City of Wasco
Local Road Safety Plan

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Executive Summary

The City of Wasco’s Local Road Safety Plan (LRSP) is one of several comprehensive plans developed by Kern Council of Governments (Kern COG) for the Cities of Arvin, Bakersfield, California City, Delano, Maricopa, Shafter, Taft, Tehachapi, and Wasco. The initiatives are part of a broader effort to improve safety in accordance with Kern COG’s Regional Transportation Plan (2018). The LRSP creates a framework to systematically identify and analyze traffic safety related issues and recommend projects and countermeasures. It aims to reduce fatal and severe injury collisions through a prioritized list of improvements that can enhance safety on local roadways.

The LRSP takes a proactive approach to addressing safety needs. It is viewed as a guidance document that can be a source of information and ideas. It can also be a living document, one that is routinely reviewed and updated by City staff and their safety partners to reflect evolving collision trends and community needs and priorities. With the LRSP as a guide, the City will be able to ready to apply for grant funds, such as the federal SR Safety Improvement Program (HSIP). This document summarizes an analysis of collisions that occurred in Wasco, identifies high-risk locations, and recommends countermeasures at each of these high-risk locations. It is organized into seven sections as follows:

Chapter 1 – Introduction
The Introduction presents the project, describes how this report is organized, summaries the vision and goals, the study area for the LRSP, and introduces the safety partners.

Chapter 2 – Existing Planning Efforts
This chapter summarizes City and regional planning documents and projects that are relevant to the LRSP. It ensures that the recommendations of the LRSP are in line with existing goals, objectives, policies, or projects.

Chapter 3 – Collision Data and Analysis
This chapter summarizes data analysis approach and presents preliminary as well as detailed collision analysis and findings in the study area. This analysis of fatal and severe injury collisions is performed by facility type (intersection and roadway segment). Collision data was obtained and analyzed for a five-year period from 2015 to 2019 from the California SR Patrol’s Statewide Integrated Traffic Records System (SWITRS) and the University of California at Berkeley SafeTREC’s Transportation Injury Mapping Service (TIMS).

Chapter 4 – Public Outreach
This chapter summarizes the community’s needs as collected through the project website, interactive map input, and stakeholder meetings.

Chapter 5 – Emphasis Areas
Emphasis areas are a focus of the LRSP that are identified through the various collision types and factors resulting in fatal and severe injury collisions within the City of Wasco. The eight emphasis areas for Wasco are:

1. Improve Intersection Safety
City of Wasco  
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2. Reduce Unsafe Speed Violations
3. Reduce Auto Right-of-Way Violations
4. Reduce Improper Turning Collisions
5. Reduce Rear-End Collisions
6. Reduce Broadside Collisions
7. Reduce Pedestrian Collisions
8. Reduce Collisions Around Parks and Schools

Chapter 6 – Countermeasure Identification
Engineering countermeasures were selected for each of the high-risk locations and for the emphasis areas. These were based off of approved countermeasures from the Caltrans Local Roadway Safety Manual (LRSM) used in HSIP grant calls for projects. The intention is to give the City potential countermeasures for each location that can be implemented either in future HSIP calls for projects, or using other funding sources, such as the City’s Capital Improvement Program. Non-engineering countermeasures were also selected using the 4 E’s strategies, and are included with the emphasis areas.

Chapter 7 – Safety Projects
A set of six safety projects were created for high-risk intersections and roadway segments, using HSIP approved countermeasures. These safety projects are:

- **Project #1: Roadway Segment Lighting and other improvements** – Add Segment Lighting, Install Edge-Lines and Centerlines, Install dynamic/variable speed warning signs
- **Project #2: Roadway Segment Improvements** – Install Delineators, Reflectors, and/or Object Markers, and Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
- **Project #3: Roadway Segment Spot Improvements** – Install centerline rumble strips/stripes, Install Edgeline Rumble Strips/Stripes, and Install raised median
- **Project #4: Systematic Improvements at Non-signalized Intersections** – Add Intersection Lighting, Install/Upgrade Larger or Additional Stop Signs or Other Intersection Warning/Regulatory, and Upgrade Intersection Pavement Markings
- **Project #5: Systemic Improvements at Signalized Intersections** – Add intersection lighting, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number, and Improve signal timing (coordination, phases, red, yellow, or operation)
- **Project #6: Spot Improvements at Non-signalized Intersections** – Install Pedestrian Crossing at Uncontrolled Locations (Signs and Markings Only), Install Flashing Beacons at Stop-Controlled Intersections, and Install/Upgrade Pedestrian Crossing at Uncontrolled Locations (with Enhanced Safety)
Chapter 8 – Implementation and Evaluation
The LRSP is a guidance document that is recommended to be updated every two to five years in coordination with the safety partners. The LRSP document provides engineering, education, enforcement, and emergency medical service-related countermeasures that can be implemented throughout the City to reduce fatal and severe injury collisions. After implementing countermeasures, the performance measures for each emphasis area should be evaluated annually. The most important measure of success of the LRSP should be reducing fatal and severe injury collisions throughout the City. If the number of fatal and severe injury collisions does not decrease over time, then the emphasis areas and countermeasures should be re-evaluated.
1. INTRODUCTION

1.1 WHAT IS A LRSP?

The Local Road Safety Plan (LRSP) is a localized data-driven traffic safety plan that provides opportunities to address unique roadway safety needs and reduce the number of fatal and severe injury (KSI) collisions. The LRSP creates a framework to systematically identify and analyze traffic safety-related issues, and recommend safety projects and countermeasures. It facilitates the development of local agency partnerships and collaboration, resulting in the development of a prioritized list of improvements that can qualify for SR Safety Improvement Program (HSIP) funding. The LRSP is a proactive approach to addressing safety needs and is viewed as a living document that can be constantly reviewed and revised to reflect evolving trends, and community needs and priorities. The systemic approach in preparing the LRSP involves the steps illustrated in Figure 1.

Figure 1. LRSP process
City of Wasco
Local Road Safety Plan

1.2 PROJECT GOALS AND OBJECTIVES

Goal #1: Systematically identify and analyze roadway safety problems and recommend improvements

Objective 1: Use the Systemic Safety Analysis data-driven process to identify traffic collisions in Wasco, (with an emphasis on KSI collisions); where, when, and how they are occurring, and implement appropriate and proven countermeasures.

Objective 2: Improve roadway planning, design, operations, and connectivity to enhance safety and mobility for users of all ages and abilities

Objective 3: Implement traffic calming strategies to discourage speeding and other unsafe driving behaviors on residential streets

Objective 4: Ensure that all recommended improvements are consistent with City of Wasco goals, as well as Kern County, State and Federal plans and goals (such as, but not limited to: California Strategic SR Safety Plan, and the FHWA Local and Rural Road Safety Program).

Goal 2: Improve the safety of pedestrians and bicyclists by using proven effective countermeasures

Objective 1: Identify safety issues and locations/hot spots where bicycle and pedestrian collisions occur in Wasco, and treat with appropriate and effective engineering countermeasures

Objective 2: Provide educational programs for bicyclists, pedestrians, and motorists to inform on how to be safe in the public right-of-way; either through after-school programs, law enforcement programs, or other public/private sponsored programs

Objective 3: Improve sidewalks, walkways, and crossings to be free of hazards and to minimize conflicts with vehicular traffic

Objective 4: Prioritize improvements that promote Safe SRs to School efforts or are located near schools

Goal 3: Ensure coordination of key stakeholders to implement roadway safety improvements & response within Wasco

Objective 1: Coordinate between City Departments, Sheriff’s Office, Fire Department, and EMS agencies to ensure a coordinated response to traffic safety, including:

- Implementation of safety improvements
- Public education on safely traveling in the public right-of-way, regardless of mode
- Enforcement of traffic safety laws in the public right-of-way
- Minimizing impacts to emergency response times.
City of Wasco
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Objective 2: Coordinate with local, regional, and state partners (such as Kern COG or Caltrans), to identify and address traffic safety issues and ensure a coordinated response.

Goal 4: Continually seek funding for safety improvements

Objective 1: Ensure the LRSP meets SR Safety Improvement Program (HSIP) guidelines in order to apply for funding for identified countermeasures

Objective 2: Provide a list of prioritized improvements that guide City investments and grant funding applications

Objective 3: Continually seek funding sources to implement engineering, education, enforcement, and emergency response solutions to roadway safety issues in Wasco

Goal 5: Ensure that safety improvements are made in a manner that is fair and equitable for all Wasco residents

Objective 1: Provide a forum for residents to submit traffic safety related complaints; and for City staff and officials to respond to such complaints

Objective 2: Ensure the consideration of equity when selecting where to make traffic safety improvements

Objective 3: Where feasible, implement community outreach to inform the public about upcoming safety improvements and seek their input

1.3 STUDY AREA

The City of Wasco, located in Kern County, California, covers a total area of 9.4 square miles and is located on the southern end of the San Joaquin Valley. The City’s estimated population is 27,047 (US Census 2020). California State SRs 43, which runs north-south, and 46, which runs east-west connect Wasco to other nearby cities. The nearest cities include Bakersfield to the south, unincorporated region of Famoso to the east, and Lost Hills to the west. The study area is mapped in Figure 2.
According to the Census American Community Survey (ACS) 2019 5-Year Estimates, 85.6% of Wasco commuters get to work by driving alone, higher than both the Kern County and State rate of walking commuters. The second most common method of commuting to work is carpooling at 10.4%. The different modes of transportation used by Wasco residents to commute to work are shown in Table 1 below.

