City of Wilmington Pedestrian Safety Study

Wilmington Pedestrian Audit

Overview

July 14, 2023

DelDOT

WRA

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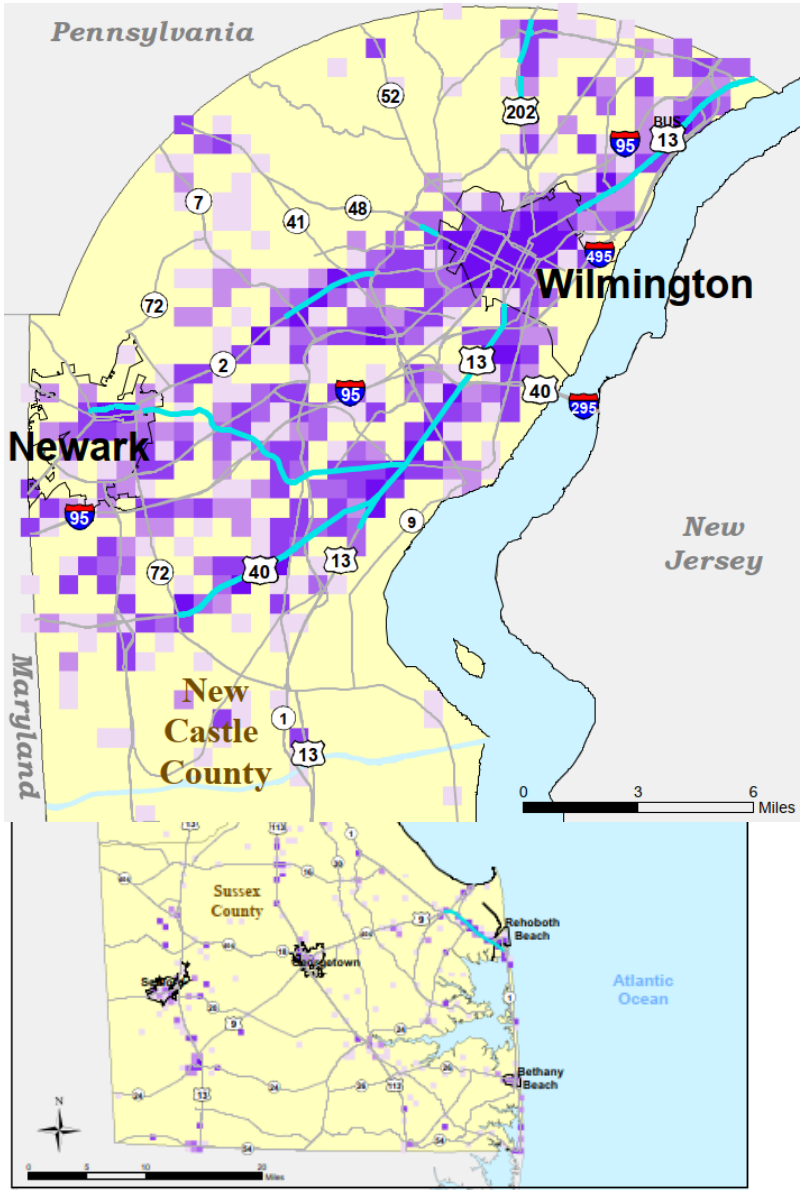
Purpose of Study

- Why are we here?
  - Improve pedestrian safety within City
  - Improve walking as a mode of transportation
    - Access to jobs
    - Access to recreation
    - Access to economic improvements
  - Major corridors surrounding Wilmington have been studied
    - US 13
    - SR 141
    - US 202
    - Philadelphia Pike
  - Site selection conducted in 2019 pinpoints Wilmington as next logical study location



Study Approach

- Review city-wide pedestrian crash history
- Identify critical corridors and intersections
- Convene stakeholder group
- Pedestrian safety audits of selected critical corridors and intersections
- Systemic pedestrian treatments at other locations
- More on that in a bit…

Stakeholder Group

- Peter Haag, DelDOT
- Sonya LaGrand, DelDOT
- Diane Gunn, Century, DelDOT Wilmington Projects Manager
- Paul Moser, DelDOT
- Meaghan Barna, DelDOT
- Aimee String, DelDOT
- Catherine Smith, DTC
- John Calnan, DTC
- Capt. Rodney Layfield, State Police
- Lt. Lance Skinner, State Police
- Richard Klepner, Office of Highway Safety
- Jackie McDermott, Office of Highway Safety
- Stephen Weber, City of Wilmington
- Tom Ogden, City of Wilmington
- Jeff Starkey, City of Wilmington
- Kelly Williams, City of Wilmington
- Sgt. Pete Leccia, Wilmington Police
- Dave Gula, WILMAPCO
- Federal Highway Administration

Pedestrian Safety In Delaware

Pedestrian Safety in Delaware

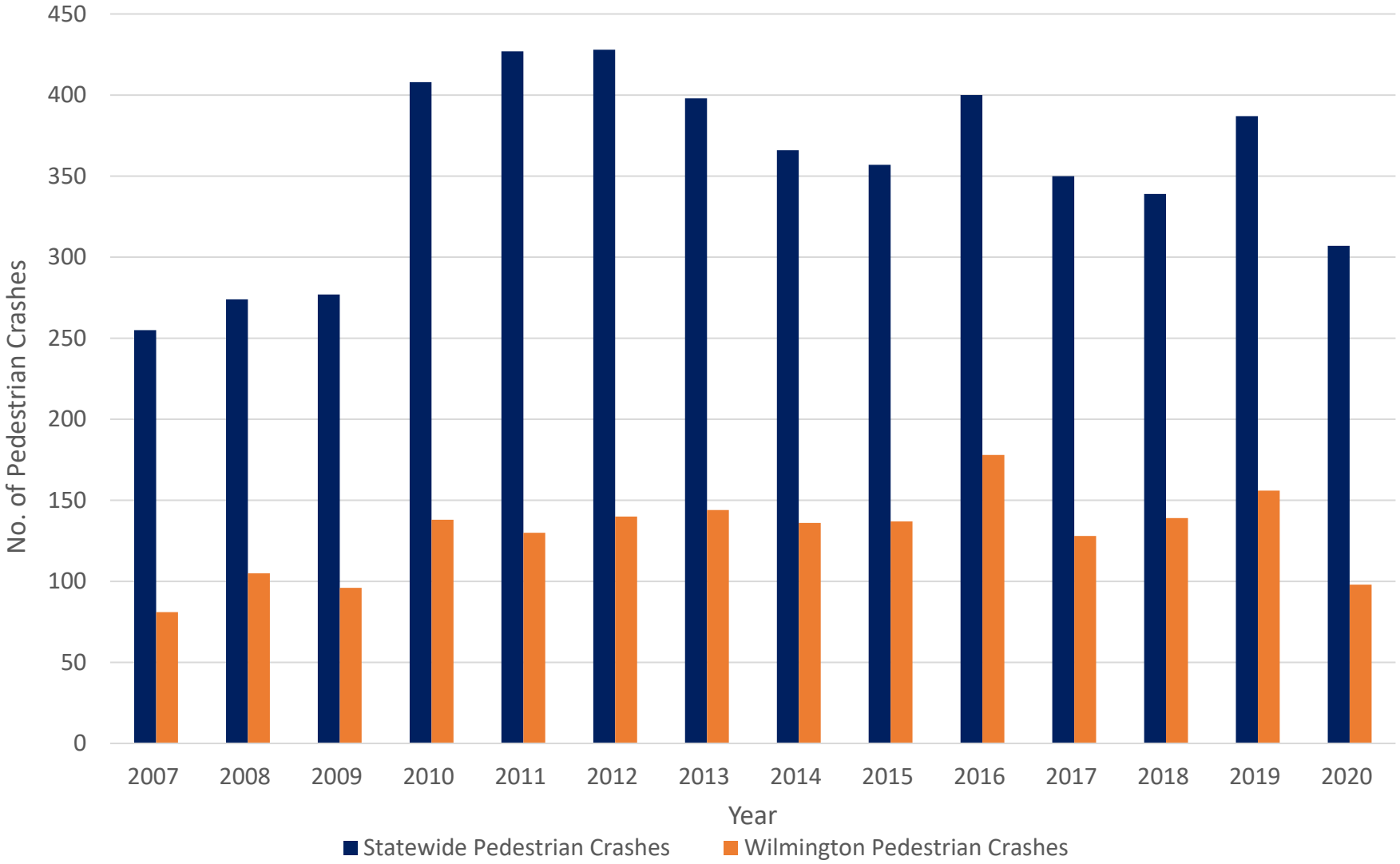
- Delaware Strategic Highway Safety Plan
  - Emphasis Area of SHSP since 2006
  - Pedestrians account for 12.5% of all fatalities and serious injuries statewide (2015-2019 data)
- Continued implementation of countermeasures
  - Engineering
  - Education
  - Enforcement

2015 to 2019 Pedestrian Fatalities & Serious Injuries

- 89% occurred in urban areas
- 63% occurred in New Castle County
- 73% occurred between 4 PM and 2 AM
- 71% were male
- 69% involved no contributing factor on the part of the vehicle driver
- 56% occurred along divided roadways
- 53% were 20 to 49 years old
- 41% occurred on principal arterials
- 36% occurred during dark (unlit) conditions
- 34% occurred on a Friday or Saturday

Pedestrian Crashes Statewide

36% of statewide pedestrian crashes from 2007-2020 have occurred in the City of Wilmington



Sources: Statewide Pedestrian Crashes: DSP Annual Traffic Statistical Reports
Wilmington Crashes: CARS

DE Pedestrian Fatalities vs. Region

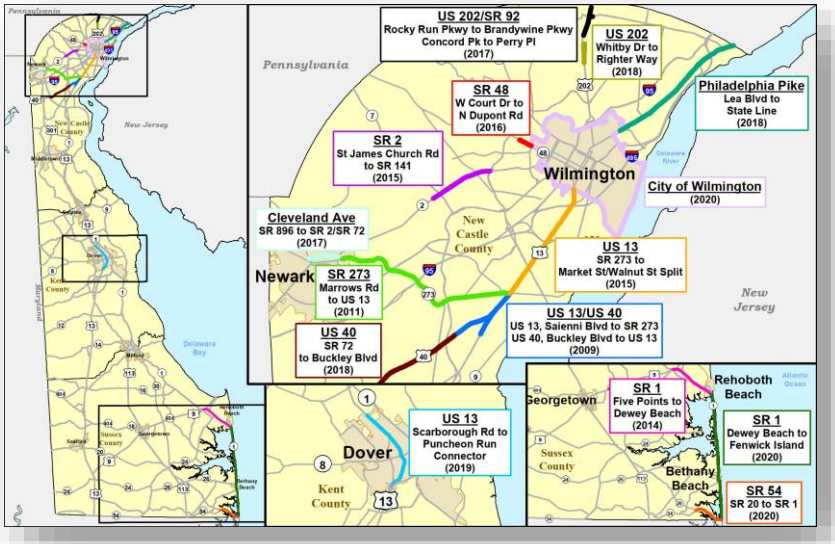
Pedestrian fatalities per 100k population	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Delaware	**1.85**	**2.41**	**1.69**	**2.45**	**1.98**	**2.94**	**2.70**	**2.67**	**3.70**	**2.84**	**3.43**	**2.38**	**3.29**
D.C.	3.23	1.52	2.33	2.15	1.29	1.11	1.39	1.37	1.93	1.17	1.59	1.57	1.28
Maryland	2.06	2.06	1.98	1.75	1.75	1.63	1.82	1.69	1.53	1.73	1.88	2.12	2.03
Pennsylvania	1.21	1.10	1.06	1.14	1.15	1.28	1.15	1.26	1.18	1.32	1.15	1.54	1.15
Virginia	1.14	0.98	0.93	0.91	0.90	1.20	0.91	1.06	0.92	1.45	1.31	1.39	1.44
West Virginia	1.49	0.72	1.15	0.70	1.08	1.67	1.51	1.03	1.03	1.31	1.43	1.22	1.73
Max. State Rate/Yr	3.23 (DC)	2.67 (FL)	2.51 (FL)	**2.45 (DE)**	2.57 (FL)	**2.94 (DE)**	**2.70 (DE)**	3.55 (NM)	**3.70 (DE)**	3.51 (NM)	3.54 (NM)	3.96 (NM)	3.96 (NM)
Min. State Rate/Yr.	0.38 (WY)	0.28 (NE)	0.37 (WY)	0.44 (NE)	0.38 (NE)	0.24 (SD)	0.14 (ND)	0.48 (NE)	1.48 (ID)	0.63 (NE)	0.66 (ND)	0.52 (ME)	0.48 (VT)

