# ADVANCING IMPLEMENTATION OF THE SAFE SYSTEM APPROACH

## NCTCOG RSAC

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ZERO IS OUR GOAL

A SAFE SYSTEM IS HOW WE GET THERE


*presented by*

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**Federal Highway Administration**

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# THE SAFE SYSTEM APPROACH

ZERO IS OUR GOAL

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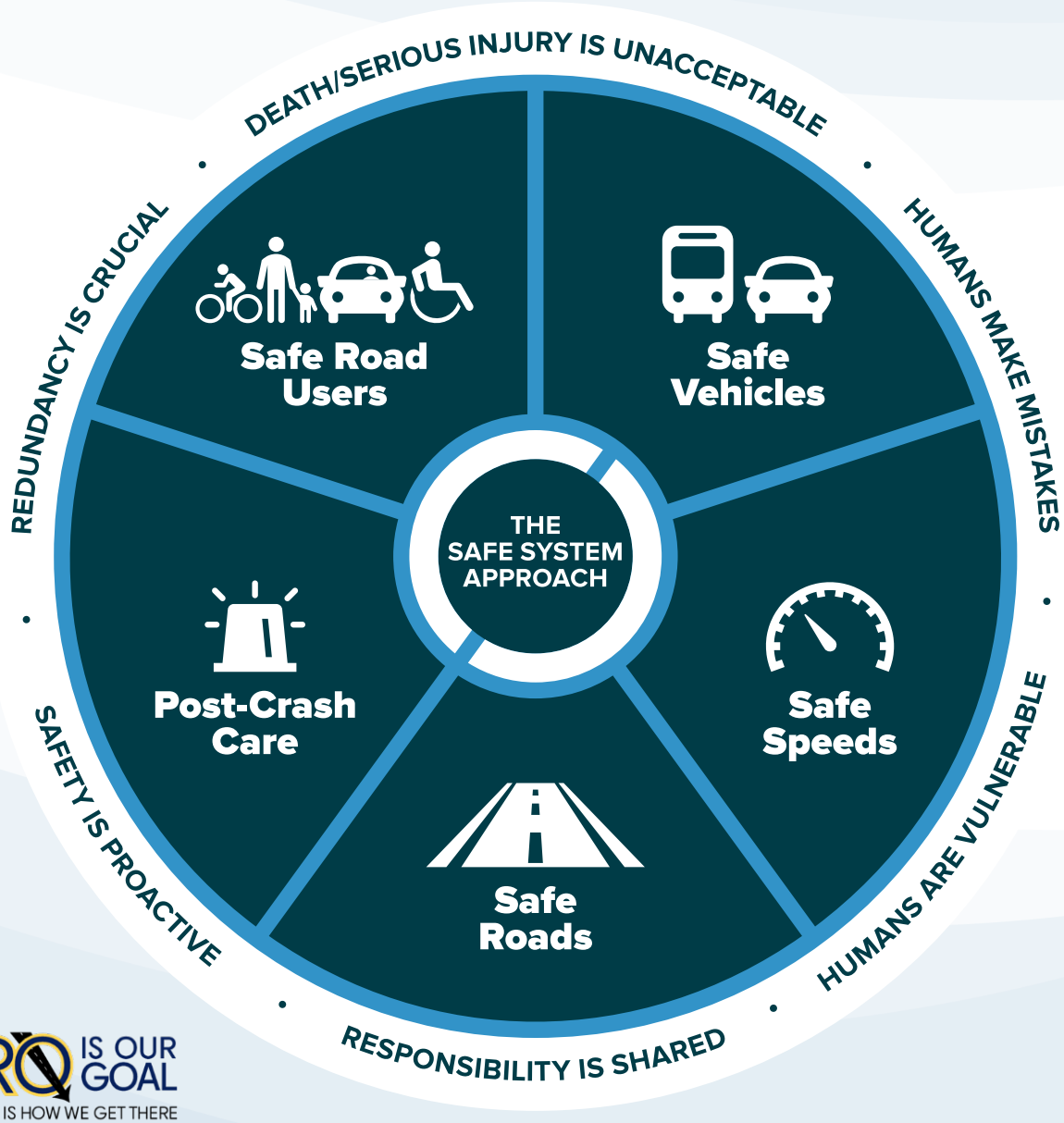
# THE SAFE SYSTEM APPROACH



# THE SAFE SYSTEM APPROACH

- 5 elements

# THE SAFE SYSTEM APPROACH

- 6 principles

**Death/Serious Injury is unacceptable**

**Humans make mistakes**

**Humans are vulnerable**


**Responsibility is shared**

**Safety is proactive**

**Redundancy is crucial**

# THE SAFE SYSTEM APPROACH

- Who is responsible?

**Death/Serious Injury is unacceptable**

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# THE SAFE SYSTEM APPROACH

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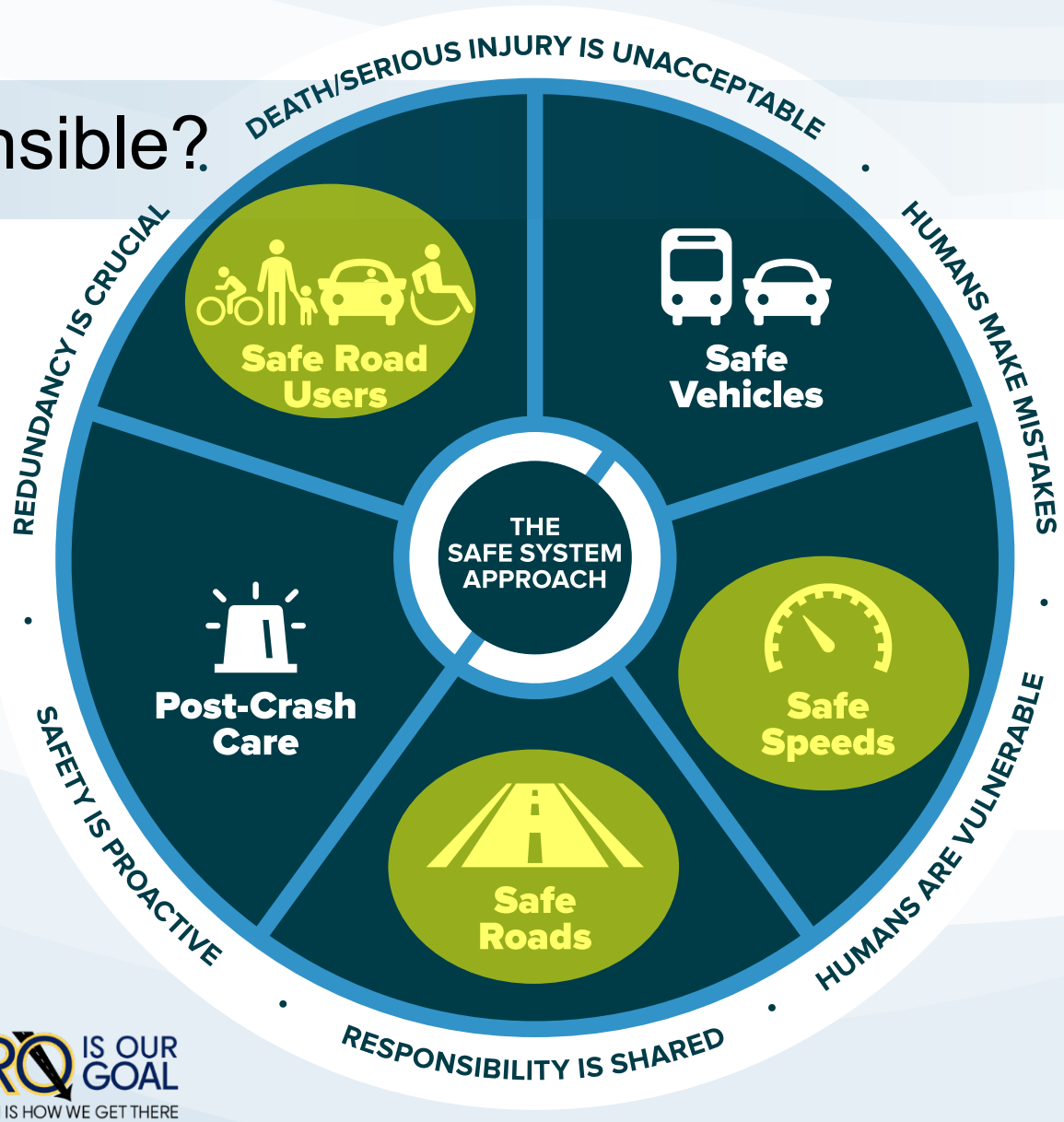