### Table 1. Wasco Commute to Work Census Data

<table>
<thead>
<tr>
<th>Commute to Work</th>
<th>Wasco</th>
<th>Kern County</th>
<th>California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Alone</td>
<td>85.6%</td>
<td>80.5%</td>
<td>73.7%</td>
</tr>
<tr>
<td>Carpool</td>
<td>10.4%</td>
<td>12.1%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>0.3%</td>
<td>0.8%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Walked</td>
<td>0.6%</td>
<td>1.0%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>0.0%</td>
<td>0.3%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Work from Home</td>
<td>1.5%</td>
<td>3.4%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Other</td>
<td>1.5%</td>
<td>1.8%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>
1.4 SAFETY PARTNERS

Safety partners are vital to the development and implementation of an LRSP. For the City of Wasco, these include City staff, Parks and Recreation Department, Kern County Sheriff - Wasco Substation, Hall Ambulance, Wasco Union Elementary School District, Wasco Union High School District, Wasco Task Force, Kern Council of Governments (Kern COG), and Wasco residents. Many of these groups/agencies attended a virtual stakeholder meeting, held on July 12, 2021, to review project goals and findings, and to solicit feedback from the group. The cover page of the presentation is shown in Figure 3.

Figure 3. Zoom Meeting from Stakeholder Meeting

This stakeholder outreach was supplemented by a project website with an interactive map tool platform (www.kerncogroadssafetyplans.com), in collaboration with the Cities of Arvin, Bakersfield, California City, Delano, Maricopa, Shafter, Taft, and Tehachapi. The interactive map was used to solicit input from Wasco residents outside the confines of traditional meetings. The homepage of the project website is shown in Figure 4.
City of Wasco
Local Road Safety Plan

Figure 4. Wasco LRSP Project Website

Project Overview

The Kern Council of Governments (Kern COG) is developing comprehensive Local Road Safety Plans (LRSPs) for the Cities of Arvin, Bakersfield, California City, Delano, Hanford, Shafter, Taft, Tehachapi, and Wasco. These LRSPs are a part of the ongoing safety effort as part of the Regional Transportation Plan (2011). An LRSP is a means for providing local and rural road owners with an opportunity to address unique roadway safety needs in their jurisdictions. The process of preparing the LRSPs will help create a framework to systematically identify and analyze safety problems and recommend safety improvements for the 8 cities of Kern COG. This LRSP would enable the cities to enhance safety for all modes of transportation and for all ages and abilities.

The overarching goal is to develop successful LRSPs utilizing collision databases to create a decision making process that relies on a partnership with stakeholders and public outreach using five “I” of traffic safety: Engineering, Enforcement, Education, Emerging Technology, and Emergency Medical Services.

Scroll down to view the Project Area.
2. EXISTING PLANNING EFFORTS

This section summarizes the planning documents, projects underway, and studies reviewed for the Wasco Local Road Safety Plan (LRSP). The purpose is to ensure the LRSP vision, goals, and E’s strategies are aligned with prior planning efforts, planned transportation projects and non-infrastructure programs. The documents reviewed are listed below:

1. 2040 General Plan, 2016, Updated in 2019
2. Bicycle Master Plan, 2014
5. Capital Improvement Budget, FY 2020-2021
6. Safe SRs to School Plan Update, 2020
7. Projects awarded under previous HSIP Grant Cycles
   a. HSIP Grant Cycle 9
   b. HSIP Grant Cycle 8
   c. HSIP Grant Cycle 7
8. Kern Region Active Transportation Plan, 2018
9. Kern County Rural Alternative Transportation Plan, 2020

The following sections include brief descriptions of these documents and how they inform the development of the LRSP. A brief document summary is listed in Table 2. A more detailed list of upcoming projects and relevant policies is listed in Appendix A.

Table 2. Document Review Summary

<table>
<thead>
<tr>
<th>Document</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>2040 General Plan, 2016 (Updated in 2019)</td>
<td>The General Plan provides long range planning guidance to the City.</td>
</tr>
<tr>
<td>Bicycle Master Plan, 2014</td>
<td>This plan will help guide the future development of school traffic improvements and bicycle infrastructure and programs in the City.</td>
</tr>
<tr>
<td>School Traffic Safety Study, 2013</td>
<td>This study identifies various infrastructure projects that could improve student safety and support walking and biking to school in Wasco.</td>
</tr>
<tr>
<td>Transit Development Plan, 2016</td>
<td>This plan conducts an objective and comprehensive assessment of existing public transit and presents practical strategies for addressing current and forecast demand for public transit service.</td>
</tr>
<tr>
<td>Capital Improvement Budget, FY 2020-2021</td>
<td>This is a detailed report on the City’s budget for the fiscal year, 2020-2021 and serves as a guidebook for achieving the goals set for the year.</td>
</tr>
<tr>
<td>Safe SRs to School Plan Update, 2020</td>
<td>An effort to advance walking and biking as a safe and healthy way to get to and from school in the City.</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Document</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects awarded under previous HSIP Grant Cycles</td>
<td><strong>HSIP Grant Cycle 9</strong>&lt;br&gt;Upgrade roadway signs and various intersections as recommended in the 2017 City of Wasco Roadway Safety Signs Audit Project Report  <strong>HSIP Grant Cycle 8</strong>&lt;br&gt;Install Rectangular Rapid Flashing Beacons (RRFB’s), high-visibility crosswalks, infill sidewalks and ADA curb ramps at various locations around Barker Park.  <strong>HSIP Grant Cycle 7</strong>&lt;br&gt;Roadway Safety Sign Audit and sign upgrade/installation at various locations within the Wasco City limits</td>
</tr>
<tr>
<td>Kern Region Active Transportation Plan, 2018</td>
<td>The Plan is an effort led by the Kern Council of Governments (Kern COG) to enhance walking, bicycling, and transit access throughout Kern County.</td>
</tr>
<tr>
<td>Kern County Rural Alternative Transportation Plan, 2020</td>
<td>This Plan evaluates alternative transportation options for Kern County that may either replace, supplement or grow current regional transportation services.</td>
</tr>
</tbody>
</table>

**Existing Traffic Safety Efforts**

The City of Wasco has already implemented safety strategies corresponding to the 4 E’s of traffic safety. The strategies detailed in this memorandum can supplement these existing programs and concentrate them on high injury collision locations and crash types. These initiatives are summarized in Table 3 below.

**Table 3. Existing Safety Initiatives**

<table>
<thead>
<tr>
<th>Program/Document</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Traffic Safety Study, 2013</td>
<td>This study identifies various infrastructure projects that could improve student safety and support walking and biking to school in Wasco.</td>
</tr>
<tr>
<td>Kern Region Active Transportation Plan (2018)</td>
<td>Details bicycle and pedestrian improvements on County significant corridors. Includes many detailed priority bike and pedestrian projects.</td>
</tr>
<tr>
<td>Bicycle Plan and Complete Streets Facilities for Caltrans District 6 (2019)</td>
<td>This report seeks to enhance bicycle access along with pedestrian and transit access in Caltrans District 6.</td>
</tr>
<tr>
<td>Safe SRs to School Plan Update, 2020</td>
<td>An effort to advance walking and biking as a safe and healthy way to get to and from school in the City.</td>
</tr>
</tbody>
</table>

E’s Addressed: Engineering, Education
3. COLLISION DATA AND ANALYSIS

This chapter summarizes the results of a citywide collision analysis for the time period between January 2015 and December 2019, as part of the Local Road Safety Plan (LRSP). This chapter includes the following sections:

- Data Collection
- Collision Trend Analysis
- Geographic Collision Analysis
- High Injury Network

The LRSP focuses on systemically identifying and analyzing safety issues and recommends appropriate safety improvements. The memo starts with an analysis of the collisions of all severity for the City of Wasco, including Property Damage Only (PDO) collisions. Further on, a detailed analysis was conducted for fatal and severe injury (KSI) collisions that have occurred on Wasco roadways.

After this data was separated between intersection collisions and roadway segment collisions, a comprehensive evaluation was conducted based on factors such as: collision severity, type of collision, primary collision factor, lighting, weather, and time of the day. A list of high-injury intersections and roadway segments were then identified and ranked based on the calculation of the equivalent property damage only (EPDO) scoring system.

3.1 DATA COLLECTION

Collision data helps understand different factors that might be influencing collision patterns and various factors leading to collisions in a given area. For the purpose of this analysis, five-years of jurisdiction-wide collision data from 2015 to 2019 was retrieved from Transportation Injury Mapping System (TIMS) and Statewide Integrated Traffic Records System (SWITRS). For the purpose of this analysis, all collisions occurring on SR-43 and SR-46 in the City of Wasco are included. The collision data was analyzed and plotted in ArcMap to identify high-risk intersections and roadways segments.

GIS shapefiles of the city’s boundary and roadway centerlines, parks and open space, water bodies, schools and surrounding city boundaries were collected from Kern County's open data portal.
3.2 COLLISION TREND ANALYSIS

COLLISION CLASSIFICATION

There were a total of 765 collisions reported City-wide from 2015 to 2019. Out of these, 620 collisions (81%) were PDO collisions, 100 collisions (13%) led to complaint of pain injury and 31 collisions (4%) led to a visible injury. There were 14 KSI collisions of which 5 collisions led to a fatality and 9 collisions led to a severe injury. Figure 5 illustrates the distribution of collisions based on their severity and Figure 6 illustrates all collisions based on severity that have occurred in the City of Wasco.

Figure 5. Collision Severity: All Collisions

The analysis first includes a comparative evaluation between all collisions and KSI collisions, based on various factors including but on limited to the collision trend, primary collision factor, collision type, facility type, motor
vehicle involved with, weather, lighting, and time of the day. Following this, an analysis is conducted for only high-injury collisions, i.e. KSI collisions. KSI collisions cause the most damage to those affected, infrastructure and the aftermath of these collisions lead to great expenses for jurisdiction administration. This plan focuses on these collision locations to proactively identify and counter safety issues leading to these collisions.

