VISION ZERO plan

MIAMI-DADE COUNTY | 2018

MIAMI-DADE COUNTY'S PLAN TO ELIMINATE TRANSPORTATION-RELATED FATALITIES AND INCAPACITATING INJURIES

TPO Miami-Dade Transportation Planning Organization

Prepared by:

THE CORRADINO GROUP

STREETPLANS Miami New York

June 2018

This page intentionally left blank.

VISION ZERO plan

MIAMI-DADE COUNTY | 2018

Prepared for:

TPO
Miami-Dade Transportation Planning Organization

Prepared by:

THE CORRADINO GROUP

STREETPLANS
Miami New York

The Preparation of this report has been financed in part from the U.S. Department of Transportation (USDOT) through the federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Miami-Dade County, Florida. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

CONTENTS

SUMMARY

The ***"Vision Zero"*** program is dedicated to ***eliminating deaths and serious injuries*** from the transportation network and has been implemented in numerous areas throughout the world. This Plan is a systematic approach to implementing safety countermeasures and policies to reduce, and ultimately eliminate fatalities and serious injuries related to mobility in Miami-Dade County. Key objectives of this Plan include: establishing a methodology by which crash statistics can continue to be used to determine priorities for crash locations improvements; measuring the ongoing progress of the Plan; providing a means to engage local government and citizenry; and offering specific guidance on proven safety countermeasures. In keeping with the goal of Vision Zero, and based on a thorough review of the state-of-the-art, this Plan proposes the ***total elimination of all traffic-related deaths and serious injuries by the year 2030, which recognizes that progress will take time. Some efforts may not yield visible results immediately. Stakeholders need to bring both a strong sense of urgency to their efforts, as well as a focus on sharing and measuring efforts as they develop longer-term investments in safety.***

Five tasks were performed to complete this project:

- **Task 1 | Vision Zero Task Team Engagement/Role**
- **Task 2 | Literature Review**
- **Task 3 | Data Collection/Data Analysis**
- **Task 4 | Countermeasure Selection**
- **Task 5 | Project Documentation**

Task 1 | Vision Zero Task Team Engagement/Role

As part of this effort, a Vision Zero Task Team (VZTT) was formed to help formulate the Plan. Team members include representatives from: the Miami-Dade Transportation Planning Organization (TPO), Miami-Dade Department of Transportation and Public Works (DTPW), Miami-Dade Department of Parks, Recreation and Open Spaces (PROS), the Florida Department of Transportation (FDOT), Miami-Dade County Department of Regulatory and Economic Resources (RER), Miami-Dade Police Department (MDPD), Florida Highway Patrol (FHP), Miami-Dade Fire Rescue, and the Florida Department of Health (DOH). The Team met four times from February through May, 2018 to review the progress of the Plan and provide comments/guidance. The VZTT will ultimately be charged with advancing the Vision Zero Plan, and its various recommendations within their own organizations. The TPO will be responsible for uniting all the municipalities such that a programmatic approach can be applied across the County without regard to municipal boundaries. As the facilitator in developing the Long-Range Transportation Plan (LRTP) and the Transportation Improvement Plan, the TPO is in a unique position to advance the Vision Zero Plan.

Task 2 | Literature Review

This task included a literature review to assist in developing safety countermeasures. Vision Zero Plans of Los Angeles, Seattle, New York, Denver, and Fort Lauderdale are summarized next. Other specific documents examined include the FDOT Highway Safety Plan, The Strategic Highway Safety Plan, plus the TPO's "Aging Road Users Strategic Safety Plan". Documentation also used to support the analyses includes: the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual; Federal Highway Administration (FHWA) PedSafe Pedestrian Safety Guide and Countermeasure Selection System; FHWA BikeSafe Bicycle Safety Guide and Countermeasure Selection System; Road to Zero Initiative; AASHTO "Toward Zero Deaths" program; Vision Zero Network website.

Task 3 | Data Collection/Data Analysis

This Plan is based on a significant Data Collection effort to determine high-crash locations. Among the data collected are: Miami-Dade crashes for the years 2010-2014; traffic fatality data from the Florida Department of Health (DOH); and current vehicular volumes, bicycle and pedestrian counts, and transit ridership data. Crash data provide details on: location, crash type and contributing causes; vehicle information, such as mode, vehicle type and speed; and occupant information, such as numbers of fatalities and injuries, ages and impairment.

Crash data were obtained from the FDOT Unified Basemap Repository for the years 2010 through 2014. These were the most current data available at the time of the initiation of this project. In examining crash data, and with the knowledge of a change in the Florida standard crash report form in 2011, it became evident that the 2010 records are not fully compatible with 2011-2014 data. Certain statistics in the 2010 data were missing or contained incorrect fields. With that caveat, crash data for the year 2010 were included for further processing to the maximum extent possible.

Graphics were created to depict high-crash locations for the On-State Highway System and Off-State (Local) Highway System. Tabulation of the data identified probable causes (mode, time of day, impairment, etc.) and other reported crash parameters. Roadway characteristics (number of lanes, speed limits, volumes, etc.) were obtained from the crash data reports, the FDOT's Straight Line Diagrams, the Florida Traffic Online website, field reviews, and aerial photography.

Task 4 | Countermeasure Selection

Based on the data analyses, safety countermeasures were identified. The recommendations include short- and long-term, location-specific actions that address both crash prevention and injury reduction. A sub-set of priority projects has been identified for rapid implementation.

Task 5 | Project Documentation

This report documents the processes undertaken to develop this Plan, and contains recommendations for further action to continue the process of achieving zero fatalities and serious injuries in Miami-Dade County.

Contributing Causes

Based on the data analysis, the local roadway network fatal and injury data were identified, and sorted to determine the primary actions of motorists that led to the incidents ***(Table S-1)***. The No. 1 cause is driving in a careless or negligent manner, at 45.6% of all crashes. Failure to Yield Right-of-Way, and two related causes: Ran Stop Sign and Ran Red Light, represent 16.8%, 8.1%, and 7.1% of all crashes, respectively, for a combined total of 32%. Causes related to excessive speed (Ran Off Roadway; Exceeded Posted Speed; Erratic, Reckless or Aggressive Driving; and Drove Too Fast for Conditions) account for 14.2% of all crashes. The remaining 8.2% of crashes, in order of prevalence include: Improper Passing; Failed to Keep in Proper Lane; Swerved or Avoided; Improper Turn; Over-Correcting/Over-Steering; Wrong Side or Wrong Way; Improper Backing; Disregard of Other Traffic Signs; Followed Too Closely; and, Disregarded Other Road Markings.

Table S-1 - Contributing Causes of Local Road Crashes (2010-2014)	
Careless or Negligent Manner	45.6%
Failed to Yield Right-of-Way	16.8%
Ran Stop Sign	8.1%
Ran Red Light	7.1%
Ran Off Roadway	6.1%
Exceeded Posted Speed	2.8%
Erratic, Reckless or Aggressive Driving	2.8%
Drove Too Fast for Conditions	2.5%
Improper Passing	1.7%
Failed to Keep in Proper Lane	1.5%
Swerved or Avoided	1.4%
Improper Turning	1.0%
Over-Correcting/Over-Steering	0.8%
Wrong Side or Wrong Way Driving	0.6%
Improper Backing	0.4%
Disregarded Other Traffic Signs	0.4%
Followed Too Closely	0.3%
Disregarded Other Road Markings	0.1%

ACTION PLAN

The strategies necessary to achieve the Vision Zero goal include the 5 "**E**"s: **E**ngineering, **E**nforcement, **E**ducation, **E**ncouragement and **E**valuation. None of these strategies can effect changes on their own; a combination of all of these, and more, are necessary to produce long-term results.

Engineering

Engineering is taking the lead on the "road to zero". Given that it is currently impossible to eliminate human error through traditional means, autonomous, or self-driving vehicles are promoted as eventually removing human driver error from the transportation system. This means that nearly all the identified contributing causes will be addressed. However, in the absence of this technology on a widespread basis, Vision Zero goals must be achieved through other means.

Regarding vehicular speed, there are seemingly conflicting goals between the need to move traffic and the safety of all roadway occupants; the natural instinct for motorists is to drive at a "comfortable" speed for the surroundings and traffic. Most drivers are preoccupied with the driving task (control, guidance, navigation) and are unaware of posted speed limits, let alone their own vehicle speed. Speed zoning relies on the 85th percentile speed of prevailing traffic, to determine the speed limit. The rationale for this practice is that vehicles moving at or near the same speed are less likely to encounter conflicts. While this rationale is totally appropriate for vehicular travel, urban areas with concentrations of pedestrian, bicycle, and transit activities must be addressed in a different context.

When urban roads are designed to move high volumes of traffic, past design standards were aimed at providing maximum safety for the operation of motor vehicles. The resulting environment tends to encourage higher speeds. Recent efforts to incorporate "Complete Streets" elements in roadway design have contributed to surroundings less conducive to speeding in critical areas. New FDOT standards allowing variances from traditional design parameters, such as narrower lane widths based on "context", have also had impacts on speeding. Therefore, more roadways are being designed to reduce speed in safety-critical areas where there are potential conflicts among and between vehicles or between vehicles and pedestrians or cyclists. Speed-zoning procedures are being modified to recognize the need for lower limits based on context. Statutory limits on minimum and maximum speeds should also be examined. State statutes allow lower blanket residential speed limits of 30 miles per hour to 25 miles per hour within the County and allow municipalities to lower the residential speed limit to 20 miles per hour.

Enforcement

Enforcement is an essential component of the strategy to reduce crashes. Targeted enforcement efforts tend to reduce speeds in the short-term, but a continuous program to issue citations can effect lasting change and, ultimately, become self-funded. Enforcement agencies also participate in the Education strategy by placing electronic speed-feedback signs at key locations. Enforcement efforts often include a campaign to issue citations for motorists operating vehicles in a careless or negligent manner, improper lane changing, aggressive (reckless) driving, jaywalking, and failure to yield right-of-way (in both vehicular and bike/ped situations).

For enforcement to be effective, the court system has to be willing to prosecute these seemingly "trivial" offenses, or allow for warnings with an associated fine.

Education

Educational opportunities include developing expanded curricula for drivers' education courses, expanded requirements and testing for licensing, continuous public awareness campaigns and public service announcements (PSAs). The FDOT and Florida Highway Patrol (FHP) sponsor monthly public awareness campaigns. While FDOT has limited the messages that can be displayed on Dynamic Message Signs (DMS), the opportunity to improve highway safety through the dissemination of public service announcements should be considered. Additional campaigns that should be expanded are "bike rodeos" in which road users are taught safe bicycling, the importance of helmets, and pedestrian safety programs.

Encouragement

Encouragement efforts usually provide some type of reward for good behavior. Insurance companies already offer reduced rates for drivers that remain incident free for given periods of time. Another potential means of encouragement under governmental control could include reduced tolls for drivers that maintain proper speeds. Expressways are equipped with sensors that monitor the speed of individual vehicles through identification of the vehicle's SunPass. These technologies should be expanded to the local roadway system so that other incentives could be offered. Encouragement techniques must extend beyond drivers to pedestrians and bicyclists, such as with incentive campaigns to prevent jaywalking or to encourage wearing of safety gear and lighting for bicyclists.

Evaluation

Evaluation is an ongoing process that includes monitoring road user behavior and crash statistics, and related data. Continued monitoring of crash statistics on an annual basis is critical to determining the relative success of countermeasures and provides guidance for continued action and shifts in areas of concern. Monitoring provides the basis for using crash prevention measures of one location at another. Ideally, the most effective countermeasures would eliminate locations from the high-crash listing and allow for re-prioritization of additional locations.

An overarching principle that guides the five "E"s includes Emergency Response, which is improved through enhanced connectivity for faster crash notification, improved injury prediction, better communication between/among traffic monitoring centers, 911 and first responders, and more-timely emergency medical care. Improvements in traffic monitoring infrastructure will also provide reductions in crashes because incidents are more rapidly recognized and shared with law enforcement and emergency response agencies. Survival in crashes sometimes depends on response times by emergency vehicles. The data collected from currently active "Intelligent Transportation Systems" (ITS) must be subject to continuing evaluation from a statistical standpoint, and these types of systems should be incorporated into the local roadway network as soon as possible. The average road user also needs education on what to do in the presence of emergency vehicles.

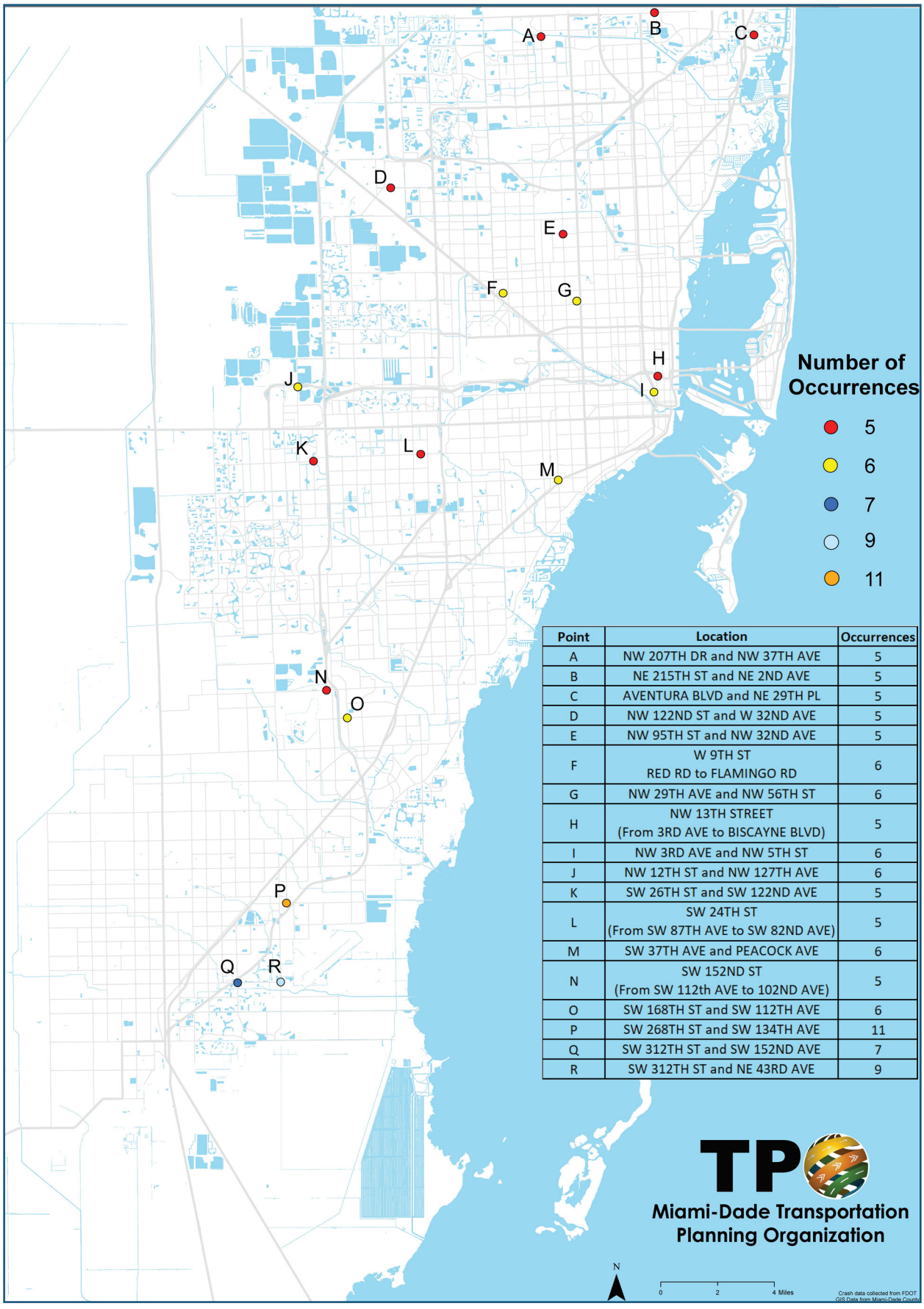
The seventh "E" – Equity ensures that all the applicable countermeasures are applied without bias in terms of location or socioeconomic environment.

Table S-2, summarizes each proposed priority improvement at locations shown on ***Figure S-1***, including its cost, implementing agency and time frame. These countermeasures show great promise for reducing vehicular crashes, especially in lowering speed limits. However, lowering speed limits in residential areas requires action on behalf of the County and local municipalities. State statutes allow lowering the residential speed limit of 30 miles per hour to 25 miles per hour within the County and allow municipalities to lower the residential speed limit to 20 miles per hour.

Table S-2 - Action Plan Implementation

Identifier	Location	Suggested Countermeasure	Cost	Responsible Party	Time Frame
A	NW 207TH DR and NW 37TH AVE	Signalize	$250,000	Miami Gardens	2-5 years
B	NE 215TH ST and NE 2ND AVE	Add left-turn phasing (Reconstruct Signal)	$250,000	Miami Gardens	2-5 years
C	AVENTURA BLVD and NE 29TH PL	Restrict left-turn phases	$75,000	Aventura	0-2 years
D	NW 122ND ST and W 32ND AVE	Add Channelized left-turn lane and phasing SB	$400,000	Hialeah Gardens	3-5 years
E	NW 95TH ST and NW 32ND AVE	Add Channelized left-turn lanes E-W and modify phasing	$750,000	Miami-Dade County (West Little River CDP)	3-5 years
F	NW 9TH ST from RED RD to FLAMINGO RD	Reduce Speed Limit	$20,000	Hialeah	0-2 years
G	NW 29TH AVE and NW 56TH ST	Convert to All-Way Stop	$2,500	Miami-Dade County (Brownsville CDP)	0-1 year
H	NW 13TH ST from 3RD AVE to BISCAYNE BLVD	Reduce Speed Limit	$20,000	City of Miami	0-1 year
I	NW 3RD AVE and NW 5TH ST	Add Signal Heads and Reflective Backplates (Reconstruct Signal)	$500,000	City of Miami	2-5 years
J	NW 12TH ST and NW 127TH AVE	Widen Median E-W	$1,500,000	Miami-Dade County (Unincorporated)	5-10 years
K	SW 26TH ST and SW 122ND AVE	Widen Median N-S	$1,500,000	Miami-Dade County (Unincorporated)	5-10 years
L	SW 24TH ST from SW 87TH AVE to SW 82ND AVE	Speed Study and Revise Speed Limit	$25,000	Miami-Dade County (Westchester CDP)	0-1 year
M	SW 37TH AVE and PEACOCK AVE	Restripe NB left-turn Receiving Lanes	$10,000	City of Miami	0-1 year
N	SW 152ND ST from SW 112TH AVE to SW 102ND AVE	Speed Study and Revise Speed Limit	$25,000	Miami-Dade County (Richmond Heights CDP)	0-1 year
O	SW 168TH ST and SW 112TH AVE	Add left-turn phasing	$50,000	Miami-Dade County (Palmetto Estates CDP)	0-2 years
P	SW 268TH ST and SW 134TH AVE	Signalize	$250,000	Miami-Dade County (Princeton CDP)	2-5 years
Q	SW 312TH ST and SW 152ND AVE	UNDER CONSTRUCTION	--	Homestead	--
R	SW 312TH ST and NE 43RD/137TH AVE	Add “Signal Ahead” Warning Sign NB	$1,200	Homestead	0-1 year

Figure S-1 - Locations of Suggested Improvements



Point	Location	Occurrences
A	NW 207TH DR and NW 37TH AVE	5
B	NE 215TH ST and NE 2ND AVE	5
C	AVENTURA BLVD and NE 29TH PL	5
D	NW 122ND ST and W 32ND AVE	5
E	NW 95TH ST and NW 32ND AVE	5
F	W 9TH ST RED RD to FLAMINGO RD	6
G	NW 29TH AVE and NW 56TH ST	6
H	NW 13TH STREET (From 3RD AVE to BISCAYNE BLVD)	5
I	NW 3RD AVE and NW 5TH ST	6
J	NW 12TH ST and NW 127TH AVE	6
K	SW 26TH ST and SW 122ND AVE	5
L	SW 24TH ST (From SW 87TH AVE to SW 82ND AVE)	5
M	SW 37TH AVE and PEACOCK AVE	6
N	SW 152ND ST (From SW 112th AVE to 102ND AVE)	5
O	SW 168TH ST and SW 112TH AVE	6
P	SW 268TH ST and SW 134TH AVE	11
Q	SW 312TH ST and SW 152ND AVE	7
R	SW 312TH ST and NE 43RD AVE	9

APPROACH

Task 1 | Vision Zero Task Team Engagement/Role

A Vision Zero Task Team (VZTT), was involved in developing the plan. It will continue to oversee implementing the Plan's recommendations and updating the Plan. The Team members are:

Figure 2 - Vision Zero Task Team	
Miami-Dade Transportation Planning Organization	Kevin Walford
Miami-Dade Transportation Planning Organization	David Henderson
Miami-Dade Department of Transportation and Public Works	Yanek Fernandez, P.E.
Miami-Dade Department of Transportation and Public Works	Claudia P. Diaz, P.E.
Miami-Dade Department of Transportation and Public Works	Irene Soria-Cordero, P.E.
Miami-Dade Parks Recreation and Open Spaces	Stephanie Cornejo
Miami-Dade Regulatory and Economic Resources	Vinod L. Sandanasamy, P.E.
Florida Department of Transportation District 6	Omar Meitin, P.E.
	Misleidys Leon, P.E.
Miami-Dade Police Department	Joshua Rodriguez
Florida Highway Patrol	Jose Sanchez
	Alejandro Camacho
Miami-Dade Fire Rescue	Humberto Quintela
Florida Department of Health	Karen Weller
The Corradino Group	Gregory A. Prytyka, P.E.
The Corradino Group	Joseph M. Corradino, AICP
The Corradino Group	Eric Ketterling
Streetplans	Tony Garcia

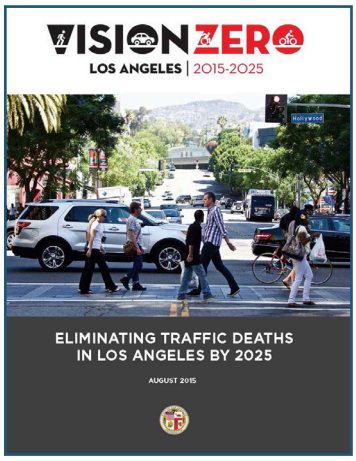
The VZTT met met four times from February to May 2018. Minutes of each meeting are provided in ***Appendix 1.***

Task 2 | Literature Review

Vision Zero Action Plans were examined for Los Angeles, Seattle, New York City, Denver, and Fort Lauderdale. Each Plan is summarized on the following pages. A summary of notable countermeasures is included in Appendix 2.

VISION ZERO ACTION PLAN FOR LOS ANGELES

What was Los Angeles' Goal?



The Los Angeles Vision Zero initiative, began in 2015, aims to eliminate all traffic deaths by 2025, with a 20% reduction by the end of 2017 and 50% reduction by the end of 2020 (both compared to 2016 data). In 2016 there were 253 traffic fatalities in Los Angeles and 245 in 2017--a 3% reduction.

The Vision Zero Executive Steering Committee was created to coordinate short-term and long-term actions, including the creation of the Vision Zero Task Force, which holds the committee accountable to its actions. The Vision Zero Action Plan, completed at the beginning of 2017, outlines specific measurable goals and strategies to achieve zero traffic deaths. The 2018 Vision Zero Action Plan and Progress Report reviews the projects completed in 2017 and outlines the actions to be completed in 2018.

What is Los Angeles Doing?

The Los Angeles Vision Zero initiative is using a data-driven approach to eliminate traffic fatalities. Rooted in equity and engagement, Los Angeles aims to achieve Vision Zero through engineering, education, enforcement, and evaluation. With specific actionable goals within each category, the City is focusing their resources on the High Injury Network (HIN) of streets and intersections with the most traffic fatalities and serious injuries.

The City created a Vision Zero Safety Study and Technical Analysis in 2016, analyzing five years of crash data. Los Angeles identified their HIN and found that people walking and biking represent about 50% of all traffic deaths in the City. Thus, the City has focused on areas along the HIN where the most traffic deaths and serious injuries have occurred involving people walking and biking. The safety study also found that most drivers involved in serious traffic collisions are men, and the biggest factors in driver behavior that lead to traffic fatalities and serious injuries are insobriety, speeding, and failure to yield.

The City created a scoring system to determine which HIN intersections and corridors to focus on immediately--identifying them as priority corridors. The scores consider the number of traffic fatalities and serious injuries, whether a child or senior was involved, and if the location was in a community with negative health outcomes.

The Vision Zero Executive Steering Committee meets with the Vision Zero Task Force--which has subcommittees for Education, Engineering, Enforcement, and Evaluation--and the Vision Zero Alliance every other week to ensure robust communication among the broad-based Vision Zero coalition. The Vision Zero Alliance is a coalition of 25 community and advocacy organizations that drives the City's Vision Zero efforts to ensure the initiative leads to safe and equitable streets.

The City's Vision Zero initiative has a dedicated focus on equity and engagement. In the development of the Vision Zero Action Plan, the City commissioned the Prevention Institute to conduct a health-equity analysis of the City's Vision Zero planning efforts and methodology to ensure that future traffic safety projects consider the equity of their locations. The Action Plan also explicitly calls out the Los Angeles Police Department (LAPD) to equitably enforce traffic violations among all communities.

The City also developed a Vision Zero Education and Outreach Strategy in April of 2016 which involves partnerships with community organizations, and robust door-to-door outreach, temporary street interventions, and media engagement. Part of the education campaign included partnerships with various community organizations to conduct Vision Zero outreach. Seven teams of community organizations engaged in creative traffic safety campaigns on priority corridors. The teams surveyed over 2,000 residents, showing an increase of Vision Zero awareness by 20%.

Following the goals laid out in the Vision Zero Action Plan at the beginning of 2017, the City has completed 90 miles of HIN corridor improvements, including over 400 new crosswalks, 157 speed feedback signs, 109 pedestrian paddle signs, 152 'right sized' intersections, 7 pedestrian refuge islands, 7 pedestrian-activated yellow flashing beacons, 3 pedestrian scrambles 27% increase in speeding tickets, completed speed surveys for 100% of the HIN, and many more. Overall, the City made 1,120 changes to streets and intersections in 2017.

Infrastructure improvements to the priority corridors will take place in three phases. In 2017, the Los Angeles Department of Transportation (LADOT) completed phase 1 improvements to 17 of the 40 identified priority corridors. Phase 1 includes upgrading crosswalks to high-visibility crosswalks, installing speed-feedback signs, and reconfiguring intersections. Phase 2 will include new traffic signals, safer crossing opportunities, and minor concrete work. 100 intersections have also been identified for new traffic signals and signal upgrades with protected left-turn phasing. It is important to note that the HIN and priority corridors are continually updated as new data becomes available.

Additionally, LADOT is advancing Vision Zero through the Safe Routes to School, Safe Routes for Seniors, and Safe Access to Play programs. The Safe Access to Play program is a partnership between LADOT and the Los Angeles Department of Recreation and Parks and will be prioritize high crash areas near parks and recreational areas. A Vision Zero/Safe Routes to School resolution is a unique partnership with the Los Angeles Unified School District (LAUSD) and was established in 2017. Other ongoing strategies involve the adoption of new traffic safety policy and legislation, increased media coverage, and building partnerships with government organizations, insurance organizations, trauma centers, and technology companies.

