Safe Streets Counter-measures

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SAFE
STREETS
PINELLAS

Non-Engineering Countermeasures

Countermeasures for human behaviors are intended to inform communications and campaigns across the region. These countermeasures are not a substitute for creating safe systems but are a critical component of Vision Zero efforts. They provide a framework to inform educational campaigns, promote changes in legislation, provide equitable enforcement, and when collisions do occur, provide rapid emergency response and medical care.

Legislation Legislation at multiple levels — including at municipal, countywide, or statewide scale — can help address human behaviors that result in crashes which cause death or serious injury. Speed limit setting is one example of legislation used to influence behaviors that result in speeding. Several cities in the United States have recently adopted 20 mph residential speed limits through "Twenty is Plenty" campaigns. Legislation can also be used to affect the penalties associated with unsafe behaviors and further discourage those types of behaviors, such as texting and driving.

While wearing motorcycle helmets is not required in Florida, studies have shown that helmets are estimated to be 37 percent effective in preventing fatal injuries to people who drive motorcycles, and 41 percent effective for motorcycle passengers. For every 100 people killed in Pinellas County not wearing a helmet while riding a motorcycle, 37 of them could still be alive today had they been wearing a helmet.[15] This is an example of legislation enacted at the state level.

Education Educational campaigns can be implemented from the local level through the national level. Effective Vision Zero campaigns use a sophisticated, data-driven approach to ensure the right message reaches the right audience at the right time. Successful campaigns have focused on the people affected by traffic crashes and individual choices that cause crashes while avoiding victim blaming.

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[15] Traffic Safety Facts 2017 Data, National Highway Traffic Safety Administration, May 2019

Enforcement Successful Vision Zero enforcement strategies focus on enforcing the most dangerous behaviors in the most important places, including along the regional High-Injury Network. Using traffic safety cameras to automate enforcement is a strategy gaining traction, and has been used successfully by Vision Zero communities around the world. Equity and empathy are critical considerations in a Vision Zero-aligned enforcement campaign to ensure that people already burdened by unsafe transportation infrastructure, including low-income populations and people of color, are not further burdened by unreasonable enforcement. **The Safe Streets Action Plan includes strategies to partner with local law enforcement agencies to provide training on best practices for collision reporting, and to better understand who is being stopped by law enforcement agencies in Pinellas County, and where and why.**

Emergency Response The speed of emergency response and quality of care is critical to the outcome of a collision. Delays accessing the scene of a collision, either due to congestion or distance of available first responders, can mean life or death in many situations. Some cities use predictive analytics to identify where collisions are likely to occur based on data from past events such as weather, congestion, or a special event. This allows first responders to access collision locations faster and improve outcomes for some crash victims. Ensuring the appropriate level of staffing, training, and capacity for emergency medical services (EMS) and hospitals can improve safety outcomes. Hospitals also have a role in providing data related to collision outcomes and cost of care to help inform overall strategies and better document the cost of collisions on our communities.

Equity Strategies

Equity is a foundational Vision Zero concept. Low-income communities and communities of color are disproportionately affected by fatal and serious-injury crashes. In Pinellas County, 73 percent of the regional HIN bounds or touches a Community of Concern, while only 32 percent of the County's area is within a designated Community of Concern.

The Vision Zero Network published Equity Strategies for Practitioners to assist communities in implementing Vision Zero with a focus on equity. Key strategies from the guide are:

- **Commit to the work** Ensure that Vision Zero or traffic safety leadership reflects the diversity of the community; agree that equity issues are a focus of Vision Zero and make a strong and firm commitment from the start.

- **Use data to focus efforts** Incorporate demographic, social, public health, and economic datasets as well as qualitative data into crash analysis and project prioritization.

- **Enforcement with empathy** Enforcement must not have a disproportionate effect on low-income communities and communities of color, nor should it damage police-community relationships. Since safe infrastructure is lacking in many low-income communities and communities of color, these communities are already unfairly burdened by the transportation system. Strategies to integrate equity into enforcement include community policing, officer training, careful application of automated enforcement, transparency in traffic stop data, diversion programs that focus on education rather than punishment, and graduated fines.