**Responsibility is shared**

**Safety is proactive**

**Redundancy is crucial**

# SAFE SYSTEM ROADWAY DESIGN HIERARCHY

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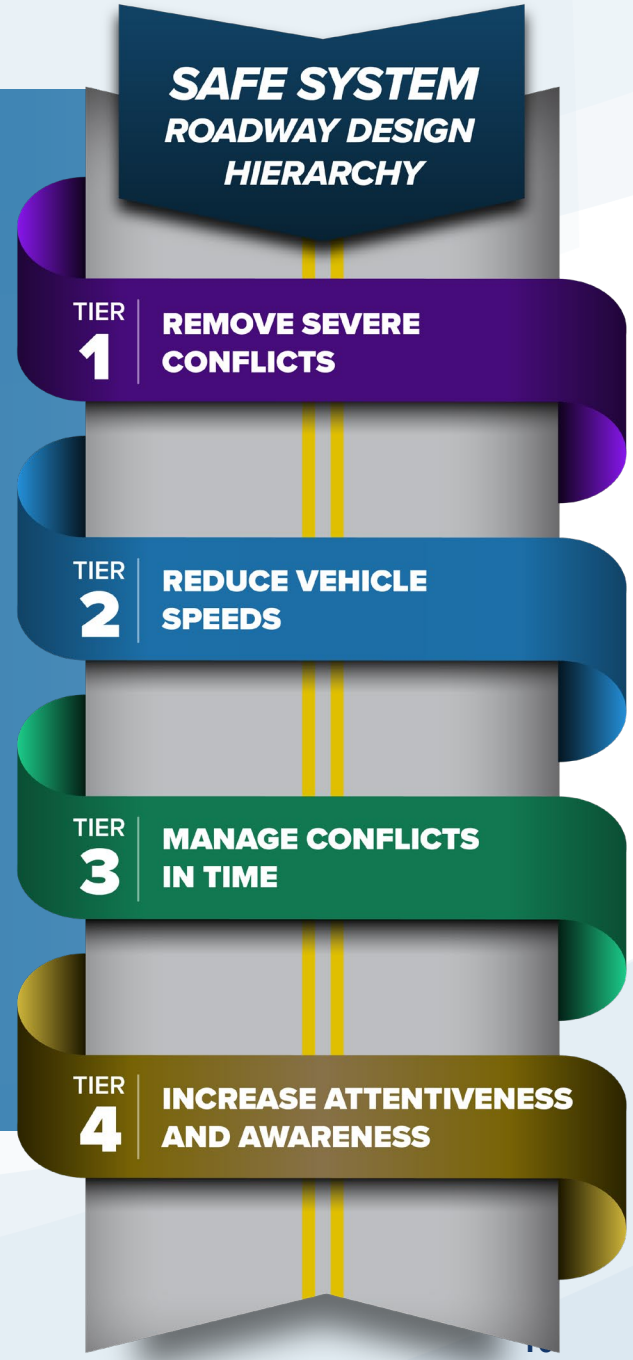
# SAFE SYSTEM ROADWAY DESIGN HIERARCHY




Source: FHWA.

# PREVENTION THROUGH DESIGN (PTD)

## HIERARCHY OF CONTROL


**Eliminate**
Physically remove the hazard

**Substitute**
Replace the hazard with option that lowers severity

**Engineering Controls**
Operate the system to reduce exposure

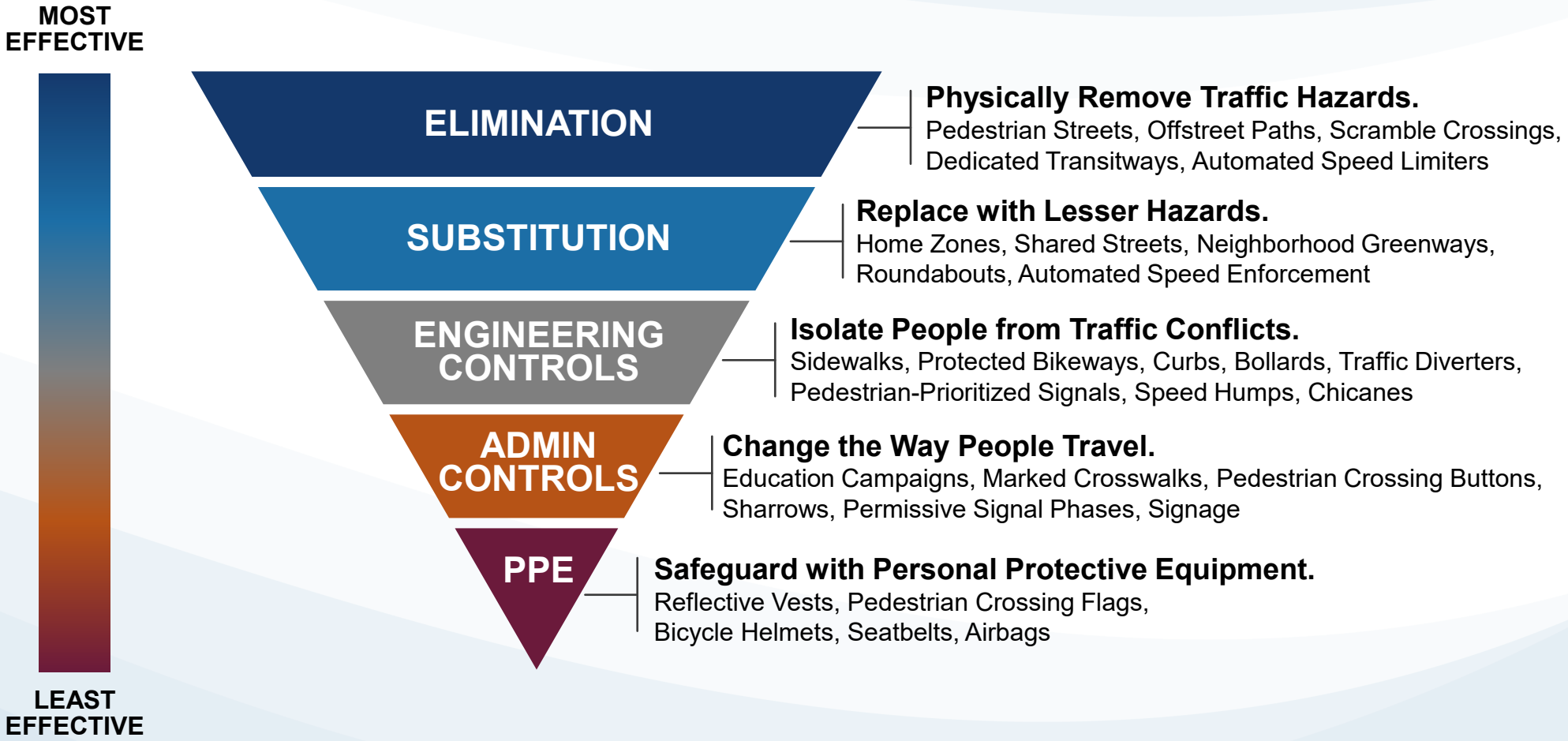
**Administrative Controls**
Education, legislation & policies to change behavior

**Personal Protective Equipment**
PPE, protective gear



Adapted from National Institute for Occupational Safety and Health – https://www.cdc.gov/niosh/topics/hierarchy/default.html