States in NHTSA's Region 3

Source: National Highway Traffic Safety Administration (NHTSA)

Pedestrian Safety Countermeasures

- Pedestrian Safety Audits
  - Better understand specific pedestrian crash trends
  - Multidisciplinary audit team to review corridors and make recommendations
  - Improvements are implemented as part of existing or future projects and programs
  - Since 2015, DelDOT has completed 10 audits/assessments and implemented various improvements
    - US 13 from Llangollen Boulevard to A Street
    - SR 273 from US 13 to SR 72
    - Kirkwood Highway from St. James Church Road to SR 141
    - US 13 Dover from Scarborough Road to Puncheon Run Connector
    - SR 1 from Lewes to Dewey Beach
    - US 202
    - SR 48 from SR 141 to DuPont Road



Pedestrian Safety Countermeasures

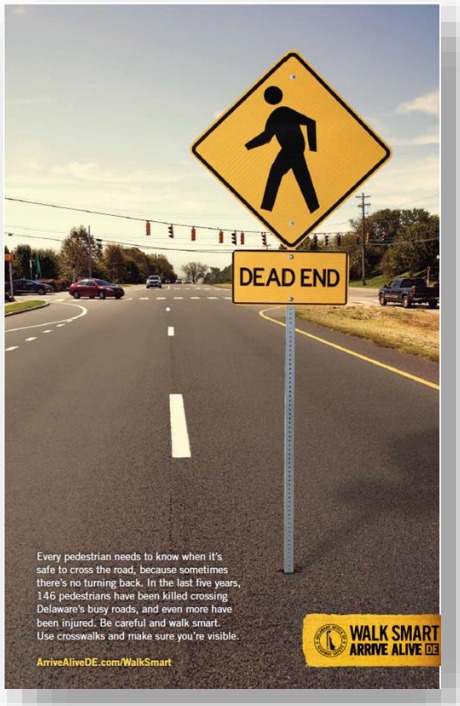
- Rectangular Rapid Flashing Beacon
  - Pedestrian-actuated warning device used at uncontrolled, marked crosswalks
  - Intended to improve compliance with motorists yielding to pedestrians in marked crosswalks
  - First installation in April 2016
  - 43 locations completed since 2016
  - 3 currently under construction
  - 12 planned for future construction
  - 25% average improvement in motorist yielding compliance across all sites

Pedestrian Safety Countermeasures

- Other Engineering Countermeasures
  - Painted crosswalks at signalized intersections
  - Pedestrian signalization
  - Marked crosswalks at appropriate mid-block locations
  - Corner sight distance improvements
  - Curb bump outs to decrease crossing distances
  - Median refuge areas
  - Transit improvements
  - Sidewalk connectivity improvements
  - Traffic calming
  - Improved warning signage
  - Barriers to prevent undesired mid-block crossings

Pedestrian Safety Countermeasures

- Pedestrian Education Countermeasures
  - Managed by Delaware Office of Highway Safety
  - Continued education outreach campaigns
    - Targeted media outreach
  - Community outreach
    - Alliance Sports Marketing
      - Cross Country Races
      - Elementary school programs
    - Corporate/Public Partner Program
    - OHS Safety Conference
    - Banners for schools
    - Beach events: Partnership with Ocean City Pedestrian Task Force
    - Pedestrian Speed Demo

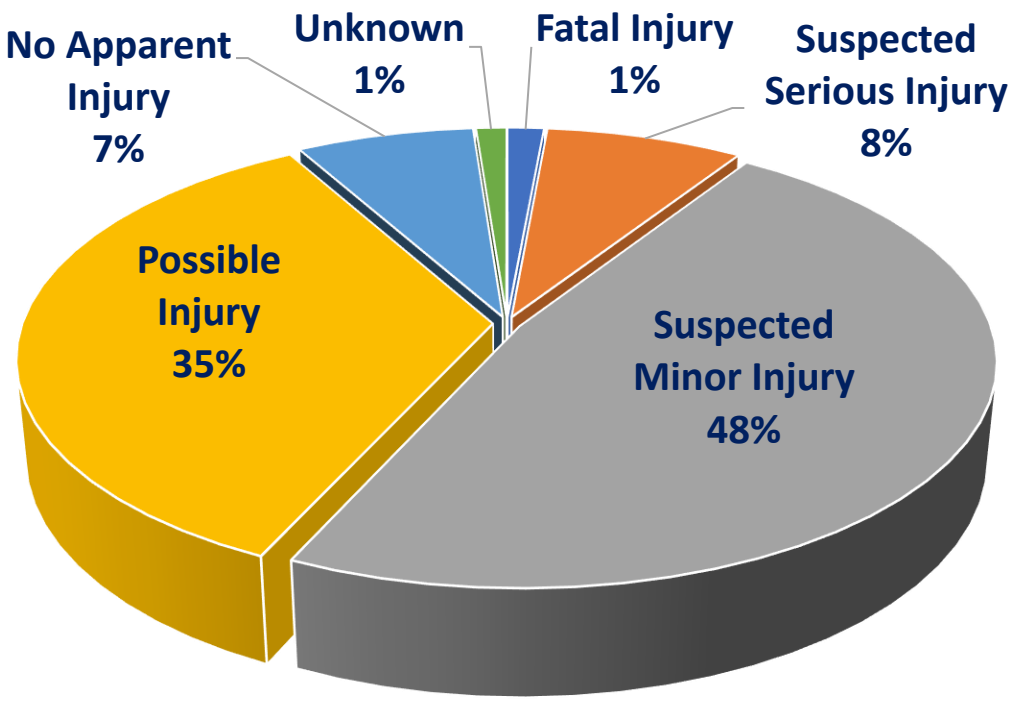


WALK SMART. ARRIVE ALIVE DE

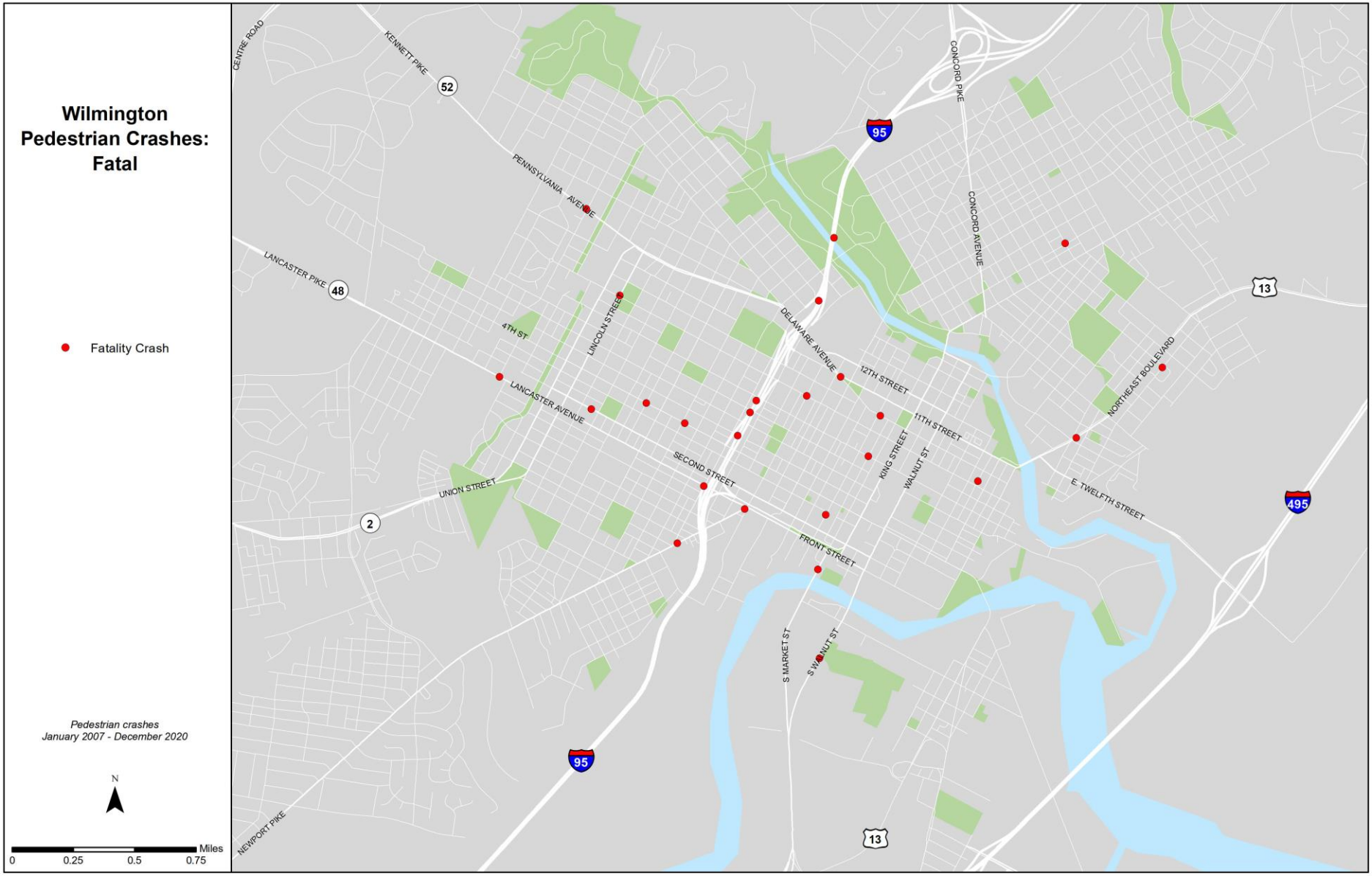
WILMINGTON PEDESTRIAN CRASH STATISTICS

Wilmington Pedestrian Crash Statistics

- Jan. 1, 2007 – Dec. 31, 2020
- Source: DelDOT's CARS Program
- All crash severities
  - Property Damage Only
  - Injury
  - Fatal
- Overall crash statistics
  - 1,591 pedestrian crashes
  - 1,670 pedestrians involved
  - 24 pedestrians killed
  - 130 pedestrians seriously injured
  - 796 pedestrians with minor injuries
  - 583 pedestrians with possible injuries



Pedestrian Crashes – Where?



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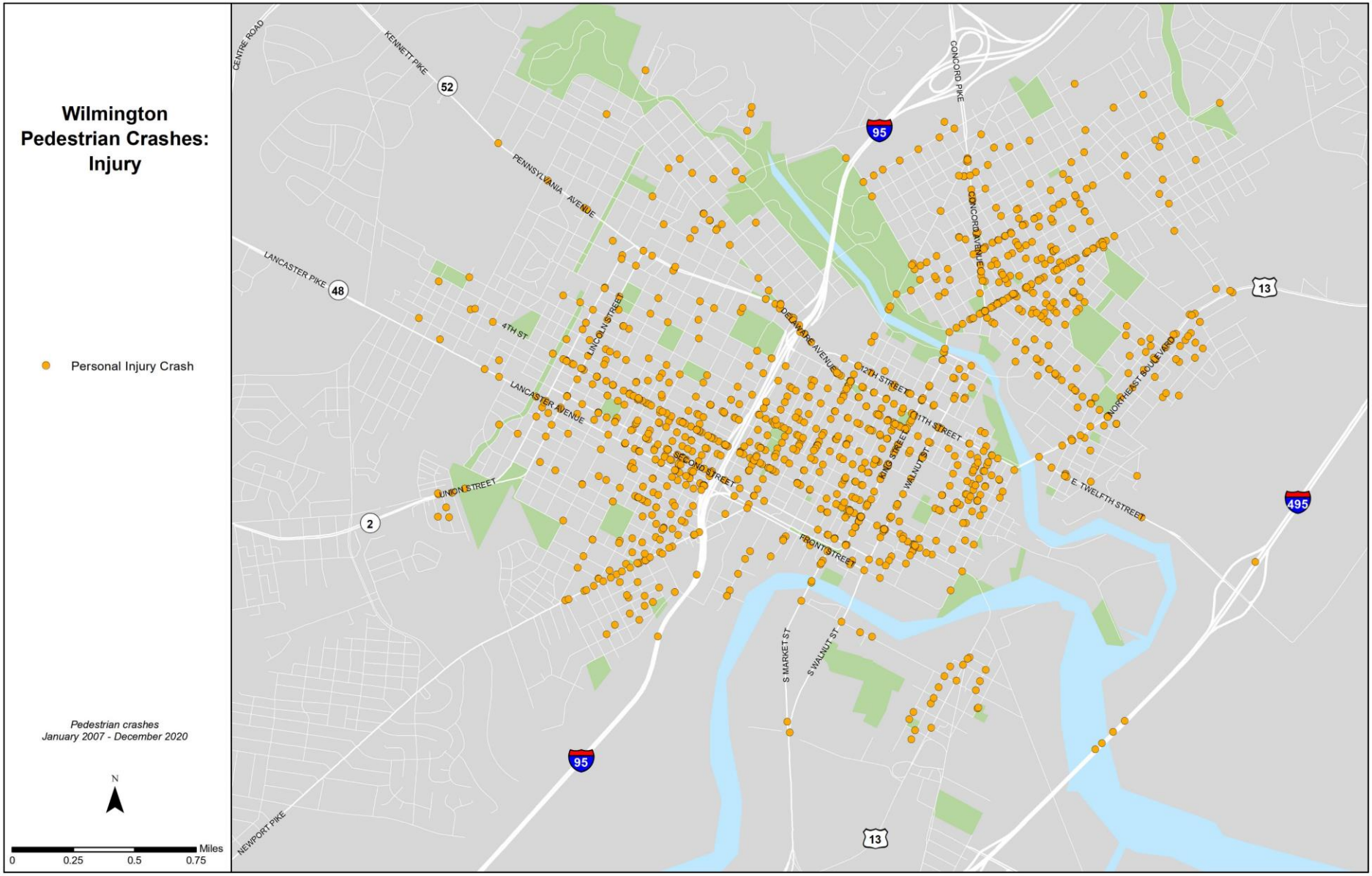

