Manager informed of any major changes to project schedule and/or scope. As stated previously, if a project cost estimate changes significantly (***deviates more than 30% from the original estimate***) the Stage 0 will need to be updated and resubmitted for re-evaluation. Depending on available funding, the increase in cost may jeopardize the letting date or the continuation of the project within the safety program.

The Project Manager should also coordinate with the Highway Safety Program Manager when requesting federal authorization.

VII. EVALUATION

Post-evaluations are a vital component to the HSIP to gauge the effectiveness of the safety projects. Currently, the DOTD Highway Safety Section is required to report annually to the Louisiana Division of Administration and FHWA various matrixes related to the HSIP funded infrastructure projects. Also, DOTD is required to evaluate statewide crash data and update the SHSP every five years.

The following performance measures are required for the Louisiana Performance Accountability System (LaPAS) submitted to the Louisiana Division of Administration:

- **Percent reduction in annual fatality rate** – this is based off of total number of fatalities in current year compared to the previous year. Also, comparison is made to the long range target goal (decrease half of fatalities from 2011 to 2030).
- **Average percent reduction in crash rates at all safety improvement locations** – This is achieved by calculating an observational before/after crash rates (all crashes) for intersection improvement projects and segment improvement projects. The percent reduction is calculated and presented for each category of projects and then combined for an average percent reduction.

For the HSIP Annual report to FHWA, all safety related projects are listed with project costs and categorized by improvement type and funding type.

The following safety performance measures are required and compared to targets established by DOTD each year:

- Number of fatalities
- Rate of fatalities per 100 million vehicle miles traveled
- Number of serious injuries
- Rate of serious injuries per 100 million vehicle miles traveled
- Number of non-motorized fatalities and non-motorized serious injuries

In addition, DOTD Highway Safety Section is in the process of formalizing a project evaluation process to cumulatively track types of improvements. Currently, the DOTD Highway Safety Section will review a list of completed infrastructure projects for the previous 3 years to evaluate site specific intersection and segment improvements. The Highway Safety Program Manager will keep a master list of all project sites evaluated. In the future, once there are more than 10 sites evaluated for sites with similar HSIP improvement types, more evaluations may be warranted to determine safety effectiveness based on a larger sample size.

This type of evaluation will allow DOTD the ability to track and monitor effectiveness for similar types of projects over a longer period of time more efficiently.

The project site evaluations, as well as the improvement type evaluations, will be then used as a resource for recommending and prioritizing future HSIP projects based on effectiveness. Also, this information will be useful to the statewide SHSP Infrastructure and Operations Emphasis Area Team and Project Selection Committee as they initiate and develop future safety project submittals.

Evaluations that result in the development of a CMF should be submitted to the FHWA CMF Clearinghouse for inclusion. If a CMF receives a 3-star or higher rating, it is considered in the Louisiana Planning Level CMF List.

APPENDIX A: Links and References

Crash1

http://www8.dotd.la.gov/crash1

Crash1 User Manual

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/Crash1%20User%20Manual_Outside%20DOTD.pdf

Crash2

http://www8.dotd.la.gov/crash2/

Crash3

http://www8.dotd.la.gov/crash3/

Crash3 User Manual

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/Crash3%20User%20Manual_Outside%20DOTD.pdf

CrashMagic User Manual

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/CrashMagic%20User%20Manual.pdf

DOTD Project Delivery Manual

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Project_Management/Project%20Delivery%20Manual/LA%20DOTD%20Project%20Delivery%20Manual%202013%20-%20FINAL.pdf

DOTD Highway Safety Webpage

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Pages/default.aspx

DOTD Stage 0 Manual & Form

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Pages/Stage_0.aspx

FHWA Crash Modification Factor (CMF) Clearinghouse

http://www.cmfclearinghouse.org/

Guidelines for Conducting a Crash Data Analysis using the Number-Rate Method and Overrepresentation

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/Guidelines%20for%20Crash%20Data%20Analysis%20using%20the%20Number-Rate%20Method%20and%20Overrepresentation%20-%20Jan%202016.pdf

Guidelines for Conducting a Crash Data Analysis using the Number-Rate Method and Overrepresentation

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/Guidelines%20for%20Crash%20Data%20Analysis%20using%20SPFs%20and%20Pattern%20Recognition%20Analysis%20-%20Jan%202016.pdf

Guidelines for Conducting a Crash Data Analysis using SPFs and Pattern Recognition Analysis

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/Guidelines%20for%20Crash%20Data%20Analysis%20using%20SPFs%20and%20Pattern%20Recognition%20Analysis%20-%20Jan%202016.pdf