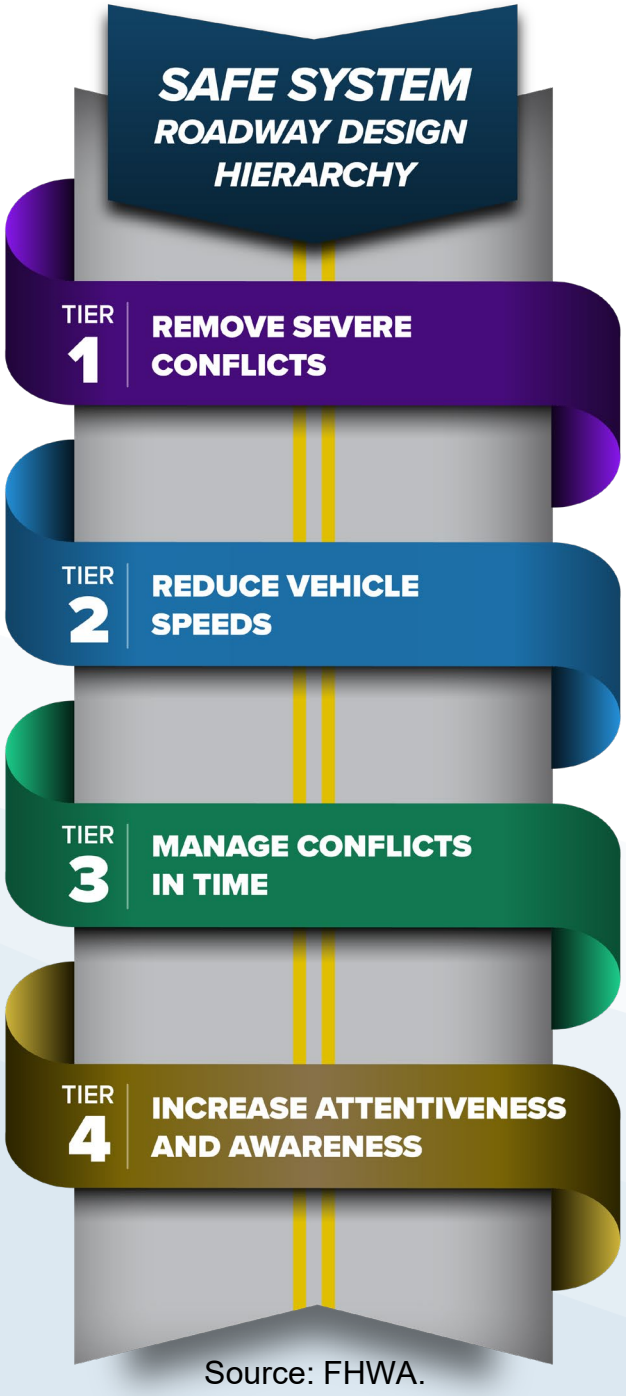
# HIERARCHY OF STREET SAFETY CONTROLS





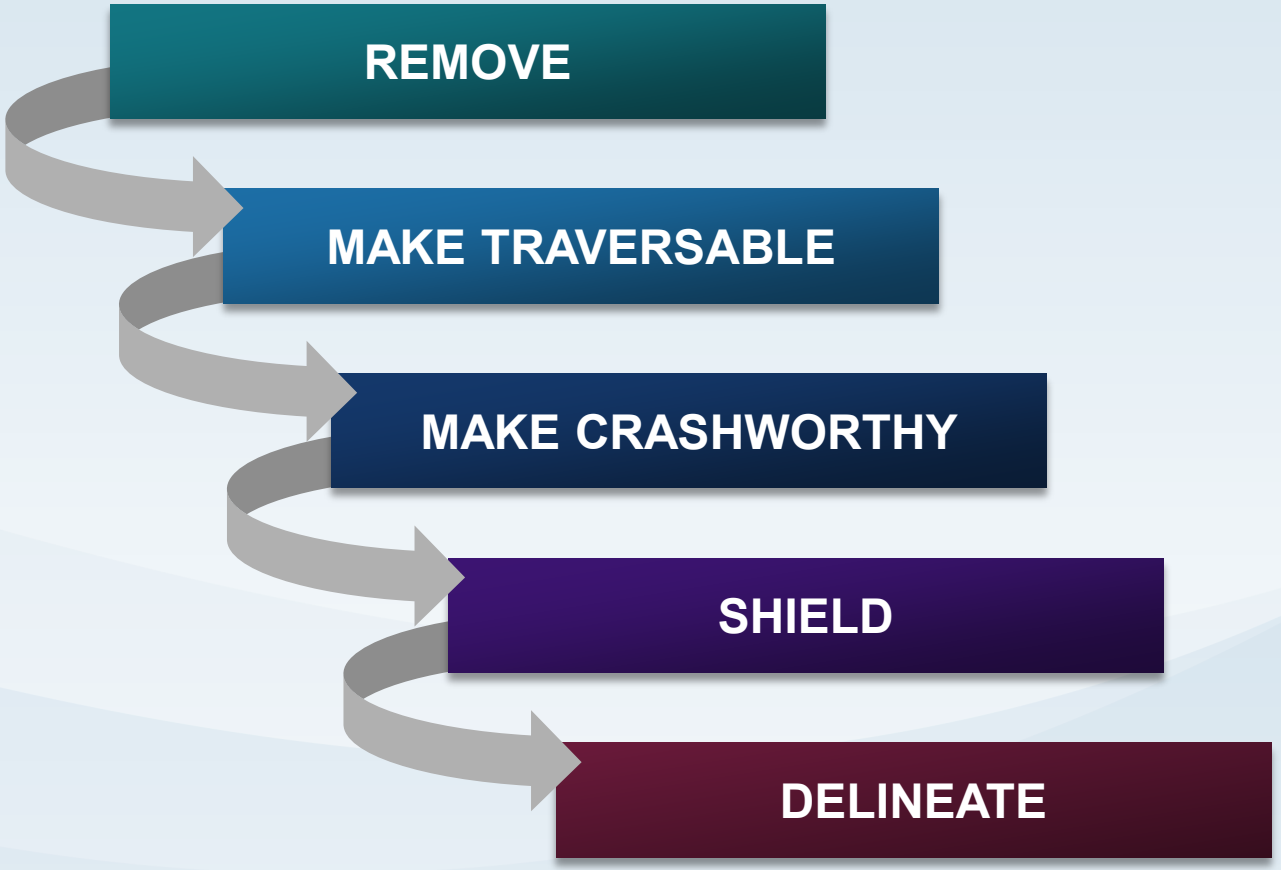

vision-zero-strategic-plan-120120.pdf (bellevuewa.gov)

# WHAT'S OLD IS NEW




Source: FHWA.

## Hierarchy to address hazards within the roadside clear zone




Derived from AASHTO Roadside Design Guide.