Is Vision Zero Working?

Following the Vision Zero Action Plan, 2017 was the first year of full Vision Zero implementation for Los Angeles, despite the announcement of the initiative in 2015. According to data from the LAPD, traffic deaths decreased by 3% in 2017, with 245 traffic deaths compared to 253 in 2016. While this marks an improvement, the 3% decrease fell well short of the City's goal to reduce traffic fatalities by 20% by the end of 2017.

The City of Los Angeles released an updated 2018 Vision Zero Action Plan with renewed goals and strategies to achieve zero traffic fatalities by 2025. Data showed a major increase in pedestrian fatalities, but a decrease in traffic fatalities involving cars, motorcyclists, and bicyclists. In May of 2017 the City voted to increase the Vision Zero budget for 2017-2018 from $3.5 million to $27.2 million, giving the initiative a major boost.

Key Components of Action Plan

Timeline and/or Progress Reports: Goal to reduce traffic fatalities by 20% by the end of 2017 and by 50% by the end of 2020; Action Plans and Progress Reports will be released every year. The 2018 Vision Zero Action Plan and Progress Report was recently released in February.

Themes/5 "E"s: Focus on engineering, enforcement, education, evaluation, and a commitment to equity and engagement. Each of these "E"s fall under larger themes: create safe streets for all; develop a culture of safety; adopt new policy and legislation to strengthen safety; respond to relevant data.

Priority Corridors: Traffic crash data identified a HIN. Within the HIN, Los Angeles has created a scoring methodology based on total number of fatalities/severe injuries at that intersection; senior/child involved at intersection; and an intersection's location within neighborhood with poor health outcomes (based upon a health-equity study). This scoring methodology identifies priority intersections. The biggest clusters of highly-scored intersections then represent the priority corridors.

Equity: Equitable enforcement is highlighted and a commitment to prioritizing marginalized communities, especially those within HIN. There are multiple pages outlining an equity and engagement approach, goals, and funding. The City partnered with a group to conduct a health-equity study that shows the disparities in health outcomes across the City.

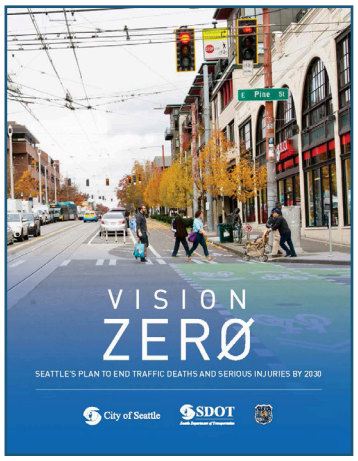
Goals/Actions: Specific goals and strategies are identified under each theme (mentioned above) for 2017, 2020, and by 2025, as well as the specific partners who will champion them.

Other Action Plan Notes

- The Vision Zero Alliance is a major advocacy champion for Vision Zero. This is a coalition of community organizations.
- There is a Vision Zero Executive Steering Committee, subcommittees for enforcement/education/engineering/evaluation, Vision Zero Core Team, and Vision Zero Task Force.
- Data shows that children, older adults, bicyclists, and pedestrians represent the highest number/proportion of traffic fatalities and serious injuries. Data also showed most traffic fatalities and serious injuries occur on arterials, by male drivers, and during turning movements.
- Separate from the action plan, Los Angeles has a Vision Zero Education & Outreach Strategy document.
- The plan provides a literature review of best practices/case studies for community engagement practices and street safety projects within Los Angeles.
- There is an associated vision zero safety study and technical analysis document that outlines the details around crashes from data (who, where, how, why, when).
- Creation of the plan: crash data and community meetings - "From July through August 2016, we conducted focus groups of community stakeholders throughout Los Angeles to learn about Vision Zero, exchange information about traffic safety issues, and identify potential solutions and partners. Ten geographically based meetings with residents and neighborhood-level leaders occurred throughout the City. Additionally, we conducted four topic-based meetings with the Vision Zero Alliance, medical/public health organizations, City legislation/policy staff from partner departments, and community leaders representing vulnerable communities. These participants also responded to the High-Injury Network data and shared their experiences and ideas for how to connect their related efforts to the Vision Zero initiative."

VISION ZERO ACTION PLAN FOR SEATTLE

What was Seattle's Goal?



The State of Washington launched a Target Zero campaign in the year 2000, which aims to end all traffic fatalities statewide. The state has since effectively reduced traffic fatalities on busy arterials in Seattle.

Building upon the state's example, Seattle released its Vision Zero Action Plan in 2015 with the goal to end traffic fatalities and serious injuries by the year 2030, with traffic fatalities decreasing every year. Seattle is considered one of the safest cities in terms of traffic fatalities and serious injuries, but approximately 20 people are still killed and 150 people seriously injured each year.

What is Seattle Doing?

Seattle is taking a data-driven approach to end traffic fatalities by closely analyzing and evaluating every traffic crash in the City. The City is focusing their efforts on arterials, as 9 out of 10 traffic fatalities and serious injuries occur on these major corridors. City data has found that motorcyclists, bicyclists, and pedestrians account for 62% of traffic fatalities. Most pedestrian fatalities occur among people 55 years or older. The major factors leading to traffic crashes have been distraction, insobriety, speeding, and failure to yield to pedestrians.

The Action Plan lays out specific short-term actions for street design, policies, regulation, education, public engagement, and enforcement. As part of Vision Zero, Seattle is building upon existing Pedestrian and Bicycle Master Plans, the Safe Routes to School program, and the Greenways program.

Seattle has completed a number projects since launching Vision Zero in February of 2015. In November 2015, $207 million was dedicated to street safety projects over a 9-year period. The City also completed the 5-year action plan for Safe Routes to School. As of the beginning of 2017, Seattle has lowered the speed limit to 20 mph on over 2,400 miles of residential streets and lowered the speed limit to 25 mph on 80 miles of arterial streets. The City has also made numerous street safety improvements to multiple major corridors, built protected bike lanes, and enhanced many pedestrian crossings.

Is Vision Zero Working?

Since Seattle's Vision Zero initiative began in 2015, the number of traffic fatalities has largely remained the same, with the number of serious injuries decreasing overall. In 2015 there were 21 traffic fatalities, 20 in 2016, and around 20 in 2017 (still pending). With traffic fatalities on the rise nationally and Seattle's rapidly increasing population, this trend appears to prove that Seattle's Vision Zero safety projects are effective, but they aren't meeting the City's goal to decrease fatalities every year.

The total number of fatal and serious injuries in 2016 was 191, a 16.5% increase from 2015. As of December 2017, however, there had been 122 serious injuries, which shows a 36% decrease from 2016. Despite traffic fatalities remaining the similar, the recent decrease in serious injuries is a good sign that Vision Zero in Seattle is beginning to see positive results.

Key Components of Action Plan

Timeline and/or Progress Reports: 2015 action plan and 2017 progress report; Progress reports every year; 2030 goal to end traffic deaths.

Themes/5 "E"s: The plan identifies near-term goals centered around themes (focused on arterials and also downtown urban center for pedestrian safety):

- Street design, policies, and regulation
- Education and public engagement
- Enforcement

Priority Corridors: traffic crash data shows a need to focus on speeds and arterials and identifies high crash corridors.

Equity: Partnering with Dept. of Neighborhoods Community Liaisons for continued community outreach in underserved communities; Outlines the goal to approach enforcement of Vision Zero through the City's Racial Equity Toolkit (part of the City's Race and Social Justice Initiative). The equity component was largely addressed in the 2017 Progress Report.

Goals/Actions: The plan outlines specific goals, actions and prioritized locations. No specific partners are identified and no specific funding. Most actions and goals are for 2015 and are to be continually updated.

Other Action Plan Notes

- Data shows that children, older adults, bicyclists, and pedestrians represent the highest number/proportion of traffic fatalities and serious injuries.
- One of their key approaches in the action plan is to coordinate all existing plans and initiatives under one Vision Zero initiative.

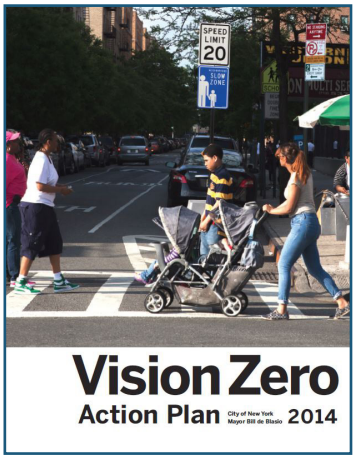
- Seattle Police Department has a traffic collision investigation squad that investigates the conditions of every traffic collision.

2017 Progress Report

- The report evaluates the City's Vision Zero progress and performance under the categories of Engineering, Education and Engagement, Enforcement, and Evaluation.
- A bicycle and pedestrian safety analysis was completed in 2016 that looks deeply at data and even identifies areas with high potential for future collisions.
- High crash corridors updated and ranked based upon traffic volume, street width, and collision history (identified 100 corridors).
- Evaluation is further emphasized through annual progress reports, annual traffic reports, Vision Zero performance dashboard, and individual project reports (all using various forms of data).

VISION ZERO ACTION PLAN FOR NEW YORK CITY

What was New York City's Goal?



As described by the Vision Zero Action Plan, "the primary mission of the government is to protect the people." The City deserves and expects safe streets, but each year there are about 4,000 residents who are significantly injured and more than 250 killed due to traffic crashes.

The City is prepared to use any and every tool available to increase safety for all. The goal is to eliminate fatalities and serious injuries. To achieve this goal, a Vision Zero Task Force has been formed to play an important role. The task force will establish additional benchmarks and record and report the results of the safety measures taken.

What is New York City Doing?

The New York City Department of Transportation (NYDOT), along with the New York City Police Department (NYPD), focused their efforts on high-crash corridors and intersections. Street redesign, enforcement, education, and public engagement were the strategies used to reduce fatalities in the high-crash areas.

The NYDOT and NYPD analyzed crash data in 2016. The research showed that early evening hours in fall and winter correlated with an increase of 40 percent in fatal and incapacitating injury crashes compared to the same hours in other seasons. The Vision Zero Task Force created a multi-agency strategy for enforcement and education. This strategy aimed to increase evening enforcement by NYPD and the Taxi and Limousine Commission (TLC) inspectors. The education component utilized on-street engagement and television/radio commercials to encourage safe driving during key hours. During this initiative, traffic fatalities declined 30%.

The TLC, along with other agencies, have developed additional safety measures. The TLC has developed rules to prevent for-hire vehicle operators from driving while excessively fatigued. The Department of Citywide Administrative Services (DCAS) developed and announced a policy prohibiting City employees from using cell phones, even with hands-free features. The Metropolitan Transit Authority (MTA) expanded their pilot project of collision avoidance sensors and pedestrian alert technologies to prevent serious crashes.

NYDOT has completed 242 Safety Engineering Projects since the beginning of Vision Zero. These projects included, narrowing lanes, adding bicycle paths, increasing visibility of pedestrians and cyclists, and shortening pedestrian crossing distances. NYDOT implemented 105 of the 242 projects in 2016 alone. This was more than any previous year and more than doubled the pace of implementation prior to Vision Zero. Other safety measures have also reduced left turn speeds at 24 percent of all locations, resulting in safer pedestrian crossings.

In October 2016, the Department of Health and Mental Hygiene (DOHMH) proposed and Coordinated "Research on the Road." This allowed for over 40 external researchers to work with agencies in the Vision Zero Task Force. This event facilitated an opportunity to share research across all agencies. In addition, the DOHMH continued the "Data Linkage" project. The Data Linkage project provides preliminary analyses of the injury patterns connected to specific crash types.

Since the Vision Zero plan has been adopted, there has been an increase in the implementation of safety measures. Some additional measures include:

1. The addition of more than 37 miles of protected bike lanes.
2. An increase in summonses given to drivers for Failure to Yield violations (42,385 in 2016).
3. 31,000 schools in/near the priority locations have received safety education.
4. 1,248 Leading Pedestrian Intervals installed (776 in 2016).

Is Vision Zero Working?

The first three years of Vision Zero resulted in the safest three-year period in the history of New York City. Even though the safest period in New York City history has occurred after the implementation of Vision Zero, there is still room for improvement. A fatal crash continues to occur once every 38 hours. Continuing with the progress that has been made, New York City is able to work towards the goal of zero fatalities and incapacitating injuries.

In 2016, a Vision Zero ad campaign allowed for more individuals to understand the importance of the goal. The New York City Vision Zero plan has reported that 82 percent of residents claim that they are more likely to practice safer driving.

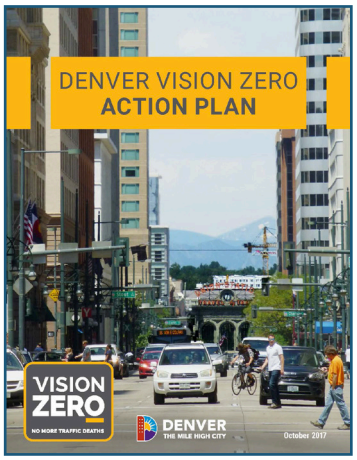
With the efforts from NYDOT, NYPD, education campaign, and other organizations, Vision Zero is working. During the five years before Vision Zero was implemented, 141 annual deaths occurred at "priority locations" as described in the Vision Zero Plan, compared to 100 in 2016, a 29 percent reduction. The fatalities of pedestrians have also declined from 99 annually from 2009-2013 to 72 in 2016, a 27 percent reduction.

Even though there is still room for improvement, the efforts from New York City's Vision Zero has seen positive results that should not go unnoticed. Agencies must continue to develop new ideas and regulations to help improve safety for all. Continuously evaluating, improving, and creating safety measures is an important component to Vision Zero.

VISION ZERO ACTION PLAN FOR DENVER

What was Denver's Goal?

The initial organization for the Denver Vision Zero initiative began in 2015, with the official commitment from the mayor announced in early 2016. The Denver Vision Zero Action Plan was then released in October of 2017. The Action Plan is a five-year plan that lays out specific measurable strategies for the first half of the City's goal to achieve zero traffic fatalities and serious injuries by the year 2030. Based upon progress and evaluation, Denver will release a second updated Action Plan in 2025 to steer the initiative for the remaining five years.



The Denver Public Works and Denver Department of Public Health and Environment are leading the effort along with Technical Advisory Committee of various local, regional, and state partners. This includes the Vision Zero Coalition, which is a group of local community and advocacy organizations formed to influence the City's Vision Zero initiative and conduct community outreach.

What is Denver Doing?

Denver conducted an in-depth data analysis, identifying a HIN of streets with the most traffic fatalities and serious injuries. The HIN consists of just 5% of Denver's streets but 50% of traffic fatalities. The data showed that most traffic fatalities occur at mid-block locations and in unlit conditions.

Equity is one of the top priorities in Denver's Vision Zero Action Plan. The City commits to equitable, community-based police enforcement efforts that focus on positive reinforcement, education, and training instead of increased fines for traffic violations. In addition to the HIN, Denver will focus most of their street safety resources on the most vulnerable underserved areas, identified as Communities of Concern. These communities often overlap with the HIN and have "low income and education levels, high concentrations of seniors and people with disabilities, low rates of vehicle ownership, high obesity rates, and high numbers of schools and community centers."

The City conducted online survey and in-person intercept surveys at different areas within the Communities of Concern. The top community concerns were distracted driving, speeding, failure to yield, a lack of crosswalks, and the amount of time for pedestrians to cross.

The Vision Zero Action Plan lays out 70 actions, developed by the Technical Advisory Committee, to collaboratively achieve zero traffic fatalities and serious injuries in both the short-term (2018-2019) and long-term (2020-2023). The actions fall under the following themes, each with leading roles for primary partner organizations:

1. Enhance City Processes and Collaboration
2. Build Safe Streets for Everyone
3. Create Safe Speeds
4. Promote a Culture of Safety
5. Improve Data and Be Transparent

The City's street design toolkit focuses on reducing speed as its primary concern while planning for all transportation modes. Street safety measures could include parking restrictions/daylighting, leading pedestrian intervals, slow zones on neighborhood streets, median refuge islands, and more. To quickly and cheaply address safety concerns where needed, Denver will utilize temporary materials such as paint, flexible bollards, and signage.

Since announcing Vision Zero in 2016, a few of the completed street safety projects have included Rectangular Rapid Flashing Beacons, lowered speed limits, curb extensions, raised medians, protected left turn phases, and improved sidewalks.

Is Vision Zero Working?

Since Denver officially committed to Vision Zero at the beginning of 2016, traffic fatalities have decreased from 61 fatalities in 2016 down to 51 fatalities in 2017. Because the detailed Vision Zero Action Plan was not released until late in 2017, implementation and evaluation has been limited. Based upon the declining numbers in 2017, however, it appears that the initiative has begun to see positive results.

Key Components of Action Plan

Timeline and/or Progress Reports: The Action Plan is a 5-year plan with the goal of ending traffic fatalities in 2030. Another action plan will be released after the first five years.

Themes/5 "E"s: The 5 "E"s are not specifically included; The action plan outlines 5 primary needs/themes:

- Enhance processes and collaboration
- Build Safe Streets for Everyone
- Create Safe Speeds
- Promote a Culture of Safety (equitable enforcement)
- Improve Data and Be Transparent (crash data, speed data, & evaluation of projects, smart City predictive data, available to public)

Priority Corridors: A HIN of locations with the highest number of traffic fatalities/injuries was identified. Of the corridors and intersections, 96% were arterials, 1% collector roads, and 3% residential streets.

Equity: Communities of Concern were identified to try and cut down on the disparities in traffic injuries/deaths. Equitable police enforcement was emphasized with a specific educational and community empowerment approach.

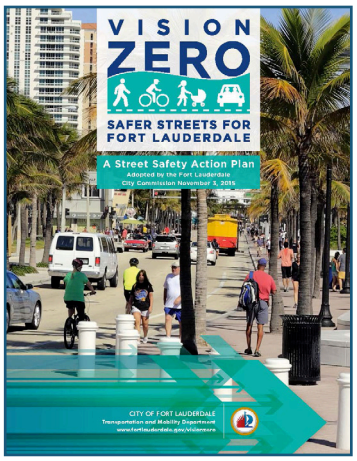
Goals/Actions: 70 actions were created by the Technical Advisory Committee--both short-term (2018-2019) and medium-term (2020-2023). All the actions have timeframes, evaluation measures, and identified partners.

Other Action Plan Notes

- The Denver Vision Zero Coalition is a major advocacy champion for Vision Zero. This is a coalition of community organizations.
- Data shows that children, older adults, bicyclists, and pedestrians represent the highest number/proportion of traffic fatalities and serious injuries.
- Traffic deaths have risen since 2009.
- The action plan was set up by reviewing crash data and from input from the Technical Advisory Committee and the public. Public input came from in-person outreach along the HIN and in Communities of Concern and through online surveys.
- The plan provides a literature review of best practices/case studies for street safety projects within Denver.

VISION ZERO ACTION PLAN FOR FORT LAUDERDALE

What was Fort Lauderdale's Goal?



The City of Fort Lauderdale adopted Vision Zero in November of 2015. The Action Plan outlines strategies centered around the Five "E"s--Engineering, Education, Encouragement, Enforcement, and Evaluation. The Action Plan includes the creation of a Vision Zero Steering Committee, consisting of various local, regional, and state partner organizations to help implement Vision Zero. Fort Lauderdale began Vision Zero implementation during the Summer of 2016. The Action Plan outlines the goal of producing a progress report every two years and an updated Action Plan every 5 years.

What is Fort Lauderdale Doing?

Through the Vision Zero Action Plan, Fort Lauderdale used an array of traffic crash data and survey responses to further understand the nature of traffic fatalities and the community's desires. Neighbor Surveys conducted from 2012-2014 revealed that residents' major concerns were of bike safety, poor sidewalk conditions, and a lack of overall multimodal options.

Fort Lauderdale has identified top priority corridors and intersections based upon traffic fatalities and crashes for pedestrians and bicyclists. Data shows that bicyclists, pedestrians, and children are involved in the highest number of traffic fatalities and serious injuries. Most traffic crashes in the City also occur at non-intersections.

Categorized under the Five "E"s--Engineering, Education, Encouragement, Enforcement, and Evaluation--the City of Fort Lauderdale has outlined specific actions as well as partners and potential funding sources. The City is committed to a holistic approach to eliminating traffic fatalities and serious injuries. Various street design methods were mentioned including bike lanes, leading pedestrian intervals, continental crosswalks, reduced lane widths, lane elimination, street lighting, and ADA accessibility improvements.

Fort Lauderdale is building upon many existing programs and plans to achieve Vision Zero such as the Fast Forward Fort Lauderdale 2035 Vision Plan and Connecting the Blocks. The Connecting the Blocks program has identified over 400 specific bicycle, pedestrian, and overall streetscape improvement projects that will be a major component of the City's Vision Zero initiative.

Is Vision Zero Working?

The City of Fort Lauderdale had 24 total traffic fatalities and 257 bike and pedestrian crashes resulting in injuries in 2014. Because that plan is so new, sufficient data are not available to judge its progress.

Key Components of Action Plan

Timeline and/or Progress Reports: No end goal for zero fatalities; Progress report aimed for every two years and action plan every five years.

Themes/5 "E"s: Focus on 5 "E"s (Engineering, Education, Encouragement, Enforcement, and Evaluation).

Priority Corridors: Identified priority corridors and intersections where bike/pedestrian fatalities/injuries were highest and who owns the street (state or City of Fort Lauderdale). The City will focus resources on these high priority streets/intersections for first five years of implementing the action plan. The crash data with the priority corridors/intersections is further broken down into six zones of the City to localize the data and see their location in relation to public schools.

Equity: One small section that mentions equity as a potential positive outcome of Vision Zero, but no specific initiatives or goals related to equity were mentioned.

Goals/Actions: Identification of specific action strategies (under each of 5 "E"s) along with partners (and secondary partners) who would champion the action, and potential funding sources and legislative action.

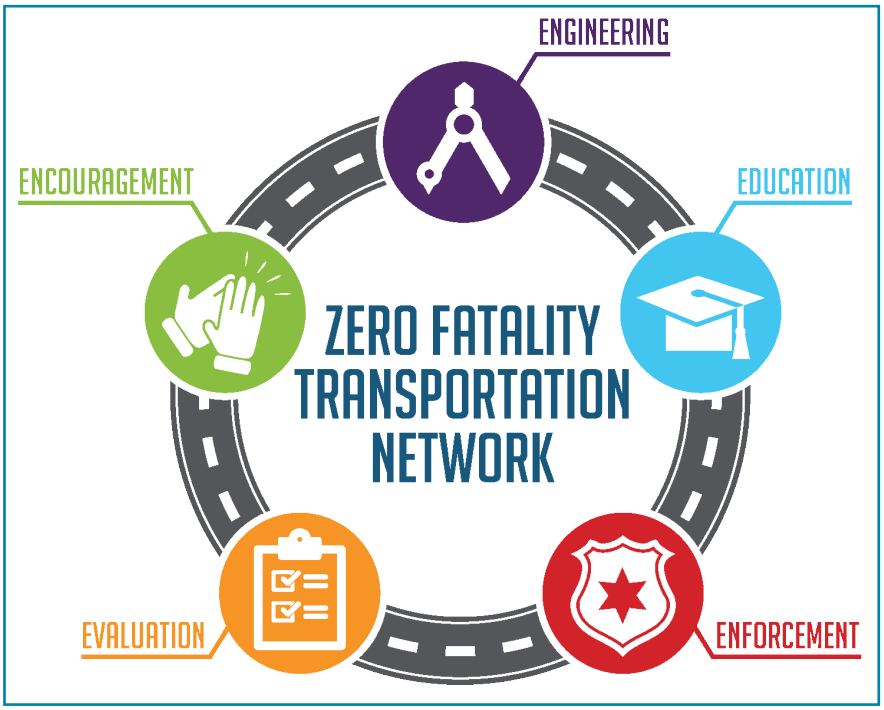
Partners/Committees: the plan specifies a goal to create a Vision Zero Champions Committee and Vision Zero Technical Committee with representatives from community partners. Various partners have been identified, but the committees have not been created yet as of the creation of the action plan.

Other Action Plan Notes

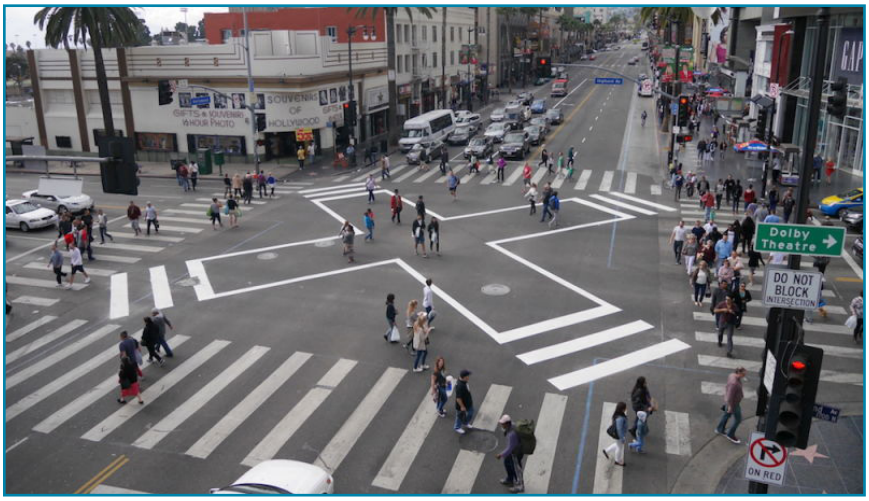
- The plan relies on existing plans/initiatives to reinforce Vision Zero, including annual neighbor surveys, the Fast Forward Fort Lauderdale 2035 Vision Plan, and the Complete Streets Policy.
- Data shows bicyclists, and pedestrians represent the highest number/proportion of traffic fatalities and serious injuries.
- Leveraging existing WalkSafe/BikeSafe and Safe Routes to School programs.
- Data analysis of bicycle and pedestrian crashes show when, how, and under what weather conditions they happen.

Lessons Learned

The relative success (or failure) of each Vision Zero Action Plan is based on their own metrics. Enforcement, encouragement, and equity are among the most expedient countermeasures that can be executed, and generally at much lower cost. Education and evaluation are examples of countermeasures that are moderate in terms of both scheduling and cost, in that it takes about one year for education to affect road user behavior, and evaluation requires at least one year's data to begin to determine if some of the short-term strategies are effective. Emergency response countermeasures vary between short- and long-term implementation schedules, and costs vary widely.



A common characteristic of the more successful plans is engagement. The most important factor for success is bringing together all relevant agencies, municipalities, and, most importantly, the general public. All of the plans reviewed focus on the 5 "E"s and all confirm the prevalence of pedestrian and bicycle fatalities and serious injuries.