- **Community engagement** Programs and associated staff should build sustaining relationships with the community and partners. Leaders must listen and demonstrate that they value the experiences of people affected by inequitable conditions. Hosting engagement meetings in locations people can attend conveniently and reducing barriers to participation are key elements of Vision Zero-focused community engagement.


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Engineering Countermeasures

When thinking about the causes of collisions, many are the result of undesirable or illegal behavior, such as speeding, texting while driving, running red lights, tailgating, and reckless driving. However, we need to recognize that no educational campaign will be 100 percent effective in eliminating undesirable or illegal behavior, and that enforcement mechanisms cannot be in place on every roadway 24 hours a day. That is where engineering countermeasures come into play, as changes to roadway design and operations can be effective in reducing vehicle speeds, conflict points, and the severity of collisions so that fewer people die or are seriously injured.

Engineering strategies are organized into seven categories:

- Signals
- Intersection and Roadway Design
- Signs and Markings
- Bikeway Facilities
- Pedestrian Facilities
- Other
- Low-cost and Quick Build

Since there are so many countermeasures, the general categories are described below, with a Safety Countermeasures Toolbox provided in Appendix D. The Countermeasures presented in this document do not represent all countermeasures that could be appropriate for implementation in Pinellas County. Agencies implementing safety projects in the County should refer to the most current guidance from the Federal Highway Administration, National Highway Traffic Safety Administration, National Cooperative Highway Research Program, Vision Zero Network, Institute of Transportation Engineers, and others.

The mode of travel whose safety is most improved by each countermeasure is noted. However, none of the countermeasures specifically apply to collisions involving motorcyclists. Collisions involving motorcyclists most commonly occur with lane changing and turning, when the motorcyclist is in the driver's blind spot. Many countermeasures can help reduce the frequency and severity of collisions involving motorcyclists, but motorcyclist education, licensing, and proper helmet use are also a large component to reducing motorcyclist KSIs.

Signals Under the signal timing and phasing category, strategies relate

Contestant Artwork

to changing signal timing based on local context, such as extending the pedestrian time if there are large volumes of pedestrians, or if pedestrians are not able to cross the intersection within the time allotted. Extending yellow and red time can help clear the intersection and reduce the potential for red light running. In locations where there are high pedestrian and bicycle volumes, right-turning vehicles may not be able to turn when they have a green light due to pedestrians in the crosswalk. Providing a separate right-turn phase could help clear right-turning vehicles and reduce conflicts with pedestrians.

Sometimes giving pedestrians a head start can make them more visible to drivers. Installing a new traffic signal or pedestrian signal can help allocate the right-of-way, reduce conflicting movements, and provide pedestrians a protected crossing. In heavy pedestrian areas, installing a pedestrian scramble where all vehicles must stop so that pedestrians can cross diagonally can be a more efficient way to operate the intersection and reduce vehicle conflicts with pedestrians.

Other strategies such as converting permissive lefts to protected lefts can be highly effective in reducing conflicts with pedestrians. Reducing cycle length can decrease pedestrian delay which reduces the occurrence of pedestrians crossing against the signal and red-light running.

Intersection and Roadway Design
Changing intersection and roadway design features — such as eliminating slip lanes to slow vehicle turning movements, narrowing travel lanes to promote slower speeds, and constructing sidewalks — are some effective methods. Many intersection and roadway design measures may require public outreach and detailed analysis. For example, partially closing a roadway could result in community concerns about increased traffic on other streets or the need to make improvements at other locations.

Some improvements, such as a protected intersection, can be expensive and might need to be programmed as a capital improvement project. There are often opportunities to take advantage of reallocating right-of-way, especially as part of planned resurfacing projects. For instance, lane eliminations to add/enhance bicycle and pedestrian facilities are good candidates for inclusion with other planned roadway projects.

Signs and Markings Installing additional signs and pavement markings can be a low-cost way to improve safety outcomes. However, to be effective, they often need to be implemented with other roadway modifications for maximum effectiveness, and sign clutter should be avoided. These types of projects can often be implemented with planned Resurfacing, Restoration and Rehabilitation (RRR) projects.

