

AGENDA

Committee of the Whole June 23, 2025 at 5:30 PM



Lansing City Hall, Tony Benavides Lansing City Council Chambers
124 W. Michigan Avenue, 10th Floor

To provide input or ask questions on any item that is listed on the agenda,
members of the public may contact the City Council at city.council@lansingmi.gov or (517) 483-4177 prior to the meeting.
To view the meeting live and participate in virtual public comment: <https://www.lansingmi.gov/1212/Council-Committee-Meetings>

Council Member Ryan Kost, Chairperson

Council Member Tamera Carter, Vice Chairperson

1. **Call to Order**
2. **Roll Call**
3. **Minutes**
 - A. May 19, 2025
4. **Public Comment on Agenda Items (Up to 3 Minutes)**
5. **Discussion/Action:**
 - B. RESOLUTION - Appointment; Lolo Robison; At-Large member of the Lansing Entertainment and Public Facilities Authority (LEPFA) Board of Commissioners; Term to Expire June 30, 2028
 - C. RESOLUTION - Adoption of the Safe Streets and Roadways for All (SS4A) Action Plan
 - D. RESOLUTION - Approval of the Local Development Finance Authority (LDFA) Budget; Fiscal Year 2025-2026
 - E. RESOLUTION - Lansing Board of Water and Light Return on Equity Agreement, Amendment #8- Chief Strategy Officer
 - F. RESOLUTION - Investment Policy - Referred from the Administration January 13, 2025

Closed Session Pursuant to MCL 15.268(e), City Council will recess into closed session to consult with the City Attorney in connection with the following specific pending litigation. An open meeting will have a detrimental financial effect on the litigating or settlement position of the City of Lansing concerning these cases:

- G. Pursuant to MCL 15.268(e), City Council will recess into closed session to consult with the City Attorney in connection with the following specific pending litigation. An open meeting will have a detrimental financial effect on the litigating or settlement position of the City of Lansing concerning these cases.

Atkinson, et al. v. City of Lansing, et al. CDDM Corporation v. City of Lansing City of Lansing v. Adeleye, MDMC, and Padsinab
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City of Lansing, et al. v. Purdue Pharma, et al. Litigation) City of Lansing v. Eli Lilly, et al. (Insulin Pricing Litigation) City of Lansing v. Woodside Meadows Apts Owner LLC Davis v. City of Lansing, et al. Davis, et al. v. City of Lansing Eskin v. City of Lansing Fitzpatrick v. City of Lansing Fitzpatrick v. City of Lansing, et al. Harken v. City of Lansing Hokenson v. City of Lansing, et al. Hulon v. City of Lansing, et al. Mingus v. City of Lansing, et al. OPV Partners, LLC v. City of Lansing, et al. Republican National Committee v. City of Lansing Robinson Memorial Church of God in Christ v. COL Romero v. City of Lansing, et al. Turlkelson v City of Lansing West Malcom X LLC v. City of Lansing Willis v. City of Lansing, et al.	(Opioid
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Reconvene

6. Other

H. Outside Board and Commission Updates from Council Members

7. Adjourn

Persons with disabilities who need an accommodation to fully participate in these meetings should contact the City Council Office at 517-483-4177 (TTY 711) 24 hour notice may be needed for certain accommodations. An attempt will be made to grant all reasonable accommodation requests.

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MINUTES
Committee of the Whole
Monday, May 19, 2025 @ 5:00 p.m.
Tony Benavides Lansing City Council Chambers

CALL TO ORDER

Council President Kost called the meeting to order at 5:00 p.m.

PRESENT

Councilmember Jeffrey Brown
Councilmember Peter Spadafore
Councilmember Tamera Carter
Councilmember Trini Pehlivanoglu
Councilmember Jeremy Garza
Councilmember Ryan Kost
Councilmember Adam Hussain
Councilmember Brian T. Jackson

OTHERS PRESENT

Sherrie Boak, Council Staff
Greg Venker, City Attorney
Lisa Hagen-Lawrence, City Attorney
Mark Lawrence, Mayor's office
Mayor Schor
Jack Brower, Chief Strategy Officer
Jackson Mills, Budget
Loretta Stanaway
Brad Jorae, IAFF 421

Minutes

MOTION BY COUNCIL MEMBER CARTER TO APPROVE THE MINUTES FROM MAY 12, 2025, AS PRESENTED. MOTION CARRIED 8-0.

Public Comment

Ms. Stanaway spoke on the training for boards and commissions, asking for ethics rules to be revised so any responsibilities change ethics affidavits are refiled. Ms. Stanaway spoke in support of opposing liquor license for 924 Kalamazoo.

Mr. Jorae spoke in support of any proposed amendments for fire fighter staffing. Mr. Jorae asked for discussions on easing the burden of retiree health cost sharing.

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Discussion/Action:

ORDINANCE – Readopting the Codified Ordinances

Council President Kost noted this is a yearly exercise so there are no lapses in ordinances.

MOTION BY COUNCIL MEMBER CARTER TO APPROVE THE ORDINANCE FOR ADOPTION ON ANNUAL RECODIFICATION. MOTION CARRIED 8-0.

RESOLUTION – Annual Training Requirement; all City Boards and Commission training on Ethics Ordinance, conflicts of interest, and the Open Meetings Act.

MOTION BY COUNCIL MEMBER CARTER TO APPROVE THE RESOLUTION FOR ANNUAL ETHICS, CONFLICT OF INTEREST AND OMA TRAINING FOR ALL CITY BOARDS AND COMMISSIONS. MOTION CARRIED 8-0.

DISCUSSION – Fiscal Year 2025/2026 Budget Policies

Council President Kost noted these were reviewed at earlier meetings and asked for any comments. No comments from Council Members.

RESOLUTION – Fiscal Year 2025/2026 Budget & Policies

Council Member Garza proposed the following amendment:

This is to add 2 firefighters for a total of 3 new positions for FY 2026 (1 per 24-hour shift) and to create a legislative analyst for stronger attention to the impact of City legislative proposals.

The proposal recognizes \$100,000 in additional statutory revenue sharing from updated estimates from the State's May 2025 Consensus Revenue Estimates and reallocates \$250,000 in contingency expense for a net increase of \$100,000 across both revenues and expenditures for the General Fund for no impact to fund balance.

Account	Line Item	To	From
101-000000-679100			(\$100,000)
	General Fund, State Grants, Statutory Revenue Sharing		
101-173901-998000			(\$250,000)
	General Fund, Non-Departmental, Contingency		
101-112101-702000	General Fund, City Council Personnel, Salary	\$62,000	
101-112101-715300	General Fund, City Council Personnel, Retirement	\$35,000	
101-112101-715400	General Fund, City Council Personnel, Fringes	<u>\$33,000</u>	
	Subtotal– Council Personnel	\$130,000	
101-343520-702000	General Fund, Fire Personnel, Salary	\$116,800	
101-343520-715300	General Fund, Fire Personnel, Retirement	\$67,200	
101-343520-715400	General Fund, Fire Personnel, Fringes	<u>\$31,400</u>	
	Subtotal – Fire Personnel	\$220,000	
Total		\$350,000	(\$350,000)

MOTION BY COUNCIL MEMBER GARZA TO APPROVE THE AMENDMENT AS STATED FOR 2 FIREFIGHTERS AND 1 LEGISLATIVE ANALYST.

Council Member Jackson noted there are different departments in this amendment and asked how many vacancies in the police department in comparison to fire department. He asked how many currently funding vacant positions there are with the fire department. Mayor Schor stated they are actively recruiting, and expect to be full, and adding these positions will

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continue to hire. It is the administration's intention to fill and front load. Council Member Jackson, noted that there is always an intent to fill, but still looking for the list of vacancies in LFD and LPD. With retirement there is still a vacancy and asked again how many vacant positions. Mr. Brower was not able to provide the number and Mayor Schor stated Ms. O'Leary the HR Director is coming up to the meeting.

Council Member Spadafore highlighted that in October the Council sent priorities to the mayor, and asked Council look into how the priorities were shaped, and this is important and were not part of the priorities. In the future Ways and Means can look into vacancies for the budget priorities this fall.

Ms. O'Leary stated that there were 3 fire vacancies, and they can be moving based on academy, paramedic license requirements, EMT, Fire 1 & 2, and with the additional filling, and there are 3-4 projected retirements for this year. Regarding LPD, there are 25 vacancies, with 5 sworn in last Monday, and 16 in vetting and 3 retirements projected. The HR is currently recruiting laterals from neighboring jurisdictions. Council Member Jackson acknowledged this is closer, but only touching less than 1%.

MOTION CARRIED 8-0.

Council Member Jackson proposed the following amendment:

This Sustainability Specialist position is a full-time position to help assist with the work being done in the Sustainability Department. The Sustainability Specialist would serve under the Sustainability Manager and assist with the daily workload including (but not limited to): grant writing, implementation of existing and new programs including the Climate Action Plan, recycling & landfill management, and energy efficiency programs within the city. The Sustainability Specialist would help enable the Sustainability Department to continue to increase savings for Lansing. These savings were discussed by the Sustainability Manager in a 2025 EDI Committee meeting and during the Public Service budget hearing. The Sustainability Specialists would help Lansing in its commitment to its people and the environment by reducing pollution and increasing revenues through grants, energy efficiency and better waste management.

Account	Line Item	To	From
101-173901-998000	General Fund, Non-Departmental, Contingency		(\$67,000)
202-000000-679100	Major Streets, Appropriation of Fund Balance		(\$4,000)
203-000000-679100	Local Streets, Appropriation of Fund Balance		(\$3,000)
590-000000-679100	Sewer Fund, Appropriation of Fund Balance		(\$14,000)
596-000000-679100	Trash Fund, Appropriation of Fund Balance		(\$21,000)
597-000000-679100	Recycling Fund, Appropriation of Fund Balance		(\$21,000)

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101-453603-801700		\$67,000	
202-453634-801700	General Fund, Public Service, Operating (Engineering)		
203-453634-801700	Major Streets Operating (Engineering)	\$4,000	
590-453670-801700	Local Streets Operating (Engineering)	\$3,000	
596-453622-801700	Sewer Fund Operating (Engineering)	\$14,000	
597-453685-801700	Trash Fund Operating (Engineering)	\$21,000	
	Recycling Fund Operating (Engineering)	\$21,000	
Total		\$130,000	(\$130,000)

MOTION BY COUNCIL MEMBER JACKSON TO APPROVE THE AMENDMENT FOR A SUSTAINABILTY SPECIALIST AS STATED.

Council President Kost noted the first amendment used \$67,000 in the resolution that was just passed. Council Member Jackson asked is there not \$67,000 in that same fund. Mr. Brower asked if the fund contingency is only the \$250,000, and so for this one it would be drawn from fund balance or another account. Council President Kost asked about the rainy day fund, and was told 14.2%, with the changes proposed the budget would be balanced without a change in fund balance. If draw from fund balance it would be reduction but currently above balance by 2%. Council Member Jackson noted he did not plan for first amendment to take from first source, he asked Mr. Brower where else the \$67,000 come from. Council Member Spadafore acknowledged this was in the budget priorities and asked if he spoke to the department since they started the hiring process. Council Member Jackson stated the 3 Bloomberg have limited to what they can do, and the full scope of the need is beyond what the Bloomberg employees can do, and Ms. Welch stated there is an interest for a FTE to the Committee on Equity Diversity and Inclusion.

Council President Kost passed the gavel.

MOTION BY COUNCIL MEMBER KOST MADE AN AMENDMENT TO THE MOTION TO TAKE THE \$67,000 FROM THE "RAINY DAY FUND" WHICH WAS STATED IS AT 14.2%.

Council Member Brown asked what that 14.2 \$ is. 173 million, FB 22.8 million, excluding transfers out approximately 6 million

Council Member Garza noted the impact on street funds, and if they can utilize the fund balance. Mr. Brower stated he would need to wait and see what is going to happen with the State on their street funding to the City. The transfer out, is more less for those funding from the property tax millage. Council Member Brown noted the amendment reflects Major and Local street funding for this amendment. He asked what the 2% dollar amount of the FB, can they take from FB instead of streets. Mr. Brower stated it would be less than 1%. Council Member Brown asked again, can the FB used for this budget amendment instead of streets, sewer, trash and recycling. Mr. Brower this was written up for the distribution of what this position is organized. Council Member Brown asked again, instead of taking money from those line items, is it possible to take funds from the 2% of the FB. Mr. Brower stated it would be a proposal to increase the cost of the GF. Council Member Spadafore said the \$250,000 contingency was ongoing dollars. Mr. Brower confirmed when the budget was proposed revenue and expenditures was for Council to allocate, and every year can expect. Council Member Spadafore noted when moving from FB, and would not agree with that with pending

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other increases in the future and other costs in doing business. Council Member Brown asked Council Member Kost if he would want to look at other accounts instead of the GF. Council Member Kost noted a lot of the increases were assessments on property taxes and other revenue streams, and accounts for the increases to match expenditures. In consensus with Council Member Spadafore.

COUNCIL MEMBER KOST WITHDREW HIS MOTION.

Council Member Carter passed the gavel back.

Council Member Jackson spoke on the amendment, and in the future the Mayor could make adjustments in the future budgets to keep this position.

Council Member Garza asked for additional clarification, there still needs another revenue stream for the \$67,000, and that was confirmed. Council Member Spadafore noted this entire position is pulled from one time fungoid, and with positions currently and 3 from Bloomberg. Council Member Jackson, difference between this and the other one, is that amendment went first, and Fire is a priority. Council President Kost noted concerns with the proposed position, with scope of grant writing and the uncertainty of grants in the Federal government with clean initiatives. There might be a conversation with HR on the vacancy factor, with a position that has been vacant for a period. Council Member Jackson stated it is not HR job to determine which position to fill, it is Councils and appreciated the idea.

Council Member Pehlivanoglu appreciated the council's efforts to build capacity, and if this position is proven productive and successful, is it possible to find a way. Sewer, trash and recycling are part of sustainability, and the other three total 74,000 could be found somewhere else, and support this position as a start for sustainability.

Motion by COUNCIL MEMBER PEHLIVATO AMENDET THE MOTION TO TAKE 74,000 FROM THE 2.2% IN FB. COUNCIL MEMBER JACKSON ACCEPTED THE AMENDMENT.

Council Member Brown asked for clarification, that trash swore and recycling will stay. Council Member Pehlivanoglu asked if it would impact the GF reserve. He then asked OCA if recycling can be used this money for this, because it is a fee. Mr. Venker stated there could be an issue and asked Mr. Brower, as written, there is a draw from major, local, sewer trash recycling FB, not the enterprise. Mr. Brower stated they are draws from their fund balances. Mr. Venker then staeted to Council, if there is a justification to be drawn that recycling benefits, sewer, trash. Council Member Jackson asked if passes today, in the future there will need to be rational on why it would not be good, and in the future the mayor will have to reconcile next year.

MOTION CARRIED -WITH ROLL CALL 6-2.

MOTION BY CARTER TO APPROVE THE AMENDED BUDGET FOR FISCAL YEAR 2025-2026. MOTION CARRIED 8-0.

DISCUSSION – Hearing Notice from the Michigan Liquor Control Commission; ADVANCE UZP, Inc. denied requests for transfer locations to 4700 Pleasant Grove Rd and 1910 E Michigan Avenue.

Council President Kost recapped that Council sent letters to the State Liquor Control Commission in opposition, and the two locations were denied licenses. The owner is now appealing that decision, and Council is now open to discussion on how they feel on the action.

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Council Member Jackson would stand behind what Council already took action on, and someone appealing would not change its stance.

Council Member Carter, agreed, but moving forward if Council were to revisit liquor transfers and would like to keep consistent.

Council President Kost stated the appeal hearing is June 17th and referred the public to the packet where the situation stands.

Council Member Pehlivanoglu stated during the hearing, anyone can log in but not input, strictly informational.

Council Member Brown noted he is not in support when the City is over capacity and support the need to be consistent.

Council President Kost spoke on the over saturation of the number of liquor licenses in the City.

MOTION BY COUNCIL MEMBER CARTER TO PLACE ON FILE. MOTION CARRIED 8-0.

RESOLUTION – Opposition to Liquor License Transfer from 610 N Cedar Steet, Suite A Mason Michigan 48854 to Liquor Express Lansing, Inc. 925 E Kalamazoo Street, Lansing MI 48912 in Lansing City in Ingham County

Council President Kost stated he requested this, and there was a sale of the Kalamazoo property and set up for a liquor store. He then spoke on the location in relation to other businesses with liquor licenses.

Council member Jackson, asked if the transfer fails, will it state at 610 N Cedar. It was clarified that 610 is in Mason.

Council Member Carter noted that there needs to be a location indicated when denying the location and look at the logistics of the location.

Council President Kost asked the OCA, if the liquor license was already purchased. Mr. Venker stated it is to transfer into the City, and typically it would have been purchased, but not sure at what point they notify the City. They can take it anywhere.

MOTION BY COUNCIL MEMBER CARTER FOR THE OPPOSITION OF LIQUOR LICENSE FROM 610 N. CEDAR SUITE A MASON MICHIGAN TO 925 E KALMAZOO STREET, LANSING. MOTION CARRIED 8-0.

Other Closed Session

MOTION BY COUNCIL MEMBER CARTER AT 6:03 P.M., Pursuant to MCL 15.268(1)(h) of the Open Meetings Act, I hereby move that we recess into closed session to consult with the City Attorney to consider material exempt from discussion or disclosure by state statute. Specifically, to discuss written material from the City Attorney provided under attorney-client privilege and attorney work-product, and which is also exempt from disclosure under the Freedom of Information Act pursuant to MCL 15.243(1)(g).
ROLL CALL VOTE, MOTION CARRIED 8-0.

Reconvene

Council President Kost reconvened the meeting at 6:46 p.m.

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Adjourn

The meeting adjourned at 6:47 pm

Respectfully Submitted by,
Sherrie Boak, Recording Secretary,
Lansing City Council
Approved by the Committee

Application for Appointment to Board or Commission

Thank you for your interest in serving on a Lansing Board, Commission, or Committee.

Certain boards, commissions, or committees require appointees to be a registered elector in the City of Lansing (Charter Section 2-102) and be a resident of Lansing for one year prior to taking office (Charter Section 2-102).

Appointees to every board, commission, or committee must not be in default to the City at the time of taking office (Charter Section 2-103.2).

Lansing City Charter, Section 5-104, Ineligibility For Boards, restricts certain City employee activities on some boards: "No person holding another City office or activity employed by the City shall be eligible to be a voting member on any board."

Date	04/18/2025
First Name	Lolo
Middle	Kazue
Last Name	Robison
Other name(s) by which you have been known, including maiden names	Laurie Kazue Robison, nee Hirano, formerly Donaldson
Date of Birth	
Home Address	3087 Rosehill Drive
City	Lansing
State	MI
Zip Code	48911
Email	lrobison@cata.org
Gender	Female
If you don't know which ward you live in, visit the Lansing Neighborhoods Ward Map and type in your address to find out!	
Ward	Regional
Best Phone Number to Contact You	
In what year did you move to Lansing?	1988
Additional Information Regarding	My professional work experience spans more than three decades and is

Experience and Credentials

concentrated in communications, i.e., public relations, advertising, marketing, internal (corporate communications and human resources), and external relations (customer service, media and community relations, governmental relations). I've served as CATA's chief marketing and public information officer since July 2011. I am a professor of practice at Michigan State University's College of Communication Arts & Sciences, Department of Advertising and Public Relations, where I teach PR 225: Writing for Public Relations; PR 310: Diversity, Equity and Inclusion in Public Relations and Advertising; PR 325: Intermediate Social Media and Public Relations Techniques; PR 335: Advanced Social Media and Public Relations Techniques; and PR 485: Integrated Public Relations Campaigns. I have also taught advertising and marketing at Lansing Community College. I hold a certificate in Diversity and Inclusion from Cornell University. I participated in and graduated from the Lansing Regional Chamber of Commerce's inaugural DEI Executive Roundtable January 2022-March 2023, and have since served as a mentor to new roundtable cohorts.

Honors, awards and achievements are noted below.

- Appointed to Dr. Martin Luther King, Jr. Commission of Mid-Michigan — May 2024 – present
- 2023 Gold Addy Award, The American Advertising Federation, Dear Rider (Multiple Out-of-Home Installations) – February 2024
- 2023 Silver Addy Award, The American Advertising Federation, Dear Rider (Integrated Advertising Campaign) – February 2024
- Selected to participate in the Lansing Regional Chamber of Commerce Diversity, Equity & Inclusion Executive Roundtable – February 2022 – March 2023
- Founder and co-chair of the Capital Area Transportation Authority's Diversity Equity & Inclusion Task Force; facilitated stakeholder group discussions to define DEI strategy and formed employee-run subcommittees – June 2020 – December 2024
- South Lansing Business Association Alfreda Schmidt Lifetime Achievement Award – May 2019
- 2019 Pinnacle Award, The Public Relations Society of America, Central Michigan Chapter, Outstanding Public Relations in Special Events, Imagine the Avenue, Transforming Community Feedback into an Immersive Experience
- 2018 Pinnacle Award, The Public Relations Society of America, Central Michigan Chapter, Outstanding Public Relations Success in Marketing Consumer Products and Services for Clean Commute Options
- American Public Transportation Association Class of 2017 Leadership Program Participant
- 2016 Award of Achievement, The Public Relations Society of America, Central Michigan Chapter, Outstanding Public Relations Success in Special Events Campaign for Come Clean Duathlon
- 2015 Award of Achievement, The Public Relations Society of America, Central Michigan Chapter, Outstanding Public Relations Success in Community Relations for Casual Commute Day
- 2014 Award of Excellence, The Public Relations Society of America, Central Michigan Chapter, Outstanding Public Relations Success in Radio PSAs for CATA Man Radio
- 2014 Award of Achievement, The Public Relations Society of America, Central Michigan Chapter, Outstanding Public Relations Success in a Social Marketing Campaign for CATA \$1K Giveaway
- 2014 American Public Transportation Association AdWheel Grand Award for Public Relations Special Event, Clean Commute Day
- Awarded highly coveted research assistantship through MSU College of Communication Arts and Sciences' Advertising, Public Relations and Retailing Department, August 2006 – December 2007
- Vice President of Development, Board of Directors, Society of Professional Journalists Mid-Michigan Professional Chapter, September 2005 – January 2008
- LSJ and MSU Next-Generation Diversity Initiative and Mentoring Partnership, August 2005 – June 2006
- Finalist, Lansing State Journal 2005 STAR (Service To Applaud and Reward) of the Year Award (September 2005) and first-quarter recipient of STAR Award for Relationships (March 2005)
- Nominated and selected in April 2005 for Gannett Midwest Newspaper

Group “Grow Our Own” Career Development Program; graduated March 2006

- Advisory Board Member and Program Committee Chair, Inforum (formerly Women’s Economic Club) Mid-Michigan, July 2004 – January 2007
- Lansing State Journal Operational Planning Committee, July 2004 – June 2006
- Lansing State Journal Editorial Board, April 2004 – January 2006
- Recipient, Regional Economic Development Team honorary award for community service in action through School-to-Work Initiatives and Youth Financial Literacy programs, February 2002
- Certified Coach, Excel® Service Plus (March 2001) and Excel® Sales Plus (January 2002)
- Recipient, Credit Union National Association advertising recognition for “Will the Real Jane Doe Please Stand Up” consumer theft-prevention campaign, October 2000

Occupational Background

Throughout my 30-plus-year professional career, I have held leadership roles in communications and human resources. As a strategist, I take a research- and process-based approach to identifying and solving communication problems. This approach helps inform decision-making and ensures outcomes that achieve organizational and client goals and objectives with precision. I am deeply committed to public service and to the tenets of good governance, including accountability, transparency, participation, the rule of law, effectiveness and efficiency, responsiveness, equity and inclusiveness, stakeholder engagement, strategic leadership and continuous improvement. I work in partnership with other service organizations to remove barriers and promote access for marginalized and homeless populations. My passion is to advance diversity, equity and inclusion throughout our community and region for the public good.

My work experience is summarized below.

August 2022 – present
Michigan State University
College of Communication Arts & Sciences
Department of Advertising & Public Relations
East Lansing, Michigan

Professor of Practice — As a fixed-term faculty member at MSU, I have taught Writing for Public Relations (PR 225), Diversity, Equity and Inclusion in Public Relations and Advertising (PR 310); Intermediate Social Media and Public Relations Techniques (PR 325), Advanced Social Media and Public Relations Techniques (PR 335), and Integrated Public Relations Campaign (PR 485). My goal is to focus on research-based public relations, and advertising strategies and theory. The classroom experience emphasizes opportunities for students to develop skills that are in demand and applicable to a public relations or advertising career post-graduation.

August 2014 – present
Crackin’ Crow Pottery
Lansing, Michigan

Artist & Owner — Own and operate a pottery studio, focusing on processes, and the production of functional and non-functional clay art for sale or donation. A portion of my sales is donated to charitable organizations that help women, children and marginalized communities prosper.

July 2011 – present
Capital Area Transportation Authority
Lansing, Michigan

Chief Marketing & Public Information Officer; DEI Task Force Founder & Co-Chair — Serve as a member of CATA’s executive leadership team, providing oversight and direction for the organization’s marketing, customer experience and public relations efforts. Responsible for day-to-day communications and activities that ensure public trust and achieve regional mobility, customer experience excellence, organizational strength, community partnership and dynamic

workplace. As a strategic leader, I work to advance diversity, equity and inclusion within the organization and the marginalized communities we serve; and implement processes and procedures for effective, integrated marketing communication that enhances CATA's brand.

January 2008 – July 2011
Michigan State University Alumni Association
East Lansing, Michigan

Director, Marketing and Public Relations — Provided oversight of marketing initiative to achieve acquisition, retention and non-dues revenue objectives; prepared monthly membership and activities reports and presented to executive leadership, national board of directors, college alumni professionals and marketing advisory board; directed third-party co-branded membership services/benefits providers; managed internal and external media and advertising relations and contracts to promote membership; analyzed audience behaviors. Directed daily activities of full-time support staff and student interns.

August 2006 – December 2007
Michigan State University College of Communication Arts & Sciences
East Lansing, Michigan

Graduate Research Assistant — Founding editor of Putting Research to Work, a project that bridged the gap between complex academic research and communications practitioners by presenting relevant research findings in an easy-to-digest, comprehensible format. Worked with department chair to provide oversight of editorial schedule, writing assignments and content.

November 2003 – July 2006
Lansing State Journal
Lansing, Michigan

Custom Publications Editor — As editor of Lansing State Journal's Custom Publications Department, contributed to newspaper's leadership; served as public face of family of niche marketing products. Ensured positive community and advertiser relations; managed and oversaw magazine production, product development, editorial and imagery content; defined workflow processes and product output standards, including layout, design and print quality. Recruited and managed community advisory board members and contributing writers. Supervised and mentored 25-person team of designers, copy editors, freelance writers and photographers, and college interns; provided product training for niche sales force. Contributed to organization's strategic planning effort. Founding editor of the Greater Lansing Woman, Greater Lansing Parent and Finance magazines.

June 2002 – December 2010
Robison & Associates Public Relations
Lansing, Michigan

President — Owned and operated small public relations agency. Provided diverse range of client services, including strategic public relations planning, research, issues and crisis management/communication, social media, branding and media relations. Defined and executed overall strategic business objectives, including budgeting, marketing, business development and operations. Hired and managed small team of writers, photographers, designers. Pro-bono advocacy on behalf of disadvantaged women and children.

July 1998 – June 2002
Capital Area School Employees Credit Union
Lansing, Michigan

Director of Operations, Marketing and Human Resources — Hired during critical period of leadership transition to create and implement new credit union brand and image. Responsible for change management, new business development, community partnerships, branding/marketing campaigns and comprehensive employee-training. Created and implemented Share in the Success pay-for-

performance employee incentive program. Directed K-12 youth financial literacy activities and career development resources. Responsible for member and regulatory-agency communications; departmental and organizational strategic analyses and planning; annual budget preparation and oversight; policy development, implementation and administration; board reports; employee and member recruitment and retention. Oversight of hiring process and delivery of compensation, benefits and annual performance evaluations for entire workforce (approximately 100 full-time employees). Counseled senior management on personnel and policy matters. Extensive, simultaneous oversight of operations for four full-service branches, one call center and seven school-partnership teaching facilities.

Educational Background

Michigan State University
East Lansing, MI
January 2025
Collaborative Institutional Training
Responsible Conduct of Research
Faculty RECR Program

Cornell University
Ithaca, NY
May 2022
Diversity & Inclusion Certificate Program

Michigan State University
East Lansing, MI
December 2007
Master of Arts in Public Relations

Central Michigan University
Mt. Pleasant, MI
December 1998
Bachelor of Science in Administration, cum laude

Are you a current City of Lansing or Lansing Board of Water and Light employee?

No

Previous Appointments

Mayor's Arts and Culture Commission, January 2021-January 2022

Current Appointments

Martin Luther King Jr. Commission of Mid-Michigan, May 2024-present

First Choice for Board to Serve on

Lansing Entertainment and Public Facilities (LEPFA)

Please comment briefly on why you wish to serve on a particular board or commission. Please be specific as to your goals and ideas about how you wish to contribute to the work of the board or commission.

The Lansing Entertainment and Public Facilities Authority is a valued asset in Greater Lansing. Its skillful management of the Lansing Center, Jackson Field and Groesbeck Golf Course — along with the various events it organizes and hosts — are key attractions that make the capital city a destination that draws visitors to the region. LEPFA promotes the economic vitality of the tri-county footprint, helping us answer that tiresome old question, "What is there to do in Lansing?" For decades, my family and I have attended LEPFA's many crowd-pleasing events at each of its venues. The opportunity to contribute through governance to LEPFA's mission, vision and values; to its continued growth; and to our region's prosperity would be a tremendous honor.

Qualifications and Eligibility – At this time, if you do not meet one or more of the qualifications or eligibility requirements listed at the top, please state here the requirement to be met and explain how you will be qualified or

N/A.

eligible before you would be sworn in to an appointed office.

This certification is not required but may impact potential consideration of the appointment being sought. I authorize the use of the information provided above to conduct a background search, including but not limited to criminal history, residency, and indebtedness to the City of Lansing. If selected to serve, I further authorize additional background checks during the term of my service to ensure the required criteria continue to be met. I also acknowledge that I have the affirmative duty to inform the City if I become aware of any change or condition in my status that fails to meet the required criteria.

Agreement to Background Check Authorization • I agree

Please type your name in this box to signify that you can serve on a board or commission and the information in this application is accurate to the best of your knowledge. Lolo Robison

Date & Time 04/20/2025 11:12 PM (EDT)

Receive an email copy of this form. Yes

BY THE COMMITTEE OF THE WHOLE
RESOLVED BY THE CITY COUNCIL OF THE CITY OF LANSING

WHEREAS, the Mayor has made the recommendation for the appointment of Lolo Robison as an At-Large member of the Lansing Entertainment and Public Facilities Authority Board of Commissioners for a term to expire June 30, 2028; and

WHEREAS, the Mayor's office has confirmed with this resolution, that they have vetted the applicant based on the original application and believes that the applicant meets the qualifications as required by the City Charter; and

WHEREAS, the Committee of the Whole met on June 23, 2025 and took affirmative action.

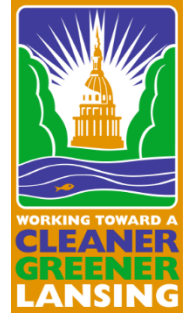
NOW, THEREFORE, BE IT RESOLVED that the Lansing City Council, hereby, confirms the appointment of Lolo Robison as an At-Large member of the Lansing Entertainment and Public Facilities Authority Board of Commissioners for a term to expire June 30, 2028



Andy Schor, Mayor

PUBLIC SERVICE DEPARTMENT

7th Floor City Hall
124 West Michigan Avenue
Lansing, Michigan 48933
(517) 483-4455
www.lansingmi.gov/pubserv



MEMORANDUM

TO: Andy Schor, Mayor
FROM: Nicole McPherson, P.E., City Engineer
DATE: May 23, 2025
SUBJECT: Adoption of the Safe Streets and Roadways for All (SS4A) Action Plan Report

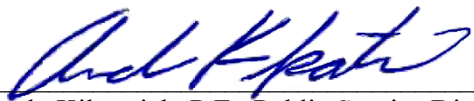
The City of Lansing was granted a SS4A Action Plan Grant from the US Department of Transportation for the development of a citywide Safety Action Plan(SAP) Report. The City hired AECOM to develop the citywide SAP.

The SAP is founded on the Safe Systems Approach, which makes recommendations in four areas (safe road users, safe vehicles, safe speeds, safe roads, and post-crash care) to address six principles: death and serious injuries are unacceptable, humans make mistakes, humans are vulnerable, responsibility is shared, safety is proactive, and redundancy is critical.

The SAP was developed by analyzing crash data from 2014-2022 to identify intersections and streets with the greatest risk of injury (the High-Injury Network), analyzing demographic data to identify areas with high concentrations of vulnerable populations where investments should be prioritized, and reviewing existing policies that impact safety in Lansing – all while engaging and collaborating with the community throughout the process. The result is an Action Plan that includes overall safety strategies and countermeasures that can be applied to different locations throughout the city depending on their characteristics (especially the High-Injury Network), a recommended method for prioritizing safety projects, a list of recommended safety projects to implement in the short, medium, and long term, and a list of funding opportunities to support the implementation of safety projects. Finally, the SAP also includes recommended metrics for measuring the City's progress towards its safety goals and methods for updating the SAP as time goes on.

It is our recommendation the SAP developed by AECOM be adopted by the City.

Approved:


Andy Kilpatrick, P.E., Public Service Director

5/23/2025

Date



Lansing Safety Action Plan

Prepared for City of Lansing

May 2025



Prepared for:



City of Lansing
124 W Michigan Avenue
Lansing, MI 48933

Prepared by:

AECOM

AECOM Great Lakes, Inc.
aecom.com

In Partnership with:



Cincar Consulting Group, LLC
itsc2g.com

Acknowledgment

The City of Lansing would like to extend thanks and appreciation to the residents, community members, advocacy groups, municipality and county staff, MDOT, and all stakeholders who participated in the study process, communication, and coordination efforts.

- Mayor Andy Schor
- City of Lansing Department of Public Services
- City of Lansing Department of Parks & Recreation
- City of Lansing Police Department
- City of Lansing Department of Neighborhoods, Arts, & Citizen Engagement
- Lansing Economic Development Corporation
- Lansing School District
- Lansing Community College (LCC)
- Lansing Board of Water & Light
- Capital Area Transportation Authority (CATA)
- McLaren Health
- Michigan Fitness Foundation and Safe Routes to School
- League of Michigan Bicyclists
- Michigan Department of Transportation
- Tri-County Office on Aging
- Capital Area Housing Partnership
- Allen Neighborhood Center



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List of Abbreviations

Acronym	Description
BCA	Baseline Crash Analysis
BIL	Bipartisan Infrastructure Law
CVB	Convention Visitors Bureau
EVP	Emergency Vehicle Preemption
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FI	Fatal and Injury
FSI	Fatal and Serious Injury
GIS	Geographic Information System
HIN	High Injury Network
ITS	Intelligent Transportation Systems
LPI	Leading Pedestrian Interval
MDOT	Michigan Department of Transportation
NHTSA	National Highway Traffic Safety Administration
NRSS	National Roadway Safety Strategy
NTOR	No Turn on Red
PHB	Pedestrian Hybrid Beacons
RSA	Road Safety Audit
RRFB	Rectangular Rapid Flashing Beacons
SAP	Safety Action Plan
SS4A	Safe Streets and Roads for All
SSA	Safe System Approach
TIM	Traffic Incident Management
US	United States
USDOT	United States Department of Transportation
VRU	Vulnerable Road Users

Executive Summary

The City of Lansing developed a citywide Safety Action Plan (SAP) as part of its commitment to creating a safe system for all.

*The City of Lansing aspires to have **zero crashes related to serious injuries and deaths**. Lansing's goal is to **reduce these crashes by 2% per year over the next 15 years** to create safe streets that provide for the various mobility needs of **all users** including pedestrians, cyclists, transit users, and motorists. By adopting the **Safe System Approach**, we commit to addressing speeding, distracted driving, and improving sidewalk and road conditions, as well as expanding bike infrastructure to create a balanced transportation network.*

This SAP is made possible through a U.S. Department of Transportation (USDOT) Safe Streets and Roads for All (SS4A) grant and is founded on the Safe Systems Approach, which makes recommendations in four areas (safe road users, safe vehicles, safe speeds, safe roads, and post-crash care) to address six principles: death and serious injuries are unacceptable, humans make mistakes, humans are vulnerable, responsibility is shared, safety is proactive, and redundancy is critical.

The SAP was developed by analyzing crash data from 2014-2022 to identify intersections and streets with the greatest risk of injury (the High-Injury Network), analyzing demographic data to identify areas with high concentrations of vulnerable populations where investments should be prioritized, and reviewing existing policies that impact safety in Lansing – all while engaging and collaborating with the community throughout the process. The result is an Action Plan that includes overall safety strategies and countermeasures that can be applied to different locations throughout the city depending on their characteristics (especially the High-Injury Network), a recommended method for prioritizing safety projects, a list of recommended safety projects to implement in the short, medium, and long term, and a list of funding opportunities to support the implementation of safety projects. Finally, the SAP also includes recommended metrics for measuring the City's progress towards its safety goals and methods for updating the SAP as time goes on.



**Community
Engagement and
Collaboration**



**Safety Analysis
and High-Injury
Network**



Equity Analysis



Policy Review



Action Plan

Safety Action Planning Process



In Lansing, the most dangerous crash types are angle crashes, pedestrian/cyclist crashes, fixed object crashes, and rear-end crashes. Impaired driving is a significant contributor to crashes in Lansing, accounting for 36% of all fatalities. Crashes involving vulnerable road users (pedestrians and cyclists) are on a downward trend. However, pedestrians and cyclists are still overrepresented in fatal and serious injury crashes; walking and biking only account for 3.6% of all commuters in Lansing but bike/pedestrian crashes account for 18% of all fatal and serious injury crashes in Lansing. Crashes happen primarily on arterial roads, which have higher speeds and higher traffic volumes than other roadway classifications. Arterial roads are most commonly in MDOT's jurisdiction, limiting the City's ability to make safety improvements to them.

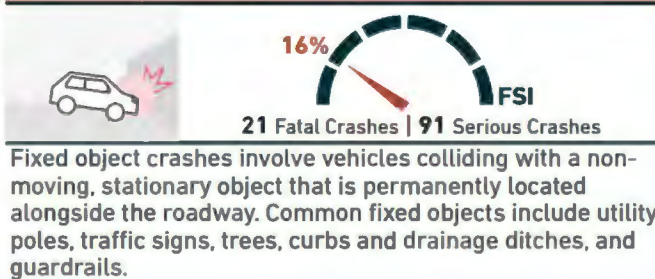
Angle Crash



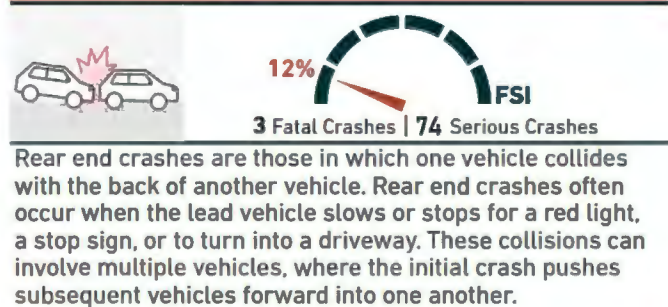
Pedestrian-Bike Crash



Fixed Object Crash

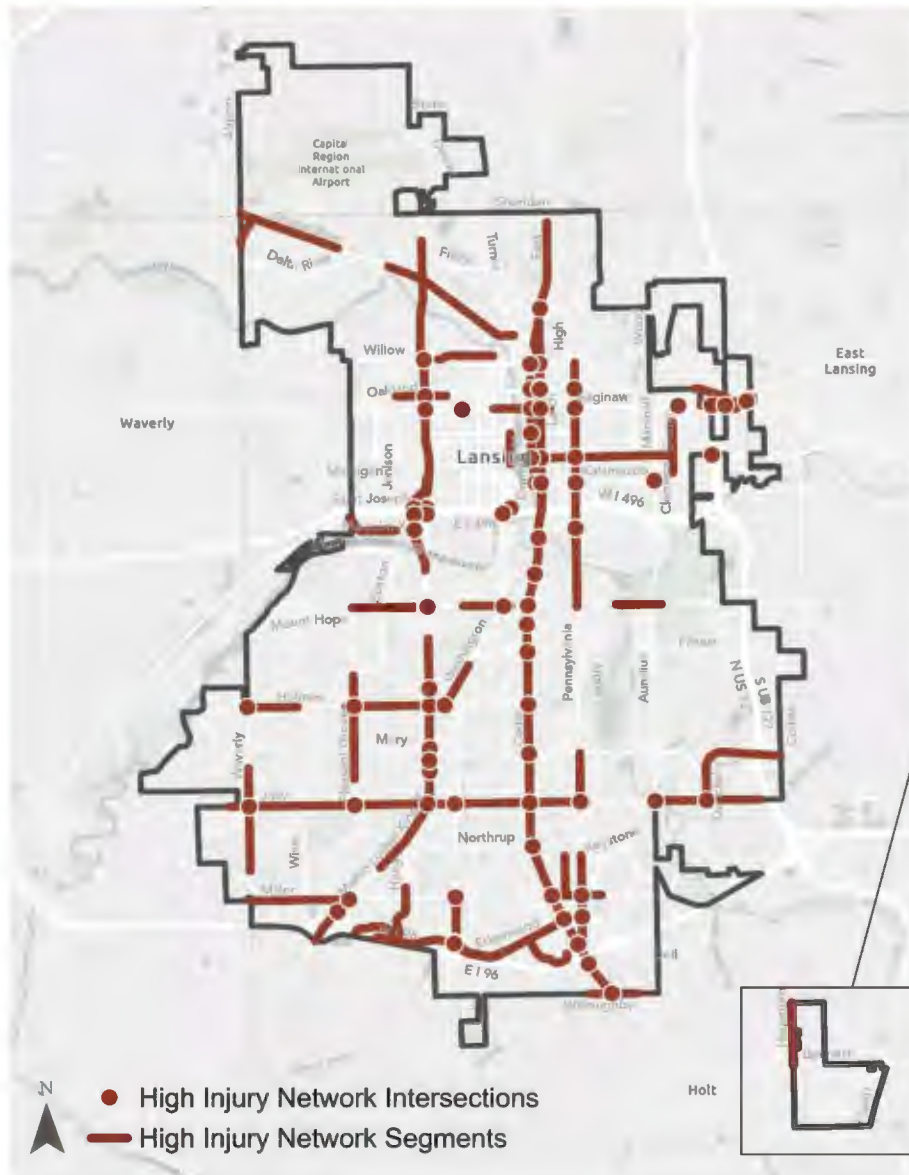


Rear-End Crash



Top Four Fatal and Serious Injury Crashes

The High-Injury Network includes a variety of streets and intersections throughout the city and is located almost entirely within areas with high concentrations of households without a vehicle and other vulnerable populations.



High-Injury Network

To address the safety issues uncovered by the crash analysis, recommended projects include road diets, signage, ADA improvements, pavement markings, signal timing and modernization, countdown pedestrian signals, non-motorized connections, roundabouts, removal of fixed objects, and access management.