In considering the application of Engineering techniques as one of the 5 "E"s, the literature provides the lesson of openness in application of different safety countermeasures. In Hollywood, CA., for example, the usage of pedestrian scrambles, such as in the photo to the left, a technique not often utilized in Miami-Dade, and sometimes discouraged, resulted in a total reduction to zero crashes and fatalities for key intersections. A community, must be willing to look at a wide range of countermeasures to allow for the critical integration of alternative means that have been effective elsewhere.

The development of these alternative countermeasures was reviewed thoroughly by other Vision Zero Plans, and provide a detailed look at various vehicular, bicycle, and pedestrian countermeasures and their effectiveness. Specifically, the Los Angeles Vision Zero Plan reviewed the *FHWA Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes* as well as the Pedestrian and Bicycle Information Center's *Evaluation of Bicycle-Related Roadway Measures*.

Task 3 | Data Collection/Data Analysis

Overall Crash Statistics

This Vision Zero Plan focuses on those crashes involving fatalities and incapacitating injuries. The term "fatality" is defined as a victim who is pronounced dead at the scene, or who dies within thirty days of the date of the crash because of injuries received in the crash. An incapacitating injury (sometimes referred to as a serious injury) means that the victim must be carried or otherwise helped from the scene. This category is based strictly on the external evidence of injury.

Initially, files for state-wide crash data were downloaded from the FDOT's GIS website, the Unified Basemap Repository. These files contain both GIS file sets (geospatial imagery files paired with corresponding data attributes), as well as supplementary metadata (a "data dictionary"), which describe the information within the GIS files. The files were organized by year over a 5-year span, from 2010 to 2014. Each year contained six files, including pertinent data regarding general crash statistics, vehicle information, and occupant data, as described below:

- Crash Data, On State Highway System – ("On")
- Crash Data, Off State Highway System (On Local Roadway System) – ("Off")
- Vehicle Data, On State Highway System – ("Von")
- Vehicle Data, Off State Highway System (On Local Roadway System) – ("Voff")
- Occupant Data, On State Highway System – ("Oon")
- Occupant Data, Off State Highway System (On Local Roadway System) – ("Ooff")

The shapefiles were then processed using GIS software (ArcMap or ArcGIS Pro). Using the "Select-by-Attribute" tool, the files were distilled to show data only within Miami-Dade County. The data were further reduced to show only the "Fatalities" and "Incapacitating Injuries" within the County. These became the base files for the project.

Data were then extracted (both spatially and numerically) of the types of crashes: bicycle, pedestrian, and automobile crashes. High-crash nodes and networks were located using ArcMap/ ArcGIS Pro data analysis tools (e.g. Kernel Density, Optimized Hot Spot Analysis, etc.). The five-year history of crashes was sorted by year to identify locations with the highest numbers of fatalities and incapacitating injuries. The records were further stratified for crashes occurring on and off the state highway system.

A map series presenting the noted stratifications of the crash data is included in ***Appendix 3***.

Vehicular Crashes

Vehicular crashes tend to be concentrated at intersections and in high-volume corridors, where the primary crash types include Sideswipe/Same direction (33.5%), Head-on (25.7%), Unknown (23.3%), Sideswipe/Opposite direction (7.9%), and At-an-Angle (6.7%). All other crash types represent fewer than 3%. The current Department of Highway Safety and Motor Vehicles (DHSMV) crash report form does not include a code for a left-turn collision nor a front-to-side crash. This may be a possible explanation for the prevalence of head-on collisions, which most closely resemble the aftermath of a left-turn collision. The major contributing causes include careless or negligent driving (45.6%), failure to yield right-of-way (32.0%), and speeding (14.2%). These causes are primarily countered by enforcement and educational countermeasures.

Bicycle and Pedestrian Crashes

Between 2011 and 2014, inclusive, pedestrian and bicycle fatalities represent 37% of all fatal crashes on the Local Road System and 33% of all fatal crashes on the State Road System ***(Tables 1 & 2, respectively)***.

Table 1 - Local Road System Fatal Crashes by Mode

Fatal Crash Modal Splits - Local Road System										
Mode	2011		2012		2013		2014		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Motorist	52	62.7%	58	67.4%	50	62.5%	69	59.5%	229	62.7%
Pedestrian	26	31.3%	21	24.4%	22	27.5%	36	31.0%	109	29.9%
Cyclist	5	6.0%	7	8.1%	8	10.0%	11	9.5%	27	7.4%
Totals	83	100.0%	86	100.0%	80	100.0%	116	100.0%	365	100.0%
Bike/Ped	31	37.3%	28	32.6%	30	37.5%	47	40.5%	136	37.3%

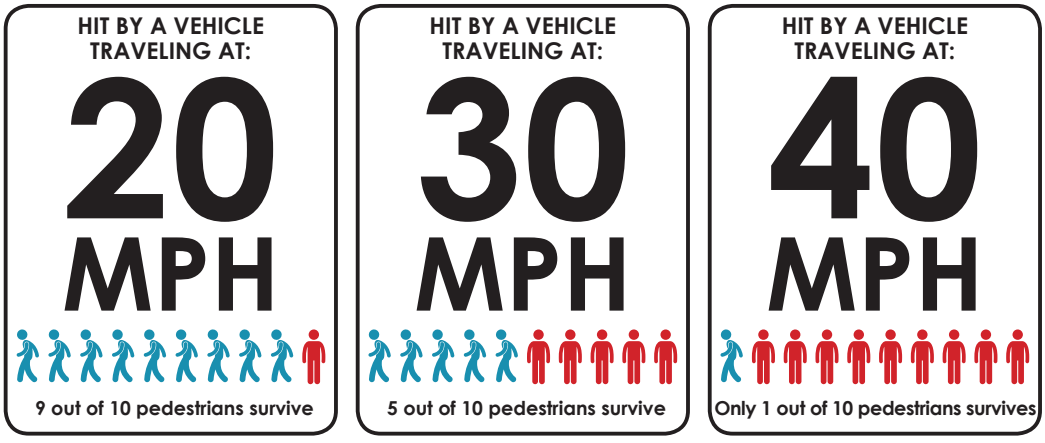
Table 2 - State Road System Fatal Crashes by Mode

Fatal Crash Modal Splits - State Road System										
Mode	2011		2012		2013		2014		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Motorist	34	58.6%	30	85.7%	89	65.0%	104	67.5%	257	66.9%
Pedestrian	23	39.7%	5	14.3%	46	33.6%	38	24.7%	112	29.2%
Cyclist	1	1.7%	0	0.0%	2	1.5%	12	7.8%	15	3.9%
Totals	58	100.0%	35	100.0%	137	100.0%	154	100.0%	384	100.0%
Bike/Ped	24	41.4%	5	14.3%	48	35.0%	50	32.5%	127	33.1%

When considering that U.S. Census data indicate fewer than 5% of the County population walk or bike to work, pedestrian and bicycle fatalities are an inordinate proportion of all fatal crashes, requiring immediate and aggressive countermeasures to reduce them. That will have a significant impact on the County's overall fatality rate.

Vehicle speed is the primary cause of pedestrian and bicyclist fatalities. A pedestrian (or bicyclist) involved in a collision with a motor vehicle traveling at 40 miles per hour has a 90% chance of being killed ***(Figure 2)***.

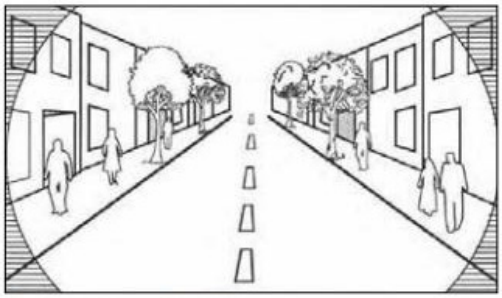
Figure 2 - Pedestrian Survivability



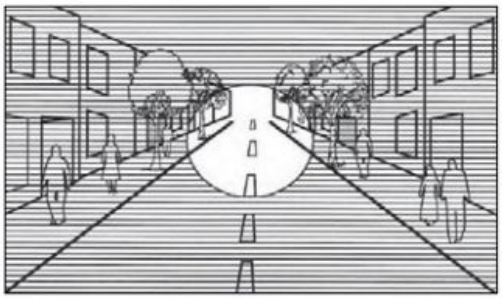
In addition to the time it takes for a motorist to react and bring a vehicle under control at high speeds, the motorist is also less likely to notice potential conflicts due to a reduced field of vision ***(Figure 3)***.

Figure 3 - Field of Vision

WHY SPEED MATTERS



Field of vision at 15 MPH



Field of vision at 30 to 40 MPH

Forty (40) mph is a comfortable traveling speed; it is equivalent to nearly 60 feet per second. Driver reaction times vary depending on the individual and surrounding environment, but an accepted average driver reaction brake time is 2.3 seconds. Actual time to stop also varies depending on the vehicle, but the average driver can bring a vehicle traveling 40 mph to a stop, in 2.7 seconds. This means that from the time a potential conflict is observed by a driver, a vehicle traveling 40 mph will cover approximately 300 feet before coming to a stop in 5 seconds. Federal guidelines for traffic signal timings assume an average walk speed of 3.5 feet per second. During the same 5 seconds that it takes a vehicle traveling at 40 mph to come to a stop, a pedestrian will have traveled only 18 feet, *less than the width of two road lanes.*

Because the goal of a Vision Zero Plan is to eliminate deaths and serious injuries, a systematic approach to achieving this goal is to prioritize locations with the largest numbers of these types of events and work toward zero. But, because pedestrian and bicycle crashes are spread throughout the County, as opposed to being concentrated at “high crash locations”, it is necessary to approach these types of crashes through county-wide, policy-based countermeasures.

Figure 4 illustrates where the most frequent numbers of fatalities and serious injuries have occurred for all modes on the State Highway System.

FDOT, as compared to local governments, has a robust program for addressing vehicular high-crash locations through engineering solutions. To compliment that program, this Plan focuses on local roadway network locations at which there have been five (5) or more vehicular fatalities and/or serious injuries in the period 2010- 2014. There are 18 such locations on the local road network throughout Miami-Dade County ***(Figure 5)***.

Figure 4 - Occurrences of Fatalities & Serious Injuries State Highway System (2010-2014)

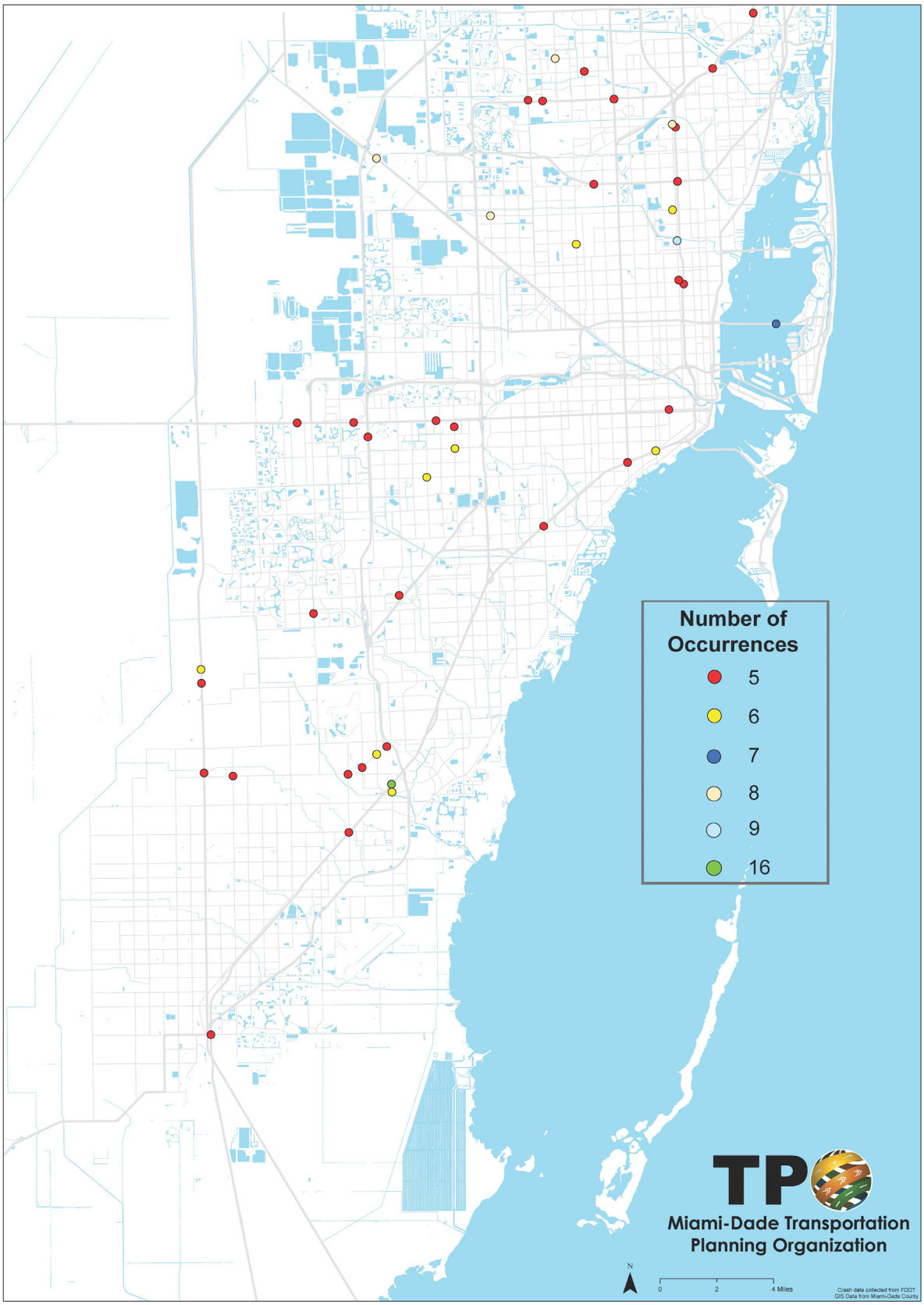
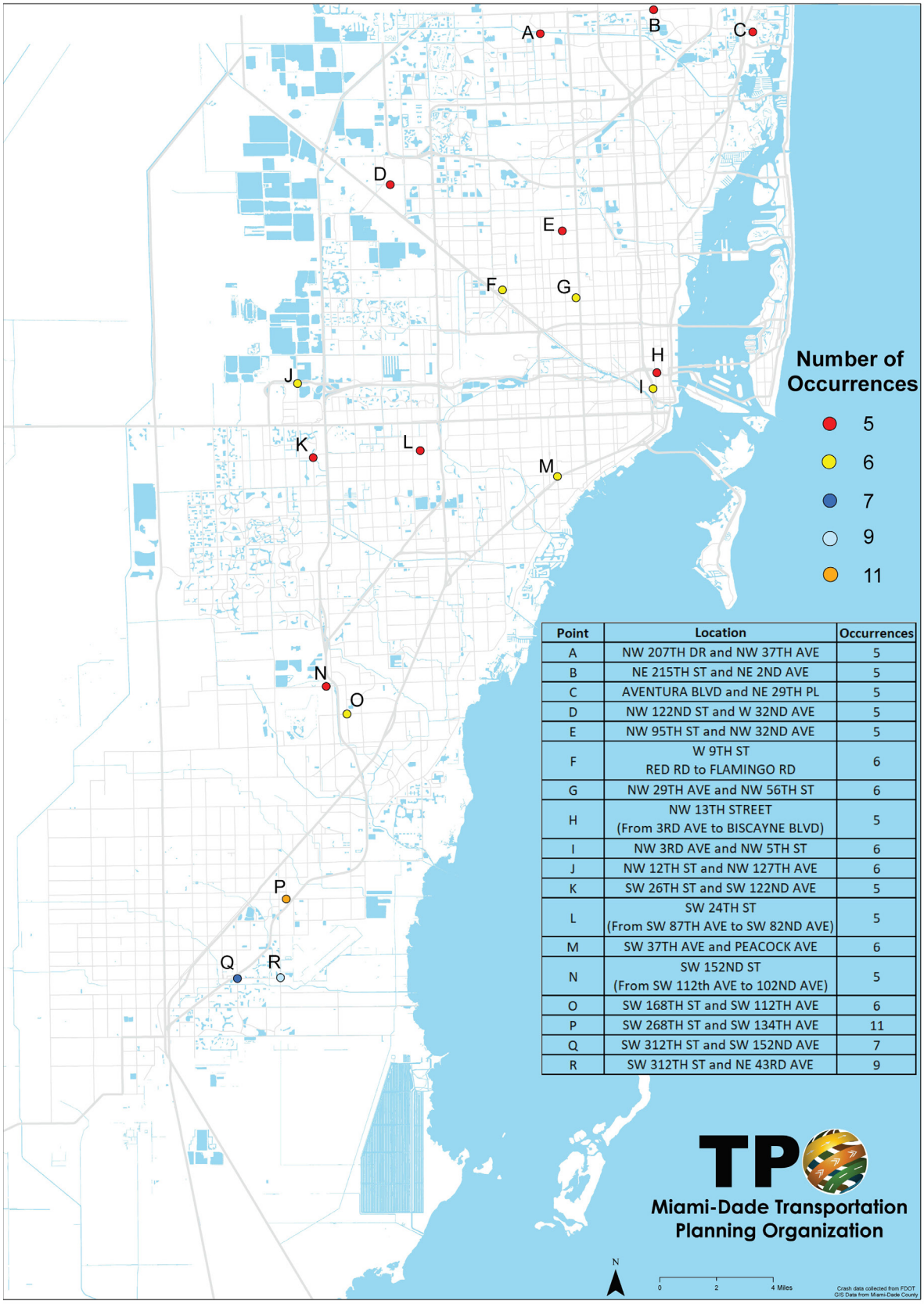


Figure 5 - Occurrences of Fatalities & Serious Injuries Local Roadway System (2010-2014)



Point	Location	Occurrences
A	NW 207TH DR and NW 37TH AVE	5
B	NE 215TH ST and NE 2ND AVE	5
C	AVENTURA BLVD and NE 29TH PL	5
D	NW 122ND ST and W 32ND AVE	5
E	NW 95TH ST and NW 32ND AVE	5
F	W 9TH ST RED RD to FLAMINGO RD	6
G	NW 29TH AVE and NW 56TH ST	6
H	NW 13TH STREET (From 3RD AVE to BISCAYNE BLVD)	5
I	NW 3RD AVE and NW 5TH ST	6
J	NW 12TH ST and NW 127TH AVE	6
K	SW 26TH ST and SW 122ND AVE	5
L	SW 24TH ST (From SW 87TH AVE to SW 82ND AVE)	5
M	SW 37TH AVE and PEACOCK AVE	6
N	SW 152ND ST (From SW 112th AVE to 102ND AVE)	5
O	SW 168TH ST and SW 112TH AVE	6
P	SW 268TH ST and SW 134TH AVE	11
Q	SW 312TH ST and SW 152ND AVE	7
R	SW 312TH ST and NE 43RD AVE	9

Figure 6 - Crash Trends (2010-2014)

Despite a lull in the 2011-2013 number of fatalities and serious injuries, 2014 data are contrary to that trend as shown in ***Figure 6***. Increases in population and traffic often lead to higher-risk behavior, such as accepting small gaps in traffic.

Table 3 provides a summary of the characteristics of the crashes at the 18 locations of interest. Eleven (11) of these locations are controlled by a traffic signal. On the other hand, the location with the highest number of incidents (SW 268th Street and SW 134th Avenue), is controlled by a 4-way stop sign.

An examination of these data indicates the prevalent ages of all persons involved in the crashes sustaining serious injuries or fatalities on the local road system ***(Figure 7)***. The group involved in over one-third (36.6%) of fatal or serious injury crashes is from 16 to 30 years of age, inclusive.

Figure 7 - Fatalities and Serious Injuries by Age on Local Roads (2010-2014)

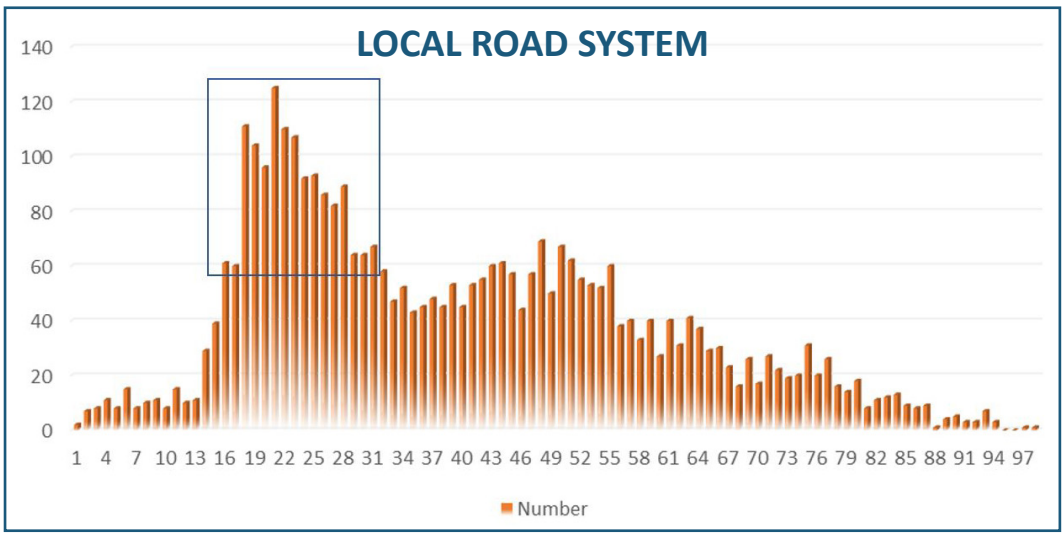


Table 3 - Characteristics of Crashes at Higher-Crash Locations on Local Miami-Dade County Roads

Identifier	Location	Crashes	Number of Lanes/ Configuration [1]	Traffic Control	Speed Limit [2]	Annual Average Daily Traffic [3]	Annual Crash Rate [4]	Sidewalks/Side [5]	Bike Lanes/Side [6]
A	NW 207TH DR and NW 37TH AVE	5	5 NB 5 SB 2/U EB	Stop EB (Tee)	35 NB 35 SB 30 WB	18,700 N-S 535 E-W	0.142	NB Y/B SB Y/B WB Y/B	NB N/N SB N/N EB N/N WB N/N
B	NE 215TH ST and NE 2ND AVE	5	2/U NB 2/U SB 2/U EB 2/U WB	Signal	30 NB 30 SB 30 EB 30 WB	6,600 N-S 7,700 E-W	0.192	NB Y/B SB Y/B EB Y/B WB Y/L	NB Y/B SB N/N EB N/N WB N/N
C	AVENTURA BLVD and NE 29TH PL	5	5 NB 4/D SB 4/d EB 4/D WB	Signal	30 NB 30 SB 35 EB 35 WB	10,000 E-W 5,900 N-S	0.172	NB Y/B SB Y/B EB Y/B WB Y/B	NB N/N SB N/N EB N/N WB N/N
D	NW 122ND ST and W 32ND AVE	5	5 NB 2/U SB 4/D EB 4/D WB	Signal	30 NB 30 SB 35 EB 35 WB	16,000 N-S 25,000 E-W	0.067	NB Y/B SB Y/B EB Y/R WB Y/L	NB N/N SB N/N EB N/N WB N/N
E	NW 95TH ST and NW 32ND AVE	5	5 NB 5 SB 2/U EB 2/U WB	Signal	35 NB 35 SB 30 EB 30 WB	25,000 N 14,800 S 12,400 W	0.085	NB Y/B SB Y/B EB Y/B WB Y/B	NB N/N SB N/N EB N/N WB N/N
F	W 9TH ST	6	4/U	Corridor	40	14,000 E-W	0.124	Y/B	N/N
G	NW 29TH AVE and NW 56TH ST	6	2/U NB 2/U SB 2/U EB 2/U WB	Stop N/S	30 NB 30 SB 30 EB 30 WB	2,480 N-S 4,760 E-W	0.454	NB Y/B SB Y/B EB Y/B WB Y/B	NB N/N SB N/N EB N/N WB N/N
H	NW 13TH STREET	5	2/U	Corridor	30	9,800 E-W	0.373	Y/B	N/N
I	NW 3RD AVE and NW 5TH ST	6	1-WAY 2 NB 1-WAY 3 EB	Signal	30 NB 30 EB	8,500 N-S 9,800 E-W	0.180	NB Y/R EB Y/B	NB N/N EB N/N
J	NW 12TH ST and NW 127TH AVE	6	4/D NB 4/D SB 4/D EB 5 WB	Signal	40 NB 40 SB 40 EB 40 WB	18,000 N-S 23,900 E 15,600 W	0.090	NB Y/B SB Y/B EB Y/B WB Y/B	NB Y/B SB N/N EB N/N WB N/N

Table 3 - Characteristics of Crashes at Higher-Crash Locations on Local Miami-Dade County Roads (continued)

Identifier	Location	Crashes	Number of Lanes/ Configuration [1]	Traffic Control	Speed Limit [2]	Annual Average Daily Traffic [3]	Annual Crash Rate [4]	Sidewalks/Side [5]	Bike Lanes/Side [6]
K	SW 26TH ST and SW 122ND AVE	5	4/D NB 5 SB 4/D EB 4/D WB	Signal	30 NB 30 SB 40 EB 40 WB	22,400 N 12,100 S 35,000 E-W	0.052	NB Y/B SB Y/B EB Y/B WB Y/B	NB N/N SB N/N EB N/N WB N/N
L	SW 24TH ST	5	6/D	Corridor	40	53,000 E-W	0.061	Y/B	N/N
M	SW 37TH AVE and PEACOCK AVE	6	5 SB 5 EB 3 WB	Signal (Tee)	40 NB 40 SB 30 WB	15,400 N-S 4,000 E	0.169	NB Y/B SB Y/B WB Y/B	NB N/N SB N/N WB N/N
N	SW 152ND ST	5	4/D	Corridor	40	37,000 E-W	0.087	Y/B	N/N
O	SW 168TH ST and SW 112TH AVE	6	2/U NB 2/U SB 2/U EB 2/U WB	Signal	40 NB 40 SB 40 EB 40 WB	8,200 N-S 9,700 E-W	0.184	NB Y/R SB Y/B EB Y/R WB Y/B	NB N/N SB N/N EB N/N WB N/N
P	SW 268TH ST and SW 134TH AVE	11	2/U NB 2/U SB 4/U EB 4/U WB	4-Way Stop	30 NB 30 SB 40 EB 40 WB	9,500 N-S 11,300 E-W	0.290	NB Y/L SB Y/B EB Y/B WB Y/B	NB N/N SB N/N EB N/N WB N/N
Q	SW 312TH ST and SW 152ND AVE	7	4/D SB 4/D EB 4/D WB	Signal (Tee)	40 SB 40 EB 40 WB	10,100 N 16,400 E-W	0.145	SB Y/B EB N/N EB Y/R	SB N/N EB N/N WB N/N
R	SW 312TH ST and NE 43RD/137TH AVE	9	4/D NB 4/D SB 2/U EB 4/D WB	Signal	40 NB 40 SB 30 EB 40 WB	7,700 N-S 16,400 E-W	0.205	NB Y/B SB Y/B EB Y/L WB Y/L	NB N/N SB N/N EB N/N WB N/N

Notes:
1 - U=Undivided, D=Divided, Odd number indicates painted median.
2 - Speed Limits are given for the identified approach. Corridors are two-way.
3 - AADTs are given for the identified approach.
4 - Crash Rate is given in crashes per million vehicles entering (intersection), or per million vehicle miles (corridor).
5 - Sidewalks are given for the identified departure. Corridors are two-way. L=Left, R=Right, B=Both, N=Neither.
6 - Bike lanes are given for the identified departure. Corridors are two-way. L=Left, R=Right, B=Both, N=Neither.