Speed Reduction Strategies

Speed is a contributing factor to many fatal and serious-injury crashes across all collision types, as there is a high level of correlation between vehicle speed and the survivability of a collision. While vehicle safety improvements have improved collision outcomes for vehicle occupants, the chance of a person walking or a person bicycling surviving a collision drops dramatically at vehicle speeds in excess of 20 miles per hour. Safe travel speed is a core Vision Zero principle given the documented relationship between speed and crash severity. A variety of proven techniques can be applied to reduce travel speed.

Traffic calming Vertical devices such as speed humps and speed tables, horizontal devices such as bulbouts, chicanes, or mini traffic circles/ roundabouts all have documented speed-reduction effects. These treatments are typically limited to local and sometimes collector roads.

Signal coordination Traffic signal coordination can maintain desired operating speeds along corridors.

Realigning skewed intersections Broad, wide-radius turns can be made at high speeds. Tighter turns, closer to 90 degrees with a small radius, are made at lower speeds.

Reducing travel lane widths Narrower travel lanes encourage lower vehicle speeds. Recent updates to the American Association of State Highway Transportation Official's (ASHTO) A Policy on Geometric Design of Highways and Streets included allowances for narrow travel lanes in recognition of safety research.

Removing travel lanes Reducing the number of travel lanes on a street enables the slowest driver to set the operating speed on a street, rather than the fastest driver.

Roundabouts By introducing horizontal deflection onto otherwise straight roadways, roundabouts can reduce operating speeds. Additionally, roundabouts have proven safety benefits compared to standard intersections.

Bikeway Facilities In Pinellas County, bicyclists are overrepresented in KSI collisions. Providing dedicated space for cyclists separate from high speed vehicle traffic can improve safety outcomes. One of the most effective measures is a dedicated pathway separate from vehicle travel. While bike lanes also help to reduce the potential for a collision, they are not as effective as a separate path especially on higher speed roadways. Bicyclists are particularly vulnerable in conflict zones. Some countermeasures aim to increase cyclist visibility in conflict zones and provide clear direction to other roadway users. In areas where there is constrained right-of-way, signing and pavement markings can be effective. However, like most strategies these are context-specific. For example, shared lane markings are appropriate on roadways with vehicle travel speeds of less than 25 mph and daily traffic volumes of less than 2,000. As speeds and traffic volumes increase, additional separation should be provided between vehicles and cyclists.

Pedestrian Facilities Pedestrians are also overrepresented in KSI collisions in Pinellas County. Providing more visible crossings, decreasing pedestrian crossing distance, and extending the amount of time to cross the street can help to reduce collisions. Many of these strategies also benefit other modes of travel although the primary benefit is to pedestrians. Lighting at the appropriate scale is also a key element and can improve visibility of all roadway users. Pedestrian detection can be used at trail crossings where users might not activate the signal. Installing a median barrier can be a way to discourage pedestrian crossings; however, a review of the pedestrian patterns in the area should be conducted as there may be a reason, such as a bus stop on one side of the street and a shopping center or apartment complex on the other side. It is unlikely and unrealistic to expect pedestrians to walk a long distance out of their way to use a protected crossing, especially in Florida weather. Typically, people are not willing to walk more than 400 feet to a crossing and while it may not be practical to install a pedestrian crossing every 400 feet, other strategies such as relocating a bus stop could also be part of the solution.

Other Several other strategies are not focused on a singular mode. For example, consolidating driveways can benefit all roadway users. Curbside management strategies can reduce passenger loading from travel lanes, reduce doubled parked delivery vehicles, and increase transit reliability.

Low-cost and Quick-build This category was created to identify countermeasures that can be installed at a lower cost and faster timeline than more traditional improvement projects. Several low-cost and quick- build items can be used as a part of a pilot project before installation of a more permanent improvement.

Countermeasure Pairing with Collision Types

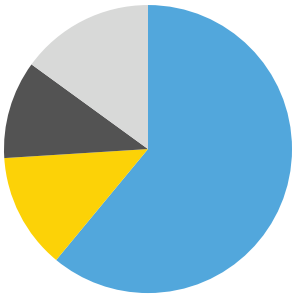
As discussed in the collision profile section, collisions classified as angle, bicyclist involved, pedestrian involved, left-turn, rear-end, right-turn, sideswipe, and U-turn accounted for 64 percent of total collisions and over 75 percent of KSI collisions. Based on the glossary of the specific strategies provided in Appendix D, these collision types were paired with potential countermeasures.

