



TECHNICAL MEMORANDUM

Date: June 16, 2022
To: Justin Fried, City of Albany
From: Cory Peterson, TJKM
Subject: Draft Emphasis Areas for the Albany Local Roadway Safety Plan (LRSP)

Emphasis areas are focus areas for the Local Roadway Safety Plan that are identified through the comprehensive collision analysis of the identified high injury locations within Albany. 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 technical memorandum summarizes the top seven (7) emphasis areas identified for Albany. These emphasis areas were derived from the consolidated high injury collision database (**Appendix A**) where top injury factors were identified by combing the data manually. The high injury collision database contains only collisions occurring at the high injury intersections or along the high injury corridors. Along with findings from the data analysis, stakeholder input was to refine the emphasis areas specific to Albany.

The following are the identified emphasis areas –

1. Improve Safety at Unsignalized Intersections (Collisions within 250 feet of an intersection)
2. Address Broadside Collisions & Automobile Right of Way Violations
3. Improve Rear End Collisions
4. Address Improper Turning Collisions
5. Address Bicycle Safety
6. Address Pedestrian Safety
7. Improve San Pablo Ave (Intersection & Roadway Segment)



THE FIVE E'S OF TRAFFIC SAFETY

The LRSP utilizes a comprehensive approach to safety incorporating “4 E’s of traffic safety”: **E**ngineering, **E**nforcement, **E**ducation, **E**quity, and **E**mergency Medical Services (EMS). This approach recognizes that not all locations can be addressed solely by infrastructure improvements. Incorporating the 5 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 facilities. Equity refers to examining the impact collisions have on disadvantaged communities and allocating resources to address them.

EXISTING TRAFFIC SAFETY EFFORTS IN ALBANY

The City of Albany and partner agencies have already implemented safety strategies corresponding to the 5 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 the following table:



Table 1: Existing Programs Summary

Document/ Program	Description	E's Addressed
Albany Traffic Calming Policy & Traffic Management Plan	The City of Albany Traffic Calming Policy establishes the process for requesting roadway elements that encourage slower vehicular traffic speeds on a particular street block or street segment.	Enforcement and Engineering
Albany Active Transportation Plan	The Albany Active Transportation Plan (ATP) assesses unmet needs for non-motorized transportation in the city and sets key goals and policy objectives. It recommends citywide bicycle routes, safe routes to school strategies, traffic calming, expanding the network of off-street paths, and safety improvements.	Engineering and Education
Solano Complete Streets	The City of Albany developed a Complete Streets and Corridor Revitalization Plan for Solano Avenue from Masonic Avenue to Tulare Avenue to create an active main street environment. The outcome will be a plan with Complete Streets designs for roadway, sidewalk and intersection changes that support all modes and users of all ages and abilities, builds foot traffic for local businesses, encourages interaction in public spaces, and adds vibrancy to the community.	Engineering
Complete Streets (Buchanan & San Pablo)	The City of Albany, in partnership with the Local Government Commission, explored ways to make it easier and safer to walk, bike, ride the bus, and drive along San Pablo Avenue and Buchanan Street.	Engineering
Safe Routes to School	The Alameda County Safe Routes to Schools (SR2S) Program organizes and supports fun, educational activities that encourage families to walk, bike, carpool, and take transit to school. The City of Albany also supplements this program with funding for in-school bicycle education programs.	Education
Albany Police Department	The Albany Police Department is responsible for the preservation of public peace, enforcement of laws, protection of life and property, and providing police related services to the community. The APD also conducts bicycle/pedestrian outreach and safety campaigns.	Enforcement, EMS, Education
Albany Fire Department	The Albany Fire Department is a full-service department providing the community with many diverse services including fire protection, emergency and disaster response, paramedic services, community education, earthquake preparedness and special events.	Enforcement, EMS



FACTORS CONSIDERED IN THE DETERMINATION OF EMPHASIS AREAS

This section presents collision data analysis of collision type, collision factors, facility type, roadway geometries, and party level data, 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 fatal and severe (KSI) injury collisions. Albany experienced a total of 88 collisions at high injury network locations during the 2016-2020 study period, including 16 KSI collisions. The data presented below in each emphasis area is based on these collisions. Emphasis areas were further refined by stakeholder and community input.

Each emphasis area is accompanied by comprehensive programs, policies and countermeasures to reduce collisions on City roads in that specific emphasis area. It will provide the basis by which the countermeasure toolbox is developed for each identified high-injury location.