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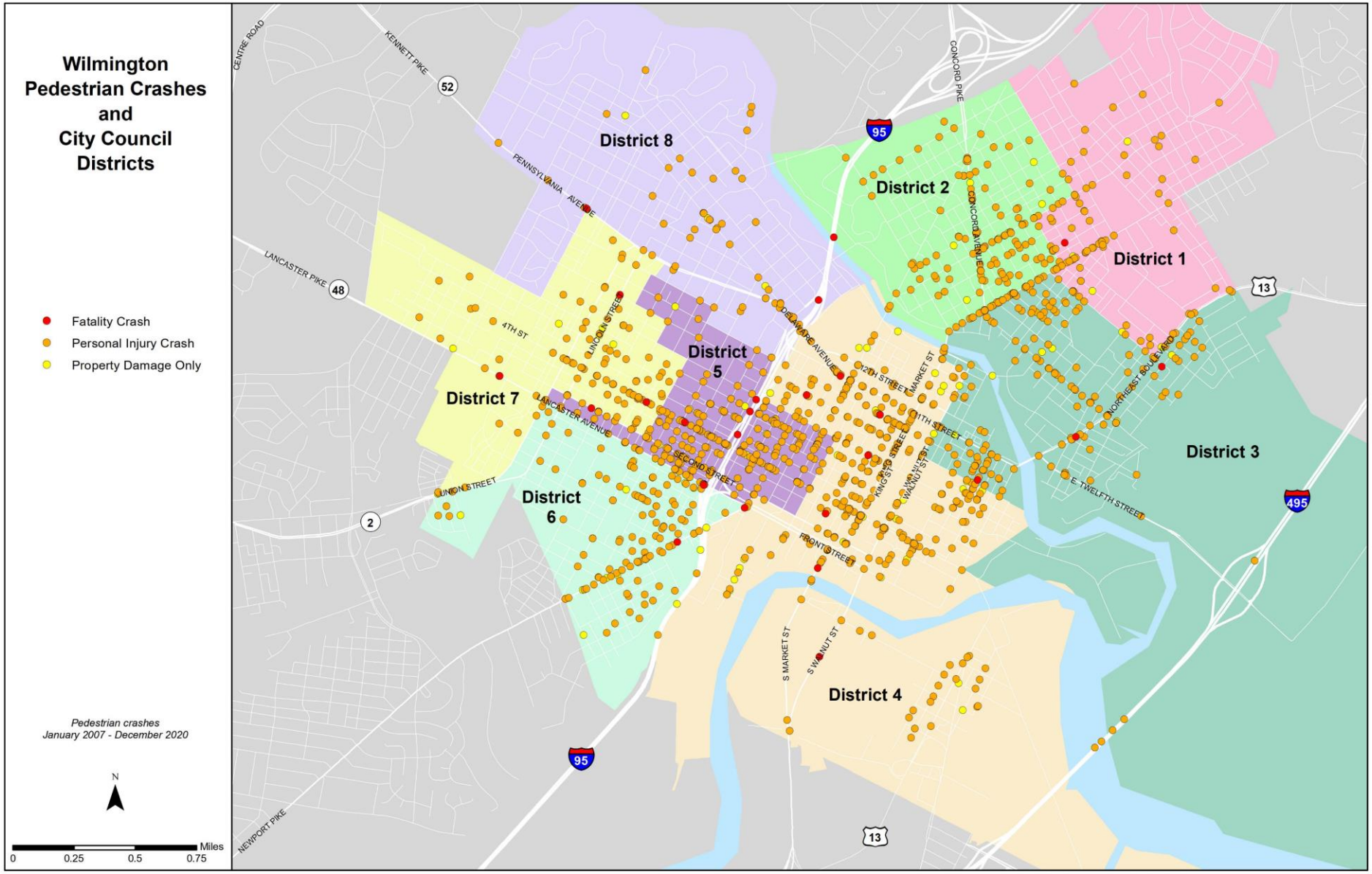

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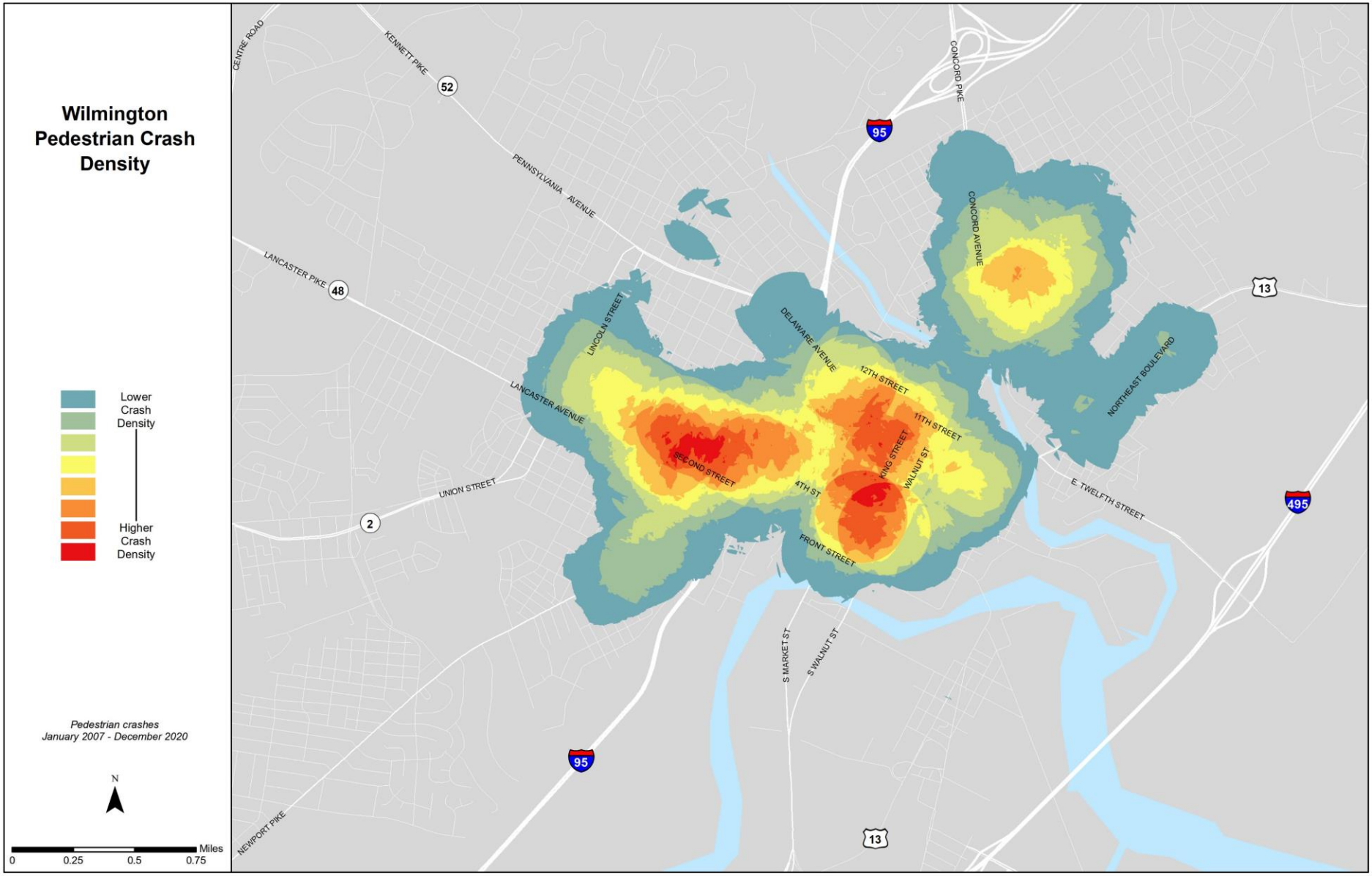