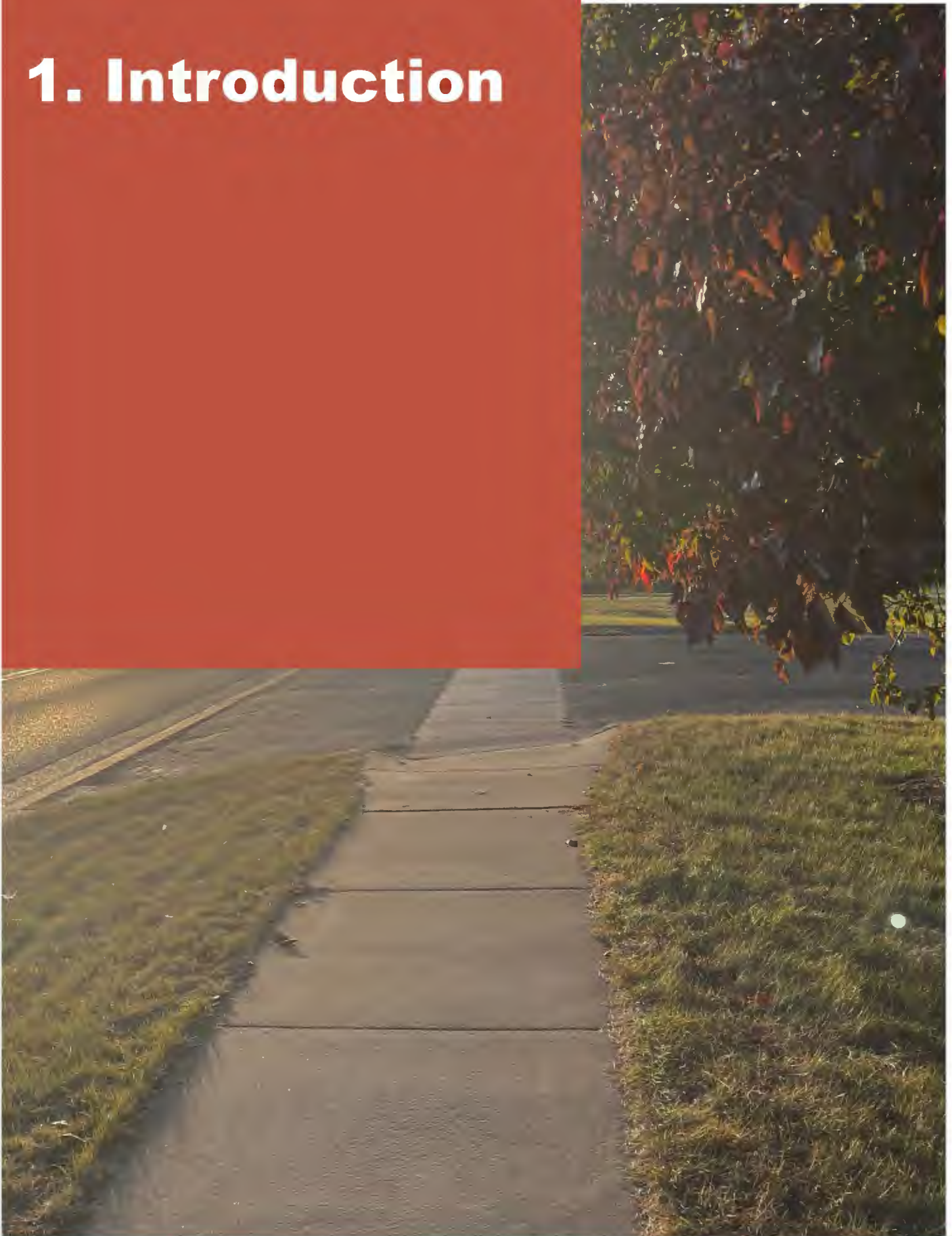
With the recommendations of the SAP in hand, the City of Lansing and its partners will work towards implementing safety improvements. As projects advance, continued collaboration with stakeholders, policymakers, and the public will be essential in fostering a safer, more connected transportation network for all users.

The City remains committed to updating the SAP as new data emerges so safety strategies remain responsive to evolving needs and priorities. Through leadership, public engagement, and strategic investment, this plan serves as a critical step toward reducing traffic-related injuries and fatalities in Lansing.

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1. Introduction



1.1 Introduction

The Safe System Approach (SSA) to roadway safety is the Federal Highway Administration's (FHWA's) initiative to achieve the **zero deaths vision**. The City of Lansing (City) is committed to implementing the Safe System Approach for its community, beginning with the development of this Safety Action Plan (SAP). The SAP is the first step toward implementing safety improvements with federal funding from the Safe Streets and Roads for All (SS4A) program.

Established with the passing of the Bipartisan Infrastructure Law (BIL) in 2021, the SS4A program allocated over \$5 billion for transportation safety efforts between 2022 and 2026. The BIL supports the Department of Transportation's National Roadway Safety Strategy (NRSS) to prevent roadway deaths and serious injuries by creating action plans with specific projects designed to accomplish this goal. While these programs are federally funded, they are locally driven, which is their true strength. Communities direct these plans to fit their specific needs and context to achieve a result that works for all.



Figure 1.1. Safe System Approach

This Safety Action Plan (SAP) is the proactive approach for the City of Lansing to target projects and priorities to fund through this program by examining existing issues that lead to death and serious injury while anticipating risk factors to prevent crashes before they occur.

This SAP was developed in accordance with SS4A program requirements and aims to ensure the needs of the City of Lansing are met and the study outcomes align with FHWA's safety initiatives. The SAP is a data driven examination of safety needs that correlate the system user types, equity, accessibility, and vulnerable road users to crash information depicting cause, context, and location. The project team, stakeholders, and public were consulted throughout the project to establish a baseline of safety concerns and consensus on study recommendations including policy, education, enforcement, and engineering.

This SAP includes recommendations, countermeasures, cost estimates, project prioritization, a project tracking mechanism, best practices, and funding opportunities to aid in the pursuit of the **zero deaths vision**.

The City of Lansing is committed to a comprehensive approach to addressing traffic safety. This approach will balance both proactive measures as highlighted by the SSA, as well as responsive measures that utilize the 5 E's (Engineering, Equity, Education, Enforcement, and Evaluation) to address issues that have contributed to severe crashes in the city. Ultimately, these measures will be targeted to provide significant progress towards meeting the goal of eventually eliminating traffic-related fatalities and serious injuries.

Using these principles will ensure that this SAP can explore the context of serious injuries and deaths, place an emphasis on designing a system which encourages safety rather than relying on the behaviors of individual actors, and identify factors that create risk for the whole system over the causes of individual/isolated incidents.

In 2022, motor vehicle crashes resulted in over 42,000 deaths across the United States (US). In Michigan alone, there were nearly 7,000 fatalities and serious injuries reported in 2022, with the city of Lansing accounting for **73 serious injuries and 16 fatalities**.

While the factors that lead to devastating crashes can be complex, they are not unknowable or inescapable. Fatalities and serious injuries are preventable. By completing a community-centered and data-driven analysis, the root causes of these crashes can be identified and addressed.

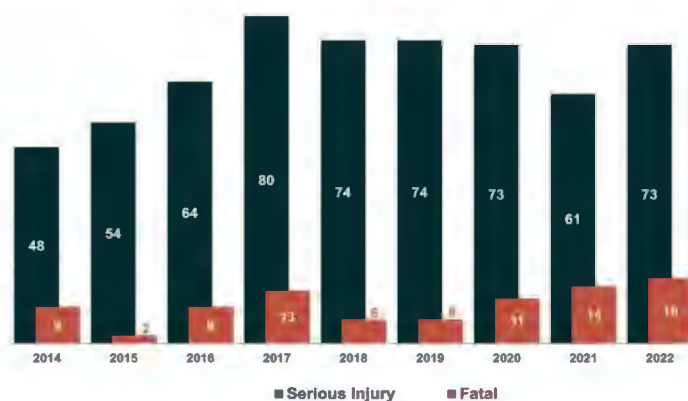


Figure 1.2. Fatal and Serious Injury (FSI) Crashes in the City of Lansing

Between 2014 and 2022, there was on average a 6% increase in serious injury crashes and a 48% increase in fatal crashes.

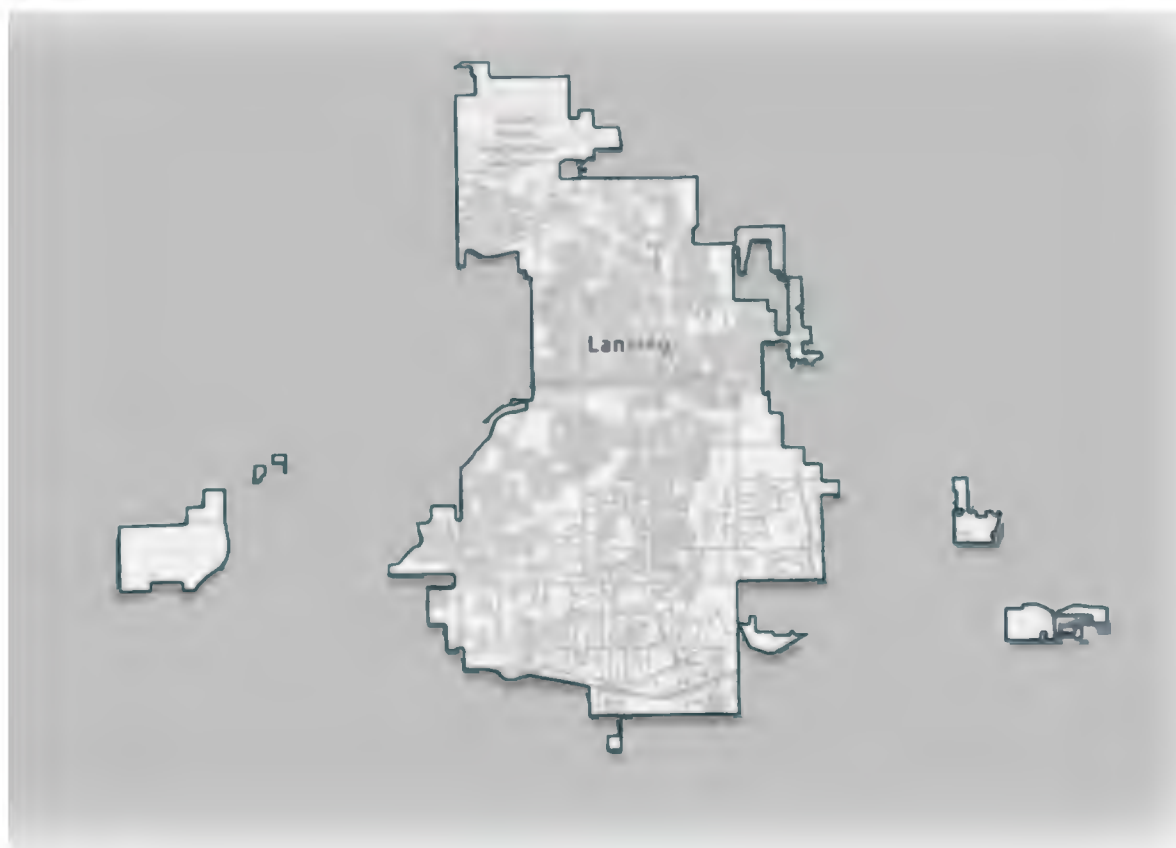


Figure 1.3. City of Lansing

Lansing at a Glance

Roadways: 440 miles of paved roads and 6 miles of gravel road

Median Income: \$51,197

Major Industries:

- Government – The State government is the largest employer in the city.
- Education – Michigan State University is a significant contributor to the local economy.
- Healthcare – Sparrow Health system and other healthcare providers are major employers in the city.
- Manufacturing – General Motors is a key source for transportation products.
- Insurance – Several insurance companies have corporate or regional offices in the city.

Tourism Destinations: Michigan State Capitol, Potter Park Zoo, Michigan History Center, Impression 5 Science Center, R.E. Olds Transportation Museum, Old Town Lansing, Lansing River Trail.

Safety Principles

The SSA recognizes that protecting human life and wellbeing should be the highest priority of a transportation system and provides a unique and effective framework for addressing the safety challenges on our roadways. The SSA includes strategies that are proactive and can create a safer transportation system that prevents fatal and serious injury crashes before they occur. The SSA is a comprehensive strategy designed to eliminate fatalities and serious injuries on our roadways by acknowledging the inevitability of human errors and vulnerability of the human body. This approach emphasizes that the transportation system must be designed to accommodate these realities, ensuring that even when mistakes occur, they do not result in severe consequences. It promotes a shared responsibility among all stakeholders, including government agencies, industry, and road users, to create a safer transportation environment. The SSA advocates for proactive safety measures, identifying and addressing potential safety issues before they lead to crashes. This approach also promotes equity by prioritizing the safety of vulnerable road users such as pedestrians and bicyclists, ensuring that everyone has access to safe mobility options. The goal is to ensure that even if a crash occurs, it does not result in death or serious injury, thereby promoting a safer community for all road users. The SSA incorporates the following principles:

- **Death and serious injuries are unacceptable.** Parties involved in delivering the SAP affirm that reaching zero transportation-related deaths is the only successful outcome of this effort.
- **Humans make mistakes.** The SAP for the City acknowledges that crashes will occur, but the severity of these incidents must be minimized through lower travel speeds and roads that are designed to reduce the risk of traveler mistakes.
- **Humans are vulnerable.** Actions defined through this SAP are human-centric and consider all types of travelers.
- **Responsibility is shared.** Collaboration and dialogue amongst a diverse group of stakeholders is incorporated into this SAP, resulting in prioritized solutions which will lead to better outcomes for travelers.
- **Safety is proactive.** Available data and emerging tools will continue to be applied throughout implementation of this SAP to identify safety risks, anticipate crashes, and provide faster incident response.
- **Redundancy is crucial.** Safety systems will be designed to work in concert to account for gaps that exist under the dynamic conditions that travelers in the city face daily.

Coordination with Other Plans

This SAP was developed in coordination with and complementary to existing City and Regional plans as noted below:

- One-Way to Two-Way Downtown Lansing Street Conversion Project
- Moving Mid-Michigan 2045 Metropolitan Transportation Plan (2020)
- Shaping the Avenue: Unique Places and Community Spaces (2017)
- Design Lansing Comprehensive Plan (2012)
- Walk and Bike Lansing Non-Motorized Plan (2012)

The Five Es

The five Es—Engineering, Equity, Education, Enforcement, and Evaluation—form a foundation for addressing safety concerns related to fatal and serious injury crashes in the city.



Engineering - involves designing and improving infrastructure to enhance safety and efficiency for all road users. This includes making physical improvements like better signage, safer intersections, improved corridors, and pedestrian-friendly infrastructure.



Equity - includes measures to produce inclusive outcomes that benefit all community members, especially vulnerable road users and underserved populations. It involves identifying high-risk areas, engaging with diverse community groups to understand their specific safety needs, and distributing resources to address disparities in traffic safety.



Education - focuses on informing and educating decision makers, engineers, and the public about road safety. Decision makers learn the impact of policies on safety. Engineers receive training on safety standards and design practices. Public campaigns promote public awareness and safe driving behaviors. Together, these efforts can reduce roadway fatalities and injuries.



Enforcement - promotes compliance with traffic laws and regulations, particularly those that protect vulnerable road users and reduce dangerous behaviors like speeding, impaired driving, and distracted driving. Enforcement agencies must often balance many priorities with limited resources. Incorporating proven practices, such as high-visibility enforcement, automated technologies, consistent penalties, and community engagement can improve the effectiveness of enforcement across the region.



Evaluation - is the process of assessing the effectiveness of safety measures and making necessary adjustments. This involves collecting and analyzing data on crashes and traffic patterns, setting and tracking goals for reducing crashes and injuries, and using evaluation results to refine and enhance safety strategies.

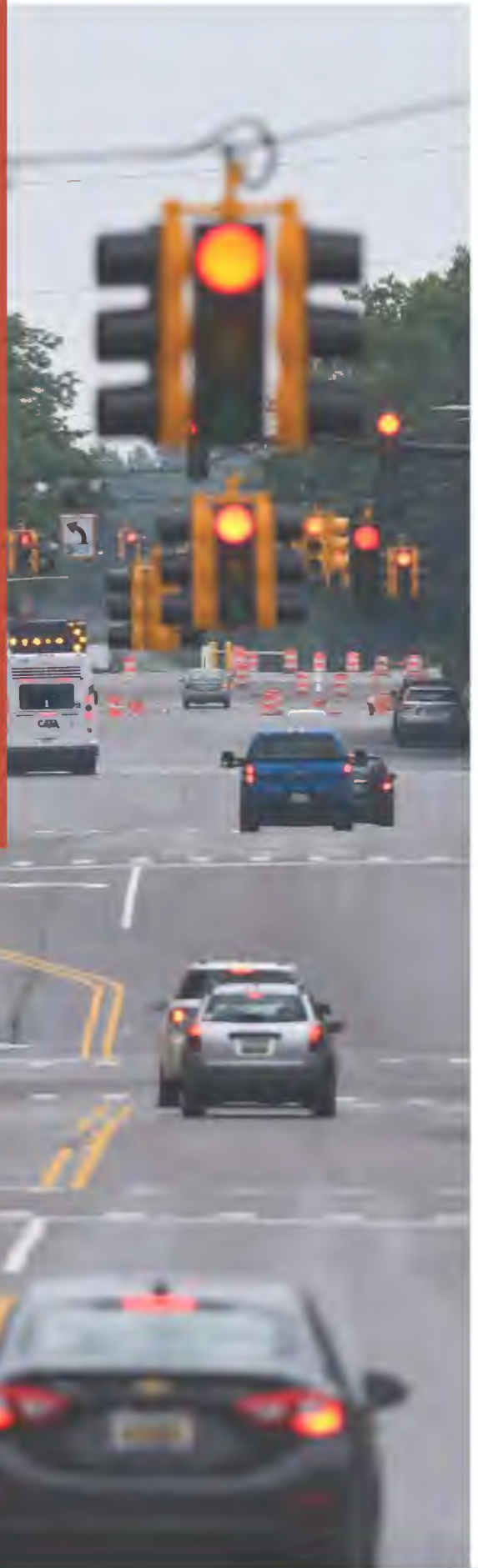
Figure 1.4. The Five Es



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2. Meeting the Challenge



2.1 Steering Committee

The Steering Committee plays a critical role in developing and implementing the Safety Action Plan (SAP) and is comprised of representatives from:

- City of Lansing
- Michigan Fitness Foundation and Safe Routes to School
- Lansing School District
- Michigan Department of Transportation (MDOT)
- City of Lansing Public Service
- McLaren Health
- League of Michigan Bicyclists
- Capital Area Transportation Authority (CATA)
- Lansing Community College
- American Council for an Energy-Efficient Economy (ACEEE)
- Southwest Agency Group
- Railroads (CSX Transportation, Canadian National Railway, and Jackson & Lansing Railroad)
- Lansing Economic Development Corporation

Roles and Responsibilities of the Steering Committee Members:

- Establish goals and targets for achieving zero fatalities and serious injuries by a target date.
- Identify strategies, project implementation, and progress tracking of the SAP.
- Identify Stakeholders and assist with public outreach.
- Identify areas of concerns (i.e. intersections or other locations where there are safety concerns, specific topic areas to address such as safer crossings near schools, ways to mitigate vehicles running red lights in targeted areas, education of younger drivers, etc.).
- Share and gather information to/from their respective organization, group, and/or business.
- Review and comment on the Safety Action Plan.
- Continue participation in the safety planning after the creation of the Safety Action Plan.

The Committee worked together to align the plan to reflect the needs of the community, local context, and diverse perspectives. Members commit to active participation not only in the development of the SAP but also in advancing strategies, implementing project, and tracking progress toward established safety targets.

2.2 Leadership Commitment

The City of Lansing received funding through the United States Department of Transportation (USDOT) SS4A program in fiscal year 2022 from FHWA to develop this comprehensive SAP that will guide investments in safety initiatives and new infrastructure across the city. This plan will also serve as a roadmap for future funding pursuits through the SS4A program to sustain these efforts.

The City of Lansing is committed to creating a safe system for all road users. The City has determined an overarching vision to steer their efforts. To realize this vision, specific and measurable goals and objectives have also been identified to create a clear path to success. **The City aims to reduce traffic fatalities by 2% annually, targeting zero fatalities and serious injuries by 2050.** The City has identified specific projects and priorities to achieve this goal and is committed to ongoing implementation, tracking, and reporting of road safety initiatives.

Lansing's Vision for the Safety Action Plan is as follows:

The City of Lansing aspires to have zero crashes related to serious injuries and deaths. Lansing's goal is to reduce these crashes by 2% per year over the next 15 years to create safe streets that provide for the various mobility needs of all users including pedestrians, cyclists, transit users, and motorists. By adopting the Safe System Approach, we commit to addressing speeding, distracted driving, and improving sidewalk and road conditions, as well as expanding bike infrastructure to create a balanced transportation network.

The above Vision statement will guide the development of actionable strategies, with a focus on resource prioritization and community engagement to achieve these goals.

2.3 Goals and Objectives

Goals and objectives provide an important function by aligning efforts to make roadways in the city safer for all users. They provide a concrete way to organize strategies and a framework for evaluating investments and activities. Guided by their commitment to creating a safe system for all users, the City has adopted goals and objectives in alignment with the SSA.



2.4 Study Area and Characteristics

The city of Lansing is the State Capital of Michigan and vibrant with a rich blend of characteristics that make it unique. Lansing has a population of approximately 112,115 community members with a density of about 2,878 people per square mile. The landscape of Lansing includes a mix of urban and natural environments. The city features well-maintained parks, green spaces, and the scenic Grand River, which flows through the heart of Lansing. The surrounding areas range from dense forests to open fields, providing a picturesque backdrop for outdoor activities.

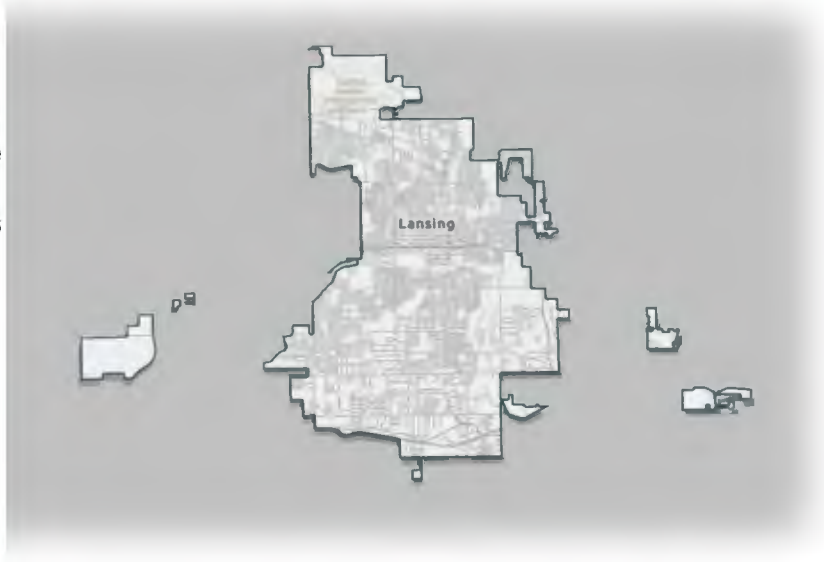


Figure 2.1. City of Lansing

Lansing offers a variety of attractions for tourists. Visitors can explore the Michigan State Capitol, the Michigan History Museum, and the Impression 5 Science Center. The city also boasts numerous parks, such as Potter Park Zoo and the Lansing River Trail, which provide outdoor activities for families and nature enthusiasts. Additionally, Lansing neighbors Michigan State University, which adds to the cultural and educational appeal of the area.

Traffic congestion in Lansing is moderate compared to other metropolitan areas of its size. The city experiences typical rush hour traffic, but it is generally manageable with access provided by major roads and highways, such as I-496 and US-127.

Lansing is a bike-friendly city with numerous trails and paths for cyclists and pedestrians. The Lansing River Trail is a popular 17-mile paved trail that runs through the city, connecting various parks and neighborhoods. Other trails, such as the Anderson Park loop and the trails at Burchfield Park, offer additional options for outdoor enthusiasts. The City encourages biking and walking as sustainable modes of transportation, and bike rentals are available for visitors.

Lansing's combination of cultural attractions, manageable traffic, active outdoor lifestyle, and beautiful landscapes make it a charming and inviting city for both residents and visitors.

3. Community Engagement and Collaboration



This plan incorporates a rational, proven planning model for safety action planning that includes goal setting, safety strategy development, action planning, monitoring and evaluation of strategies, communication plans, and a continuous improvement process. The process to develop the Lansing SAP followed an established model for strategic planning involving an assessment of existing conditions through the involvement of stakeholders, public input, and the evaluation of safety data, the selection of proven safety countermeasures to address the greatest safety needs, and the subsequent prioritization of several projects and priorities for implementation.



**Engage
Stakeholders**



Safety Data



**Select Proven
Solutions**



**Prioritize
Projects**



**Transit
Analysis**

3.1 Stakeholder Committee

Stakeholder input plays a crucial role, ensuring that the plan reflects community needs, local context, and diverse perspectives. Representatives from organizations, groups, and businesses identified on the following page were invited to participate in a Stakeholder Committee. These stakeholders met to discuss and review data and pinpoint targeted areas for improvement. The Stakeholders were engaged for pivotal milestone meetings to provide input during the development of the Plan.

Roles and Responsibilities of the Stakeholder Committee Members:

- Identify areas of concerns (i.e. intersections or other locations where there are safety concerns, specific topic areas to address such as safer crossings near schools, ways to mitigate vehicles running red lights in targeted areas, education of younger drivers, etc.)
- Share and gather information to/from their respective organization, group, and/or business
- Assist in promoting public outreach
- Review and comment on the Safety Action Plan



The following groups were identified to participate in the Stakeholder Committee:

- American Association of Retired Persons (AARP)
- Allen Neighborhood Center
- Capital Area Transportation Authority (CATA)
- City Rescue Mission
- Disability Network - Capital Area
- Health Care Providers - McLaren/Sparrow/Care-Free Medical
- Holy Cross Services
- Ingham County Health Department
- Lansing Board of Water & Light
- Lansing School District
- League of Michigan Bicyclists
- Lime/Bird/Spin
- National Association for the Advancement of Colored People (NAACP)
- Northwest Initiative Refuge Development Center
- South Lansing Community Development Association
- Tri-County Office on Aging
- Tri-County Bicycle Association
- United Way
- Uber/Lyft
- Michigan Department of Transportation (MDOT)
- Michigan Fitness Foundation
- Michigan State University



Figure 3.1. Stakeholder Committee Meeting - September 11, 2024

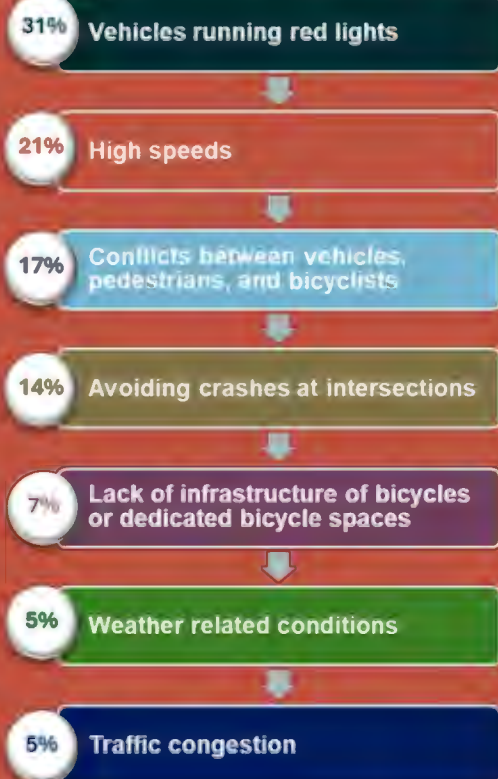
WHAT WE HEARD FROM STAKEHOLDERS

Top Safety Concerns

Select your top priorities for making traveling around Lansing safer:



In your daily travel, what safety issues are most important to you?



"It's important to consider that people who are differently abled may need a longer time to cross or smoother cross transitions"

"...Increase access to public transportation may decrease the overall number of vehicles..."

"More traffic monitored lights, ground crosswalks, and personnel at school locations..."

Other Comments:

"Consider all modes of transportation as valuable"

"The city needs to seriously consider reducing the number of lanes to slow traffic"



3.2 Public Engagement

Community Input

Effective public engagement is the cornerstone of any effective planning process. It ensures the plan recommendations are feasible and grounded in local needs and perceptions. Input from the community helped shape an understanding of how residents of the city experience safety on their roads while driving, walking, biking, or taking transit. The residents and leadership agencies who utilize the roadways have a unique perspective as they travel and experience safety issues regularly. To conduct this SAP, the public was engaged via online surveys, an interactive online mapping tool, and an open house to obtain feedback and input on the safety concerns most important to the community. This input was used to develop the strategies included in the SAP.



Figure 3.2. Public Open House - November 21, 2024

Online Survey

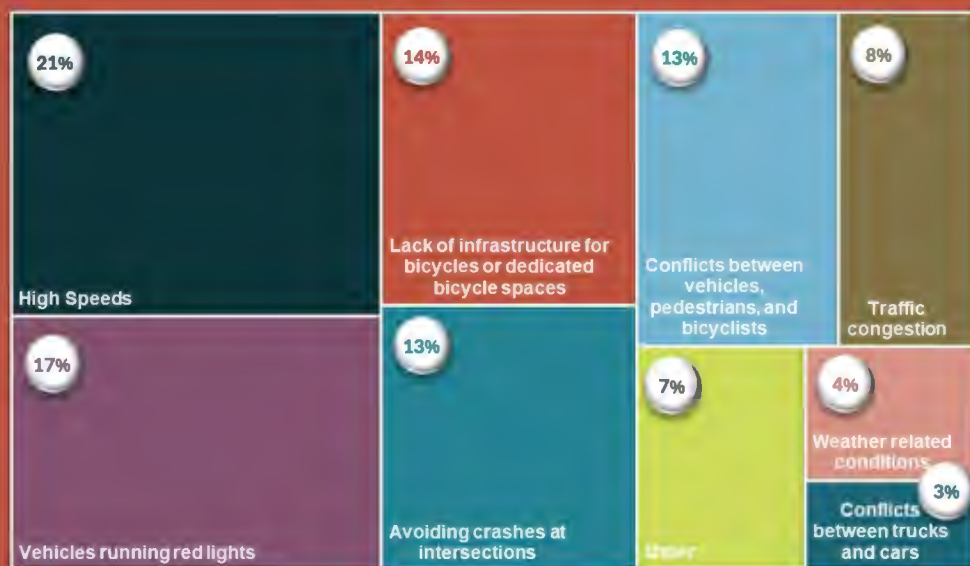
Community members were presented with baseline information regarding safety issues and had the opportunity to provide input on issues they observed. A total of **226 responses** were collected as part of an online survey.

WHAT WE HEARD FROM ONLINE PUBLIC SURVEYS

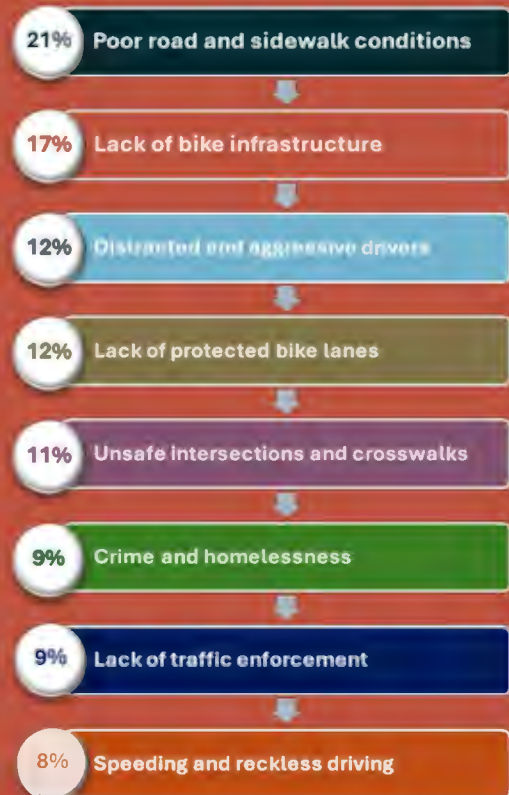
Top Safety Concerns

226 Online Participants

In your daily travel, what safety issues are most important to you?



Please provide a brief reason why you feel safe or unsafe while walking and/or biking in Lansing?



50%



Of respondents reported that a member of their household has been involved in a crash in Lansing

58%



of respondents feel unsafe when walking or biking



Interactive Mapping Tool

An interactive online mapping tool was used to gather public feedback and identify safety concerns at specific locations. Safety concerns were divided into four categories for the public to use when marking their concerns: speed, congestion, pedestrian/bicycle, and other transportation issues. In total, there were **180 markers** placed on the map, with over half of those indicating pedestrian/bike safety issues. The comments have been summarized below.

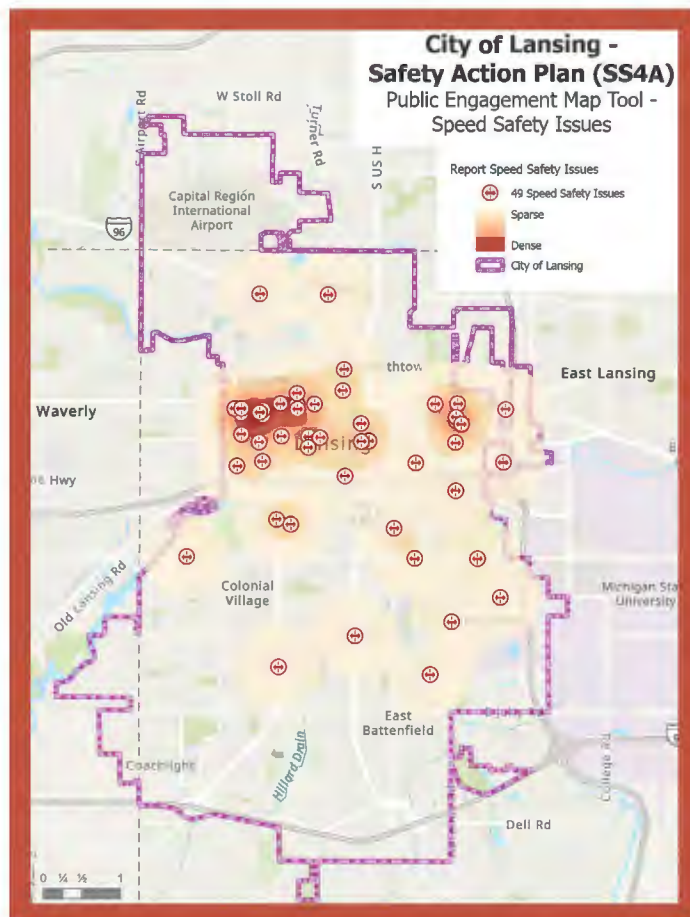


Figure 3.4. Interactive Mapping Tool Results - Speed

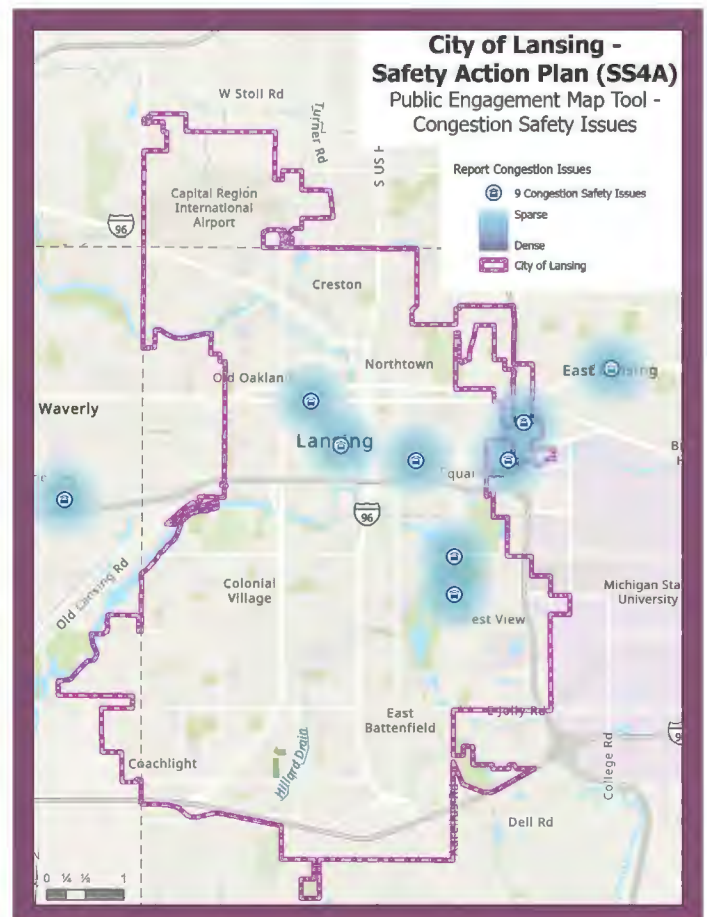


Figure 3.3. Interactive Mapping Tool Results - Congestion

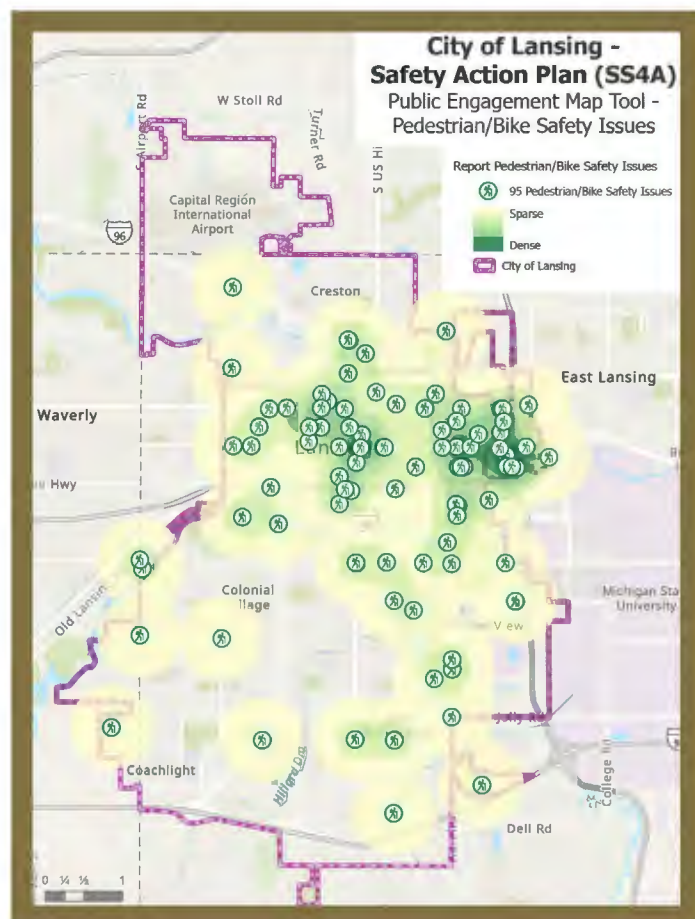


Figure 3.5. Interactive Mapping Tool Results - Pedestrian/Bike

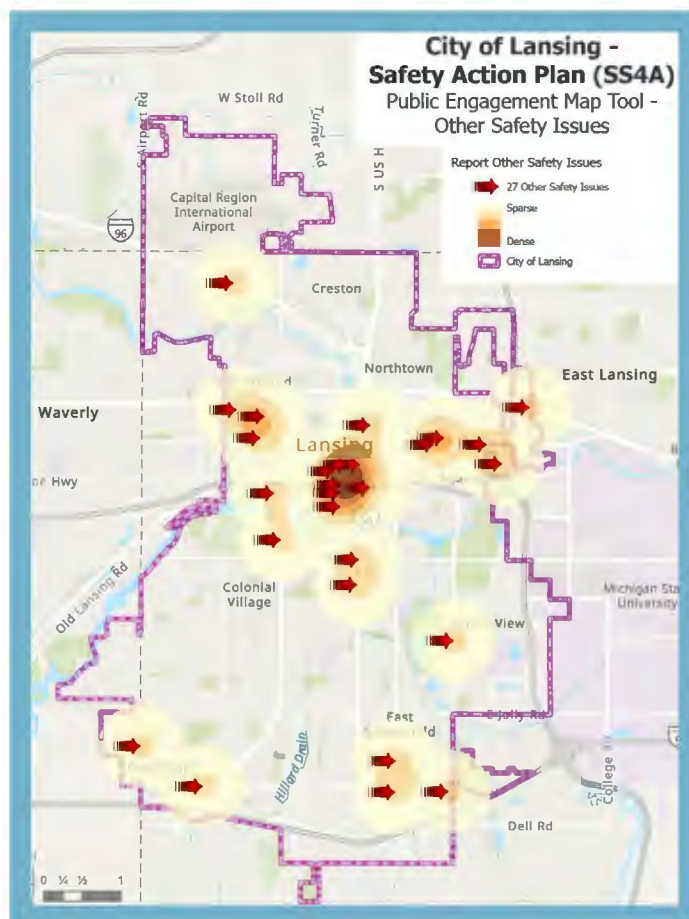


Figure 3.6. Interactive Mapping Tool Results - Other Safety

Public Open House

An in-person public meeting was held on November 21, 2024, from 4:30 PM to 6:30 PM at the Gier Community Center in Lansing, Michigan. The public was presented with an overview of the project goals, breakdown of the crash trends, existing plans and policy review takeaways, and maps to mark concerns.



WHAT WE HEARD FROM PUBLIC OPEN HOUSE

Top Safety Concerns

Safety Concerns

Speeding

Lack of well-maintained and accessible bike lanes throughout the City of Lansing

Traffic issues around school zones and residential areas.

Improvement Suggestions

Improved pedestrian safety measures including crosswalks and better sidewalk maintenance

Address traffic issues around school zones and residential areas.

Summary of Mapped Comments

34% Bike Lanes

25% Speeding

17% Pedestrian Safety

14% Road Conditions

10% Traffic Issues

Interactive Map Comments (82)

An interactive mapping exercise was available at the meeting which allowed participants to put a dot sticker on any location in the city and then write a corresponding comment/concern. Public comments received during this meeting, including dot stickers, were added to the interactive online mapping tool following the meeting.



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4. Safety Analysis



4.1 Overview

Effective transportation safety management requires a thorough understanding of the factors contributing to roadway crashes. An analysis of crash data from the Michigan Department of Transportation (MDOT) asset management system, known as Roadsoft, and the Michigan State Police (MSP) Crash Database was reviewed to assess crash patterns and trends from 2014 to 2022 in the city of Lansing. The analysis includes the crash types, contributing factors, current conditions, and locations of all crashes with a focus on Fatal and Serious Injury (FSI) crashes. The data will serve as a foundation for targeted initiatives to reduce the occurrence and severity of crashes and improve overall traffic safety for all road users.