# TIER 1 REMOVE SEVERE CONFLICTS

- Supports the ***Safe Roads*** and ***Safe Road Users*** elements of the SSA
- Removing severe conflicts reduces risk by **eliminating potential roadway safety hazards**, providing **physical separation by space** to protect all roadway users, and **manages kinetic energy**

## Proven Safety Countermeasures


Bicycle Lanes


Medians and Pedestrian Refuge Islands


Road Diets


Walkways


Median Barriers


Roadside Design Improvements at Curves


SafetyEdge$^{SM}$


Roundabouts


Corridor Access Management


Dedicated Left and Right Turns at Intersections


Reduced Left Turn Conflict Intersections


Local Road Safety Plans


Pavement Friction Management


Road Safety Audits

TIER 1

# REMOVE SEVERE CONFLICTS

NSC New or Novel Safety Countermeasures

PSC Proven Safety Countermeasures

NSC

## Cable Median Barriers

Source: Oregon Highway US-26 – https://www.semanticscholar.org/paper/Performance-Evaluation-of-a-Cable-Median-Barrier-on-Burns-Bell/3b556bdc0762981e9f88612a1247d0d9e91f5591

PSC

## Roundabouts

Source: McCormick Taylor, Frankford-Trenton-York Roundabout (Philadelphia, Pennsylvania) – https://www.mccormicktaylor.com/our-work/frankford-trenton-york-roundabout

NSC

## Centerline Buffer Areas

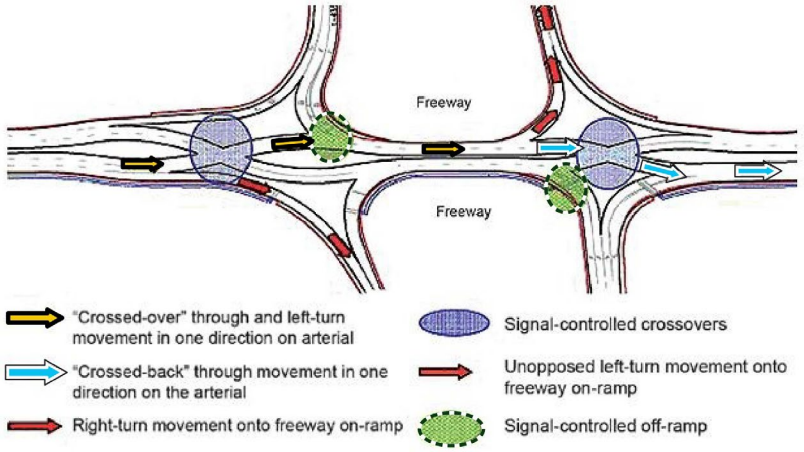
Source: Centerline Buffer Area with yellow strips and centerline rumble strips on Highway 14, MnDOT: https://www.mnltap.umn.edu/publications/exchange/2015/spring/us14.html

PSC

## Separated Bike Lanes

Source: Making Safer Streets, New York City DOT – dot-making-safer-streets.pdf (nacto.org)

# TIER 1 REMOVE SEVERE CONFLICTS

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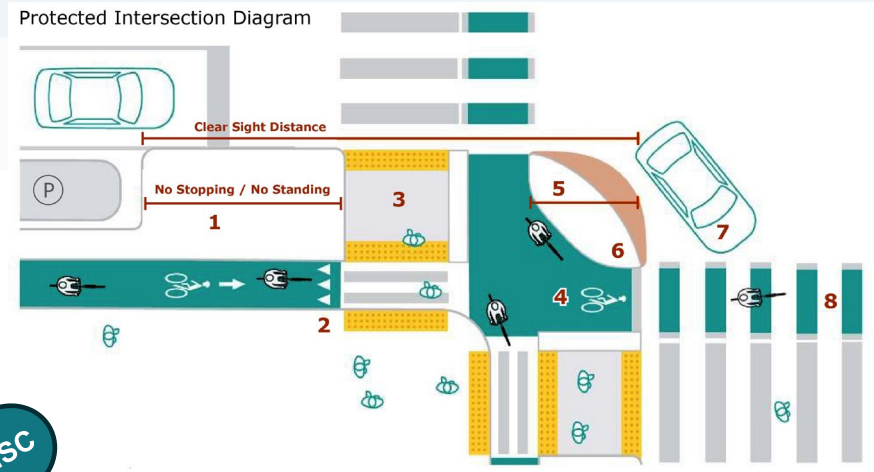
## Diverging Diamond Interchange

Source: FHWA, Diverging Diamond Interchange – https://safety.fhwa.dot.gov/intersection/crossover/fhwasa14039.pdf

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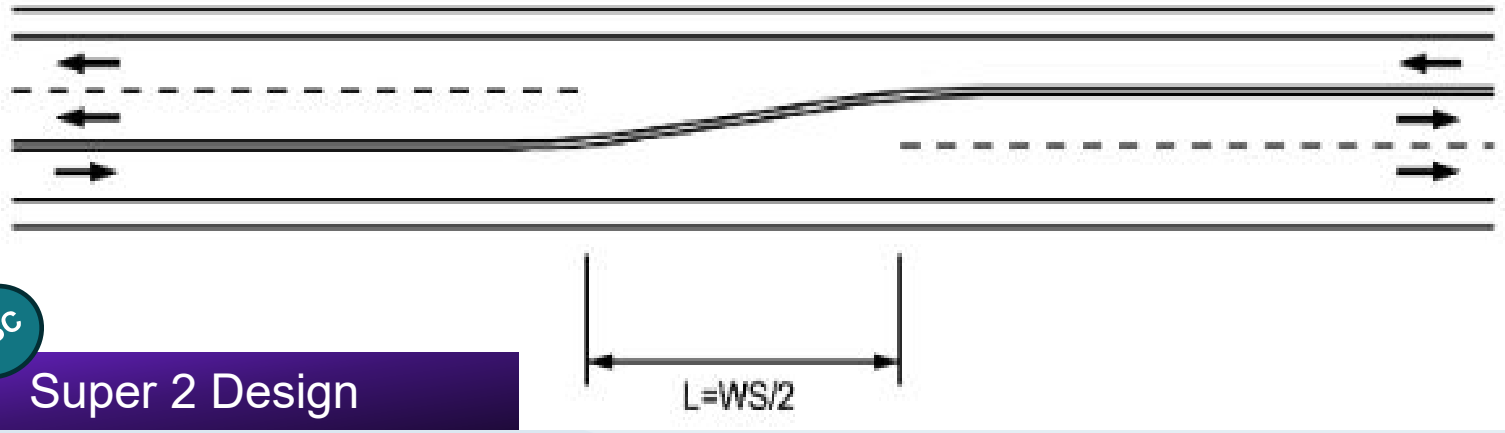
## Protected Intersection Features

Source: Protected Intersection Diagram, NACTO – https://nacto.org/publication/dont-give-up-at-the-intersection/protected-intersections/#:~:text=At%20protected%20intersections%2C%20the%20bikeway,way%20over%20turning%20motor%20vehicles.

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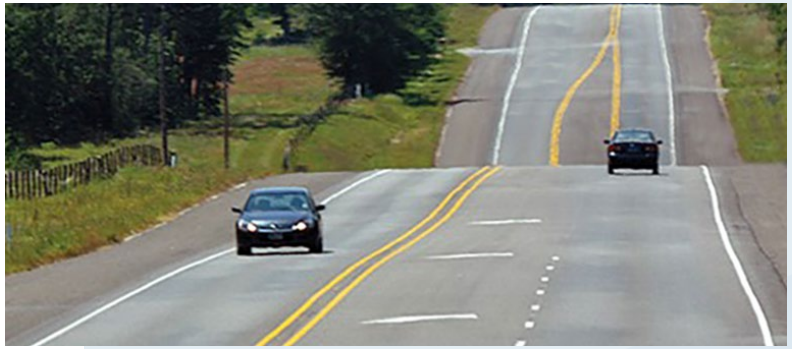
## Super 2 Design



Source: Super 2 Design, Texas A&M Institute

Source: Opening an Inside Passing Lane, TxDOT – http://onlinemanuals.txdot.gov/txdotmanuals/rdw/super_2_highways.htm#i1012456

# TIER 2 | REDUCE VEHICLE SPEEDS

- Supports the ***Safe Roads, Safe Speeds,*** and ***Safe Road Users*** elements of the SSA
- Physical features to slow traffic supports the **management of kinetic crash energy to reduce impact forces on the human body**