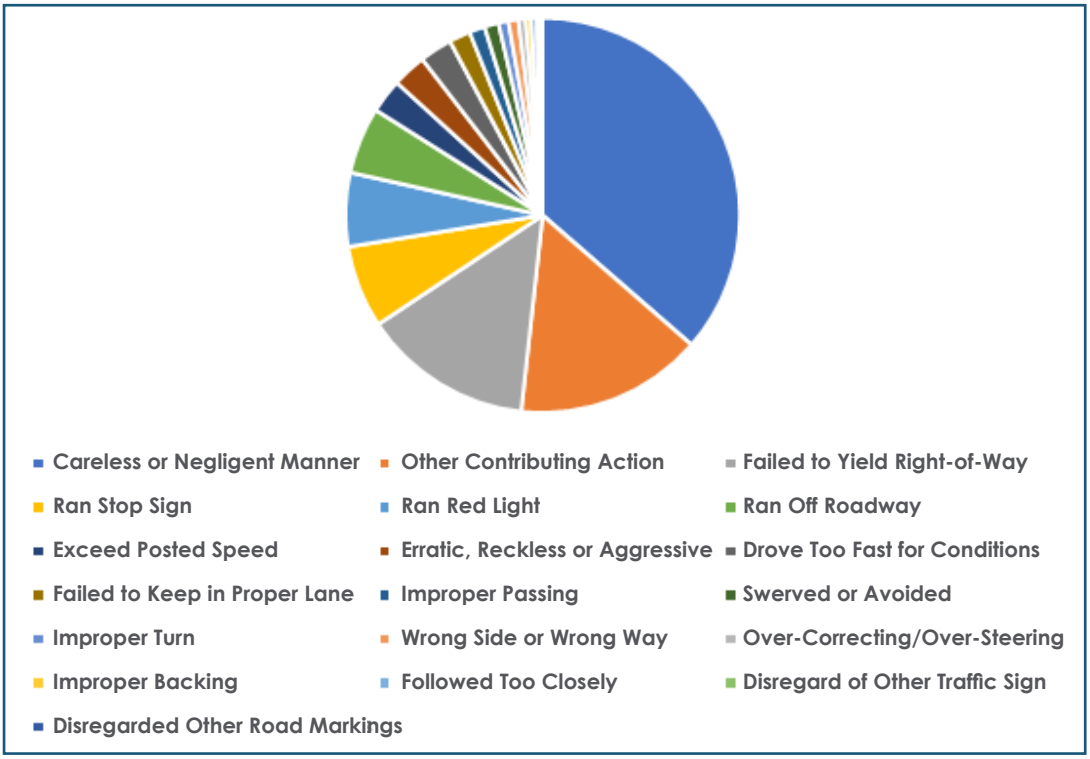
Contributing Causes

The local roadway network fatal and injury data for which contributing causes were identified[4], were sorted to determine the primary actions of motorists that led to the incidents ***(Table 4 & Figure 8)***. The No. 1 cause is driving in a careless or negligent manner, at 45.6% of all crashes. Failure to Yield Right-of-Way, and two related causes: Ran Stop Sign and Ran Red Light, represent 16.8%, 8.1%, and 7.1%, respectively, of all crashes, for a combined total of 32%. Causes related to excessive speed (Ran Off Roadway; Exceed Posted Speed; Erratic, Reckless or Aggressive; and Drove Too Fast for Conditions) account for 14.2% of all crashes. The remaining 8.2% of crashes, in order of prevalence include: Improper Passing; Failed to Keep in Proper Lane; Swerved or Avoided; Improper Turn; Over-Correcting/Over-Steering; Wrong Side or Wrong Way; Improper Backing; Disregard of Other Traffic Signs; Followed Too Closely; and, Disregarded Other Road Markings.

Table 4 - Contributing Causes of Local Road Crashes (2010-2014)	
Careless or Negligent Manner	45.6%
Failed to Yield Right-of-Way	16.8%
Ran Stop Sign	8.1%
Ran Red Light	7.1%
Ran Off Roadway	6.1%
Exceeded Posted Speed	2.8%
Erratic, Reckless or Aggressive Driving	2.8%
Drove Too Fast for Conditions	2.5%
Improper Passing	1.7%
Failed to Keep in Proper Lane	1.5%
Swerved or Avoided	1.4%
Improper Turning	1.0%
Over-Correcting/Over-Steering	0.8%
Wrong Side or Wrong Way Driving	0.6%
Improper Backing	0.4%
Disregarded Other Traffic Signs	0.4%
Followed Too Closely	0.3%
Disregarded Other Road Markings	0.1%

[4] Those crashes removed from consideration included: Not Coded, No Contributing Action, Other Contributing Action, and Unknown.

Figure 8 - Contributing Causes of Local Road Crashes (2010-2014)



Typically, a law enforcement officer (LEO) is not present at the instant a collision occurs, and she/he must rely on evidence obtained from those involved in the collision, physical evidence, and any witnesses who volunteer to stay on-site to give a statement. During the officer's interview, *those involved are unlikely to implicate themselves by admitting to speeding or being distracted by texting, eating, talking on the phone, etc.* Therefore, speeding and distracted driving are deemed to be under-reported contributing causes for the purposes of this analysis, which is borne out by previous studies implicating these causes on the number and severity of crashes.

The most frequently-cited contributing factor by LEOs is driving in a "Careless or Negligent Manner", undoubtedly the most probable cause for crashes, but this classification lacks specific details on how the driver acted carelessly or negligently. Electronic crash report systems do not allow for the identification of distractions as a contributing cause. Florida has enacted a "No-Texting-While-Driving" law, but due to physical limitations, it is difficult to enforce, or is cited as a secondary offense, if there happens to be a witness.

To identify crash prevention countermeasures, *speeding and distracted driving must rank high on the list of priority targets.* Failure to yield right-of-way is also a major cause of crashes occurring primarily at intersections. The remaining contributing causes are less prevalent, but no less important. Improper passing, failure to keep in proper lane, improper turns, are all contributing causes related to driver performance, and point to the need for increased/improved education and enforcement.

Task 4 | Countermeasure Selection

The Miami-Dade Transportation Planning Organization commissioned this report to determine the extent of fatal and serious injury crashes, identify mitigating strategies, and develop an action plan of implementing countermeasures to prevent these tragedies in the future. Analyses were undertaken to stratify the various types of crashes and crash characteristics (time and day-of-week, mode, age, and contributing causes, etc.). The overall crash statistics ***(Table 5)*** stress the need to take positive action NOW.

Table 5 - Fatal and Serious Injury Crashes
Miami-Dade County

Year	On-System		Off-System		Total	
	K	A	K	A	K	A
2010	140	1,139	103	586	243	1,725
2011	58	391	83	686	141	1,077
2012	35	313	86	697	121	1,010
2013	137	1,108	80	638	217	1,746
2014	151	1,087	116	712	267	1,799
Total	521	4,038	468	3,319	989	7,357
AVG	104	808	94	664	198	1,471
	11%	89%	12%	88%	12%	88%

K = Fatality
A = Incapacitating Injury

The technical analysis indicates that county-wide, 35% of all fatalities involved pedestrians and bicyclists. The total number of fatalities shows an increasing trend, with pedestrian fatalities showing the greatest increase on the Local Roadway System. ***Table 6, Figure 9*** and ***Figure 10*** demonstrate these increasing trends. Overall, pedestrian and bicycle fatalities represent 35% of all fatalities county-wide, while accounting for fewer than 5% of the choice of transportation mode. Vision Zero must focus heavily on immediate and aggressive countermeasures on a systemic basis to reduce the County's overall fatality rate. To this end, a number of countermeasures are proposed later in this report.

Table 6 - County-Wide Fatal Crash Modal Splits

Mode	2011		2012		2013		2014		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Motorist	970	79.6%	932	82.4%	1575	80.2%	1675	81.1%	486	65.1%
Pedestrian	185	15.2%	142	12.6%	292	14.9%	280	13.6%	222	29.8%
Cyclist	63	5.2%	57	5.0%	96	4.9%	111	5.4%	38	5.1%
Totals	1218	100.0%	1131	100.0%	1963	100.0%	2066	100.0%	746	100.0%
Bike/Ped	248	20.4%	199	17.6%	388	19.8%	391	18.9%	260	34.9%

Figure 9- State Road System Fatalities by Mode (2011-2014)

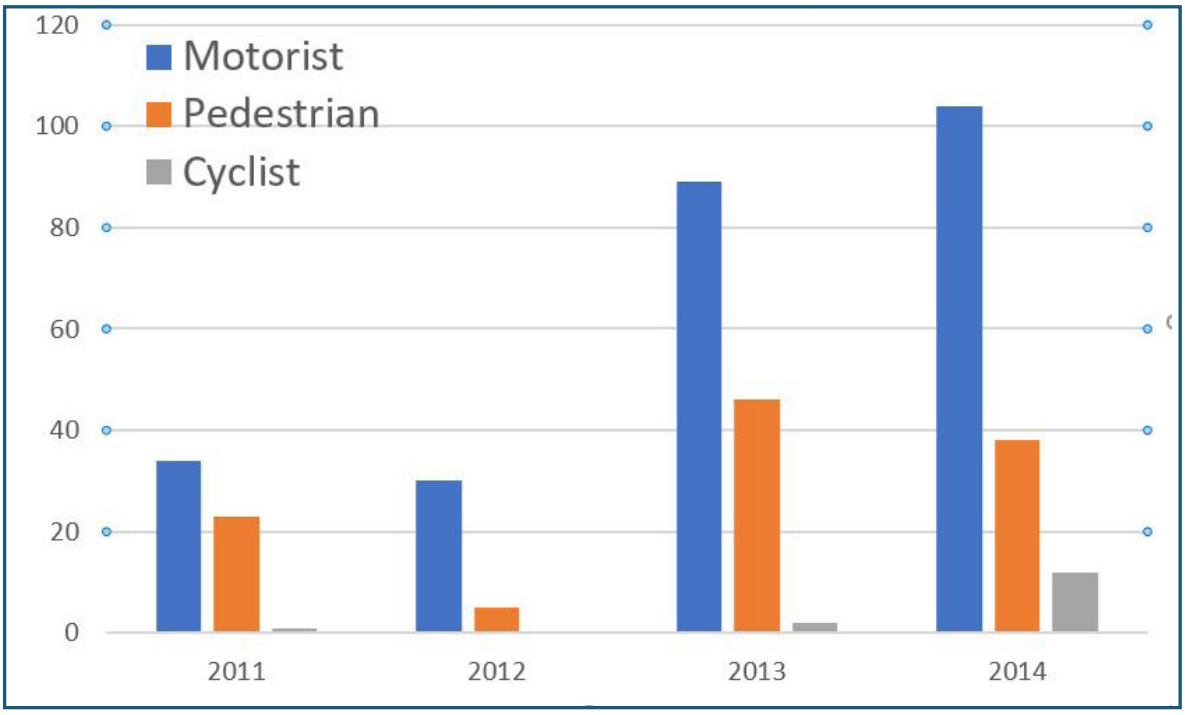
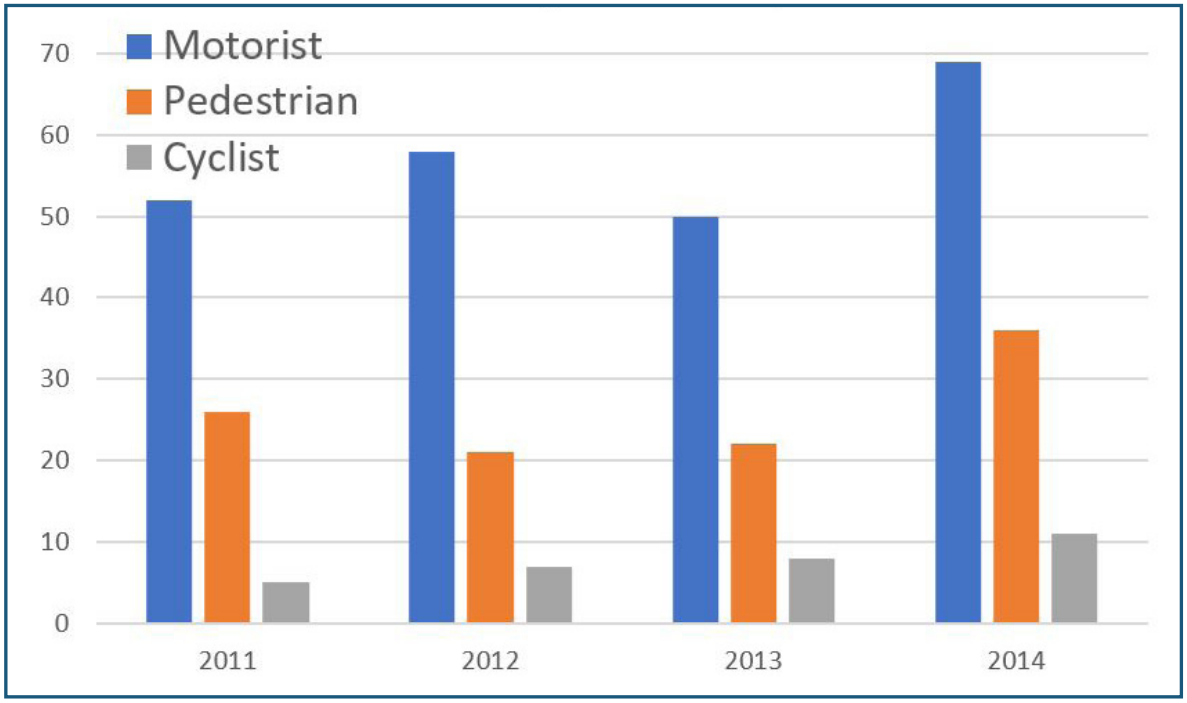


Figure 10 - Local Roadway Fatalities by Mode (2011-2014)



The Florida Department of Transportation (FDOT) provides Comprehensive Crash Costs for various crash categories ***(Table 7)***.

Table 7 - FDOT Comprehensive Crash Costs	
Crash Severity	**Comprehensive Crash Cost**
Fatal (K)	**$10,560,000**
Severe Injury (A)	**$599,040**
Moderate Injury (B)	**$162,240**
Minor Injury (C)	**$100,800**
Property Damage Only (O)	**$7,600**
Note: *(1) Source: FDOT State Safety Office's Crash Analysis Reporting (CAR) System, analysis years 2011 through 2015.*	

Driving-while-Intoxicated (DWI) has been refined to include the use of drugs – Driving Under the Influence (DUI); and stiffening State statutes regarding penalties for conviction have had a significant impact on the number of drivers involved in fatal and serious injury crashes. ***Table 8*** provides statistics on the number of fatal and serious injury crashes that have root causes in alcohol and/or drug use.

Table 8 - Effects of Alcohol (A) and/or Drugs (D) on Fatal and Serious Injury Crashes															
	2011			2012			2013			2014			Total		
	A/D	Total	%	A/D	Total	%	A/D	Total	%	A/D	Total	%	A/D	Total	%
State Road System	22	449	4.9%	16	348	4.6%	52	1245	4.2%	46	1238	3.7%	136	3280	4.1%
Local Road System	28	769	3.6%	43	783	5.5%	32	718	4.5%	20	828	2.4%	123	3098	4.0%
Total	50	1218	4.1%	59	1131	5.2%	84	1963	4.3%	66	2066	3.2%	259	6378	4.1%

While the effects of alcohol and drug use is steadily declining as a contributing cause of crashes, distracted driving has increased. The effects of texting and talking on the phone have been shown to mimic the effects of alcohol and drug use. While Texting-while-Driving is already prohibited under state law, the Vision Zero Team should promote similar legislation that prohibits talking on the phone and other distractive activities. Unfortunately, it is difficult to determine if there were a distraction within a vehicle that contributed to the crash, unless the victim self-reports.

Countermeasures

Engineering

Description: Based on the crash analysis, the local roadway high crash network locations are listed in **Table 9**, along with suggested countermeasures, the anticipated crash reduction, as well as estimated benefit/cost ratios. Because of the dominance of vehicular crashes, this table is primarily related to the reduction of vehicle-to-vehicle conflicts.

Table 9 - Vehicular Engineering Countermeasures

Identifier	Location	Crashes	Suggested Countermeasure	Fatal Crash Reduction Factor	Annual Fatalities Prevented	Serious Injury Crash Reduction Factor	Annual Serious Injuries Prevented	Annual Benefit	Lifetime (Years)	Cost	Annual Cost	Benefit/Cost Ratio
A	NW 207TH DR and NW 37TH AVE	5	Signalize	0.15	0.04	0.20	0.88	$18,358	10	$250,000	$25,000	0.73
B	NE 215TH ST and NE 2ND AVE	5	Add left-turn phasing (Reconstruct Signal)	0.59	0.37	0.36	1.57	$977,188	10	$250,000	$25,000	39.09
C	AVENTURA BLVD and NE 29TH PL	5	Restrict left-turn phases	0.00	0.00	0.31	1.35	$161,572	10	$75,000	$7,500	2.15
D	NW 122ND ST and W 32ND AVE	5	Add Channelized left-turn lane and phasing SB	0.59	0.37	0.36	1.57	$977,188	20	$400,000	$20,000	2.44
E	NW 95TH ST and NW 32ND AVE	5	Add Channelized left-turn lanes E-W and modify phasing	0.59	0.37	0.67	2.93	$1,139,378	20	$750,000	$37,500	1.52
F	NW 9TH ST from RED RD to FLAMINGO RD	6	Reduce Speed Limit	0.56	0.39	0.50	2.65	$1,143,301	6	$20,000	$3,333	57.17
G	NW 29TH AVE and NW 56TH ST	6	Convert to All-Way Stop	0.48	0.36	0.48	2.54	$1,075,018	6	$2,500	$417	430.01
H	NW 13TH ST from 3RD AVE to BISCAYNE BLVD	5	Reduce Speed Limit	0.56	0.35	0.50	2.18	$1,010,325	6	$20,000	$3,333	303.10
I	NW 3RD AVE and NW 5TH ST	6	Add Signal Heads and Reflective Backplates (Reconstruct Signal)	0.58	0.45	0.15	0.78	$1,048,840	10	$500,000	$50,000	20.98
J	NW 12TH ST and NW 127TH AVE	6	Widen Median E-W	0.28	0.22	-0.14	-0.73	$373,484	20	$1,500,000	$75,000	4.98
K	SW 26TH ST and SW 122ND AVE	5	Widen Median N-S	0.28	0.18	-0.14	-0.61	$311,237	20	$1,500,000	$75,000	4.15
L	SW 24TH ST from SW 87TH AVE to SW 82ND AVE	5	Speed Study and Revise Speed Limit	0.07	0.05	0.07	0.30	$132,535	6	$25,000	$4,167	31.81
M	SW 37TH AVE and PEACOCK AVE	6	Restripe NB left-turn Receiving Lanes	0.61	0.43	0.09	0.47	$955,711	2	$10,000	$5,000	191.14
N	SW 152ND ST from SW 112TH AVE to SW 102ND AVE	5	Speed Study and Revise Speed Limit	0.07	0.05	0.07	0.30	$132,535	6	$25,000	$4,167	31.81
O	SW 168TH ST and SW 112TH AVE	6	Add left-turn phasing	0.59	0.45	0.36	1.89	$1,172,625	10	$50,000	$5,000	234.53
P	SW 268TH ST and SW 134TH AVE	11	Signalize	0.15	0.19	0.20	1.94	$63,839	10	$250,000	$25,000	2.55
Q	SW 312TH ST and SW 152ND AVE	7	UNDER CONSTRUCTION	--	--	--	--	--	--	--	--	--
R	SW 312TH ST and NE 43RD/137TH AVE	9	Add "Signal Ahead" Warning Sign NB	0.08	0.09	0.13	1.03	$53,576	6	$1,200	$200	267.88

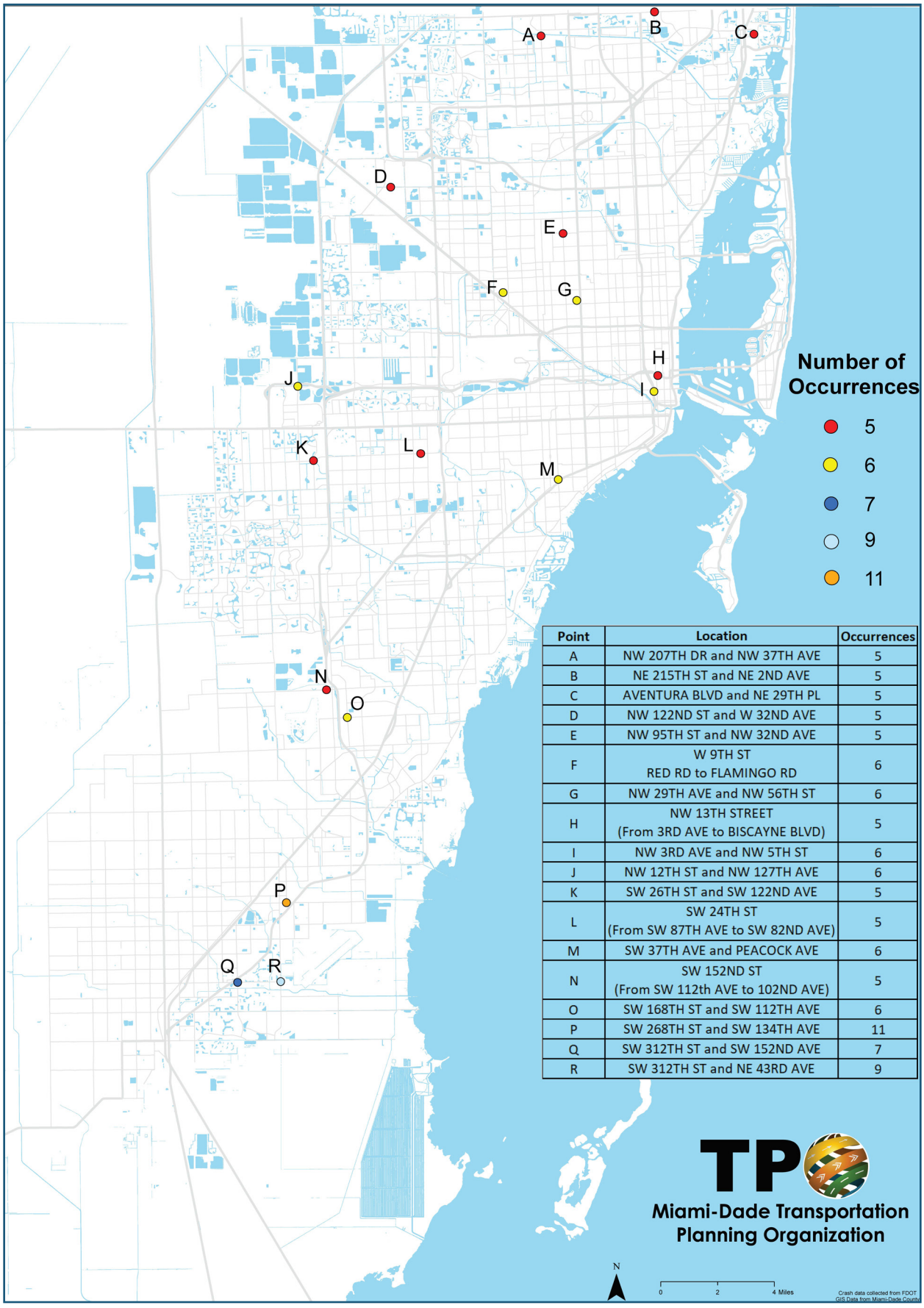
The locations of the suggested improvements presented in ***Table 9*** are shown on ***Figure 11***. Demographics data of the population within ½ mile radius of each location indicate, all but one of the 18 sites (C: AVENTURA BLVD and NE 29TH PL) are populated by more than 75% Black and Hispanic peoples. The three highest crash locations are at between 59% and 69% Hispanic (P: SW 268TH ST and SW 134TH AVE; Q: SW 312TH ST and SW 152ND AVE; and R: SW 312TH ST and 137TH AVE). The poverty level annual median income in 2017 for a family in Miami-Dade County is $25,300; only location G -- NW 29TH AVE at NW 56TH ST -- includes families with median incomes lower than the poverty level.

Table 10, summaries each proposed priority improvement, its cost, implementing agency and time frame. These countermeasures show great promise for reducing vehicular crashes, especially in lowering speed limits. However, lowering speed limits in residential areas requires action on behalf of the County and local municipalities. State statutes allow lowering the residential speed limit of 30 miles per hour to 25 miles per hour within the County and allow municipalities to lower the residential speed limit to 20 miles per hour.