The collision data was separated by facility type, i.e. based on collisions occurring on intersections and roadway segments. For the purposes of the analysis, a collision was said to have occurred at an intersection if it occurred within 250 feet of it. The reported collisions categorized by facility type and collision severity are presented in Table 4.

Table 4. Collisions by Severity and Facility Type

<table>
<thead>
<tr>
<th>Row Labels</th>
<th>Roadway Segment</th>
<th>Intersection</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>Severe Injury</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>1%</td>
</tr>
<tr>
<td>Visible Injury</td>
<td>3</td>
<td>28</td>
<td>31</td>
<td>4%</td>
</tr>
<tr>
<td>Complaint of Pain</td>
<td>6</td>
<td>94</td>
<td>100</td>
<td>13%</td>
</tr>
<tr>
<td>Property Damage Only (PDO)</td>
<td>44</td>
<td>576</td>
<td>620</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>57</strong></td>
<td><strong>708</strong></td>
<td><strong>765</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

YEAR TREND

For all collisions, the number of collisions were observed to be the highest in the year 2017 with 167 collisions and the lowest number was observed in the year 2018 with 131 collisions. Of 14 KSI collisions, the highest number occurred in the year 2019 with 6 collisions. No KSI collisions occurred in the year 2018. Figure 7 illustrates the five-year collision trend for all collisions, KSI collisions and PDO collisions.

Figure 7. Five-Year Collision Trend
INTERSECTION VS. ROADWAY SEGMENT COLLISIONS

When evaluating all severity collisions based on the facility type they occurred on, it was observed that 93% of collisions occurred at intersections and 7% occurred at roadway segment/mid-block locations. For KSI collisions that occurred in the City of Wasco, about 29% collisions occurred on roadway segment/mid-block locations and 71% collisions occurred at intersections. This classification by facility type can be observed in Figure 8.

Figure 8. Intersection and Roadway Segment Collisions - All Collisions vs. KSI Collisions

COLLISION TYPE

For collisions of all severity, the highest occurring collision types were broadside collisions (30%) and rear-end collisions (24%). For KSI collisions, the most commonly occurring collision type were vehicle-pedestrian collisions (57%) and the second most common was rear-end collision (14%). Figure 9 illustrates the collision type for all severity collisions and KSI collisions.

Figure 9. Collision Type: All Collisions vs. KSI Collisions
City of Wasco
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PRIMARY COLLISION FACTOR

For collisions of all severity, the highest occurring primary collision factor was observed to be improper turning (18%) followed by automobile right-of-way (14%). For KSI collisions, pedestrian violation (21%) was observed to be the highest occurring violation category. Other violation categories observed for KSI collisions were DUI (14%), unsafe speed (14%) and improper turning (14%). Figure 10 illustrates the violation category for all collisions and KSI collisions.

Figure 10. Primary Collision Factor: All Collisions vs. KSI Collisions

MOTOR VEHICLE INVOLVED WITH

For collisions of all severity, 63% of the collisions are motor vehicle involved with another motor vehicle. For KSI collisions, 57% collisions occurred between a pedestrian and a motor vehicle. Figure 11 illustrates the percent of motor vehicle involved with for all collisions as well as KSI collisions.

Figure 11. Motor Vehicle Involved In: All Collisions vs. KSI Collisions
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LIGHTING

For collisions of all severity, 61% of collisions occurred in daylight, and 27% of collisions have occurred in the dark on streets with street lights. For KSI collisions, 43% of collisions occurred in daylight and rest of them have occurred in dark lighting conditions. **Figure 12** illustrates the lighting condition for all collisions and KSI collisions.

![Figure 12. Lighting: All Collisions vs. KSI Collisions](image)

WEATHER

For collisions of all severity, 91% of collisions occurred in clear weather conditions. For high-severity collisions, 93% occurred in clear weather conditions and 7% occurred in foggy conditions. **Figure 13** illustrates the weather conditions for all severity vs. KSI collisions.

![Figure 13. Weather: All Collisions vs. KSI Collisions](image)
TIME OF DAY

For collisions of all severity, the collision occurrence stayed relatively constant throughout the day (7:00 a.m. to 8:00 p.m.) but for KSI collisions, the collision occurrence peaked between 5 p.m. to 9 p.m. Figure 14 illustrates the pattern of collision occurrence throughout the day.

Figure 14. Time of the Day: All Collisions vs. KSI Collisions
3.3 FATAL AND SEVERE INJURY COLLISIONS

The detailed collision analysis is effective for identifying high-risk locations by evaluating a shorter list of collisions that have led to a fatality or a severe injury. Roadway segment and intersection KSI collisions have been further analyzed taking into account the following collision attributes:

- Collision Type and Severity
- Collision Type and Violation Category
- Collision Type and Motor Vehicle Involved With
- Collision Type and Lighting

**Figure 15** illustrates all the KSI collisions that have occurred in the City of Wasco from 2015 to 2019.

**Figure 15. City of Wasco - Fatal and Severe Injury Collisions (2015-2019)**
ROADWAY SEGMENT ANALYSIS

Collision Type and Severity

For the KSI collisions that occurred on roadway segments, the collision that led to fatality was a vehicle/pedestrian collision. The rest were severe injury collisions, which included hit-object collisions, overturned and vehicle pedestrian collisions. Figure 16 illustrates this distribution.

Collision Type and Violation Category

For KSI collisions that occurred at roadway segments, improper turning caused hit-object and overturned collisions. A vehicle/pedestrian fatal collision was caused due to DUI. Figure 17 illustrates this distribution of collision type vs. violation category.
Collision Type and Motor Vehicle Involved With

For KSI collisions that occurred on roadway segments, 50% of them occurred between motor vehicle and pedestrians. The overturned and hit object collisions occurred between a motor vehicle and a fixed object. Figure 18 illustrates this distribution of collision type vs. motor vehicle involved with.

Figure 18. Collision Type vs. Motor Vehicle Involved With: Roadway Segment KSI Collisions

Collision Type and Lighting

For KSI collisions that occurred on roadway segments, the vehicle pedestrian collisions were observed to have occurred at locations where the lighting conditions were dark. The rest of the collisions occurred in daylight. Figure 19 illustrates this distribution.

Figure 19. Collision Type vs. Lighting: Roadway Segment KSI Collisions
INTERSECTION ANALYSIS

Collision Type and Severity

For all KSI collisions that occurred at intersections, vehicle/pedestrian collisions, broadside collision and rear-end collisions led to a fatality. Severe injury collisions included vehicle/pedestrian collisions and rear-end collisions. Figure 20 illustrates this distribution.

Figure 20. Collision Type vs. Severity: Intersection KSI Collisions

Collision Type and Violation Category

For KSI collisions that occurred at intersections, vehicle pedestrian collisions were caused due to pedestrian right-of-way violation and unsafe starting and backing violation. Rear-end collisions were caused by unsafe speed violations. Figure 21 illustrates this distribution.

Figure 21. Collision Type vs. Violation Category: Intersection KSI Collisions
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Collision Type and Motor Vehicle Involved With

For KSI collisions that occurred at intersections, rear-end and broadside collision occurred between two motor vehicles. The rest were vehicle/pedestrian collisions that involved pedestrians. Figure 22 illustrates this distribution.

Figure 22. Collision Type vs. Motor Vehicle Involved With: Intersection KSI Collisions

Collision Type and Lighting

For KSI collisions that occurred at intersections, 40% of the vehicle/pedestrian collisions occurred in the dark at locations with low-light conditions. Rear end collisions occurred both in the day light and in the dark on streets with street lights. Figure 23 illustrates this distribution.

Figure 23. Collision Type vs. Lighting: Intersection KSI Collisions
3.4 GEOGRAPHIC COLLISION ANALYSIS

This section describes a detailed geographic collision analysis performed for injury collisions occurring at roadway segments and intersections in the City of Wasco. The above collision analysis was used to identify five main collision factors that highlight the top trends among collisions in the City of Wasco. These five collision factors were identified to be broadside collisions, rear-end collisions, vehicle/pedestrian collisions, improper turning collisions, and night-time collisions.

BROADSIDE COLLISIONS

Broadside collisions accounted for 30% of all severity collisions and 7% KSI collisions. Figure 24 illustrates the locations where broadside collisions have been observed to occur. SR 46, SR 43 and Poso Drive are roadways that have been observed to have higher numbers of broadside collisions.

Figure 24. Broadside Collisions
REAR-END COLLISIONS

24% of all severity and 14% of KSI collisions were observed to be rear-end collisions. Figure 25 illustrates the roadways where rear-end collisions were observed to occur throughout the City. SR 46, Palm Avenue and Poso Drive are roadways where rear-end collisions have been observed to occur.

Figure 25. Rear-End Collisions
VEHICLE/PEDESTRIAN COLLISIONS

Of the KSI collisions that occurred in the City of Wasco, 57% collisions were vehicle/pedestrian collisions. Figure 26 illustrates the locations where high number of vehicle/pedestrian collisions have been observed throughout the City. Poso Drive and D Street were observed to be major high-risk segments for pedestrians.

Figure 26. Vehicle/Pedestrian Collisions
IMPROPER TURNING COLLISIONS

About 18% of all severity collisions and 14% of KSI collisions occurred due to an improper turning violation. Figure 27 illustrates the roadway segments where this violation has been observed and led to collisions. Poso Drive, Palm Avenue, D Street and SR 46 are some segments where collisions caused by improper turning have been observed.

Figure 27. Improper Turning Collisions
NIGHT-TIME COLLISIONS

About 58% KSI collisions occurred during night-time in dark lighting conditions. Figure 28 illustrates roadway segments where collisions during night-time have been observed to occur. SR 46, Poso Drive, SR 43, and F Street are roadways where night-time collisions have been observed.