## Proven Safety Countermeasures


Appropriate Speed Limits for All Road Users

Speed Safety Cameras


Variable Speed Limits

Medians and Pedestrian Refuge Islands

Road Diets

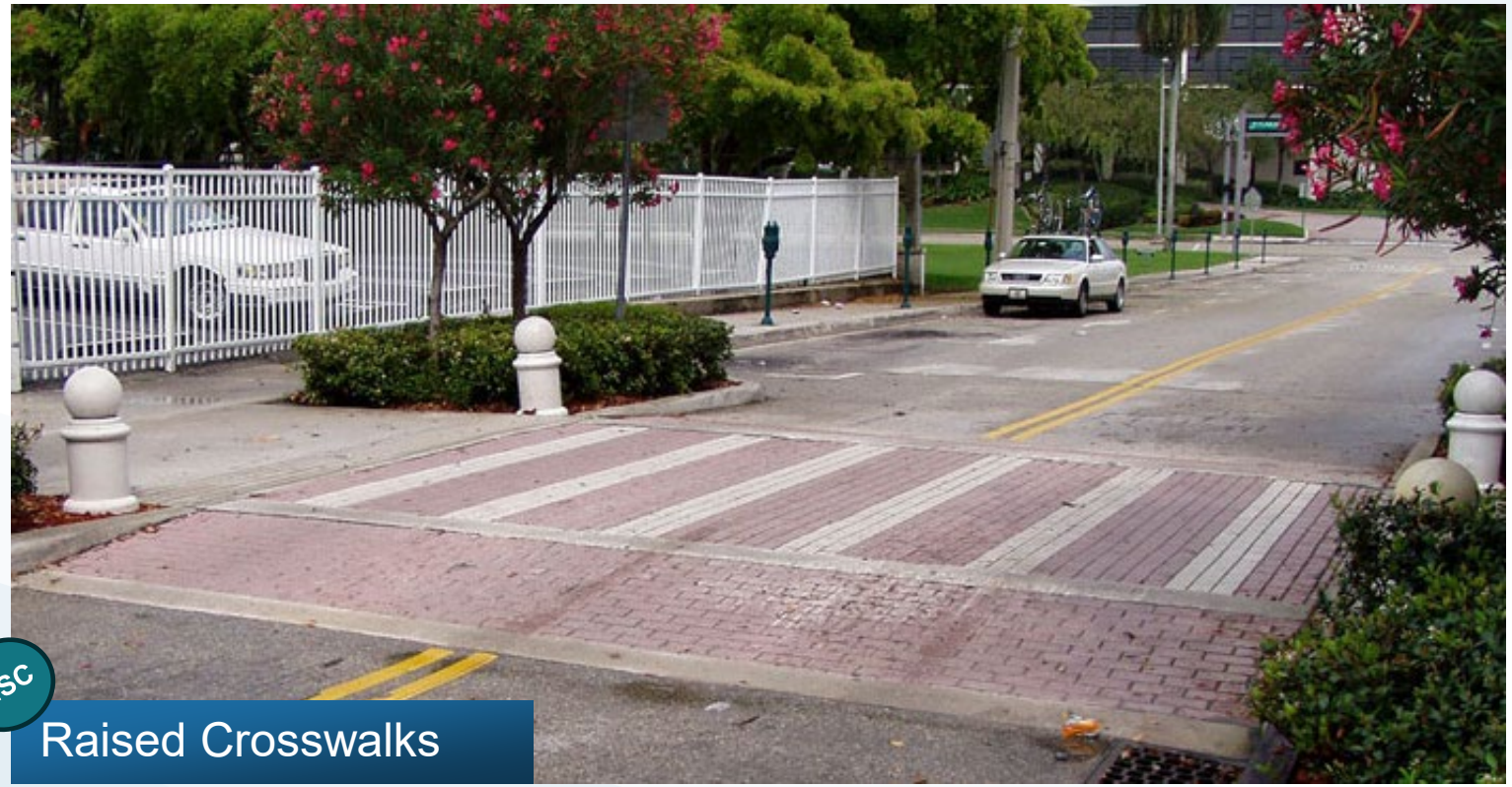
Roundabouts

Local Road Safety Plans

Pavement Friction Management

Road Safety Audit

# TIER 2 REDUCE VEHICLE SPEEDS



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Raised Crosswalks

Source: PedBikeImages – https://www.pedbikeimages.org/details.php?picid=1301.

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Self-Enforcing Roads

Source: Dan Hartman, City of Golden, CO – https://highways.dot.gov/safety/speed-management/noteworthy-practice-booklet-speed-management/case-study-2-noteworthy-speed.


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## Gateways

Source: Overhead reduced speed reduction sign leading up to the Village of Chatham gateway sign (Village of Chatham, Pennsylvania), Google Street View.


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## Speed Bump/Hump

Source: Speed Bump in Glendale Arizona, photo credit – Mike Cynecki: https://www.pedbikeimages.org/details.php?picid=435.

TIER 2

# REDUCE VEHICLE SPEEDS

# TIER 3 MANAGE CONFLICTS IN TIME

- Supports the ***Safe Roads, Safe Speeds,*** and ***Safe Road Users*** elements of the SSA
- Reduces traffic collisions by **separating users in time**
- Managing conflicts in time supports **safe roadway navigation**, **comfort**, and **convenience** for all users

## Proven Safety Countermeasures

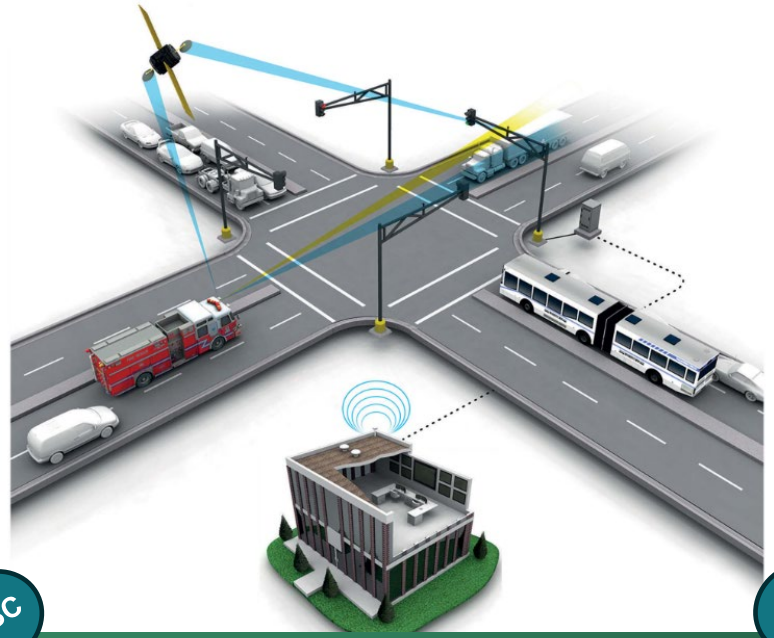

Leading Pedestrian Interval


Pedestrian Hybrid Beacons


Yellow Change Intervals


Local Road Safety Plans


Road Safety Audit



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## Emergency Vehicle Preemption

Source: ITS International – https://www.itsinternational.com/its8/feature/priority-management-saves-time-money-and-lives


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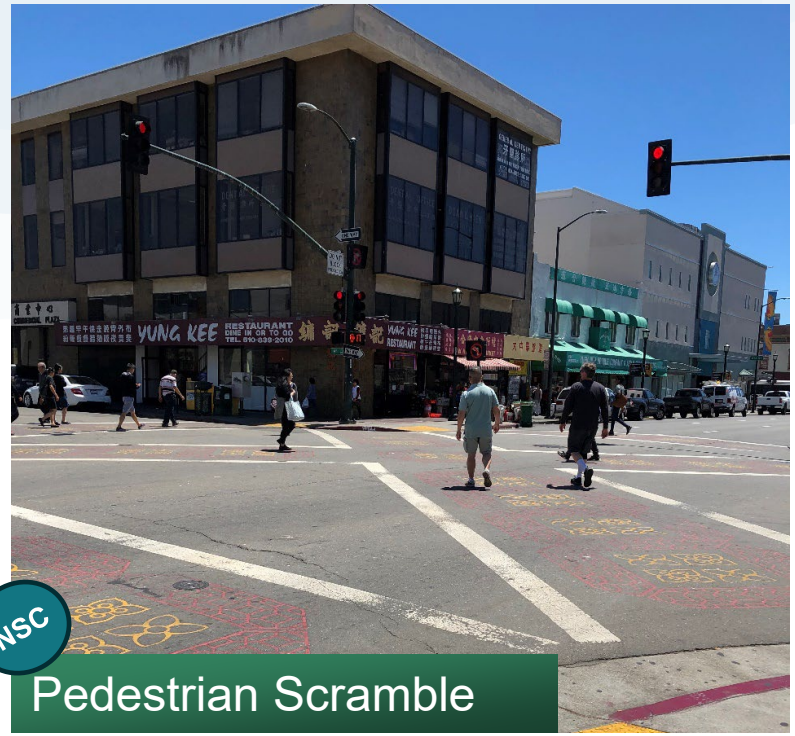
## Coordinated Signal Timing

Source: Urban Street Design Guide, NACTO.