Table 10 - Action Plan Implementation

Identifier	Location	Suggested Countermeasure	Cost	Responsible Party	Time Frame
A	NW 207TH DR and NW 37TH AVE	Signalize	$250,000	Miami Gardens	2-5 years
B	NE 215TH ST and NE 2ND AVE	Add left-turn phasing (Reconstruct Signal)	$250,000	Miami Gardens	2-5 years
C	AVENTURA BLVD and NE 29TH PL	Restrict left-turn phases	$75,000	Aventura	0-2 years
D	NW 122ND ST and W 32ND AVE	Add Channelized left-turn lane and phasing SB	$400,000	Hialeah Gardens	3-5 years
E	NW 95TH ST and NW 32ND AVE	Add Channelized left-turn lanes E-W and modify phasing	$750,000	Miami-Dade County (West Little River CDP)	3-5 years
F	NW 9TH ST from RED RD to FLAMINGO RD	Reduce Speed Limit	$20,000	Hialeah	0-2 years
G	NW 29TH AVE and NW 56TH ST	Convert to All-Way Stop	$2,500	Miami-Dade County (Brownsville CDP)	0-1 year
H	NW 13TH ST from 3RD AVE to BISCAYNE BLVD	Reduce Speed Limit	$20,000	City of Miami	0-1 year
I	NW 3RD AVE and NW 5TH ST	Add Signal Heads and Reflective Backplates (Reconstruct Signal)	$500,000	City of Miami	2-5 years
J	NW 12TH ST and NW 127TH AVE	Widen Median E-W	$1,500,000	Miami-Dade County (Unincorporated)	5-10 years
K	SW 26TH ST and SW 122ND AVE	Widen Median N-S	$1,500,000	Miami-Dade County (Unincorporated)	5-10 years
L	SW 24TH ST from SW 87TH AVE to SW 82ND AVE	Speed Study and Revise Speed Limit	$25,000	Miami-Dade County (Westchester CDP)	0-1 year
M	SW 37TH AVE and PEACOCK AVE	Restripe NB left-turn Receiving Lanes	$10,000	City of Miami	0-1 year
N	SW 152ND ST from SW 112TH AVE to SW 102ND AVE	Speed Study and Revise Speed Limit	$25,000	Miami-Dade County (Richmond Heights CDP)	0-1 year
O	SW 168TH ST and SW 112TH AVE	Add left-turn phasing	$50,000	Miami-Dade County (Palmetto Estates CDP)	0-2 years
P	SW 268TH ST and SW 134TH AVE	Signalize	$250,000	Miami-Dade County (Princeton CDP)	2-5 years
Q	SW 312TH ST and SW 152ND AVE	UNDER CONSTRUCTION	--	Homestead	--
R	SW 312TH ST and NE 43RD/137TH AVE	Add "Signal Ahead" Warning Sign NB	$1,200	Homestead	0-1 year

Figure 11- Locations of Suggested Improvements



Point	Location	Occurrences
A	NW 207TH DR and NW 37TH AVE	5
B	NE 215TH ST and NE 2ND AVE	5
C	AVENTURA BLVD and NE 29TH PL	5
D	NW 122ND ST and W 32ND AVE	5
E	NW 95TH ST and NW 32ND AVE	5
F	W 9TH ST RED RD to FLAMINGO RD	6
G	NW 29TH AVE and NW 56TH ST	6
H	NW 13TH STREET (From 3RD AVE to BISCAYNE BLVD)	5
I	NW 3RD AVE and NW 5TH ST	6
J	NW 12TH ST and NW 127TH AVE	6
K	SW 26TH ST and SW 122ND AVE	5
L	SW 24TH ST (From SW 87TH AVE to SW 82ND AVE)	5
M	SW 37TH AVE and PEACOCK AVE	6
N	SW 152ND ST (From SW 112th AVE to 102ND AVE)	5
O	SW 168TH ST and SW 112TH AVE	6
P	SW 268TH ST and SW 134TH AVE	11
Q	SW 312TH ST and SW 152ND AVE	7
R	SW 312TH ST and NE 43RD AVE	9

While vehicular crashes dominate the number of fatal and serious injury incidents, between 2011 and 2014, pedestrian and bicycle fatalities represent 35% of all fatal crashes. Clearly, a concentrated effort to reduce pedestrian and bicycle fatalities is critical to Vision Zero. While the following suggested engineering countermeasures are focused on pedestrian and bicycle modes first, they also produce benefits for auto users:

Create a Comprehensive Speed Reduction Plan

Objective: Data unequivocally show that speed is the number one determinant of the severity of a crash. Thus, one of the key strategies of Vision Zero is lowering vehicle speeds such that collisions, either between cars, or with bicyclists and pedestrians, do not lead to serious injury or death.

Lead Partner: Miami-Dade County DTPW, Municipalities, State Legislature.

Resources Required: Modest upfront costs; consulting fees for creation of plan (cost range $100,000 - $200,000); infrastructure hard costs to vary based on plan (cost range TBD).

Description: Among the ways that to lower speeds are:

- **"20 is Plenty Campaign":** Using data, like that illustrated in the *Vision Zero Technical Report*, implement a comprehensive speed limit reduction campaign in high-risk districts and along high-risk corridors where there is a high volume of bicyclists and pedestrians. The campaign should include marketing efforts that reach these road users, and a robust enforcement effort during the initial rollout of the program. The first step in the campaign will be to identify areas that have a high probability of crashes based on the volume of bicyclists and pedestrians as shown in crash maps, and work with the local municipalities to define district limits.
  - In Florida, local communities are permitted to lower the speed limit in residential districts to 20 mph. Ninety (90%) the pedestrians stricken by a motor vehicle traveling 40 mph will be killed – 40 mph is a comfortable driving speed. Still, at 20 mph, half of pedestrians struck will be killed.
- **Implement Arterial Slow Zones and Neighborhood Slow Zones:** Arterial Slow Zones exist at locations that should have lower speed limits based on the High Crash Network maps. These corridors may include altered signal timing to reflect new speed limits, increased enforcement, speed-feedback signs, and slow-zone signage. Neighborhood Slow Zones utilize several traffic calming measures to significantly slow car traffic on residential streets and divert cut-through traffic from neighborhoods. These streets have speed limits of 20 mph, distinctive slow-zone signage, and traffic calming measures, such as speed humps, raised crosswalks, speed tables, traffic circles, chicanes, narrowed lanes, curb extensions, and/or chokers (pinch points).

Create a Vision Zero Traffic Safety Toolkit

Objective: Design street safety improvements that reflect the need to slow cars and encourage a greater balance of safe transportation options.

Lead Partner: Miami-Dade County DTPW.

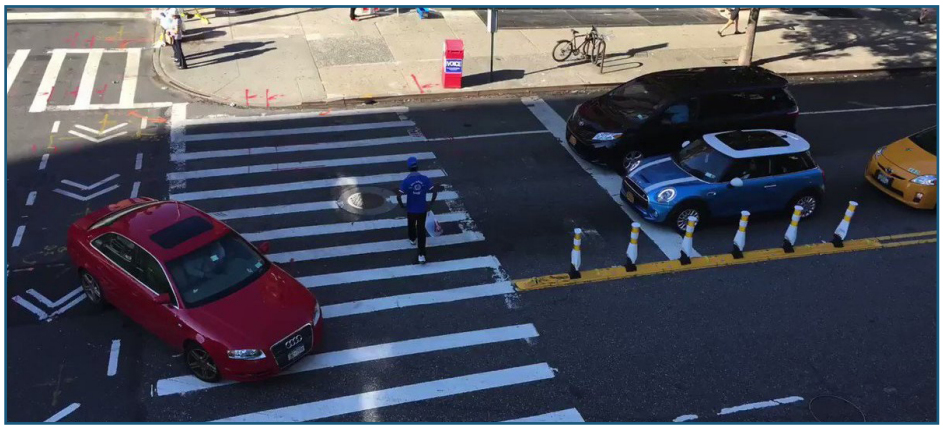
Resources Required: Modest upfront costs; consulting fees for creation of Toolkit (cost range $100,000 - $200,000).

Description: Create an approved street safety design toolkit that addresses the needs revealed by crash location. Common countermeasures that have shown to immediately increase safety across all modes include:

- **Pedestrian Priority Zone (PPZ):** Create PPZs in areas where there is a high concentration of crashes. Elements of a PPZ might include many of the countermeasures described in this section.

- **Leading Pedestrian Intervals (LPI) and increased crossing times:** One low-cost method of addressing pedestrian safety at intersections, and a proven Vision Zero tool, is the use of Leading Pedestrian Intervals at signalized intersections and increased crossing times. LPIs give pedestrians a 3-5 second head-start to cross and should be adapted to the needs of the local context. Locations around schools, hospitals, retirement communities, retail districts, etc. should be given greater consideration for crossing times. The current assumption for walk speed of 3.5 feet per second should be re-evaluated.
- **Lane Reductions (Road Diets):** This strategy includes narrowing the vehicular travel way by eliminating lanes and/or reducing lane widths. The reclaimed space can be used for separated bike lanes, wider sidewalks, landscaping, bus-only lanes, etc.
- **Left-turn traffic calming:** Failure to yield right-of-way is a major cause of traffic collisions, particularly at intersections. Left-turn movements comprise most of failure-to-yield crashes. Design countermeasures for increasing safety for turns include: hardened center lines ***(Figure 12)*** and protected left-turn signals.

Figure 12 - Hardened Centerline



- **No-Turn-on-Red policies:** Locations where there is a high volume of pedestrian and/or bicycle activity should be prioritized for No-Turn-on-Red' policies. These are common in commercial corridors, trail and bike lane crossings, and other areas of high bicycle/pedestrian activity.
- **Curb Extensions (bulb-outs):** Curb extensions are areas at intersections that are converted into expanded sidewalks ***(Figure 13)***. They are typically created by reducing the curb radius of an intersection and sometimes occupy pavement area created by on-street parking. Curb extensions reduce the crossing distance for pedestrians and slow turning traffic. This can permit installing traffic control devices closer to the travel lanes where they become more visible (notice the apparent blockage of the Stop sign by the tree and on-street parking in ***Figure 13***). Where feasible, this method is also one that can be quickly implemented in a relatively short period of time at moderate cost.

Figure 13 - Curb Extension

- **Rectangular Rapid Flashing Beacons (RRFBs):** At unsignalized or mid-block crossings, RRFBs are repeatedly flashing lights accompanied by large pedestrian crossing signage ***(Figure 14)***.

Figure 14 - Rectangular Rapid Flashing Beacon

- **Pedestrian Countdown Signals:** This on-street display provides information to pedestrians regarding the amount of time available to complete a street crossing. This is a standard requirement on new installations on State roads which should also be adopted by Miami-Dade County DTPW ***(Figure 15)***.

Figure 15 - Pedestrian Count-Down Signals

- **Pedestrian Scramble:** This technique allows pedestrians to cross an intersection in any direction while vehicular traffic is completely stopped by a traffic signals ***(Figure 16)***.

Figure 16 - Pedestrian Scramble

- ***Improved Sidewalks:*** In conjunction with Road Diets, sidewalk widths can be increased, allowing area to accommodate pedestrians, provide space for landscaping and street furniture, such as benches, and encourage the development of sidewalk cafes, and retail uses. Crosswalks can be marked to raise awareness to the pedestrian ***(Figure 17)***.

Figure 17 - Accentuated Crosswalk

- **Parking Restrictions/Daylighting:** This treatment, which can also fall under the category of a curb extension, restricts on-street parking adjacent to crossings (both at intersections and mid-block) to increase pedestrian visibility and shorten crossing distances. Refer to ***Figure 13***.

- **Street Lighting:** Crosswalks should have adequate overhead lighting. The FDOT has introduced new standards that provide "front-lighting" on pedestrians. Traditional intersection lighting has provided the most intense lighting within the intersection itself, thereby reducing pedestrians to "silhouettes". Providing additional lighting in advance of the crosswalks provides improved awareness of pedestrians.
- **Special Emphasis Crosswalks:** Crosswalks can be dramatically improved by including advance-warning signage, ADA accessible ramps, speed tables, pedestrian refuge islands, and/or curb extensions. Mid-block crosswalks are especially improved by these measures.
- **Median Refuge Islands:** When crossing wide or multi-lane streets, median refuge islands can provide places for pedestrians and bicyclists to cross in two stages. These can be implemented in locations where there may be median space that is unused at intersections. Splitter islands at modern roundabouts are a requirement that serve as refuge islands. At signalized locations, it is important to install additional pedestrian detectors on the refuge island to ensure the two-stage crossing can be accomplished.
- **Shared Streets:** A shared street is a narrow street without pavement markings that is intended for all road users share the entire street. It is typically a slow speed, continuous yield condition and should be used in areas with moderate to high volumes of pedestrian and bicycle activity ***(Figure 18)***.

Figure 18 - Shared Street

- **Separated Bike Lanes:** A connected network of separated and low-stress bicycle facilities designed for all ages and abilities should be implemented. Separated bike lanes should be the priority bicycle facility type but should especially be considered when a street has high curbside activity, frequent buses, motor vehicle congestion, turning conflicts, and when speeds are greater than 20 mph.
- **Bicycle Intersection Treatments:** Ensuring cyclists/pedestrians can safely move through intersections is key to addressing safety within the context of a Vision Zero Plan:
  - ✓ **Bike Boxes:** A bike box is a designated area at the intersection for bicyclists to stop ahead of motor vehicle traffic. Bike Boxes make cyclists visible to motorists and allow them to get a start on turning vehicles turning movements and placement in the travel lane, once the light turns green ***(Figure 19)***.

Figure 19 - Bike Box

- ✓ **Intersection Crossing Signals and Markings:** In conjunction with Cycle Tracks, use separate traffic signals for control of bicycle traffic, as well as brightly-colored, repeated bicycle pavement markings that highlight the continued path for bicyclists through intersections ***(Figure 20)***.

Figure 20 - Intersection Crossing Signals and Markings

- ✓ **Two-stage Turn Queue Boxes:** Two-stage turning boxes are designated spaces within an intersection that provide a safe space for bicyclists to advance through a signalized intersection and wait to make a clear turn. This is similar to a "jug-handle" turn for vehicular traffic.
- ✓ **Bicycle Boulevards:** These are very low-volume and low-speed streets that give bicycle traffic priority through signage, pavement markings, and traffic calming to prevent motor vehicle through traffic. These should be considered on all streets with extremely low traffic volumes that can be posted with a speed limit of 20mph, or less.

Accelerate implementing projects through Tactical Urbanism

Objective: Accelerating implementation of projects that are shown to be the most critical for safety. Lead Partner: Miami-Dade County DTPW, and Public Works departments from member cities.

Resources Required: High upfront costs; higher ongoing consulting and stewardship costs. Recommend setting a yearly amount for materials, maintenance, and traffic control costs (yearly allocation may range from $500,000-$1,000,000). DTPW may consider 2-3 additional internal staff to process permitting drawings, procurement, and outreach for this program alone. A yearly allocation of $500,000 for outside consulting fees should be considered.

Description: To quickly improve safety, test design strategies, and achieve goals set in the Action Plan, use Tactical Urbanism demonstration projects to implement the priority projects. Using low-cost design elements, such as flexible bollards and paint, Miami-Dade County and Vision Zero Team member municipalities can immediately improve safety as costlier permanent projects are planned.

Tactical urbanism breaks down the conventional project delivery cycle into smaller increments called "Quickbuild" projects. Rather than jump into long-term planning for capital improvements, Miami-Dade County DTPW could use a Quickbuild Program to provide an accelerated implementation for capital improvement projects related to Vision Zero recommendations.

The low-cost 'Quickbuild' approach can be effectively used on both high-speed corridors and low-speed residential streets. Design elements can include, but are not limited to: protected bike lanes, curb extensions, median islands, expanded sidewalks, enhanced crossings, roundabouts, lane reconfigurations, left turn traffic calming, etc.

Enforcement

Objective: Enforcement is a critical element in the success of Vision Zero. This not only involves providing an adequate number of qualified Law Enforcement Officers on the street, plus implementing enforceable laws and the willingness of the judicial branch to prosecute offenders.

Lead Partner: Miami-Dade County, member cities, County and local police departments, FHP.

Lowering speed limits in residential areas requires action on behalf of the County and local municipalities. State statutes allow lowering the residential speed limit of 30mph to 25mph on County roads, and allow municipalities to lower the residential speed limit to 20mph.

Once lower speed limits are instituted, it requires a concentrated effort on behalf of law enforcement agencies to ensure compliance. Additional tools that can be applied include radar speed feedback signs and speed enforcement cameras. Speed enforcement cameras are not currently allowed under State statutes, but studies conducted during development of the AASHTO Highway Safety Manual indicate that such measures can result in a 29% reduction in the number of fatalities and incapacitating injuries in urban areas. Similarly, red light enforcement cameras can result in a 24% reduction in fatal crashes.

Typically, a law enforcement officer (LEO) is not present at the instant a collision occurs, and he or she must rely on evidence obtained from those involved in the collision, physical evidence, and any witnesses who may volunteer to stay on-site. During the officer's interview, *those involved are unlikely to implicate themselves by admitting to speeding or being distracted by texting, eating, talking on the phone, etc.* Therefore, speeding and distracted driving are deemed to be under- reported contributing causes for the purposes of this analysis, which is borne out by previous studies implicating these causes on the number and severity of crashes.

The Vision Zero Task Team should work with State government to enact speed enforcement camera and cell phone laws. Traffic judges should be more aware of the consequences of "minor" infractions and imposing appropriate penalties.

Education

Objective: Conduct comprehensive outreach to various agencies, as well as the general public to change the way people approach the transportation system.

The Vision Zero Task Team should be expanded to include members from all 37 municipalities in Miami-Dade County, including Police Departments and Public Works officials. The Team should partner with community and neighborhood groups (PTAs, etc.), particularly those in areas of high-crash concentrations. The Team should also partner with nightlife businesses, transit agencies, and ridesharing operators to offer incentives for potentially impaired drivers. New educational opportunities include:

- Creating a Vision Zero Website that includes an interactive map(s) showing traffic fatalities, separated by

bike/ pedestrian/vehicle modes, and traffic safety projects under study, being planned, and those currently under construction
- Providing training to roadway engineers on pedestrian & bicycle facilities, transit accommodations, and Complete Streets
- Upgrading drivers' education programs
- Making compulsory bicyclists' education for elementary schools

To provide the most-relevant data for future analyses, DHSMV should update and standardize electronic crash reporting forms; provide in-depth training for Law Enforcement Officers stressing the importance of accurate crash data; provide additional training for LEOs on bicycle and pedestrian laws; and improve the procedure FDOT uses to parse crash data.

There are several existing safety campaigns to continue and expand, such as:

- Safe Routes to School
- Make Healthy Happen Miami
- Make Safe Streets Happen
- Click it or Ticket
- Arrive Alive
- Move Over, Florida
- Drive Sober or Get Pulled Over
- Distracted Driver Awareness
- Work Zone Awareness

The VZTT should seek FDOT approval to publicize more campaigns on Dynamic Message Signs.

Encouragement

Develop a Vision Zero Alliance with members of the Community

Objective: No single agency can achieve the Vision Zero goal alone. Municipal agencies and community groups working together can make sure that these efforts are robust, authentic, and implementable.

Lead Partner: Miami-Dade County DTPW, Public Works departments from member cities.

Resources Required: Municipal staff time in organizing and attending meetings. Low upfront out-of-pocket costs.

Description: Continue and expand the Vision Zero Task Team to include key members of the community. For example, Denver has the Vision Zero Coalition, a group of community organizations; Los Angeles has the Vision Zero Alliance, a coalition of 25 community and advocacy organizations that drives the city's Vision Zero efforts to further push for safe and equitable streets. Not only will implementation of the Vision Zero Action Plan rely on very strong collaboration between city and county departments, but it will also require strong partnerships with community organizations, schools, businesses, insurance organizations, trauma centers, and the like. These partnerships will strengthen the data sharing and collection efforts, as well as better focus the engineering, enforcement and education initiatives.

Coordinate Other Parallel and Related Efforts

Objective: Cooperating between/among different efforts will lead to outcomes faster.

Lead Partner: Miami-Dade County TPO, Miami-Dade County Public Schools, Miami-Dade DTPW, Public Works departments from member cities, various community organizations.

Resources Required: Municipal staff time in organizing and attending meetings. Low upfront out-of-pocket costs.

Description: Build upon and organize existing safety initiatives under Vision Zero. Efforts, such as the MDCPS Safe Routes to School (SRTS) initiative should be approached as an official element of the VZTT in advancing the Vision Zero Action Plan. Part of this effort should be coordinating between/among the Vision Zero Action Plan, and prioritization maps, and the allocation of investments being made in SRTS projects.

In addition to Safe Routes to School, consider advancing Vision Zero through Safe Routes for Seniors, and Safe Access to Play programs. A Safe Access to Play program prioritizes high crash areas near parks and recreational areas.

Work with Community Partners to Establish Community Liaisons

Objective: Addressing road safety improvements in a comprehensive manner involves communicating, one-on-one, with people in high-crash areas to fully understand what works and doesn't

Lead Partner: Miami-Dade County TPO.

Resources Required: Modest ongoing costs related to offering grants to transportation community groups to facilitate outreach with targeted communities. Start by establishing a pilot program with an initial budget of $50,000.

Description: Partner with community groups to do outreach with a focus on street safety improvements in the most vulnerable areas, identified as Communities of Concern. Often these communities overlap with areas identified in the High Crash Network. As part of this effort, community groups should partner with FHP and local police departments to work toward equitable, community-based police enforcement that focuses on positive reinforcement, education, and training.

Evaluation

Continued monitoring of crash statistics on an annual basis is critical to determining the relative success of countermeasures and providing guidance for continued action and shifts in areas of concern. This provides a "feedback loop" on which to base further crash prevention measures.
Ideally, the most effective countermeasures would eliminate locations from the high-crash network and provide justification for using similar strategies at other locations with similar characteristics.

A key part of the "prioritizing process" is creating a scoring system to determine which intersections and corridors on which to immediately focus. The scores should evaluate potential projects based on traffic volume, street width, volume of traffic fatalities, overall density of bicycle/pedestrian crashes, and serious injuries at each location. Often, traffic fatalities and serious injuries occur in communities of color, and/or lower incomes. Therefore, a step in the evaluation process should be a demographics analysis of the people surrounding each location to ensure that safety projects take into account the *equity* of the Action Plan. As noted by the data in ***Tables 9 and 10*** and ***Figure 11***, all but one of the 18 sites (C: AVENTURA BLVD and NE 29TH PL) are populated by more than 75% Black and Hispanic peoples. The three highest crash locations are at between 59% and 69% Hispanic (P: SW 268TH ST and SW 134TH AVE; Q: SW 312TH ST and SW 152ND AVE; and R: SW 312TH ST and 137TH AVE). The poverty level annual median income in 2017 for a family of four in Miami-Dade County is $25,300; only location G -- NW 29TH AVE at NW 56TH ST -- includes families with median incomes lower than the poverty level.

Further action should be taken by FDOT and DHSMV to facilitate future data processing. Locational information varies widely; for instance, for local street network data, a given location may be defined as NW 1st Street, W 1st Street, Northwest 1st Street, 1st Street NW, etc. Cross streets also exhibit this ambiguity, thereby making difficult locational analyses by street name. It will be necessary to coordinate with FDOT to bring standardization to the

manner in which the data are processed. Latitude and longitude, and X-Y coordinates allow for processing for location based on vicinity, but they lack the accuracy needed to locate specific points. Law enforcement agencies should provide in-depth training for crash investigations and reporting.

Principles

An overarching principle that guides the 5 "**E**"s includes **E**mergency Response, which is improved through enhanced connectivity for faster crash notification, improved injury prediction, better communication between/among traffic monitoring centers, 911 and first responders, and more-timely emergency medical care. Improvements in traffic monitoring infrastructure will also provide reductions in crashes because incidents are more rapidly recognized and shared with law enforcement and emergency response agencies. Survival in crashes sometimes depends on response times by emergency vehicles. The data collected from currently active "Intelligent Transportation Systems" (ITS) must be subject to continuing evaluation from a statistical standpoint, and these types of systems should be incorporated into the local roadway network as soon as possible. The average road user also needs education on what to do in the presence of emergency vehicles.

The seventh "**E**" – **E**quity ensures that all the applicable countermeasures are applied without bias in terms of location or socioeconomic environment.

APPENDIX 1

MIAMI-DADE COUNTY VISION ZERO TASK TEAM MEETING MINUTES

MIAMI-DADE COUNTY VISION ZERO TASK TEAM
INAUGURAL MEETING - FEBRUARY 15, 2018 – 10:00 AM
MEETING MINUTES

1. Introductions

i. A brief introduction was provided by Kevin Walford, Project Manager for the TPO, and continued with self-introductions by all attendees.
ii. Organizations present included the TPO, FDOT, FHP, MDC DTPW, MDPD, PROS, RER, MDC Fire Rescue, FDOT, FHP, Streetplans, and The Corradino Group.
iii. Mr. Walford introduced Greg Prytyka, Project Manager for The Corradino Group, who is leading the study effort.

2. Vision Zero Movie – Why are we doing this?

i. Mr. Prytyka presented a short video (Man on the Street) to the attendees. The focus was to show the importance and expectation of Vision Zero. Copies of this video are being provided to VZTT members. This study is being conducted with the goal of *eliminating fatalities and incapacitating injuries*.

3. Scope of Services Overview

a. VZTT – Study Advisory Committee
i. Mr. Prytyka presented a short video (Man on the Street) to the attendees. The focus was to show the importance and expectation of Vision Zero. Copies of this video are being provided to VZTT members. This study is being conducted with the goal of *eliminating fatalities and incapacitating injuries*.

b. Data Collection
i. The primary data collected for this study is crash data as provided by FDOT, which has been thoroughly vetted. Supplemental data collected include vehicular volumes, bicycle and pedestrian counts, transit ridership data and other sources of data that can be used to estimate exposure to risk. Additional data that are being collected include Vision Zero Plans prepared by other jurisdictions across the United States.
ii. References obtained include the AASHTO Highway Safety Manual, FHWA PedSafe Pedestrian Safety Guide and Countermeasure Selection System, FHWA BikeSafe Bicycle Safety Guide and Countermeasure Selection System, Road to Zero Initiative, AASHTO "Toward Zero Deaths" program, FDOT Highway Safety Plan and Strategic Highway Safety Plan.

c. Data Analyses
i. Preliminary analyses have been provided in a series of maps that show the locations of fatalities and injuries by mode. Further data analyses will focus on the highest crash locations by type and mode, and identify crash patterns that are responsive to "5E" countermeasures.

d. Countermeasure Selection
i. The safety countermeasure selections will focus around "The Five E's" (engineering, enforcement, education, encouragement, and evaluation).

e. Documentation
i. The documentation will include a full report on the locations with the highest number of incidents, and selection of countermeasures that are recommended to progress towards the goal of *zero fatalities and incapacitating injuries.*

4. Project Schedule

The timeline for this report is as follows:

a. VZTT Meetings 02/18 – 06/18 (monthly)
   i. One meeting a month on the third Thursday at 10am.
      1. Kickoff (this meeting) 2/15/18
      2. 3/15/18
      3. 4/19/18
      4. 5/17/18
      5. 6/21/18

b. Data Collection 01/18 – 02/18
   i. Complete the collection of data.

c. Data Analyses 02/18 – 04/18
   i. Further the hot spot analysis and provide detailed information on specific locations.

d. Countermeasure Selection 03/18 – 05/18
   i. Create countermeasures for each hot spot location. Coordinate with DOT on locations for which crash reduction techniques are being planned.

e. Documentation 02/18 – 05/18
   i. In addition to providing data analysis and countermeasures, the documentation will also include summaries of other Vision Zero Plans.

f. FINAL REPORT 06/18
   i. The final draft report will be distributed to the VZTT on June 11, 2018, for further discussion at the 6/21/18 meeting. The final report will be delivered to the TPO on June 30, 2018.

5. Project Status – Study Advisory Committee

The VZTT Study Advisory Committee was represented by the following individuals and organizations:

a. Miami-Dade Transportation Planning Organization (TPO) – Kevin Walford & David Henderson
b. Miami-Dade Department of Public Works and Transportation (DTPW) – Yanek Fernandez
c. Miami-Dade Police Department (MDPD) – Joshua Rodriguez
d. Miami-Dade Department of Parks, Recreation and Open Spaces (PROS) – Stephanie Cornejo
e. Miami-Dade Department of Regulatory and Economic Resources (RER) – Vinod Sandanasamy
f. Miami-Dade Fire Rescue – Humberto Quintela

These individuals took part in discussions describing important ideas, areas of concern, and related experience to help form a structure for future thought and discussion. The discussion was centered around "The Five E's" with strong emphasis on enforcement, engineering, and education.

6. Next meeting:

By the next meeting, the VZTT was asked to provide a list of current safety campaigns in the county as well as the State Road System safety analysis and planned projects from FDOT.

MIAMI-DADE COUNTY VISION ZERO TASK TEAM
MARCH 15, 2018 – 10:00 AM
MEETING MINUTES

On March 15, 2018, the second Vision Zero Task Team meeting was held. Greg Prytyka, Project Manager for The Corradino Group, facilitated the presentation. After brief introductions by everyone in the room, the meeting was guided by two major focuses, a progress report from The Corradino Group and new business.