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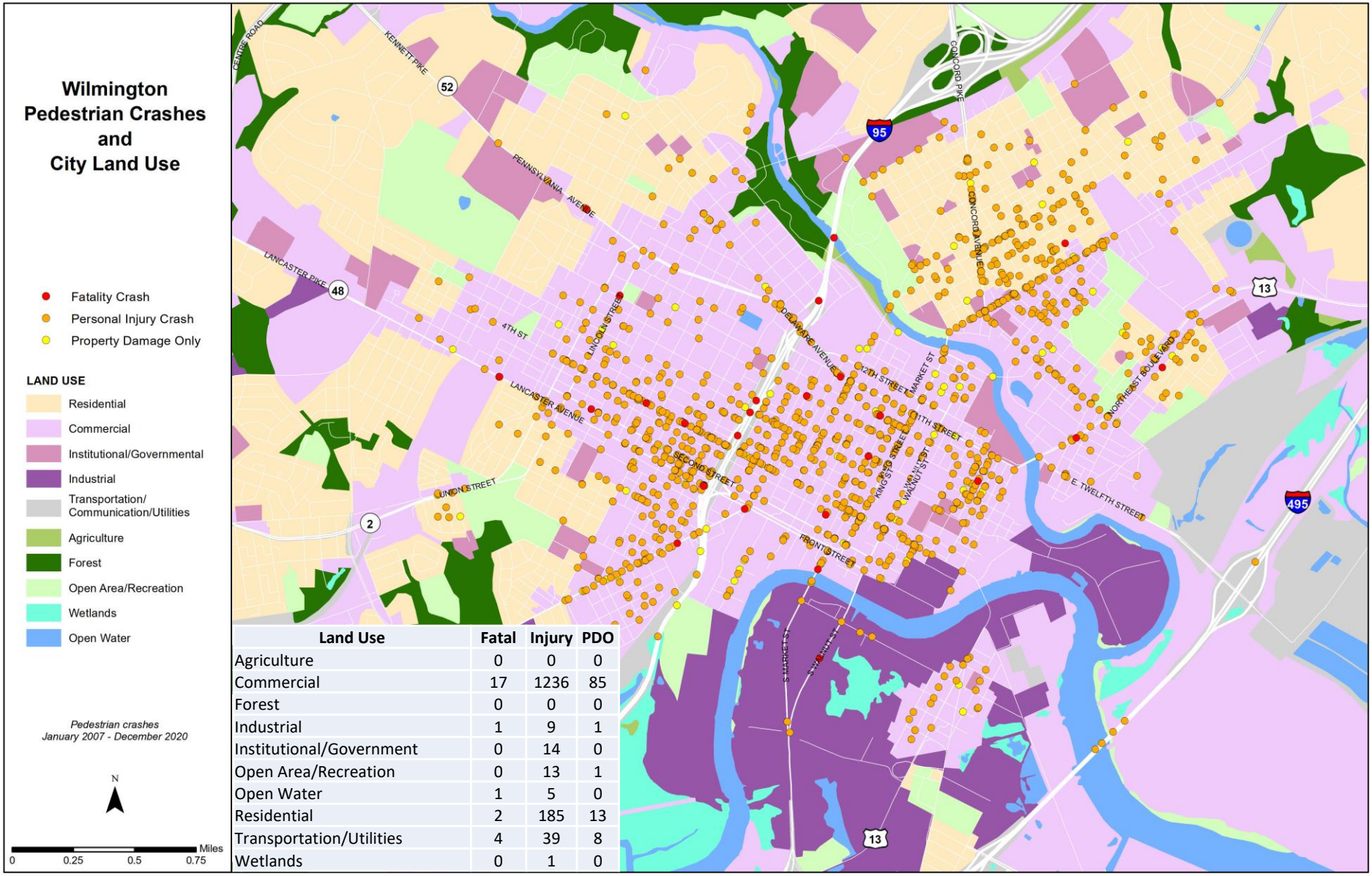
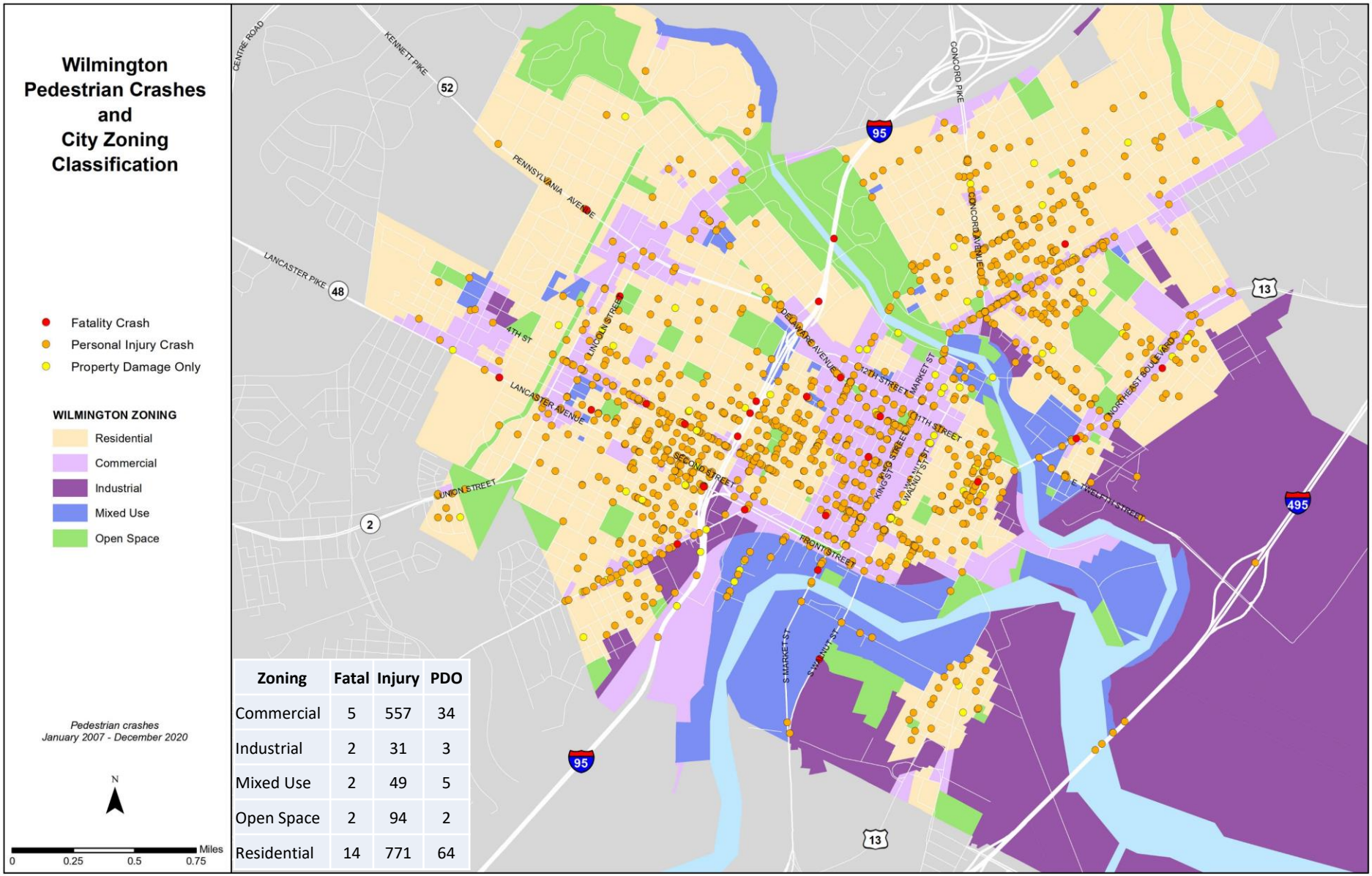


Land Use	Fatal	Injury	PDO
Agriculture	0	0	0
Commercial	17	1236	85
Forest	0	0	0
Industrial	1	9	1
Institutional/Government	0	14	0
Open Area/Recreation	0	13	1
Open Water	1	5	0
Residential	2	185	13
Transportation/Utilities	4	39	8
Wetlands	0	1	0

Pedestrian Crashes – Where?



Zoning	Fatal	Injury	PDO
Commercial	5	557	34
Industrial	2	31	3
Mixed Use	2	49	5
Open Space	2	94	2
Residential	14	771	64

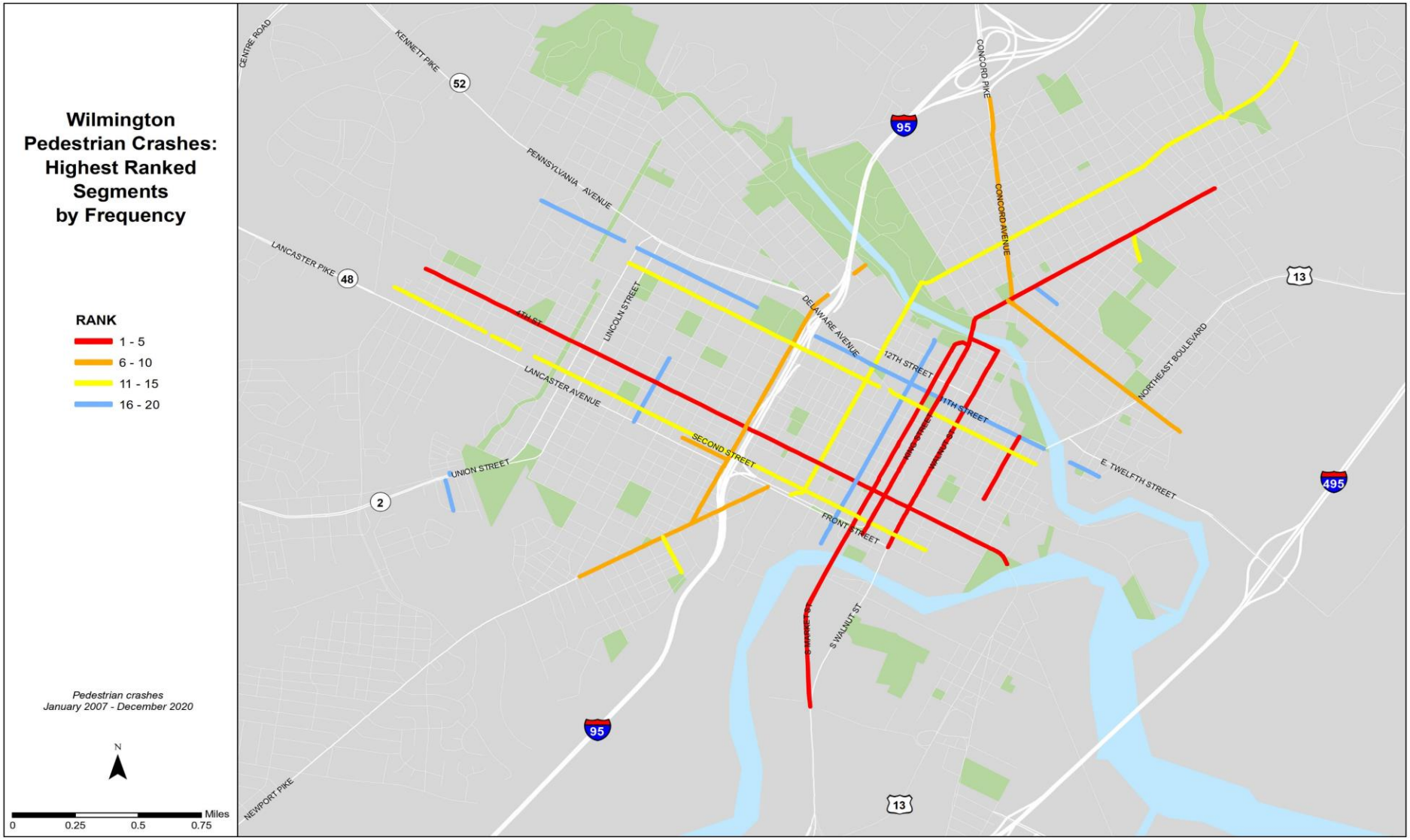
Pedestrian Crashes – Where?

- Top 20 roadways ranked by crash rate (Crashes/mile)

Rank	Roadway Name	Segment Length	# Crashes	Fatal Crashes	Injury Crashes	PDO Crashes	Pedestrian Crashes/Mile
1	King St.	0.94	95	0	90	5	101.45
2	W. 4th St.	2.64	207	2	196	9	78.52
3	Walnut St.	1.06	60	0	54	6	56.43
4	Kirkwood St.	0.30	16	1	13	2	53.64
5	S. Market St.	2.96	130	1	127	2	43.91
6	E. Newport Pike	0.84	35	2	27	6	41.71
7	Concord Ave.	0.88	34	0	32	2	38.48
8	Vandever Ave.	0.88	32	0	32	0	36.32
9	Pleasant St.	0.20	7	0	7	0	34.86
10	Jackson St.	1.18	40	1	35	4	34.04
11	W. 10th St.	1.78	60	1	52	7	33.65
12	Danby St.	0.12	4	0	4	0	33.44
13	Washington St.	2.91	97	0	91	6	33.38
14	2nd St.	2.29	70	1	54	5	30.57
15	Lower Oak St.	0.17	5	0	4	1	29.95
16	Seneca Rd.	0.14	4	0	3	1	28.88
17	11th St.	2.06	55	0	54	1	26.72
18	Delamore Place	0.30	8	0	8	0	26.36
19	Orange St.	0.96	25	1	24	0	26.04
20	Gordon St.	0.12	3	0	3	0	25.84

Pedestrian Crashes – Where?

- Top 20 roadways ranked by crash rate (Crashes/mile)



Pedestrian Crashes – Where?

- 20 highest ranked intersections with pedestrian crashes (Crash Severity Index*)