Interactive Highway Safety Design Model (IHSDM)

https://www.fhwa.dot.gov/research/tfhrc/projects/safety/comprehensive/ihsdm/

http://www.ihsdm.org

Interchange Safety Analysis Tool (ISATe)

http://www.highwaysafetymanual.org/Pages/tools_sub.aspx

Local Road Safety Program Guidelines and Application

http://www.ltrc.lsu.edu/ltap/lrsp.html

Safe Routes to Public Places Program Guidelines and Application

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/SRTPPP/Pages/default.aspx

Louisiana Strategic Highway Safety Plan (SHSP)

http://destinationzerodeaths.com/strategic/

Louisiana Highway Safety Manual (HSM) Implementation Plan

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/LADOTD%20HSM%20Implementation.pdf

Louisiana Fact Sheet CMF Resource Guide

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/Louisiana%20Fact%20Sheet%20CMF%20Resource%20Guide.pdf

Louisiana Fact Sheet Highway Safety Manual Project Applications

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Misc%20Documents/Louisiana%20Fact%20Sheet%20Project%20Map.pdf

Louisiana Specific Cost of Crashes

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Pages/Highway_Safety_Analysis_Toolbox.aspx

The Economic and Societal Impact of Motor Vehicle Crashes

(http://www-nrd.nhtsa.dot.gov/pubs/812013.pdf).

Pedestrian and Bicycle Crash Analysis Tool

http://www.pedbikeinfo.org/pbcat_us/

Regional Safety Coalitions

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Pages/Destination_Zero_Deaths.aspx

Road Safety Assessment (RSA) Guidelines

http://safety.fhwa.dot.gov/rsa/guidelines/

State of Louisiana Uniform Motor Vehicle Traffic Crash Report

http://lacrash.lsu.edu/ICRM_Info.aspx?

Safety Analyst

http://www.safetyanalyst.org/

APPENDIX B: HSIP State Infrastructure Projects Stage 0 Evaluation Form

Louisiana Highway Safety Improvement Program
State Infrastructure Projects
Stage 0 Evaluation Form

Project Title:	**LA 600 Road Diet**		
Route:	LA 600 / Rocky Road		**Improvement Category**
Parish:	Marshmallow		Roadway
DOTD District:	02		
Roadway Classification:	Urban 4-Lane Undivided		**Subcategory**
Control-Section:	123-45		Roadway narrowing (road diet, roadway reconfiguration)
Log-Mile Begin	0.00		
Log-Mile End	2.00		
Average Annual Daily Traffic:	10,000	vehicles/day	
Total Estimated Costs:	**$200,000**		

Stage 1 Recommendation:	**ADVANCE TO STAGE 1**	Include in HSIP **FY 19/20**
	HOLD	Comments need to be addressed
	SHELVE	Not considered a priority safety project at this time

Submitted by: Ben & Jerry Johnson, District 02 — **Date:** 7/4/16

Reviewed by: Sherbet Smith, Highway Safety — **Date:** 8/4/16

STEP 1: PRE-REQUISITES FOR EVALUATION (Check all that apply)		
1) Purpose & Need focused on Safety	☑	
2) Aligned with Strategic Highway Safety Plan (SHSP) Emphasis Areas	☑	**Non-motorized users**
3) High Potential for Safety Improvement (PSI)/Abnormal **OR;**	☑	
Systemic Approach (Risk factors identified through data analysis) **AND/OR;**	☐	
Benefit cost ratio > 1	☑	
4) Safety Effectiveness (Does the recommended alternatives address crash history or potential for reducing crashes?)	☑	

STEP 2: SAFETY EVALUATION FACTORS	**Weight**	**Rating***	**Total Earned Points**	**Total Potential Points**	**NOTES**
Crash History					
High Relative Severity ***(Fatal & Injury Crashes)***	5	● 4	20	20	
High Potential for Safety Improvement (PSI) or Abnormal ***(All Crashes)***	5	● 4	20	20	
High Probability or Over-represented Crash Types	4	● 4	16	16	
Potential Safety Risks based on Existing Condition					
Roadway Geometric Issues	2	● 4	8	8	
Access Management Challenges	2	● 4	8	8	
Pedestrian & Bike Considerations	2	● 4	8	8	Reclaimed pavement will be used for bike lanes
Potential Safety Risks Reduction based on proposed project scope					
Safety Effectiveness (Does the recommended alternatives address crash history or potential for reducing crashes?)	5	● 4	20	20	
Implementing Project Appropriate FHWA Proven Safety Countermeasures ***(Check those that apply)***	5	● 4	20	20	