Figure 28. Night-time Collisions
3.5 IDENTIFICATION OF HIGH INJURY NETWORK

EQUIVALENT PROPERTY DAMAGE ONLY (EPDO) SCORE

Equivalent Property Damage Only (EPDO) method was used to identify the high severity collision network. The EPDO method accounts for both the severity and frequency of collisions by converting each collision to an equivalent number of property damage only (PDO) collisions. The EPDO method assigns a crash cost and score to each collision according to the severity of the crash weighted by the comprehensive crash cost. These EPDO scores are calculated using a simplified version of the comprehensive crash costs per HSIP Cycle 10 application. The weights used in the analysis are shown below in Table 5.

Table 5. EPDO Score used in HSIP Cycle 10

<table>
<thead>
<tr>
<th>Collision Severity</th>
<th>EPDO Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal and Severe Injury Combined</td>
<td>165*</td>
</tr>
<tr>
<td>Visible Injury</td>
<td>11</td>
</tr>
<tr>
<td>Possible Injury</td>
<td>6</td>
</tr>
<tr>
<td>PDO</td>
<td>1</td>
</tr>
</tbody>
</table>

*This is the score used in HSIP Cycle 10 for collisions on roadways segments, to simplify the analysis this study uses the same score for all KSI collisions regardless of location.

EPDO is used because it provides a methodology for the project team to understand the locations in Wasco that are experiencing the most severe crashes. Because of the high score given to KSI crashes, locations that have these types of crashes are more likely to receive a higher EPDO score than other locations that may have more collisions, but fewer fatal or severe injury collisions. Locations that have the highest EPDO scores are selected for inclusion in the High Injury Network. Identified intersections are scored based on collisions occurring at or within 250 feet of the intersection, while roadway segment locations are identified based on collisions that occur along the segment, except directly at an intersection (0 feet from intersection per the collision data). Identifying the locations with the most severe crashes allows the team to focus recommended solutions and countermeasures at these locations.

The EPDO scores for all collisions can then be aggregated in a variety of ways to identify collision patterns, such as location hot-spots. The weighted collisions for the City of Wasco were geolocated onto Wasco’s road network. For the purposes of this analysis (and future analyses), PDO collisions were included. GIS is then used to calculate the EPDO score for each roadway segment and intersection citywide, which is then ranked according to its score.

Figure 29 shows the location and geographic concentration of collisions by their EPDO score.
Figure 29. EPDO Score: City of Wasco
HIGH INJURY NETWORK

Following the detailed collision analysis in the previous sections, the next step is to identify the high-risk roadway segments and intersections in the City of Wasco. The methodology for identifying the high injury locations is the methodology used for calculating the EPDO Score of roadways in the City. Figure 30 shows the 8 high-collision corridors and 11 high-collision intersections.

Figure 30. City of Wasco High Injury Network
Intersection Ranking

A total of 11 intersections were identified as high-injury intersections. There were a total of 9 KSI collisions that occurred at these intersections. The intersection of F Street and 7th Street has the highest EPDO scores, i.e. it has maximum number of high severity collisions. Table 6 lists the collision rate of the identified high-collision intersections along with the EPDO score, and total number of collisions that occurred at that location in various categories.

Table 6. City of Wasco High-injury Intersections

<table>
<thead>
<tr>
<th>Rank</th>
<th>Intersection</th>
<th>Collisions</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>EPDO Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F Street &amp; 7th Street</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>SR 46 &amp; Palm Avenue</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>SR 46 &amp; Central Avenue</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>SR 43 &amp; Prospect Avenue</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>SR 46 &amp; E Street</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>3rd Street &amp; Poplar Avenue</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>E Street &amp; 6th Street</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Palm Avenue &amp; Prosperity Lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>SR 46 &amp; SR 43</td>
<td>10</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>SR 43 &amp; Filburn Avenue</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>SR 43 &amp; Kimberlina Road</td>
<td>7</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
Corridor Ranking

A total of 8 corridors have been identified as high-injury corridors. There were a total of 7 KSI collisions that occurred on these corridors. The corridor with the highest EPDO score lies between Magnolia Avenue and Griffith Avenue on SR 46.

Table 7 lists the EPDO score of the 8 corridors identified as high-injury corridors along with the number of collisions that occurred on these corridors.

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Length</th>
<th>Collisions</th>
<th>EPDO Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SR 46, from Magnolia Avenue to Griffith Avenue</td>
<td>1.7</td>
<td>8</td>
<td>207</td>
</tr>
<tr>
<td>B</td>
<td>7th Street, from Western Avenue to G Street</td>
<td>2.4</td>
<td>3</td>
<td>177</td>
</tr>
<tr>
<td>C</td>
<td>Palm Avenue, SR 46 to 0.15 mi N of Jackson Avenue</td>
<td>1.8</td>
<td>3</td>
<td>177</td>
</tr>
<tr>
<td>D</td>
<td>SR 43, from Kimberlina Road to 00.06 miles N of Kimberlina Road</td>
<td>0.06</td>
<td>1</td>
<td>165</td>
</tr>
<tr>
<td>E</td>
<td>N Palm Avenue, from SR 46 to Prosperity Lane</td>
<td>0.36</td>
<td>1</td>
<td>165</td>
</tr>
<tr>
<td>F</td>
<td>Shamrock Court</td>
<td>0.33</td>
<td>1</td>
<td>165</td>
</tr>
<tr>
<td>G</td>
<td>Wasco Avenue, from Poso Drive to City Boundary</td>
<td>0.18</td>
<td>1</td>
<td>165</td>
</tr>
<tr>
<td>H</td>
<td>Poso Drive, from Central Avenue and 0.25 miles E of Wasco Avenue</td>
<td>1.75</td>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>
4. PUBLIC OUTREACH

This chapter summarizes the community’s needs as collected through the project website, interactive map input, and stakeholder meetings. A total of 81 responses were collected through the project website and stakeholder meetings. The results of the public outreach were pulled and summarized on November 30, 2021. Detailed information on responses collected through various platforms can be found in Appendix B.

All the comments collected through the outreach process have been incorporated to complement the collision data, and develop emphasis areas, countermeasures and safety projects (Chapters 5, 6 and 7). The most comments were received about Paso Robles SR (SR 46), and the most common concern were related to the following:

- Speeding
- Bicycle/Pedestrian Safety
- Intersection Safety
- Congestion

Figure 31 shows the responses noted in the project website and stakeholder meetings. Mapped responses can be viewed in Figure 32.

Figure 31. Public Comments on Traffic Safety by Location
Figure 32. Interactive Map Comment Responses
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5. EMPHASIS AREAS

Emphasis areas are focus areas for the LRSP that are identified through the comprehensive collision analysis of the identified high injury locations within the City of Wasco. Emphasis areas help in identifying appropriate safety strategies and countermeasures with the greatest potential to reduce collisions occurring at these high injury locations. They can include (but not be limited to): specific collision types, human behaviors, facility types, and specific locations or corridors.

This chapter summarizes the top eight (8) emphasis areas identified for the City of Wasco. These emphasis areas were derived from the consolidated high injury collision database (Appendix C) where top injury factors were identified by combining the data manually. Along with findings from the data analysis, stakeholder input was also considered while identifying emphasis areas specific to the City of Wasco.

5.1 THE 4 E’S OF TRAFFIC SAFETY

The LRSP utilizes a comprehensive approach to safety incorporating the “4 E’s of traffic safety”: Engineering, Enforcement, Education and Emergency Medical Services (EMS). This approach recognizes that not all locations can be addressed solely by infrastructure improvements. Incorporating the 4 E’s of traffic safety is often required to ensure successful implementation of significant safety improvements and reduce the severity and frequency of collisions throughout a jurisdiction.

Some of the common violation types that may require a comprehensive approach are speeding, failure-to-yield to pedestrians, red light running, aggressive driving, failure to wear safety belts, distracted driving, and driving while impaired. When locations are identified as having these types of violations, coordination with the appropriate law enforcement agencies is needed to arrange visible targeted enforcement to reduce the potential for future driving violations and related crashes and injuries.

To improve safety, education efforts can be used to supplement enforcement and improve the efficiency of each strategy. Education can also be employed in the short-term to address high crash locations until the recommended infrastructure project can be implemented. Similarly, Emergency Medical Services entails strategies around supporting organizations that provide rapid response and care when responding to collisions causing injury, by stabilizing victims and transporting them to medical facilities.

5.3 THE CITY OF WASCO’S EMPHASIS AREAS

This section presents collision data analysis of collision type, collision factors, facility type, roadway geometries, analyzed for the various emphasized areas. Emphasis areas were determined by factors that led to the highest amount of injury collisions, with a specific emphasis on KSI collisions. This section also presents comprehensive programs, policies and countermeasures to reduce collisions in specific emphasis areas.

The identified emphasis areas are as follows:

- Emphasis Area 1 – Improve Intersection Safety
- Emphasis Area 2 – Reduce Unsafe Speed Violations
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- Emphasis Area 3 – Reduce Automobile Right-of-Way Violations
- Emphasis Area 4 – Reduce Improper Turning Collisions
- Emphasis Area 5 – Reduce Rear-End Collisions
- Emphasis Area 6 – Reduce Broadside Collisions
- Emphasis Area 7 – Reduce Pedestrian Collisions
- Emphasis Area 8 - Reduce Collisions Around Parks and Schools
Emphasis Area 1 – Improve Intersection Safety

A total 58 collisions occurred on the high injury network of the City of Wasco, out of which 90% (52 collisions) occurred at intersections including 20% of the KSI collisions. The following collision data is based on intersection injury collisions that occurred on the high injury network, followed by strategies to make these locations safer (Table 8).