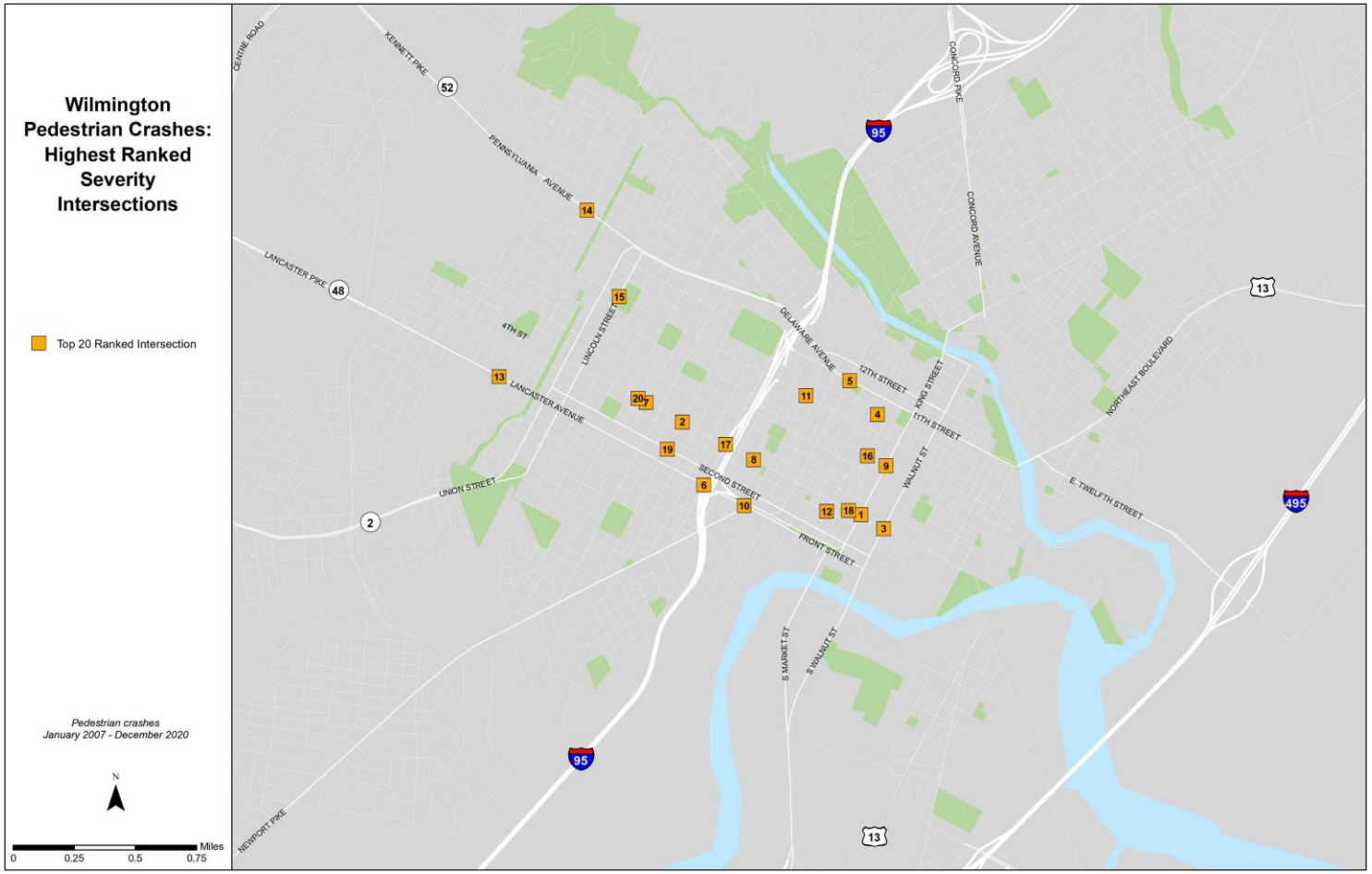
Rank	Intersection	Signalized?	Fatal Crashes	Injury Crashes	PDO	Total Crashes	Crash Severity Index
1	King St. @ 4th St.	YES	0	27	3	30	124.5
2	4th St. @ Franklin St.	YES	1	12	0	13	94
3	Walnut St @ 4th St.	YES	0	19	1	20	86.5
4	10th St. @ Orange St.	YES	1	6	0	7	67
5	11th St. @ Washington St.	YES	0	14	0	14	63
6	Lancaster Ave. @ Jackson St.	YES	1	5	0	6	62.5
7	4th St. @ Rodney St.	YES	1	4	1	6	59
8	4th St. @ Monroe St.	YES	0	12	0	12	54
9	8th St. @ King St.	YES	0	12	0	12	54
10	Maryland Ave./MLK Blvd. @ Lancaster Ave./Madison St.	YES	1	2	0	3	49
11	9th St. @ Madison St.	NO	1	2	0	3	49
12	Orange St. @ 3rd St.	NO	1	2	0	3	49
13	Lancaster Ave. @ Woodlawn Ave.	YES	1	1	0	2	44.5
14	Pennsylvania Ave. @ Woodlawn Ave.	YES	1	1	0	2	44.5
15	9th St. @ Lincoln St.	YES	1	1	0	2	44.5
16	8th St. @ Shipley St.	YES	1	0	1	2	41
17	4th St. @ N. Jackson St.	YES	0	9	0	9	40.5
18	4th St. @ Market St.	YES	0	9	0	9	40.5
19	2nd St. @ Franklin St.	YES	0	9	0	9	40.5
20	4th St. @ Delamore Place	NO	0	9	0	9	40.5

***Crash Severity Index = Fatal Crashes x 40 + Injury Crashes x 4.5 + PDO Crashes x 1**

Based on UD Research Project

Pedestrian Crashes – Where?

- 20 highest ranked intersections with pedestrian crashes (Crash Severity Index*)



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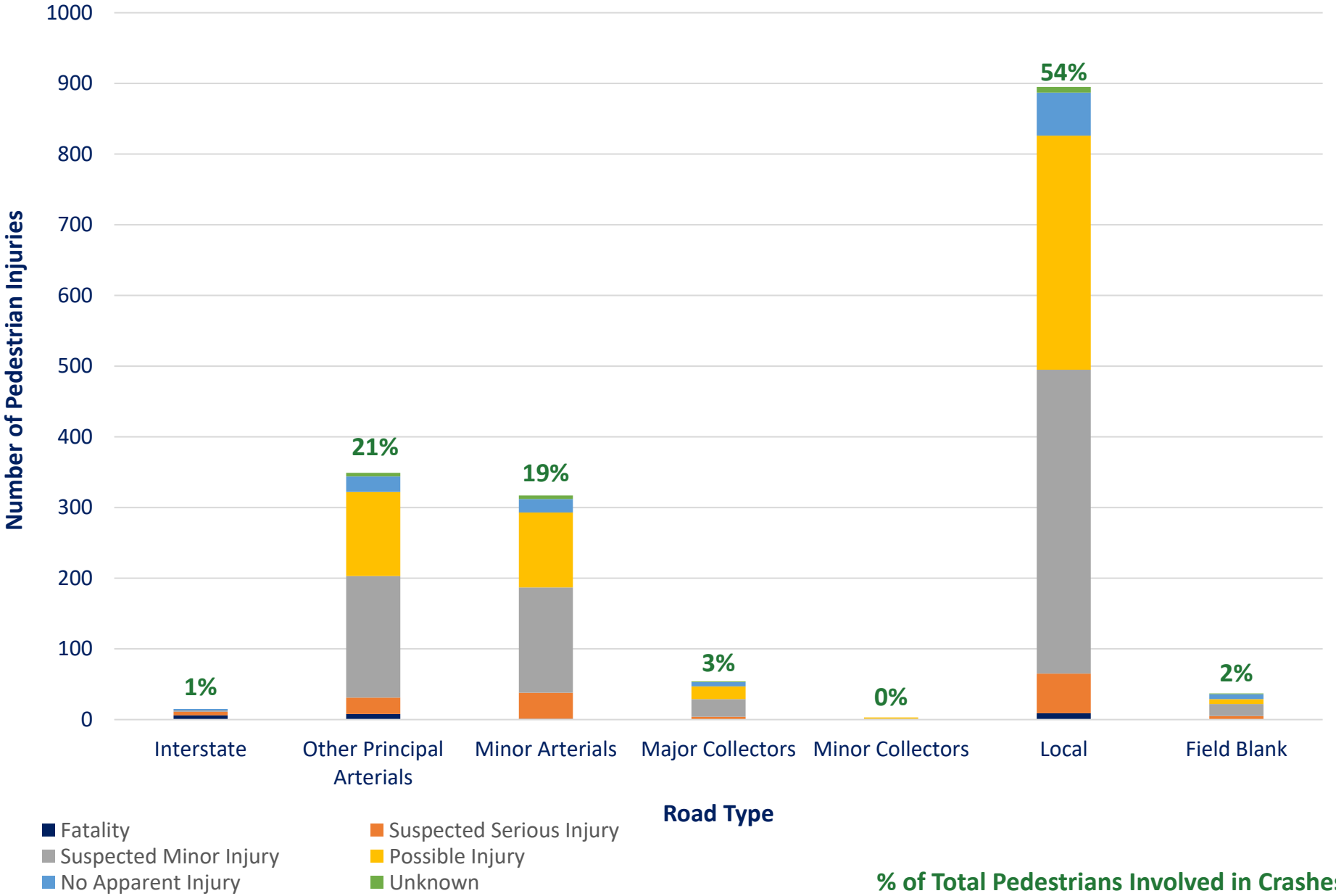
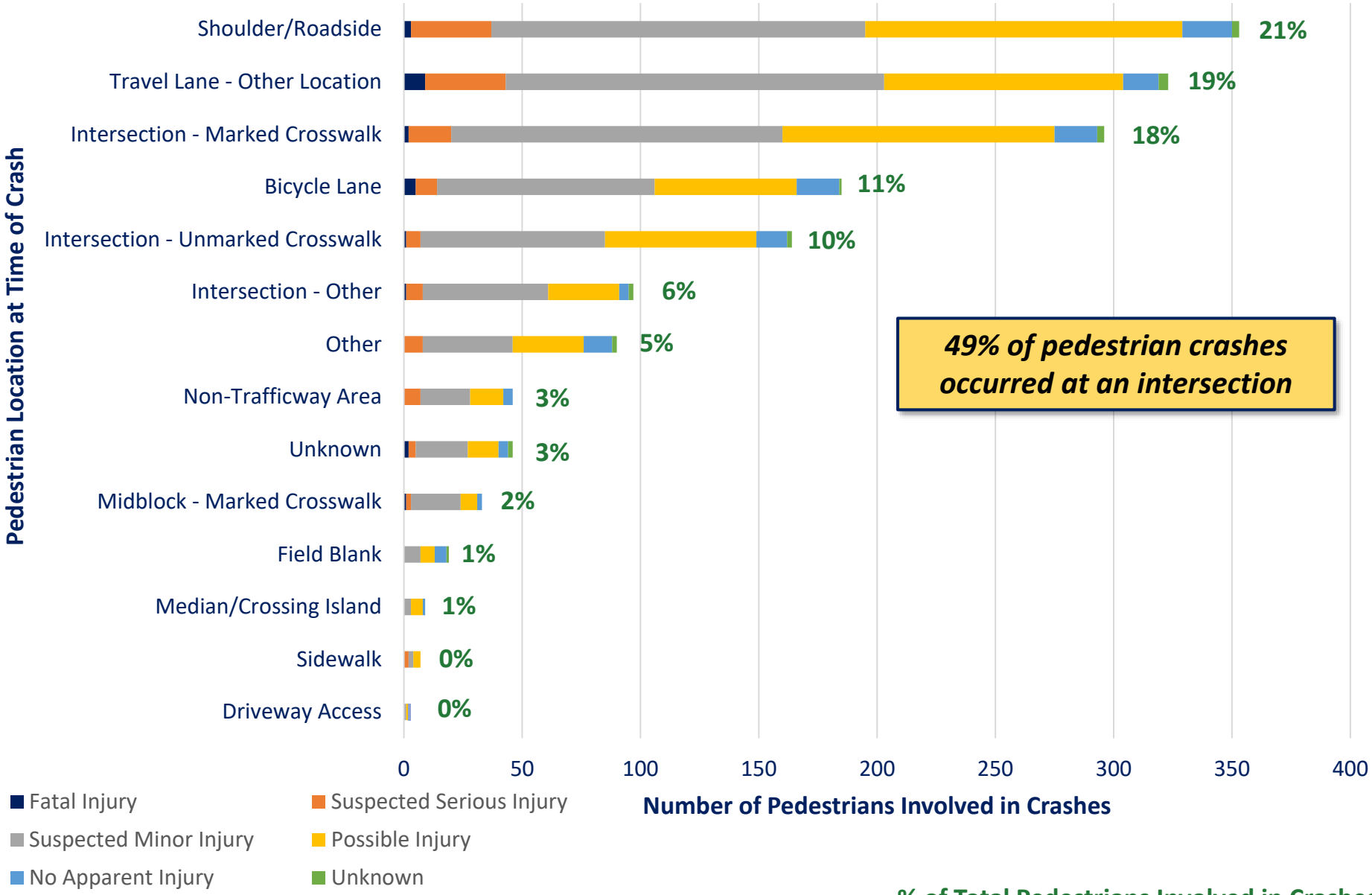
Based on UD Research Project

Pedestrians – Where?