EMPHASIS AREA 1 – IMPROVE SAFETY AT NON-SIGNALIZED INTERSECTIONS

Non-Signalized Intersection collisions comprised 75% of collisions of all severity, as well as 69% of KSI collisions. 6 of 11 KSI collisions on the High Injury Network occurred at non-signalized intersections. The following collision data is based on only non-intersection collisions on the High Injury Network in Albany, followed by E’s strategies selected to address intersection collisions.

34% (17 collisions)
Rear End Collisions

32% (16 collisions)
Due to Unsafe Speed

36% (18 collisions)
Involved Bicycle or Pedestrian

Table 2. Emphasis Area 1 Strategies

Objective:			
Reduce the number of fatal and severe injury collisions at non-signalized intersections.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for intersection safety laws regarding traffic signals, stop signs, and turning left or right.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury intersections to monitor right-of-way violations, speed limit laws and other violations that occur at non-signalized intersections.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	<ul style="list-style-type: none"> • NS01, Install intersection lighting • NS02, Convert to all-way STOP control (from 2-way or Yield control) • NS03, Install signals • NS04/NS05, Convert intersection to roundabout • NS05mr, Convert intersection to mini-roundabout • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings • NS08, Install Flashing Beacons at Stop-Controlled Intersections • NS09, Install flashing beacons as advance warning • NS11, Improve sight distance to intersection (Clear Sight Triangles) • NS13, Install splitter-islands on the minor road approaches • NS14, Install raised median on approaches • NS15, Create directional median openings to allow (and restrict) left turns and u-turns • NS21PB, Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features) • NS22PB, Install Rectangular Rapid Flashing Beacon 	Number of intersections improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams



EMPHASIS AREA 2 – ADDRESS BROADSIDE COLLISIONS & AUTOMOBILE RIGHT OF WAY VIOLATIONS

14 (16%) of the high injury network collisions were broadside collisions, including 4 fatal or severe injury (KSI) collisions. 13% (11 collisions) of high injury network collisions were caused by an automobile right of way violation (which also caused 36% of broadside collisions). These two are combined due to the correlation between automobile right of way violations and broadside collisions. The following collision data is based on only broadside injury collisions on the high injury network of Albany, followed by E's strategies to address them.

29% (4 collisions)
KSI Collisions

93% (13 collisions)
Occurred at Intersections

43% (6 collisions)
Occurred on San Pablo Ave

Table 3. Emphasis Area 2 Strategies

Objective:			
Reduce the number of fatal and severe injury broadside collisions and automobile right of way violations.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaigns for intersection safety laws regarding traffic lights, stop signs and turning left or right.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury locations where violations that lead to broadside collisions are more common, such as automobile right of way and traffic signal/stop sign violations.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	<ul style="list-style-type: none"> • S01/NS01/R01, Add intersection or segment lighting • S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number • S03, Improve signal timing • S08, Convert signal to mast arm (from pedestal-mounted) • S09, Install raised pavement markers and striping • 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 • NS09/S10, Install flashing beacons as advance warning • NS11, Improve sight distance to intersection (Clear Sight Triangles) • NS13, add splitter-islands on the minor road approaches • S12/NS14, install raised median on approaches 	Number of locations improved to mitigate broadside collisions.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams



EMPHASIS AREA 3 – ADDRESS REAR END COLLISIONS & UNSAFE SPEED VIOLATIONS

25 (28%) of collisions on the high injury network were rear end collisions, including one (7%) KSI collision. 25% of high injury collisions were caused by unsafe speed, and also caused the majority of rear end collisions. Rear end collisions constituted the most prominent collision type among the high injury network collisions. The following collision data is based on only rear end collisions on the high injury network of Albany, followed by E’s strategies selected to address rear end collisions.

**84% (21 collisions)
Involved Other Motor
Vehicle**

**36% (9 collisions)
Occurred on Marin Ave**

**76% (19 collisions)
Occurred due to Unsafe Speed
Violation**

Table 4. Emphasis Area 3 Strategies

Objective:			
Reduce the number of fatal and severe injury rear end collisions.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for safety laws regarding unsafe speed and its dangers.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury locations where unsafe speed violations are more common. Deploy a radar trailer at locations where instances of unsafe speed is more prevalent	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	<ul style="list-style-type: none"> • S01/NS01/R01, Add intersection or segment lighting • S02, Improve signal hardware • S03, Improve signal timing • S04, Provide Advanced Dilemma-Zone Detection for high speed approaches • S06/NS18, Install left turn lane • S09, Install raised pavement markers and striping (Through Intersection) • S11/NS12/R21, Improve pavement friction (High Friction Surface Treatment) • S16/NS04/NS05, Convert intersection to roundabout • NS06, Install/upgrade larger or additional intersection signs • NS07, Upgrade intersection pavement markings (NS.I.) • R14, Road Diet • R22, Install/Upgrade signs with new fluorescent sheeting • R26, Install dynamic/variable speed warning signs • R28, Install edge-lines and centerlines • Decrease width of travel lanes & traffic calming strategies where appropriate • Simplify turn configurations and decrease curb radius of intersections. 	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams



EMPHASIS AREA 4 – ADDRESS IMPROPER TURNING VIOLATIONS

9 (10%) of high injury network collisions occurred due to improper turning violations, including two (13%) KSI collisions. It also made up 19% of all collisions citywide. The following collision data is based on only improper turning violations on the high injury network of Albany, followed by E’s strategies selected to address improper turning violations.

**44% (4 collisions)
Involved another motor
vehicle**

**33% (3 collisions)
Occurred Not at
Intersection**

**78% (7 collisions)
Occurred on San Pablo Ave**

Table 5. Emphasis Area 4 Strategies

Objective:			
Reduce the number of fatal and severe injury collisions that occur due to improper turning violations.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for intersection safety laws and the rules of the road.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury locations where improper turning violations are more common.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	<ul style="list-style-type: none"> • S01/NS01/R01, Add Lighting • S02, Improve signal hardware • S03, Improve signal timing (coordination, phases, red, yellow, or operation) • S09, Install raised pavement markers and striping (Through Intersection) • S12/NS14, Install raised median on approach • S14, Create directional median openings to allow (and restrict) turns • 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.) • NS13, Install splitter islands on minor road approaches • R22, Install/Upgrade signs with new fluorescent sheeting • R27, Install delineators, reflectors and/or object markers • R26, Install dynamic/variable speed warning signs • R28, Install edge-lines and centerlines 	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/ Fire Department & EMS Response Teams



EMPHASIS AREA 5 – ADDRESS BICYCLE SAFETY

16 (18%) of collisions on the high injury network involved bicyclists, however, of these 16 collisions, 3 were severe injury collisions. Majority of the bicycle collisions (including most severe injury) occurred along the San Pablo Road running through of the City. The following collision data is based on only bicycle collisions on the high injury network of Albany, followed by 4 E’s strategies to address them.

20% (3 collisions)
KSI Collisions

31% (5 collisions)
**Occurred due to Automobile
Right-of-Way Violation**

50% (8 collisions)
Occurred at on San Pablo Ave

Table 6. Emphasis Area 5 Strategies

Objective:			
Reduce the number of fatal and severe injury collisions involving bicyclists.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct bicycle safety campaigns and outreach to raise their awareness of bicycle safety needs through media outlets, social media, and public events. Partner with Safe Routes to School to conduct bicycle and pedestrian safety programs in Albany’s schools.	Number of education campaigns or residents reached.	City/School District/ Police Department
Enforcement	Targeted enforcement at high-injury locations especially near schools, trails, and other areas where bicyclists are more present. Continue to place a high priority on enforcement of motorist and bicyclist violations that most frequently cause injuries and fatalities among bicyclists.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	<ul style="list-style-type: none"> • S01/NS01/R01, Add intersection or segment lighting • S17PB, Install pedestrian countdown signal heads • S20PB, Install advance stop bar before crosswalk (Bicycle Box) • S21PB, Modify signal phasing to implement a Leading Pedestrian Interval • NS19PB, Install raised medians (refuge islands) • NS21PB/R35PB, Install/upgrade pedestrian crossing (with enhanced safety features) • NS22PB/R37PB, Install Rectangular Rapid Flashing Beacon (RRFB) • NS23PB, Install pedestrian signal (including Pedestrian Hybrid Beacon (HAWK)) • R14, Road diet (reduce travel lanes from 4 to 3 and add a two-way left turn lane and bike lanes) • R32PB, Install bike lanes • R33PB, Install separated bike lanes • R34PB, Install sidewalk/pathway (to avoid walking along roadway) • Mid-block curb extension • Intersection bulb-outs 	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined, particularly to areas and times of high bicycle activity.	EMS vehicle response time.	City/ Fire Department & EMS Response Teams



EMPHASIS AREA 6 – ADDRESS PEDESTRIAN SAFETY

20 (23%) of collisions on the high injury network involved pedestrians, out of which 3 were KSI collisions. The majority of the pedestrian collisions (including 2 out of 3 KSI collisions) occurred along the San Pablo Ave. The following collision data is based on only pedestrian collisions on the high injury network of Albany, followed by E’s strategies to address them.