15% Unsafe speed and automobile right-of-way violations
35% Broadside collisions
42% Occurred on SR 46

Table 8. Emphasis Area 1 Strategies

<table>
<thead>
<tr>
<th>Objective:</th>
<th>To reduce the number of fatal and severe injury collisions at intersections.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Performance Measure</th>
<th>Agencies/Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Number of education campaigns</td>
<td>City/School District/Police Department</td>
</tr>
<tr>
<td>Enforcement</td>
<td>Number of tickets issued.</td>
<td>Police Department</td>
</tr>
<tr>
<td>Engineering</td>
<td>Number of intersections improved.</td>
<td>City</td>
</tr>
<tr>
<td>EMS</td>
<td>EMS vehicle response time.</td>
<td>City/Health Department</td>
</tr>
</tbody>
</table>

- S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number
- S03, Improve signal timing (coordination, phases, red, yellow, or operation)
- S08, Convert signal to mast arm (from pedestal-mounted)
- S09, Install raised pavement markers and striping (Through Intersection)
- S16/NS04/NS05, Convert intersection to roundabout
- NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs
- NS07, Upgrade intersection pavement markings (NS.I.)
- R01, Add Segment Lighting
- R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
- R27, Install delineators, reflectors and/or object markers
- R01, Add Segment Lighting
- R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
- R27, Install delineators, reflectors and/or object markers
- Curb extensions
- High visibility crosswalks

EMS: S05, Install emergency vehicle pre-emption systems

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**Emphasis Area 2 – Reduce Unsafe Speed Collisions**

A total of 58 collisions occurred on the high injury network in the City of Wasco, out of which 8 (14%) occurred due to unsafe speed violations, including 2 KSI collisions. The following collision data is based on unsafe speed collisions that occurred on the high injury network in the City of Wasco, followed by strategies to make these locations safer (Table 9).

- **63%** Occurred on SR 46
- **100%** Rear-end collisions
- **38%** Occurred in dark/low-lighting conditions

Table 9. Emphasis Area 2 Strategies

| Objective: To reduce the number of fatal and severe injury collisions due to unsafe speed violations. |
|---|---|---|
| **Strategies** | **Performance Measure** | **Agencies/Organizations** |
| **Education** | Conduct public information and education campaign for safety laws regarding unsafe speed and its dangers. | Number of education campaigns | City/ School District/ Police Department |
| **Enforcement** | • Targeted enforcement at high-risk locations to monitor unsafe speed.  
• Speed radar trailers | Number of tickets issued. | Police Department |
| **Engineering** | • S16/NS04/NS05, Convert intersection to roundabout  
• NS07, Upgrade intersection pavement markings (NS.l.)  
• R14, Road diet  
• R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)  
• R27, Install delineators, reflectors and/or object markers  
• R26, Install dynamic/ variable speed warning signs  
• R28, Install edge-lines and centerlines  
• R36PB, Install/upgrade pedestrian crossing (with enhanced safety features)  
• Decrease width of travel lane  
• Speed legend pavement marking | Number of locations improved. | City |
| **EMS** | S05, Install emergency vehicle pre-emption systems | EMS vehicle response time. | City/ Health Department |
Emphasis Area 3 – Reduce Automobile Right-of-Way Violations

A total 58 collisions on the high injury network in the City of Wasco, of which 8 (14%) collisions occurred due to automobile right-of-way violations. The following collision data is based on automobile right-of-way violations-related injury collisions that occurred on the high injury network in the City of Wasco, followed by strategies to make these locations safer (Table 10).

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Occurrence</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>38%</td>
<td>Occurred on SR 43 and SR 46 each</td>
<td>88% Broadside collisions</td>
</tr>
<tr>
<td>38%</td>
<td>Occurred in low-lighting conditions</td>
<td></td>
</tr>
</tbody>
</table>

Table 10. Emphasis Area 3 Strategies

<table>
<thead>
<tr>
<th>Objective:</th>
<th>To reduce the number of collisions caused due to automobile right-of-way violations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies</td>
<td>Performance Measure</td>
</tr>
<tr>
<td>Education</td>
<td>Distribute brochures/fliers with basic automobile right-of-way rules and illustrations at public events.</td>
</tr>
<tr>
<td>Enforcement</td>
<td>Targeted enforcement at locations with most automobile right-of-way violations and implement strict penalties for such violations.</td>
</tr>
</tbody>
</table>
| Engineering| • S03, Improve signal timing (coordination, phases, red, yellow, or operation)  
• S09, Install raised pavement markers and striping (Through Intersection)  
• NS02, Convert to all-way STOP control (from 2-way or Yield control)  
• NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs  
• NS07, Upgrade intersection pavement markings (NS.I.)  
• NS11, Improve sight distance to intersection (Clear Sight Triangles)  
• R21, Improve pavement friction (High Friction Surface Treatments)  
• R30, Install centerline rumble strips | Number of locations improved. | City |
| EMS        | Improve resource deployment for emergency responses at collision sites. | EMS vehicle response time. | City/ Health Department |
Emphasis Area 4 - Reduce Improper Turning Collisions

A total of 58 collisions occurred on the high injury network in the City of Wasco out of which 7 (12%) of these collisions occurred due to improper-turning violations, including 2 KSI collisions. The following findings are based on improper-turning-related injury collisions that occurred on the high injury network in the City of Wasco, followed by strategies to make these locations safer (Table 11).

### Table 11. Emphasis Area 4 Strategies

| Objective: To reduce the number of collisions caused due to improper-turning violation. |
|-----------------------------------|-----------------|---------------------------|
| Strategies                        | Performance Measure | Agencies/Organizations    |
| Education                        | Conduct public information and education campaign for intersection safety laws regarding traffic lights, stop signs, and turning left or right. | Number of education campaigns | City/School District/Police Department |
| Enforcement          | Targeted enforcement at high-risk intersections to monitor improper turning violations. | Number of tickets issued | Police Department |
| Engineering     | S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number | Number of intersections improved | City |
|                        | S03, Improve signal timing (coordination, phases, red, yellow, or operation) |  |  |
|                        | S08, Convert signal to mast arm (from pedestal-mounted) |  |  |
|                        | S09, Install raised pavement markers and striping (Through Intersection) |  |  |
|                        | S16/NS04/NS05, Convert intersection to roundabout |  |  |
|                        | NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs |  |  |
|                        | NS07, Upgrade intersection pavement markings (NS.I.) |  |  |
|                        | R01, Add Segment Lighting |  |  |
|                        | R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) |  |  |
|                        | R27, Install delineators, reflectors and/or object markers |  |  |
|                        | Curb extensions at wider approaches |  |  |
| EMS                 | S05, Install emergency vehicle pre-emption systems | EMS vehicle response time | City/Health Department |
Emphasis Area 5 – Reduce Rear-End Collisions

A total of 58 collisions occurred on the high injury network out of which 18 (31%) collisions were rear-end collisions, including 2 KSI collisions. The following collision data is based on rear-end collisions that occurred on the high injury network in the City of Wasco, followed by strategies to make these locations safer (Table 12).

45% Due to unsafe speed violations

45% Occurred in low-lighting conditions

100% Occurred between two motor vehicles

Table 12. Emphasis Area 5 Strategies

<table>
<thead>
<tr>
<th>Objective:</th>
<th>To reduce the number of rear-end injury collisions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies</td>
<td>Performance Measure</td>
</tr>
<tr>
<td>Education</td>
<td>Conduct public information and education campaign for safety laws regarding and the larger risk of collisions.</td>
</tr>
<tr>
<td>Enforcement</td>
<td>Targeted enforcement at high-risk locations to monitor collisions that occur at due to unsafe speed violations.</td>
</tr>
<tr>
<td>Engineering</td>
<td>S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size and number</td>
</tr>
<tr>
<td></td>
<td>S10, Install flashing beacon as warning</td>
</tr>
<tr>
<td></td>
<td>NS06, Install/large or additional stop signs or other intersection warning/regulatory signs</td>
</tr>
<tr>
<td></td>
<td>R01, Add segment lighting</td>
</tr>
<tr>
<td></td>
<td>R22, Install/ Upgrade signs with new fluorescent sheeting (regulatory or warning)</td>
</tr>
<tr>
<td></td>
<td>R27, Install delineators, reflectors and/or object markers</td>
</tr>
<tr>
<td></td>
<td>R26, Install dynamic/ variable speed warning signs</td>
</tr>
<tr>
<td></td>
<td>R27, Install delineators, reflectors and/or object markers</td>
</tr>
<tr>
<td></td>
<td>Curb extensions at wider approaches</td>
</tr>
<tr>
<td>EMS</td>
<td>S05, Install emergency vehicle pre-emption systems</td>
</tr>
</tbody>
</table>
Emphasis Area 6 – Reduce Broadside Collisions

A total of 58 collisions occurred on the high injury network out of these 18 collisions (31%) were broadside, including 3 KSI collisions. The following collision analysis findings is based on broadside injury collisions that occurred on the high injury network in the City of Wasco, followed by strategies to make these locations safer (Table 13).