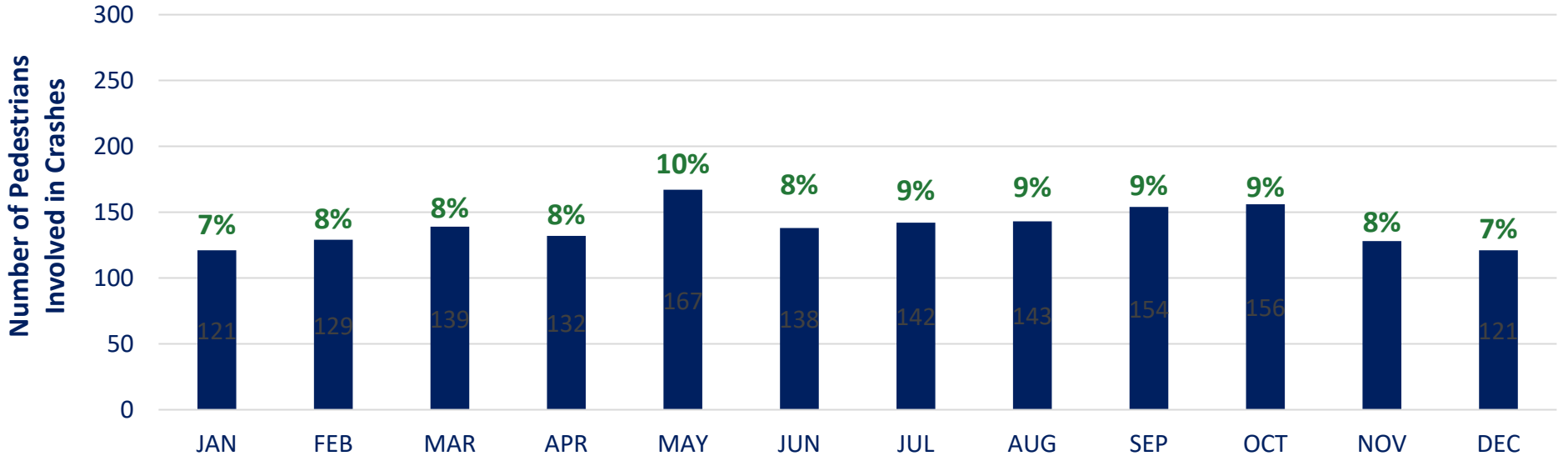


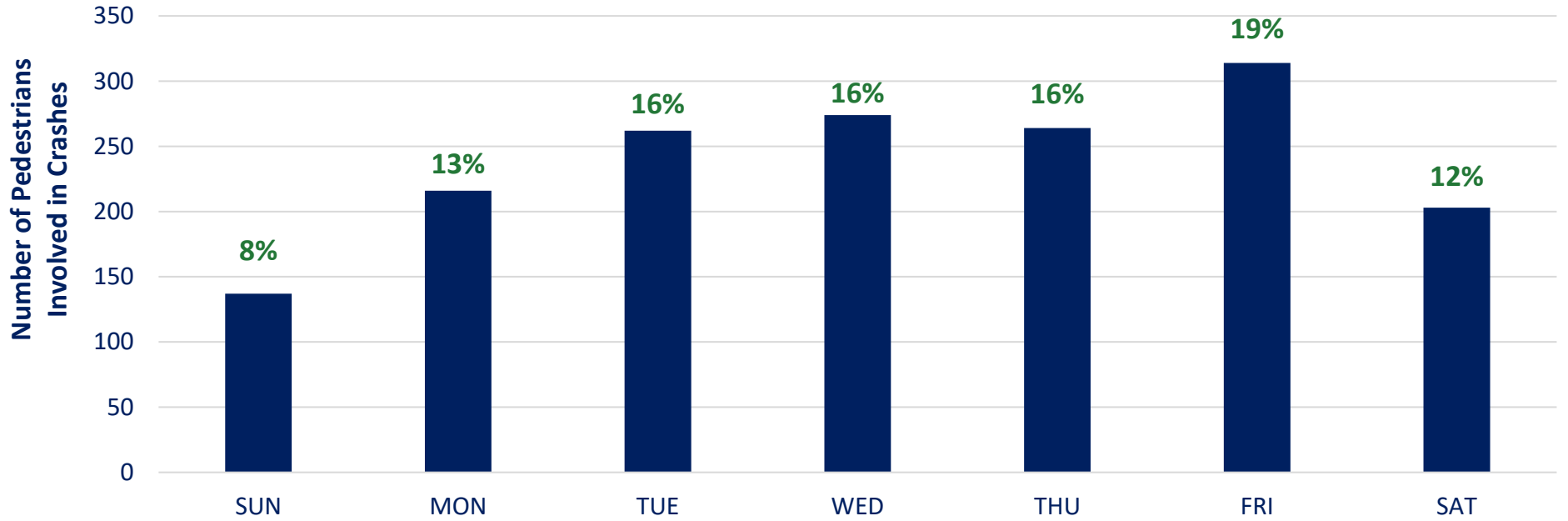
Pedestrians – Where?



49% of pedestrian crashes occurred at an intersection

Pedestrians – When?

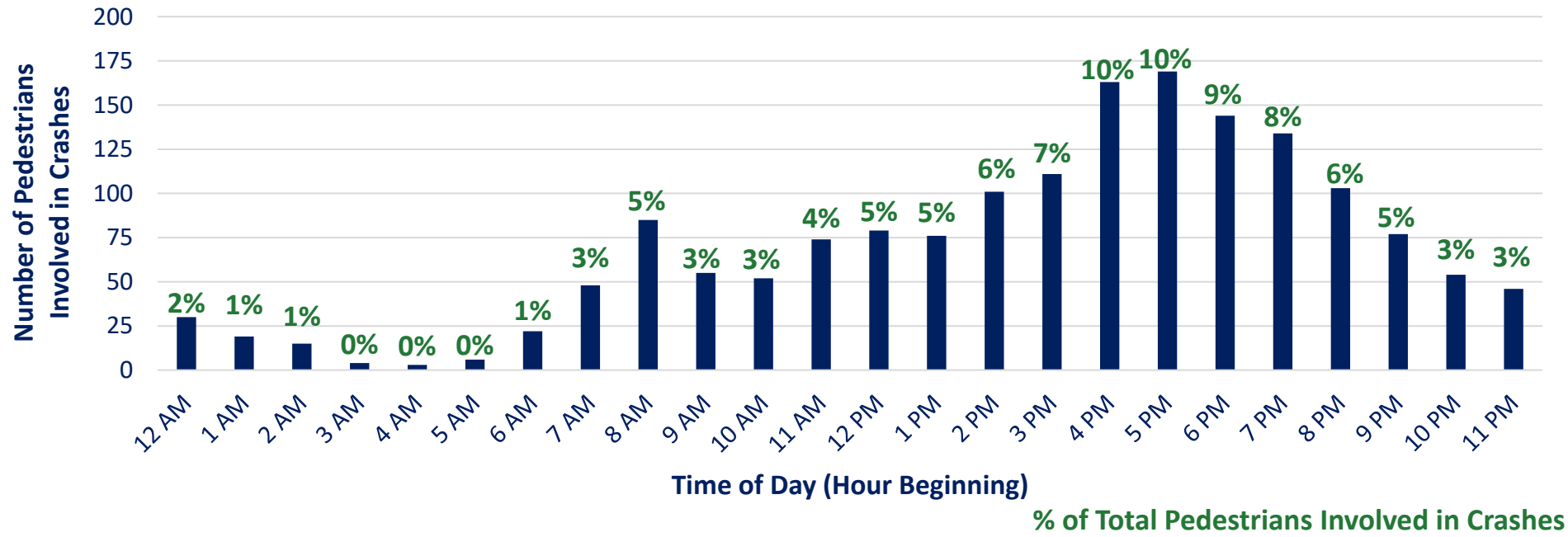




Pedestrians – When?

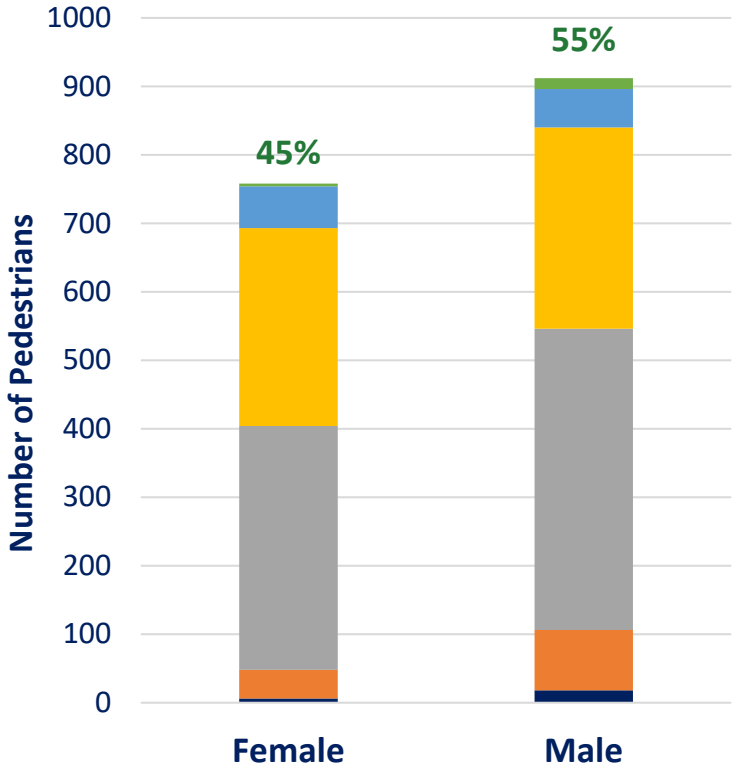
	12A	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12P	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P	Totals
Sunday	5	7	7	2			2	2	2	2	2	5	5	7	11	9	10	14	14	13	9	5	2	2	137
Monday	2	2	1			3	3	10	13	4	10	7	8	11	13	18	18	23	21	16	14	14	3	2	216
Tuesday	5	5	2		2	1	4	6	9	15	9	15	9	12	17	17	28	25	16	18	18	12	7	10	262
Wednesday	1		2		1	1	3	9	25	11	4	15	10	14	20	17	31	31	26	15	10	12	11	5	274
Thursday	3		1				4	13	18	4	9	21	20	6	18	12	26	26	22	25	15	7	8	6	264
Friday	7	2	1				4	7	15	13	11	5	20	18	12	22	35	29	34	19	18	15	12	15	314
Saturday	7	3	1	2		1	2	1	3	6	7	6	7	8	10	16	15	21	11	28	19	12	11	6	203
Totals	**30**	**19**	**15**	**4**	**3**	**6**	**22**	**48**	**85**	**55**	**52**	**74**	**79**	**76**	**101**	**111**	**163**	**169**	**144**	**134**	**103**	**77**	**54**	**46**	**1670**

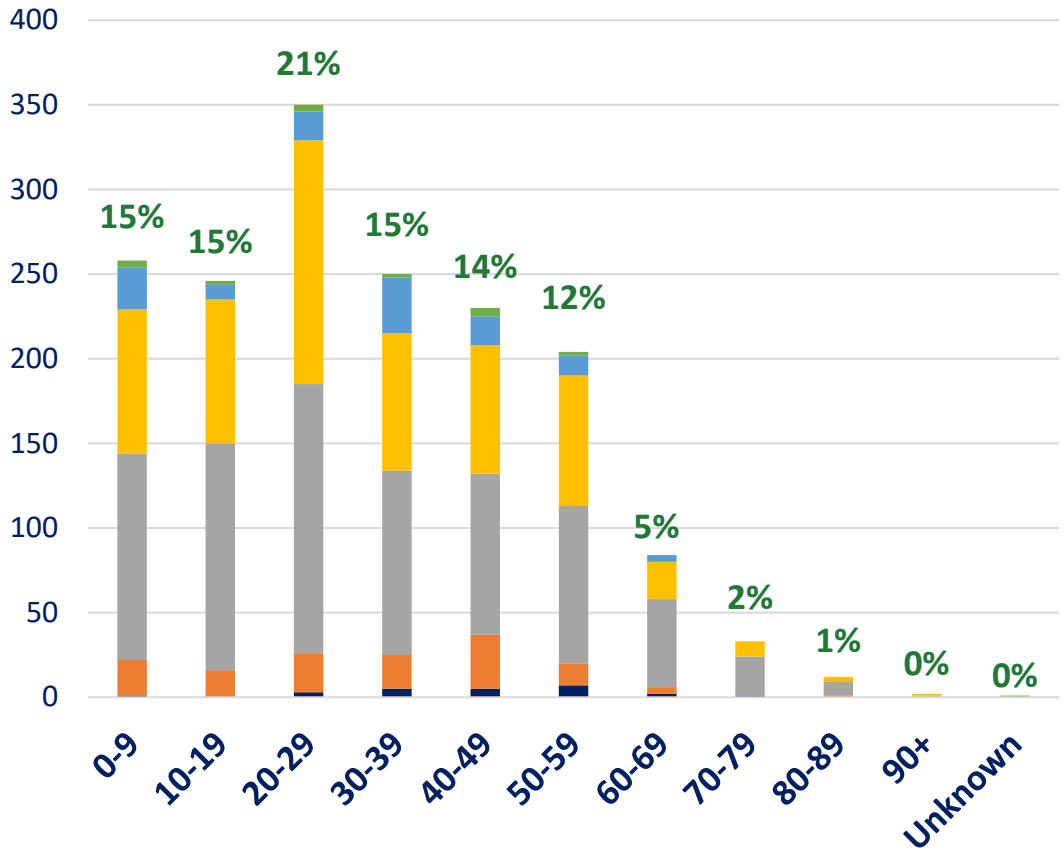
Lower Frequency — *Higher Frequency* XX Number of Pedestrians Involved in Crashes



Pedestrians – Who?