Crash trends identified at this stage of the analysis form the baseline conditions necessary to develop countermeasures to address the predominant factors contributing to crashes in the city. The analysis provides valuable insights for the region and their stakeholders to prioritize mitigation strategies and allocate resources effectively. The following sections provide a holistic perspective on the state of traffic safety in the region. Additional crash data summaries have been provided in Appendix B.

By assigning a crash frequency to a population, a fair comparison can be drawn to demonstrate crashes based on population and thus compare local to statewide values. A preliminary review of data comparing the city of Lansing to the State of Michigan shows the city consistently experienced a higher crash rate when compared to the statewide average when normalized by population (Figure 4.1). Comparing fatal and serious crashes per 1 million population, the city of Lansing is higher than the statewide average and on an upward trend for both metrics (Figure 4.2).



Figure 4.1. Crash Frequency per 10,000 Population

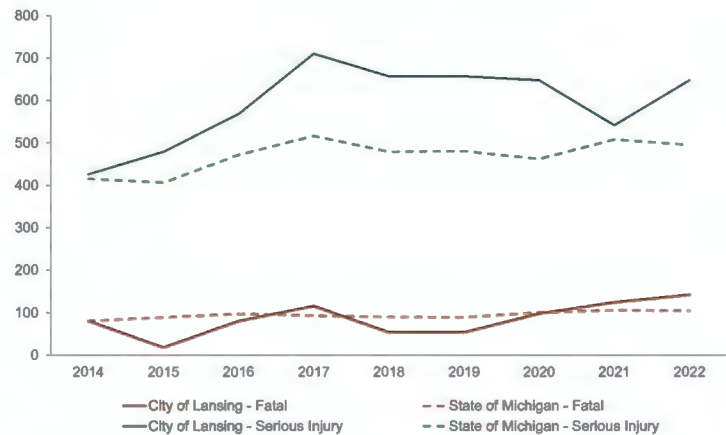


Figure 4.2. FSI Crash Frequency per 10,000 Population

Crash frequency per 10,000 population in the City of Lansing exceeds the statewide values. The frequency of fatal and serious injury crashes also exceeds the statewide values for Michigan. All three metrics are on an upward trend making this Safety Action Plan a valuable tool to improve safety for all road users.

4.2 Crash Analysis

Crash History

Between 2014 and 2022, there were 35,849 crashes reported in the city (see Figure 4.3). Of those, 86 were fatal and 601 involved a serious injury. The number of crashes was steady from 2014 to 2019, averaging about 4,200 per year. There was a significant decline in 2020 with averages of about 3,480 from 2020 to 2022. The severity of crashes, however, has been increasing from 2014 to 2022. The average number of FSI crashes from 2014 to 2019 was 73. The average increased to 83 FSI crashes from 2020 to 2022.

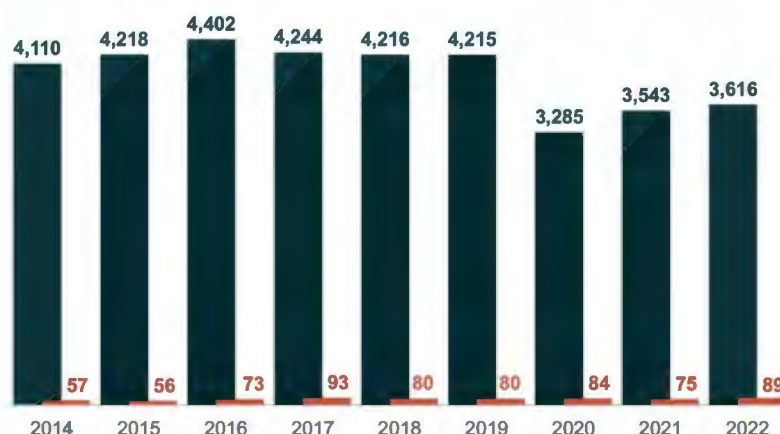


Figure 4.3. Crash History

Crash Severity

Crash severity is broken down into a classification system developed by FHWA known as the KABCO Injury Classification Scale, as shown in Figure 4.4. The KABCO system was applied to break down crash severity based on the definitions of the categories developed by MDOT. MDOT defines a fatality (K) as one that results in death within 30 days after a crash. Serious injuries (A) include severe lacerations, broken or distorted extremities, crush injuries, suspected skull, chest, or abdominal injury, significant burns, and those causing a loss of consciousness when taken from the crash scene. Minor injury (B) includes injuries that are evident at the scene but are non-incapacitating injuries. Possible injury (C) includes injuries that are reported or claimed, but not visibly evident. Property damage only (O) crashes or no injury crashes indicate there was no bodily harm because of the crash.



Figure 4.4. Crash Severity

(B) includes injuries that are evident at the scene but are non-incapacitating injuries. Possible injury (C) includes injuries that are reported or claimed, but not visibly evident. Property damage only (O) crashes or no injury crashes indicate there was no bodily harm because of the crash.

There are several factors to consider when establishing priority crash profiles, which focus on the most frequent and most severe crashes and the potential contributing circumstances involved in the incident. The following information will evaluate the crash data and establish crash profiles for the city of Lansing. There were 7,536 crashes involving a fatality (K) and injuries (A, B, and C) and of those, 687 were FSI crashes (K and A). It is important to understand this distinction to effectively follow the analyses discussed below. While the focus is on FSI (K and A) crashes, some data sets require a larger sample size or distribution to assess patterns and trends. Therefore, the following discussion will fluctuate between FI, fatal (K) and injury (A, B, and C), crashes and FSI (K and A) crashes to effectively emphasize the features in the information.

Crash Types

Crash type categorizes and summarizes the nature of a crash. There is a contrast between the most prevalent crash types and the most harmful or severe crash types (FSI crashes). For example, rear-end crashes may occur at an intersection or driveway. Potential reasons may include sight distance, intersection awareness, lighting, slick pavement, and driver or operator behavior. Rear-end crashes may be a fender bender (property damage only) crash at lower speeds, but fatal on higher speed roads. By understanding the type of crash, potential contributing factors, severity, location, and context, these elements and the relationships between them will help shape the crash profiles to be addressed through this SAP.

An examination of the type of crashes that are occurring in the city of Lansing helped identify the patterns and potential contributing factors associated with crashes.

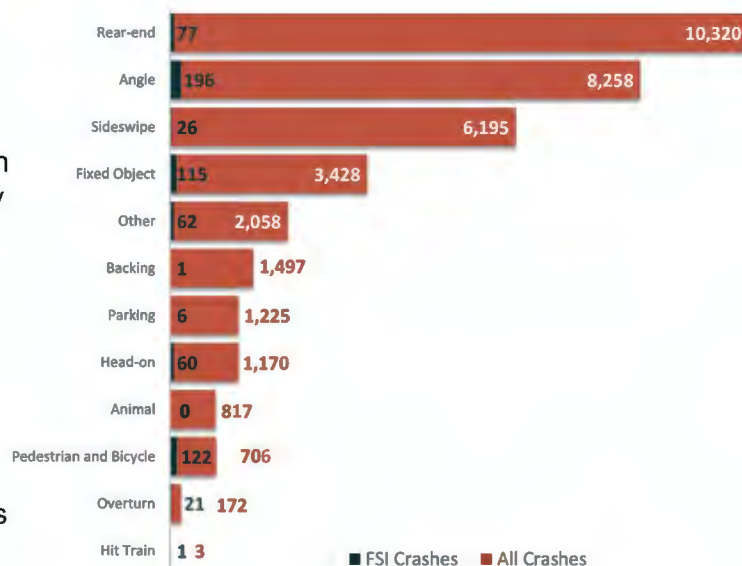


Figure 4.5. Crash Type and Severity

There is a contrast between the most prevalent crash types and the most harmful crash types (FSI crashes). Rear-end, angle, sideswipe, and fixed object crashes were the most prevalent crash types. However, the most severe crash types were angle, pedestrian and bicycle, fixed object, and rear-end crashes (see Figure 4.5).

When examining crashes that result in FSI, angle, bicycle and pedestrian, fixed object, and rear-end collisions emerge as the most dangerous with the most severe outcomes.

Crash Environment

Non-behavioral factors also contribute to crashes. These factors include the weather, lighting, and pavement surface conditions:

- **Weather:** Inclement weather can reduce visibility and make navigation difficult by obscuring signage, traffic signals, and pavement markings. While cloudy weather is not typically considered an adverse condition, it was included in the crash data that accounted for the crash totals for K, A, B, and C crashes.
- **Lighting:** Lighting may be a function of the time of day and/or the availability of artificial lighting. Poor lighting can reduce visibility and make navigation difficult by causing glare or by making signage and pavement markings that lack retroreflectivity difficult to see. In rural areas, dark and unlit roadways may make it difficult to ascertain the edge of pavement or edge of pavement lines.
- **Road surface:** Adverse weather conditions such as rain, snow, and ice can reduce tire traction, making it more difficult for drivers to maintain control of their vehicles. Rain can create slick surfaces and lead to hydroplaning, where a layer of water builds up between the tires and the road, causing a loss of traction. Snow and ice can make roads extremely slippery, increasing stopping distances and the risk of skidding.

It is important to identify these factors so targeted interventions may be implemented as appropriate to improve safety for all users. The environmental conditions noted for fatal (K) and injury related crashes (A, B, and C) are highlighted in the charts in Figure 4.6. Overall, most crashes occurred during optimal environmental conditions such as in the daylight, on dry pavement, and/or with clear weather conditions, potentially due to increased volume during daylight hours. The impact of weather conditions on the roadway is typically reflected in the pavement conditions but may also indicate that visibility improvements for pavement markings or signage should be considered to enhance visibility during periods in poor weather. Environmental crash conditions indicate a need to consider applications such as high friction surface treatments to improve traction, retroreflective pavement markings and signage to improve visibility, and the addition or improvement of overhead lighting where appropriate.



Figure 4.6. Environmental Crash Conditions

Understanding of distribution of crashes across time (hours, days, months, and years) enables the identification of peak periods of risk, identification of contributing factors, and formulation of targeted interventions to reduce roadway risk. Analyzing the relationships among crash characteristics over time, such as seasonal variations, time-of-day trends, and long-term patterns, offers valuable insights for evaluating intervention effectiveness and guiding road safety improvements.

Monthly crash rates are influenced by a variety of factors such as weather, daylight, and travel patterns. For example, elevated crash rates during the summer months may be due to higher travel volumes, tourism, and special events. A review of crash data in Figure 4.7 highlights the highest volume of FSI (K and A) crashes during the months of September and October for motorists and VRUs.

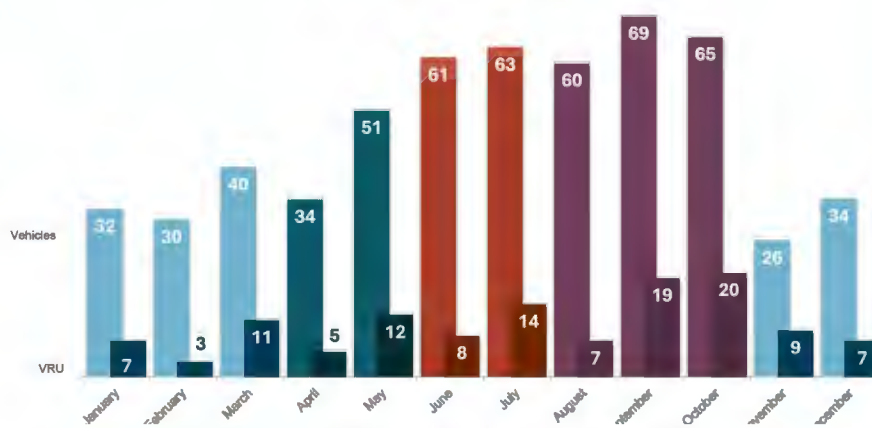


Figure 4.7. FSI by Month for Vehicles and VRU

The distribution and occurrence of fatal (K) and injury related (A, B, and C) crashes based on the time of day and day of week has been illustrated in Table 4.1. As illustrated in this table, the highest number of crashes occurred between 3 PM and 6 PM Monday through Friday. Another elevated trend occurs between 12 PM and 3 PM on Thursday and Friday. The weekend peaks occur between 12 PM and 6 PM, but the crash trends are diminished when compared to the weekday statistics.

Table 4.1. Crash Distribution by Time and Day of the Week

	From To	Time of Day							
		12 AM	3 AM	6 AM	9 AM	12 PM	3 PM	6 PM	9 PM
		3 AM	6 AM	9 AM	12 PM	3 PM	6 PM	9 PM	12 AM
Day of Week	Mon	31	23	122	155	215	290	138	85
	Tues	43	23	141	156	208	358	172	93
	Wed	42	18	151	155	214	322	182	83
	Thu	44	17	138	170	229	315	187	103
	Fri	45	30	121	171	242	314	180	128
	Sat	84	45	49	115	160	158	161	137
	Sun	83	36	28	62	159	175	151	73
		Dark Conditions		AM Peak	Light Conditions		PM Peak	Dark Conditions	

Driver Behavior

A primary objective of the SSA is to promote safer, more responsible driving and travel behavior among all road users. Dangerous behaviors such as impaired driving, red light running and distracted driving significantly increase the risk of crashes. According to the Michigan Traffic Crash Statistics, Michigan Traffic Crash Annual Reports and Statistics, and other driver behavior related publications, there were 576 FSI crashes in the city of Lansing related to undesirable driver behavior during the study period. Of these FSI crashes, drug and alcohol impairment, red-light running, and speed/speeding were the highest contributing factors in these crashes, as shown in Figure 4.8. This underscores the danger of impaired driving and highlights the urgent need for effective prevention measures.



Figure 4.8. Impaired Driving

Hit by a car driving at...



9.5 out of 10 pedestrians survive.



5 out of 10 pedestrians survive.



1 out of 10 pedestrians survive.



Source: NACTO Urban Street Design Guide



Vulnerable Road Users

Certain types of road users, such as pedestrians and bicyclists, are more vulnerable to death or serious injury when a traffic crash occurs. These users are known as Vulnerable Road Users (VRUs). The number of VRU crashes in the City has been on a steady decline since 2014, as shown in Figure 4.10. However, these crashes still rate in the top 4 by severity and occurrence (see Figure 4.12 on the following page).

Of the 35,849 total crashes in the city of Lansing between 2014 and 2022, there were a total of 706 VRU-related crashes resulting in 17 fatalities and 105 serious injuries (see Table 4.2).

The role of speed in crash survivability is a critical factor, especially when crashes involve a VRU. To understand the potential contribution speed played in the VRU crash outcomes, it's possible to consider the functional classification of the roadway to assess the speeds involved (see Figure 4.11). Interstates typically have posted speed limits above 55 MPH. Principal arterials were most frequently a factor in pedestrian and bicycle related FSI crashes. The posted speed limits are usually between 35-55 MPH, with higher speed limits in rural areas. Minor arterials generally have posted speed limits between 30-45 MPH. Major collector roads often have posted speed limits between 25-45 MPH and local residential streets usually have posted speed limits of 25 MPH. From this data, a crash profile was developed to mitigate with system-wide and targeted strategies to improve safety for VRUs.

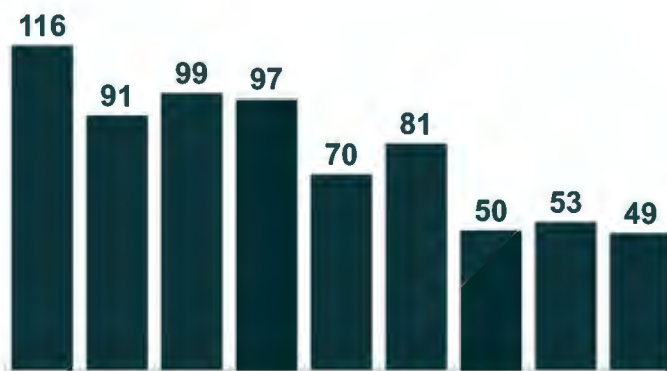


Figure 4.10. VRU Crashes (2014-2022)

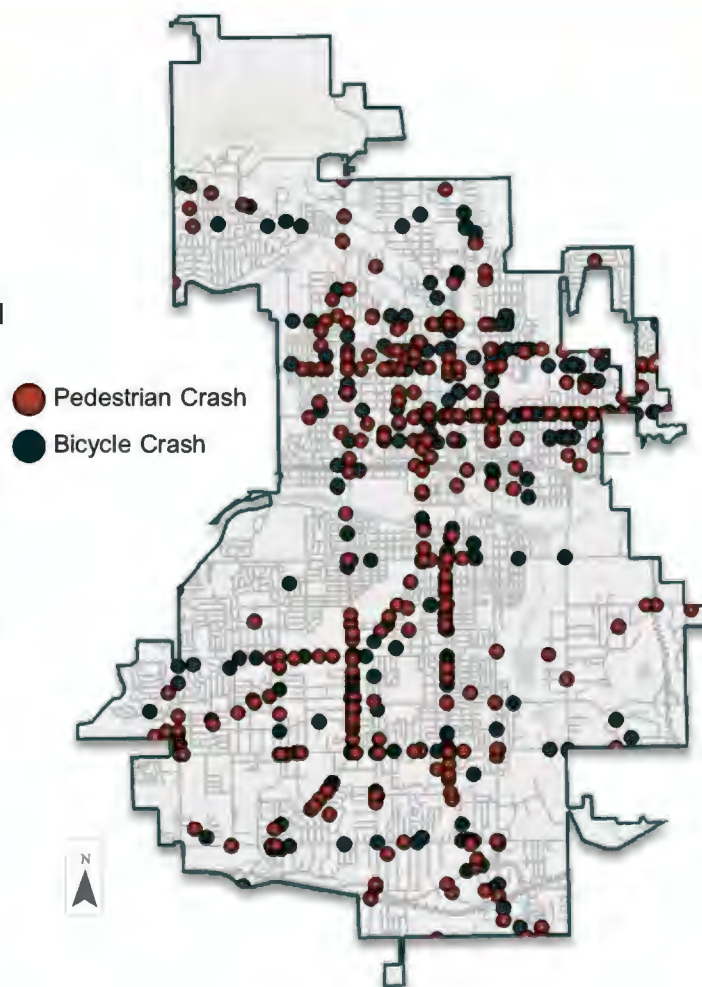


Figure 4.9. VRU Crash Map

Table 4.2. VRU Crash Severity

	K	A	B	C	O
	16	74	145	102	43
	1	31	148	77	69

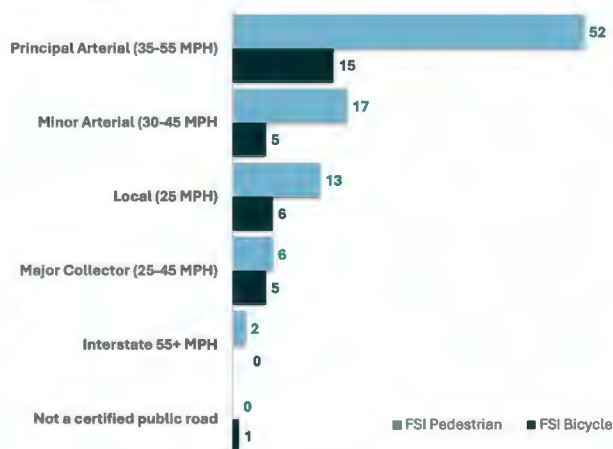


Figure 4.11. VRU FSI Crashes by Functional Class

Crash Profiles

Having compiled and evaluated the crash history for the city of Lansing from 2014-2022, a series of crash profiles were developed to address the most frequent and severe crash types. These profiles will aid in identifying system-wide and targeted strategies to mitigate safety concerns and improve safety for all users.

Figure 4.12 summarizes crash data by collision type, highlighting the severity and frequency of incidents. Angle crashes account for the highest number of total crashes (8,258), with 25 fatalities and 171 serious injuries, making them a significant concern. Vulnerable road user (VRU) crashes, which involve pedestrians and cyclists, have a lower total count (706) but a higher proportion of severe outcomes, with 17 fatalities and 105 serious injuries. Fixed object crashes, where vehicles collide with stationary objects, result in 21 fatalities and 91 serious injuries out of 3,428 total incidents. Rear-end crashes are the most common (10,320) but tend to be less severe, with 3 fatalities and 74 serious injuries. This data underscores the need for targeted safety measures to address high-risk crash types.

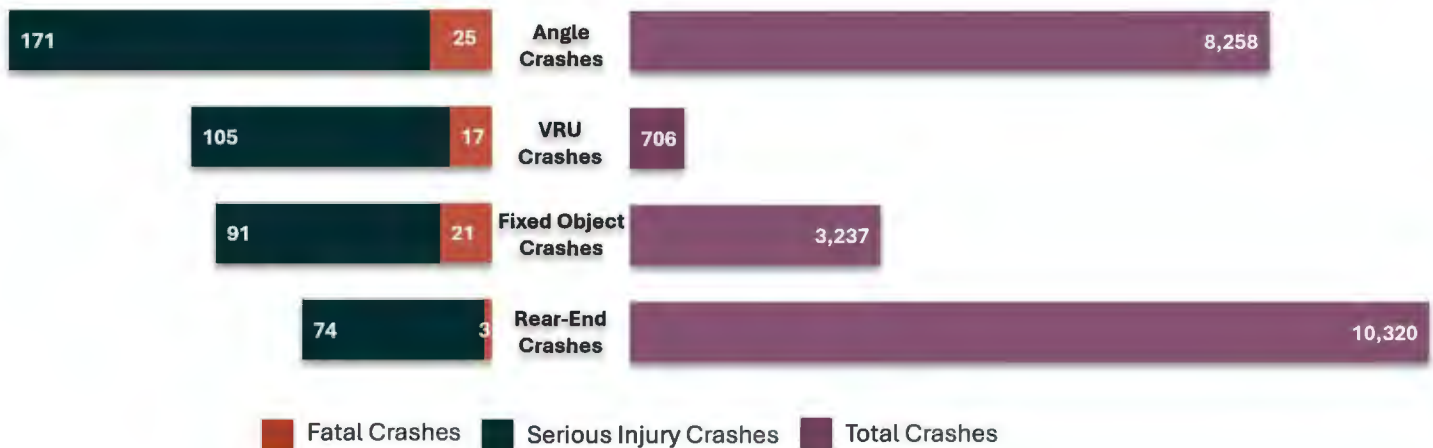


Figure 4.12. Top Four Serious Injury Crash Types



Spatial Analysis

Spatial crash analyses offer a powerful approach to understanding the geographical distribution and patterns of crashes, such as highlighting locations, road segments, and intersections with higher crash frequencies. Spatial analysis provides insight into the underlying factors that contribute to crashes in a certain area. Understanding the location and concentration of crashes is instrumental in developing targeted interventions, implementing effective safety measures, and optimizing resource allocation to reduce risks for road users.

Figure 4.13 contains a heat map and location map for FSI traffic crashes from 2014 to 2022 in the city of Lansing. These maps illustrate that crashes are more prevalent along higher volume roadways, at intersections, and in urban centers. The higher concentration of people and vehicles often leads to increased intersections and conflicts on the roads, which elevates the risk of crashes. Commercial activity areas also generally experience higher levels of congestion, which can lead to driver frustration and aggressive driving. The map reveals that crash concentrations are clustered around the urban center and along arterials. Key areas of concern include major intersections on arterial roads such as M-99, M-96, M-69, and I-496.

Over 70 percent of fatal and serious injury crashes occurred on principal arterials and minor arterials.

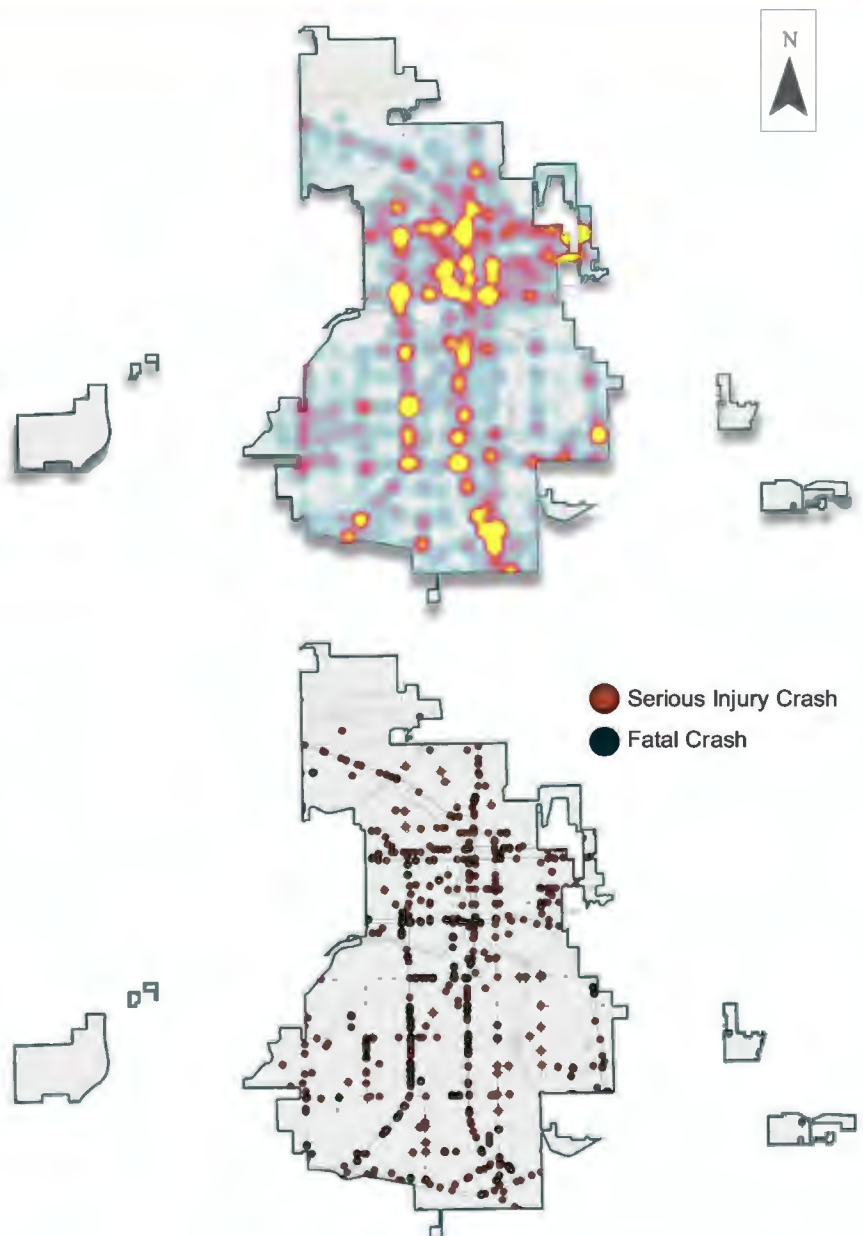


Figure 4.13. FSI Crash Map

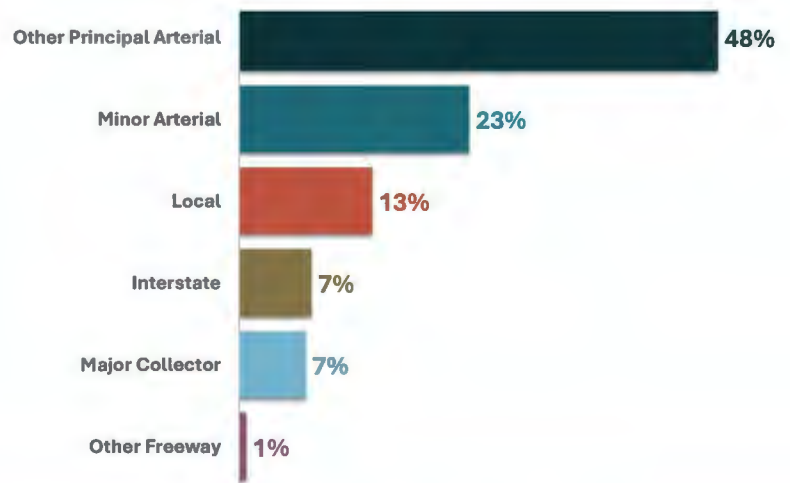


Figure 4.14. FSI by Functional Class

Geographic Information System (GIS) for Safety Analysis



Geographic Information Systems (GIS) are used to analyze crashes and visualize data on maps. Crash data contain tabular form details about crashes (date, time, conditions, type, speed limit, etc.) and the location of the crash (latitude, longitude, road type, road characteristics, intersection, etc.). GIS software is used to generate spatial visualizations of the crash data set.

GIS mapping is constructed by compiling and stacking layers of information. Layers can be linked, connected, and filtered to drill down on targeted information. GIS integrates the crash data set with cause, location, and context information to aid in the identification of the high risk networks and hot spots. This spatial analysis can reveal patterns and trends that would not be apparent from tabular data alone. Additional and pertinent layers can also be added and evaluated in context with the high risk network to aid in equity assessments, multimodal linkages, educational institutions, emergency services, and other area characteristics that aid in the safety analysis.

The spatial analysis capabilities of GIS provide flexibility for complex computation for system wide, corridor, and hot spot crash data analysis.

Leveraging the computational power of GIS comprehensive analysis of the various factors contributing to crashes can be assessed. This advanced analysis facilitates the development of targeted mitigation practices aimed at preventing and eliminating crashes.



4.3 Corridor Road Safety Audits

To better understand the road characteristics and their relationship to FSI crashes in the City of Lansing, two Road Safety Audits (RSAs) were conducted. An RSA is a combined desktop and field observation activity that results in a formal assessment of existing conditions and the identification of specific safety improvements for the studied roadway. For this Safety Action Plan, the recommendations identified in the RSAs were also used to determine representative improvements for other roadways that share the same characteristics (speeds, volumes, road configuration, and land use).

By considering context, crash density, and crash severity, a risk factor can be determined and solutions applied system wide. RSAs were conducted for (see Figure 4.15):

- **Jolly Road Corridor:** from Jolly Cedar Court to Oakbrook Drive. An arterial road with a mix of residential, commercial, and recreational land use. Jolly Road has four to five lanes with sidewalks. The speed limit varies between 35 MPH and 50 MPH.
- **Pennsylvania Avenue Corridor:** from Mt. Hope Road to Cesar E. Chavez Avenue. An arterial road with residential, commercial, and industrial land use. Pennsylvania Avenue has four lanes with a two-way left turn lane (TWLTL) or vegetative median throughout. There are sidewalks on portions of the road. The speed limit is 30 MPH.

Jolly Rd is a 4- to 5-lane arterial with sidewalks and 35-50 MPH limit; Pennsylvania Ave has four lanes, a TWLTL/median, partial sidewalks, and a 30 MPH limit.

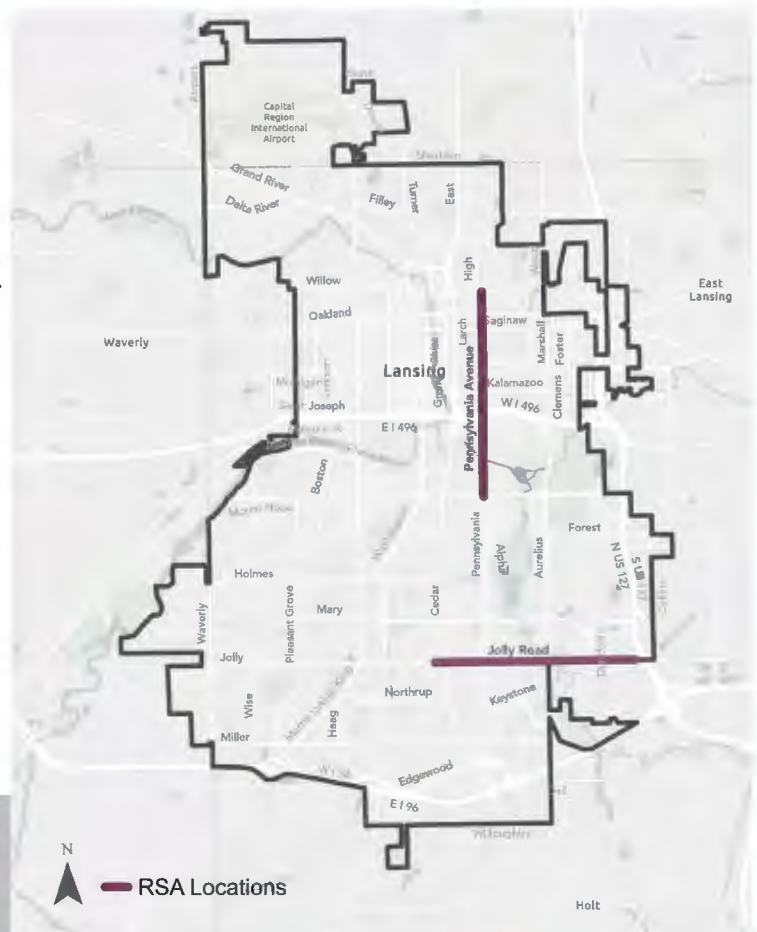


Figure 4.15. RSA Map

The RSAs were performed based on the FHWA Road Safety Audit Guidelines and the associated National Highway Institute (NHI) training course. Safety concerns that were identified as part of the RSA process were assigned a risk rating according to the RSA Safety Risk Matrix. The rating represents the relative risk and priority that the risk should be given between a rating of A, which represents the lowest risk and lowest priority, and a rating of F, which represents the highest risk and highest priority. The ratings were derived from the combination of the likely frequency or exposure and the expected resulting severity of crashes that are associated with each safety concern. Each risk category was qualitatively estimated and not solely based on historical crash data.

Suggested treatments and countermeasures aimed to address the identified safety concerns were developed for each RSA corridor. A summary of identified countermeasures is provided in Table 4.3. The full RSA reports are provided in Appendix B. These solutions were used to establish risk factors for application to the Safety Action Plan for roads with similar characteristics.

Table 4.3. RSA Summary

Jolly Road Countermeasure Summary		
Safety Issue	Risk Rating	Suggested Countermeasure
Signal timing	D	Adjust signal timing Enforcement Roundabout
Corridor design vehicle	C	Road Diet
Intersection turning movements	C	Increase turning radius Increase green time
Faded stop bars and crosswalk markings	C	Repaint and maintain markings Stripe minor crossings
Fixed objects in close proximity to through lanes	C	Relocate utility poles Bury Utilities
Lack of physical barrier at railroad tracks	B	Install railroad gate Place signing for north sidewalk
Detectable warning surfaces	B	Install ADA warning strips where they are missing
Non-Countdown pedestrian signals	B	Install countdown pedestrian signals
Non-Motorized Connectivity	B	Connect sidewalk through the corridor Extend sidewalk east of Belle Chase Boulevard Clear direction for non-motorized path users Mid-block trail crossing Implement sharrows and share the road signing Extend bike lanes east into the RSA corridor Convert sidewalks to multi use pathways
Hidden or missing signage	B	Maintain vegetation to ensure sign visibility Increase sign reflectivity
Sidewalk Obstructions	A	Maintain vegetation to keep walkways clear Remove fixed objects in walkways
Inconsistent street name signs	A	Update street name signs to meet current MUTCD standards
Unused driveway openings	A	Remove unnecessary driveway openings

Pennsylvania Avenue Countermeasure Summary		
Safety Issue	Risk Rating	Identified Countermeasures
Safety Issue #1 - Road Users •Sidewalk width and condition •Vehicle-VRU Crosswalk Conflicts •ADA Tactile warning surfaces and ramps •Pedestrians crossing outside crosswalk	E	Widen and repair sidewalk Leading pedestrian intervals Standardize ADA ramps Pedestrian refuge island Accommodate bicyclists SEMCOG/MDOT Multimodal Tool
Safety Issue #2 – Intersections •Diagonal Span Signals •Signal visibility •Faded or non-existent pavement markings •Uncoordinated signals	E	Installing box or mast arm signals Signal backplates Improve or repaint pavement markings Traffic signal coordination
Safety Issue #3 – Corridor Wide •Lighting •Road Geometry	D	Establish uniform lighting Consistent roadway geometry Road diet



4.4 High Injury Network Development

The High Injury Network (HIN) maps fatal and serious injury crash locations, identifying roads with the highest crash concentrations and risk factors. It includes all modes of transportation including motor vehicles, pedestrians, and bicyclists, and guides safety investments by identifying areas with the greatest potential for improvement based on crash history and risk. From the crash analysis, an evaluation of the crash types and circumstances has emphasized the type of improvements that should be considered as part of the improvement and countermeasures toolbox. This data is translated into a graphical depiction of FSI crash locations to aid in the identification of potential improvement locations and to examine the context of where crashes occur.

The HIN map identifies roadway segments and intersections where the highest concentration of all fatal and serious injuries occurred along a subset of the roadway network. **The HIN represents 9.2% of the overall transportation network but captures 71% of the overall FSI crashes.** The HIN aids in the identification of higher crash frequency and severities where the greatest potential for safety improvements can be expected with the application of appropriate safety countermeasures.

Table 4.4. Total HIN

City of Lansing	Total Roadway Miles	Total Crashes	Total HIN		
			Miles	% of Total Mileage	% of FSI Crashes
2014-2022	510	8,863	47	9.2%	71%
Crash Data					

Table 4.5. HIN Miles by NFC Classification

NFC Classification	HIN miles
Principal Arterial	26.3 miles
Minor Arterial	15.5 miles
Major Collector	2.6 miles
Local	2.8 miles

Table 4.6. HIN Miles by Jurisdiction

Jurisdiction	HIN miles
MDOT	16.1 miles
City of Lansing	29.7 miles
County	1.3 miles

The city of Lansing had 687 fatal and serious injury crashes over the nine-year study period. The roadway network was divided into approximately 0.5-mile segments and a 3:3:2:1 KABC crash severity weighting applied to evaluate the number of FSI crashes per segment and examine the context for crashes to determine the segments and intersections with the greatest need for safety improvements. Addressing safety includes an examination of the featured location, identifying the relationship between the context and the crash factors, and matching solutions to suit both.

A 3:3:2:1 KABC weighting was utilized. Fatal (K) crashes and Serious Injury (A-injury) crashes were assigned a weight of 3, B-injury crashes were assigned a weight of 2, and C-injury crashes were assigned a weight of 1. Property Damage Only (O/PDO) crashes were not included in the calculation of the weighted score.

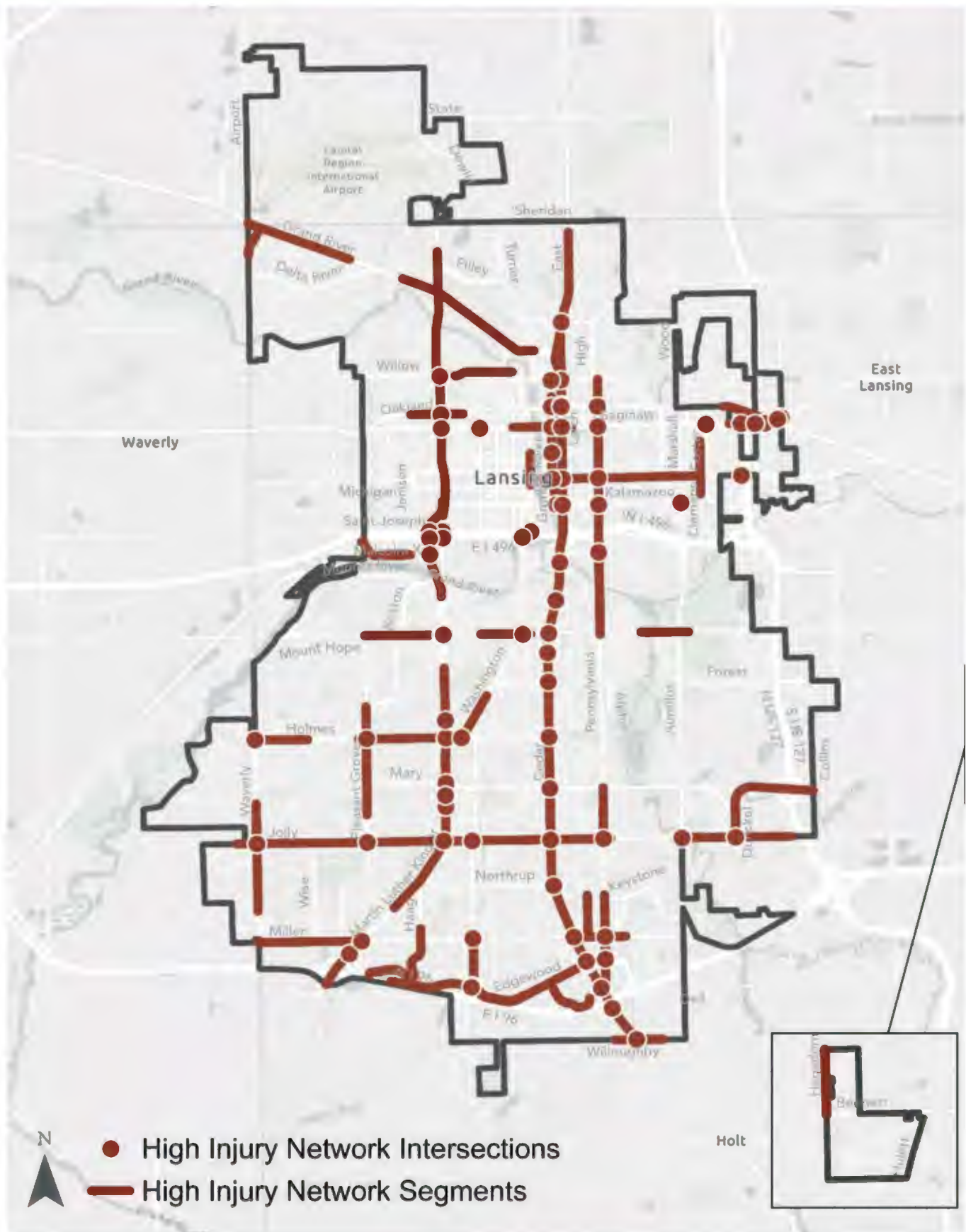
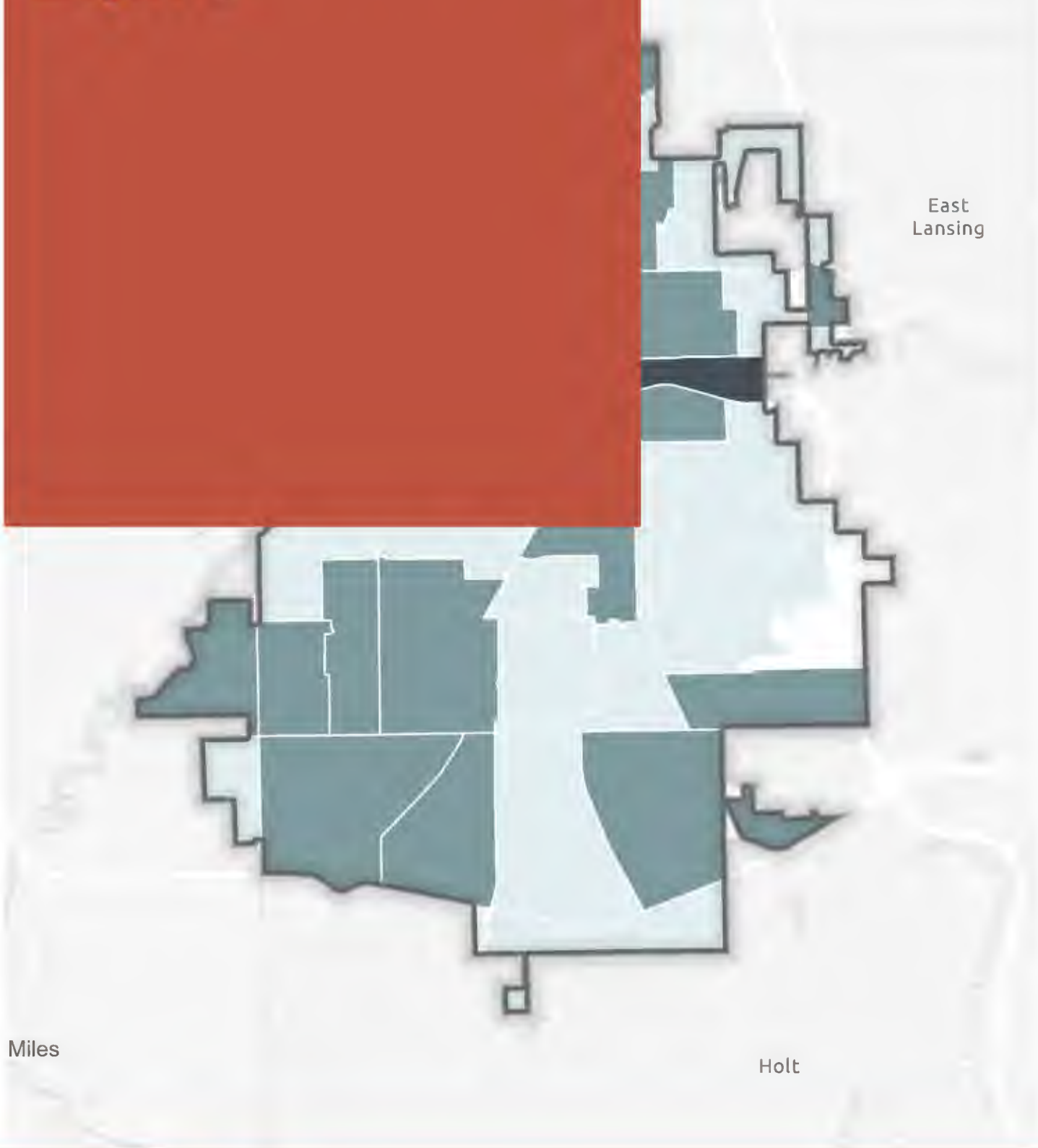


Figure 4.16. High-Injury Network (HIN)

5. Incorporating Equity



Equity plays a crucial role in safety action plans. Many of the recommendations in the plan to improve transportation safety address inequities and burdens borne by historically disadvantaged demographics. This section will introduce elements that should be considered when evaluating and generating recommendations to address these inequalities with transportation investments.