1. March Progress Report

a. Resources Collected

i. Mr. Prytyka began by briefly discussing what resources were collected and examined for this study. These resources included the AASHTO Highway Safety Manual, FHWA PEDSAFE Pedestrian Safety Guide and Countermeasure Selection System, FHWA BIKESAFE Bicycle Safety Guide and Countermeasure Selection System, Road to Zero Initiative, AASHTO "Towards Zero Deaths" program, Vision Zero Network website, FDOT Highway Safety Plan, and the Strategic Highway Safety Plan.

b. Data Collection

i. There have been five key sources where data has been collected from. Each source provided a key component to the project. These sources include:
   1. FDOT UBMR – Crash Records
   2. FDOH – Injury Surveillance System
   3. FTO – Traffic Volumes
   4. Miami-Dade DTPW – Transit Ridership
   5. Processing Well Underway

c. Vision Zero Plans and Summaries

i. Mr. Prytyka discussed the following cities with a Vision Zero Plan:
   1. Los Angeles (2015)- currently trying to eliminate all fatalities by 2025; a 6% reduction has occurred in the programs two-year history
   2. Seattle (2015)- currently trying to eliminate all fatalities and serious injuries by 2030; there were 20 fatalities and 150 injuries on average per year; goal is more achievable
   3. New York City (2014)- there is no goal date on eliminating all fatalities and injuries; Action Plan provides structure to achieve goal; safest three- year period in City's history
   4. Denver (2017)- currently trying to eliminate all fatalities and injuries by 2030; focusing on high crash networks; a five-year action plan is updated every 5 years in order to ensure progress
   5. Fort Lauderdale (2015)- there is no goal date on all eliminating fatalities and injuries; progress reports every two years and action plan every five years

d. Data Analysis

i. A series of four maps were shown to illustrate different findings. These maps included:
   1. All On-State Highway System Fatalities from 2010-2014
   2. All Off-State Highway System Fatalities from 2010-2014
   3. On State Highway System High Crash Networks from 2010-2014
   4. Off State Highway System High Crash Networks from 2010-2014

e. Countermeasures

i. Mr. Prytyka discussed the countermeasures under the “Five E’s.” These are some of the following recommendations that were discussed by all:
   1. Engineering: CMF Clearinghouse, FDOT CRFs, BIKESAFE, PEDSAFE
   2. Education: schoolboard outreach, areas with new funding and projects, safe route of schools
   3. Enforcement: upholding tickets pertaining to jaywalking, texting and driving, etc.
   4. Encouragement: South Florida commuter services
   5. Evaluation: monitoring the impact of implemented countermeasures

2. New Business

i. The New Business focus of the meeting was to bring up additional information before the meeting concluded. A brief discussion over the FDOT Work Program and additional information on the “Five E’s” fed into an overall general discussion.
ii. The next meeting will be on Thursday April 19, 2018.

MIAMI-DADE COUNTY VISION ZERO TASK TEAM
APRIL 19, 2018 – 10:00 AM
MEETING MINUTES

On April 19, 2018, the third Vision Zero Task Team meeting was held. Greg Prytyka, Project Manager for The Corradino Group, facilitated the presentation.

The meeting started with the "Zero Fatalities" movie to emphasize and reinforce the importance of striving towards zero deaths and fatalities.

The goal of this meeting was to provide the panel a draft of the report and discuss openly in a forum setting.

1. Discussion

a. Current Campaigns

i. Before Mr. Prytyka began with the report, a discussion on current campaigns throughout the county was provided from Officer Sanchez.
ii. The listed campaigns were solely from DHSMV. The discussion from the panel stated the importance of pulling resources from multiple campaigns, municipalities, and other organizations in order to achieve greater success.
iii. These campaigns are working and being incentivized by the Florida LEL. The date of campaigns are correlated with data to help reduce crashes and other problems. An example of this is having a DUI campaign around the Superbowl, Cinco de Mayo, and Halloween.

b. Report

i. Mr. Prytyka began with stating that 46% of all fatalities occur off of the state highway system. This number is higher than many panel members expected.
ii. After a minor discussion on some general data, the discussion began to focus around the five E's. Many members began to provide examples of specific roadways and how the five E's helped improve a particular area.
iii. The report continued with describing the task list, summaries of other Vision Zero plans, discussion over the fatalities off the highway system and high crash networks, what contributed to these crashes and countermeasures.

Before the meeting came to a close, Mr. Prytyka stated that he would send the draft of this report to the members of the task force team. Each member is to review and submit edits, questions, and/or comments within two weeks from receiving the report.

The next meeting will be held on May 17th, 2018.

MIAMI-DADE COUNTY VISION ZERO TASK TEAM
MAY 24, 2018 – 10:00 AM
MEETING MINUTES

On May 24, 2018, the fourth and final Vision Zero Task Team meeting was held. Greg Prytyka, Project Manager for The Corradino Group, facilitated the presentation.

The Final Draft Vision Zero Report was presented in a slide show; an outline of the presentation follows on the next page.

The goal of this meeting was to present the Final Draft of the Vision Zero Report and discuss openly in a forum setting.

1. Discussion

a. FDOT Work Program

i. Misleidys Leon advised that the FDOT now has funding set aside for improvements for the High Crash Networks on local roads.

b. General

i. Mr. Prytyka indicated that there are miscoding errors in the crash data wherein left-turn collisions may have been coded as angle collisions, and vice versa. He pointed out the need for additional training as stated in the report.
ii. In reviewing the numbers of fatalities by age, it was suggested that an additional analysis that would be helpful is to report on age by mode. Mr. Prytyka explained that there are many ways to sort the data that could be suggested for the continuation of the Vision Zero process.
iii. A suggestion was made to add a "Safe Routes to School – On Bicycles" program.
iv. A suggestion was made to require a higher level of training at the vendor for rental scooter riders.
v. Mr. Prytyka reflected on a program in effect during his childhood in Tampa which was called "Safety Village". This 1.6-acre facility was a scaled-down replica of downtown Tampa including roads, stop signs, traffic signals, railroad crossings, and small scale electric cars that children would drive. School groups were brought in and children were given training in highway safety, home safety, and fire safety. Team members indicated interest in a similar facility for MDC.

Before the meeting ended, Mr. Prytyka stated that the Final Draft Report would be transmitted to the members of the Vision Zero Task Team later in the day. Each member is to review and submit edits, questions, and/or comments by June 7, 2018.

PRESENTATION OUTLINE

SLIDE 1: Title Slide

SLIDE 2: Introductions
- Kevin Walford – Project Manager, TPO
- David Henderson – Intermodal Manager, TPO
- Joseph M. Corradino, AICP – President, The Corradino Group
- Gregory Prytyka, P.E. – Project Manager, The Corradino Group

SLIDE 3: What is *"Vision Zero"*?
- *Eliminate all Fatalities and Serious Injuries by 2050*
- *Every Year 1,500 Seriously Injured and 200 Killed in MDC*
- *2014 – 1,799 Seriously Injured and 267 Killed*
- *Transportation-related Deaths are Unacceptable*
- *Transportation-related Deaths are Preventable*
- *Human Error is Inevitable*
- *Accommodations*
- *Systematic Application of Countermeasures*

SLIDE 4: Vision Zero Plan Structure
- Technical Report
- Literature Review
- Action Plan

SLIDE 5: Technical Report
- Data Collection
- Data Analyses
- Countermeasure Selection

SLIDE 6: Data Collection
- FDOT: UBR 2010 – 2014
- DOH: Injury Surveillance Data System
- Vision Zero Plans from Other Locations
- AASHTO
- FHWA
- FDOT

SLIDE 7: Data Analysis
- 2010 – 2014
- DHSMV New Traffic Report Form 2011
- Crash Locations
- Mapping
- Crash Types
- Contributing Causes
- Modal Split
- Alcohol/Drug Usage

SLIDE 8: Findings
- Crash Types
  - Sideswipes – 41.4%
  - Head-on/LT?
  - Rear-end – 0.5%
  - No "Type" for Bike/Ped

SLIDE 9: Findings
- Contributing Causes
  - Careless/Negligent – 45.6%
  - Failure to Yield – 32%
  - Speeding – 14.2%
  - Others – 8%

SLIDE 10: Findings
- High Crash Networks

SLIDE 11: Findings (Graphics)

SLIDE 12: Findings (Graphics)

SLIDE 13: Findings (Graphics)
- Fatalities and Serious Injuries by Mode

SLIDE 14: Findings
- Total Transportation by Mode
  - 2010 Census Data
  - Commuters
  - 35% of Fatalities
  - 4% of all Travel
  - 9X More Likely Fatal

SLIDE 15: Findings
- KSI by Age

SLIDE 16: Findings
- KSI by Age
  - 16-31 – 38.4%
  - Peak 21
  - Driver Education

SLIDE 17: Findings
- KSI by Age
  - 8-15 – 3.6%
  - Bike/Walk to School
  - Elementary Education

SLIDE 18: Findings
- KSI by Age
  - 0-7 – 1.6%
  - Passengers

SLIDE 19: Findings
- KSI by Age
  - 39-55 – 26%
  - Miami Demographics

SLIDE 20: Findings
- Fatalities and Serious Injuries by Facility Type
  - 62% Fatalities on Local Roads
  - 69% SI on Local Roads

SLIDE 21: Findings
- FDOT Safety Funding
  - 2018 - $6.3M
  - 2019 - $5.4M
  - 2020 - $5.4M
  - 2021 - $5.3M
  - 2022 - $5.6M
  - Ongoing - $5M
- County Safety Funding
  - ?

SLIDE 22: Literature Review
- VZ Reports
  - Los Angeles
  - Seattle
  - New York City
  - Denver
  - Fort Lauderdale
- Lessons Learned
  - Bike/Ped Most Vulnerable
  - Speeding
  - Failure to Yield
  - 5 “E”s

SLIDE 23: Action Plan
- Countermeasures
  - Engineering
  - Enforcement
  - Education
  - Encouragement
  - Evaluation

SLIDE 24: Action Plan
- Vehicular Engineering Countermeasures
  - Traditional Geometric Improvements
  - Roundabouts
  - 4-Way Stops
  - Signalization
  - Signal Operations
  - Speed Limits
  - Signing & Marking

SLIDE 25: Action Plan
- Pedestrian Engineering Countermeasures
  - Speed Limits
  - Pedestrian Countdown Signals
  - Rectangular Rapid Flashing Beacons
  - Leading Pedestrian Interval
  - Pedestrian Sensors
  - Pedestrian Scrambles
  - Accessible Pedestrian
  - Raised Median/Refuge Islands
  - Raised Crosswalks & Speed Tables
  - Bulb-Outs/Curb Extensions
  - Lighting

SLIDE 26: Action Plan
- Pedestrian Engineering Countermeasures
  - Safe Routes to School
  - Safe Routes to Play
  - Safe Routes for Seniors

SLIDE 27: Action Plan
- Bicycle Engineering Countermeasures
  - Speed Limits
  - Bicycle Lanes (7-foot)
  - Bike Trails
  - Cycle Tracks
  - Bicycle Signals
  - Signal Timing
  - On-Street Parking Configuration
  - Road Diets
  - Lighting
  - Colored Pavements

SLIDE 28: Action Plan
- Vehicular Enforcement Countermeasures
  - Blanket Speed Limits
  - Arterial Slow Zones
  - Radar Speed Feedback Signs
  - Red Light Cameras
  - Speed Enforcement Cameras
  - Cell Phone Law
  - MDPD Distracted Driver Policy
  - Targeted Campaigns

SLIDE 29: Action Plan

- Pedestrian Enforcement Countermeasures
  - Failure to Yield
  - Transit Stops
  - Jaywalking
  - Pedestrian Fences
  - Judicial Prosecution
  - Ticket/Citation

SLIDE 30: Action Plan

- Bicycle Enforcement Countermeasures
  - 3-foot Clearance
  - Share the Road
  - 2 Abreast
  - Failure to Yield

SLIDE 31: Action Plan

- Educational Countermeasures
  - Drivers' Ed
  - Bicyclists' Ed
  - Bike 305
  - UM Walk Safe
  - UM Bike Safe
  - DHSMV Crash Training
  - Complete Streets
  - Expanded Safety Campaigns
  - Licensing
  - VZ Website

SLIDE 32: Action Plan

- Encouragement
  - Incentives
  - VZTT
  - Municipalities
  - Public Works Departments
  - Police Departments
  - School Board
  - AAA
  - National Safety Council
  - Businesses
  - Uber @ Events
  - "Jiffy Lube" Safety Exam Discount

SLIDE 33: Action Plan

- Evaluation
  - Data Updates
  - Data Standardization
  - Metrics
  - High Crash Network
  - Action
  - FUNDING

SLIDE 34: *Thank You!*

APPENDIX 2

VISION ZERO LITERATURE REVIEW OF SAFETY COUNTERMEASURES

There are many resources on safety countermeasures, and a wide range of technical approaches to evaluate their effectiveness. The most comprehensive resource is the Federal Highway Administration's (FHWA) Crash Modification Factors Clearinghouse, a database of studies on most safety countermeasures. Typically effectiveness is measured and reported by a crash reduction factor (CRF), the percentage reduction in collisions that could be expected after implementing a given countermeasure.

The Clearinghouse often contains multiple studies with a range of CRFs. In order to get the best estimate of effectiveness, we consulted two additional resources: The FHWA Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes (February 2013) and the Pedestrian and Bicycle Information Center's Evaluation of Bicycle-Related Roadway Measures: A Summary of Available Research (February 2014). Each of these resources provides a thorough review of the quantitative research to date by selecting only those CRFs that have been derived from studies based on rigorous research methods.

The following sections include a comprehensive list of safety countermeasures, along with summaries of effectiveness research on each countermeasure. The list of safety countermeasures is grouped according to the following categories:

- **Signalization**
- **Geometric (Road Design)**
- **Signs, Markings, Operational**
- **Speed Control Measures, Miscellaneous**

This list includes all countermeasures discussed in the FHWA Toolbox with the associated CRF, as well as additional countermeasures identified in the sources described above. In some cases, countermeasures lack a quantified CRF but show some safety-related effects; these have also been included in the description below. This review does not reflect details about the feasibility or appropriateness of a proposed countermeasure for a specific location. Location-specific constraints
and existing facilities must be considered when determining the most appropriate countermeasure for a given location.

Signalization

Pedestrian countdown heads

Definition: Signal head that provides pedestrian countdown, as opposed to traditional WALK/ DON'T WALK signal head.

CRF: 25% reduction in pedestrian collisions

Additional research has shown that pedestrian countdown timers have reduced pedestrian collisions by between 52% and 70%.

Flashing beacons (includes RRFB signals)

Definition: Flashing beacons highlighting crosswalks and pedestrian crossing signs through the addition of a flashing light. Rectangular Rapid Flash Beacons provide a high-visibility, brighter strobe-like flashing frequency.

Research focused on the rate of drivers yielding to pedestrians has demonstrated an increase in the yield rates in most cases.

While research has focused mainly on the installation of flashing beacons as a pedestrian safety measure, these benefits could be applied to bicyclists as well. Studies have shown that flashing beacons increase the rate of drivers yielding to pedestrians by 50 – 80%.

Leading pedestrian phase/Leading pedestrian intervals (LPI)

Definition: Traffic signals timed to allow pedestrians a short head start in crossing the intersection to minimize conflicts with turning vehicles.

CRF: 5% reduction in pedestrian collisions

Additional research demonstrated a 59% reduction in the number of pedestrian collisions after implementation of the treatment.

Permissive or permissive/protected left-turn phasing conversion

Definition: Protected left-turn phasing provides an exclusive phase for left-turning vehicles to enter the intersection separate from any conflicting vehicle or pedestrian movements.

Permissive/protected left-turn phasing provides the exclusive left-turn phase in addition to a phase permitting left turns simultaneously with conflicting through movements.

CRF: 99% reduction in left-turn collisions (convert permissive or permissive/protected to protected only); 16% reduction in left-turn collisions (convert permissive to permissive/ protected)

Additional research has demonstrated that implementing a left turn phase can reduce the pedestrian crash rate by 34%.

Signal timing improvements (to match ITE specified intervals)

Definition: Shorter signal cycle lengths and longer walk intervals.

CRF: 37% reduction in fatal and injury pedestrian collisions.

In one study in which pedestrian crossing times were increased at over 200 intersections, the pedestrian collision rate decreased by 50%.

Pedestrian detection to extend crossing time when pedestrian is detected within the intersection

Definition: Sensors that detect when pedestrians are present in a crossing and automatically increase crossing time when necessary.

Research examining the impact of automated pedestrian detection and crossing time extension on pedestrian collision rates has not yielded statistically significant results.

Pedestrian scrambles/Exclusive pedestrian phasing

Definition: Restricts all vehicular movements to provide an exclusive signal phase allowing pedestrians to cross in all directions, including diagonally.

CRF: 35% reduction in pedestrian collisions

Accessible Pedestrian Signals (APS)

Definition: Pedestrian signals that provide audible or tactile cues to aid visually or cognitively impaired pedestrians in safely crossing the street.

Research on accessible pedestrian signals has not focused on the impact of the treatment on pedestrian collisions. However, research has shown that they are effective in decreasing start delay and increasing the number of crossings that stay within the crosswalk.

New traffic signals at unsignalized intersections, when warranted

Definition: Traffic signal installed at previously unsignalized intersection.

CRF: 25% reduction in all collisions

Research has shown that pedestrian collision rates increased by 12% at treatment sites, compared to an increase of 60% at control sites. However, the findings were not statistically significant.

Removal of unwarranted traffic signals

Definition: Traffic signals replaced with all-way stop signs.

CRF: 17% reduction in pedestrian collisions (research is specific to one-way streets).

Optimize signal timing for bicyclists (Green Wave)

Definition: Signal timing optimized for bicyclist speeds, reducing number of times bicyclists encounter red signals along a stretch of road.

Signal timing changes have been shown to reduce pedestrian and bicyclist injury collisions by 37%.

Additional countermeasures - The following countermeasures are currently being used, but research is not yet available to indicate the effectiveness in reducing bicycle collisions:

- Bicycle signal detection (pushbutton, loop detector)
- Bicycle scramble scramble phase (not currently permitted by FHWA)
- Bicycle signal heads Leading bicycle interval
- Separate bicycle signal phase

Geometric (Road Design)

Intersection conversion to roundabout

Definition: Roundabout installed at a previously unsignalized intersection or to replace a former traffic signal. Roundabouts are large circular islands, placed in the middle of an intersection, which direct flow in a continuous circular direction around the intersection. Roundabouts can reduce the number of conflict points, compared to an uncontrolled intersection, and decrease vehicle speeds due to intersection geometry.

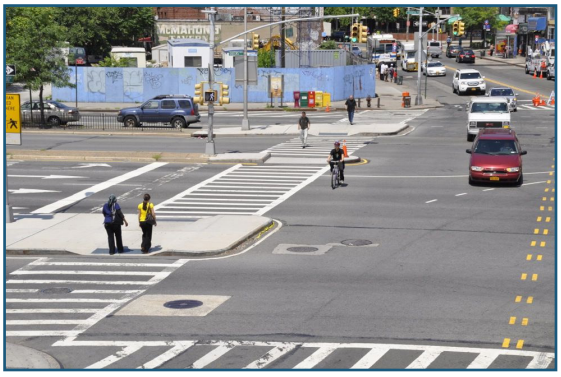
CRF: 27% reduction in collisions for conversion from unsignalized intersection to roundabout.

Research from the United States and Europe has demonstrated increased safety concerns for bicyclists after the installation of roundabouts, including:

- 48% increase in risk of injury for bicyclists
- 700% increase in risk of bicycling injury

Additional research from the Crash Modification Factors Clearinghouse shows a 73% reduction in pedestrian collisions after conversion of intersections to roundabouts, but it does not specify if those intersections were signalized or unsignalized prior to installation of the treatment.

Refuge islands/raised median/pedestrian refuge islands



Definition: Curbed sections in the center of the roadway that are physically separated from vehicular traffic. Raised medians or refuge islands shorten crossing distances across wider roadways.

CRF: 46% reduction in pedestrian collisions (raised median at marked crosswalk); 39% reduction in pedestrian collisions (raised median at unmarked crosswalk); 56% reduction in pedestrian collisions (refuge island)

Research has shown that pedestrian collisions rates were 33% lower on streets with 10 foot medians than on streets with painted medians.

A study demonstrated that mid-block pedestrian collisions decreased by 73% after the installation of a pedestrian refuge island.

In a study comparing locations with raised medians to those without, the pedestrian collision rate at marked crosswalks was 0.74 in locations with a raised median and 1.37 for sites without a median. At unmarked crossings the pedestrian collision rate was 0.17 at sites with raised medians and 0.28 at sites without a raised median.

Temporary painted medians

Definition: Pavement striping that separates lanes of traffic but does not provide a raised surface.

No research is available that demonstrates the impact of installing a temporary painted median as a countermeasure for pedestrian collisions. However, research has shown that pedestrian collisions rates were 33% lower on streets with 10 foot raised medians than on streets with painted medians.

Raised pedestrian crossing/raised crosswalks/speed tables & raised crosswalks

Definition: Pedestrian crossings that are elevated to the level of the sidewalk, with ramps on each vehicle approach.

CRF: 30% reduction in all collisions, 36% reduction in fatal and injury collisions across all modes intersection to minimize conflicts with turning vehicles.

Corner bulb outs and curb extensions

Definition: Raised devices, usually constructed from concrete and/or landscaping, that reduce the corner radius or narrow the roadway in order to reduce traffic speeds and shorten crossing distances.

No research is available that demonstrates the impact of installing curb extensions as a countermeasure for pedestrian collisions, though research shows decreases in pedestrian crossing delay and increases in drivers yielding to pedestrians.

Closed crosswalk removal/new crosswalks

Definition: Removal of existing crosswalks, or installation of new crosswalks.

Research conducted between the 1970s and 2000s produced results stating that pedestrian collision rates were higher in marked crosswalks than in unmarked crosswalks. A 2002 study investigated the importance of various factors such as the presence of a median, ADT, and the number of lanes, demonstrating that the impact of crosswalk installation or removal on pedestrian safety is context-specific. Additional countermeasures explored within this document, including lighting, type of pavement markings, and signs, should also be considered.

On-street parking reconfiguration

Definition: Removing on-street parking near intersections and driveways, or reconfiguring parking to minimize conflict points with bicyclists.

Research has shown that biking on a road without parked cars reduces risk of bicyclist injury by 37%, when compared to roads with on-street parking. An analysis of before and after conditions at a parking reconfiguration treatment site showed that potentially dangerous actions (drivers parking in bike lane, wrong way travel) decreased, but there were no collisions before or after the treatment.

Roadway cross section reduction from 4 to 3 lanes (road diet)

Definition: Reduction in number of travel lanes in roadway from 2 lanes in each direction to 1 lane in each direction with a center turning lane.

CRF: 29% reduction in all collisions

Research has shown that for every 10 foot increase in street width, the likelihood that a bicycle collision will occur increases by 38%. In one study of over 300 road diet intersection sites in New York City, researchers found an increase in the number of bicycle collisions, but this did not account for volumes before or after implementation of the treatment.

Additional research on road diets has shown a 41% reduction in pedestrian collisions at treatment sites.

Temporary removable pedestrian refuge island with sign (curb) on two-lane road Definition: Small, painted, raised surface in the center of the roadway, with high-visibility pedestrian crossing signs.

No research is available that demonstrates the impact of installing a temporary removable pedestrian island as a countermeasure for pedestrian collisions, though one study demonstrates reduction in speeds after installation of the treatment.

New traffic signals at unsignalized intersections, when warranted

Definition: Traffic signal installed at previously unsignalized intersection.

On-street parking reconfiguration

Definition: Removing on-street parking near intersections and driveways, or reconfiguring parking to minimize conflict points with bicyclists.

Research has shown that biking on a road without parked cars reduces risk of bicyclist injury by 37%, when compared to roads with on-street parking. An analysis of before and after conditions at a parking reconfiguration treatment site showed that potentially dangerous actions (drivers parking in bike lane, wrong way travel) decreased, but there were no collisions before or after the treatment.

Separated bike lane (cycle track)

Definition: Designated bicycle lanes, separated from vehicle traffic by a physical barrier, usually bollards, landscaping, parked cars, or through elevated separation.

Several studies have examined the effectiveness of cycle tracks as a bicycle collision countermeasure. The highlights of this research is outlined below:

Statistically insignificant decrease in bicyclist injury rates on street segments, but a statistically significant increase of 24% at intersections. 63% decrease in rear-end vehicle-bicycle collisions, 41% decrease between left-turning bicycles and other bicycles, 38% decrease in collisions between bicycles and parked cars. 120% increase in rear-end collisions between two bicycles, 140% increase in collisions between bicycles and right-turning vehicles, 48% increase between bicycles and left-turning vehicles.

Cycle tracks associated with 28% reduction in risk of injury when compared to streets without bicycle facilities.

89% decrease in risk of bicyclist injury, when compared to major streets without bicycle infrastructure and with on-street parking.

95% decrease in risk of bicyclist injury when compared to streets without biking infrastructure.

This research, while supporting the positive impact of cycle tracks as a countermeasure to bicycle collisions, points to the need for additional considerations to increase bicyclist safety at intersections and other bicycle-vehicle conflict points.

Separate shared-use or bicycle path

Definition: Off-street path, either for exclusive use by bicyclists or by bicyclists and pedestrians, usually with minimal street crossings, and designated by signs and/or pavement markings.

Shared-use paths associated with an 88% decrease in injury risk for children and 86% decrease in injury risk for adults, when compared to bicycling in the street.

Wide curb lane

Definition: Provision of a wider curb lane that accommodates bicyclists and vehicles, where a dedicated bike lane or other bicycle facility is not possible. Research on wide curb lanes has not focused on collision rates, and studies about the lateral passing distance between vehicles and bicycles demonstrates varying results on safety impacts for bicyclists.

Traffic diverters

Definition: Physical barrier placed diagonally across an intersection, which restricts the flow of vehicular traffic, but allows for pedestrians and bicyclists to cross the intersection.

96% decrease in the risk of bicyclist injury on streets with traffic diverters, when compared with other roadway segments.

ADDITIONAL COUNTERMEASURES

The following countermeasures are currently being used, but research is not yet available to indicate the effectiveness in reducing collisions:

- Lane narrowing Curb ramps Rumble strips Paved shoulder
- Curb radius reduction Mini-circles
- Chicanes
- Full or partial street closures
- Streetcar track/bike lane alignment
- Protected intersections
- Medians and crossing refuge islands
- Driveway reconfigurations (narrowing, restricting turn movements, improving driveway definition)

Signs, Markings, Operational

Intersection lighting/crosswalk lighting

Definition: Lighting between the crosswalk and oncoming vehicles, usually 10 feet before the crosswalk.

CRF: 27% reduction in injury collisions across all modes; 21% reduction in all collisions

Segment lighting

Definition: Quality and consistent placement of streetlights for drivers, as well as pedestrian-scale lighting for sidewalks.