4% of all pedestrians involved in crashes were impaired pedestrians





Percentage

Unknown

No Apparent Injury

Possible Injury

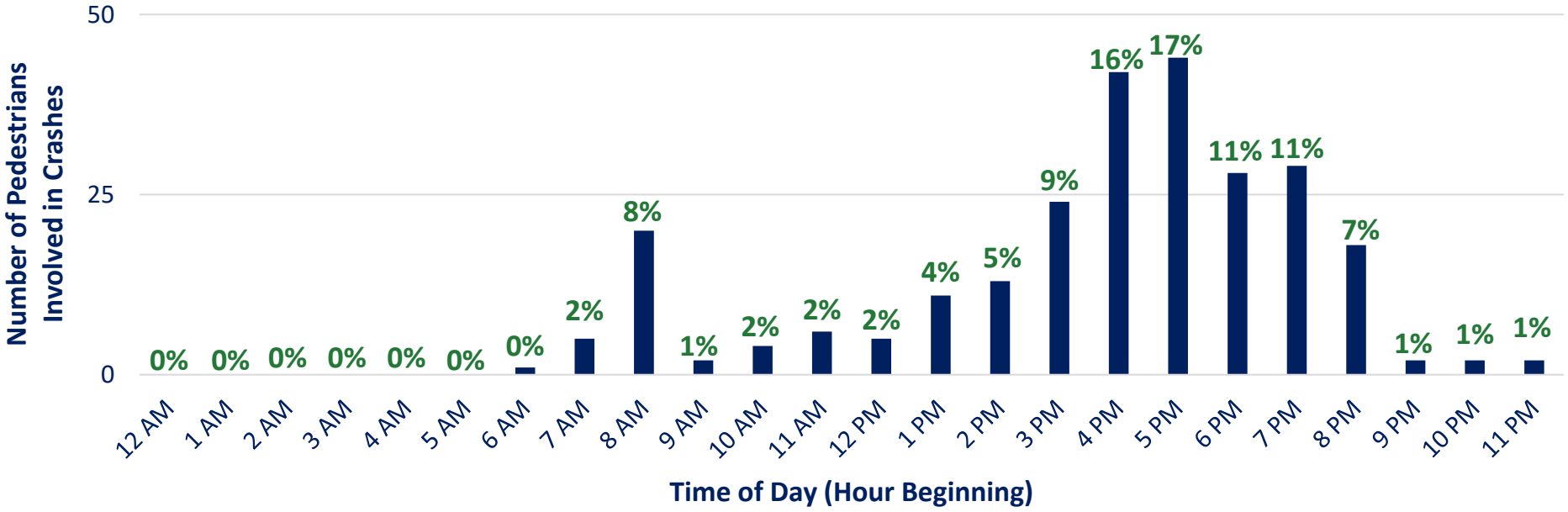
Suspected Minor Injury

Suspected Serious Injury

% of Total Pedestrians Involved in Crashes

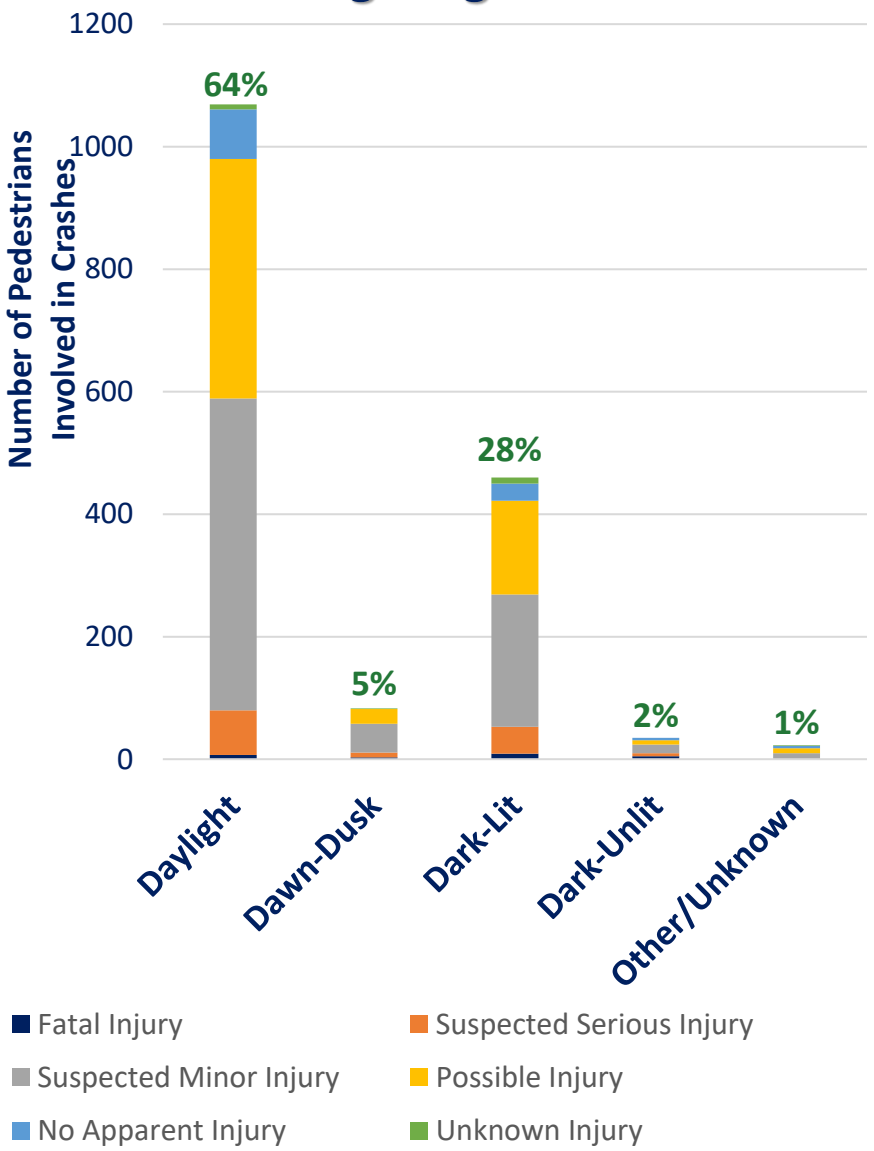
Pedestrians – Who?