By understanding where areas of historical underinvestment may be for a community, decision makers can create plans of action that can mitigate harm and benefit all. Transportation underinvestment in particular can exacerbate inequities within a community. The USDOT created a dataset built on 2023 census data that explores the results of historically disadvantaged communities in their Climate and Economic Justice Screening Tool (CEJST), 2024, which considers Transportation Insecurity, Climate and Disaster Risk Burden, Environmental Burden, Health Vulnerability, and Social Vulnerability.

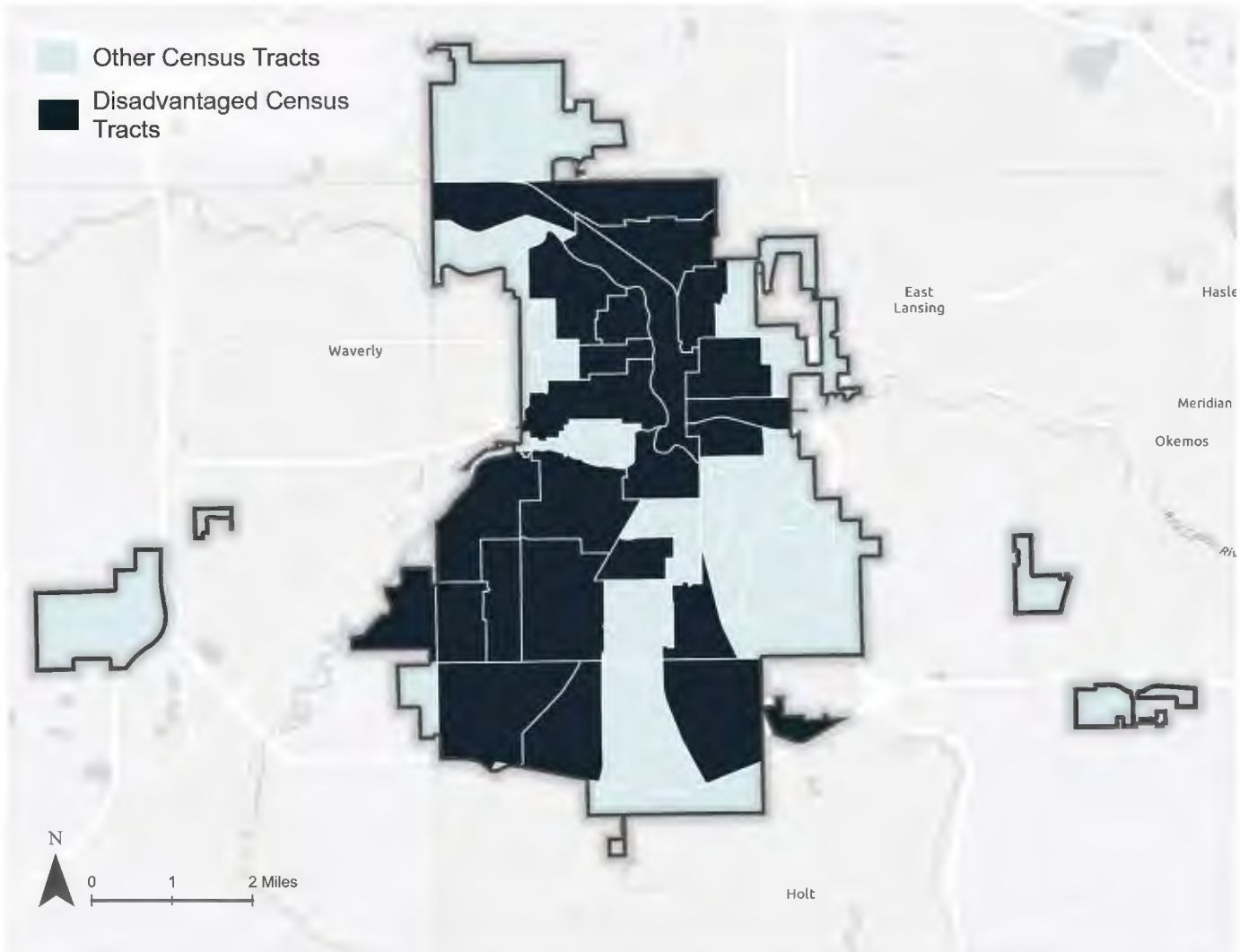


Figure 5.1. Disadvantaged Census Tracts in the City of Lansing
Source: Climate and Economic Justice Screening Tool (CEJST), 2024

5.1 Population and Demographics

The city of Lansing is home to approximately 111,268 residents. The population is nearly evenly split, with 49% male and 51% female. About 15.3% of residents are aged 65 and older, highlighting the need for age-friendly infrastructure and services to support their mobility and quality of life. The median age is 35.5 years. While the population remains predominantly white at 57%, the Hispanic/Latino community, comprising 13.4% of residents, is among the fastest-growing groups, contributing to the city's increasing diversity. The median household income is \$55,197, indicating moderate income levels across the city.

These trends emphasize the importance of prioritizing investments in transportation and pedestrian infrastructure to support children (18.5% of the city's population), seniors (15.3%), and other vulnerable populations. Around 10% of households in the city do not have a vehicle. Expanding and connecting sidewalk networks, particularly in underserved areas, can improve access to essential services, public transportation, and community resources, promoting equitable outcomes and enhancing the quality of life for all residents.

5.2 Equity Analysis

Understanding where certain populations are through a spatial analysis can help target the strategies most effective in context. Analyzing population demographics is a critical component of the safety planning process, promoting equitable outcomes for all communities, particularly those that have historically faced disparities in environmental decision-making. These disparities have resulted in disproportionate environmental impacts on minority communities due to transportation and infrastructure projects. Incorporating demographic analysis aligns with the broader goals of the SAP, which emphasizes inclusivity and equitable solutions.

The analysis utilized 2023 American Community Survey 5-Year Estimates and demographic data included in the 2024 release of the Climate and Economic Justice Screening Tool. The analysis considered four key populations:

- **Minority Population:** Non-white individuals
- **Households without a Vehicle:** Households that rely heavily on walking, biking, and public transportation
- **Low-Income Population:** Individuals whose income is at or below 200% of the Federal poverty line
- **Elder Population:** Individuals aged 65 and older

As noted above, Lansing is home to several growing vulnerable populations. Toward the center of the city, there is a higher proportion of people of color. The west side of Lansing has a relatively high proportion of seniors and zero-vehicle households. The east side of Lansing has a relatively high proportion of low-income individuals and people of color.

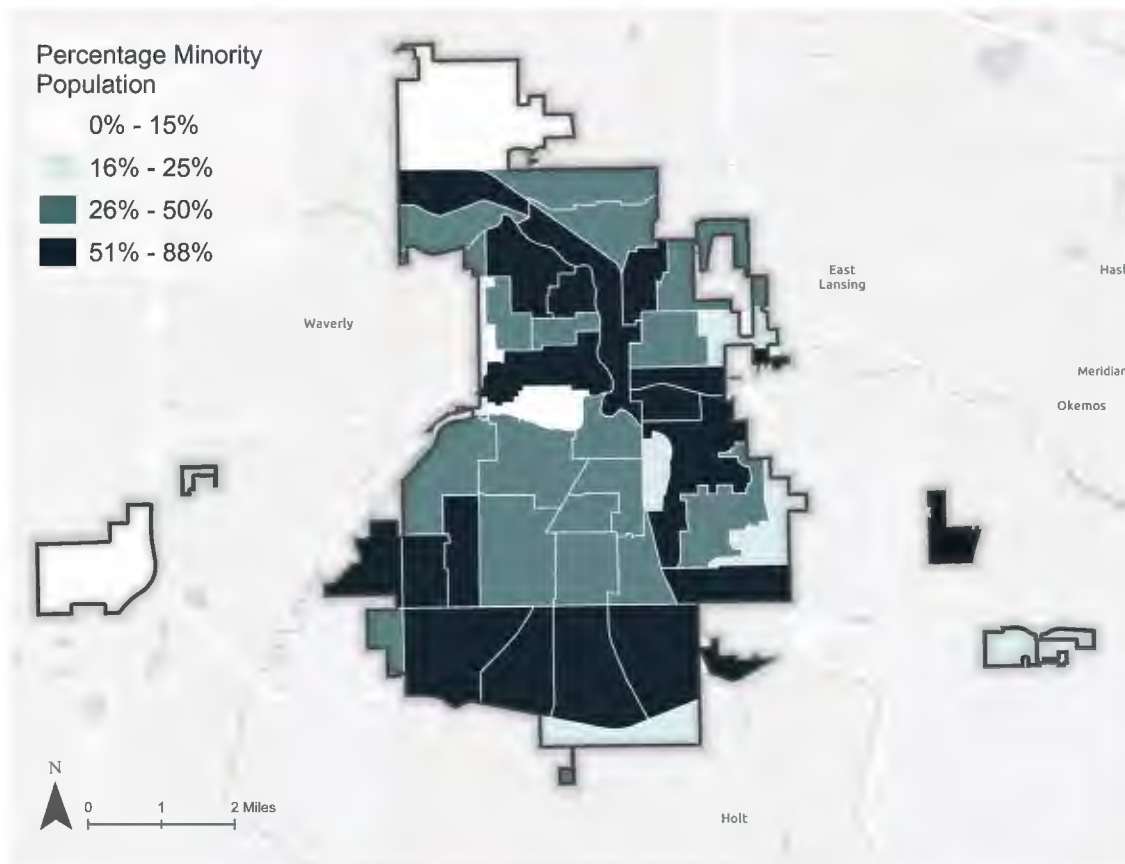


Figure 5.2. Percentage Minority Population in the City of Lansing Census Tracts

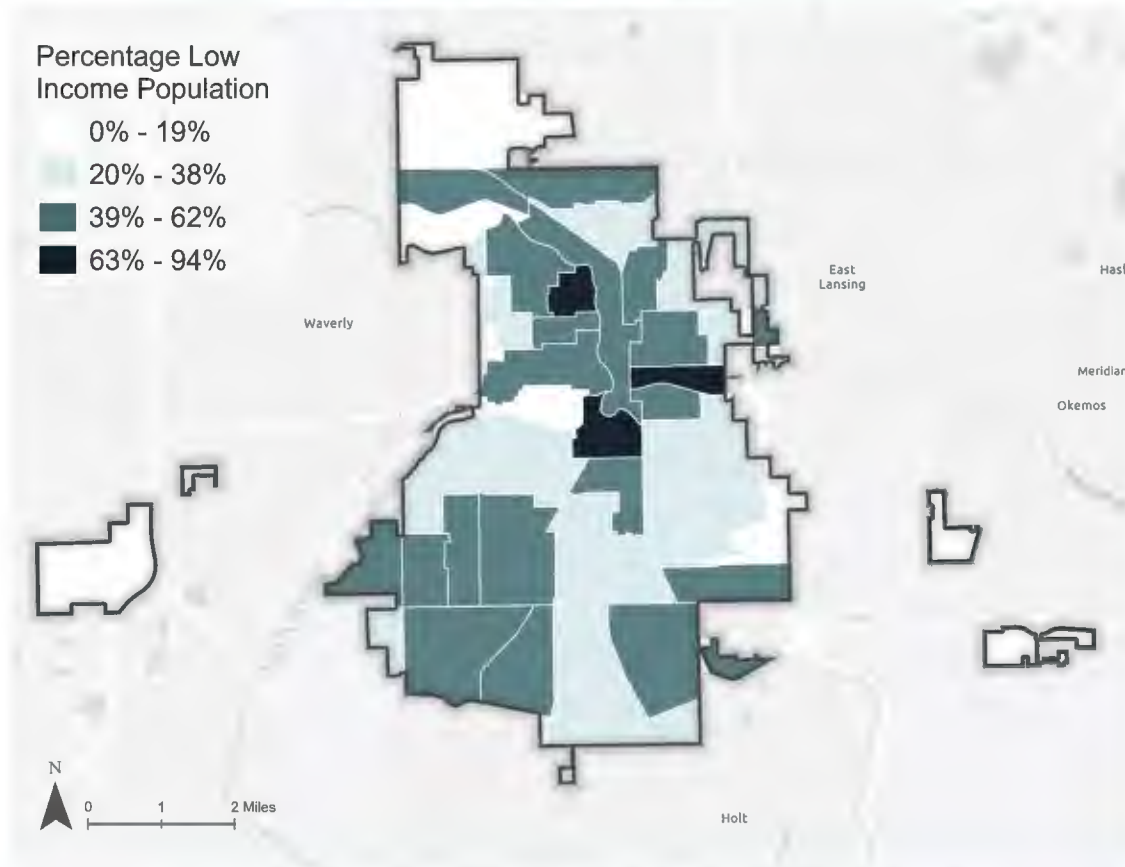


Figure 5.3. Percentage Low-Income Population in the City of Lansing Census Tracts

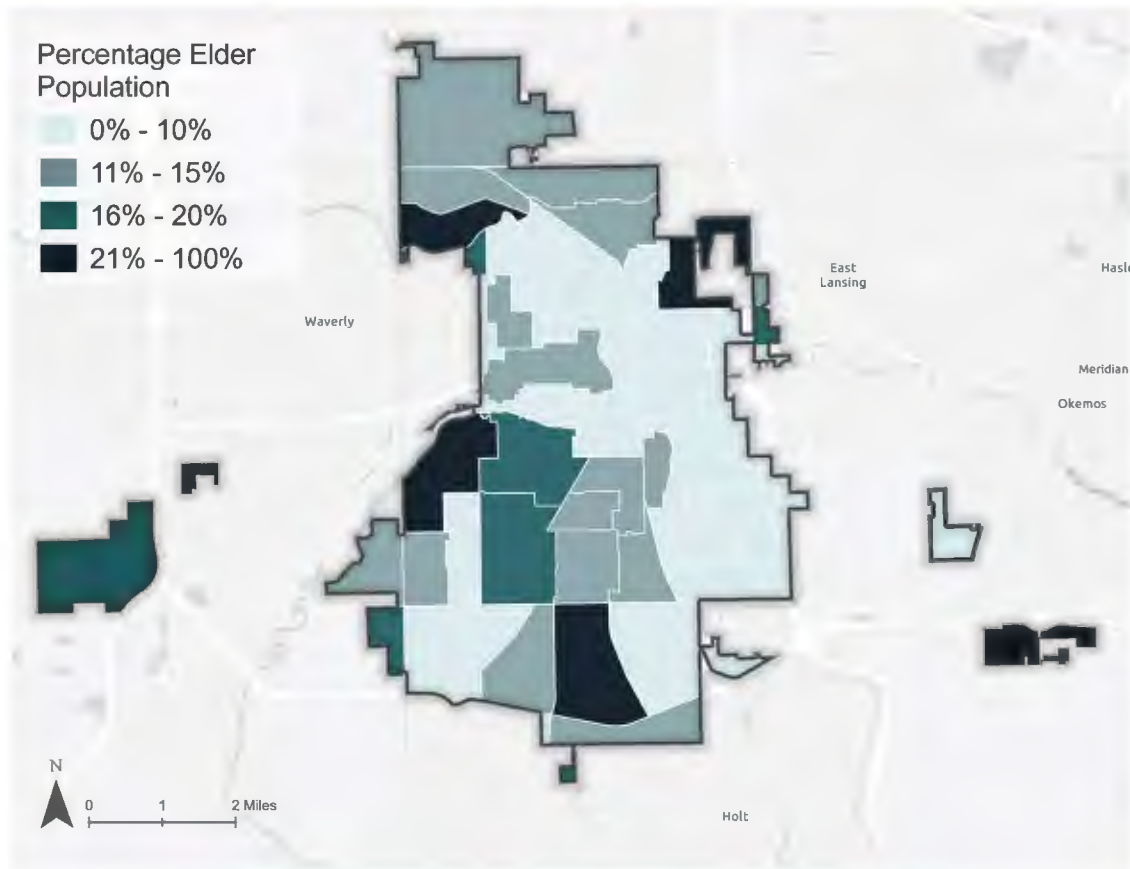


Figure 5.4. Percentage Elder Population in the City of Lansing Census Tracts

Equity Overlays

To assess whether crashes disproportionately impact certain communities, the High-Injury Network (HIN) is overlaid on areas with disadvantaged census tracts, zero-car households, and transit demand. **The majority of the HIN falls within these equity areas.** Zero-car household census tracts are geographic areas defined by the U.S. Census Bureau, where a significant percentage of households do not own a vehicle. Notably, the southern end of the city, around the Miller Road Meijer, also has a high proportion of zero-vehicle households while also having a suburban, car-oriented land use pattern and being quite far from the city center. There is also a high proportion of zero-vehicle households along the Cedar Street and Larch Street corridors just north of downtown. These corridors also have many intersections included in the high-injury network.

Table 5.1. HIN Equity Overlay

Lansing Equity Overlays	HIN Miles Overlaid	% Of HIN Overlaid	No. Of HIN Intersections Overlaid	% Of HIN Intersections Overlaid
Disadvantaged Census Tracts	39 miles	83%	55	71%
Households with No Vehicles	37.5 miles	80%	51	66%

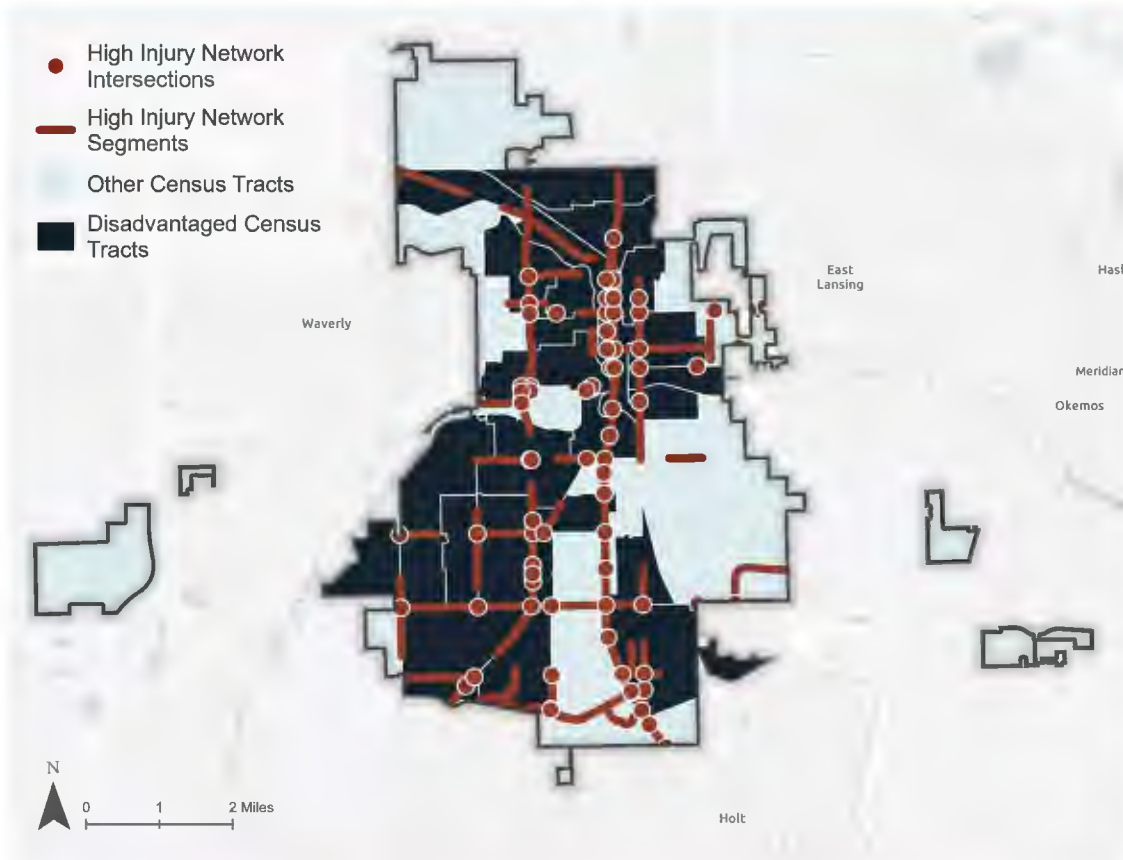


Figure 5.5. High Injury Network Overlay on Census Tracts with Disadvantaged Population

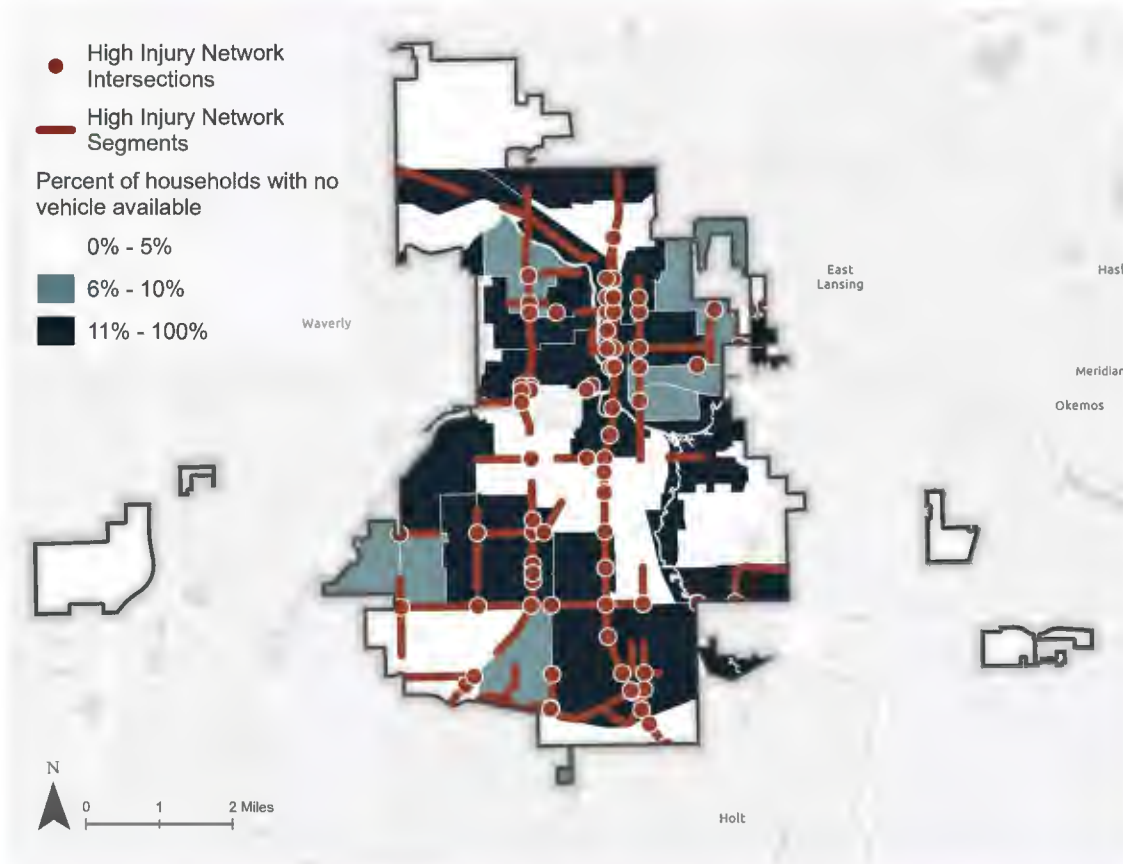


Figure 5.6. High Injury Network Overlay on Census Tracts with No Vehicle Households

The HIN is overlaid on transit demand data received from Replica. To estimate where public transit is most needed, factors such as how many people live and work in a neighborhood, how many households don't own a car, the average income level, and how many people are already using public transit to get to work were considered. These factors help us understand where the need for transit is likely to be highest. Areas with more people, more jobs, fewer cars, lower household incomes, and more transit riders tend to have greater demand for public transportation.

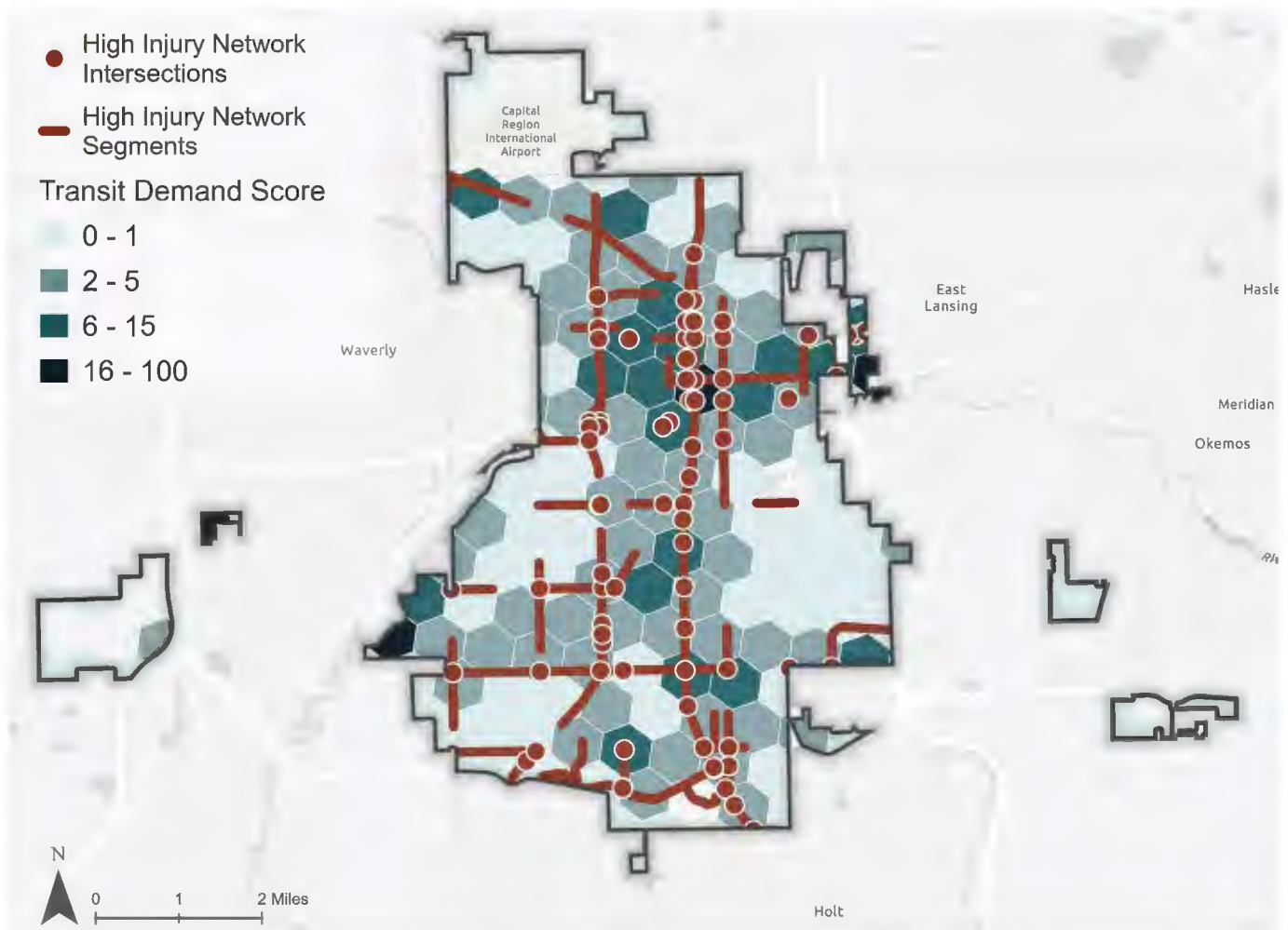


Figure 5.7. High Injury Network Overlay on Transit Demand

The Institute of Transportation Engineers (ITE) has broadly recognized several factors as structural components of transportation equity. Those components include the distribution of resources, the distribution of costs or burdens, the provision of inclusive facilities that serve persons of all abilities, affordability, and social justice. Following are some additional resources and tools that can be used by the City of Lansing to measure how investments in safety improvements create more equitable outcomes in these areas.

Table 5.2. Equity Resources

Equity Category	Resources/Metrics
Resource Distribution Universal Access	■ Walk Score & Bike Score ■ MDOT Pavement Management Pavement Quality Index
Cost/Burden Distribution	■ DOT Transportation Insecurity Analysis Tool
Affordability	■ Housing + Transportation Affordability Index
Social/Environmental Justice	■ American Community Survey (ACS) 5-Year Estimates ■ Climate and Economic Justice Screening Tool (CEJST)

6. Policy Review



6.1 Existing Policy and Process Assessment

Existing policies and procedures and their impact on transportation safety within the city were evaluated. Numerous existing plans and policy documents were reviewed to determine opportunities and gaps to expand the City's programs for traffic safety. These plans directly involve transportation functions and processes. However, to ensure a full breadth of review, similar, yet not transportation, plans (e.g., recreation, land use, etc.) were included in this review. These plans range from the region down to the city and the neighborhood level.

The following policy documents were reviewed as part of this planning process:

- Moving Mid-Michigan 2045 Metropolitan Transportation Plan
- Design Lansing Comprehensive Plan
- Walk and Bike Lansing Non-Motorized Plan
- City of Lansing Code of Ordinances

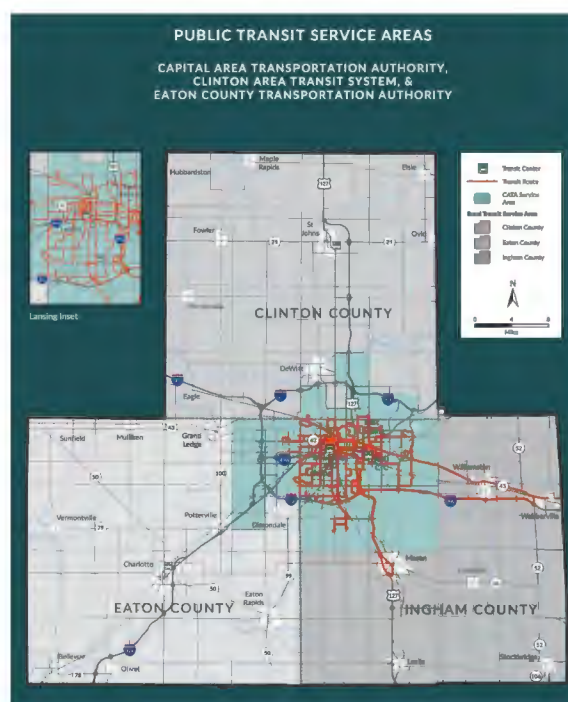


Figure 6.1. Moving Mid-Michigan Regional Metropolitan Transportation Plan

The policy and planning documents were compared to a list of possible safety action policies, procedures and programs. These example policies are a representative sample set of policies that have been used throughout the country and hence a good gauge of what opportunities exist and can be leveraged in developing the Safety Action Plan. The sample policy, action, and interventions are described in the below table:

Policy Strategies	Description
Policy Goals & Guidelines	
Create Goals / Targets for Crash Reductions	Develop metrics and targeted goals for a reduction in serious injury and fatal crashes. These targets can be adopted administratively by an implementing agency or formally approved by a governing board or council.
Implement Safe System Approach	The USDOT has adopted the Safe System Approach to address road safety. The SSA focuses holistically on all systems (users, vehicles, roads, etc.) to solve the problem, providing redundancy. https://www.transportation.gov/NRSS/SafeSystem

Policy Strategies	Description
Policy Goals & Guidelines	
"Complete Streets" Policy / Multi-Modal Policy	Michigan law defines "complete streets" to mean roadways planned, designed, and constructed to provide appropriate access to all legal users in a manner that promotes safe and efficient movement of people and goods whether by car, truck, transit, assistive device, foot, or bicycle. Implementing a Complete Streets Policy or defining multi-modal street designs can be useful to focus designs towards the safety of pedestrians and bicyclists, and often result in designs that slow speeding and mitigate unsafe driving behaviors.
Create Complete Streets Design Guidelines	Often local governments are required to follow state-written design manuals, or to follow traditional street classifications. In some circumstances or contexts, however, these guidelines are not adaptable or dynamic enough to reflect the real human-focused needs on the ground. Creating specific manual and design guidelines for a specific context can be useful in pushing forward safe designs that reflect what works for a particular community, while still maintaining the benefits and efficiencies of standardization.
Enforcement	
Data-Driven Enforcement Campaigns	Policing and enforcement of unsafe traffic behavior can sometimes be dispatched based on perceived problem locations. Instead, use data (crash rates, for example), to ensure police resources are being depolyed most effectively to where the problems are.
Education	
Develop or Enhance Crash Reporting to Public/Leadership	Often stakeholders and local leadership are in the best position to make change to improve safety. By creating a routine data-driven approach to notifying leadership of the trends in crashes, it can help create institutional support and accountability around finding solutions to traffic safety.
Campaigns: Dangers of Speeding/DUI	Public agencies might have opportunities to communicate with their constituents more than they realize through websites, newsletters, signage at public buildings, etc. These can be opportunities to promote new safety initiatives or to discuss the problem. Grants are often available to help support even more robust campaigns if desired.



Policy Strategies	Description
Land Use / Town Design	
Mixed-Use and Transit-Oriented Development (TOD)	Land use plans can designate specific areas, often along transit routes, where different land uses co-locate with one another, developing land in such a way that residents do not need to drive in order to access daily destinations such as workplaces, schools, grocery stores, parks, and libraries. This kind of land development reduces residents' exposure to traffic crash risk.
Walkability Requirements (e.g., more rear parking, less curb-cuts, well-marked crosswalks)	Land use and/or building ordinances can require site designs that are more conducive to safe, walkable developments. Placing curb cuts for parking and vehicle access on side streets or only via rear access points, for example, are such policies.
Traffic / Street Design	
Traffic Calming/Road Diets	Roadway design standards can be adjusted to prioritize road designs that intentionally are used to decrease road capacity to reduce opportunities for high speeding and other unsafe driving behaviors. Traffic calming techniques (e.g., shorter lane widths, high-visibility signage, on-street parking) can compel drivers into a higher level of awareness and therefore caution.
Speed Management	Programs could be developed to intentionally slow speeds in some contexts. This could include for instance speed humps on residential streets or near schools, or lowering speed limits in strategic locations; near commercial districts or parks, where people on foot are more likely to be.
Corridor Studies (signal timings, geometric, pedestrian crossing, street network concerns all approached holistically)	Often the best safety solutions happen when corridors are studied in their entirety. Pursuing funding or grants to further study and redesign a corridor can not only lead to safer outcomes but can be leveraged with other community benefits, for instance economic development efforts.
Signal Timings/Investments/Roundabouts	Intersections often pose the highest vulnerability and likelihood for crashes and therefore offer an opportunity to solve a safety concern when timing or making signal investments. When upgrading 4-way stop locations, potentially roundabouts may offer a safer and more traffic-friendly solution, depending on the context of the location.



Policy Strategies	Description
Pedestrian	
Walkability Audits	Often, the truest way to assess the quality of an environment for its walkability and comfort level for safety is to conduct a walkability audit, which entails walking through an area and assessing what users find difficult or easy to use, or where safety concerns arise. These audits can sometimes be done using volunteers near or around a particular area of concern.
Pedestrian	
School Zone Treatments	School zones should receive an upgraded and standard set of treatments —whether that is high visibility crosswalks, activated pedestrian signals, speed humps, or rumble strips.
Biking	
Plan / Network Creation / Trail Development	One effort to improve bicycle safety is to ensure that there is a network that provides a comfort level to those who bike. These can be a network of recreational trails combined with an on-street network that is well-marked, complete, and connects to places people in the community want to go.

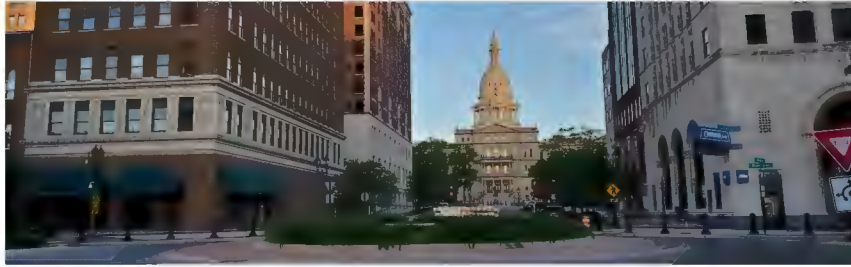
Existing Policy and Process Assessment Results

Key Takeaways from all Plans/Policies reviewed in combination with engagement with stakeholders and residents:

- Residents desire enhanced street designs to accommodate pedestrians and cyclists, transit service, and increased access to the non-motorized trails.
- Gateway corridors into the city should be enhanced with streetscaping, sidewalk treatments, lighting, and crosswalks to be aesthetically appealing and more accessible by all modes of travel.
- Corridors identified as candidates to become complete streets with potential for bike lanes are Holmes Road, Saginaw Street, Oakland Avenue, Pleasant Grove Road, and Mount Hope Avenue.
- Non-motorized crossings identified as those that need to be improved include the intersection of Holmes Road and Martin Luther King Jr Boulevard, the Frandor Shopping Center area, and crossings along Martin Luther King Jr Boulevard south of the Grand River.
- Bike parking, bike sharing, and route signage were the most preferred bike amenities residents desire.
- The City is in the process of converting the remaining one-way streets downtown to two-way

operation to reduce trip lengths, improve access, and reduce driver confusion.

- The City supports traffic calming strategies including reducing the number of travel lanes, roundabouts, sidewalk widening, streetscape improvement, installing speed humps, and other traffic calming measures, and improving transit.



6.2 Policy Strategies and Recommendations

The following are recommended policy revisions to existing City of Lansing policies:

- **Walkable-Bikeable Complete Streets Policy**
 - **Current Policy:** Future construction or reconstruction of City rights-of-way shall be in conformity with the non-motorized network plan.
 - **Recommendation:** Non-motorized network plan (2012) should be updated to better reflect current conditions and needs to encourage additional investment in complete streets.
- **Restoration of Curb Cuts**
 - **Current Policy:** The Director of Public Service may require parcel or lot owner to replace curbing that has been cut for driveway or other purposes.
 - **Recommendation:** This policy should be updated to give the City the power to require a parcel or lot owner to remove a curb cut/driveway to meet access management standards before a lot receives a permit for changes to a parcel.

Based on the top concerns regarding road safety in the city of Lansing, the following policy strategies can be developed to address the greatest safety concerns and the disparities created by historical transportation policies.

Engineering Policy

- **Road Design Improvements:** Redesigning intersections, adding roundabouts, and improving road signage to reduce conflict points and enhance visibility.
- **Access Management:** Implementing access management to maintain traffic progression, consolidate driveways, and improve safety.
- **Traffic Calming Measures:** Implementing speed humps and curb extensions to slow down traffic in residential and high-pedestrian areas.
- **Pedestrian and Bicycle Infrastructure:** Building sidewalks, crosswalks, bike lanes, and multi-use paths to provide safe routes for non-motorized users.

Engineering policy should address traffic calming measures, access management, and VRU infrastructure. These policies can provide guidance for applying these measures system-wide, in combination with a series of countermeasures or as stand-alone solutions. Certain types of countermeasures can be pre-approved to streamline the project planning and design process. These countermeasures can serve as the basis for engineering design and guidance to address safety throughout the city.

Establishing access management standards for adoption could address signal spacing, signal operations, median openings, number of driveways, driveway design, driveway linkages, backside access, acceleration/auxiliary lanes, deceleration lanes, and retrofitting existing driveways to improve safety.

Additional information for speed management, pedestrian and bicycle safety, roadway departure mitigation, intersection, and other engineering applications can be found in FHWA's Proven Safety Countermeasures. Timeframes for implementation of these countermeasures are dependent on many factors that will be established as local preference, prioritization, and matching funds are identified.

MDOT's Local Safety Initiative is a free, opt-in program that empowers local agencies to strengthen roadway safety. The program analyzes crash data to pinpoint high-risk locations and recommend countermeasures, supplements the analysis with on-site field visits, and provides follow-up reviews to ensure the improvements are effective.

Education Policy

- **Public Awareness Campaigns:** Conducting campaigns to educate the public about safe driving practices, the dangers of distracted driving, and the importance of sharing the road.
- **School Programs:** Implementing safety education programs in schools to teach children about driver, pedestrian, and bicycle safety.
- **Driver Training:** Offering defensive driving courses and other training programs to improve driver behavior and awareness.
- **Red Light Education Program:** Create a Red Light Education Program that includes installing red light cameras at targeted intersections that will issue warnings to drivers who run red lights.

Educational campaigns to improve safety should be bolstered in Lansing. Changing driving behavior is an important part of helping to reduce the likelihood of crashes through enhanced education and public awareness campaigns as well as implementing safety education school programs to educate younger drivers, walkers, and bikers about safety precautions while on the road.

In order to specifically address community concerns related to drivers running red lights, a Red Light Education Program should be adopted that includes installing red light cameras at targeted intersections where there have been a higher number of crashes reported. If a driver runs a red light, the cameras will be triggered and the driver will receive a written warning in the mail.