☐ Dedicated Left- and Right-Turn Lanes at Intersections	☐ Reduced Left-Turn Conflict Intersections
☐ Roundabouts	☐ Backplates with Retroreflective Borders
☐ Systemic Application of Multiple Low Cost Countm. At Stop-Contr. Inters.	☐ Yellow Change Intervals
☐ Safety Edge	☐ Pedestrian Hybrid Beacon
☐ Longitudinal Rumble strips & stripes 2 lane roads	☑ Leading Pedestrian Interval
☐ Enhanced Delineation & Friction for Horizontal Curves	☑ Medians & Pedestrian Crossing Islands (Urban & Suburban areas)
☐ Roadside Design Improvement at Curves	☐ Walkways
☐ Median Barrier	☐ Local Road Safety Plan
☑ Road Diets (Roadway Reconfiguration)	☐ USLIMITS2
☑ Corridor Access Management	https://safety.fhwa.dot.gov/provencountermeasures/

BONUS: RSA, HSM Analysis (5 points for each)			*10*		
SAFETY EVALUATION SCORE			130	120	
STEP 3: FEASIBILITY EVALUATION FACTORS					
Safety Benefit Cost Ratio	5	● 4	20	20	BCR=3.5
Stakeholder Support (District, MPO, LPA, Regional Safety Coalition)	3	● 4	12	12	See Attached letter from Safety Coalition & Mayor of Neapolitan
Sponsor's commitment to delivering previous HSIP projects	3	● 4	12	12	
Right-of-Way Required	3	● 4	12	12	No R/W required
Utility Relocation(s) Required	3	● 4	12	12	No utility impacts
Construction Cost	2	● 4	8	8	Construction cost = $150,000
Other (Environmental Impacts, Permitting, Railroad Constraints)	2	● 4	8	8	
Consistent with plans for other nearby projects	2	● 4	8	8	
FEASIBILITY EVALUATION SCORE			92	92	
TOTAL SCORE			222	212	

*NOTE: Ratings are based on proposed implications of safety elements within the project. See pages 2-3 for descriptions of evaluation criteria.

● 4 = Most Desirable for HSIP projects
○ 0 = Least Desirable for HSIP projects

Revision Date: 10/18/2017

Louisiana Highway Safety Improvement Program
State Infrastructure Projects
Stage 0 Evaluation Form

EVALUATION FACTORS	Rating*	Description
STEP 2: SAFETY EVALUATION FACTORS		
Crash History		
High Relative Severity (Fatal & Injury Crashes)	4	Segment: LOSS 4 or above for fatal and injury crashes (KABC) and at least 3 KAB crashes/3yr; Intersection: Observed Fatal, Injury % > 2x statewide % and ≥ 5 crashes/year)
	3	Segment: LOSS 4 for KABC and less than 3 KAB crashes/3yr. Intersection: Observed Fatal, Injury % > 2x statewide average and < 5 crashes/yr
	2	Systemic Project Segment: LOSS 3 for KABC Intersection: Observed Fatal, Injury % > statewide average and ≥ 5 crashes/yr
	1	Segment: LOSS 2 for KABC Intersection: Observed Fatal, Injury % < statewide average and ≥ 5 crashes/yr
	0	Segment: LOSS 1 for KABC Intersection: Observed Fatal, Injury % < statewide average and < 5 crashes/yr
High Potential for Safety Improvement (PSI) or Abnormal (All Crashes)	4	Segment: LOSS 4 and more than 5 total crashes/year; Intersection: Abnormal (>2x statewide average and ≥ 5 crashes/year)
	3	Segment: LOSS 4; Intersection: Crash rate > 2x statewide average and < 5 crashes/yr
	2	Systemic Project Segment: LOSS 3; Intersection: Crash rate > statewide average and ≥ 5 crashes/yr
	1	Segment: LOSS 2; Intersection: Crash rate < statewide average and ≥ 5 crashes/year
	0	Segment: LOSS 1; Intersection: Crash rate < statewide average and < 5 crashes/yr
High Probability or Over-represented Crash Types	4	Target crash type has a high probability of occurring (documentation required from CAT scan and/or VZS).
	3	Target crash type is over-represented and occurs frequently (depends on crash type).
	2	Target crash type is over-represented.
	1	N/A
	0	0 crash types have a high probability or are over-represented
Potential Safety Risks based on Existing Condition		
Roadway Geometric Issues	4	Substantial geometric issues with supporting evidence
	3	Marginal geometric issues
	2	Moderate geometric issues
	1	Slight geometric issues
	0	No geometric issues
Access Management Opportunities	4	Proposed improvement to significantly adjust access points relative to land use and functional class.
	3	Proposed improvement to moderately adjust access points relative to land use and functional class.
	2	Proposed improvement to marginally adjust access points relative to land use and functional class.
	1	No opportunities for improving access management exist.
	0	Adjustments to access are not proposed even though opportunities exist.
Pedestrian & Bike Considerations	4	Appropriate pedestrian/bicycle considerations within project context and is identified within a local complete
	3	Appropriate pedestrian/bicycle considerations within project context and is located within an FHWA identified
	2	Appropriate pedestrian/bicycle considerations within project context.
	1	N/A
	0	No pedestrian/bicycle considerations within project context.
Potential Safety Risks Reduction based on proposed project scope		
Safety Effectiveness (Does the recommended alternatives address crash history or potential for reducing crashes?)	4	Countermeasure(s) proposed address crash history or potential for reducing crashes.
	3	N/A
	2	N/A
	1	N/A
	0	Countermeasure(s) proposed do NOT address crash history or potential for reducing crashes.
Implementing FHWA Proven Safety Countermeasures	4	1 or more countermeasures proposed
	3	N/A
	2	N/A
	1	N/A
	0	No countermeasures are proposed