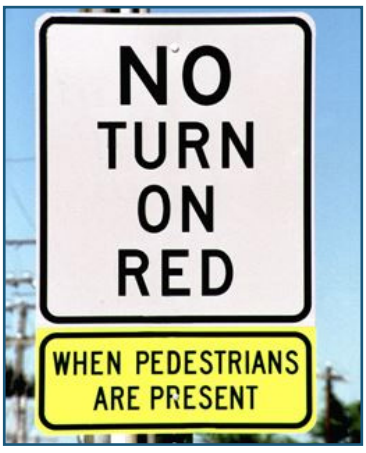
CRF: 23% reduction in injury collisions across all modes; 20% reduction in all collisions

Right turn on red restriction

Definition: Right turns prohibited on red to reduce conflicts between pedestrians and right- turning vehicles.

CRF: 3% reduction in all collisions

Additional analysis of collision rates before and after implementation of permitted right turns on red in the eastern United States demonstrates that allowing right turns on red increased pedestrian collision rates between 43% and 107%.



Left turn restriction

Definition: Left turns prohibited to reduce conflicts between pedestrians and left-turning vehicles.

CRF: 10% reduction in pedestrian collisions

Parking restriction near intersections

Definition: Parking spaces removed near crossing locations to allow for improved sightlines for both pedestrians and drivers.

CRF: 30% reduction in pedestrian collisions

Advance stop or yield lines, pedestrian yield signs Definition: Pedestrian yield signs or warning signs for drivers installed either on a post or in the roadway in advance of the crossing. Advance stop or yield lines stop indicate that a driver should stop or yield before approaching the pedestrian crossing. They are usually placed 4 feet away from the crossing.

While studies have not examined the impact of these treatments on the pedestrian collision rate, research indicates that these advanced stop and yield lines are effective in increasing the rate at which drivers yield to pedestrians.

Pavement friction (textured pavement)

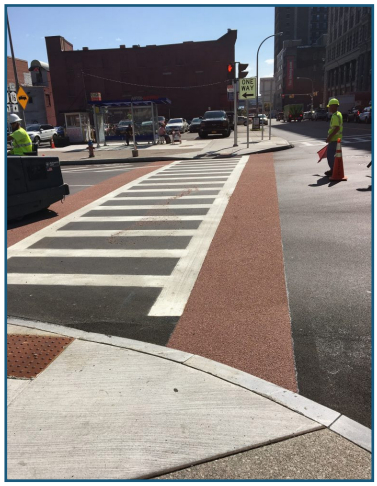
Definition: Textured pavement or a textured overlay on pavement to provide additional cues to drivers that they are reaching a pedestrian crossing, or other key area such as a tight radius corner.

CRF: 3% reduction in fatal or injury pedestrian collisions

Targeted enforcement efforts (along corridors for yielding in marked crosswalks)

Definition: Police enforcement efforts targeted at drivers at specific pedestrian crossings, or as part of a broader enforcement campaign.

CRF: 23% reduction in pedestrian collisions



High-visibility crosswalk (includes continental crosswalks)

Definition: Distinct pavement markings, such as a continental, zebra or ladder pattern, or a reflective inlay or thermoplastic tape.

CRF: 48% reduction in pedestrian collisions; 37% reduction in pedestrian collisions when high-visibility crosswalks are installed in school zones.

Research demonstrated a 37% reduction in pedestrian collisions after the installation of high- visibility crosswalks.

A study of high-visibility crosswalks in New York City shows a 48% reduction in the pedestrian collision rate after installation of the treatment.

Decorative and colored crosswalks

Definition: Crossing pavement markings in colors other than white.

A study of strong yellow/green crosswalks concluded that using the colored crosswalks had no impact on safety.

High-visibility crosswalk in conjunction with illuminated overhead crosswalk sign

Definition: A high-visibility sign on mast arms over the roadway that calls additional attention to the crossing.

Research on this treatment has not focused on collision rates, but research has found an increased rate of drivers yielding to pedestrians after installation of a high-visibility crosswalk with illuminated overhead sign.

Pedestrian warning signage

Definitions: Signs such as "Yield Here to Pedestrians" or "Stop Here for Pedestrians" that can be placed at the roadway surface level in advance of the crosswalk, on posts, or overhead.

Research on this countermeasure has not specifically examined pedestrian collision rates, but one study has found an 80% decrease in pedestrian-motorist conflicts after installation of a "Stop Here for Pedestrians" sign.

Shared bus-bike lane

Definition: Lanes designated for use only by public transit buses, bicycles and usually right-turning vehicles.

The only study available demonstrated a statistically insignificant decrease in the rate of bicycle crashes.

Intersection and segment lighting

Definition: Quality and consistent placement of streetlights for drivers and bicyclists.

Research has shown a lack of lighting associated with 111% increase in likelihood of bicyclist fatality, and 100% increase in likelihood of incapacitating injury for bicyclists. In another study, roadway lighting associated with 60% reduction in bicyclist injury collisions.

Shared lane markings

Definition: Pavement markings on travel lanes, also called Sharrows, which indicate that road space should be shared between bicycles and vehicles.

Studies investigating the impact of sharrows on bicyclist safety show varied results. Research conducted was not focused on the rate of collisions, but several studies did demonstrate that the installation of sharrows increased the lateral distance between bicyclists and drivers, as well as the distance between bicyclists and parked cars. Additionally, sharrows have been associated with a reduction in the number of bicyclists riding on the sidewalk and riding against the flow of traffic. However, additional research showed no change in behavior after the installation of sharrows.

Bike lanes

Definition: Five to seven foot wide designated lanes for bicyclists adjacent to vehicle travel lanes, delineated with pavement markings.

Studies dating back to the mid- 1970s have produced varying results on the safety impacts of bike lanes, the highlights of which are outlined below:

- Overall reduction in bicycle collisions, with an increase in the rate of collisions due to bicyclists making improper left turns
- Increase in bicycle collisions associated with turning movements in the first year, with sharp reductions in subsequent years
- Reduction in bicycle collisions along roadway segments, with increases at some intersections
- Statistically insignificant increases in bicyclist injuries and collisions, and statistically significant 73% increase in collisions involving bicycles and right- turning vehicles
- Increase in number of bicycle collisions at treatment sites versus control sites at intersections. Collisions on roadway segments decreased for treatment sites, but decreased much more significantly for control sites. However, this study did not account for bicycle volumes.

This research points the need for special consideration at intersections and other conflict points between bicyclists and vehicles to minimize collisions.

Warning and regulatory signs for drivers ("Share the Road," "No Parking in Bike Lane")

Definition: Posted signs that provide warning and regulatory messages alerting drivers to the presence of bicyclists and shared roadway facilities.

Research on the use of these signs has not focused on bicycle collision reduction, but studies have shown they may hold promise in increasing bicycle safety based on the passing distance of vehicles before and after sign installation.

Buffered bike lanes

Definition: Designated lanes for bicyclists, five to seven feet wide, separated from vehicle travel lanes and/or parked cars by pavement markings, usually 3 feet wide and with a double-line, chevron or diagonal line pattern.

In one study of a two-way buffered bike lane in Washington, D.C., the rate of bicycle crashes increased by one crash per year (accounting for the increase in bicycle use) after installation. However, the study also suggested that confusing signage at intersections may have led to the increase in collision rates.

Bike box

Definition: Designated area for bicycles to wait at red traffic signals in front of queuing vehicles, usually marked with green pavement, with the intent of reducing delay at signals, increasing visibility of bicyclists, and in some cases, facilitating left-turn positioning for bicyclists.

One study of 10 intersections showed that bicyclist-motorist conflicts decreased by 9%. However, that study and others have shown that bike boxes are not effective in encouraging drivers to yield to bicyclists more often, and in many cases drivers encroach on the bike box space.

Green colored pavement

Definition: Green markings, created with paint, epoxy, thermoplastic, or colored asphalt, used to designate bike lanes, cycle tracks, bike boxes, conflict zones or intersection crossings.

One study showed a statistically insignificant reduction in the rate of vehicle-bicyclist conflicts, as well as a significant increase in the rate of drivers yielding to bicyclists, following the installation of a green bike lane. Other studies on the use of green pavement at and across intersections were inconclusive: in some cases drivers yield to bicyclists more often, but in other cases less often.

Additional countermeasures - The following countermeasures are currently being used, but research is not yet available to indicate the effectiveness in reducing bicycle collisions:

- Automated speed enforcement (ASE)
- Right turn pockets Smart Lighting
- Contraflow bike lanes (for one-way streets)
- Bicycle route and bicycle boulevard signage
- Pavement markings (bike symbol, bike detector marking, yield lines)
- Two-stage turn queue box Right turn on red restriction Targeted enforcement efforts
- Parking restrictions near intersections and driveways

Speed Control Measures, Miscellaneous

Speed limit reductions

Definition: Speed limit reductions performed street by street or implemented as part of a speed reduction zone (often found near schools and parks) or bicycle boulevard program.

Research on speed limit reductions has shown a 56% decrease in pedestrian collisions along roadway segments at treatment sites, compared with a 6% increase at control sites. The same study found a 45% decrease in pedestrian collisions from speed limit reductions at intersections, though the findings were not significant in the case of intersections.

Research shows that the likelihood of a bicyclist fatality in vehicle-bicycle collisions increases by over 1,000% if the vehicle is traveling over 40 mph, when compared to speeds under 20 mph. If the vehicle is traveling between 20 and 30 mph, risk of bicyclist fatality increases 93% and over 300% for vehicles traveling between 30 and 40 mph. In a study on the implementation of 20 mph speed limit zones, bicyclist injuries decreased by 17% and severe injuries or fatalities decreased by 38%.

In another study of streets with vehicles traveling under 30 mph, there was a 48% reduction in the risk of bicyclist injury when compared with streets with speeds over 30 mph.

Speed tables and humps

Definition: Asphalt protrusions 3-4 inches high that extend the width of the roadway, varying in length depending on type. Speed humps are rounded, while speed tables have a flat top.

Research compiled in the Evaluation of Pedestrian-Related Roadway Measures report provides mixed results regarding the impact of speed hump installation on pedestrian collisions, with some studies finding increases (though statistically insignificant) and others finding decreases.

Additional research included in the FHWA Crash Modification Factor Clearinghouse demonstrates a decrease of between 40% and 50% in all collision types after speed hump installation.

Portable speed trailer/and radar speed display signs

Definition: Portable speed trailers that display the speed limit as well as the speed of the approaching vehicle in real- time, and in some cases have changeable message display boards.

Research on this countermeasure has not focused specifically on collision rates, but has shown increases in drivers yielding to pedestrians.

Hazard identification and response program Definition: Publicly-run program that allows for two-way communication between jurisdictions and the public, including temporary signage alerting bicyclists to potential hazards, as well as technology solutions that allows the public to submit real-time information (often via cell phone) on hazards, such as debris in the road.

Construction sites – one particular type of hazard – have been associated with a 167% increase in the risk of bicycling injury.

ADDITIONAL COUNTERMEASURES

The following countermeasures are currently being used, but research is not yet available to indicate the effectiveness in reducing bicycle collisions:

- Shared space
- Visual narrowing (using street trees, paving treatments, roadway markings)
- Railings and channelization
- Ongoing maintenance (sweep bike and curb lanes, repair potholes)
- Visual narrowing (using street trees, paving treatments, roadway markings)

APPENDIX 3

MAPS OF CRASH DATA

Figure 3-1 - Miami-Dade County Crash Densities Fatalities and Incapacitating Injuries (2010-2014) On State Highway System

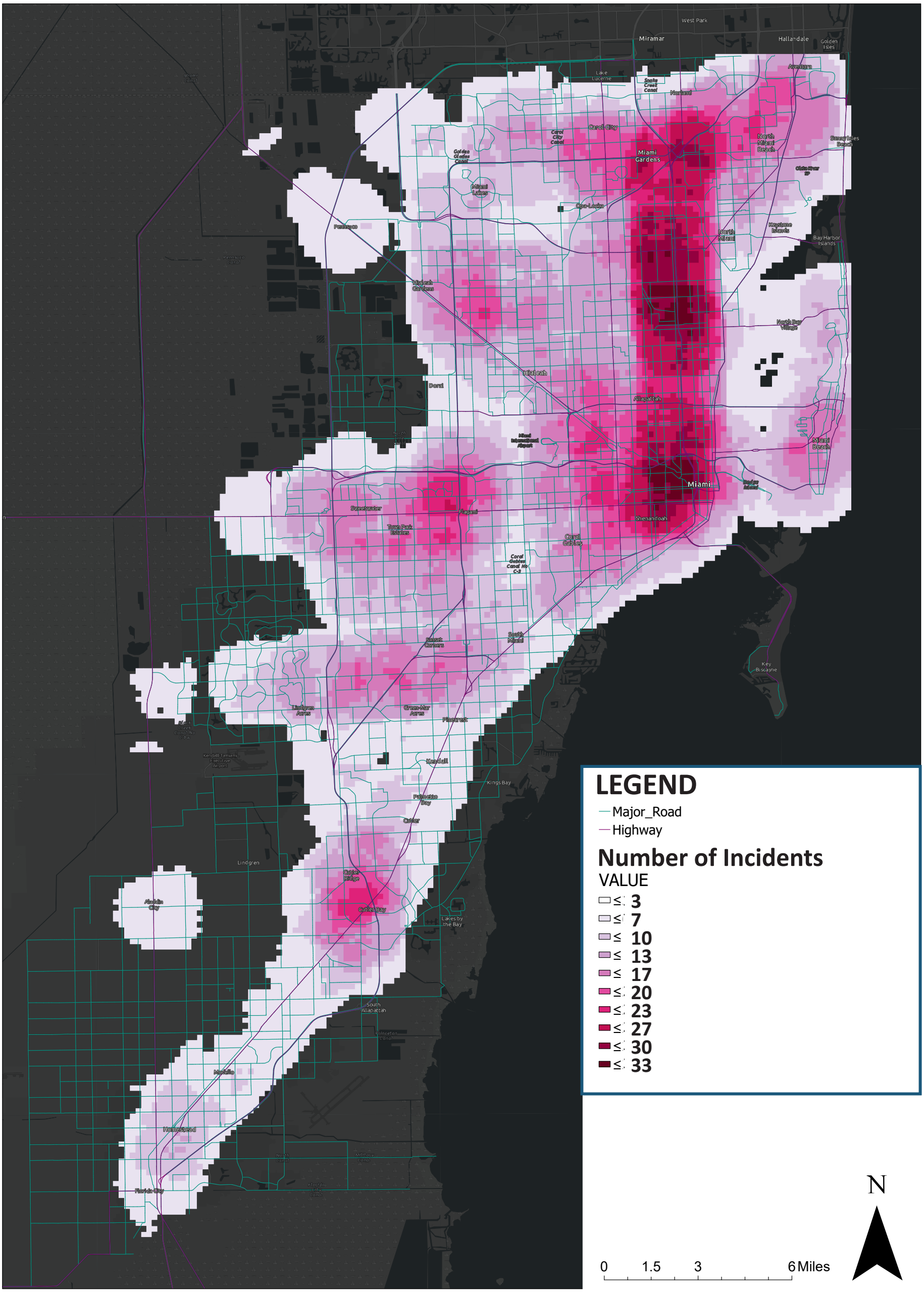


Figure 3-2 - Miami-Dade County Crash Densities Fatalities and Incapacitating Injuries (2010-2014) On Local Roads

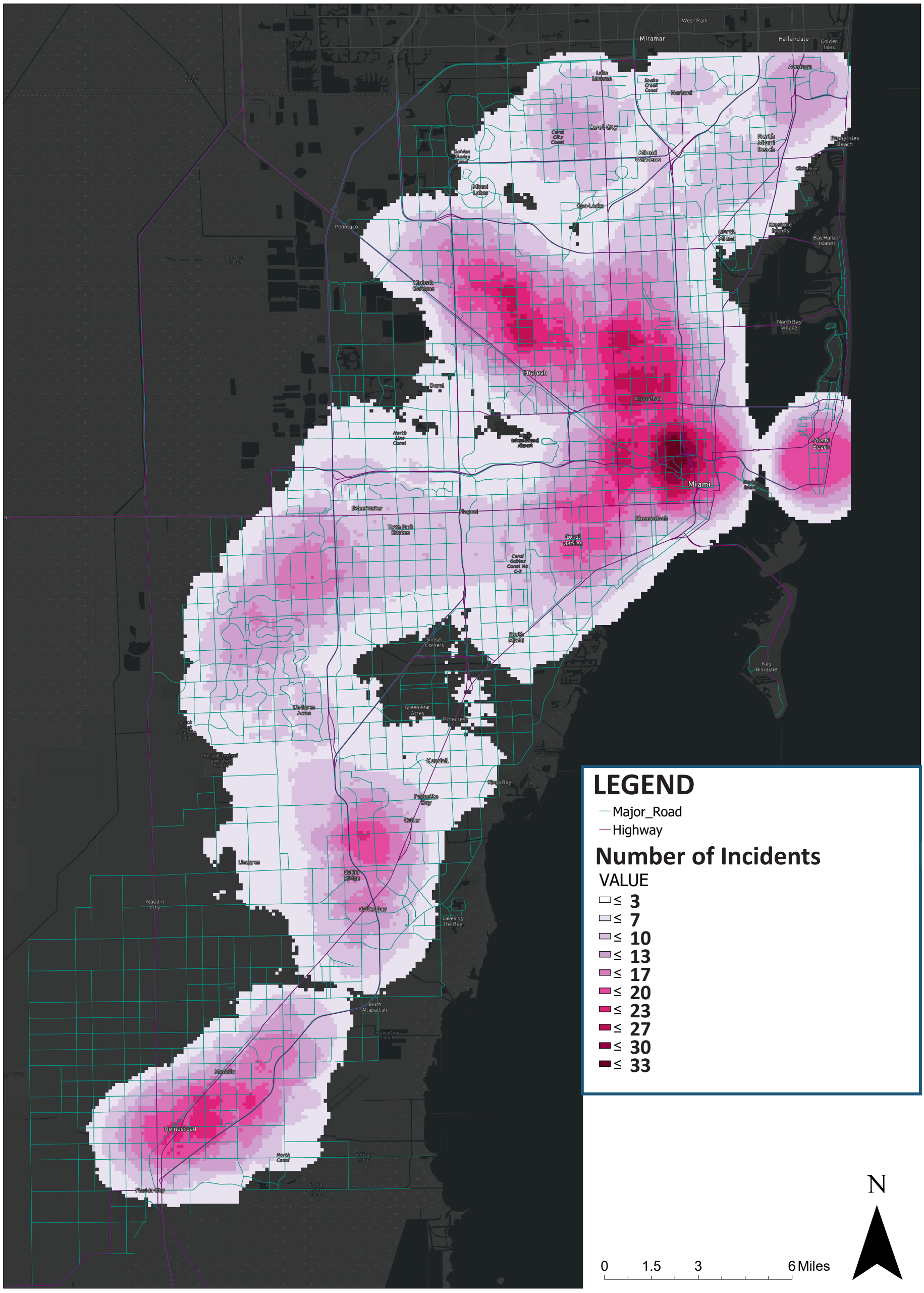


Figure 3-3 - Incapacitating Injuries and Fatalities Miami-Dade County Crash Locations (2010-2014)

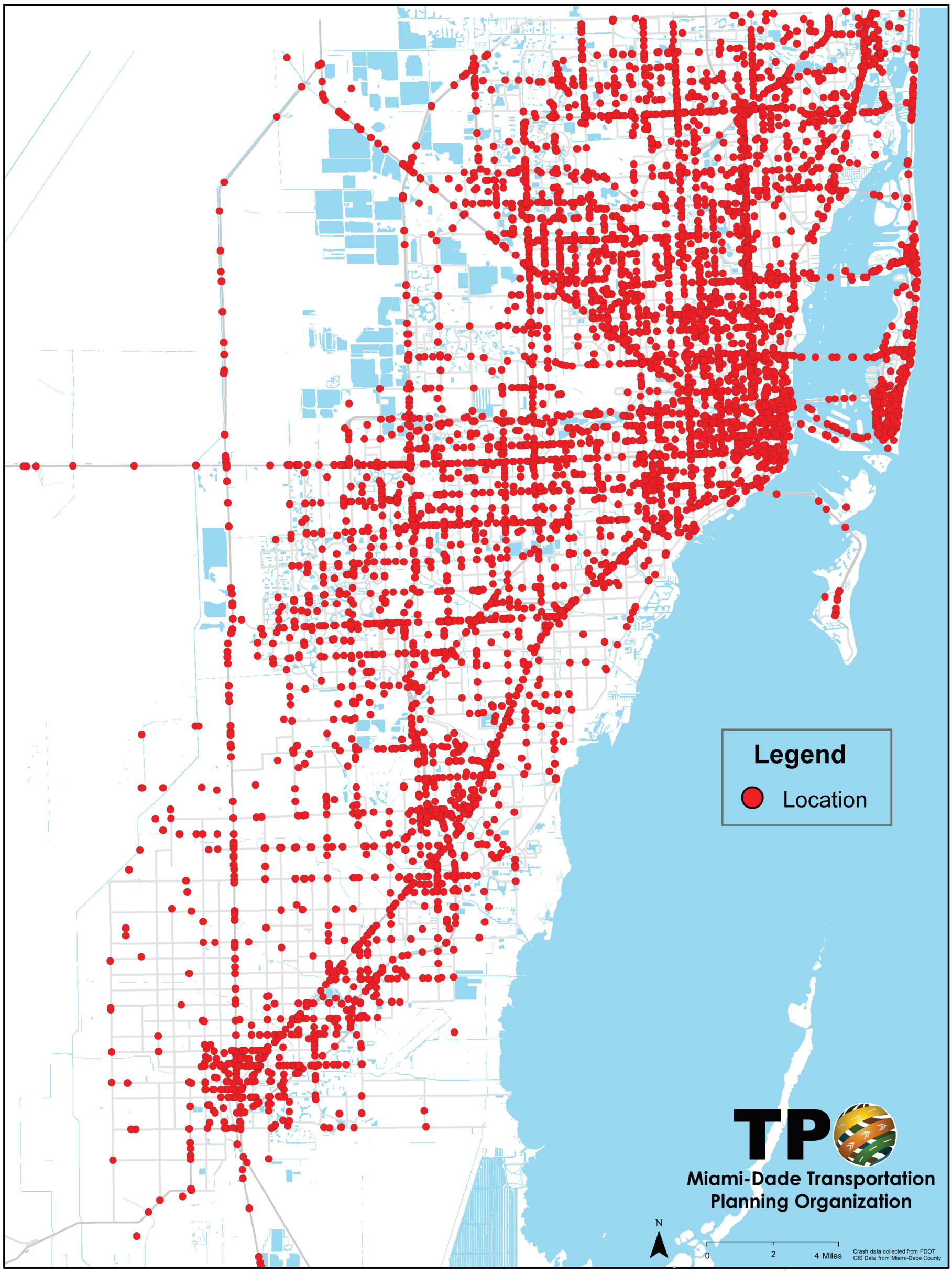


Figure 3-4 - Fatality Locations Miami-Dade County (2010-2014) On State Highway System

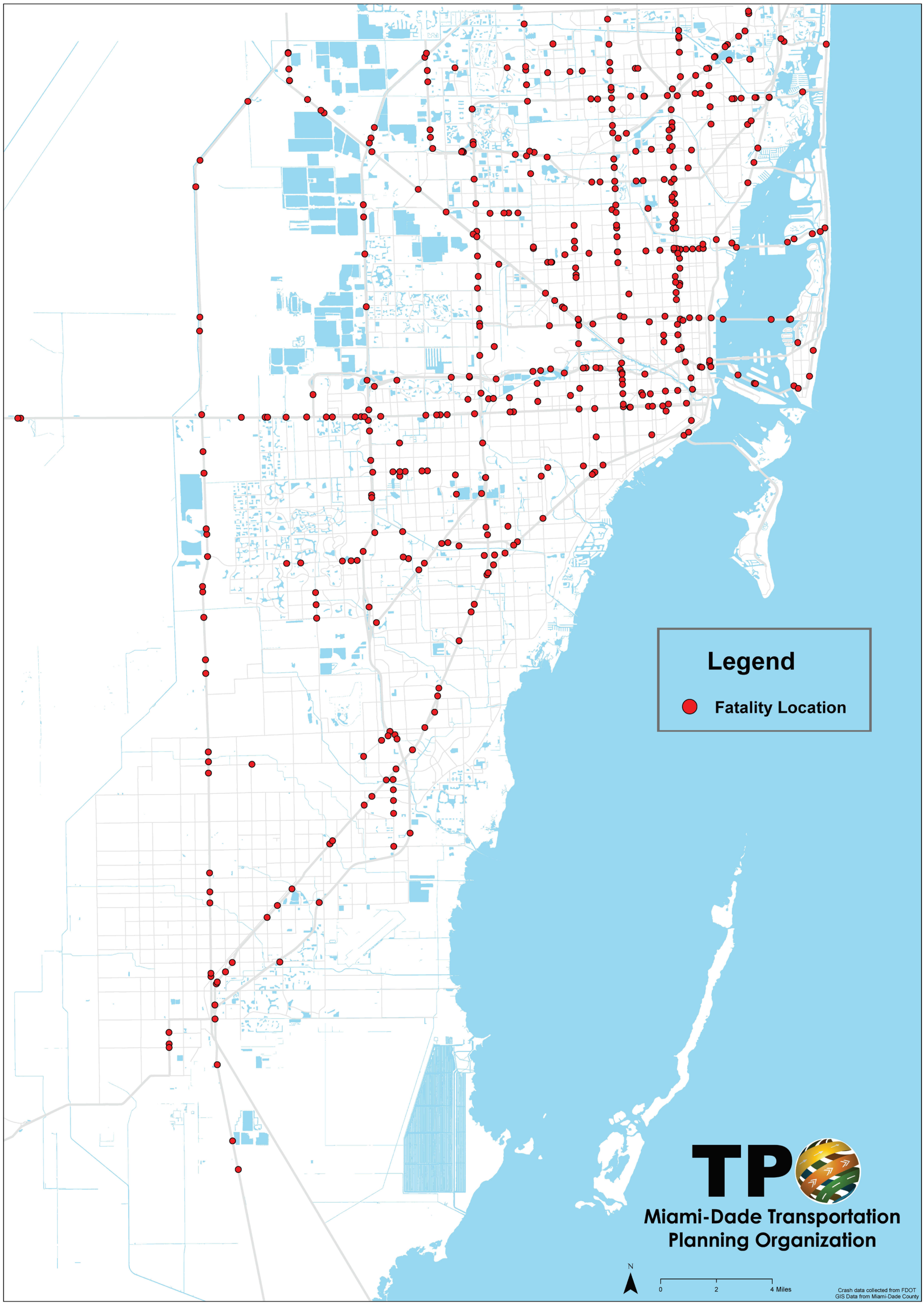


Figure 3-5 - Fatality Locations Miami-Dade County (2010-2014) On Local Roads

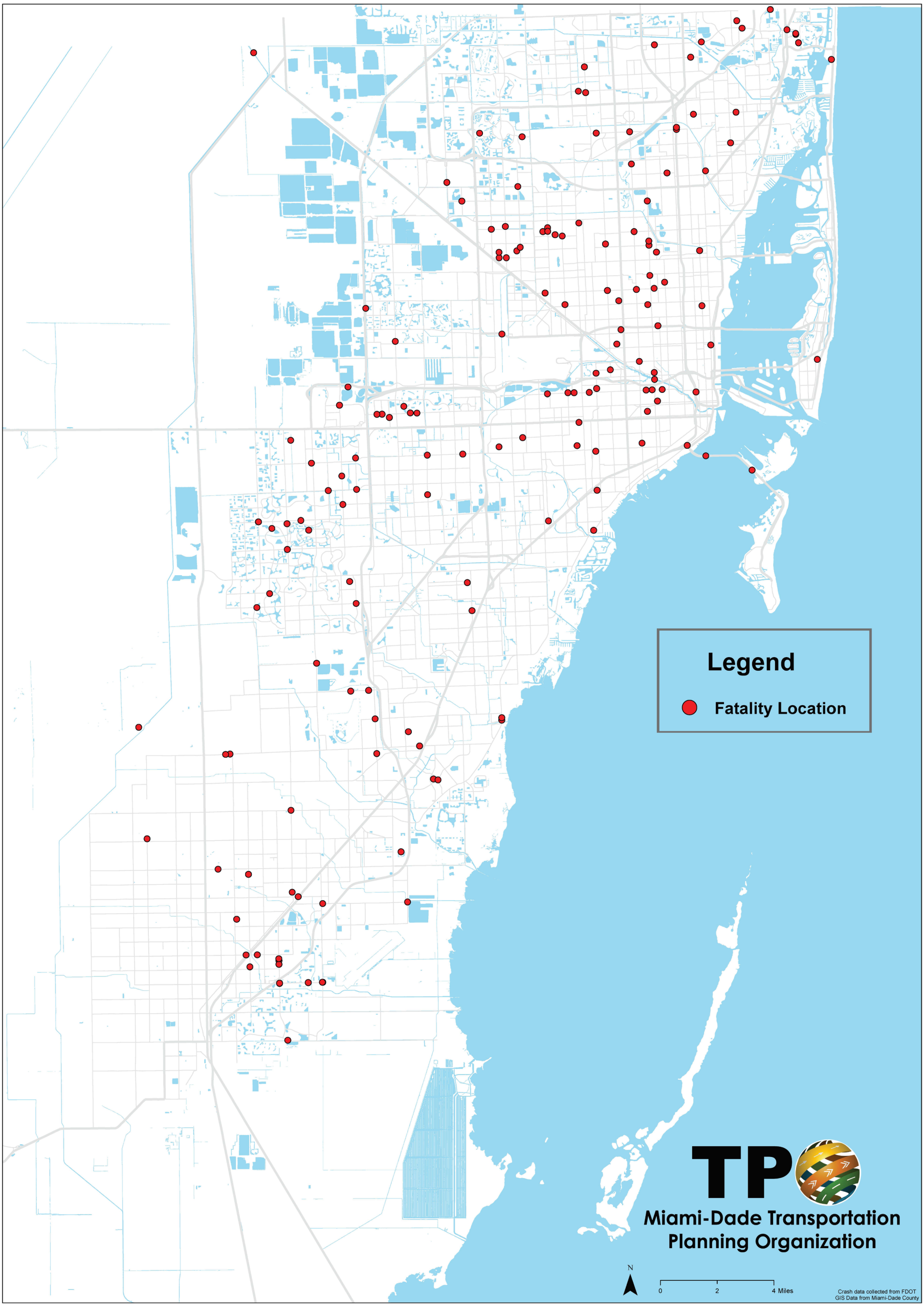


Figure 3-6 - Automobile Fatalities Miami-Dade County (2011-2014)