Enforcement Policy

- **Law Enforcement:** Increasing police presence and enforcement of traffic laws, such as speeding, DUI, and seatbelt use.
- **Automated Systems:** Using red light cameras, speed cameras, and other automated systems to deter violations and notify offenders. Can be used in combination with automated speed feedback signs.
- **Penalties and Fines:** Implementing strict penalties for traffic violations to discourage unsafe behaviors.

Enforcement policy includes speed management programs that can be implemented by lowering speed limits in residential areas and high-risk zones where speeding-related crashes are more common. Additionally, while not yet permitted by Michigan state statute, automated enforcement through the use of speed cameras can help deter speeding without requiring constant law enforcement presence. These strategies reduce speed-related crashes while ensuring that enforcement is consistent and impartial. Traffic calming measures such as speed bumps, roundabouts, and narrowed lanes can also help slow down vehicles naturally, improving road safety without requiring constant law enforcement presence.

Increased law enforcement presence during peak traffic hours at high-risk intersections can help to reinforce compliance, ensuring that drivers follow the rules where violations are most frequent. Police presence should be increased strategically in areas with high numbers of crashes and violations, focused through [high-visibility enforcement strategies](#).



7. Action Plan



Local jurisdictions pursuing Safe Streets and Roads for All (SS4A) Implementation Grants must have an Action Plan that outlines its goals and prioritized projects. The Safety Action Plan (SAP) outlines the specific steps and strategies to address the safety challenges and goals outlined in the plan. The Action Plan includes the concrete recommendations, steps, funding sources, and responsible entities to move the plan through implementation. The Action Plan is organized to be a stand-alone section that can be updated on a regular basis.

7.1 Overview

While fatal and serious injury crashes account for only 1.9% of total crashes, analyses have provided several key insights into the factors contributing to roadway crashes within the city, allowing targeted initiatives aimed at reducing the occurrence and severity of crashes and improving the overall traffic safety for all road users. Human factors including driver behaviors and demographics further inform emphasis areas for targeted initiatives. Figure 7.1 shows the four crash types resulting in the highest percentage of fatalities and serious injuries in the city.

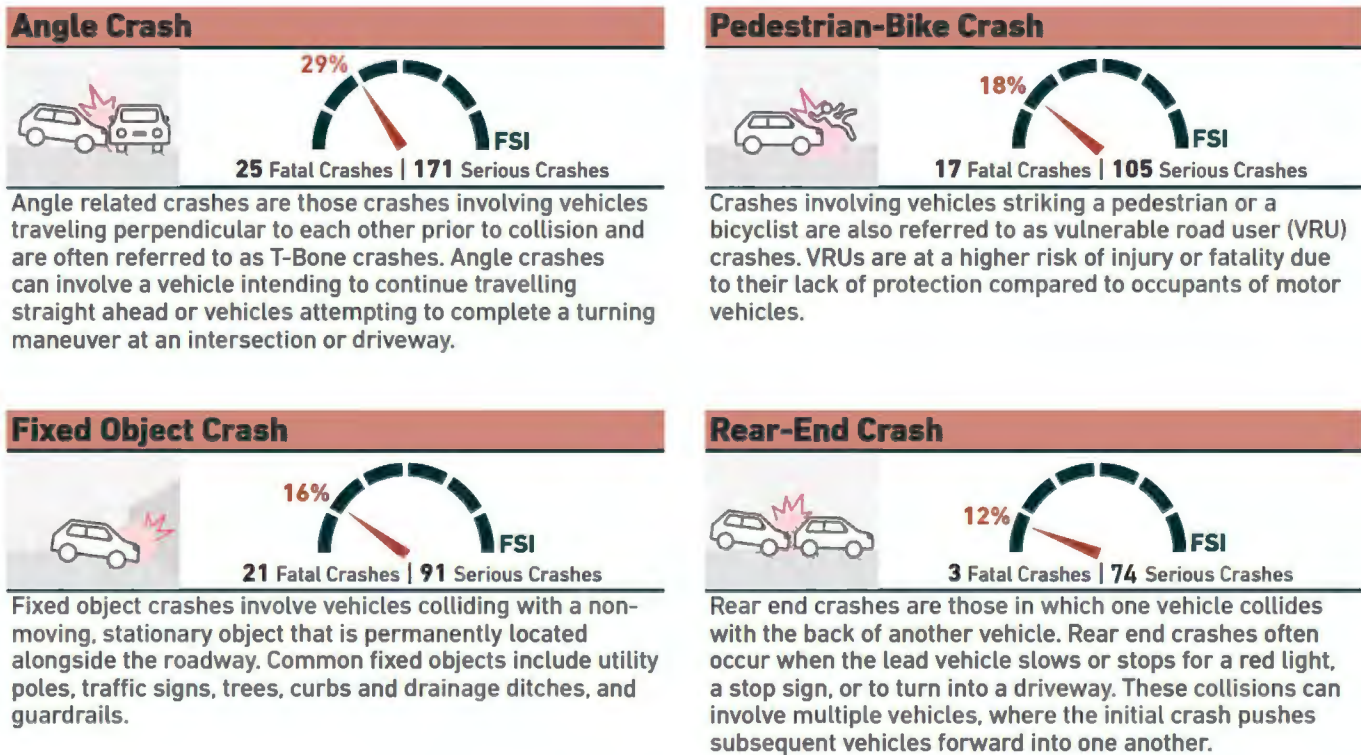


Figure 7.1. Top Four Serious Injury Crash Types

7.2 Safety Strategies

By analyzing crash data, a holistic perspective on the historical state of traffic safety in Lansing can be established, serving as a baseline for targeted initiatives aimed at reducing the occurrence and severity of crashes and improving the overall traffic safety for all road users. The following subsections will dive deeper into prominent crash profiles, factors, and behaviors experienced within the city categorized by resulting frequency and severity levels. Strategies have been identified for these emphasis areas to quantify the problem by summarizing the historical crash data, providing context to describe the problem, and describing action items that may be taken to effect positive change.

Intersections

Intersections are inherently more dangerous than straight stretches of road due to the complex interactions that can occur for all modes. There are an increased number of conflict points, compared to straight stretches of road. Issues such as limited visibility, speed differences, confusion and misunderstanding of signals, and driver distractions all equate to high crash volumes at intersections. Intersections are common locations for pedestrians and bicyclists to cross, increasing the likelihood of crashes since drivers may not always be aware of pedestrians and see them cross.

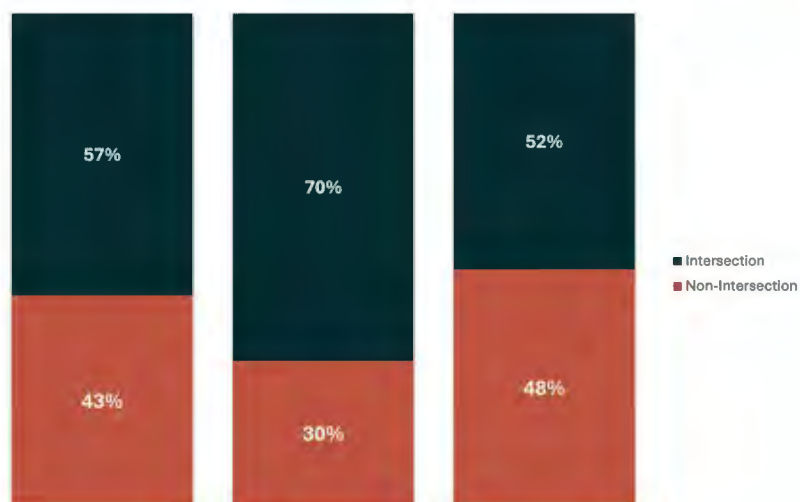


Figure 7.2. FSI Crashes by Intersection Location (2014-2023)

Figure 7.2 shows that out of all of the motorized FSI crashes, 57% occurred at an intersection. FSI crashes at intersections for VRU are also very prevalent. Seventy percent of all bicycle crashes and 52% of all pedestrian crashes occur at an intersection.

Reducing conflict points on roadways is a key strategy to enhance safety. Conflict points are locations where vehicle paths intersect, merge, or diverge, creating opportunities for collisions. By minimizing these points, the likelihood of crashes decreases, leading to safer roads. Intersection designs that reduce the number of these conflict points, especially crossing conflicts, can lower the severity of angle-related intersection crashes. Roundabouts and indirect left-turns using medians (also known as “Michigan Lefts”) are examples of intersection designs that reduce crossing conflict points.

The table below provides a list of strategies to address the high rate of crashes at intersections.

Strategies



- Reduce the number of conflict points through intersection design and increase sight distance. Roundabouts are one example of an intersection design.
- Improve signal visibility by adding reflective backplates and updating diagonal spans to a box span design to have one signal head per lane.
- Separate users in time by installing All-Way stop control at lower volume intersections that are experiencing angle crashes
- Optimize signal timing along corridors with closely spaced signals such as along the side streets crossing on major roads.

Vulnerable Road Users

Vulnerable Road Users, such as pedestrians and bicyclists, are particularly susceptible to crashes for a variety of reasons. This includes inadequate infrastructure, driver inattention and distraction, and limited visibility. There is a lack of protection and a higher risk of serious injury if there is a crash with a pedestrian or cyclist.

From 2014 to 2022, there were 35,849 total crashes, including 706 (1.9%) vulnerable road user crashes; however, of the total 86 fatal and 601 serious injury crashes, 17 and 105 involved VRUs, respectively. As shown in Figure 7.3, out of all of the pedestrian and bicycle crashes, 2.4% were fatal (K) and 14.9% resulted in a serious injury.

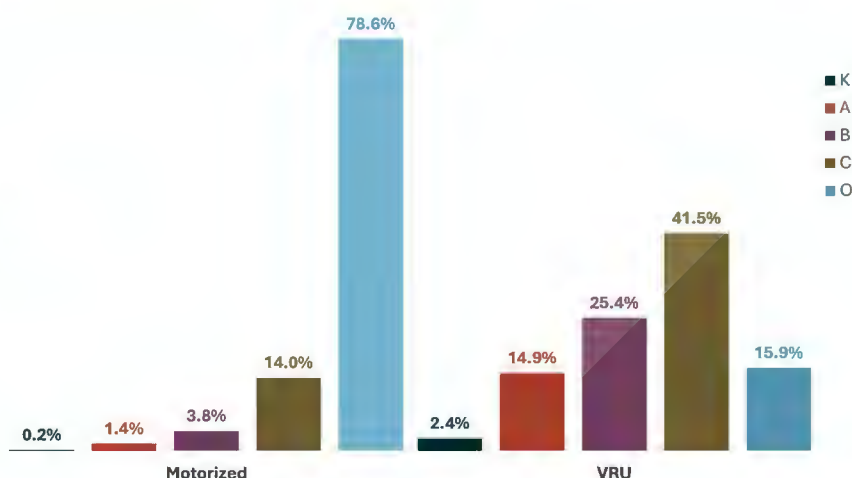


Figure 7.3. 2014-2022 Motorized and VRU Involved Crashes by Severity

The City of Lansing was the first city in Michigan to pass a Complete Streets Ordinance when the Lansing City Council approved its adoption in August of 2009. Since the adoption of the first biking and walking plan in 2011, the City has constructed nearly 7 miles of trail, 9.5 miles of bike lanes, and 1.5 miles of side paths. The entire biking and walking network is over 50 miles.



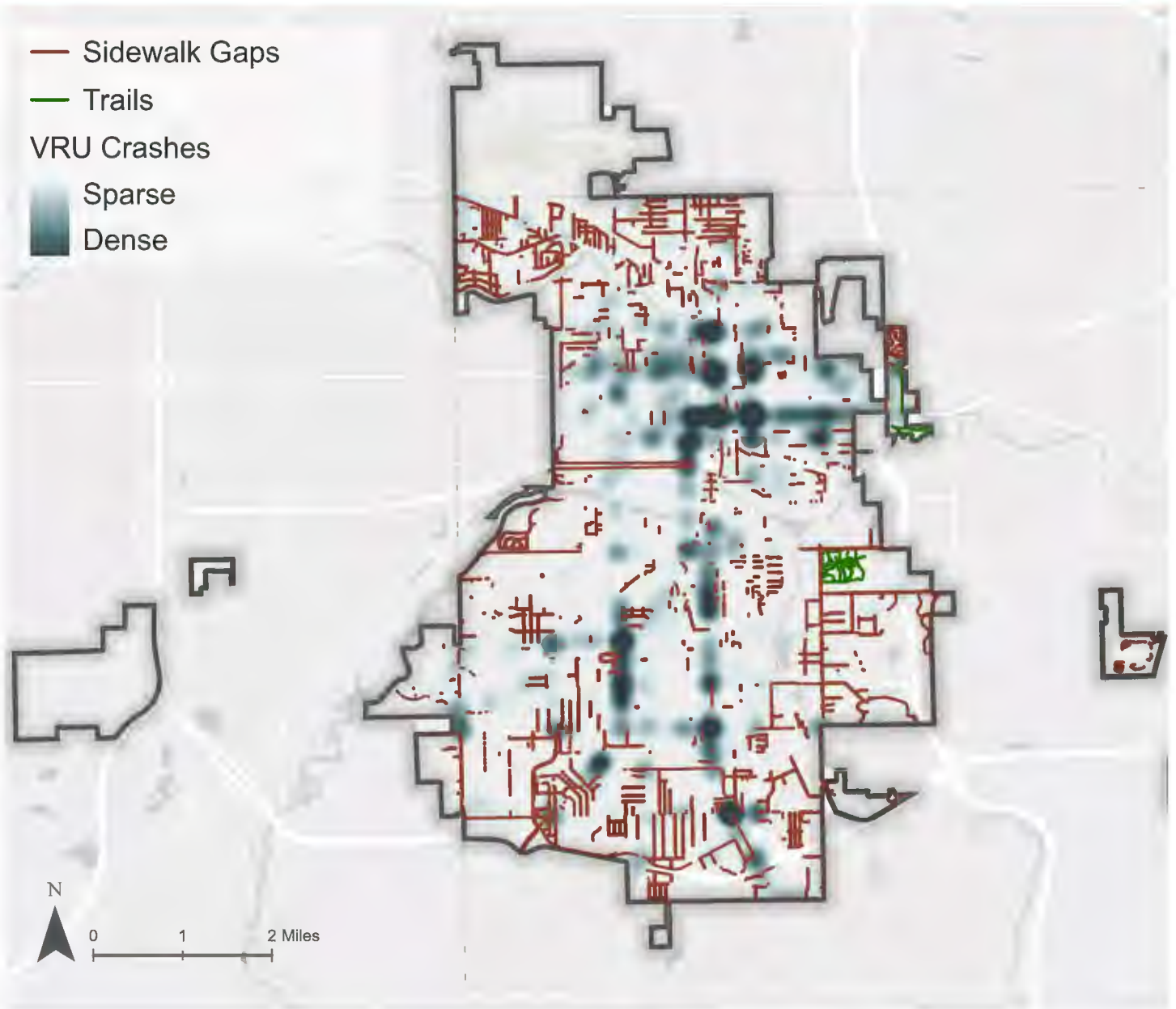


Figure 7.4. VRU Involved Crashes and Sidewalk Gaps

Strategies



- Improve network connectivity by filling sidewalk gaps and installing bike lanes. Focus on locations within 1 mile of schools and parks, and areas surrounding low-income housing.
- Install enhanced crossings adjacent to all schools.
- Add Leading Pedestrian Interval (LPI) to signals.
- Strive for a maximum of a 1/4 mile between enhanced crossings such as stop-controlled crossings, signals, RRFBs, and PHBs.
- Add paved shoulders along rural roadways.
- Expand the on-roadway bike facility network to improve the viability of commuting by bicycle as a mode share option.
- Install centerline hardening and slow turn wedges. Centerline hardening includes modular curbs placed where the centerline meets the intersection. Slow turn wedges include striping and barriers placed at corners to slow turning vehicles.
- Restrict parking near crosswalks, also known as daylighting.
- Eliminate permissive left turn signal phasing in downtown areas or at intersections with high pedestrian and bicyclist usage.
- Enhance place-making along the roadside in heavy VRU areas. Landscaping, bus stops, wayfinding, kiosks, etc. can help define VRU areas of the right-of-way.
- Install enhanced pedestrian street lighting at intersections, focusing on the non-motorized system and providing proper illumination of VRUs.
- Where there is only a sidewalk or separated facility on one side of the roadway, install enhanced crossings near residential neighborhoods and near traffic generators such as grocery stores.



Transit

Improving bus stop safety and accessibility is essential to creating a transit system that serves all users—especially those who rely on it most. The city of Lansing has a higher percentage of its population that are zero-vehicle or one-vehicle households. Per the US Census, in the city of Lansing, 10% of occupied housing units have no vehicles available and 46.9% have one vehicle available. In Michigan, 7.1% of occupied housing units have no vehicles available and 34.5% have one vehicle available. **Nearly 45% of bus stops are located within 250 feet of either a fatal, serious injury, or VRU crash.**

To identify the top priority bus stops, a scoring system was used that combined five key metrics, each weighted based on its importance. First, fatal and serious injury vehicle crashes within 250 feet of a bus stop were evaluated. Stops with more crashes received higher scores, with this metric weighted at 25%. Similarly, bike and pedestrian crashes within the same distance were assessed and scored in the same way, also with a 25% weight. Equity considerations were included by assigning full points to stops located in Disadvantaged Census Tracts, contributing 10% to the total score. Two additional measures came from Replica data: the Transit Equity Score, which reflects how well a stop serves transit-dependent populations (15% weight), and the Transit Demand Score, which estimates potential ridership levels near each stop (25% weight). All scores were combined to generate a total score for each stop, with higher scores indicating higher priority for improvements. Table 7.1 shows the detailed methodology criteria.

Table 7.1. Bus Stop Prioritization Methodology

No.	Prioritization Scoring Metric	Analysis	Thresholds	Score	Weights
1	Fatal and Serious Injury Vehicle Crashes	Identify high crash zones within a 250 ft buffer of bus stops.	0	0	25%
			1-2	5	
			3-5	10	
			>5	15	
2	Bike/Pedestrian Crashes	Number of pedestrian/bike crashes within 250 ft of bus stops.	0	0	25%
			1-2	5	
			3-5	10	
			>5	15	
3	Equity Considerations	One point will be given to a bus stop in Disadvantaged census tract	0	0	10%
			1	15	
4	Replica Transit Equity Score	Higher points are assigned to bus stops in higher transit equity zones.	0	0	15%
			1-45	5	
			46-75	10	
			>75	15	
5	Replica Transit Demand Score	Higher points are assigned to bus stops in higher transit demand zones.	0-5	0	25%
			5-10	5	
			11-30	10	
			>30	15	

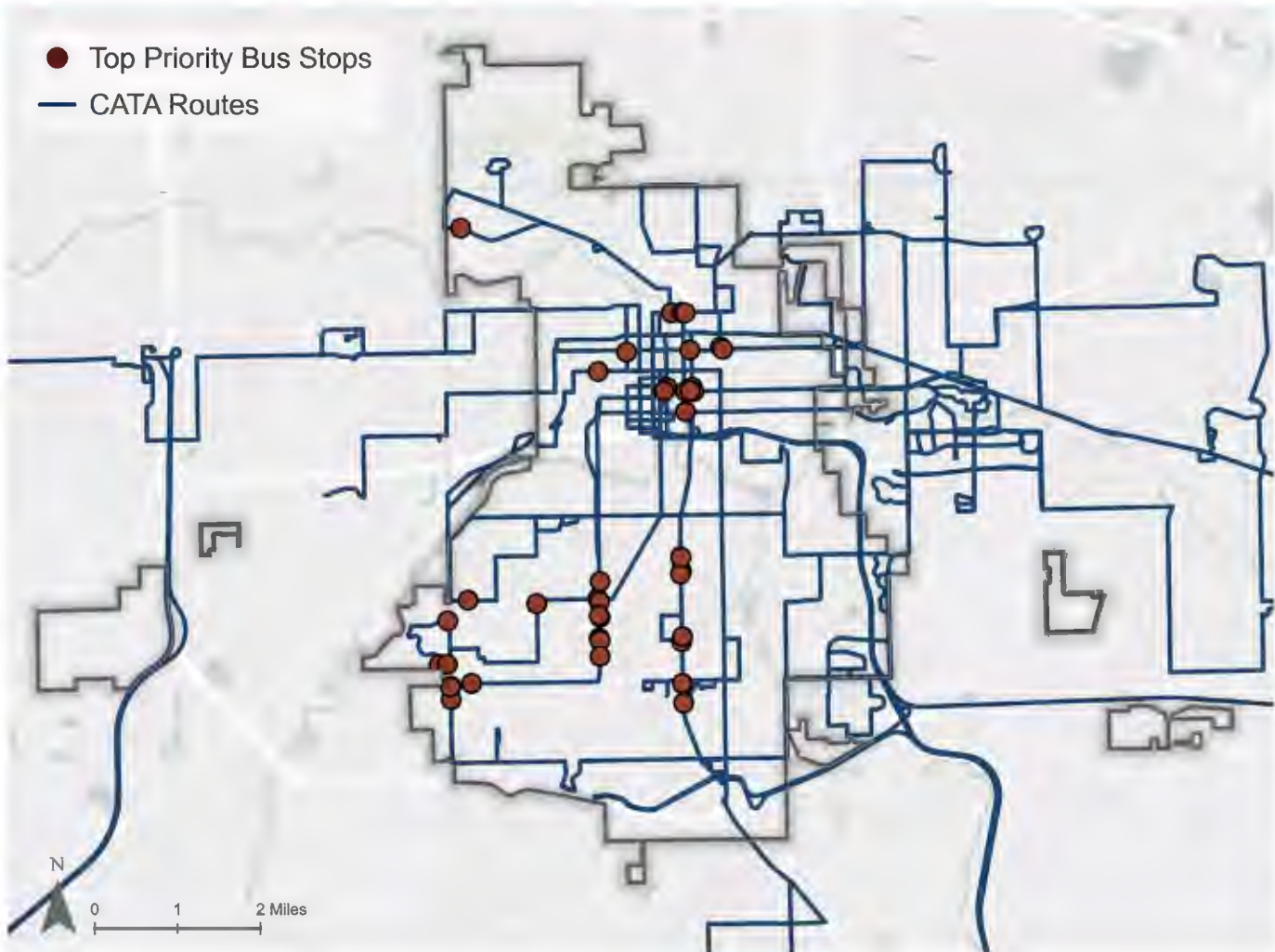


Figure 7.5. Top Priority Bus Stop Locations

Based on the prioritization analysis, top 41 bus stops were identified as priority locations (see Appendix B). Figure 7.5 shows the location of top priority bus stops. The analysis identified priority bus stops across several routes, with some routes showing a higher concentration of high-need locations. Route 9 had the highest number of priority stops with 11, followed by Route 5 with 8, and Route 2 with 5. Routes 1 and 16 each had 3 priority stops, while Routes 11 and 13 had 2 each.

Table 7.2. Routewise number of priority bus stops

# Route Number	Number of Priority Stops on the Routes
1	4
2	5
3	1
4	1
5	8
9	11
10	1
11	2
13	2
14	1
16	3
17	1
46	1



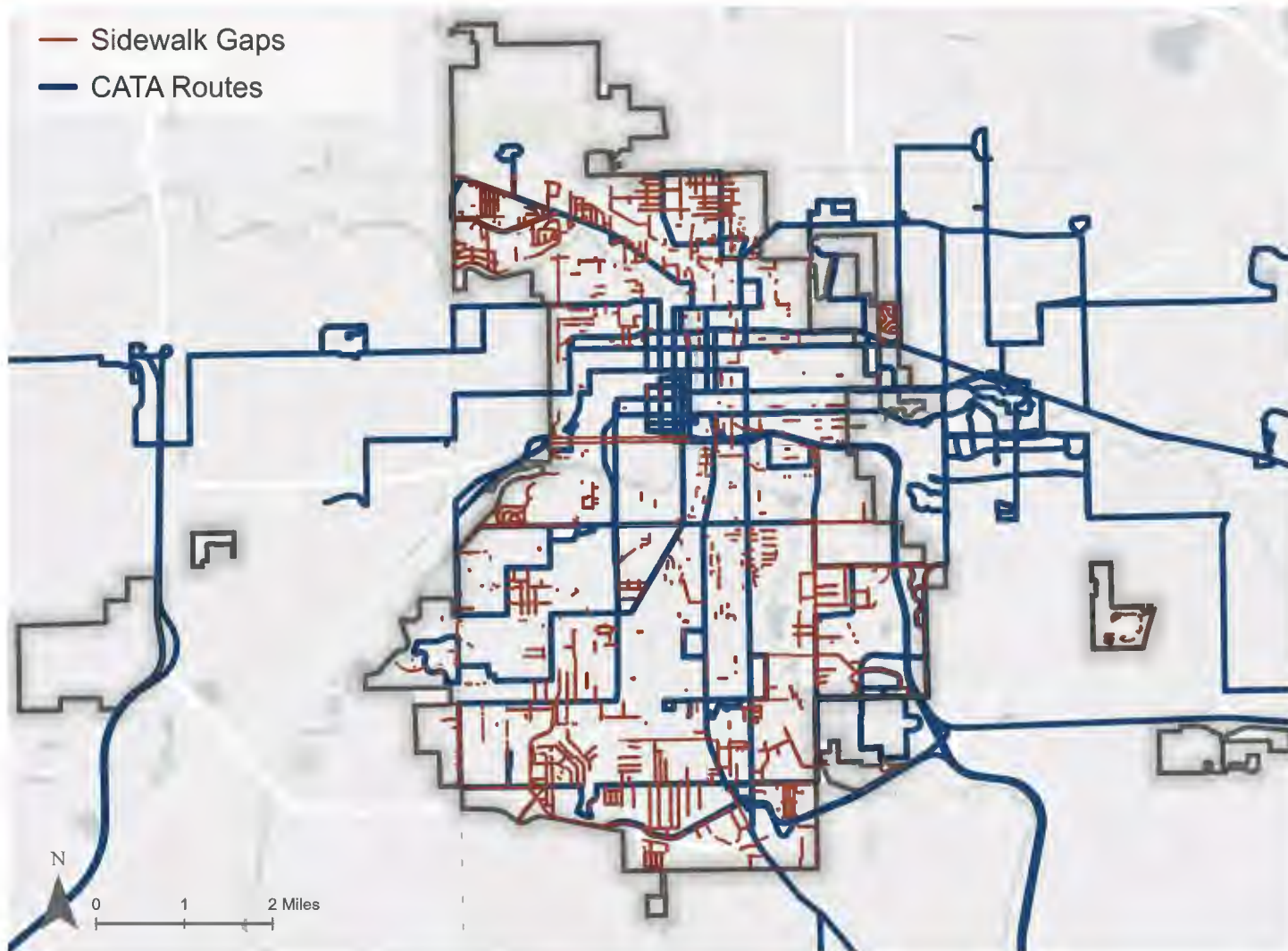


Figure 7.6. Sidewalk Gaps along Transit Routes

The map above highlights the sidewalk gaps along transit routes, helping to identify areas where pedestrians may face challenges accessing bus stops safely. This information is critical for guiding infrastructure investments that improve walkability and support safe, convenient transit access for all users.

Strategies



- Install or upgrade sidewalks, curb ramps, and crosswalks near bus stops to ensure safe and accessible connections. Curb extensions and pedestrian signals can further improve visibility and reduce crossing distances.
- Add lighting and high-visibility pavement markings to make bus stops safer at night and more noticeable to drivers, especially in high-crash areas
- Install shelters, benches, and ADA-compliant boarding pads to support safe and comfortable waiting areas for all users, including those with mobility needs.

Driver Behavior

Driver behavior plays a large role in crashes. The most common behaviors are distracted driving, speeding, driving while impaired, aggressive driving, and running red lights. According to Michigan Traffic Crash Facts, from 2019 – 2023, the city of Lansing had 1,258 crashes that were caused by distracted driving. Of these crashes, 26% resulted in some sort of injury.

Drivers under the influence are involved in a higher proportion of fatal and incapacitating injury crashes compared to those who are not impaired. This underscores the dangers of impaired driving and highlights the urgent need for effective prevention measures. Between 2014 and 2022, there were 550 impaired driving related crashes in the city of Lansing resulting in a fatality (K) or injury (A, B, and C) during the study period. Alcohol-involved crashes resulting in a fatality or injury accounted for 1.5% of total crashes and 22% of total fatalities. In addition, during that same time period, there were 266 crashes related to drug use, in which 52% resulted in injury.

Addressing these behaviors through education, enforcement, and public awareness campaigns can significantly reduce the number of crashes.



Figure 7.7. 2019 - 2023 Distracted Driving Crashes

Strategies





- Conduct educational campaigns around risky behaviors including distracted and impaired driving in public schools.
- Introduce driving simulator days in all schools in the region.
- Develop public awareness campaigns around distracted driving, speeding, and impaired driving.
- Discuss with Lansing Police Department about introducing Red-Light Indicator Lights (RLILs), also known as “rat lights” at intersections with prevalent red light running. These devices are mounted on signal heads or mast arms that activate simultaneously with the red interval, allowing officers to monitor red-light running from downstream.
- Consider automated red-light cameras at intersections with high red-light running. Law enforcement officials would review the photographs and mail citations. Staff would need to discuss with law enforcement since state laws need to be adjusted. A pilot program can be considered as a first phase.
- Participate in statewide driver behavior programs and contests.
- Consider ride home program through partnership with transit/or a transportation network company (TNC) such as Uber or Lyft.

Segment-Related Crashes

Segment-related crashes refer to crashes that occur due to the specific characteristics or conditions of a roadway segment. These types of crashes are often influenced by the road's design, condition, traffic volume, speed limit, and lighting and visibility. The following chart shows that the highest number of FI crashes for all modes are along minor arterial roads. Arterial roads usually have higher speeds, more lanes, and more traffic volumes compared to collector roads.

Table 7.3. FI Crashes by Mode and Roadway Type

Location Type	Motorized		VRU			
	#	%	Bicyclist		Pedestrian	
			#	%	#	%
Interstate	550	8%	0	0%	4	1%
Major Collector	407	6%	22	9%	32	10%
Minor Arterial	1,788	26%	51	20%	68	20%
Other Principal Arterial	3,426	50%	101	40%	171	51%
Other Freeway	25	0%	0	0%	0	0%
Local	720	10%	79	31%	58	17%
Total	6,916	100%	253	100%	333	100%

According to the FHWA, a Road Diet, or roadway reconfiguration, can improve safety, calm traffic, provide better mobility and access for all road users, and enhance overall quality of life. Roadway reconfigurations provide opportunities to enhance the bicycle and pedestrian infrastructure and can often reduce vehicle speeds. When planned in conjunction with a simple pavement overlay, a roadway reconfiguration can be accomplished at no additional cost. The FHWA reports that converting a 4-lane to a 3-lane road can reduce total crashes in the roadway by 19-47%. However, converting a 4-lane to a 3-lane road may not be feasible due to the AADT. Directional volumes should be reviewed for the potential of creating an unbalanced flow; for example, two northbound lanes, one bi-directional left turn lane, and one southbound lane. Road diets should be balanced with various factors, such as current or anticipated AADT, freight traffic, local and regional travel and mobility needs, and impacts to other nearby routes. Further evaluation is necessary of individual corridors before implementation.

Road Diet Examples

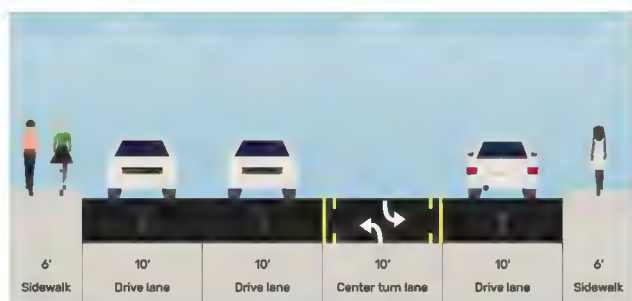
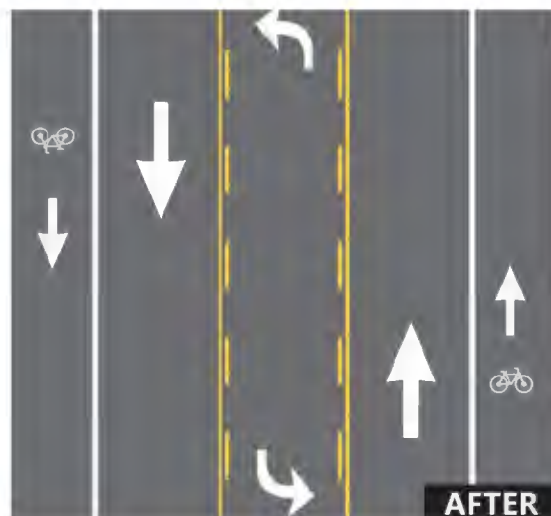
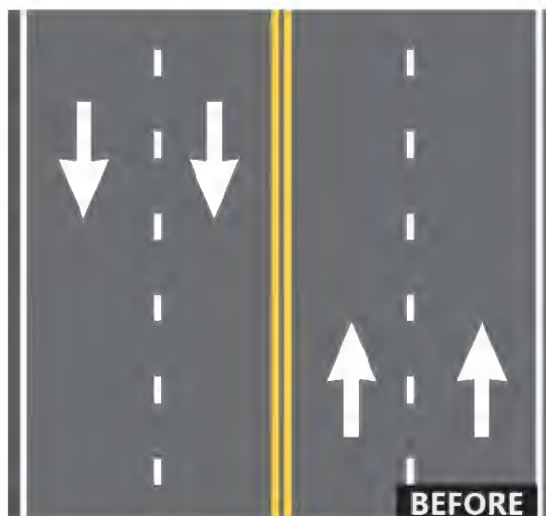


Figure 7.8. Unbalanced Road Reconfiguration

Note- Lane width 11 feet for federally funded and 10 feet for locally funded roads.

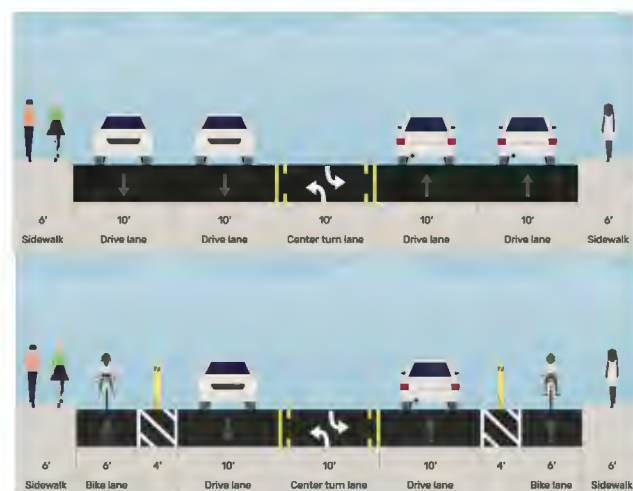


Figure 7.9. 5-Lane Road to a 3-Lane Road Reconfiguration

Strategies



- Reallocate laneage on roadways with extra capacity through **Road Diets**. Lane reallocation projects often result in the addition of a center left turn lane providing space for a pedestrian refuge island to reduce crossing distances and create multiple stage crossings.
- Add a center turn lane. This can specifically address angle and rear-end crash types by providing dedicated space for turning vehicles out of the path of other vehicles and reducing the number of lanes a vehicle must turn across.
- Implement **traffic calming** to reduce vehicle operating speeds and create space for non-motorized facilities.
- Review existing grade-separated locations to add **new non-motorized facilities** to improve connectivity. Consider new grade-separated facilities where feasible.

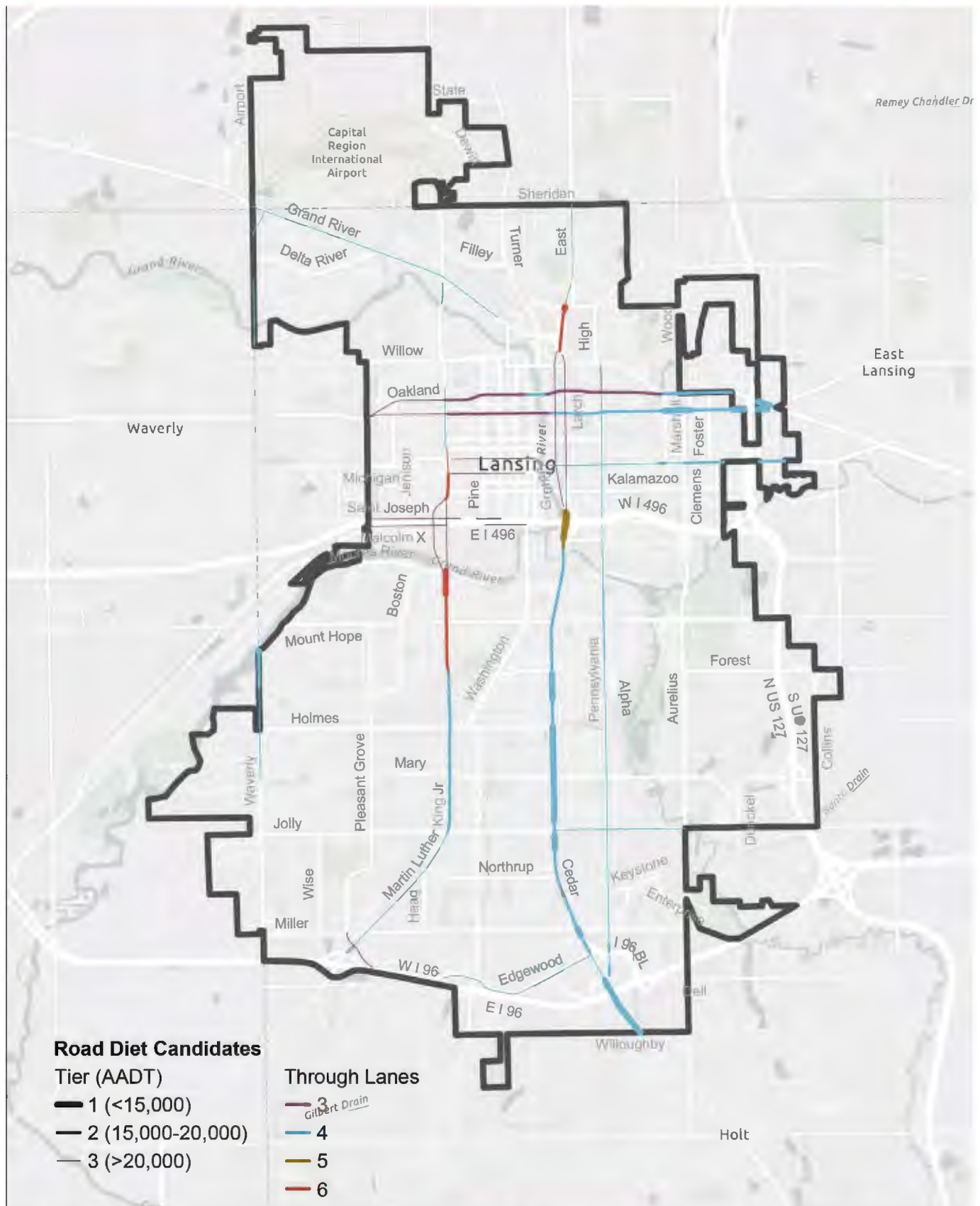


Figure 7.10. Road Diet Candidates

Note- Tier 1 = easiest to implement and Tier 3 = most difficult to implement

Post-Crash Care

Post-crash care refers to actions taken immediately after a crash. From the regional planning perspective, post-crash care can include strategies such as establishing a Fatal Crash Investigation Review Team (FCIRT) and notification policy. The goal of the FCIRT is to analyze fatal traffic accidents comprehensively, identify contributing factors, recommend preventive measures, and ensure accountability in crash investigations. This team can include a multidisciplinary group such as law enforcement officers, traffic engineers, public health officials, and community stakeholders and advocates.

The crash survivability rate can vary based on the severity of the crash, the location, and the time it takes for emergency services to arrive and the time it takes to transport crash victims to a trauma center. Prehospital, injured patients are managed according to two essential concepts: the golden period or golden hour and the platinum 10 minutes. The golden period refers to the 60 minutes from the time of the accident to receiving definitive care, after which morbidity and mortality significantly increase. Coupled with the golden hour, the platinum 10 minutes refers to paramedics having at most 10 minutes at the scene to manage severely injured patients to improve the rate of survival.

Trauma centers are equipped to handle severe injury crash victims and trauma patients thereby increasing the survival rate. According to the Fatality Analysis Reporting System (FARS) 2021 Annual Report File, nationally 40% of crash fatality victims were alive when first responders arrived but later died. Figure 7.12 shows the proximity of trauma centers in Lansing. The National Highway Traffic Safety Administration (The NHTSA) 2022 annual report lists the average time elapsed from the time of crash to hospital arrival for Michigan as 19 minutes for urban crashes; an average time was not listed for rural crashes.

There were 232 traffic crashes involving emergency response vehicles within the city of Lansing from 2019-2023. Traffic signal preemption for emergency response vehicles can address this crash type by providing a green light to approaching vehicles, preventing them from needing to proceed through intersections when cross traffic may have a green light. The NHTSA Emergency Vehicle Preemption (EVP) statistics note these systems improve response times by up to 25%. A recent examination of EVP in Savannah, GA noted an average of 5 to 7 minute savings per trip and reduction in congestion.