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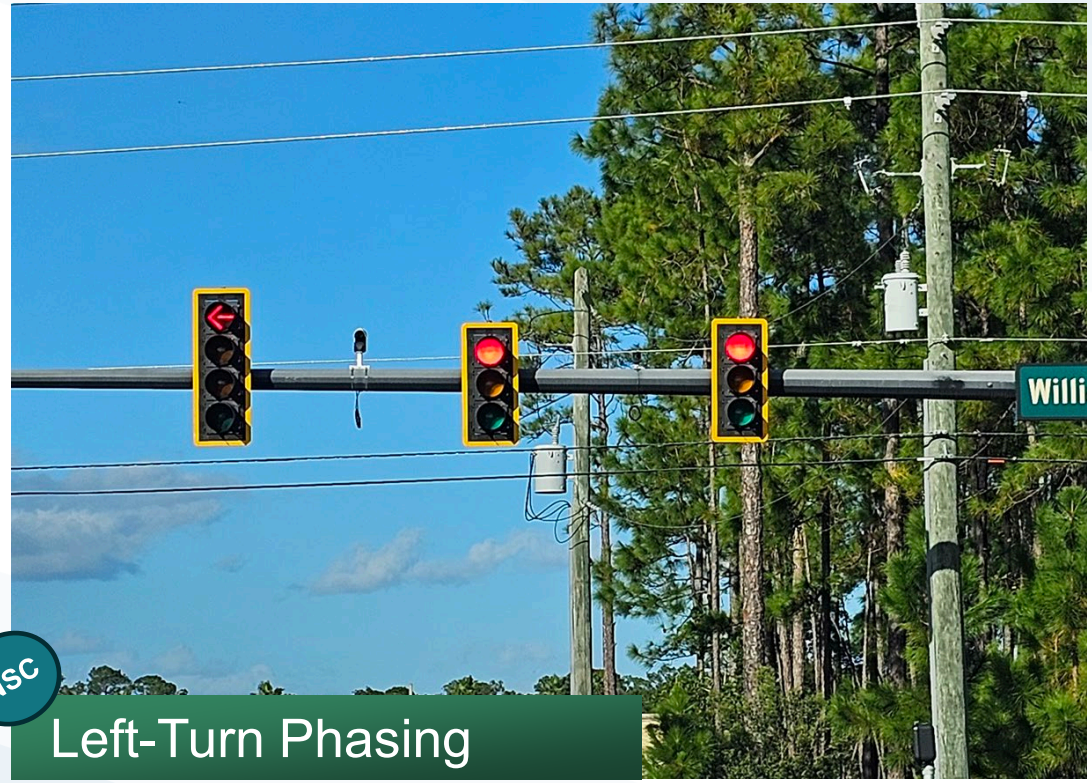
## Pedestrian Scramble

Source: Kamala Parks: https://www.pedbikeimages.org/details.php?picid=2580

# TIER 3 | MANAGE CONFLICTS IN TIME

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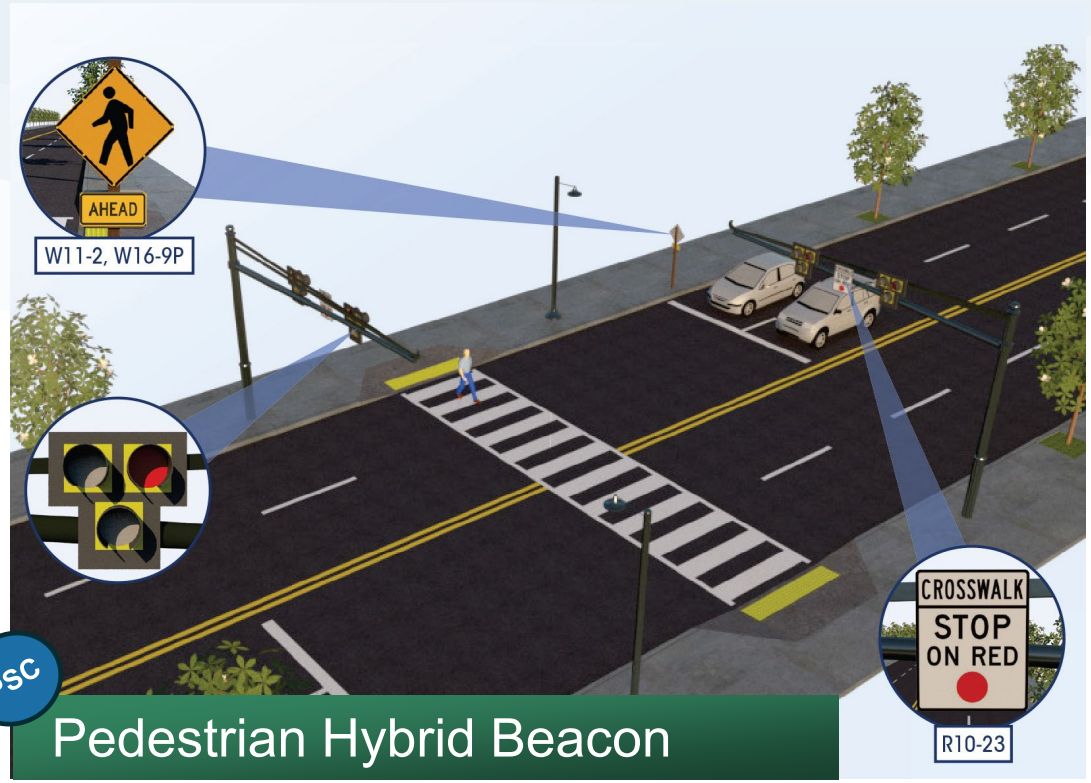
Left-Turn Phasing

Source: FHWA.

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Pedestrian Hybrid Beacon

Source: Pedestrian Hybrid Beacon (PHB), FHWA.

TIER 3

# MANAGE CONFLICTS IN TIME

# TIER 4 | INCREASE ATTENTIVENESS AND AWARENESS

- Supports the ***Safe Roads, Safe Speeds,*** and ***Safe Road Users*** elements of the SSA
- Reinforces the Safe System principle that **responsibility is shared among all road users**
- Countermeasures that increase attentiveness and awareness **help drivers avoid potential crashes**

## Proven Safety Countermeasures


Variable Speed Limits

Crosswalk Visibility Enhancements

Rectangular Rapid Flashing Beacons (RRFB)