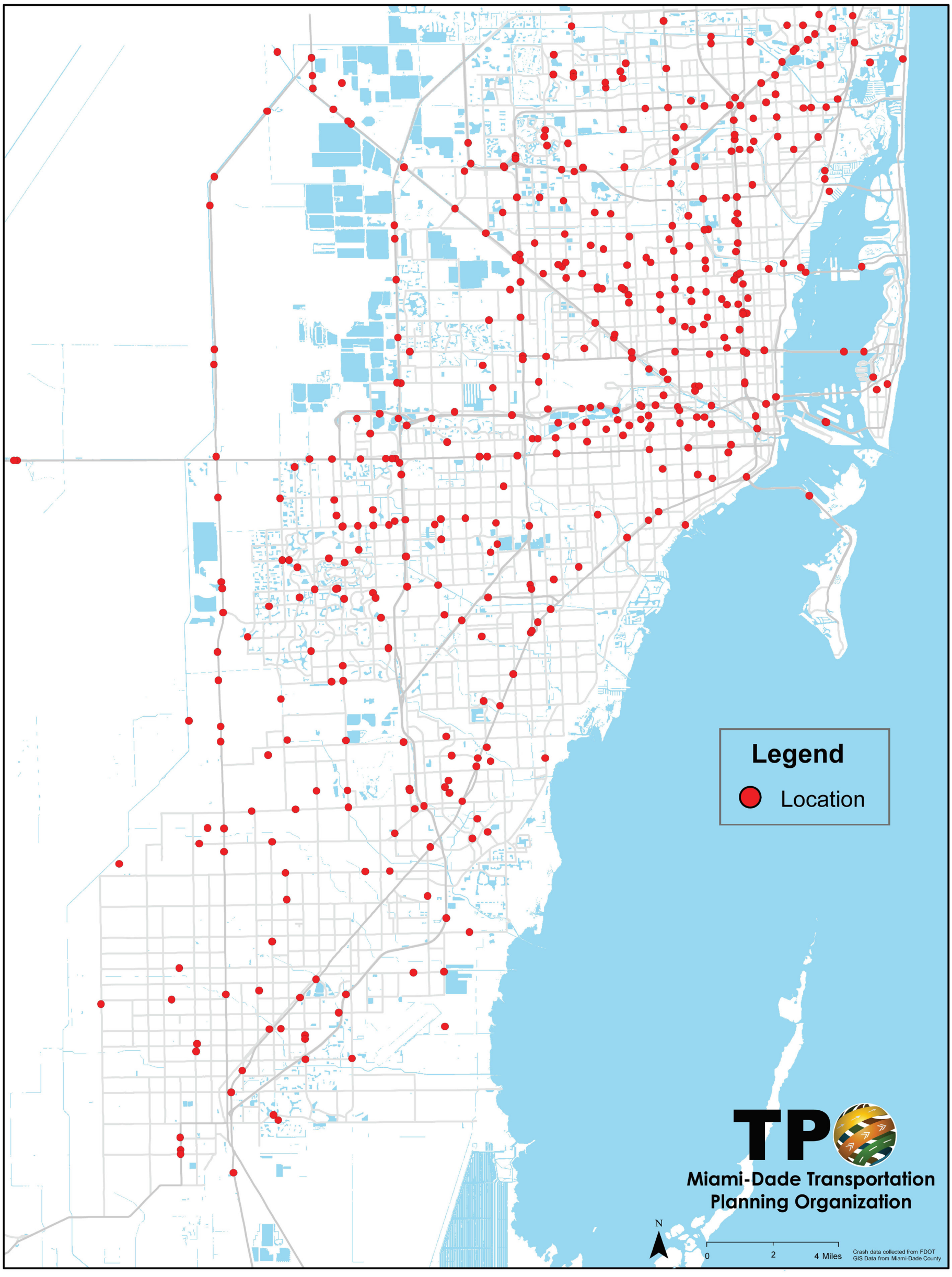


Figure 3-7 - Pedestrian Fatalities Miami-Dade County (2011-2014)

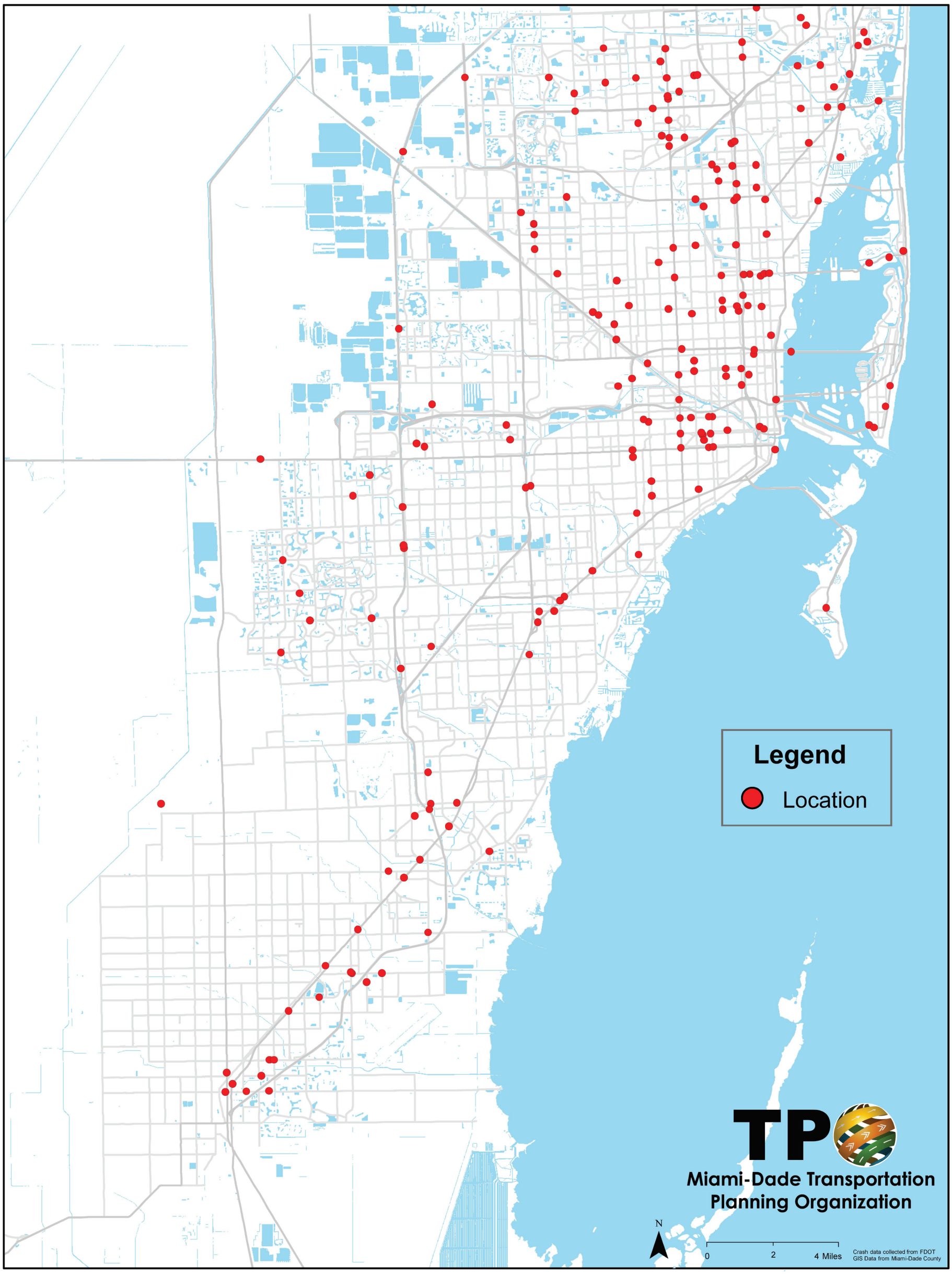


Figure 3-8 - Bicycle Fatalities
Miami-Dade County (2011-2014)

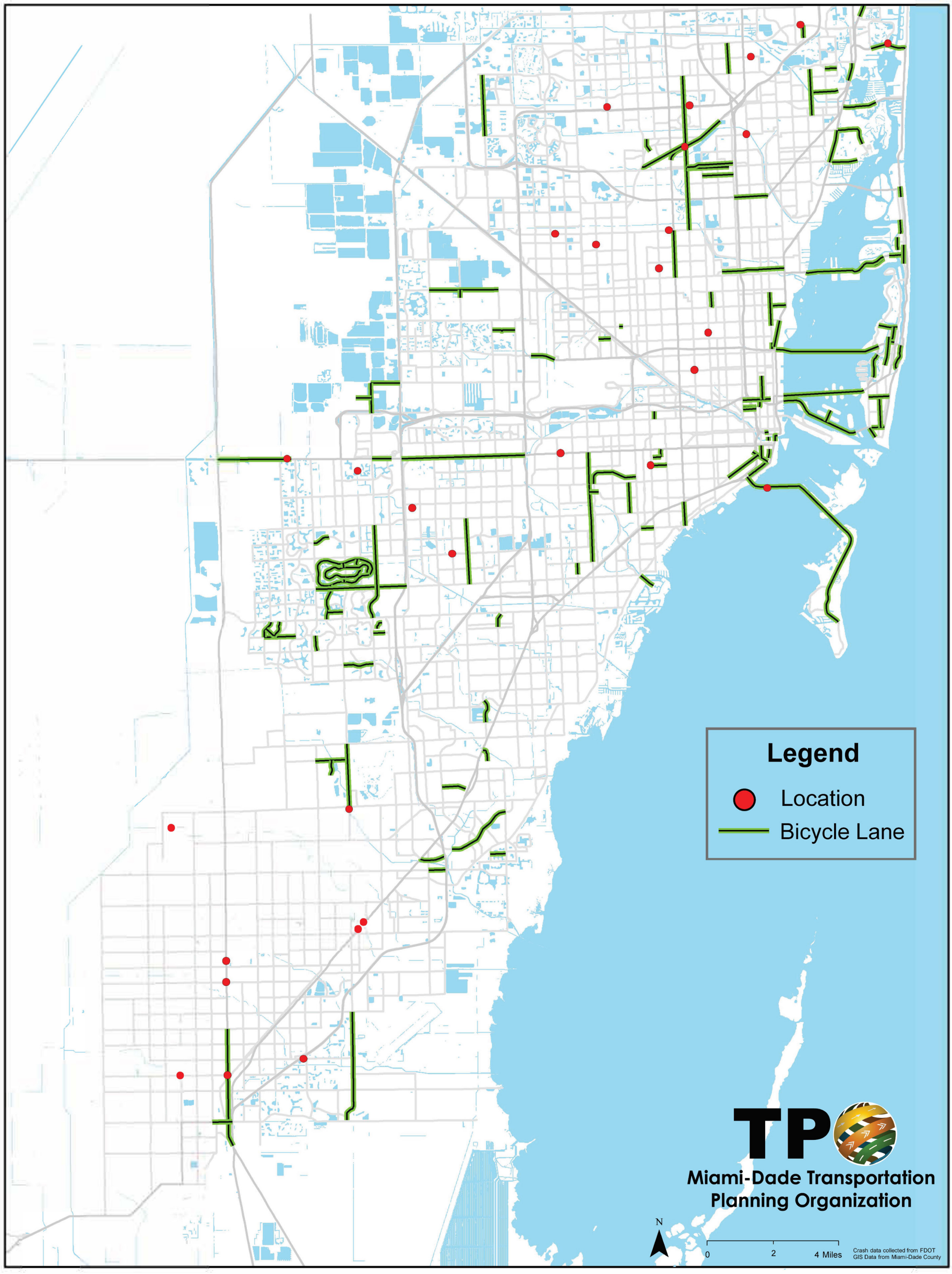


Figure 3-9 - Incapacitating Injuries by Automobile Miami-Dade County (2011-2014)

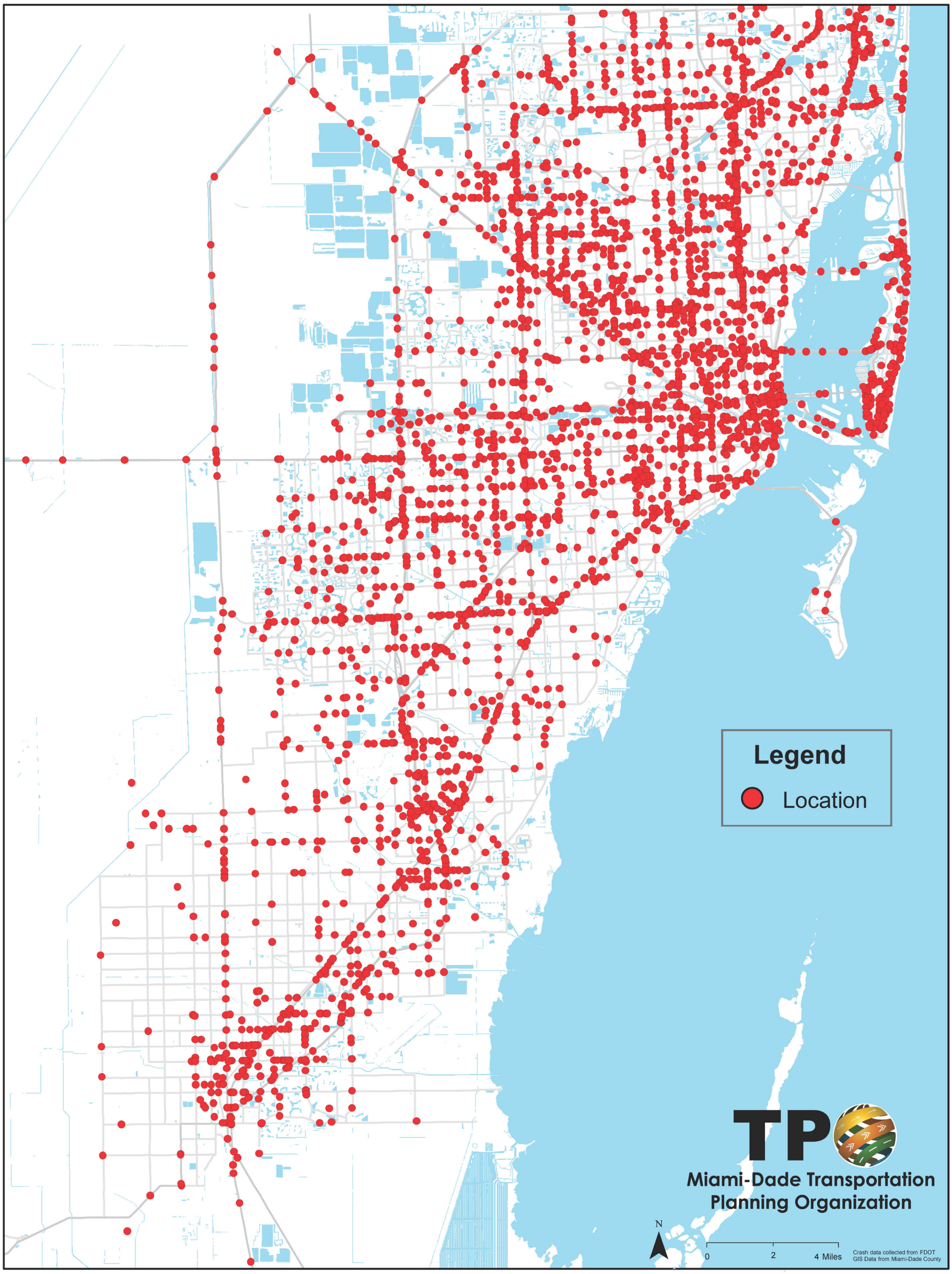


Figure 3-10 - Pedestrian Incapacitating Injuries Miami-Dade County (2011-2014)

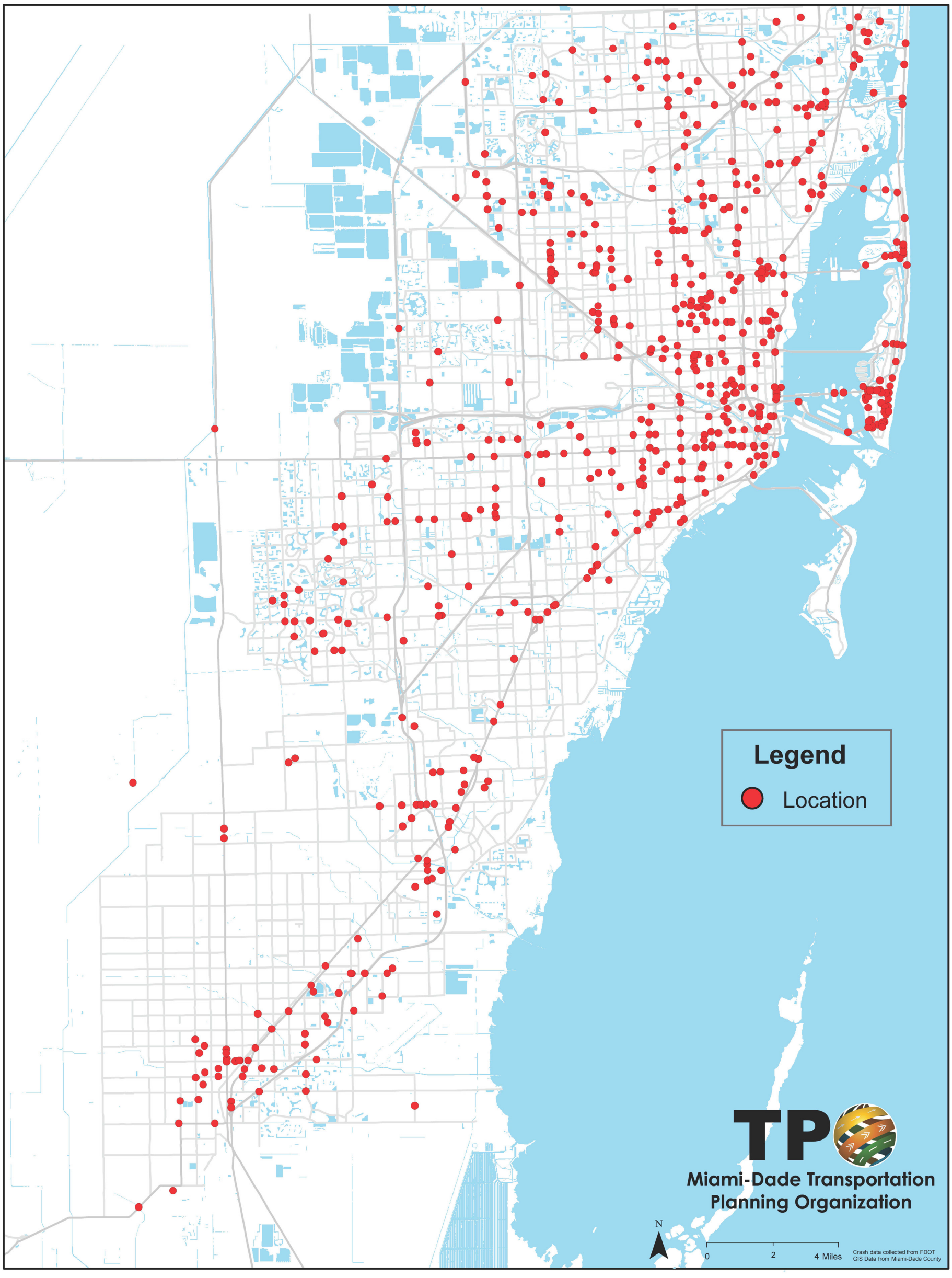
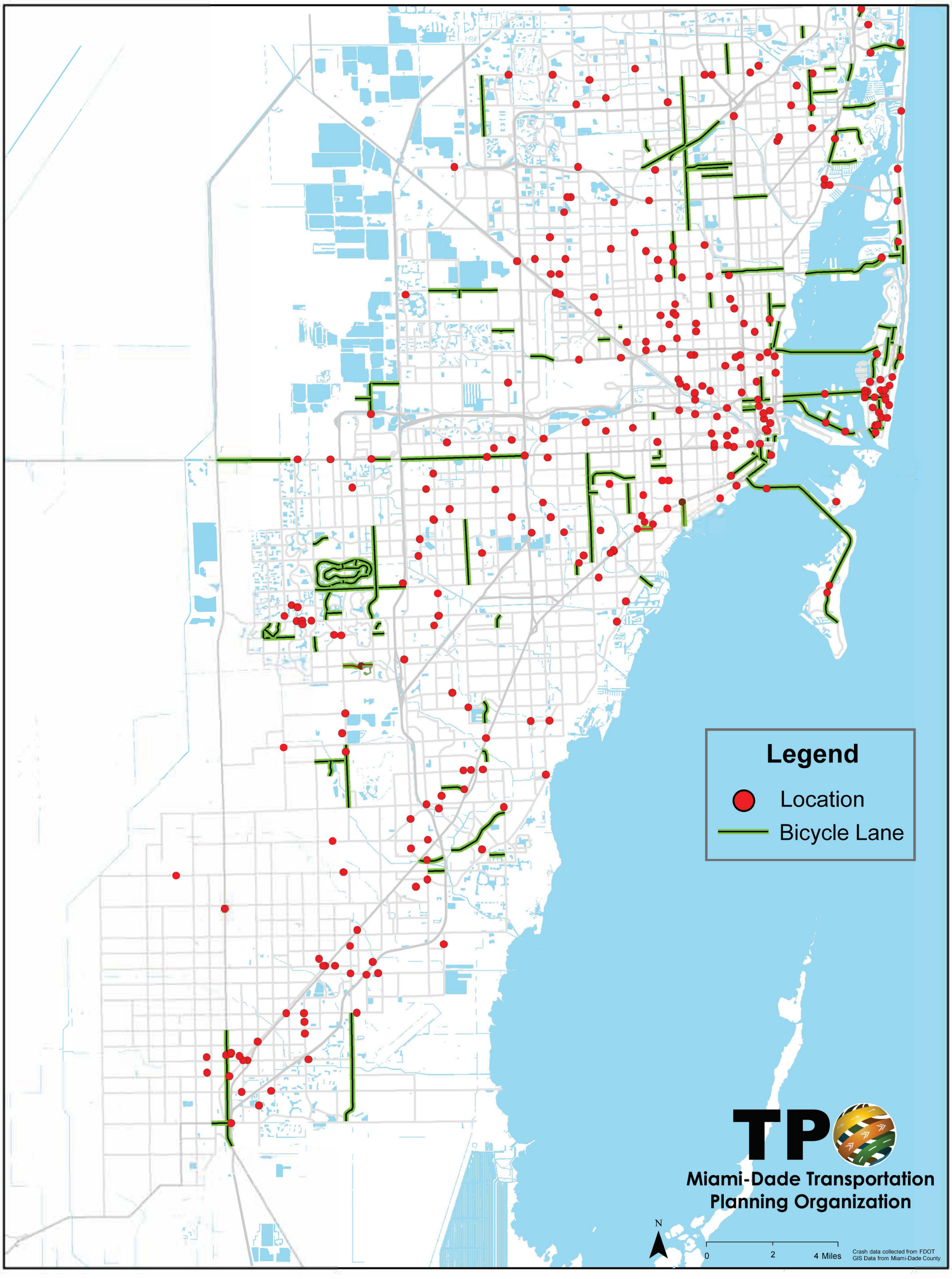


Figure 3-11 - Incapacitating Injuries by Bicycle Miami-Dade County (2011-2014)



Miami-Dade Transportation Planning Organization

FOR MORE INFORMATION ON VISION ZERO PLAN VISIT WWW.MIAMIDADETPO.ORG