**35% (7 collisions)
Occurred at Night**

**20% (5 collisions)
Occurred due to Pedestrian
Violation**

**45% (9 collisions)
Occurred due to Pedestrian
Right-of-Way Violation**

Table 7. Emphasis Area 6 Strategies

Objective:			
Reduce the number of fatal and severe injury collisions involving pedestrians.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	<p>Conduct pedestrian safety campaigns and outreach to raise their awareness of pedestrian safety needs through media outlets, social media, and public events.</p> <p>Partner with Safe Routes to School to conduct bicycle and pedestrian safety programs in Albany’s schools.</p>	Number of education campaigns or residents reached.	City/School District/ Police Department
Enforcement	<p>Targeted enforcement at high-injury locations especially near schools, trails, and other areas where pedestrians are more present.</p> <p>Continue to place a high priority on enforcement of motorist and pedestrian violations that most frequently cause injuries and fatalities among pedestrians.</p>	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	<ul style="list-style-type: none"> • S01/NS01/R01, Add intersection or segment lighting • S13PB/R10PB, Install pedestrian median fencing • S17PB, Install pedestrian countdown signal heads • S18PB, Install pedestrian crossing (S.I.) • S19PB, Pedestrian Scramble • S20PB, Install advance stop bar before crosswalk (Bicycle Box) • S21PB, Modify signal phasing to implement a Leading Pedestrian Interval • NS11, Improve sight distance to intersection • NS19PB, Install raised medians (refuge islands) • NS21PB/R35PB, Install/upgrade pedestrian crossing (with enhanced safety features) • NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB) • NS23PB, Install pedestrian signal (including Pedestrian Hybrid Beacon (HAWK)) • R34PB, Install sidewalk/pathway (to avoid walking along roadway) • R36PB, Install raised pedestrian crossing • R37PB, Install Rectangular Rapid Flashing Beacons (RRFB) • High-visibility ladder crosswalks • Mid-block curb extension & intersection bulb-outs • In-road yield sign for pedestrian crossing at crosswalk 	Number of locations improved.	City
EMS	<p>S05, Install emergency vehicle pre-emption systems</p> <p>Improve resource of deployment for emergency responses to collision sites.</p> <p>Ensure emergency routes are clear and well defined, particularly to areas and times of high pedestrian activity.</p>	EMS vehicle response time.	City/Fire Department & EMS Response Teams



EMPHASIS AREA 7 – IMPROVE SAN PABLO AVENUE (INTERSECTIONS AND ROADWAY SEGMENTS)

A total of 38 (43%) of high injury network collisions occurred along San Pablo Avenue, including 6 KSI collisions (40%). San Pablo Ave was selected as an emphasis area due to the high percentage of collisions, combined with the fact that San Pablo Ave is an important arterial. The following collision data is based on only San Pablo Ave collisions on the high injury network of Albany, followed by E’s strategies selected to address DUI collisions.

**50% (19 collisions)
Involved Pedestrian or
Bicycle**

**29%
Occurred at Night or
Dawn/Dusk**

**21% (8 collisions)
Rear-End Collisions**

Table 8. Emphasis Area 7 Strategies

Objective:			
Reduce the number of fatal and severe injury collisions on San Pablo Avenue.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaigns on risks of improper driving behaviors occurring on San Pablo Ave, such as unsafe speed and improper turning.	Number of education campaigns	City/Police Department
Enforcement	Targeted enforcement at high-injury intersections and roadway locations on San Pablo Ave to monitor violations of driving under influence. Deploy a radar trailer along San Pablo Ave to warn drivers of unsafe speed.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	<ul style="list-style-type: none"> • S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number • S03, Improve signal timing • S09, Install raised pavement markers • S11/NS12/R21, Improve pavement friction • NS06, Install/upgrade larger or additional stop/warning/regulatory signs • NS07, Upgrade intersection pavement markings • NS11, Improve sight distance to intersection (Clear Sight Triangles) • NS13, Install splitter-islands on the minor road approaches • NS19PB, Install raised medians (refuge islands) • NS22PB/R37PB, Install Rectangular Rapid Flashing Beacon (RRFB) • NS23PB, Install pedestrian signal (Including HAWK signal) • R22, Install/Upgrade signs with new fluorescent sheeting • R27, Install delineators, reflectors, and/or object markers • R33PB, Install separated bike lanes • Speed warning signs 	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	Fire Department & EMS Response Teams



APPENDIX A: Consolidated High-Injury Collision Database