Enhanced Delineation for Horizontal Curves

Longitudinal Rumble Strips and Stripes

Wide Edge Lines

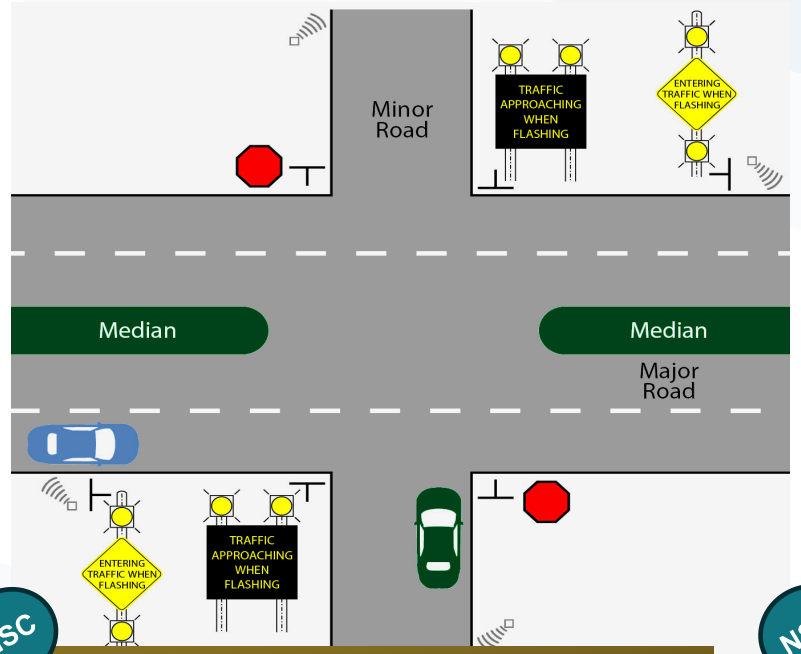
Backplates with Reflective Borders

Systemic Application of Low-Cost Counter-measures at Stop-Controlled Intersections

Lighting

Local Road Safety Plans

Road Safety Audit

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## Conflict Warning Systems

Source: ICWS highway roadway diagram and signage, Indiana Department of Transportation: https://www.in.gov/indot/traffic-engineering/intersection-conflict-warning-systems/


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## Bicycle Treatments

Source: FHWA, Green Colored Paint: Improving Intersections for Pedestrians and Bicyclists: Informational Guide (dot.gov)

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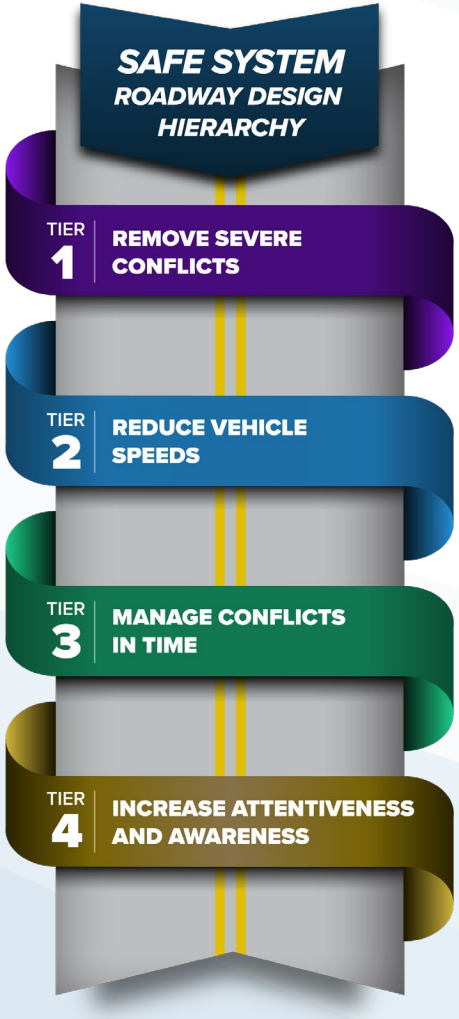
## Transverse Rumble Strips

Source: Getty Images.

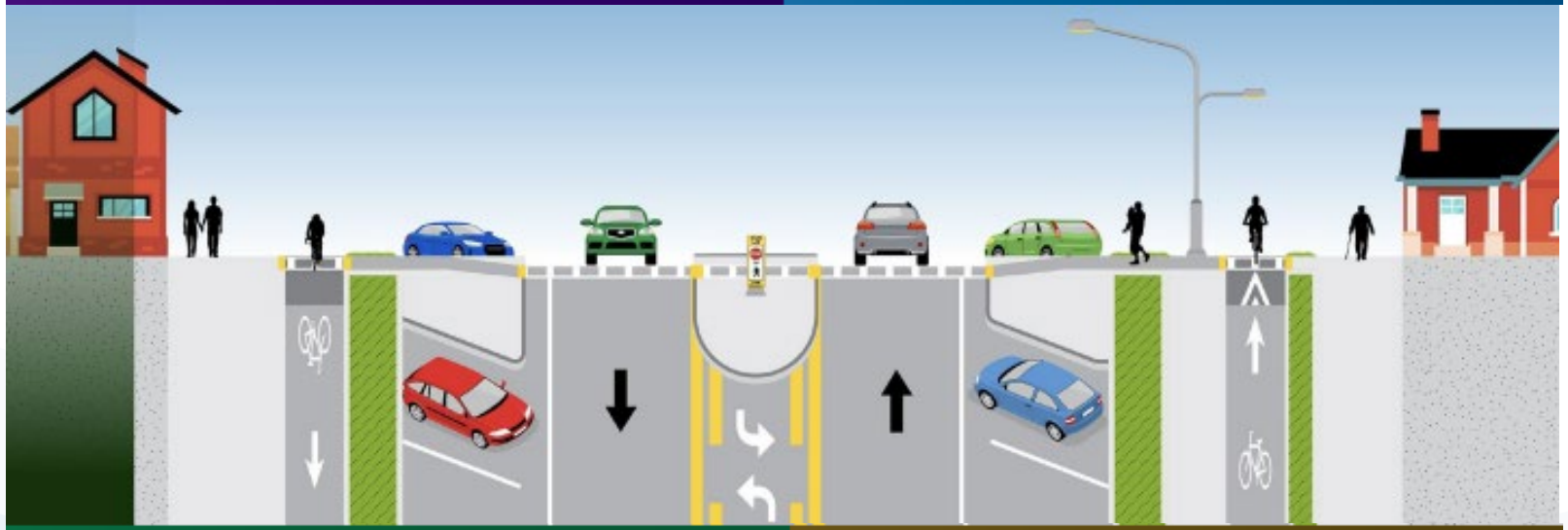
# TIER 4 | INCREASE ATTENTIVENESS AND AWARENESS

# HOW TO USE THE HIERARCHY




**TIER 1: REMOVE SEVERE CONFLICTS**
The roadway design provides separation in space to protect all roadway users.

**TIER 2: REDUCE VEHICLE SPEEDS**
Self-enforcing road design and gateway treatments provide contextual encouragement for motorists to drive at safer speeds.