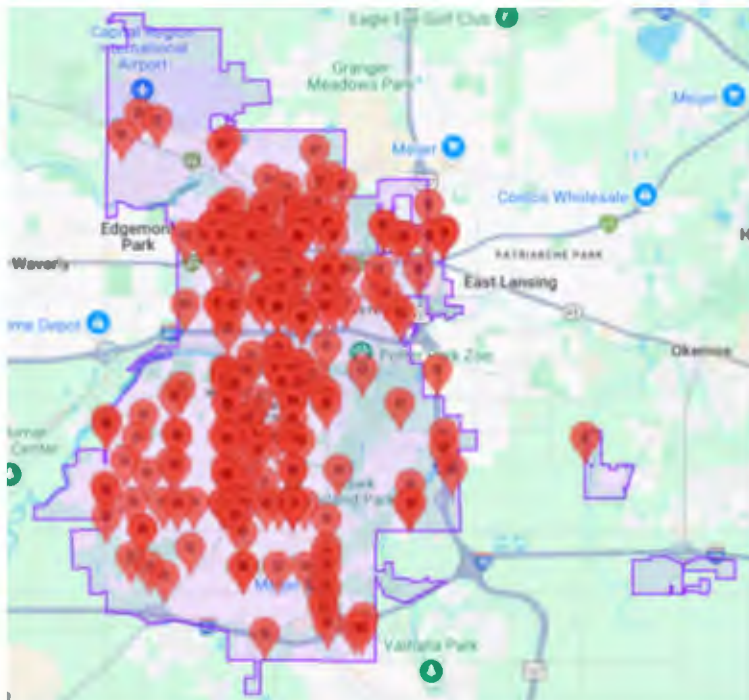


Figure 7.11. Crashes Involving an Emergency Services Vehicle (2019-2023)
Source: Source: Michigan Traffic Crash Facts (2019 -2023)

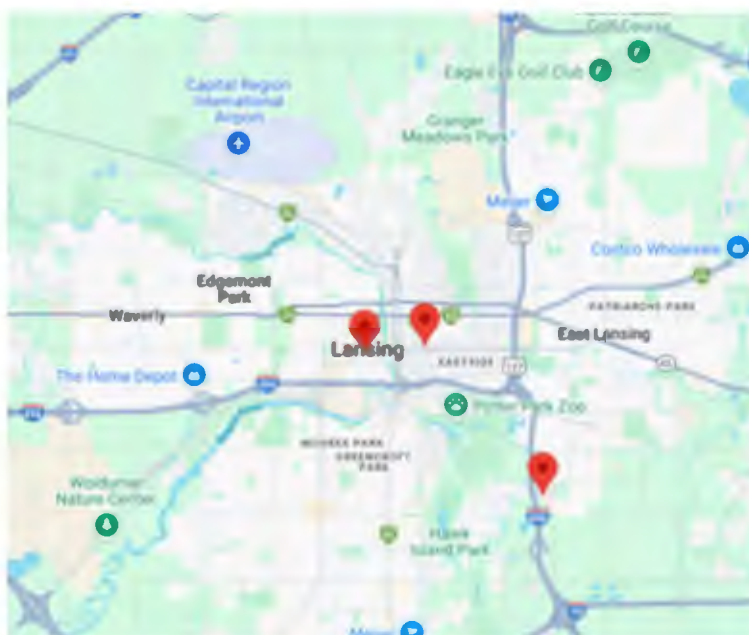


Figure 7.12. Hospitals with Trauma Centers

Strategies



- Expand **Traffic Incident Management (TIM)** Training for first responders.
- Maintain signal preemption and priority for emergency response vehicles and expand to include LPD/private services.
- Leverage technologies such as **automatic crash notification systems**, **GPS tracking** for emergency vehicles, and **real-time traffic management systems** which can expedite the dispatch and arrival of emergency services.
- Increase awareness of Michigan's **Quick-Clearance law**, which requires people involved in minor, non-injury crashes to move vehicles to a safe location out of the way of traffic if they can do so safely.

7.3 Proven Safety Countermeasures

The Federal Highway Administration (FHWA) launched the Proven Safety Countermeasures Initiative (PSCI) in 2008 to reduce traffic-related fatalities and injuries through data-driven, standardized safety treatments. The initiative recognizes 28 countermeasures targeting key safety areas of speed management, intersection safety, roadway departures, and non-motorist safety. Some countermeasures are crosscutting, addressing multiple safety areas.

These initial 28 countermeasures served as a foundation for developing a toolkit of **77 countermeasures** and investments proven to improve roadway safety. These countermeasures incorporate resources from the FHWA, state and local governments, the National Association of City Transportation Officials (NACTO), and direct engineering experience from fatal crash investigations and roadway safety projects¹.

The countermeasures are organized by the four PSCI themes, with modifications to include general segment elements such as lighting, access management, medians, enhanced delineation, vegetation mitigation, and weather management.

How does this all work?

Identifying and allocating proven **safety countermeasures** is the first step to address identified safety concerns and trends. Safety analysis findings and countermeasures determine project types, benefits, and costs. Priorities are set (see **Prioritization Matrix**), and top projects can then advance to construction or be used for future grant applications (see **Funding Opportunities**).

¹ Making Our Roads Safer | One Countermeasure at a Time, FHWA (2021)
 Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts, FHWA (2016)
 Small Town and Rural Multimodal Networks, FHWA (2016)
 Urban Street Design Guide, National Association of City Transportation Officials.
 Urban Bikeway Design Guide, National Association of City Transportation Officials.
 Pedestrian Safety Action Plan, Maryland Department of Transportation (2023)
 Context-Driven Access & Mobility for All Users, Maryland Department of Transportation (2020)
 Fatal Crash Investigation Project & Reports, Nashville Department of Transportation & AECOM (2022 - Present)
 FHWA Proven Safety Countermeasures Initiative: <https://highways.dot.gov/safety/proven-safety-countermeasures>
 Safe System Roadway Design Hierarchy, Federal Highway Administration, (January 2024)

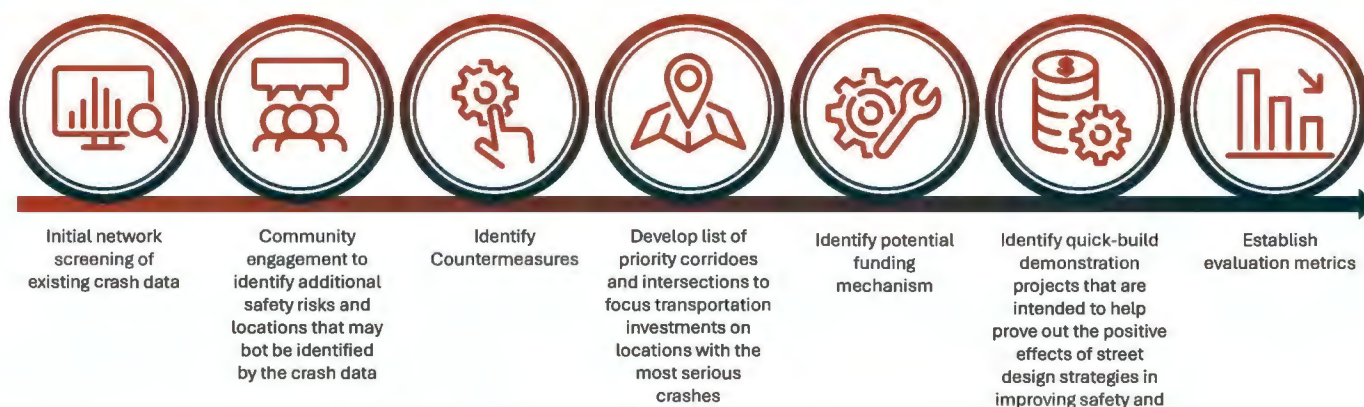


Figure 7.13. Proven Safety Countermeasures

Countermeasure Toolbox Summary

To help stakeholders quickly identify and apply the most effective and context-appropriate safety solutions, each countermeasure was categorized by targeted crash type, implementation timeframe, land use context, crash reduction factor, and estimated per-unit cost range. A full list of the countermeasures and a summary of these categories is provided in Appendix C.

Countermeasure Types

Four (4) main countermeasure types were identified for implementation in the city. Those countermeasure types include the following:

 Intersection Safety Countermeasures

 General Segment Safety (Including roadway departures) Countermeasures

 Non-Motorized Safety Countermeasures

 Speed Safety Countermeasures

Almost a third of the countermeasures (27%) were categorized as meeting multiple criteria, and therefore categorized as a combination countermeasure.

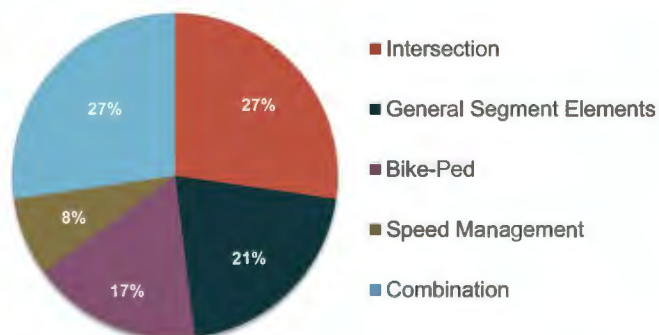


Figure 7.14. Countermeasures

Targeted Safety Issues

The countermeasures developed under this effort addresses a wide range of safety issues. The most common types of safety issues addressed by the countermeasures include those related to non-motorized crashes (25%), angle crashes (14%), intersection crashes (10%), rear-end crashes (9%), speed-related crashes (8%), and roadway departure crashes (7%). Other issues addressed by the countermeasures include:

- Failure to yield
- Night/dark conditions
- Head-on collisions
- Distracted driving
- Animal/wildlife collisions
- Sideswipe crashes
- Multimodal safety (including Amish)
- General roadway surface safety
- School zone safety
- Curve-related safety

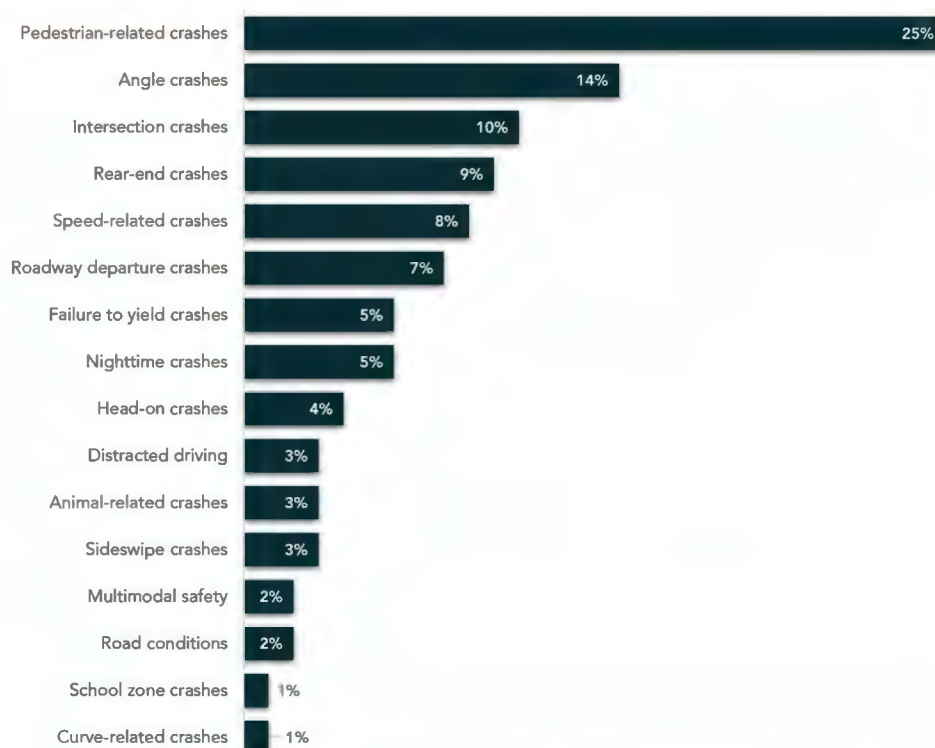


Figure 7.15. % of Countermeasures Addressing Each Safety Issue

Implementation Timeframes

The countermeasures developed through this effort include 26 that could be developed in the short-term¹, 22 that could be implemented in the mid-term², and 29 that would most likely be implemented in the long-term³.

¹ Short-term defined here as within the first five years

² Mid-term defined here as between five and ten years

³ Long-term defined here as ten years or more into the future

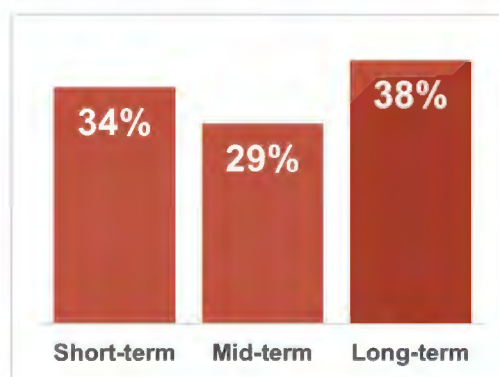


Figure 7.16. Implementation Timeframes

Land Use Context

Land use and development intensity influence the character and needs of an area, impacting factors like travel speeds, parking needs, recreational events, and commercial activities. Not all countermeasures are most effective in every land use or development context. Tailoring countermeasures to various land use and development



Figure 7.17. USGS National Land Coverage Database, 2023

contexts can be an effective way to ensure implementation aligns with the character and needs of the area. In alignment with research by the Victoria Transport Policy Institute¹, the city was divided into the discrete criteria, aligning with their corresponding land use and development intensity.

¹ Evaluating Transportation Land Use Impacts, Victoria Transport Policy Institute (March 2023)

Crash Reduction Factor

Crash Reduction Factors (CRF) measure the expected percentage reduction in fatal and serious injury crashes after implementing a specified safety improvement. For this study, CRFs were collected from national or State research organizations such as the Federal Highway Administration (FHWA), the National Cooperative Highway Research Program (NCHRP), and various State Departments of Transportation (DOT) to provide an effective platform for comparing the countermeasures. Information was not available in every instance, but in the end, a CRF was identified for about 70% (52) of the identified countermeasures.

The median CRF predicted for countermeasures in this study is 35%, with a minimum CRF of 3% and a maximum CRF of 90%.

Estimated Per-Unit Cost Range

Cost is a critical factor in selecting safety countermeasures. Agencies must allocate limited resources to projects with the greatest safety impacts. An estimated per unit cost range for each countermeasure helps understand its relative cost and cost-effectiveness¹. This approach ensures transparency, aids in cost-benefit analysis, and supports efficient resource allocation.

Cost can vary greatly based on the size and scope of a roadway safety project. Starting with a survey of background and field research, a cost range was estimated per unit for each countermeasure. These cost ranges were categorized into three tiers.

- Tier 1 \$: Up to \$149,999
- Tier 2 \$\$: From \$150,000 to \$499,999
- Tier 3 \$\$\$: 500,000 or greater

Tier 1 cost countermeasures are mostly comprised of signs, striping, delineators, minor lighting upgrades, modest intersection updates, and weather/vegetation mitigation.

Tier 2 cost countermeasures include signal upgrades, bus stop extensions, chicanes, mid-block crossings, smaller roundabouts, driveway closures, shoulder improvements, and speed safety cameras.

Tier 3 cost countermeasures include road diets, new turn lanes and interchanges, center concrete medians, new sidewalks and shared use paths, larger or more complex roundabouts, corridor lighting, variable speed limits, corridor lighting, and corridor access management.

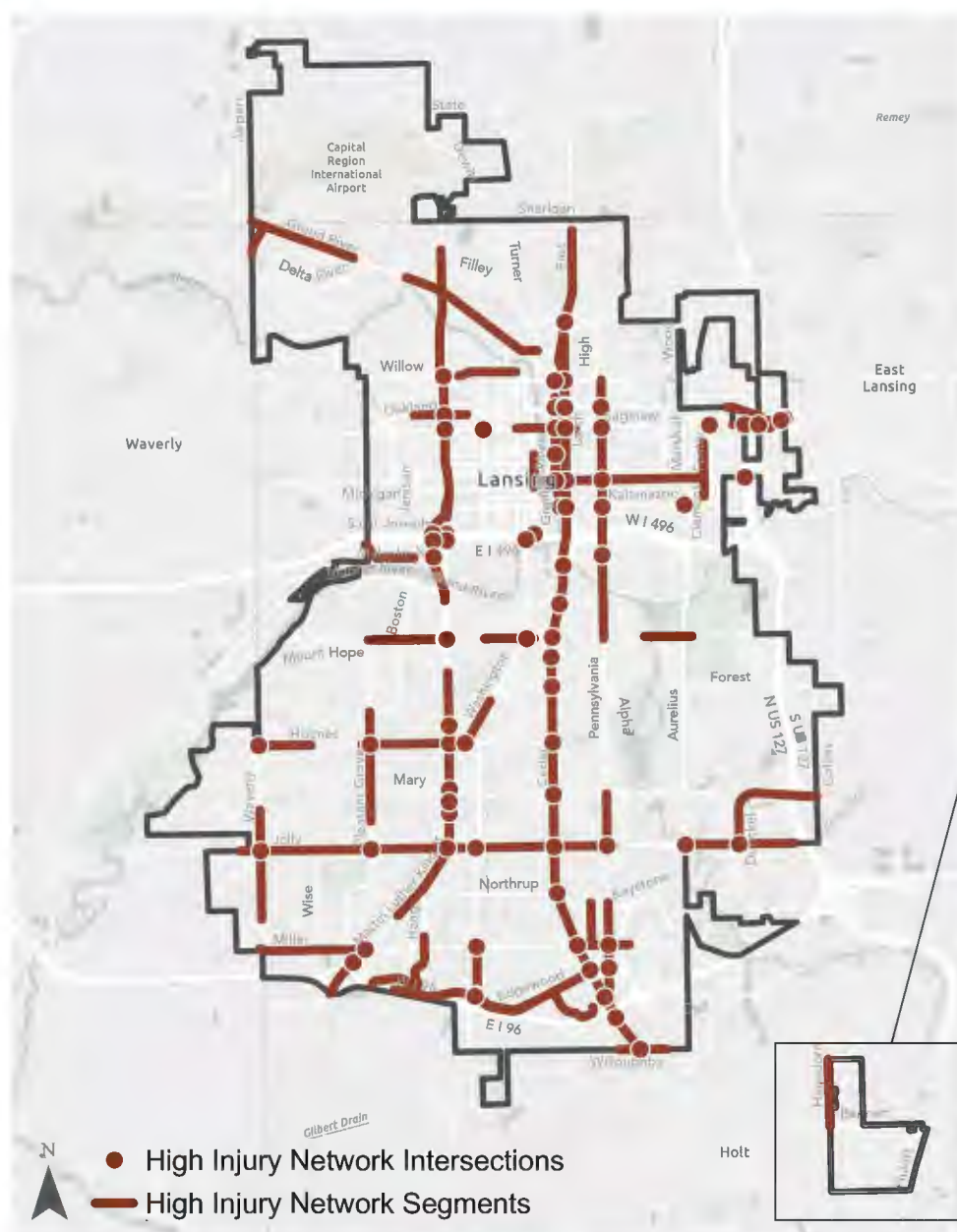
¹ Per-unit cost estimate ranges based on 2024 dollars

7.4 Traffic/Roadway Project Selection

To meet the goals and objectives of the plan, initial projects and strategies have been identified. The process begins with the proven safety countermeasures published by the Federal Highway Administration (FHWA) and identifies additional viable projects that have a known track record of successful implementation and improvements to safety in Michigan.

High Injury Network

The HIN map identifies roadway segments and intersections where the highest concentration of all fatal and serious injuries occurred along a subset of the roadway network. The HIN represents 9.9% of the overall transportation network but captures 71% of the overall FSI crashes. The HIN aids in the identification of higher crash frequency and severities where the greatest potential for safety improvements can be expected with the application of appropriate safety countermeasures.



Prioritization Matrix

The prioritization matrix evaluates safety projects based on impact and feasibility. It assesses each project's potential to address critical safety issues and aligns with overall safety goals. By assigning scores to criteria like risk severity, cost, and timeline, the matrix identifies high-priority projects that balance reactive and proactive strategies. Local priorities informed the weight for each criterion, ensuring alignment with the SS4A Program.

Each prioritization category includes multiple factors and associated scoring criteria. Adding the scores for each category results in a prioritization score for each proposed project.

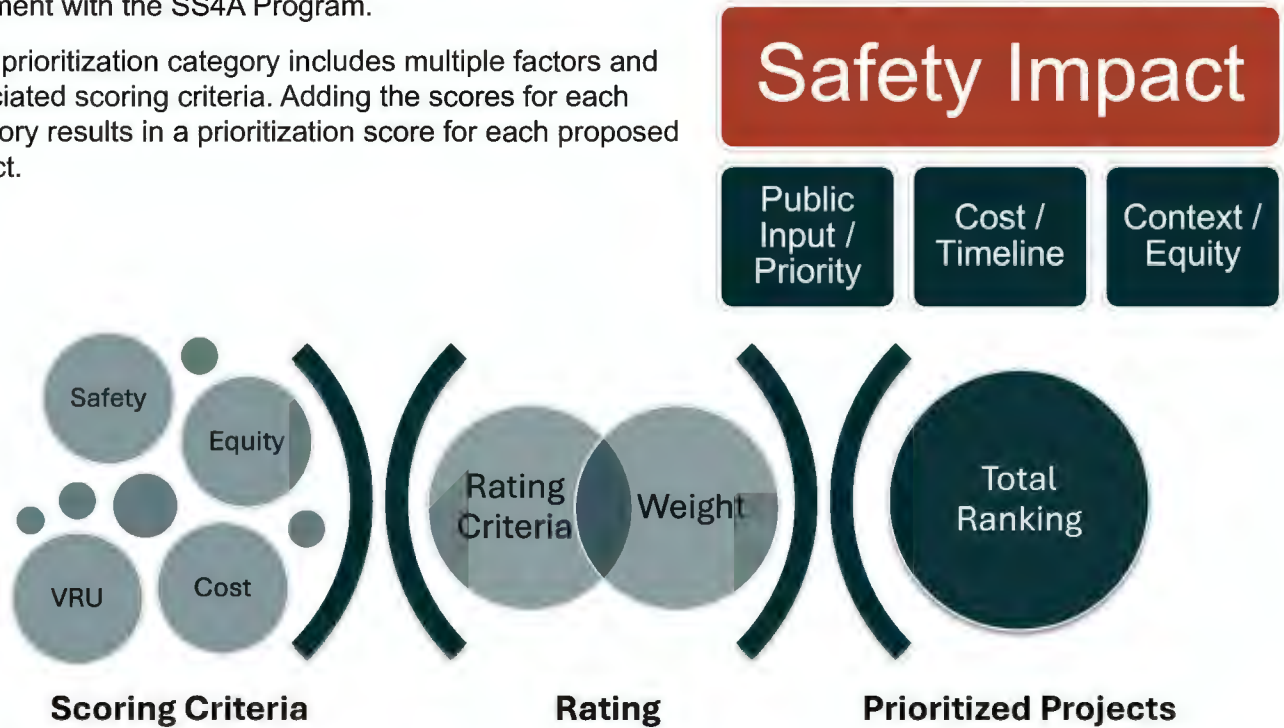


Figure 7.19. Prioritization Matrix

	Description	Criteria	Weight Factor
Relation to Other Plans 1	Project is identified in a previous regional plan?	Yes = 1 No = 0	1
Relation to Other Plans 2	Project is identified in a previous local plan?	Yes = 1 No = 0	1
Public Input 1	Project has been noted by the public as priority?	Yes = 1 No = 0	1
Public Input 2	Project location received three or more public comments on the interactive mapping tool during the development of this SAP?	Yes = 1 No = 0	1

Figure 7.20. Prioritization Matrix for Public Input

	Description	Criteria	Weight Factor
HIN	The project is located on the High Injury Network.	Yes (Fully) = 1 Yes (Partially) = 0.5 No = 0	2
FHWA Proven Safety Countermeasures 1	The project incorporates one or more of the FHWA Proven Safety Countermeasures (PSC).	>1 PSC = 1 1 PSC = 0.5 0 PSC = 0	1
FHWA Proven Safety Countermeasures 2	Identify the FHWA Safe System Roadway Design Hierarchy Tier level.	Tier 1 = 1 Tier 2 = 0.75 Tier 3 = 0.5 Tier 4 = 0.25 Tier 5 = 0	1
Targeted Crash Types and Road Users 1	Project targets at least one of the top three crash types (Angle, Rear End, Fixed Object).	Yes = 1 No = 0	1
Targeted Crash Types and Road Users 2	Project mitigates observed FSI crashes that occurred within the most recent 5-year period. VRU safety projects may include crashes within a ¼ mile buffer of the project location.	One point for each FSI crash.	1
Targeted Crash Types and Road Users 3	Project implements countermeasures targeted at improving safety for VRUs.	Yes = 1 No = 0	1
Targeted Crash Types and Road Users 4	Project improves safety at intersections by reducing the number of conflict points. Project is located on a multi-lane corridor with more than one travel lane in each direction.	Yes = 1 No = 0	1
Speed Related 1	Project is expected to reduce operating speeds through physical infrastructure to create self-enforcing roadways.	Yes = 1 No = 0	1
Speed Related 2	Posted speed limit of roadway in the existing configuration.	≥45 MPH = 1 30-40 MPH = 0.5 <30 MPH = 0	1

Figure 7.21. Prioritization Matrix for Context

	Description	Criteria	Weight Factor
Cost Effectiveness 1	Project cost effectiveness using Time of Return (TOR). How many years will it take for the safety benefits from reduced crashes outweigh the construction cost to implement the project?	<1 year = 1 1-6 years = 0.75 7-10 years = 0.25 >10 years = 0	1
Cost Effectiveness 2	Project cost effectiveness using Benefit-Cost Ratio (BCR). A BCR greater than 1.0 indicates that the benefits outweigh the costs. [BCR=Total Benefit/Total Costs]	>25 = 1 >10-25 = 0.75 1-10 = 0.5 <1 = 0	1
Timeline 1	Anticipated timeframe from securing funding to completing construction including environmental reviews, right-of-way acquisition, design, procurement, and construction.	<3 years = 1 3-6 years = 0.75 7-9 years = 0.25 >10 years = 0	1
Timeline 2	Project is a quick-build project that can be implemented in less than one year. Projects can be permanent or temporary (demonstration) in nature.	Yes = 1 No = 0	1
Project Readiness 1	Funding source has already been secured.	Yes = 1 No = 0	1
Project Readiness 2	Does the project require right-of-way (ROW) acquisition?	No = 1 Yes = 0	1
Project Readiness 3	Has NEPA (National Environmental Policy Act) review been completed? If not, can the project be environmentally classified as a Categorical Exclusion?	Yes = 1 No = 0	1
Project Readiness 4	Does the project require state or federal permits (e.g. FAA, MDEQ, 4f property impacts, etc)? If yes, but all permits have already been secured, score this factor as 1.	No = 1 Yes = 0	1

Figure 7.22. Prioritization Matrix for Cost-timeline



Project List

The projects listed below are organized by lead agency and they are not prioritized. Further evaluation and review of factors, including but not limited to, environment factors, design and construction feasibility, agency resource capacity, and community priorities will guide project priorities. Agencies should coordinate with their asset management programs for project implementation.

The anticipated safety benefits are derived from the Crash Modification Factor (CMF) Clearinghouse, unless otherwise noted. A Crash Reduction Factor (CRF) was developed, which is an estimate of the reduction in crashes that can be expected after implementing a specific countermeasure.

Project Description	Location	Targeted Safety Concern	Anticipated Safety Benefits	Lead Agency Support Agency	Timeline for Implementation
✓ Lane reallocation through a road diet from an undivided four-lane section to a three-lane section with marked bike lanes	 Jolly Rd from Cedar St (I-96BL) to Five Oaks Dr	Sideswipe crashes, bicyclist crashes, aggressive driving behaviors  	Estimated crash reduction is 71%	City	Medium-term ●●○
✓ Update signage along route with increased reflectivity ----- ✓ Install ADA detectable warning strips where missing and connect sidewalks where missing ----- ✓ Update pavement markings ----- ✓ Signal timing changes to improve left turn safety such as protected lefts and leading pedestrian intervals (continue on the next page)	 Jolly Rd from Jolly Cedar Ct to Oakbrook Dr	Angle crashes, VRU safety, fixed object  	Estimated crash reduction is 94% ----- MDOT TOR CRF (construct sidewalks): Pedestrian Crashes 85% reduction ----- Estimated crash reduction is 30% ----- Estimated crash reduction is 30%	City	Short-term ●○○ ----- Short-term ●○○ ----- Short-term ●○○ ----- Short-term ●○○ -----

Project Description	Location	Targeted Safety Concern	Anticipated Safety Benefits	Lead Agency Support Agency	Timeline for Implementation
✓ (cont'd) Install countdown pedestrian signals ----- ✓ Improve non-motorized connectivity along the corridor through implementation of sharrows and/or extended bike lanes ----- ✓ Installation of roundabouts at major intersections to facilitate operational efficiency and reduce crashes ----- ✓ Road Diet to decrease number of lanes and increase lane width to accommodate larger vehicles ----- ✓ Remove fixed objects in clear zone (utilities) ----- ✓ Access management measures to reduce driveways	 Jolly Rd from Jolly Cedar Ct to Oakbrook Dr	Angle crashes, VRU safety, fixed object  	(Cont'd) Estimated crash reduction is 95% ----- Estimated crash reduction is 43% ----- Estimated crash reduction is 52% ----- Estimated crash reduction is 71% ----- N/A ----- Reduction in up to 23% (FHWA)	City (Planned to implement in 2026)	(Cont'd) Medium-term ●●○ ----- Medium-term ●●○ ----- Long-term ●●● ----- Long-term ●●● ----- Long-term ●●●

Project Description	Location	Targeted Safety Concern	Anticipated Safety Benefits	Lead Agency <i>Support Agency</i>	Timeline for Implementation
✓ Install ADA detectable warning strips where missing and connect sidewalks where missing: ✓ 1100 block east side of N Pennsylvania Ave • 900 block west side of N Pennsylvania Ave ✓ 100 block east side of S Pennsylvania Ave (Narrow at Pilgrim Congregational United Church of Christ) • 600 block east side of S Pennsylvania Ave (Railroad crossings are not ADA compliant) • 1400 block west side of S Pennsylvania Ave • 1500 block west side of S Pennsylvania Ave ----- Improve non-motorized connectivity along the corridor through installation of midblock crossings ----- Improve non-motorized connectivity along the corridor through implementation of sharrows and/or bike lanes	📍 Pennsylvania Ave from Mt Hope Ave to César Chávez Ave	VRU   	MDOT TOR CRF (construct sidewalks): Pedestrian Crashes 85% reduction	City	Short-term ●○○ ----- Medium-term ●●○ ----- Medium-term ●●○
✓ Improve non-motorized connectivity along the corridor through installation of midblock trail crossings	📍 Jolly Rd. w. of Aurelius Rd @ Lansing River Trail	VRU	Estimated crash reduction is 82%	City	Medium-term ●●○



Project Description	Location	Targeted Safety Concern	Anticipated Safety Benefits	Lead Agency Support Agency	Timeline for Implementation
✓ Modernize traffic signals to box span configuration	 Pennsylvania Ave at Baker St, Haco Dr, Hazel St, Jerome St, Shiawassee St, César E. Chávez Ave	Intersection safety 	Estimated crash reduction is 10%	City	Medium-term ●●○
✓ Update signage along route with increased reflectivity ----- ✓ Update pavement markings ----- ✓ Signal timing optimization to reduce frequent stopping along corridor ----- ✓ Evaluation of a road diet and/or consistent cross section along roadway	 Pennsylvania Ave from Mt Hope Ave to César Chávez Ave	Angle and rear end crashes, VRU 	Estimated crash reduction is 94% ----- Estimated crash reduction is 30% ----- Estimated crash reduction is up to 12% ----- Estimated crash reduction is 71%	City (Planned to implement in 2026)	Short-term ●○○ ----- Short-term ●○○ ----- Short-term ●○○ ----- Long-term ●●●
✓ Evaluate signal timings	 Saginaw St (I-69BL) at Pine St	Sideswipe, Rear-end, Angle Crashes 	Estimated crash reduction is up to 12%	City	Short-term ●○○
✓ Evaluate signal timings	 Aurelis Rd from Forest Rd to Mt Hope Ave	Rear-end, Angle Crashes 	Estimated crash reduction is up to 12%	City	Short-term ●○○
✓ Updated pavement markings and ADA compliant crosswalks	 Kalamazoo St at Fairview St	VRU 	Estimated crash reduction is up to 52% (FHWA)	City	Short-term ●○○
✓ Roundabout	 Jolly Rd at Cedar St (I-96BL)	Angle crashes, VRU safety 	Roundabouts can reduce crashes by 40% (FHWA)	MDOT City	Long-term ●●●

Project Description	Location	Targeted Safety Concern	Anticipated Safety Benefits	Lead Agency Support Agency	Timeline for Implementation
✓ Roundabout	📍 Cedar St (I-96BL) at Edgewood Blvd	Angle crashes, VRU safety 	Roundabouts can reduce crashes by 40% (FHWA)	MDOT City	Long-term ●●●
✓ Remove slip ramps and the loop ramp to and from Pennsylvania Avenue and construct indirect left turn crossovers. Install new sidewalks .	📍 Pennsylvania Ave at Cedar St (I-96BL)	Left turn crashes, angle crashes, fatal and serious injury crashes, VRU safety 	MDOT TOR CRF (construct sidewalks): Pedestrian Crashes 85% reduction	MDOT City	Long-term ●●●
✓ Replace diagonal span signal ----- ✓ Evaluation of a road diet	📍 Saginaw St (I-69BL) at MLK Jr Blvd	Crash hot spot, speeding 	Estimated crash reduction is 10% ----- Estimated crash reduction is 71%	MDOT City	Medium-term ●●○ ----- Long-term ●●●
✓ Adjust signal timings ----- ✓ Replace diagonal span signal	📍 Saginaw St (I-69BL) at Cedar St (I-96BL)	Crash hot spot (angle, rear, sideswipe) 	Estimated crash reduction is up to 12% ----- Estimated crash reduction is 10%	MDOT City	Short-term ●○○ ----- Medium-term ●●○
✓ Replace diagonal span signal	📍 Saginaw St (I-69BL) at Larch St (I-96BL)	Crash hot spot (angle) 	Estimated crash reduction is 10%	MDOT City	Medium-term ●●○
✓ Replace diagonal span signal , consider protected left turn	📍 Saginaw St (I-69BL) at Pennsylvania Ave	Crash hot spot (angle) 	Estimated crash reduction is 10%	MDOT City	Medium-term ●●○
✓ Update signage along route with increased reflectivity ----- ✓ Update pavement markings	📍 Saginaw St (I-69BL) from US-127 to Grand River Ave (M-43)	Crash hot spot (angle, Sideswipe- same, dark) 	Estimated crash reduction is 94% ----- Estimated crash reduction is 30%	MDOT City	Short-term ●○○ ----- Short-term ●○○

Project Description	Location	Targeted Safety Concern	Anticipated Safety Benefits	Lead Agency Support Agency	Timeline for Implementation
✓ Evaluation of a road diet	📍 Cedar St (I-96BL) from S city limits to I-496	VRU 	Estimated crash reduction is 71%	MDOT City	Long-term ●●●
✓ Exclusive pedestrian phasing, update crosswalk markings	📍 Holmes Rd from Pleasant Grove Rd to MLK Jr Blvd	VRU 	Estimated crash reduction is 65%	MDOT City	Medium-term ●●○
✓ Evaluation of a road diet	📍 Holmes Rd from Waverly Rd to Pleasant Grove Rd	VRU 	Estimated crash reduction is 71%	MDOT City	Long-term ●●●
✓ Replace diagonal span signal, protected left turn lanes, update crosswalk markings	📍 Michigan Ave (M-143) at Howard St	VRU 	Estimated crash reduction is 65%	MDOT City	Medium-term ●●○
✓ Evaluation of a road diet , add on street parking, pedestrian bump outs, updated sidewalks and pedestrian crossings, updated signals	📍 Michigan Ave (M-143) from Pennsylvania Ave to Clippert St	VRU 	Estimated crash reduction is 71%	MDOT City	Long-term ●●●
✓ Evaluation of a road diet	📍 MLK Jr Blvd from Willow St to Jolly Rd	All crash types 	Estimated crash reduction is 71%	MDOT City	Long-term ●●●
✓ Evaluation of a road diet	📍 Cedar St (I-96BL) from E Ceaser E Chavez Ave to Willoughby Rd	All crash types 	Estimated crash reduction is 71%	MDOT City	Long-term ●●●
✓ Evaluation of a road diet	📍 S MLK Jr Blvd from Holmes Rd to Miller Rd	All crash types 	Estimated crash reduction is 71%	MDOT City	Long-term ●●●
✓ Evaluation of a road diet	📍 Grand River Ave (I-96BL) from Tecumseh River Rd to Turner Rd	All crash types 	Estimated crash reduction is 71%	MDOT City	Long-term ●●●
✓ Improve safety at railroad crossing via gate installation and signing for pedestrians	📍 Jolly Rd from Tranter St to Contec Drive	Train related crashes 	Estimated crash reduction is 55%	City	Medium-term ●●○
✓ Improve non-motorized connectivity along the corridor through installation of midblock trail crossings	📍 Jolly Rd west of Aurelius Rd @ Lansing River Trail	VRU 	Estimated crash reduction is 82%	City	Medium-term ●●○

Project Description	Location	Targeted Safety Concern	Anticipated Safety Benefits	Lead Agency Support Agency	Timeline for Implementation
✓ Install bus pads , sidewalk connections, lighting, bike racks, shelters	 Transit stops throughout the city.	Transit safety and accessibility, VRU crashes 	Adding bus pads can reduce bus-related crashes by approximately 10-15% by providing designated, safe stopping areas for buses, which reduces conflicts with moving vehicles. Pedestrian Safety: They can also reduce pedestrian crashes by 5-10%, as they ensure a consistent area for passengers to board and alight.	CATA Transit <i>City</i> <i>MDOT</i>	Medium-term ●●○
✓ Evaluation of a road diet, access management, intersection improvements, roundabout, and pedestrian crossings	 Saginaw St and Grand River Ave from Homer St to Coolidge Rd	All crash types 	Estimated crash reduction is 71%	MDOT <i>City of Lansing, City of E. Lansing, Lansing Twp</i>	Long-term ●●●
✓ Replace diagonal span signal, consider protected left turn, reduce pedestrian crossing distance	 Cedar St (I-96BL) at Mt Hope Ave	Rear end and Angle crashes 	Estimated crash reduction is 65%	MDOT <i>City</i>	Medium-term ●●○

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7.5 Funding Opportunities

A strategy for funding and partnership opportunities is critical to the long-term success of this safety action plan. It identifies areas for collaboration between public and private agencies and can help identify the requirements and timelines for future funding applications. It can also leverage local, state, and national resources and expertise to maximize the impact of safety projects within budget constraints. This section will summarize potential funding and partnership opportunities to make roadways safer in the city.

The majority of the grant programs listed below were funded during the Biden administration through the Bipartisan Infrastructure Law (BIL), which was signed in 2021. At the time of plan adoption, it is unclear if these grant programs will continue under the current Trump administration.

Safe Streets For All

The Safe Streets and Roads for All (SS4A) federal grant program, funded by the Infrastructure Investment and Jobs Act (IIJA), helps communities reduce roadway fatalities and injuries. It provides funding to local and regional governments for safety action plans, infrastructure improvements, and road safety activities for all users. By supporting strategies like Vision Zero, the SS4A grant aims to create safer streets and reduce traffic-related harm. The City of Lansing was awarded a \$210,000 SS4A grant in October of 2022 to develop a regional Safety Action Plan, which will allow the City to apply for construction and implementation grants for safety projects. Nationwide, in FY2024, around \$1.2 billion was awarded for planning, demonstration, and implementation grants.

Safe Routes To School

The Safe Routes to School (SRTS) federal grant program aims to improve safety and accessibility for students traveling to and from school by walking or biking. The program provides funding for infrastructure projects, such as sidewalk construction, crosswalks, and bike lanes, as well as educational initiatives to encourage healthy, active transportation. SRTS grants focus on reducing traffic-related accidents, promoting physical activity, and creating safer environments for children, particularly those in underserved areas. The program helps communities create safer and more accessible routes, ultimately supporting the well-being and independence of school-age children. There is no dedicated funding through the BIL, but funding is available through TAP, STP, and HSIP fund sources.

Reconnecting Communities And Neighborhoods

The Reconnecting Communities and Neighborhoods grant program aims to address the impacts of transportation infrastructure that has divided communities, particularly those that have been historically marginalized. The program provides funding for projects that reconnect neighborhoods, improve mobility, and enhance accessibility for all residents, particularly pedestrians, cyclists, and other active transportation users. It focuses on creating safer, more inclusive spaces that promote social, economic, and environmental benefits, helping to rebuild communities and restore connectivity that was lost due to infrastructure developments like highways and railroads. Nationwide, in FY2024, around \$200 million in funding was made available.

Transportation Alternatives Program

The Transportation Alternatives Program (TAP) provides federal funding for projects that enhance active transportation options and improve the quality of life in communities. TAP supports a wide range of initiatives, including the development of bike paths, sidewalks, pedestrian bridges, and shared use



pathways. The program also funds efforts to improve safety and accessibility for pedestrians and cyclists, helping to reduce congestion, promote active transportation, and foster more sustainable, connected communities. TAP plays a key role in encouraging healthier and more environmentally-friendly transportation options. Nationwide, in FY2024, around \$1.5 billion was awarded.

Active Transportation Infrastructure Investment Program

The Active Transportation Infrastructure Investment Program is designed to provide funding for projects that support walking, biking, and other forms of active transportation. This program focuses on developing and enhancing infrastructure such as bike lanes, sidewalks, and shared use pathways, with the goal of improving safety, accessibility, and mobility for active transportation users. It aims to reduce traffic congestion, promote healthier lifestyles, and create more sustainable transportation networks. By investing in active transportation infrastructure, the program encourages the use of environmentally friendly modes of travel and fosters connected, vibrant communities. Nationwide, in FY2024, around \$44 million was awarded.

Community Development Block Grants

Community Development Block Grants (CDBG) are federal funds provided to local governments to support a wide range of community development activities, including affordable housing, infrastructure improvements, and economic development. These grants aim to improve the quality of life in low- and moderate-income neighborhoods by funding projects that address pressing community needs, such as infrastructure upgrades, public facilities, and accessibility improvements. CDBG funds can also support initiatives that promote public health, safety, and employment opportunities, fostering vibrant, inclusive communities. Nationwide, in FY2024, around \$3.4 billion was made available.

Highway Safety Improvement Program (HSIP)

The HSIP is a federally funded initiative under the FHWA aimed at reducing traffic fatalities and serious injuries. Local agencies can use HSIP funds on any roadway open to public travel for safety projects like road diets, signal upgrades, and pedestrian enhancements. Projects must be data-driven, demonstrate safety benefits, and align with the state's Strategic Highway Safety Plan (SHSP). For FY 2027, the federal budget apportioned for the Michigan local roadway network is approximately \$21 million.

Surface Transportation Block Grant (STBG)

The STBG program is a flexible, federally funded program designed to support a wide range of transportation projects, including road maintenance, construction, and transit improvements. Funded through the Federal-aid Highway Program, STBG grants can be used for projects that enhance the safety, efficiency, and connectivity of transportation systems. Local agencies can utilize STBG funds for highway construction, bridge repair, public transit, and non-motorized transportation improvements. Projects must meet federal requirements, with funding allocated based on a formula that considers factors like population and road miles. In FY 2024, STBG funding was approximately \$13.2 billion nationwide.

Strengthening Mobility And Revolutionizing Transportation (SMART)

The SMART grant program, funded by the U.S. Department of Transportation, supports innovative transportation technologies and smart infrastructure projects. The program aims to improve mobility, safety, and sustainability through advancements like autonomous vehicles, connected infrastructure, and data-driven transportation solutions. Local agencies can use SMART grants for pilot projects that integrate emerging technologies into transportation systems. In FY 2024, SMART funding was approximately \$100 million.

Promoting Resilient Operations For Transformative, Efficient, And Cost-Saving Transportation (PROTECT)

The PROTECT grant program, funded by the U.S. Department of Transportation, focuses on enhancing the resilience of transportation infrastructure to natural disasters and climate change. The program supports projects that improve the durability and reliability of transportation systems, such as flood mitigation, climate adaptation, and disaster recovery efforts. Local agencies can use PROTECT grants to strengthen infrastructure and reduce vulnerability to extreme weather events. In FY 2024, PROTECT funding totaled approximately \$450 million.

Michigan-Based Grants Supporting Trails And Greenways Michigan Spark Grants

Michigan Spark Grants fund the development and improvement of parks and trails, including bike paths, pedestrian walkways, and greenway connections. The program targets projects that improve community access to outdoor recreation and encourage physical activity. Local governments, nonprofits, and other community organizations can apply, with projects focusing on enhancing recreational infrastructure.