	Total Collisions	KSI Collisions	Person in Vehicle	Person Walking	Person Bicycling	Person Motorcycling
Rear End	37.54%	20.8%	86%	1%	0%	13%
Angle	17.0%	19.4%	81%	1%	2%	16%
Pedestrian	1.8%	14.8%	0%	94%	5%	1%
Left Turn	5.0%	11.3%	73%	1%	0%	26%
Hit Fixed Object	16.7%	10.8%	77%	2%	1%	20%
Bike	1.9%	7.8%	0%	1%	97%	2%
Single Vehicle	1.0%	4.3%	44%	1%	0%	55%
Sideswipe	10.3%	3.3%	67%	2%	1%	30%
Head On	1.6%	2.5%	87%	1%	4%	8%
Unknown	3.9%	1.8%	41%	24%	10%	25%
U-Turn	1.0%	1.1%	71%	0%	0%	29%
Right Turn	1.3%	1.0%	72%	2%	9%	17%
Hit Non-Fixed Object	0.6%	0.6%	44%	16%	16%	24%
Run Off Road	0.4%	0.5%	81%	0%	0%	19%

Pedestrian Collisions

This crash profile includes all crashes that are classified as pedestrian or crashes when a person walking is harmed during a collision. While crashes involving people walking account for just two percent of total crashes, they represent 40 percent of all fatal crashes. As speeds increase the likelihood of a serious injury or fatality increases exponentially for pedestrians. The data shows that for the vast majority of pedestrian involved KSI collisions, there was either no contributing action, or the contributing action was unknown. In about 13 percent of KSI collisions, there was a failure to yield the right-of-way, which could be either a failure on the part of the person walking or the person driving. In 11 percent of KSI collisions, the person driving was found to be careless or negligent.

Top Contributing Factors



- **61%** no contributing action
- **13%** failed to yield right-of-way
- **11%** careless or negligent driving
- 15% other factors

Potential Engineering Countermeasures

Signalized Intersections

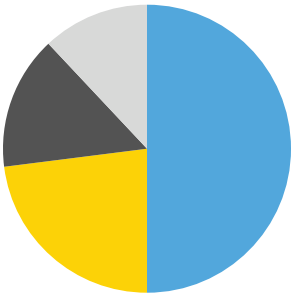
- ADA Ramps & Audible Push Button Upgrades
- Advance Stop Bar
- Countdown Pedestrian Signal Heads
- Curb Extensions
- Extend Pedestrian Crossing Time
- High Visibility Crosswalks
- Intersection Tightening
- Leading Pedestrian Interval
- Parking Prohibition/ Daylighting
- Pedestrian Detection
- Pedestrian Hybrid Beacon
- Pedestrian Lighting
- Pedestrian Median Barrier
- Pedestrian Recall Signal Timing
- Pedestrian Refuge Island
- Prohibit Turn During Pedestrian Phase
- Protected-Only Turn Phase
- Raised Crosswalk
- Rectangular Rapid Flashing Beacon
- Remove Crossing Prohibition
- Restripe Crosswalk
- Shorten Signal Cycle Length
- Straighten Crosswalks
- Upgrade Curb Ramp

Non-Signalized Intersections / Corridors

- All-Way Stop Sign
- Co-Locate Bus Stops and Pedestrian Crossings
- ADA Ramps
- Narrow Lanes
- New Traffic Signal
- Repurpose Travel Lanes
- Install Sidewalks
- Signal Spacing
- Traffic Calming

Bicyclist Collisions

Top Contributing Factors



- **50%** no contributing action
- **23%** failed to yield right-of-way
- **15%** careless or negligent driving
- 12% other factors

This crash profile includes all crashes that are classified as bike, or crashes when a person bicycling is harmed during a collision. While crashes involving people bicycling account for only three percent of total crashes, they represent ten percent of all KSI crashes, and five percent of all fatal crashes. The data show that for the vast majority of bicyclist involved KSI collisions, there was either no contributing action, or the contributing action was unknown. In about 23 percent of KSI collisions, there was a failure to yield the right-of-way, which could be either a failure on the part of the person bicycling or the person driving. In 15 percent of KSI collisions, the person driving was found to be careless or negligent.