40% Due to Automobile ROW violation

67% Occurred in Daylight

94% Occurred between two motor vehicles

Table 13. Emphasis Area 6 Strategies

<table>
<thead>
<tr>
<th>Objective:</th>
<th>To reduce the number of broadside collisions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies</td>
<td>Performance Measure</td>
</tr>
<tr>
<td>Education</td>
<td>Conduct public information and education campaign for intersection safety laws regarding traffic lights, stop signs, and turning left or right.</td>
</tr>
<tr>
<td>Enforcement</td>
<td>Targeted enforcement at locations with most red light running and stop sign violations, and implement strict penalties for such violations.</td>
</tr>
</tbody>
</table>
| Engineering | • S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number 
• S03, Improve signal timing (coordination, phases, red, yellow, or operation) 
• S08, Convert signal to mast arm (from pedestal-mounted) 
• S09, Install raised pavement markers and striping (Through Intersection) 
  • S16/NS04/NS05, Convert intersection to roundabout 
• NS02, Convert to all-way STOP control (from 2-way or Yield control) 
  • NS03, Install signals 
• NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs 
• NS07, Upgrade intersection pavement markings (NS.I.) 
• NS08, Install flashing beacons at stop controlled intersections 
• NS11, Improve sight distance to intersection (Clear Sight Triangles) | Number of locations improved. | City |
| EMS | S05, Install emergency vehicle pre-emption systems | EMS vehicle response time. | City/ Health Department |
City of Wasco
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**Emphasis Area 7 – Reduce Pedestrian Collisions**

A total 58 collisions occurred on the high injury network in the City of Wasco out of which 9 collisions (16%) were pedestrian collisions, including 8 KSI collisions. The following collision data is based on pedestrian injury collisions that occurred on the high injury network in the City of Wasco, followed by strategies to make these locations safer (Table 14).

- **33%** Occurred on SR 46
- **67%** Occurred in dark or low-lighting conditions
- **12%** Occurred due to DUI violation

Table 14. Emphasis Area 7 Strategies

<table>
<thead>
<tr>
<th>Objective: To improve walking environment for pedestrians.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies</td>
</tr>
<tr>
<td><strong>Education</strong></td>
</tr>
<tr>
<td>- Pedestrian safety campaigns and outreach to raise their awareness of pedestrian safety needs through media outlets and public events.</td>
</tr>
<tr>
<td>- Post signage along roadways in areas of anticipated or known high pedestrian activity advising motorists of zero tolerance motor vehicle law enforcement.</td>
</tr>
<tr>
<td>- Provide public outreach to advice of City efforts toward zero-tolerance motor vehicle law enforcement in high pedestrian activity.</td>
</tr>
<tr>
<td><strong>Enforcement</strong></td>
</tr>
<tr>
<td>Targeted and zero-tolerance enforcement of motor vehicle speed limit violations, signal/right-of-way violations, pedestrian violations, aggressive driving, distracted driving, DUI, and illegal vehicle modifications in areas with known or anticipated high pedestrian activity.</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
</tr>
<tr>
<td>- S02, Improve signal hardware: lenses, back-plates with retro-reflective borders, mounting, size, and number</td>
</tr>
<tr>
<td>- S03, Improve signal timing (coordination, phases, red, yellow, or operation)</td>
</tr>
<tr>
<td>- S09, Install raised pavement markers and striping (Through Intersection)</td>
</tr>
<tr>
<td>- S11, Improve pavement friction (High Friction Surface Treatments)</td>
</tr>
<tr>
<td>- S12, Install raised median on approaches (S.I.)</td>
</tr>
<tr>
<td>- NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs</td>
</tr>
<tr>
<td>- NS07, Upgrade intersection pavement markings (NS.I.)</td>
</tr>
<tr>
<td>- NS10, Install transverse rumble strips on approaches</td>
</tr>
<tr>
<td>- NS11, Improve sight distance to intersection (Clear Sight Triangles)</td>
</tr>
<tr>
<td>- NS12, Improve pavement friction (High Friction Surface Treatments)</td>
</tr>
<tr>
<td>- R05, Install impact attenuators</td>
</tr>
<tr>
<td>- R06, Flatten side slopes</td>
</tr>
<tr>
<td>- R15, Widen shoulder</td>
</tr>
</tbody>
</table>
## City of Wasco
### Local Road Safety Plan

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMS</strong></td>
<td>Improve resource deployment for emergency responses at collision sites in areas of high pedestrian activity.</td>
<td>EMS vehicle response time.</td>
</tr>
<tr>
<td></td>
<td>R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R27, Install delineators, reflectors and/or object markers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R30, Install centerline rumble strips/stripes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R31, Install edgeline rumble strips/stripes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Install pedestrian signal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High-visibility ladder crosswalks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mid-block curb extension</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pedestrian crossing flags</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yield sign for pedestrian crossing at crosswalk</td>
<td></td>
</tr>
</tbody>
</table>
Emphasis Area 8 – Reduce Collisions near Parks and Schools

A total 58 collisions occurred on the high injury network in the City of Wasco, out of which 7 collisions (12%) of these collisions occurred within 0.25 miles of a school or a park. The following collision data is based on injury collisions that occurred at a radius of 0.25 miles of a school or a park on the high injury network in the City of Wasco, followed by strategies to make these locations safer (Table 15).

29% Involved a bicyclist

57% Rear-end collisions

29% Due to improper-turning violations

Table 15. Emphasis Area 8 Strategies

<table>
<thead>
<tr>
<th>Objective:</th>
<th>Strategy</th>
<th>Performance Measure</th>
<th>Agencies/Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>To reduce the number of collisions that occur within 500 feet radius of a school or a park.</td>
<td>Education: Develop safe SRs to school (SRTS) program to educate students about safe walking practices and activities on road safety.</td>
<td>Number of schools participating in SRTS the program.</td>
<td>City/School District/Police Department</td>
</tr>
<tr>
<td></td>
<td>Enforcement: Targeted enforcement at intersections and roadway segments around schools during pickup and drop-off hours.</td>
<td>Number of citations issued around school properties.</td>
<td>Police Department</td>
</tr>
</tbody>
</table>
|                                                                             | Engineering: • S09, Install raised pavement markers and striping (Through Intersection)  
• S12, Install raised median on approaches (S.I.)  
• S21PB, Modify signal phasing to implement a Leading Pedestrian Interval (LPI)  
• NS07, Upgrade intersection pavement markings (NS.I.)  
• NS08, Install Flashing Beacons at Stop-Controlled Intersections  
• NS21PB, Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)  
• NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB)  
• R14, Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)  
• R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)  
• R35PB, Install/upgrade pedestrian crossing (with enhanced safety features)  
• R37PB, Install Rectangular Rapid Flashing Beacon (RRFB) | Number of locations improved.                                              | City                                        |
|                                                                             | EMS: Improve resource deployment for emergency responses at collision sites within 0.25 miles of schools. | EMS vehicle response time.                                                          | City/Health Department                     |
6. COUNTERMEASURE SELECTION

6.1 IDENTIFICATION OF COUNTERMEASURES

Upon the identification of high-risk locations and Emphasis Areas, the next step was to identify appropriate safety countermeasures. The Caltrans Local Roadway Safety Manual (LRSM) provides 82 countermeasures, of which 21 are eligible in the current HSIP call for signalized intersections, 23 for un-signalized intersections, and 38 for roadway segments. The LRSM provides guidance on where to apply the countermeasures including the crash types each countermeasure would address, and a Crash Reduction Factor (CRF) for each countermeasure. The Federal SR Administration (FHWA) CMF Clearinghouse and published research papers were reviewed by the project team to gain additional insight on CRFs and effectiveness of specific countermeasures.

The project team conducted a thorough review of the high-risk locations (intersections and roadway segments) using aerial photography, and Google Maps Street View software. Crash characteristics of all collisions occurring on the High Injury Network were considered. After combining the physical and collision characteristics, the project team developed a table of preliminary countermeasures that address each of the eight identified Emphasis Areas. The table was refined by selecting up to four countermeasures for each high-risk location that were most commonly recommended among all Emphasis Areas. By doing this, the project team was able to identify countermeasures with the greatest opportunity for systemic implementation.

6.2 COUNTERMEASURE TOOLBOX

Engineering countermeasures were selected for each of the high-risk locations and for the emphasis areas. These were based off of approved countermeasures from the Caltrans Local Roadway Safety Manual (LRSM) used in HSIP grant calls for projects. The intention is to give the City potential countermeasures for each location that can be implemented either in future HSIP calls for projects, or using other funding sources, such as the City’s Capital Improvement Program. Non-engineering countermeasures were also selected using the 4 E’s strategies, and are included with the emphasis areas. The countermeasure toolbox in Appendix D details the draft countermeasures for each high-risk location and emphasis area, separated by intersections and roadway segments. While not all of these countermeasures will be included in the resulting safety projects, they are included to give the City a toolbox for implementing future safety improvements through other means, such as the City’s Capital Improvement Program.

Tables 16 provides a description of each countermeasure along with the crash reduction factor (CRF), federal funding eligibility, and opportunity for systemic implementation. An excerpt of the LRSM, detailing each available HSIP countermeasure referenced in the recommendations tables, is included as Appendix E.
## Table 16. Countermeasures selected for the City of Wasco