- Pedestrians involved – ages 0-9

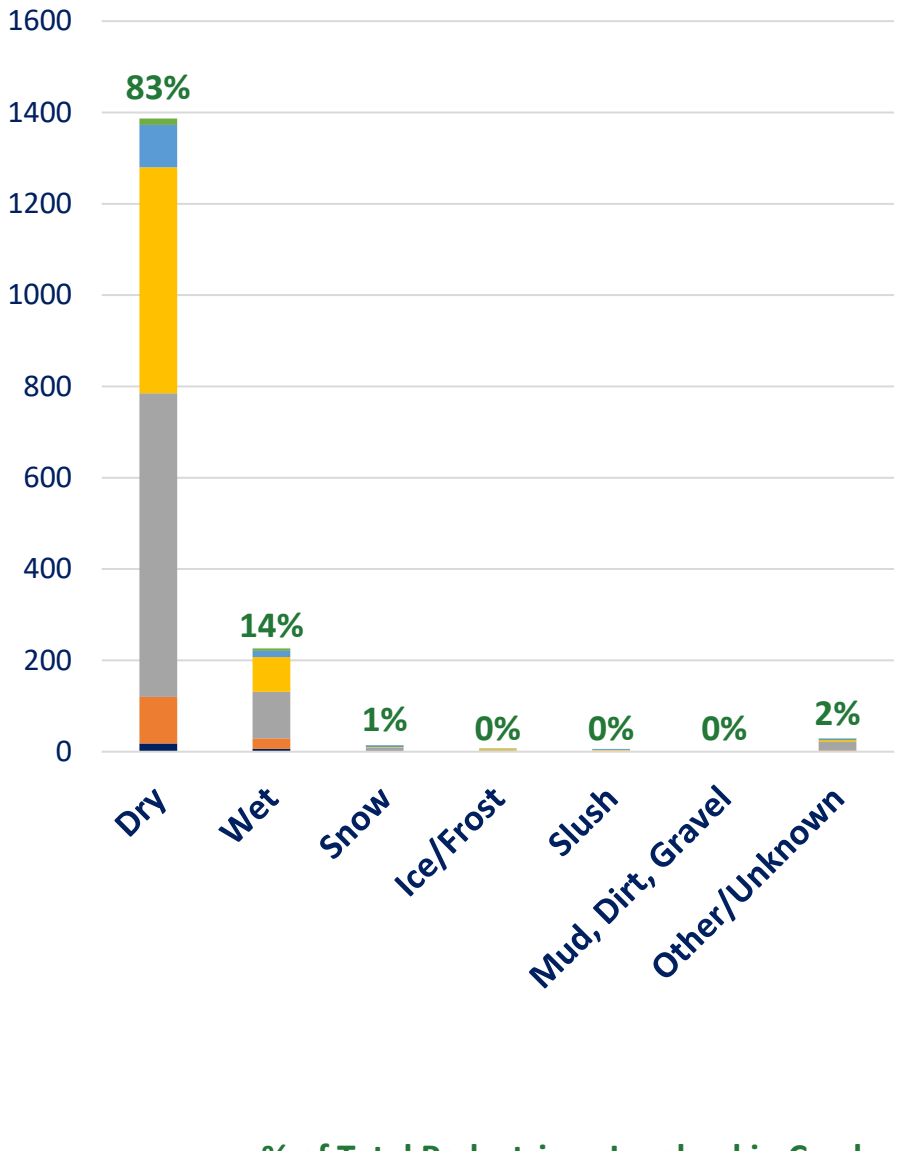


Pedestrians – Crash Conditions

Lighting Conditions

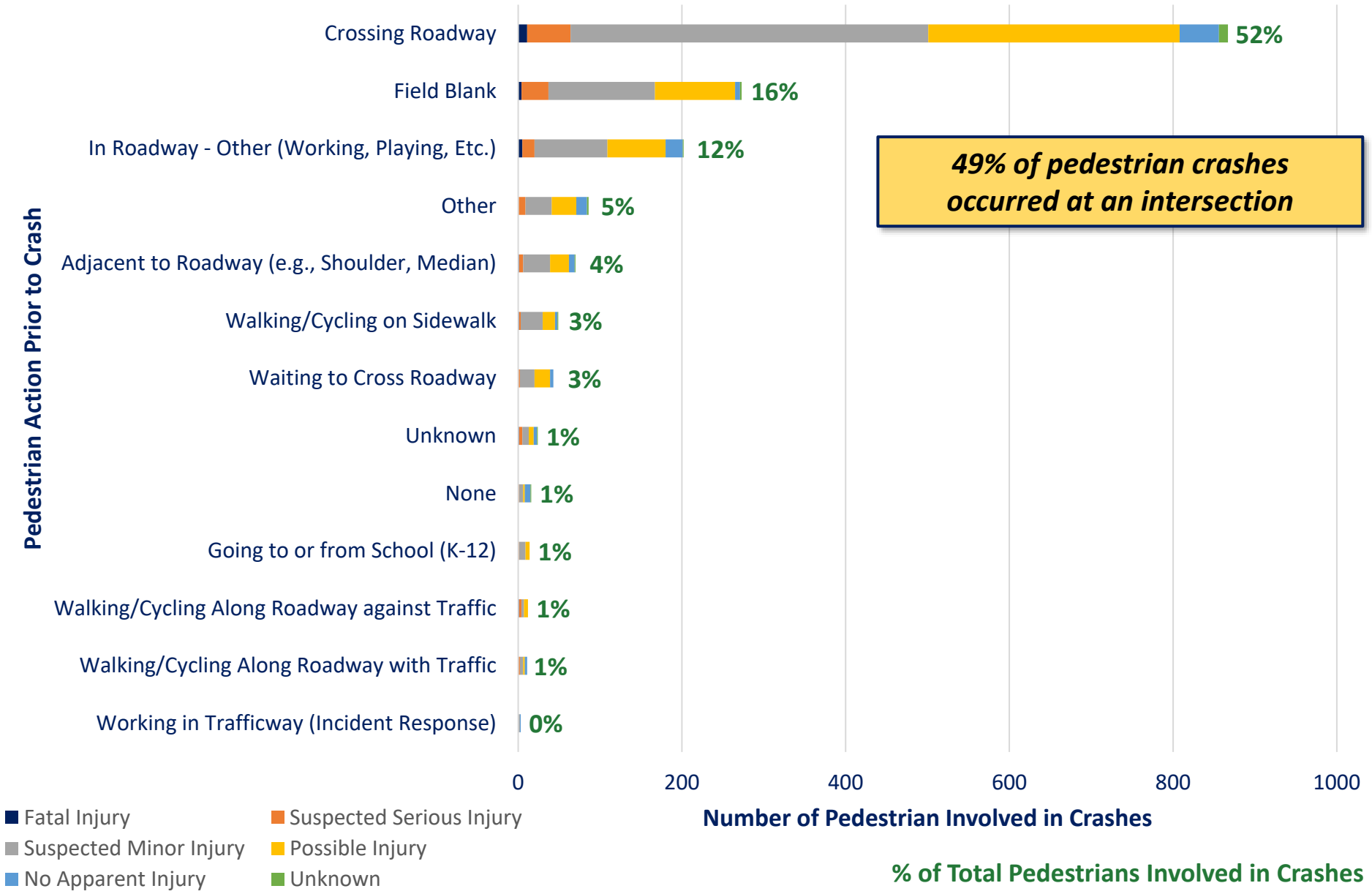


Surface Conditions

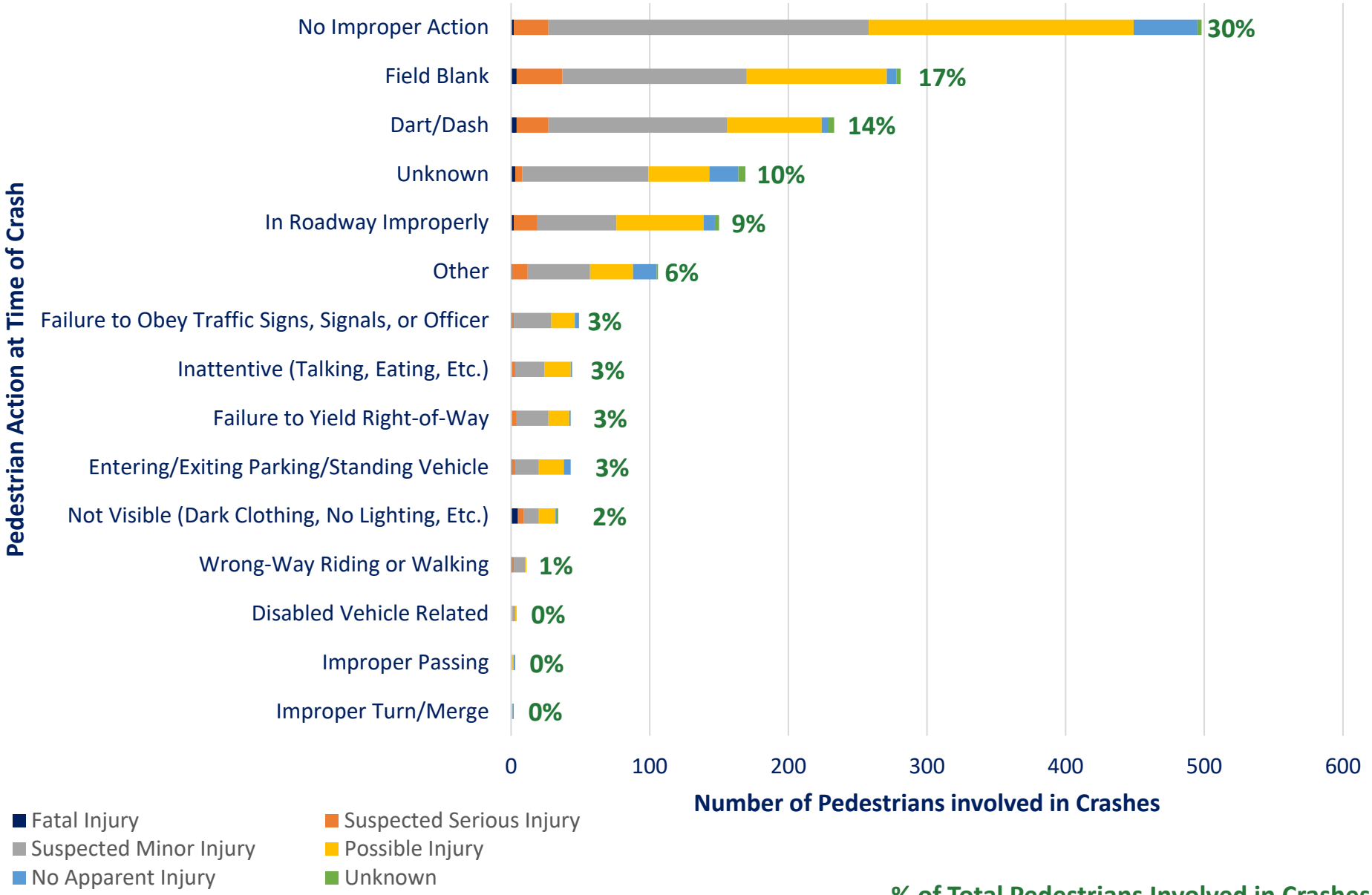


% of Total Pedestrians Involved in Crashes

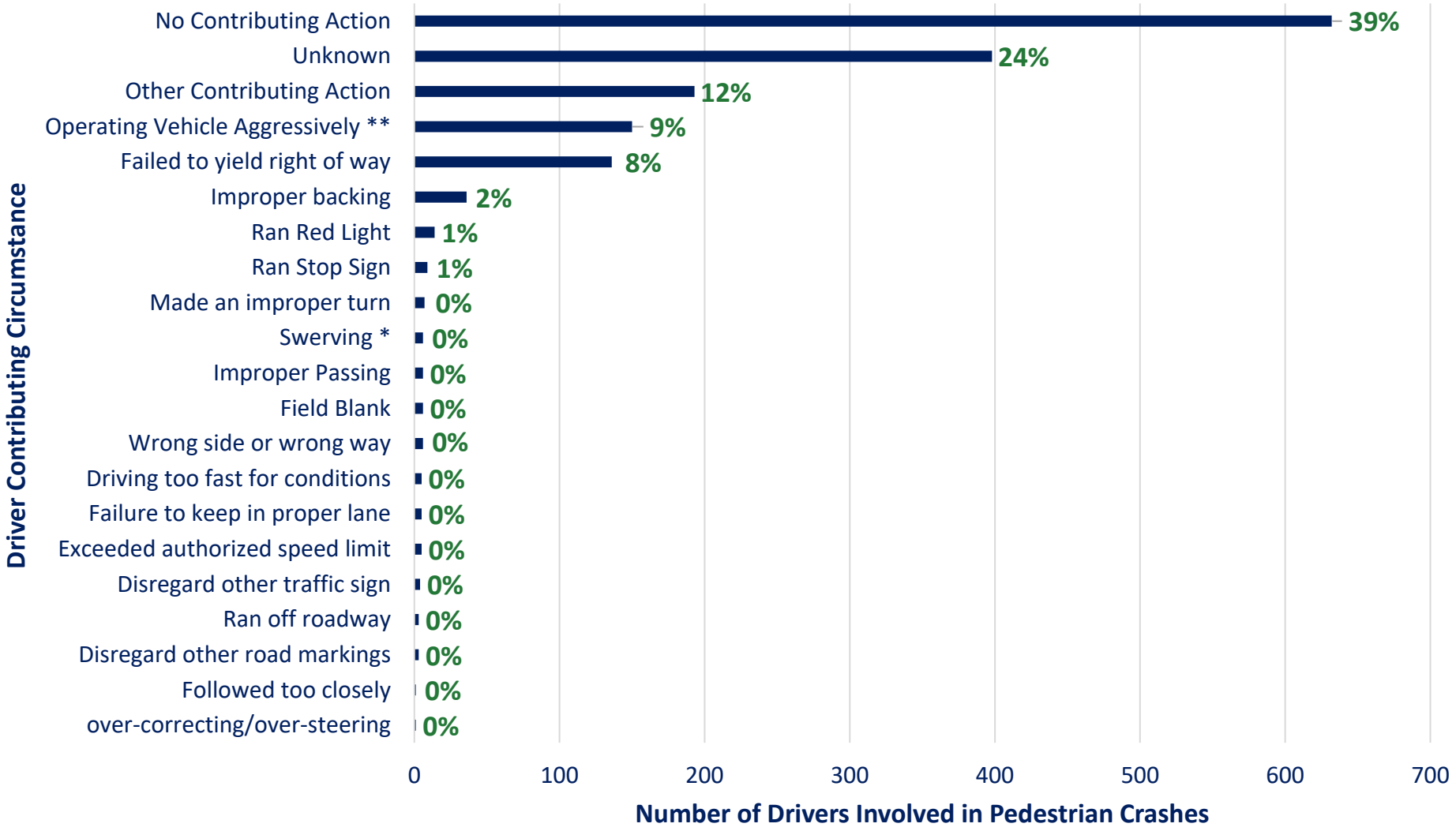
Pedestrians – Action Prior to Crash



Pedestrians – Action at Time of Crash



Pedestrians – Driver Contributing Circumstance



% of Total Drivers Involved in Pedestrian Crashes

** Operating vehicle in erratic, reckless, careless, negligent or aggressive manner*

*** Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.*

Pedestrian Crash Trends

Attribute	% Pedestrians Involved in Crashes
% fatal and serious injuries	9%
% minor and possible injuries	83%
% intersection related	49%
% occurring between 4PM and 7PM	37%
% male	55%
% pedestrian age 20-29	21%
% pedestrian age 0-9	15%
% occurring during non-daylight periods	35%
% involving a pedestrian crossing the roadway	52%
% involving no contributing action on the part of the driver	39%
% involving a pedestrian darting or dashing into the roadway	14%
% pedestrians that were impaired	4%

WILMINGTON PEDESTRIAN AUDIT PROCESS & STUDY LOCATIONS

Pedestrian Safety Audit Process

- Location specific pedestrian safety audits were conducted to better understand specific pedestrian crash trends
- Reviewed location-specific pedestrian & bicycle crash history at selected site
- Performed pedestrian observations & counts
- Compiled existing data
  - Pedestrian facilities: sidewalk, pedestrian signals, etc.
  - Roadway facilities: channelization, lighting, etc.
  - Vehicular and pedestrian volumes
- Present suggested improvements to stakeholders for concurrence

Pedestrian Safety Study Locations

- Road Segments (top 5)
  - King Street – Front Street to 16th Street
  - Fourth Street – Ogle Avenue. to Christina River
  - Kirkwood Street – 7th Street to 11th Street
  - Walnut Street – Front Street to 16th Street
  - S. Market Street – Walnut Street to 16th Street
  - *N. Market Street (as recommended from 2019 HEP)* – 18th Street to 31st Street
- Intersections (top 10)
  - King Street at 4th Street
  - 4th Street at Franklin Street
  - Walnut Street at 4th Street
  - 10th Street at Orange Street
  - 11th Street at Washington Street
  - Lancaster Avenue at Jackson Street
  - 4th Street at Rodney Street
  - 4th Street at Monroe Street
  - 8th Street at King Street
  - Maryland Avenue / MLK Boulevard at Lancaster Avenue / Madison Street

System-Wide Recommendations and Next Steps

Potential Systemic Treatments

- Review and update pedestrian clearance times at signalized intersections
- Install TURNING VEHICLE YIELD TO PED signs (R10-15) at signalized intersections where RTOR or LTOR is permitted
- Implement No Turn on Red operations at intersections with turning movement and pedestrian conflicts
- Implement Lead Pedestrian Interval (LPI) phasing
- Convert all pedestrian signals to countdown indications
- Refresh painted crosswalks and utilize "piano key" style crosswalks throughout City
- Clear corner sight obstructions
- No parking signage/curb painting at intersections
- Install pedestrian signals at all signalized intersections and on all legs of the intersection
- Curb bump outs to decrease crossing distances
- Pedestrian crossing warning signage at unsignalized intersections

Other Pedestrian Safety Recommendations

- Work with Office of Highway Safety on targeted outreach
  - Stakeholders within the City
  - Focus on over-represented age and gender groups
- Consider pedestrian safety messaging campaigns using City social media accounts and the WITN television network
- Consider adopting a city-specific Vision Zero strategy
- Consider developing standard design practices accommodating pedestrians at signalized and unsignalized intersections

Next Steps

- Identify active projects for implementation of improvements where appropriate
  - e.g. recommendations from Walnut Street could be included in the Walnut Street, 3rd Street to 16th Street DelDOT Capital Project
  - Other recommendations may require additional funding sources, i.e., Kirkwood Street
- Identify funding sources for improvements that cannot be incorporated into active projects
  - Consider applying for SS4A Implementation Grants through Federal Highway Administration
  - Requires development of a safety action plan
  - More information: https://www.transportation.gov/grants/SS4A
- Develop a prioritization list for implementation of identified location-specific improvements
- Develop a prioritization list for implementation of systemic improvements

Thank you!

Questions & Answers