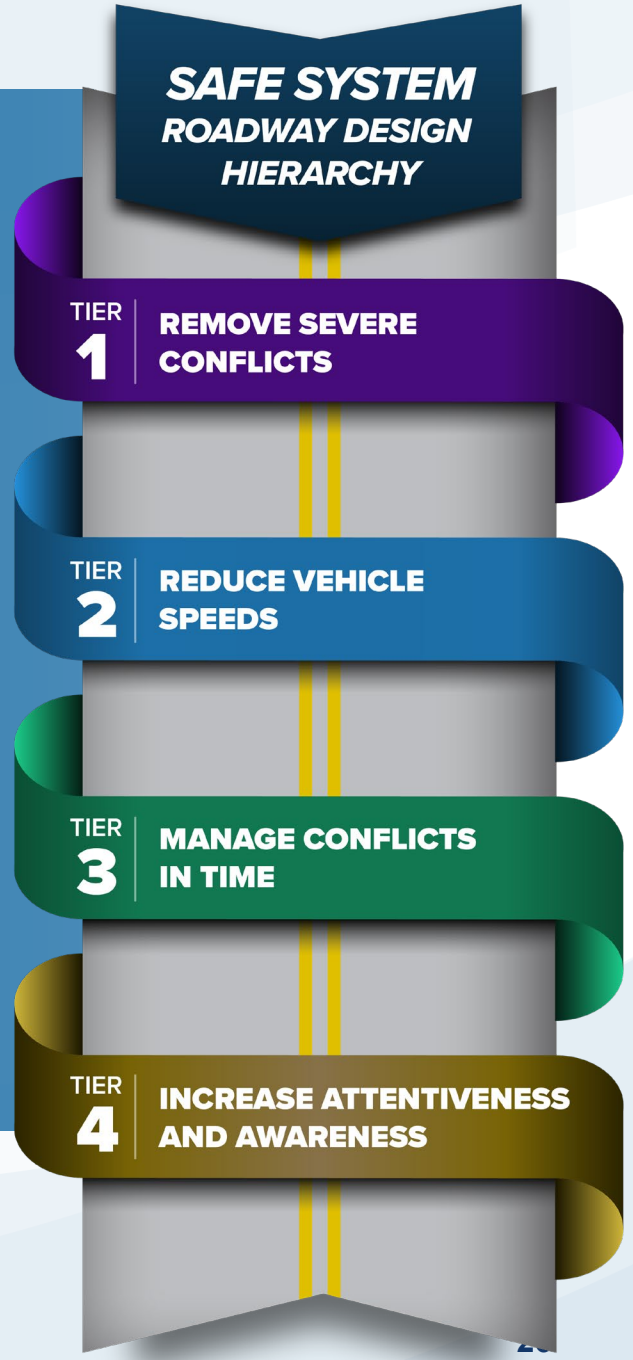


**TIER 3: MANAGE CONFLICTS IN TIME**
A Pedestrian Hybrid Beacon (PHB) can assist pedestrians crossing at the uncontrolled intersection.

**TIER 4: INCREASE ATTENTIVENESS AND AWARENESS**
Bicycle treatments and pedestrian signage make motorists aware of crossing cyclists and pedestrians.

Source: Complete Streets Transformations, FHWA.

# SAFE SYSTEM ROADWAY DESIGN HIERARCHY




Source: FHWA.

# SAFE SYSTEM APPROACH

## Choose Your Own Pathway

"There is **no single pathway** for the adoption, establishment and implementation of a Safe System. Moving to a Safe System is a learning-by-doing process best described as a journey which presents opportunities, hazards and challenges along the way."

*Source: Zero Road Deaths and Serious Injuries: Leading a Paradigm Shift to a Safe System; OECD (2016)*

# SAFE SYSTEM POLICY-BASED ALIGNMENT FRAMEWORK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## POLICY-BASED ALIGNMENT FRAMEWORK FACTORS

- *Death/Serious Injury is Unacceptable*
- *Humans Make Mistakes*
- *Humans are Vulnerable*
- *Responsibility is Shared*
- *Safety is Proactive*
- *Redundancy is Crucial*
- *Equity*

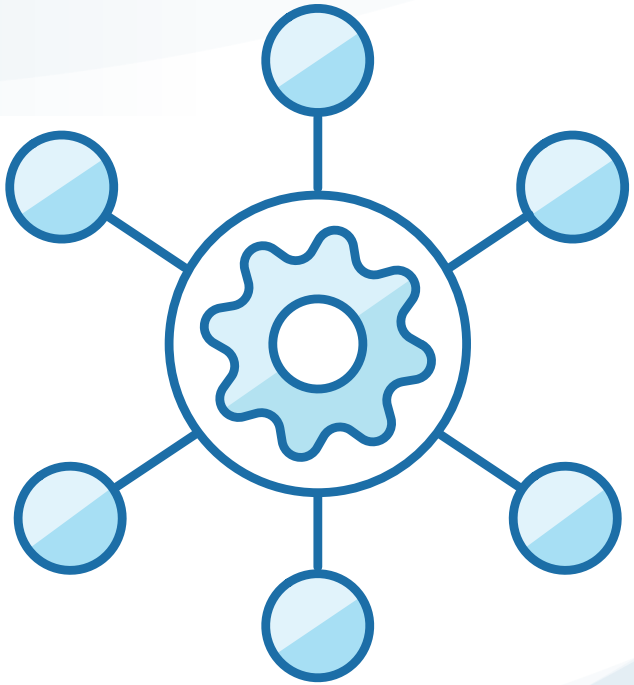
**Based on FHWA HSIP Self Assessment Criteria**

Source: FHWA

| Phase | Scoring | Description | Example Situation | Example Scoring |
|---|---|---|---|---|
| **Initiation** | (0-3) | Agency has started to address the requirement described in the question. If the agency has not initiated any activities to address the requirement, record a response of "0". | The policy does not explicitly state a goal of **zero** fatal and serious injury crashes; however, the agency and management recently agreed that a goal should be developed. | "1" Agency has begun initial discussion of the importance of planning around making zero fatal and serious injury crashes the documented goal.<br>"2" Agency has identified ways to document that death and serious injury are unacceptable.<br>"3" Agency has had advanced discussions on developing a plan to address the need to eliminate all fatal and serious injury crashes. |
| **Development** | (4-6) | Agency has developed a plan or approach to address the requirement described in the question. | The policy does not explicitly state a goal of zero fatal and serious injury crashes; however, the agency and management recently committed future staff time and resources to the development of policy language explicitly stating fatal and serious injury crashes are unacceptable. | "4" Agency has advanced the development of a plan (e.g., identified strategies, solutions, etc.) for addressing elimination of death and serious injury, but the plan has not been drafted yet.<br>"5" Agency has advanced plan development, but plan is not finalized.<br>"6" Agency has developed and finalized the plan to meet the requirement of addressing death and serious injury as unacceptable. |
| **Execution** | (7-9) | Agency has executed an approach to meet the requirement described in the question. | The policy language has been edited to include the "elimination: of fatal or serious injury crashes, not just reducing crashes. | "7" Agency has started drafting language into the policy about eliminating death and serious injury impacts to roadway improvement needs.<br>"8" Agency has drafted language about addressing death and serious injury specifically and defined as a methodology.<br>"9" Agency has finalized and adopted the approach and methodology to be integrated into the project delivery process. |
| **Evaluation** | (10-12) | Agency has assessed the performance of the requirement described in the question after it has been executed for a period. | The agency has recently evaluated the adopted policy changes and developed a process to update the policy as needed. | "10" Agency has the policy approved and has begun to set goals for the evaluation.<br>"11" Agency has set goals for evaluation and evaluation approach focused on death and serious injury has been identified.<br>"12" Agency has the goals set, initiated evaluation and has screened the policy to update based on results of evaluation. |
| **Integration** | (13-15) | Agency has integrated the requirement described in the question into agency culture. | The agency has published policy updates following the assessment and uses it to guide several other agency practices. | "13" Agency has adopted the policy changes supporting the notion that death and serious injury on the system is unacceptable.<br>"14" Partners and agencies receiving support from or working with the Safety Program are required to support the principle.<br>"15" All partner agencies and divisions are guided by the understanding mistakes on the roadway should not result in death and serious injury. |

# POLICY-BASED ALIGNMENT FRAMEWORK

- Can be used to:
  - » Benchmark and track progress towards improving the Safe System Alignment of Agency Polices
  - » Raise the level of awareness of Safe System-related practices and strategies
  - » Identify gaps in existing policy and program efforts
  - » Generate strategies to improve Safe System Alignment in agency practices



# WRAP-UP

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# RESOURCES

- Safe System Roadway Design Hierarchy
- Safe System Policy-based Alignment Framework
- Proven Safety Countermeasures

https://highways.dot.gov/safety/zero-deaths/resources

# WORKSHOPS

- **Policy-based Workshop**
  - A one-day workshop hosted by a State, regional, local, or tribal agency.

**Policy-based Workshop:** A one-day workshop hosted by a State, regional, local, or Tribal agency. The host agency will select a policy to review using the Safe System Policy-based Alignment Framework. The Policy-based workshop includes an overview of the Safe System Roadway Design Hierarchy, as well as both the Project-based and Policy-based Alignment Frameworks. Instructors will then facilitate a discussion of the policy identified by the host agency using the Policy-based Alignment Framework to determine current Safe System alignment and opportunities to improve the policy moving forward.

*[Note: The Policy-based workshop may occur over two non-consecutive days. The first day (could be virtual) will provide an overview of the Safe System alignment resources. Participants will then individually review the policy using the Policy-based Alignment Framework and then reconvene on another day to come to consensus on findings and opportunities.]*

# THANK YOU!

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