Potential Engineering Countermeasures

Intersections

- Automatic Recall Signal Timing
- Bike Box
- Bike Conflict Zone Markings
- Extend Bike Lane to Intersection
- Extend Signal Clearance Time
- Partial Closure/ Diverter
- Prohibit Left Turn
- Prohibit Right Turn on Red
- New Traffic Signal
- Shorten Signal Cycle Length
- Slow Green Wave
- Traffic Signal Bike Detection

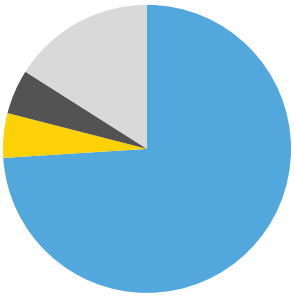
Non-Intersections / Corridors

- Bike Conflict Zone Markings
- Narrow Lanes
- Prohibit Left Turn
- Protected/ Separated Bikeway
- Road Diet
- Traffic Calming

Rear-End Collisions

The rear-end crash profile includes all crashes classified as rear-end or crashes when a person driving one vehicle impacted the rear-end of another vehicle. Rear-end collisions are the most prevalent type of crash in Pinellas County and account for the most serious injuries and fatalities on the roadway system.

Top Contributing Factors



- **74%** careless or negligent driving
- **5%** other contributing action
- **5%** followed too closely
- 16% other factors

Potential Countermeasures

Signalized Corridors

- Advanced Dilemma Zone Detection
- Appropriate Yellow/ All Red Signal Timing
- Improve Sight Distance
- Incident Management Protocol
- Signal Coordination
- Traffic Calming
- Variable Message Sign

Non-Signalized Corridors

- Improve Sight Distance
- Incident Management Protocol
- Traffic Calming
- Variable Message Sign

Distracted Driving / Careless or Reckless Driving (Tailgating) / Speeding

- Targeted Enforcement
- Speed Strategies
- Education

Turning Collisions

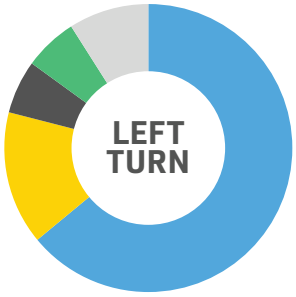
Left-turn, U-turn and right-turn collisions account for about seven percent of total collisions and 13 percent of KSI collisions. Left-turn movements resulted in more fatal and serious injury collisions than right- or U-Turn collisions. People riding motorcycles represent more than 25 percent of the victims of KSI collisions for both left- and U-turn collisions, which combined, represent the movement that causes the greatest number of KSI collisions involving motorcyclists.

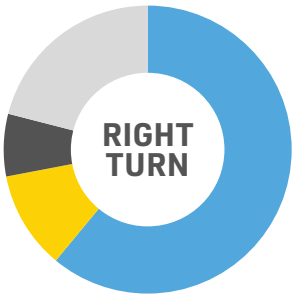
For all collisions involving a turning movement, the most prevalent contributing factors were failure to yield right-of-way, operating the motor vehicle in a careless or negligent manner, improper turning and red light running.

Angle collisions have similar contributing factors as turning collisions since they involve roadway users colliding at an angle. Accounting for 17 percent of all collisions and 19 percent of KSI collisions, collisions classified as angle collision also disproportionately affect people who motorcycle. People who motorcycle are most likely to be killed or seriously injured from angle collisions (19 percent of all motorcycle KSIs are angle collisions, followed by 18 percent left-turn, and 17 percent rear-end).