<table>
<thead>
<tr>
<th>Code*</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roadway Segment Countermeasures</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **R01** | **Add segment lighting.** Providing roadway lighting improves the safety during nighttime conditions by (1) making drivers more aware of the surroundings, which improves drivers’ perception-reaction times, (2) enhancing drivers’ available sight distances to perceive roadway characteristic in advance of the change, and (3) improving non-motorist’s visibility and navigation. | • Crash Reduction Factor – 35%  
• Expected Life – 20 years  
• Baseline Cost – Approximately $20,000 per lighting |
| **R08** | **Install raised median.** Adding raised medians is a particularly effective strategy as it adds to or reallocates the existing cross section to incorporate a buffer between the opposing travel lanes and reinforces the limits of the travel lane. Raised median may also be used to limit unsafe turning movements along a roadway. | • Crash Reduction Factor – 25%  
• Expected Life – 20 years  
• Baseline Cost – Approximately $200,000 |
| **R14** | **Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes).** The application of this strategy usually reduces the roadway segment speeds and serious head-on crashes. In many cases the extra pavement width can be used for the installation of bike lanes. In addition to increasing bicycle safety, these bike lanes can improve the safety of on-street parking. | • Crash Reduction Factor – 30%  
• Expected Life – 20 years |
| **R22** | **Install/Upgrade signs with new fluorescent sheeting (regulatory or warning).** The target for this strategy should be on roadway segments with patterns of head on, nighttime, non-intersection, run-off road, and sideswipe crashes related to lack of driver awareness of the presence of a specific roadway feature or regulatory requirement. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install chevrons, warning signs, delineators, markers, beacons, and relocation of existing signs per MUTCD standards). | • Crash Reduction Factor – 15%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $750 per sign |
| **R26** | **Install dynamic/variable speed warning signs.** This strategy primarily addresses crashes caused by motorists traveling too fast around sharp curves. It is intended to get the drivers attention and give them a visual warning that they may be traveling over the recommended speed for the | • Crash Reduction Factor – 30%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $5,000 sign |
<table>
<thead>
<tr>
<th>Code*</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
</table>
| R27   | **Install delineators, reflectors and/or object markers.** Delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed. They are intended to provide tracking information and guidance to the drivers. They are generally less costly than Chevron Signs as they don’t require posts to place along the roadside, avoiding an additional object with which an errant vehicle can crash into. | • Crash Reduction Factor – 15%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $3,000 sign |
| R28   | **Install edge-lines and centerlines.** Installing edgelines and centerlines where none exists or making significant upgrades to existing lines (paint to thermoplastic, adding audible disks/bumps in the thermoplastic stripes, or adding RPMs) are intended/designed to help drivers who might leave the roadway because of their inability to see the edge of the roadway along the horizontal edge of the pavement or crossover the centerline of the roadway into oncoming traffic. | • Crash Reduction Factor – 25%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $10,000 installation |
| R30   | **Install centerline rumble strips/strips.** Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line. Additionally, rumble stripes (pavement marking in the rumble itself) provide an enhanced marking, especially in wet dark conditions. | • Crash Reduction Factor – 20%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $3,000 |
| R31   | **Install edgeline rumble strips/strips.** Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line. Additionally, rumble stripes (pavement marking in the rumble itself) provide an enhanced marking, especially in wet dark conditions. | • Crash Reduction Factor – 15%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $5,000 |

**Signalized Intersection Countermeasures**

| S01   | **Add intersection lighting.** Providing lighting at the intersection itself, or both at the intersection and on its approaches, improves the safety of an intersection during nighttime conditions by (1) making drivers more aware of the | • Crash Reduction Factor – 40%  
• Expected Life – 20 years  
• Baseline Cost – Approximately $20,000 per lighting |
## Code

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
</table>
| S02  | Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number. | • Crash Reduction Factor – 15%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $5,000 per intersection |
| S03  | Improve signal timing (coordination, phasing, red, and yellow or operations). Locations that have a crash history at multiple signalized intersections. Signalization improvements may include adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations. Understanding the corridor or roadway's crash history can provide insight into the most appropriate strategy for improving safety. | • Crash Reduction Factor – 15%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $50,000 per intersection |

### Non-Signalized Countermeasures

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
</table>
| NS01 | Add intersection lighting. Providing lighting at the intersection itself, or both at the intersection and on its approaches, improves the safety of an intersection during nighttime conditions by (1) making drivers more aware of the surroundings at an intersection, which improves drivers' perception-reaction times, (2) enhancing drivers' available sight distances, and (3) improving the visibility of non-motorists. | • Crash Reduction Factor – 40%  
• Expected Life – 20 years  
• Baseline Cost – Approximately $20,000 per intersection |
| NS06 | Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs. The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by installing larger regulatory and warning signs at or prior to intersections. A key to success in applying this strategy is to select a combination of regulatory and warning sign techniques appropriate for the conditions on a particular non-signalized intersection approach. | • Crash Reduction Factor – 15%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $2,000 per intersection |
| NS07 | Upgrade intersection pavement markings (NS.I.). The visibility of intersections and, thus, the ability of approaching | • Crash Reduction Factor – 25%  
• Expected Life – 10 years |
### City of Wasco
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<table>
<thead>
<tr>
<th>Code*</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>drivers to perceive them can be enhanced by installing appropriate pavement delineation in advance of and at intersections will provide approaching motorists with additional information at these locations. Providing visible stop bars on minor road approaches to non-signalized intersections can help direct the attention of drivers to the presence of the intersection. Drivers should be more aware that the intersection is coming up, and therefore make safer decisions as they approach the intersection.</td>
<td>• Baseline Cost – Approximately $1,500 per intersection</td>
</tr>
</tbody>
</table>
|       | Install Flashing Beacons at Stop-Controlled Intersections. Flashing beacons provide a visible signal to the presence of an intersection and can be very effective in rural areas where there may be long stretches between intersections as well as locations where night-time visibility of intersections is an issue. | • Crash Reduction Factor – 15%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $25,000 per intersection |
| NS08  | Install (or upgrade) pedestrian crossing at uncontrolled locations (signs and markings only). Adding pedestrian crossings has the opportunity to enhance pedestrian safety at locations noted as being problematic. Pavement markings delineate a portion of the roadway that is designated for pedestrian crossing. These markings will often be different for controlled versus uncontrolled locations. The use of “ladder”, “zebra” or other enhanced markings at uncontrolled crossings can increase both pedestrian and driver awareness to the increased exposure at the crossing. | • Crash Reduction Factor – 25%  
• Expected Life – 10 years  
• Baseline Cost – Approximately $5,000 per intersection |
| NS20PB | Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features). Adding pedestrian crossings that include enhances safety features has the opportunity to enhance pedestrian safety at locations noted as being especially problematic. The enhanced safety elements help delineate a portion of the roadway that is designated for pedestrian crossing. Incorporating advanced “yield” markings provide an extra safety buffer and can be effective in reducing the ‘multiple-threat’ danger to pedestrians. | • Crash Reduction Factor – 35%  
• Expected Life – 20 years  
• Baseline Cost – Approximately $12,000 per intersection |

* Code:  
  S - Signalized intersection improvements  
  NS - Non-signalized intersection improvements  
  R - Roadway segment improvements
8. VIABLE SAFETY PROJECTS

This chapter summarizes the process of selecting safety projects as part of the analysis for the City of Wasco's Local Road Safety Plan (LRSP). The next step after the identification of high injury network, emphasis areas and applicable countermeasures was to identify location specific safety improvements for all high-risk roadway segments and intersections.

As specified in Chapter 6, countermeasures and improvements were selected from the 2022 Local Roadway Safety Manual (LRSM) from Caltrans, where:

- S refers to improvements at signalized locations,
- NS refers to improvements at non-signalized locations, and
- R refers to improvements at roadway segments.

The corresponding number refers to the countermeasure number in the LRSM (2022). The countermeasures were grouped into safety projects for high-risk intersections and roadway segments. A total of six safety projects were developed. All countermeasures were identified based on the technical teams’ assessment of viability that consisted of extensive analysis, observations, City staff input, and stakeholder/community input. The most applicable and appropriate countermeasures as identified have been grouped together to form projects that can help make high-risk locations safer.

A set of six safety projects were created for high-risk intersections and roadway segments, using HSIP approved countermeasures:

- **Project #1: Roadway Segment Lighting and other improvements** – Add Segment Lighting, Install Edge-Lines and Centerlines, Install dynamic/variable speed warning signs
- **Project #2: Roadway Segment Improvements** – Install Delineators, Reflectors, and/or Object Markers, and Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
- **Project #3: Roadway Segment Spot Improvements** – Install centerline rumble strips/stripes, Install Edgeline Rumble Strips/Stripes, and Install raised median
- **Project #4: Systematic Improvements at Non-signalized Intersections** – Add Intersection Lighting, Install/Upgrade Larger or Additional Stop Signs or Other Intersection Warning/Regulatory, and Upgrade Intersection Pavement Markings
- **Project #5: Systemic Improvements at Signalized Intersections** – Add intersection lighting, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number, and Improve signal timing (coordination, phases, red, yellow, or operation)
- **Project #6: Spot Improvements at Non-signalized Intersections** – Install Pedestrian Crossing at Uncontrolled Locations (Signs and Markings Only), Install Flashing Beacons at Stop-Controlled Intersections, and Install/Upgrade Pedestrian Crossing at Uncontrolled Locations (with Enhanced Safety)

*Table 17* lists the safety projects for high-risk intersections and roadway segments, along with total base planning level cost (2022 dollar amounts) estimates and the resultant preliminary Benefit-Cost (B/C) Ratio. The
“Total Benefit” estimates were calculated for the proposed improvements being evaluated in the proactive safety analysis. This “Total Benefit” is divided by the “Total Cost per Location” estimates for the proposed improvements, giving the resultant B/C Ratio. The B/C Ratio Calculation follows the methodology as mentioned in the LRSM (2022).

Appendix F lists the detailed methodology to calculate B/C Ratio, as well as the complete cost, benefit and B/C Ratio calculation spreadsheet. Appendix G contains grant ready materials required for HSIP Cycle 11 application.