Louisiana Highway Safety Improvement Program
State Infrastructure Projects
Stage 0 Evaluation Form

EVALUATION FACTORS	Rating *	Description
STEP 3: FEASIBILITY EVALUATION FACTORS		
Safety Benefit Cost Ratio	4	3 ≤ Benefit to Cost Ratio
	3	2 ≤ Benefit to Cost Ratio < 3
	2	1.5 ≤ Benefit to Cost Ratio < 2
	1	1 ≤ Benefit to Cost Ratio < 1.5
	0	Benefit to Cost Ratio < 1 or not provided
Stakeholder Support (District, MPO, LPA, Regional Safety Coalition)	4	Stakeholders ***actively support*** the project and documentation is available (i.e. Regional Safety Coalition
	3	Stakeholders ***support*** the proposed project but documentation is not available.
	2	Stakeholders are ***indifferent*** to the proposed project.
	1	Stakeholders have ***reservations*** about the proposed project.
	0	Stakeholders have ***reasonable concerns*** to the proposed project.
Sponsor's commitment to delivering previous HSIP projects	4	There have been no major changes to scope, budget, or schedule on a HSIP project in last 3 years.
	3	There have been minor changes to scope, budget, or schedule on a HSIP project in last 3 years.
	2	There have been marginal changes to scope, budget, or schedule on a HSIP project in last 3 years. *(BASELINE EXPECTATION)*
	1	There have been moderate changes to scope, budget, or schedule on a HSIP project in last 3 years.
	0	There have been substantial changes to scope, budget, or schedule on a HSIP project in last 3 years.
Right-of-Way Required	4	No right-of-way acquisition/relocation anticipated.
	3	Minimal right-of-way acquisition/relocation anticipated (up to 10% of construction cost)
	2	Marginal right-of-way acquisition/relocation anticipated (up to 25% of construction cost)
	1	Substantial right-of-way acquisition/relocation anticipated (up to 50% of construction cost)
	0	Extensive right-of-way acquisition/relocation anticipated (> 50% of construction cost)
Utility Relocation(s) Required	4	No utility relocation anticipated.
	3	Minimal utility impacts anticipated (up to 10% of construction cost)
	2	Marginal utility impacts anticipated (up to 25% of construction cost)
	1	Substantial utility impacts anticipated (up to 50% of construction cost)
	0	Extensive utility impacts anticipated (> 50% of construction cost)
Construction Cost * *Districtwide projects to be evaluated per site.	4	Construction costs are less than $500,000.
	3	Construction costs are between $500,000 and $1 million.
	2	Construction costs are between $1 million and $2 million.
	1	Construction costs are between $2 million and $3 million.
	0	Construction costs are over $3 million.
Other (Environmental Impacts, Permitting, Railroad Constraints)	4	No impacts anticipated. Design is straightforward.
	3	Minimal impacts anticipated. Design will require coordination with external stakeholders.
	2	Marginal impacts anticipated. Design will require coordination with external stakeholders.
	1	Substantial impacts anticipated. Design is more complex and will require coordination with external stakeholders.
	0	Extensive impacts anticipated, and therefore, not feasible.
Consistent with plans for other nearby projects	4	Complements adjacent project under development or under construction by DOTD or other entity.
	3	N/A
	2	No adjacent projects.
	1	N/A
	0	Contradicts adjacent project under development or under construction