Top Contributing Factors

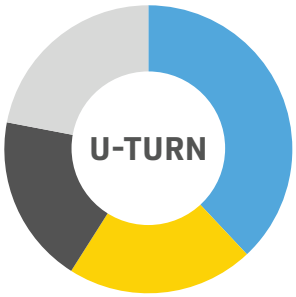
- **64%** failed to yield right-of-way
- **15%** careless or negligent driving
- **6%** ran a red light
- **6%** improper turn
- 10% other factors

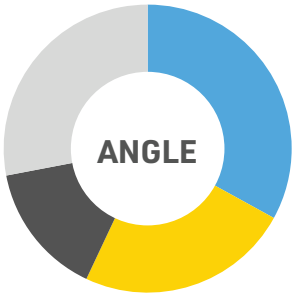




failed to yield right-of-way **61%**
ran a red light **15%**
careless or negligent driving **6%**
other factors 18%

- **38%** failed to yield right-of-way
- **21%** careless or negligent driving
- **19%** improper turn
- 22% other factors





failed to yield right-of-way **33%**
ran a red light **14%**
careless or negligent driving **15%**
other factors 38%

Potential Engineering Countermeasures

Left Turns at Signalized Intersections

- Appropriate Green Time for Left Turn
- Appropriate Yellow/ All Red Signal Timing
- Lagging Turn Phase
- Positive Left Turn Offset for Visibility
- Protected-Only Turn Phase
- Roundabout

Left Turns at Unsignalized Intersections

- All-Way Stop Sign
- Consolidate Driveways
- Improve Sight Distance
- New Traffic Signal
- Partial Closure/ Diverter
- Positive Left Turn Offset for Visibility
- Prohibit Left Turn
- Raised Median
- Roundabout
- Stop Signs at the Near and Far Side
- Traffic Calming
- Two-Stage Gap Acceptance

Right Turns

- All-Way Stop Sign
- Improve Sight Distance
- Leading Pedestrian Interval
- Lighting
- Prohibit Right Turn on Red
- Protected Turn Phase

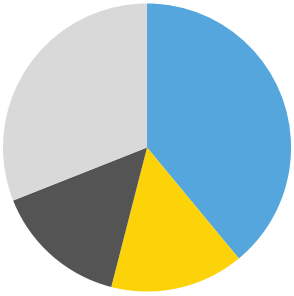
Angle Collisions

- Advance Stop Bar
- Advanced Warning Sign
- All-Way Stop Sign
- Lighting
- Appropriate Yellow/ All Red Signal Timing
- New Traffic Signal
- Overhead Flashing Beacon
- Prohibit Left Turn
- Raised Median
- Replace Two-Way Left-Turn Lane with Turn Lanes
- Roundabout
- Signal Coordination
- Stop Signs at the Near and Far Side

Sideswipe Collisions

Sideswipe collisions are one of the collision types least likely to result in a serious injury or fatality; however, motorcyclists represent about a third of people who are seriously injured or killed. Although not a primary collision factor as noted in the collision reports, failure to keep in the proper lane, improper passing, and improper turning collectively account for about 15 percent of the primary contributing action, in addition to the factors listed to the right.

Top Contributing Factors



- **39%** careless or negligent driving
- **15%** failed to yield right-of-way
- **15%** other contributing action
- 31% other factors

Potential Countermeasures

Departure to Left

Also see the speeding countermeasures

- Advanced Warning Sign
- Barrier
- No Passing Zone
- Pavement Markings
- Raised Median
- Rumble Strips

Departure to Right

Also see the speeding countermeasures

- Advanced Warning Sign
- Barrier
- Clear Distance
- Pavement Markings
- Raised Median
- Rumble Strips

Sideswipe

Also see the speeding countermeasures

- Advanced Warning Sign
- Pavement Markings

At Night

- Lighting
- Variable Speed Limit

Impaired Driving

- Targeted Enforcement
- Education

Other Collisions

The remaining 24 percent of collisions are classified as hitting fixed-object, single-vehicle, head-on, unknown, hit non-fixed object, and run off-road. Single vehicle and head-on collisions are more likely to result in a KSI that the other collision types. Single vehicle collisions disproportionally result in a KSI for people riding a motorcycle (55 percent). At a national level, a primary cause of single-vehicle collisions is excessive speed and driving under the influence. In about ten percent of the single-vehicle KSI collisions involving a person motorcycling, the person riding the motorcycle was under the influence, and in about five percent of cases excessive speed was shown to be a factor.

Potential Countermeasures

Fixed Object

Also see the speeding countermeasures

- Advanced Warning Sign
- Barrier
- Pavement Markings
- Rumble Strips

At Night

- Advanced Warning Sign
- Lighting
- Pavement Markings
- Variable Speed Limit

Impaired Driving

- Targeted Enforcement
- Education

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