Table 17. Viable Safety Projects

<table>
<thead>
<tr>
<th>No.</th>
<th>Locations</th>
<th>CM1</th>
<th>CM2</th>
<th>CM3</th>
<th>Cost per Location</th>
<th>B/C Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Project 1: Roadway Segment Lighting and other improvements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>SR 46, from Magnolia Avenue to Griffith Avenue</td>
<td>R01</td>
<td></td>
<td>R26</td>
<td>$305,625</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>7th Street, from Western Avenue to G Street</td>
<td>R01</td>
<td></td>
<td>R28</td>
<td>$333,180</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SR 43, from Kimberlina Road to 00.06 N of Kimberlina Road</td>
<td>R01</td>
<td></td>
<td></td>
<td>$63,585</td>
<td>10.33</td>
</tr>
<tr>
<td>4</td>
<td>Shamrock Court</td>
<td>R01</td>
<td></td>
<td>R28</td>
<td>$103,975</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Wasco Avenue, from Poso Drive to City Boundary</td>
<td>R01</td>
<td></td>
<td>R28</td>
<td>$135,715</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Poso Drive, from Central Avenue and 0.25 miles E of Wasco Avenue</td>
<td>R01</td>
<td></td>
<td>R28</td>
<td>$582,770</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Project 2: Roadway Segment Spot Improvements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>SR 46, from Magnolia Avenue to Griffith Avenue</td>
<td>R27</td>
<td></td>
<td></td>
<td>$8,700</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>7th Street, from Western Avenue to G Street</td>
<td>R27</td>
<td></td>
<td></td>
<td>$16,800</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shamrock Court</td>
<td>R22</td>
<td></td>
<td></td>
<td>$950</td>
<td>45.01</td>
</tr>
<tr>
<td>4</td>
<td>Wasco Avenue, from Poso Drive to City Boundary</td>
<td>R27</td>
<td></td>
<td></td>
<td>$5,100</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Poso Drive, from Central Avenue and 0.25 miles E of Wasco Avenue</td>
<td>R22</td>
<td></td>
<td></td>
<td>$21,250</td>
<td></td>
</tr>
</tbody>
</table>
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### Project 3: Roadway Segment Spot Improvements

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
<th>Segment</th>
<th>Cost</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SR 43, from Kimberlina Road to 00.06 N of Kimberlina Road</td>
<td>R30 R31 R08</td>
<td>$115,897</td>
<td>15.30</td>
</tr>
</tbody>
</table>

### Project 4: Systemic Improvements at Non-signalized Intersections

<table>
<thead>
<tr>
<th>Project</th>
<th>Location</th>
<th>Segments</th>
<th>Cost</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F Street &amp; 7th Street</td>
<td>NS01 NS06 NS07</td>
<td>$74,340</td>
<td>53.21</td>
</tr>
<tr>
<td>2</td>
<td>SR 43 &amp; Prospect Avenue</td>
<td>NS01 NS07</td>
<td>$92,735</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SR 46 &amp; E Street</td>
<td>NS01 NS07</td>
<td>$61,310</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SR 46 &amp; Poplar Avenue</td>
<td>NS01 NS07</td>
<td>$59,035</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>E Street &amp; 6th Street</td>
<td>NS01 NS07</td>
<td>$56,785</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SR 43 &amp; Filburn Avenue</td>
<td>NS01 NS06 NS07</td>
<td>$72,000</td>
<td></td>
</tr>
</tbody>
</table>

### Project 5: Systemic Improvements at Signalized Intersections

<table>
<thead>
<tr>
<th>Project</th>
<th>Location</th>
<th>Segments</th>
<th>Cost</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SR 46 &amp; Palm Avenue</td>
<td>S01 S02 S03</td>
<td>$47,016</td>
<td>60.83</td>
</tr>
<tr>
<td>2</td>
<td>SR 46 &amp; Central Avenue</td>
<td>S01 S02 S03</td>
<td>$47,016</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SR 43 &amp; Kimberlina Road</td>
<td>S01 S02 S03</td>
<td>$47,016</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SR 46 &amp; SR 43</td>
<td>S03</td>
<td>$6,150</td>
<td></td>
</tr>
</tbody>
</table>

### Project 6: Spot Improvements at Non-Signalized Intersections

<table>
<thead>
<tr>
<th>Project</th>
<th>Location</th>
<th>Segment</th>
<th>Cost</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SR 43 &amp; Prospect Avenue</td>
<td>NS08</td>
<td>$25,600</td>
<td>30.97</td>
</tr>
<tr>
<td>2</td>
<td>SR 46 &amp; E Street</td>
<td>NS20PB</td>
<td>$21,272</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>E Street &amp; 6th Street</td>
<td>NS21PB</td>
<td>$33,090</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>F Street &amp; 8th Street</td>
<td>NS21PB</td>
<td>$33,090</td>
<td></td>
</tr>
</tbody>
</table>
9. IMPLEMENTATION AND EVALUATION

This chapter describes the steps the City may take to evaluate the success of this plan and steps needed to update the plan in the future. The LRSP is a guidance document and requires periodic updates to assess its efficacy and re-evaluate potential solutions. It is recommended to update the plan every two to five years in coordination with the identified safety partners. This document was developed based on community needs, stakeholder input, and collision analysis conducted to identify priority emphasis areas throughout the City. The implementation of strategies under each emphasis area would aim to reduce KSI collisions in the coming years.

9.1 IMPLEMENTATION

The LRSP is a guidance document that is recommended to be updated every two to five years in coordination with the safety partners. The LRSP document provides engineering, education, enforcement, and emergency medical service-related countermeasures that can be implemented throughout the City to reduce KSI collisions. It is recommended that the City of Wasco implement the selected projects in high-collision locations in coordination with other projects proposed for the City’s infrastructure development in their future Capital Improvement Plans. After implementing countermeasures, the performance measures for each emphasis area should be evaluated annually. The most important measure of success of the LRSP should be reducing KSI collisions throughout the City. If the number of KSI collisions does not decrease over time, then the emphasis areas and countermeasures should be re-evaluated.

Funding is a critical component of implementing any safety project. While the HSIP program is a common source of funding for safety projects, there are numerous other funding sources that could be pursued for such projects. (See Table 18 below).

Table 18. List of Potential Funding Sources

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Funding Agency</th>
<th>Amount Available</th>
<th>Next Estimated Call for Projects</th>
<th>Applicable E’s</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Transportation Program</td>
<td>Caltrans, California Transportation Commission</td>
<td>~$450 million per cycle (every two years)</td>
<td>2022</td>
<td>Engineering, Education</td>
<td>Can use used for most active transportation related safety projects as well as education programs. Funding available through Caltrans.</td>
</tr>
<tr>
<td>SR Safety Improvement Program</td>
<td>Caltrans</td>
<td>April 2022</td>
<td>Engineering</td>
<td></td>
<td>Most common grant source for safety projects</td>
</tr>
</tbody>
</table>
## City of Wasco
### Local Road Safety Plan

<table>
<thead>
<tr>
<th>Office of Traffic Safety Grants</th>
<th>California Office of Traffic Safety</th>
<th>Varies by grant</th>
<th>Closes January 31st annually</th>
<th>Education, Enforcement, Emergency Response</th>
<th>10 grants available to address various components of traffic safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordable Housing and Sustainable Communities Program</td>
<td>Strategic Growth Council and Dept. of Housing and Community Development</td>
<td>~$405 million</td>
<td>2022</td>
<td>Engineering, Education</td>
<td>Must be connected to affordable housing projects; typically focuses on bike/pedestrian infrastructure/programs</td>
</tr>
<tr>
<td>Urban Greening</td>
<td>California Natural Resources Agency</td>
<td>$28.5 million</td>
<td>2022</td>
<td>Engineering</td>
<td>Focused on bike/pedestrian infrastructure and greening public spaces</td>
</tr>
<tr>
<td>Local Streets and Road Maintenance and Rehabilitation</td>
<td>CTC (distributed to local agencies)</td>
<td>$1.5 billion statewide</td>
<td>N/A; distributed by formula</td>
<td>Engineering</td>
<td>Typically pays for road maintenance type projects</td>
</tr>
<tr>
<td>RAISE Grant</td>
<td>USDOT</td>
<td>~$1 billion</td>
<td>2022</td>
<td>Engineering</td>
<td>Typically used for larger infrastructure projects</td>
</tr>
<tr>
<td>Sustainable Transportation Equity Project</td>
<td>California Air Resources Board</td>
<td>~$19.5 million</td>
<td>TBD; most recent call in 2020</td>
<td>Engineering, Education</td>
<td>Targets projects that will increase transportation equity in disadvantaged communities</td>
</tr>
<tr>
<td>Transformative Climate Communities</td>
<td>Strategic Growth Council</td>
<td>~$90 million</td>
<td>TBD; most recent call in 2020</td>
<td>Engineering</td>
<td>Funds community-led projects that achieve major reductions in greenhouse gas emissions in disadvantaged communities</td>
</tr>
</tbody>
</table>

## 9.2 MONITORING AND EVALUATION

For the success of the LRSP, it is crucial to monitor and evaluate the four E-strategies continuously. Monitoring and evaluation help provide accountability, ensures the effectiveness of the countermeasures for each emphasis area, and help making decisions on the need for new strategies. The process would help the City make informed...
City of Wasco
Local Road Safety Plan

decisions regarding the implementation plan’s progress and accordingly, update the goals and objectives of the plan.

After implementing countermeasures, the strategies should be evaluated annually as per their performance measures. The evaluation should be recorded in a before-after study to validate the effectiveness of each countermeasure as per the following observations:

- Number of KSI collisions
- Number of police citations
- Number of public comments and concerns

Evaluation should be conducted during similar time periods and durations each year. The most important measure of success of the LRSP should be reduction in KSI collisions throughout the City. If the number of KSI collisions doesn’t decrease initially, then the countermeasures should be evaluated as per the other observations, as mentioned above. The effectiveness of the countermeasures should be compared to the goals for each emphasis area.

9.3 LRSP UPDATE

The LRSP is a guidance document and is recommended to be updated every two to five years after adoption. After monitoring performance measures focused on the status and progress of the E’s strategies in each emphasis area, the next LRSP update can be tailored to resolve any continuing safety problems. An annual stakeholder meeting with the safety partners is also recommended to discuss the progress for each emphasis area and oversee the implementation plan. The document should then be updated as per the latest collision data, emerging trends, and the E’s strategies’ progress and implementation.