Michigan Natural Resources Trust Fund (MNRTF)

The MNRTF supports the acquisition and development of outdoor recreation spaces, including trails, parks, and greenways. The program prioritizes projects that enhance public access to recreational areas and encourage outdoor activities. Eligible applicants include local governments and nonprofits, and projects must align with the state's outdoor recreation goals. Funding is primarily from oil and gas royalties from state-owned lands, with annual amounts varying.



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8. Progress and Transparency Methods



Successful Safety Action Plans establish a process to evaluate and assess that implemented safety measures are effective and improving safety. Evaluation involves collecting and analyzing data from various sources such as crash reports, traffic flow studies, and feedback from partner agencies, stakeholders, and the public. By examining this data, the City of Lansing can assess the impact of safety countermeasures, identify trends, and pinpoint areas where further improvements are needed. The evaluation helps understand the real-world effectiveness of safety measures and highlight unforeseen issues that may have developed.

The City of Lansing and the SAP Steering Committee will be responsible for reviewing the findings and discuss the outcomes of the safety measures implemented as a result of this SAP. By engaging all relevant parties, the evaluation phase will enhance the SAP and bolster the shared commitment to safer transportation systems in the city of Lansing. Keeping the public informed is crucial to the success of this effort. The SAP should be made publicly available online, so continued efforts to engage the public may accompany the document.

The insights gained from evaluation and project tracking are used to refine and enhance the SAP. Based on the analysis, recommendations are made for adjustments or additional measures to further mitigate risks. This iterative process ensures that the safety plan remains dynamic and responsive to changing conditions, such as new traffic patterns or emerging technologies. Additionally, the evaluation phase provides an opportunity to celebrate successes and recognize the efforts of those who contribute to maintaining a safe transportation environment. Progress monitoring and reporting include metrics to evaluate the effectiveness of strategies and countermeasures. By leveraging successful outcomes, the City can demonstrate accountability, pursue funding opportunities, and maintain transparency with stakeholders and the public.

8.1 Metrics

Building on the criteria outlined in the prioritization matrix (Section 8.4), metrics have been developed to measure and illustrate program success. These metrics will assess fatal and serious injury crashes over time, demonstrating the impact of investments and strategies. Additionally, they will highlight the effects of safer infrastructure, traffic conditions, and overall crash rates. The metrics are designed to provide information that can be easily shared and understood by funding agencies and the public.

The figure on the next page outlines metrics that can be used to measure progress toward improving safety on the roadways in the city of Lansing. Each metric relates to the goals for safety and includes a description, a measure, and a benchmark with the average for each measure from the years 2018 through 2022.

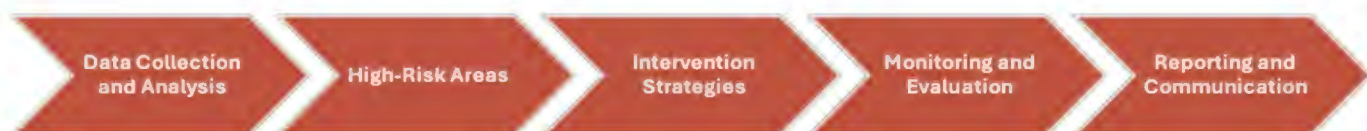
Below is an example of how the established metrics will be tracked and shared with the city of Lansing residents. The annual progress update will be shared publicly on the [Lansing Safety Action Plan website](#).

	Description	Measure	Benchmark (2018-2022)
Total Crashes	Total number of crashes occurring on roads in the City of Lansing each year.	Reduced total number of crashes each year.	3,775 average annual crashes, 0.32 crashes per capita
Fatal & Serious Injury Crashes	Total number of fatal and serious injury crashes in the City of Lansing each year.	Reduced number of fatal and serious injury crashes each year.	20 average annual FSI crashes
Vulnerable Road User Crashes	Total number of crashes involving vulnerable road users each year.	Reduced number of vulnerable road user crashes each year.	12 average annual VRU crashes
Dangerous Driver Behavior Related Crashes	Total number of speed or speeding, impaired driving, and red-light running crashes each year.	Reduced number of FSI crashes related to dangerous driver behavior each year.	88 average annual FSI crashes
Distracted Driving Related Crashes	Total number of crashes involving distracted driving each year.	Reduced number of crashes involving distracted driving each year.	14 annual distracted driving related crashes

Figure 8.1. Tracking Metrics

8.2 Updating the Plan

As conditions change, and the plan is implemented, a clear process for revising and improving the plan elements will allow for timely adjustments and continuous enhancement of safety measures. Progress tracking metrics identified in Section 9.1 will be updated annually following the release and certification of the previous year's crash data by the Michigan State Police ensuring this SAP remains aligned with evolving safety priorities.



1. Data Collection and Analysis

- **Crash Data:** Collect updated crash data for the most recent five-year period, including location, severity, lighting conditions, pavement conditions, collision type, functional class, context, date, most harmful event, and probable cause.
- **Traffic Data:** Gather information on traffic volumes, speeds, and road conditions.
- **Analysis Tools:** Utilize mapping tools like GIS to identify crash locations, refine the High-Injury Network (HIN), and assess trends and crash densities. Use analytical tools such as pivot tables, charts, and tables to summarize findings.
- **Other Inputs:** Overlay crash data with land use, demographic, and planning data to assess trends. Utilize tools like NCHRP 966 and USLIMITS2 to evaluate and enhance operational safety, including speed limits and traffic management.

2. High-Risk Areas

- **Hot Spot and Corridor Identification:** Identify locations and corridors with a high frequency of crashes.
- **Risk Factors:** Analyze contributing factors such as road design, traffic flow, driver behavior, and the involvement of vulnerable road users (VRUs), motorcycles, and transit.
- **HIN Comparison:** Use crash data and existing analysis to compare high-risk areas to the HIN.
- **Prioritization:** Prioritize improvements in the highest-risk areas, with a focus on equity.

3. Intervention Strategies

- **Engineering:** Implement strategies from the established countermeasures toolkit, including speed studies, traffic calming measures, signage, and the Safe System Approach. Categorize interventions into short-term and long-term strategies.
- **Education:** Conduct campaigns to educate decision-makers, engineers, and the public on road safety. Emphasize the impact of policies, safety standards for design, and safe driving behaviors to reduce roadway fatalities and injuries.
- **Enforcement:** Deploy targeted or broad enforcement strategies to reinforce speed limits and other safety measures in high-risk areas.



4. Monitoring and Evaluation

- **Performance Metrics:** Establish evaluation metrics based on reductions in crashes and crash severity.
- **Monitoring Process:** Develop a review and evaluation process to regularly assess traffic safety applications and plans.

5. Reporting and Communication

- **Transparency:** Use agency websites to keep the public informed about implementation efforts, policies, enforcement measures, and outcomes.
- **Stakeholder and Public Engagement:** Engage with stakeholders, the public, and law enforcement to foster collaboration and communication on key safety approaches. Implement targeted outreach to ensure input from underserved and disadvantaged communities.

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Appendix A: Public Engagement





Andy Schor, Mayor

CITY OF LANSING SAFETY ACTION PLAN *OPEN HOUSE*

JOIN US!

Thursday, November 21

4:30 P.M. - 6:30 P.M.

Gier Community Center - Community Room
2400 Hall St, Lansing, MI 48906

Attendees may arrive any time between 4:30 - 6:30 PM
to view informational boards, ask questions, and provide
feedback.

Free parking is available on-site.
Location of the meeting is near EBD Thomas at Hall St stop
of CATA Route 10 - North Lansing - Turner.

Questions? Please contact Nicole McPherson, City Engineer
nicole.mcpherson@lansingmi.gov
(517) 483-4458

The City of Lansing, with community input, is developing a Safety Action Plan that will prioritize roadway and infrastructure projects to address transportation safety challenges for Lansing residents. One of the primary goals of this plan is to provide safe streets for all travelers, including pedestrians, bicyclists, and motorists.

**Your voice matters! Please take the survey below
and visit our project website for more information.**



[Project Website](#)



[Safety Action Plan Survey](#)

City of Lansing Safety Action Plan

Open House Meeting

November 21, 2024

Purpose of the Safety Action Plan

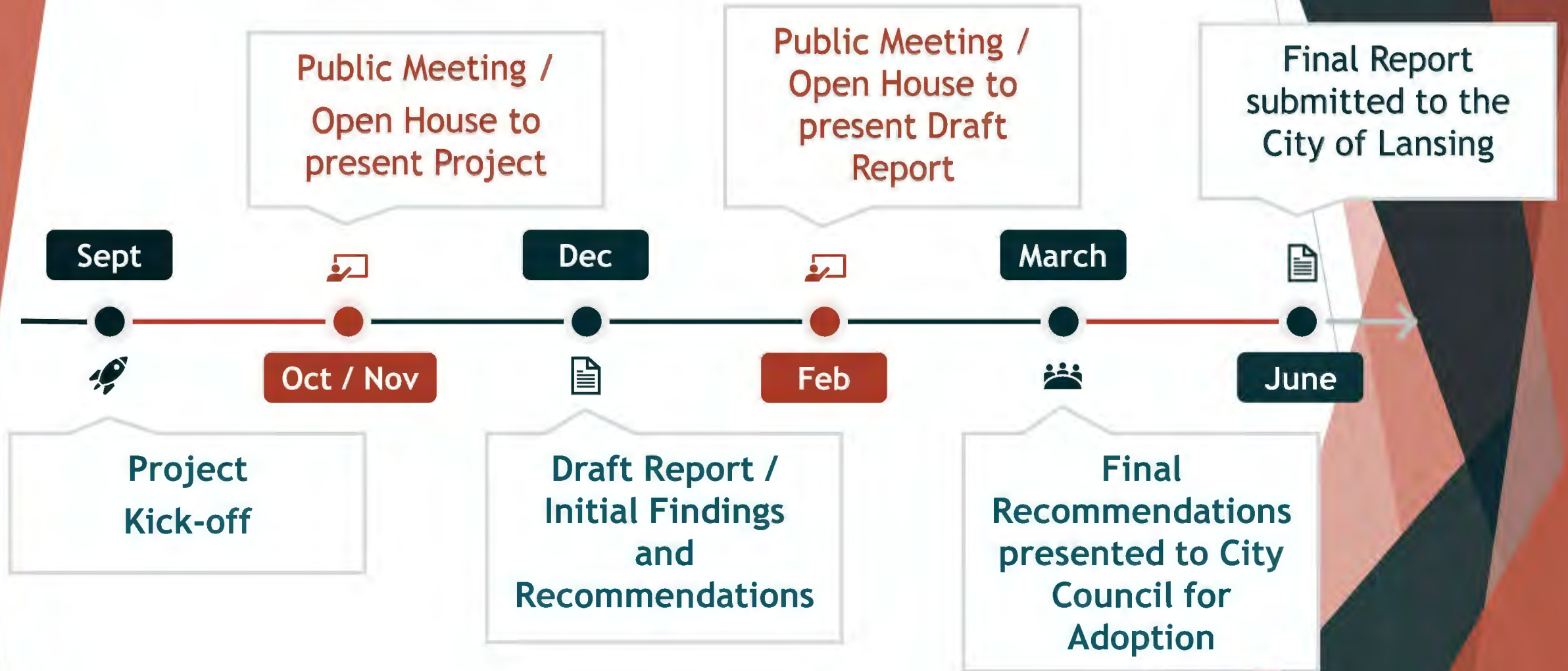
- ▶ The City of Lansing has obtained a U.S. Department of Transportation Safe Streets and Roads for All (SS4A) grant to:
 1. Review and evaluate existing regional and local safety related policies, plans, and guidelines
 2. Determine and recommend target safety goals
 3. Develop a program of projects and strategies targeted at improving safety
 4. Prioritize projects based on project readiness, funding, economic benefit analysis, equity, safety and other relevant factors

Plan Goals

- ▶ Create a Citywide Safety Action Plan
- ▶ Provide a framework focused on real world, readily implementable solutions
- ▶ Incorporate all 5 Es and the Safe System Approach:
 - ▶ Engineering
 - ▶ Education
 - ▶ Emergency Medical Response
 - ▶ Enforcement
 - ▶ Equity

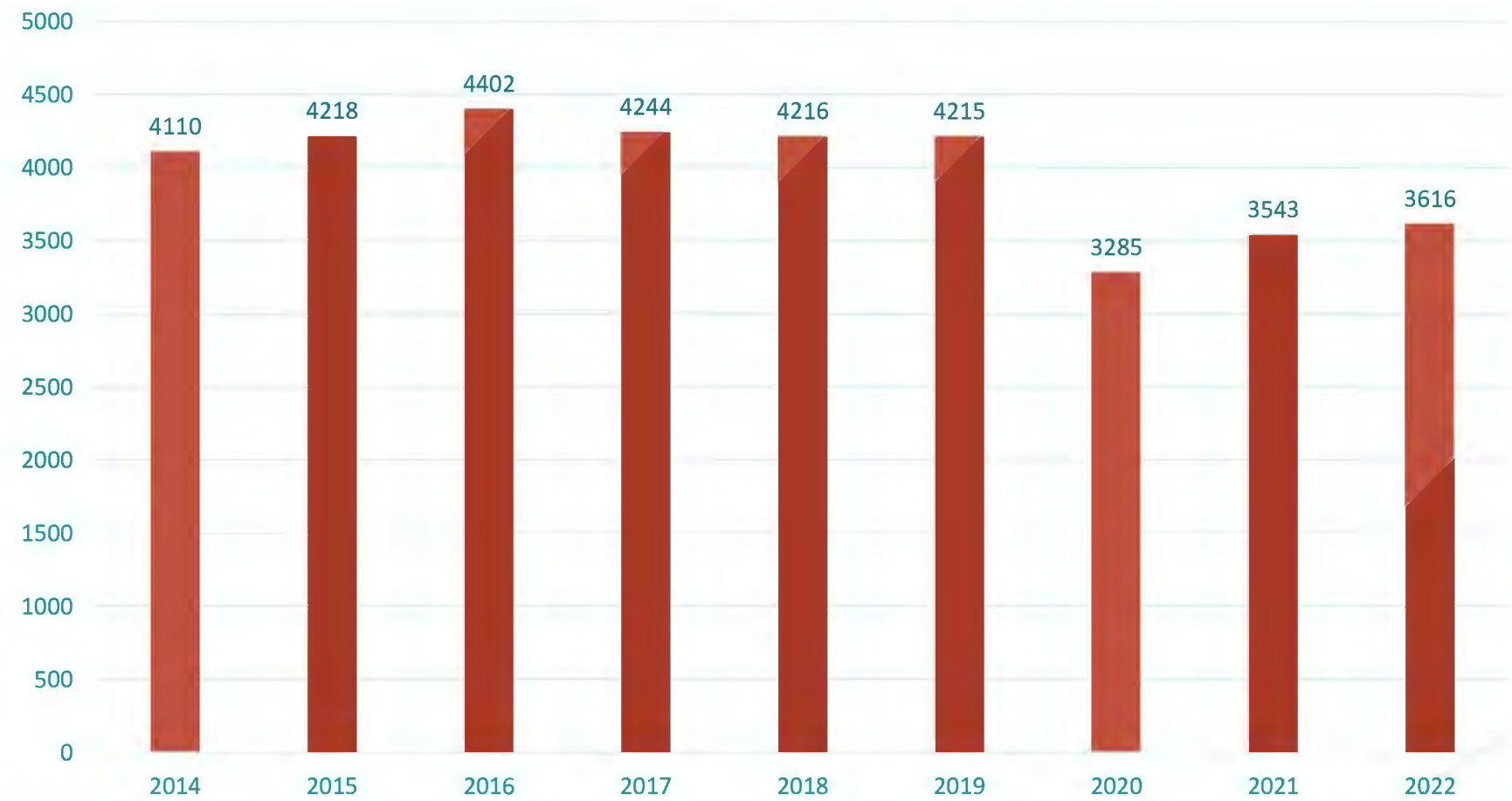


Project Schedule



Data Evaluation Overview

All Crashes by Year, 2014-2022



Data Evaluation Overview

Fatal/Incapacitating Injury Crashes, 2014-2022



Key Takeaways So Far...

- ▶ Vulnerable Road Users (pedestrians and bicyclists) account for nearly 20% of Fatal crashes
- ▶ Most prevalent overall crash types match general trends for urbanized areas but a focus on Fatal / Serious Injury crashes necessitates the need for a shift in priorities and strategies

Total Crashes

Crash Type	# of Crashes	% of Total Crashes
Rear-End Straight	9242	25.8%
Angle Straight	5996	16.7%
Side-Swipe Same	5672	15.8%
Subtotal	20,910 (of 35,849)	58.3%

Fatal Crashes

Fatal Crash Type	# of Fatal Crashes	% of Total Crashes
Fixed Object	21	24.4%
Angle Straight	17	19.8%
Pedestrian/Bicycle	17	19.8%
Subtotal	55 (of 86 total)	64%

Key Takeaways So Far...

- Over 70% of Fatal and Incapacitating Injury crashes are occurring on Principal Arterials and Minor Arterials

NFC	Fatal		Incapacitating Injury		Non-Incapacitating Injury	Possible Injury	No Injury	Grand Total
Interstate	10	12%	40	7%	121	383	2392	2946
Other Freeway		0%	5	1%	4	16	99	124
Other Principal Arterial	47	55%	284	47%	749	2618	12011	15709
Minor Arterial	18	21%	141	23%	369	1379	6566	8473
Major Collector	3	3%	43	7%	95	320	1820	2281
Local	8	9%	84	14%	200	565	5260	6117
Not a certified public road		0%	4	1%	9	21	165	199
				100				
Grand Total	86	100%	601	%	1547	5302	28313	35849

Key Takeaways So Far...

- Concentration on Principal Arterials and Minor Arterials also applies to VRU crashes

	Killed	Incapacitating Injury
Bicycle total crashes	1	31
Interstate		
Other Principal Arterial	1	14
Minor Arterial		5
Major Collector		5
Local		6
Not a certified public road		1
Pedestrian total crashes	16	74
Interstate	1	1
Other Principal Arterial	12	40
Minor Arterial	1	16
Major Collector	1	5
Local	1	12
Not a certified public road		
Grand Total	17	105



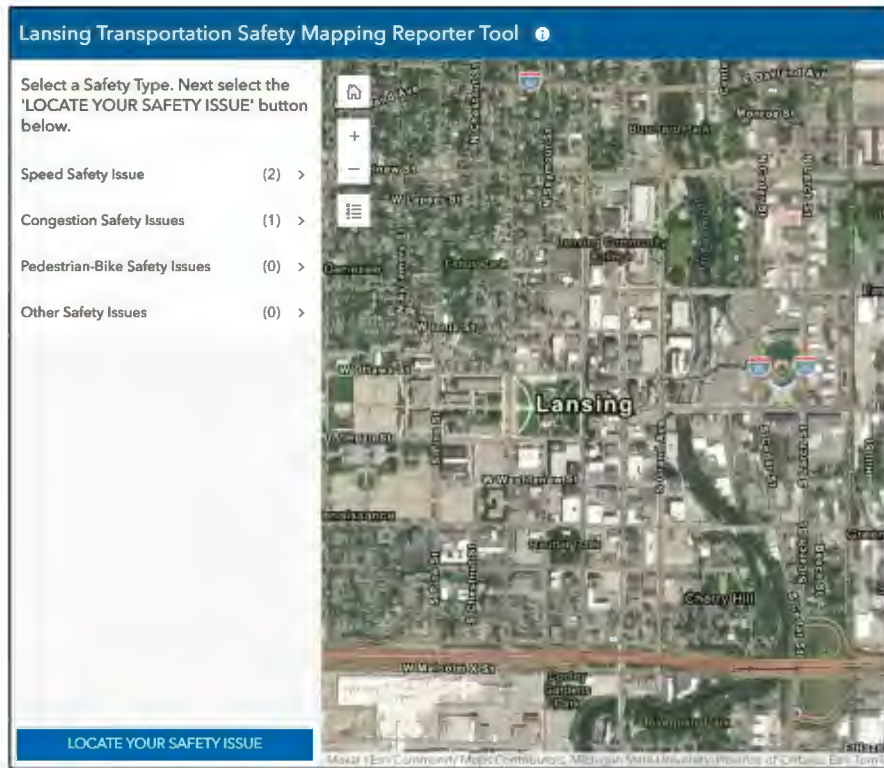
Take our Public Survey!

- ▶ A public survey has been developed to understand:
 - ▶ Public transit and non-motorized frequency
 - ▶ Commuting habits
 - ▶ Perceived safety while traveling in Lansing
 - ▶ Safety priorities
 - ▶ Crash and safety hotspots



[City of Lansing Safety
Action Plan Survey
\(arcgis.com\)](https://arcgis.com)

Use our Mapping Tool!



- ▶ A mapping tool has been developed to help the public and stakeholders identify crash and safety hotspots throughout the City of Lansing



[Lansing Transportation
Safety Mapping
Reporter Tool
\(arcgis.com\)](https://arcgis.com)

**THANK YOU FOR
PARTICIPATING TO
HELP MAKE LANSING'S
ROADS SAFE!**



LANSING SAFETY ACTION PLAN

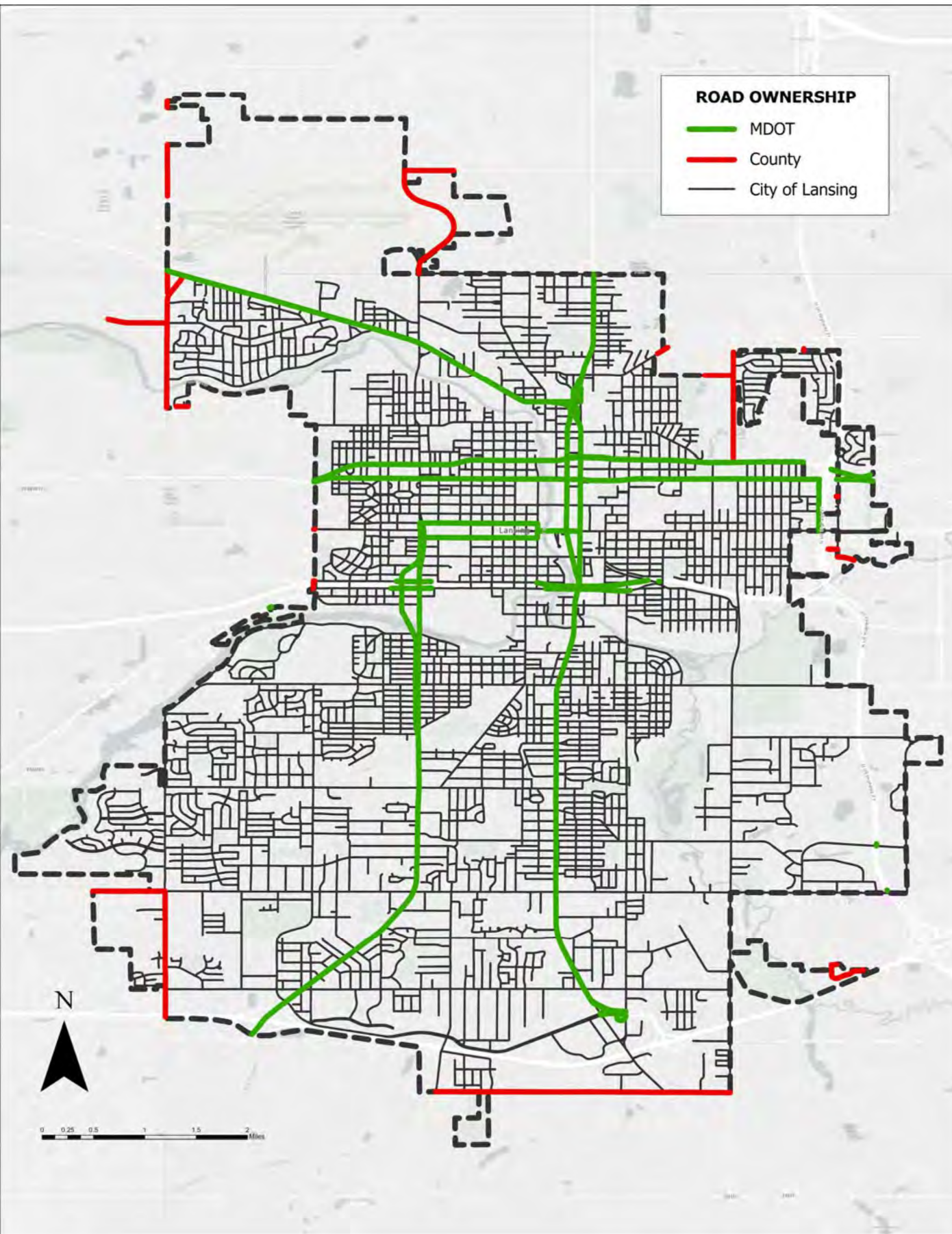
Project Overview

The City of Lansing has secured a Safe Streets and Roads for All (SS4A) grant from the U.S. Department of Transportation to create a comprehensive strategy to reduce roadway fatalities and serious injuries.

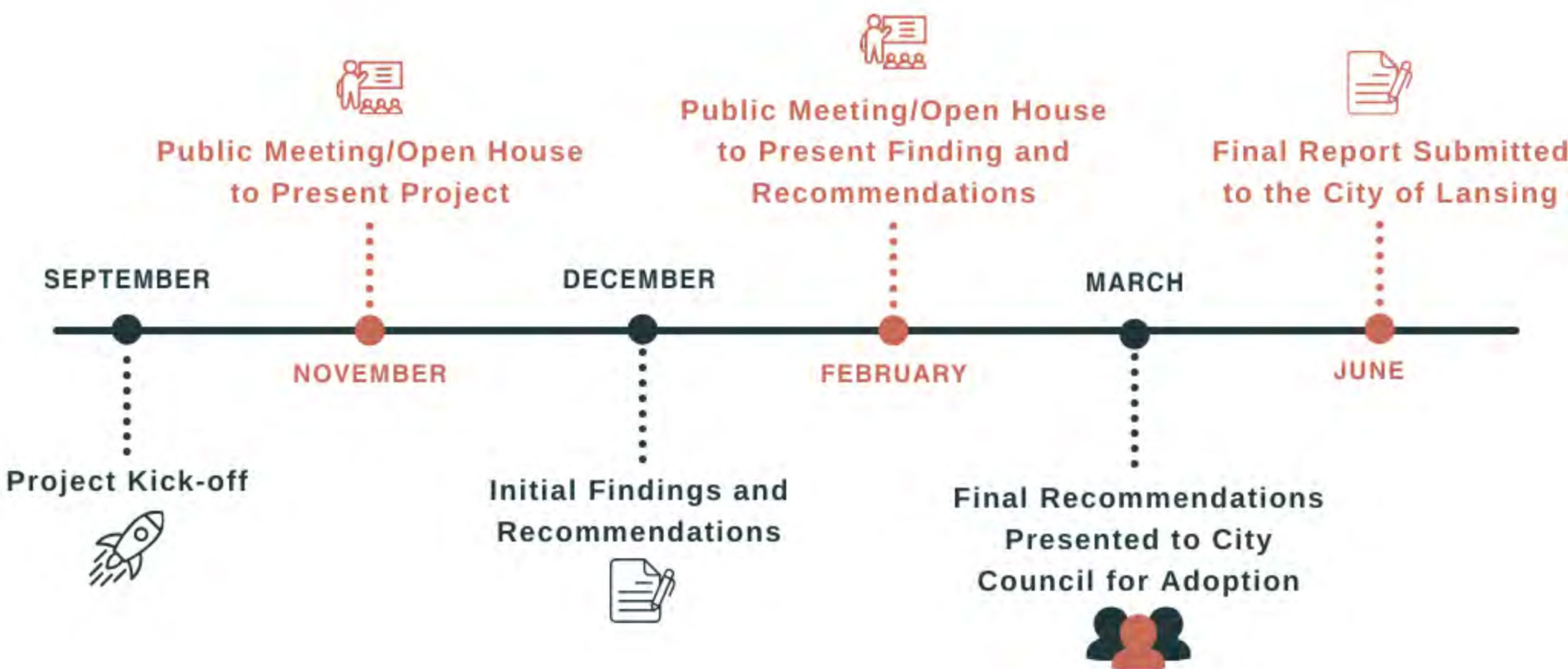
With community input, this plan will prioritize roadway and infrastructure projects that address transportation safety challenges for County residents and support future funding opportunities for safety projects. Over the next several months, the City of Lansing will be working with representatives of the community, major employers, the school district, and other groups to identify concerns and ideas related to this plan to improve transportation safety.



City of Lansing Road Ownership



PROJECT SCHEDULE



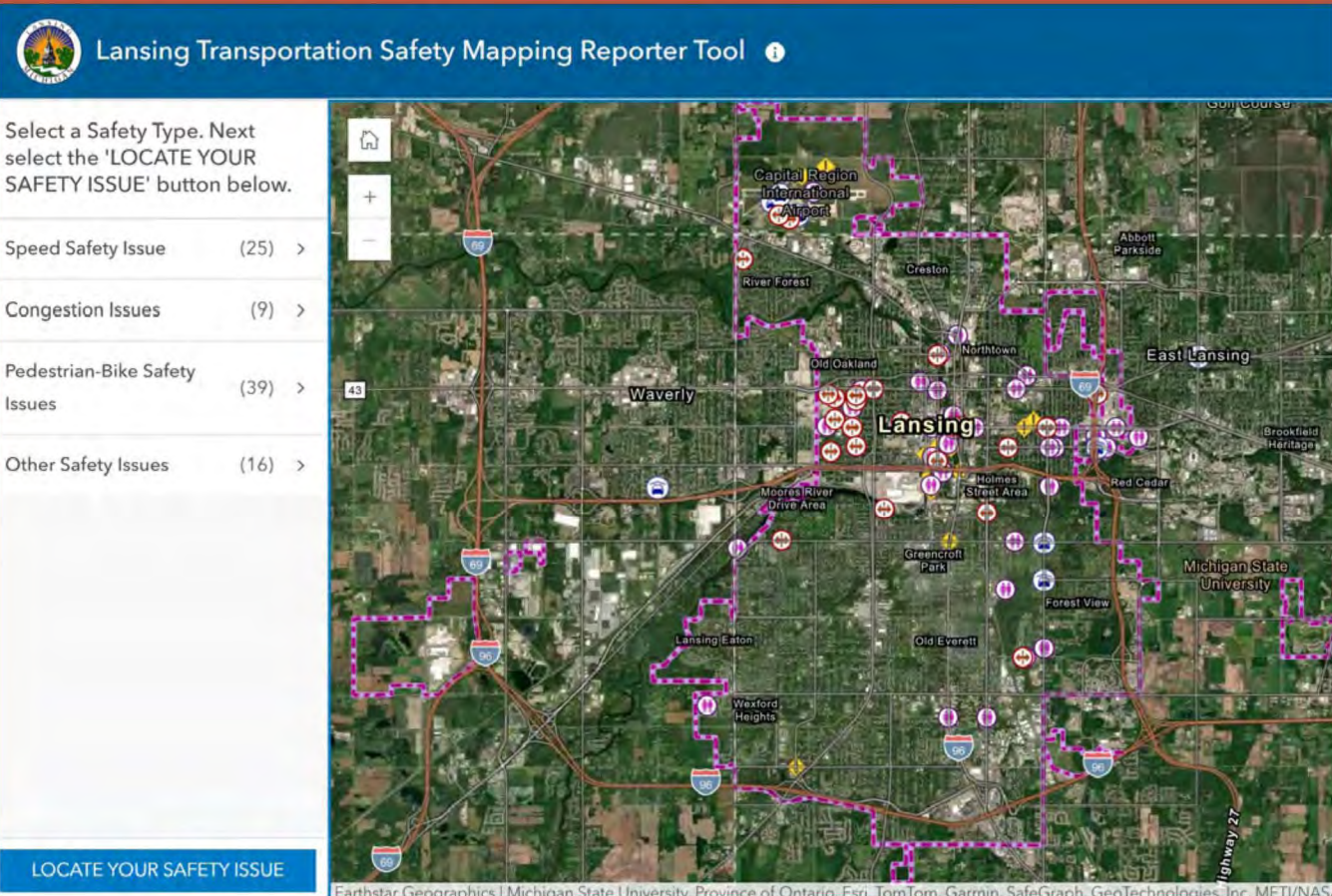
Tell Us What You Think!

Please take a few moments to respond to the survey and interactive mapping tool to let us know your thoughts regarding transportation safety in the City of Lansing.

Take the survey here:



Use our interactive mapping tool to place your safety priorities at specific locations throughout the city:



CRASH DATA ANALYSIS

Crash Density

These maps visualize the crash density throughout the Lansing area. This data will be combined with stakeholder/public input to prioritize areas that need safety improvements.

The left map shows fatal and injury crashes (FI) for all transportation modes including vehicles, pedestrians, and bicyclists.

The right map shows only those vehicular crashes involving pedestrians or bicyclists, also known as vulnerable road users (VRU).

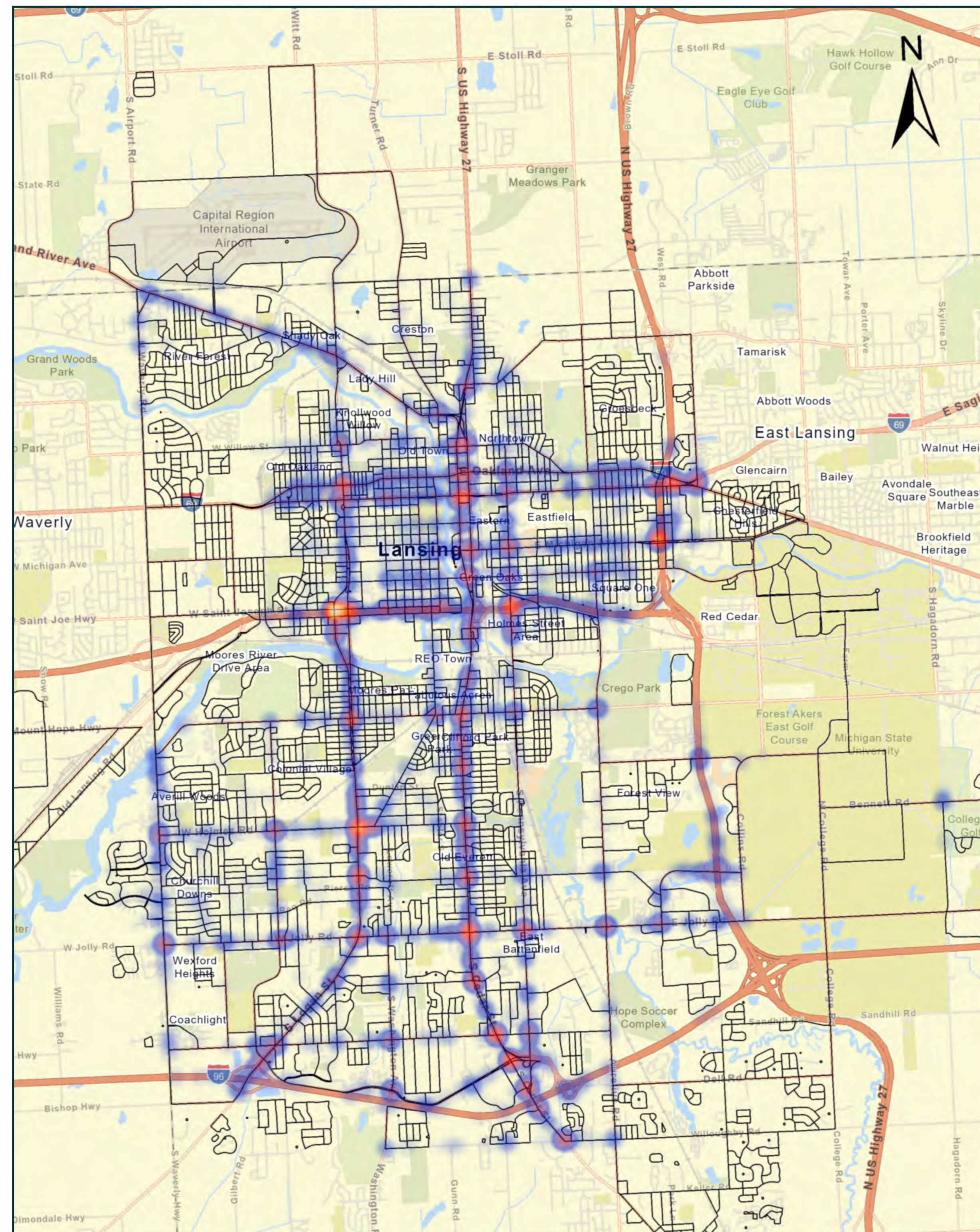
Legend

Relative Crash Density



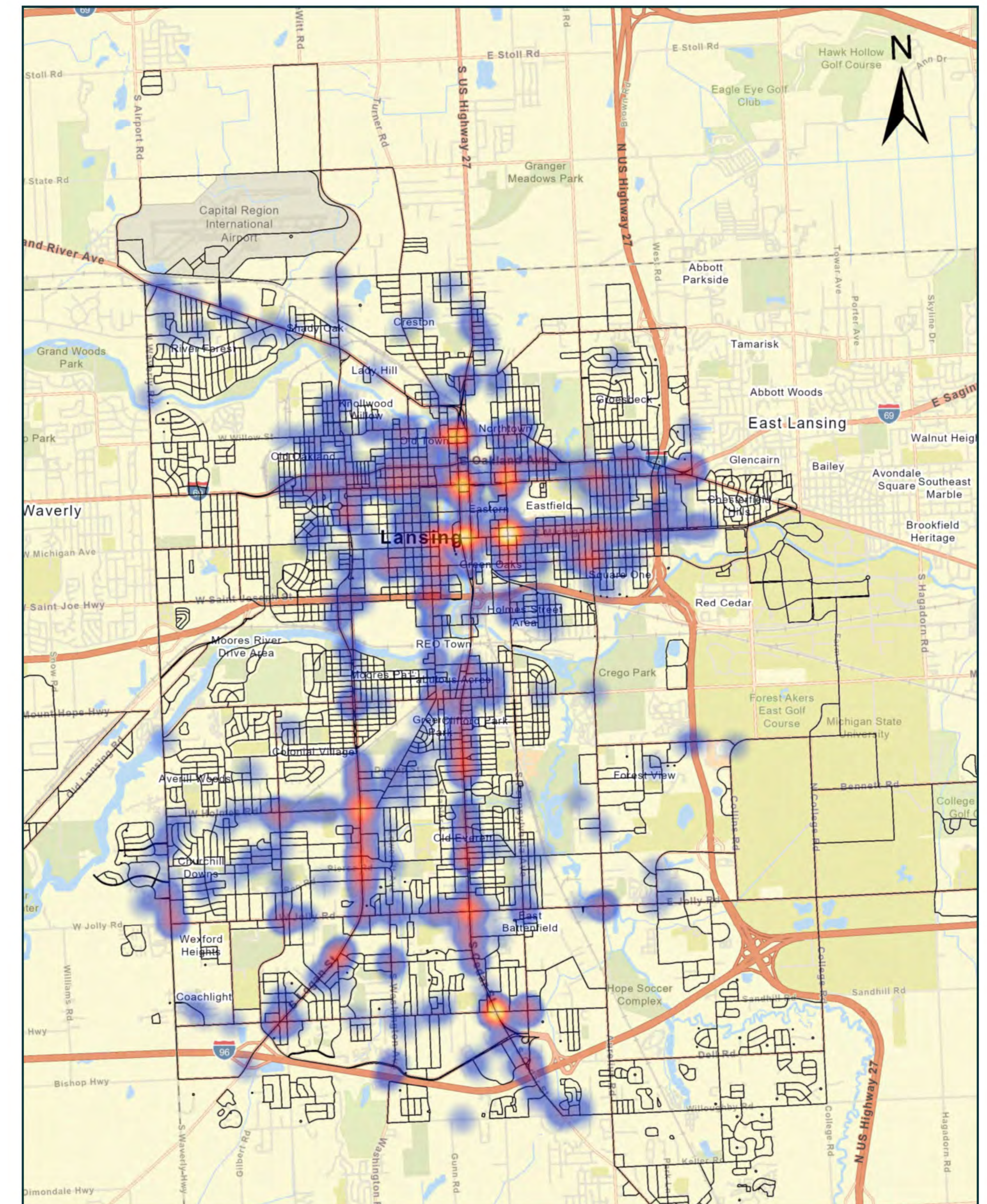
City Boundary

Fatal and Injury Crashes (2014 - 2022)



0 0.5 1 2 Miles

Vulnerable Road User Crashes (2014 - 2022)



0 0.5 1 2 Miles

Visit our project website for more information:

<https://www.lansingmi.gov/1246/Lansing-Safety-Action-Plan>

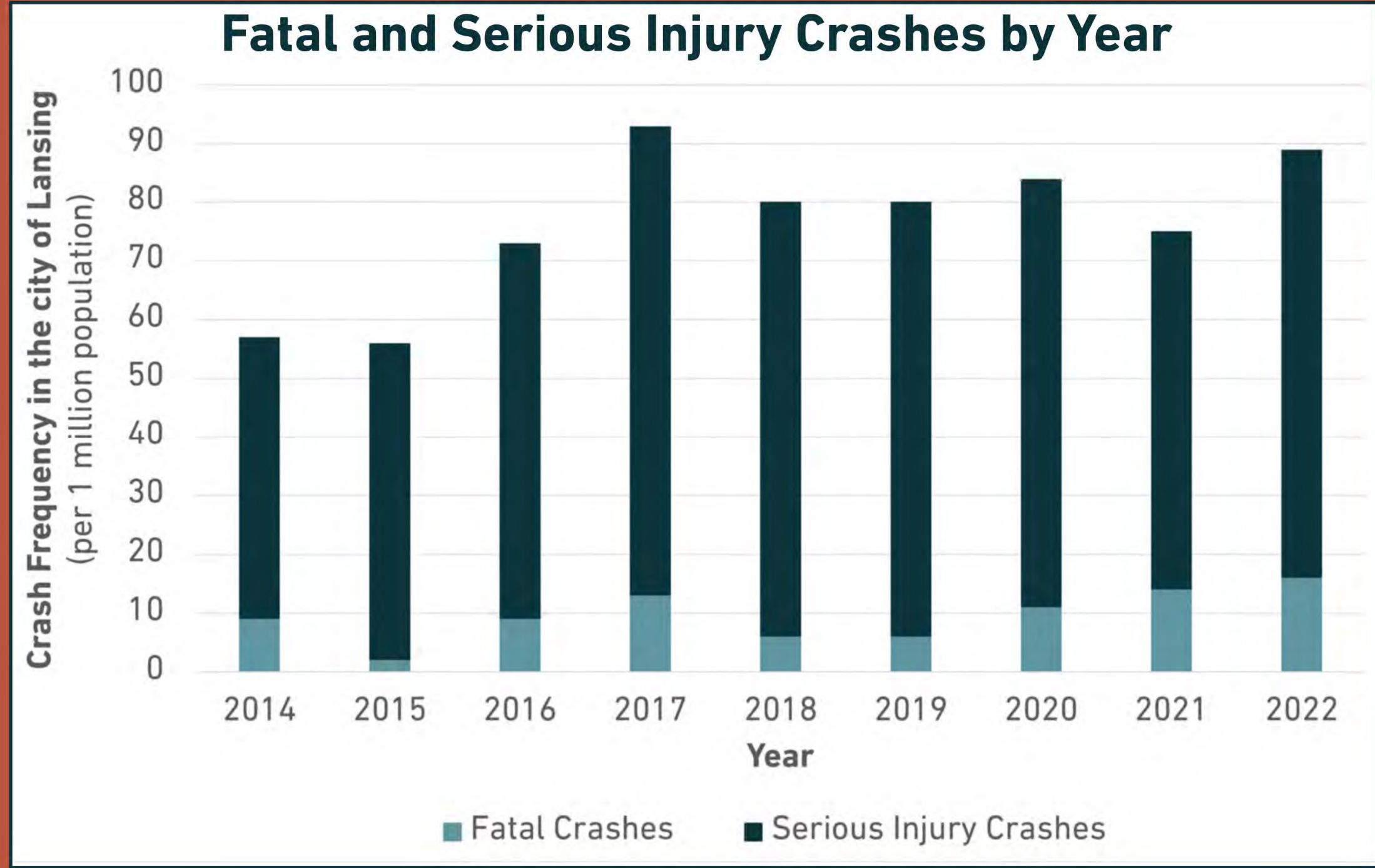
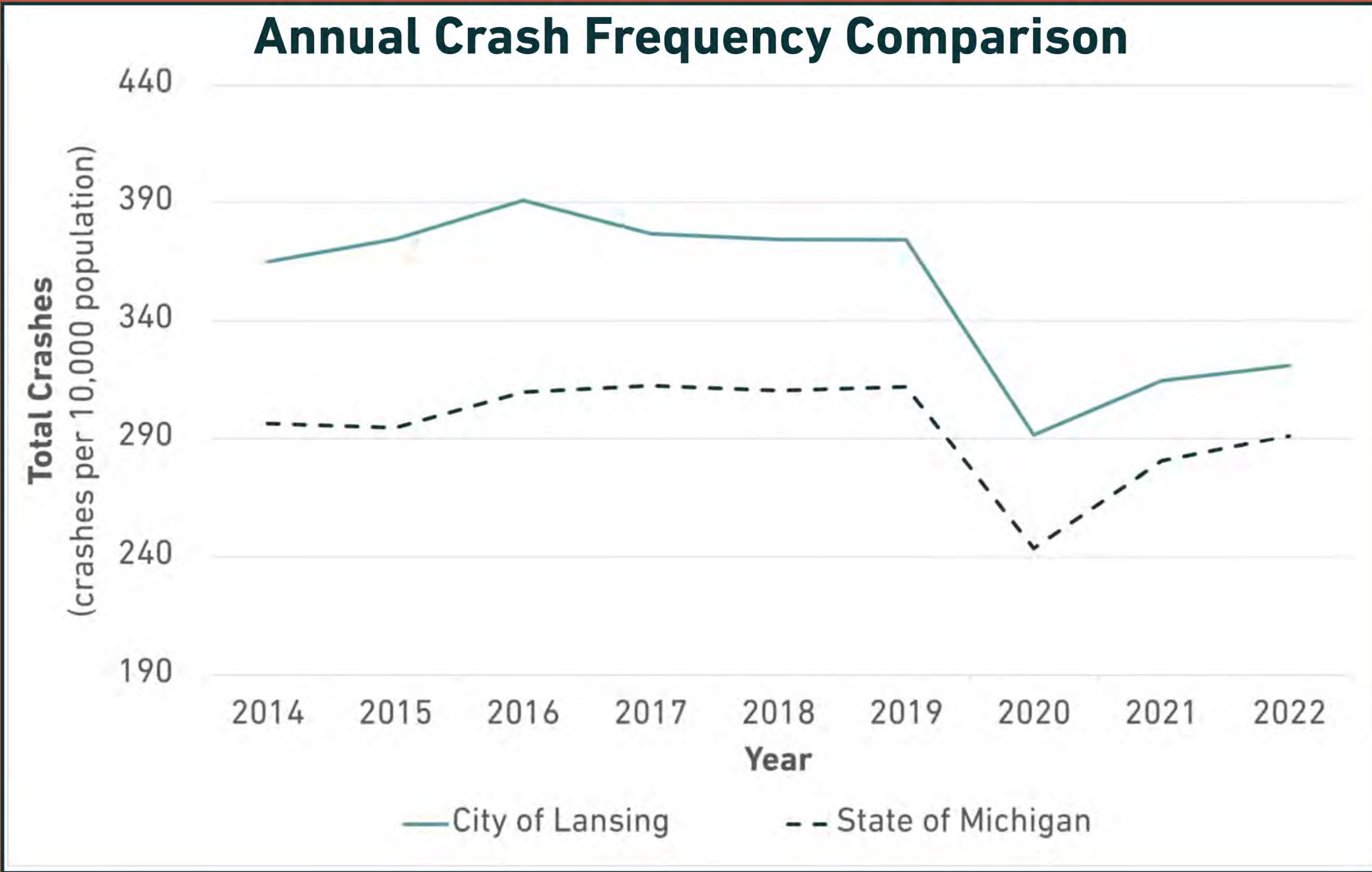


CRASH DATA ANALYSIS

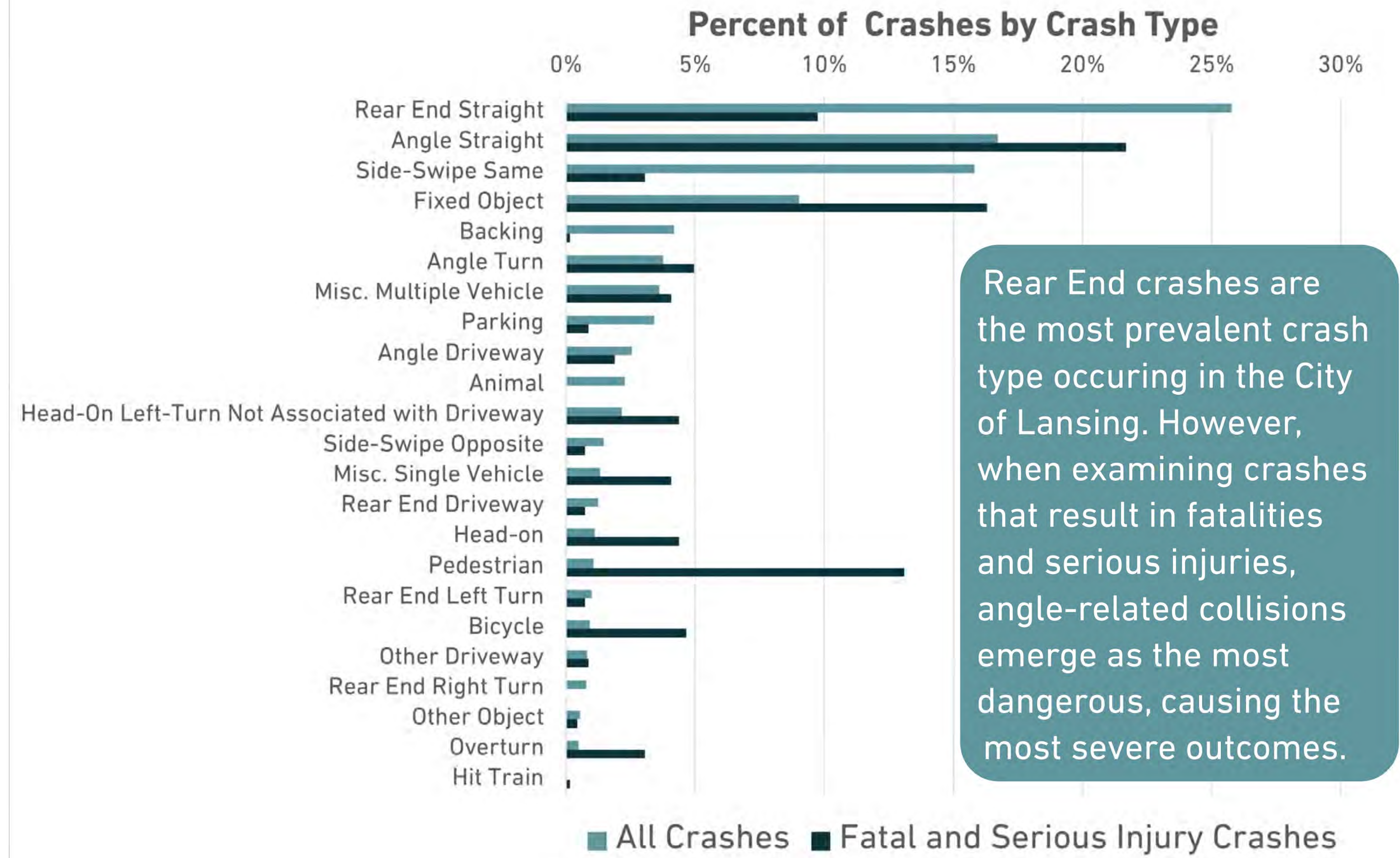
Annual Crash Trends

These graphs visualize the crash trends experienced between 2014 and 2022.

- The city of Lansing experiences more crashes per year than the state of Michigan average on a population basis.
- The frequency of fatal crashes in the city of Lansing has increased over the last five years with 2022 having the most fatal crashes.



Crash Distrubution by Type and Severity



Top Four Serious Injury Crash Types

Angle Crash

29% FSI

25 Fatal Crashes | 171 Serious Crashes

Angle related crashes are those crashes involving vehicles traveling perpendicular to each other prior to collision and are often referred to as T-Bone crashes. Angle crashes can involve a vehicle intending to continue travelling straight ahead or vehicles attempting to complete a turning maneuver at an intersection or driveway.

Pedestrian-Bike Crash

18% FSI

17 Fatal Crashes | 105 Serious Crashes

Crashes involving vehicles striking a pedestrian or a bicyclist are also referred to as vulnerable road user (VRU) crashes. VRUs are at a higher risk of injury or fatality due to their lack of protection compared to occupants of motor vehicles.

Fixed Object Crash

16% FSI

21 Fatal Crashes | 91 Serious Crashes

Fixed object crashes involve vehicles colliding with a non-moving, stationary object that is permanently located alongside the roadway. Common fixed objects include utility poles, traffic signs, trees, curbs and drainage ditches, and guardrails.

Rear-End Crash

12% FSI

3 Fatal Crashes | 77 Serious Crashes

Rear end crashes are those in which one vehicle collides with the back of another vehicle. Rear end crashes often occur when the lead vehicle slows or stops for a red light, a stop sign, or to turn into a driveway. These collisions can involve multiple vehicles, where the initial crash pushes subsequent vehicles forward into one another.



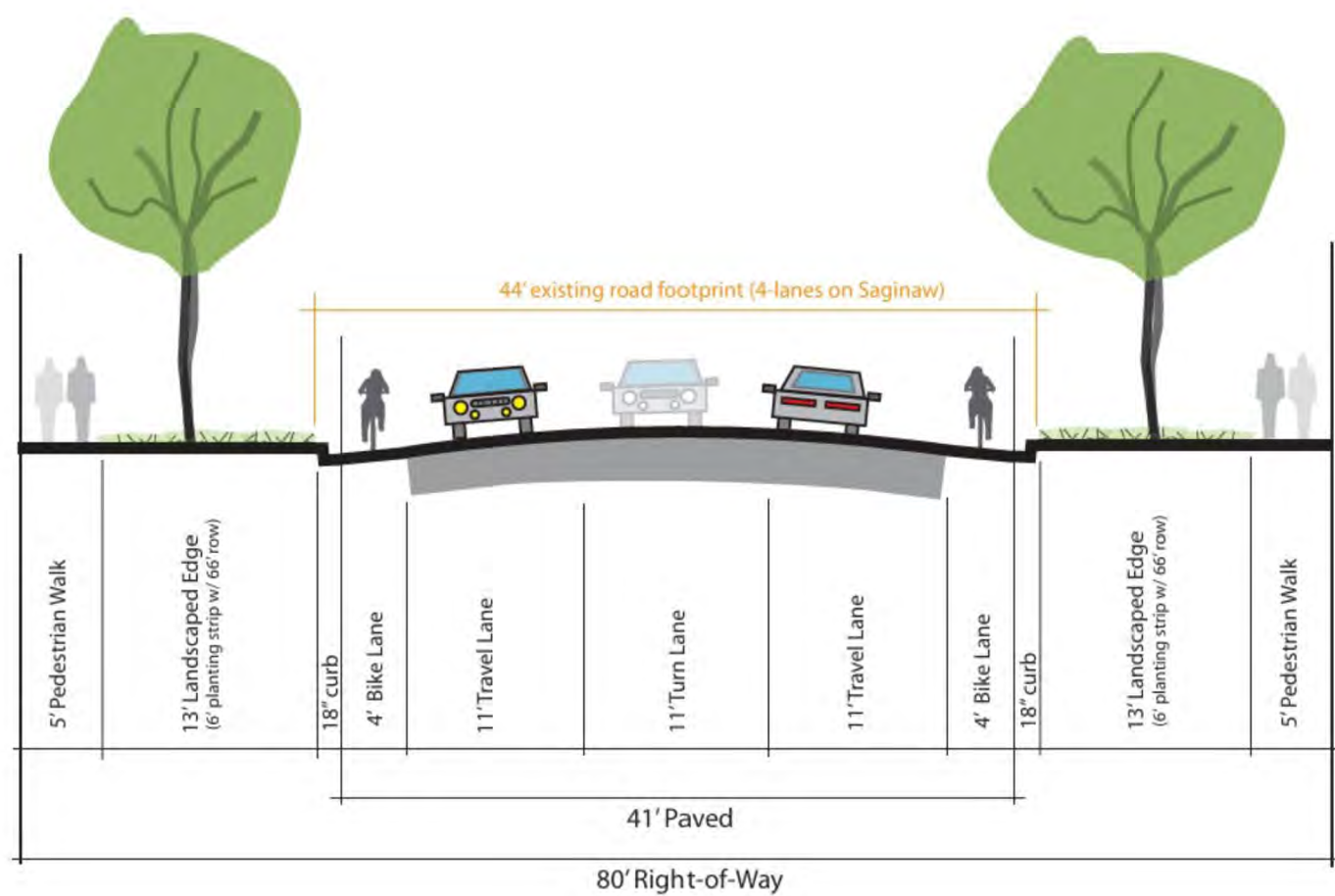
EXISTING PLANS AND POLICIES

Plan and Policy Review

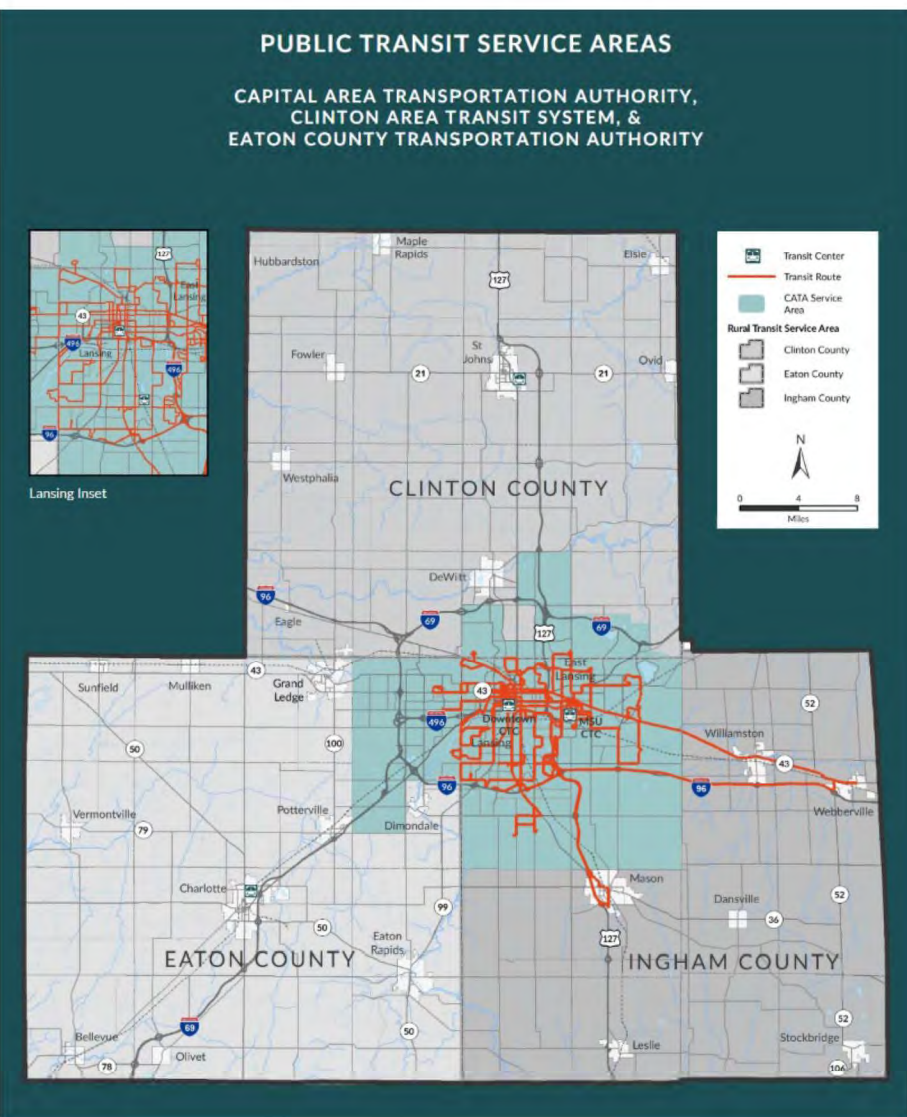
Previous plans and policies were reviewed and summarized to understand previous initiatives and goals of the City of Lansing. These plans and policies will be taken into consideration throughout the development of the Safety Action Plan.

Plans and policies that were reviewed include:

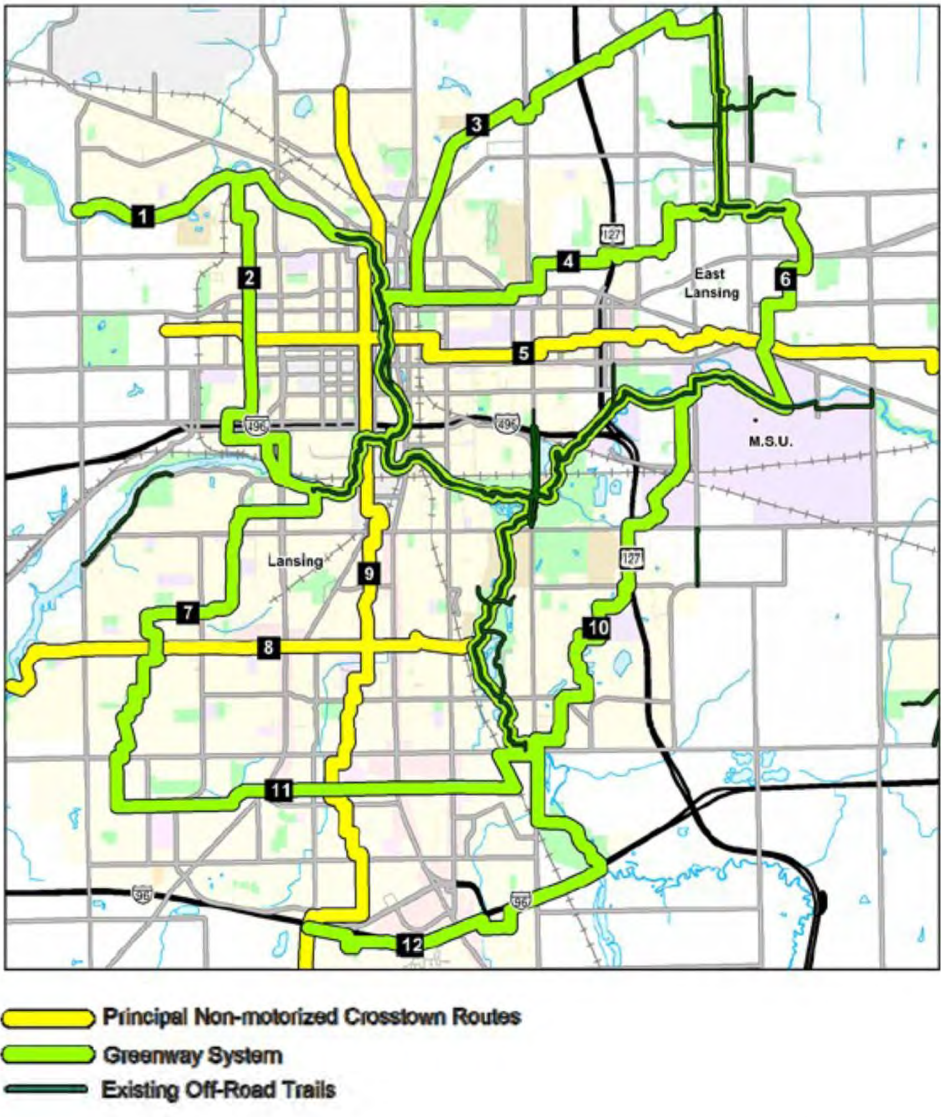
- One-way to Two-way Downtown Lansing Street Conversion Project
- Moving Mid-Michigan 2045 Metropolitan Transportation Plan - 2020
- Shaping the Avenue: Unique Places and Community Spaces - 2017
- Design Lansing Comprehensive Plan - 2012
- Walk and Bike Lansing (Non-Motorized Plan) - 2012



Design Lansing Comprehensive Plan



Tri-County Metropolitan Transportation Plan



Walk and Bike Lansing Non-Motorized Transportation Plan

Key Takeaways from all Plans/Policies reviewed:

- Residents desire enhanced street designs to accommodate pedestrians and cyclists, transit service, and increased access to the non-motorized trails.
- Gateway corridors into the city should be enhanced with streetscaping, sidewalk treatments, lighting and crosswalks to be aesthetically appealing and more accessible by all modes of travel.
- Corridors identified as candidates to become complete streets with potential for bike lanes are Holmes Road, Saginaw Street, Oakland Avenue, Pleasant Grove Road, and Mount Hope Avenue.
- Non-motorized crossings identified as those that need to be improved include the intersection of Holmes Road and Martin Luther King Jr Boulevard, the Frandor Shopping Center area, and crossings along Martin Luther King Jr Boulevard south of the Grand River.
- Bike parking, bike sharing, and route signage were the most preferred bike amenities residents desire.
- The City is in the process of converting the remaining one-way streets downtown to two-way operation to reduce trip lengths, improve access, and reduce driver confusion.
- The City supports traffic calming strategies including reducing the number of travel lanes, roundabouts, sidewalk widening, streetscape improvement, installing speed humps and other traffic calming measures, and improving transit.

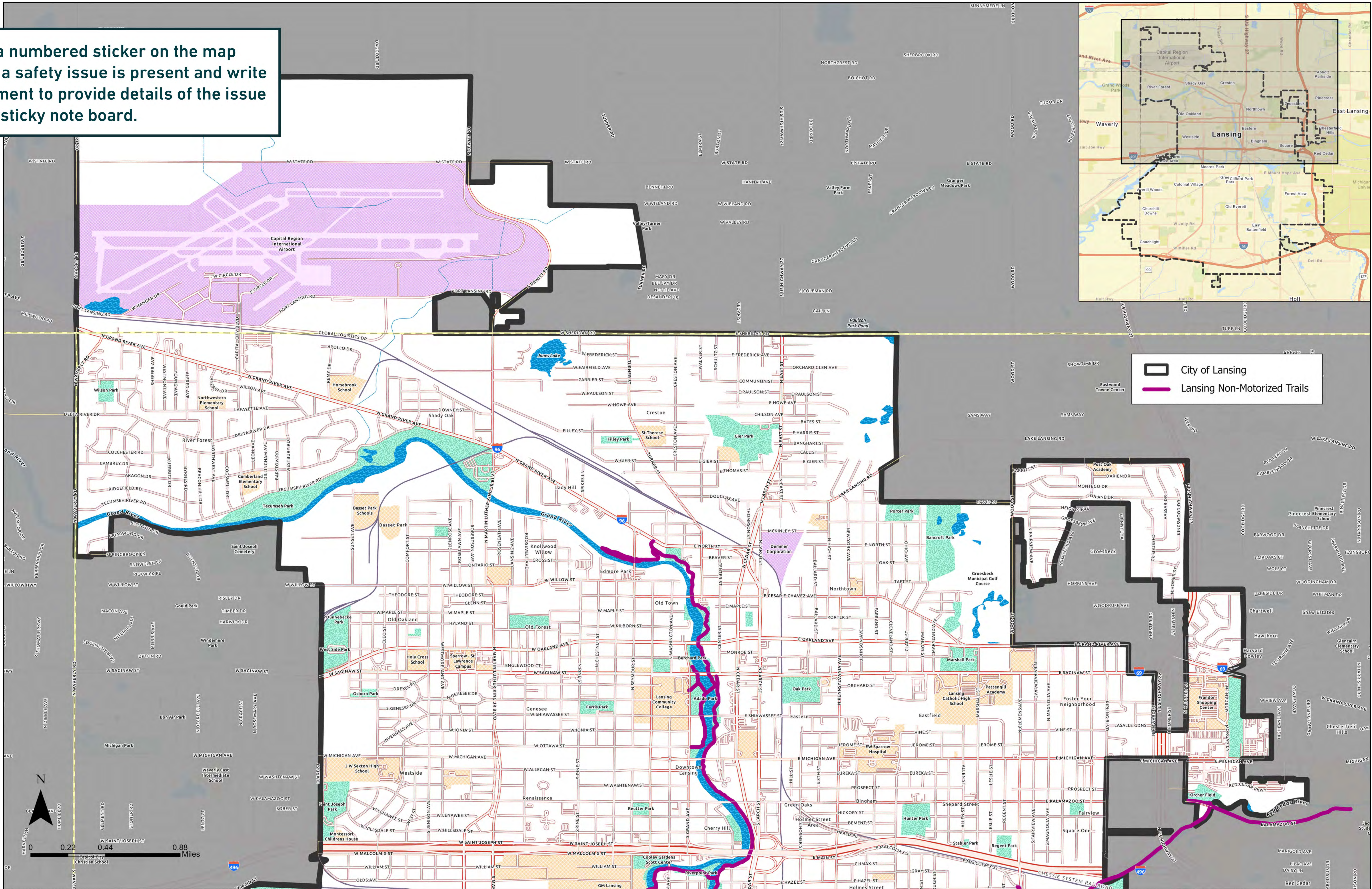
What other policies would you like to see included in the Safety Action Plan?

Write Your Comments Here:



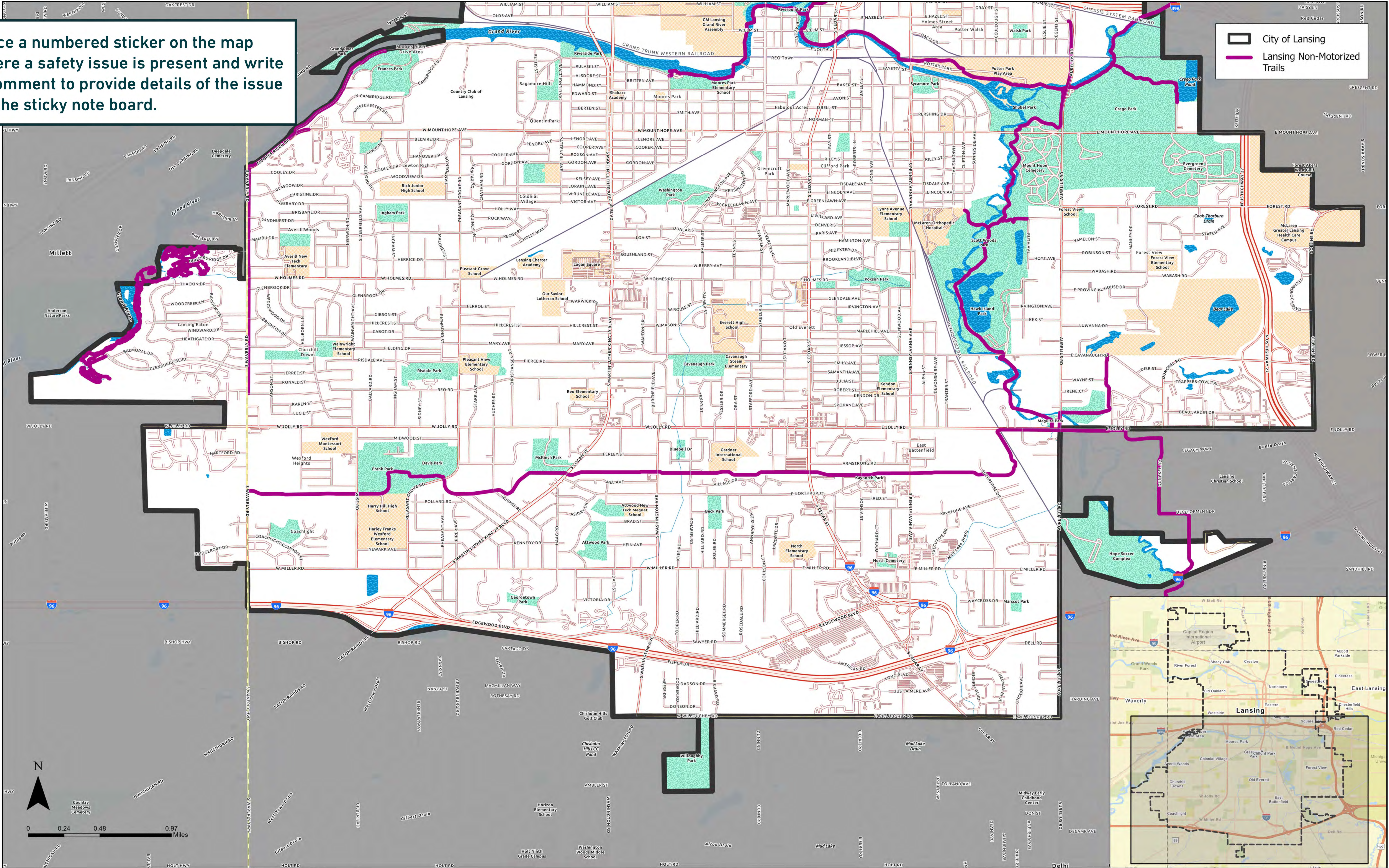
MAP YOUR SAFETY CONCERNS AND PRIORITIES!

Place a numbered sticker on the map where a safety issue is present and write a comment to provide details of the issue on the sticky note board.



MAP YOUR SAFETY CONCERNS AND PRIORITIES!

Place a numbered sticker on the map where a safety issue is present and write a comment to provide details of the issue on the sticky note board.



MAP YOUR SAFETY CONCERNS AND PRIORITIES!

Place a numbered dot sticker on the map where each of following issues are present within the city:

Speed Issue	
Congestion Issue	
Pedestrian or Bicycle Issue	
Other Transportation Issues	

Write down which safety issues you encounter in Lansing or improvements you would like to see as a part of the Safety Action Plan. Include the corresponding number from the dot sticker on your note.



MAP YOUR SAFETY CONCERNS AND PRIORITIES!

Place a numbered dot sticker on the map where each of following issues are present within the city:

Write down which safety issues you encounter in Lansing or improvements you would like to see as a part of the Safety Action Plan. Include the corresponding number from the dot sticker on your note.

Speed Issue	
Congestion Issue	
Pedestrian or Bicycle Issue	
Other Transportation Issues	



City of Lansing Safety Action Plan

•Tell Us About Yourself:

◉ What is your ZIP Code? *

if Other please specify

48910

48912

48915

48917

48823

48911

48906

48933

48864

48854

48820

48837

48842

48813

0

10

20

30

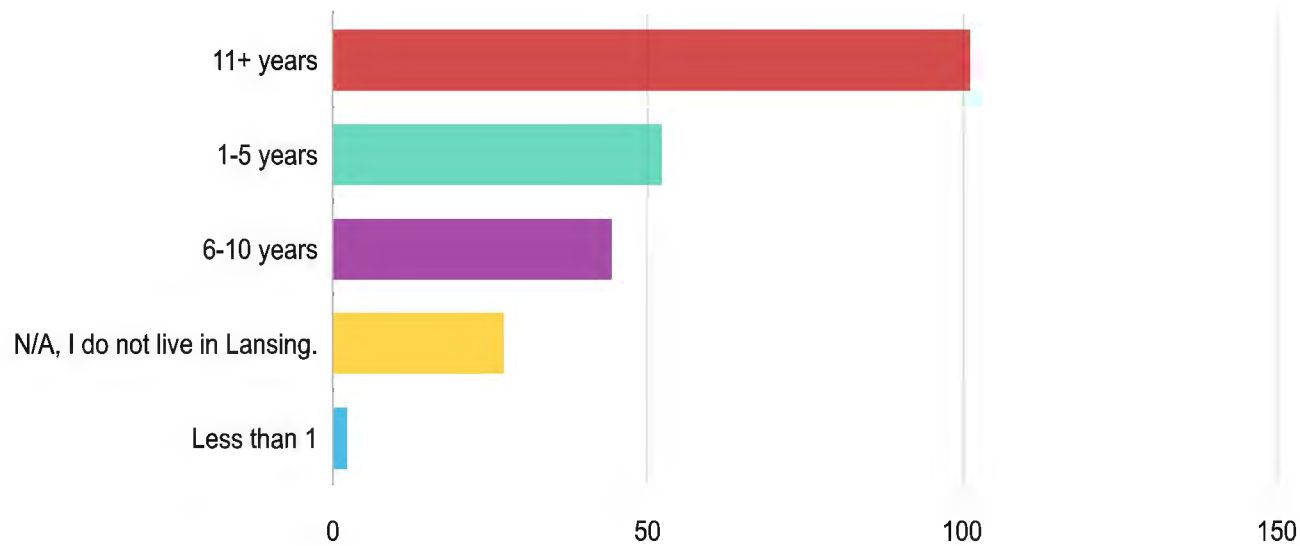
40

50

Answers	Count	Percentage
48910	47	20.8%
48912	38	16.81%
48915	38	16.81%
48917	18	7.96%
48823	17	7.52%
48911	17	7.52%
if Other please specify	15	6.64%
48906	12	5.31%
48933	10	4.42%
48864	6	2.65%
48854	3	1.33%
48820	2	0.88%
48837	2	0.88%
48842	1	0.44%
48813	0	0%

Answered: 226 Skipped: 0

○ How long have you lived in Lansing?



Answers

Count

Percentage

11+ years

101

44.69%

1-5 years

52

23.01%

6-10 years

44

19.47%

N/A, I do not live in Lansing.

27

11.95%

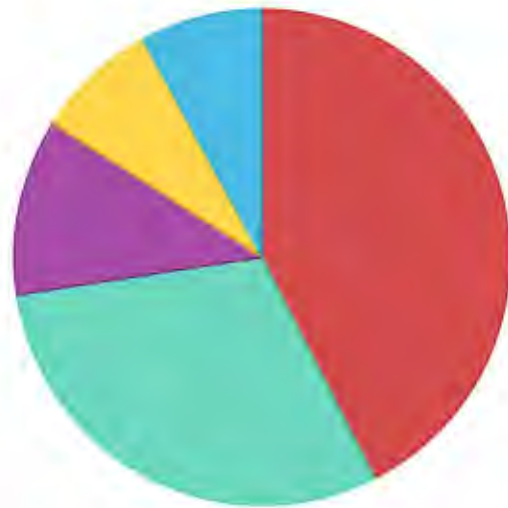
Less than 1 year

2

0.88%

Answered: 226 Skipped: 0

○ What is your age?

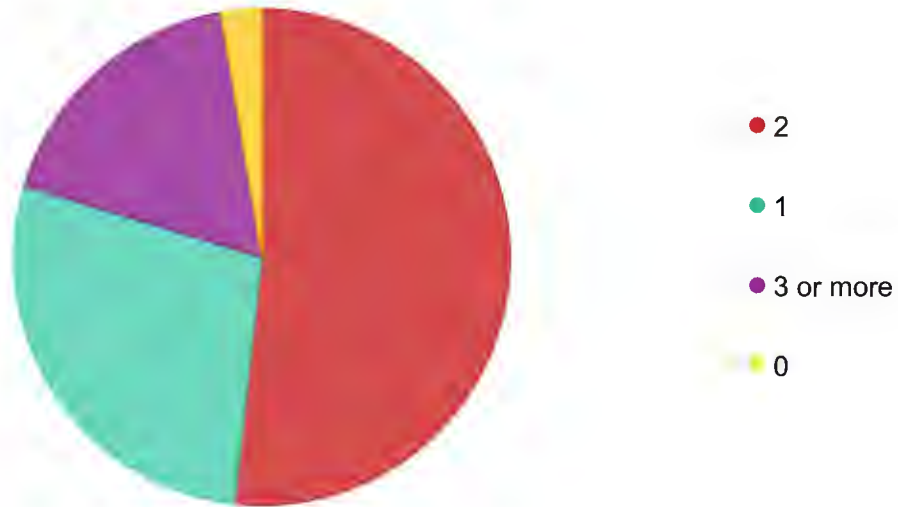


- 36-54
- 26-35
- 55-64
- 19-25
- 65+
- 18 or under
- I prefer not to answer.

Answers	Count	Percentage
36-54	96	42.48%
26-35	68	30.09%
55-64	26	11.5%
19-25	18	7.96%
65+	18	7.96%
18 or under	0	0%
I prefer not to answer.	0	0%

Answered: 226 Skipped: 0

○ How many people in your household drive?



Answers

Count

Percentage

2

117

51.77%

1

63

27.88%

3 or more

40

17.7%

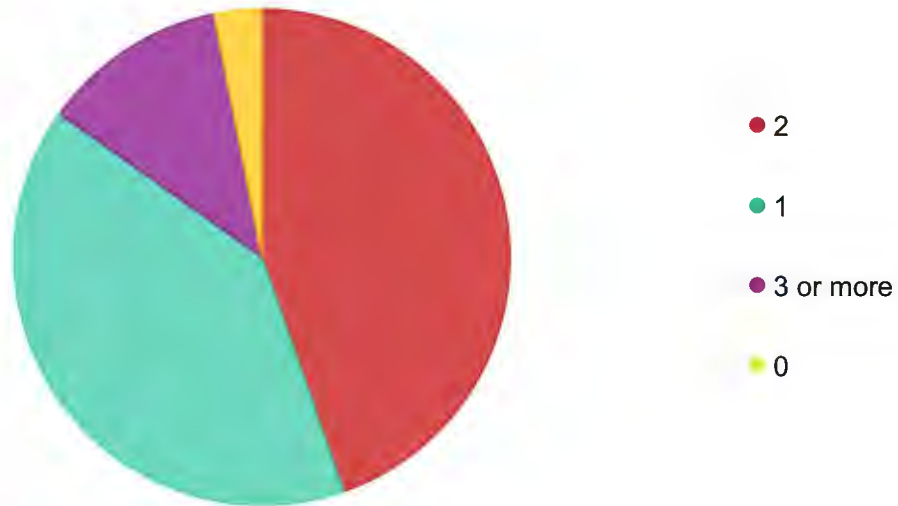
0

6

2.65%

Answered: 226 Skipped: 0

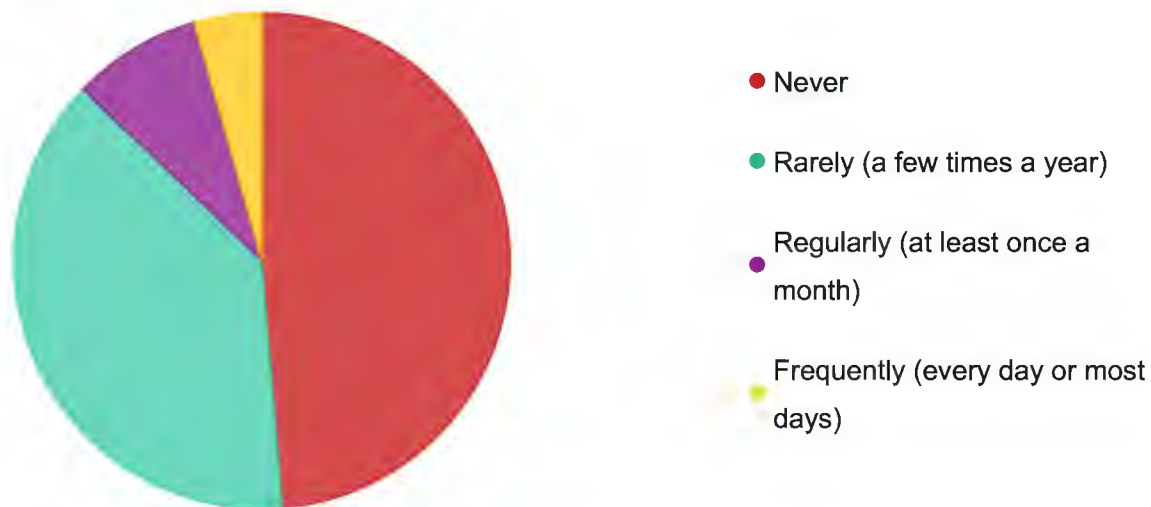
○ How many vehicles are available in your household drive?



Answers	Count	Percentage
2	100	44.25%
1	90	39.82%
3 or more	27	11.95%
0	7	3.1%

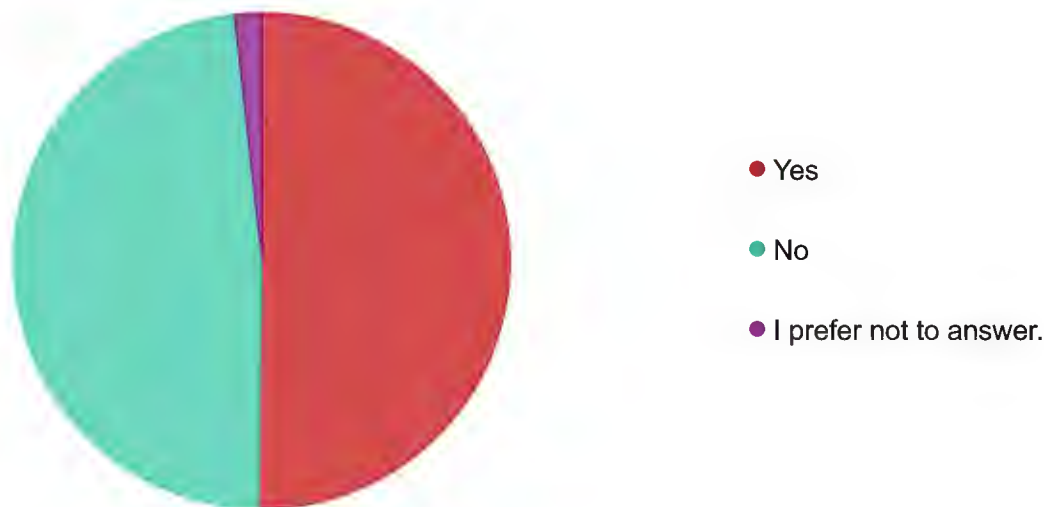
Answered: 224 Skipped: 2

○ How often do you take public transit?



Answers	Count	Percentage
Never	110	48.67%
Rarely (a few times a year)	87	38.5%
Regularly (at least once a month)	19	8.41%
Frequently (every day or most days)	10	4.42%
Answered: 226 Skipped: 0		

○ Has anyone in your household, including yourself, been involved in a crash in...

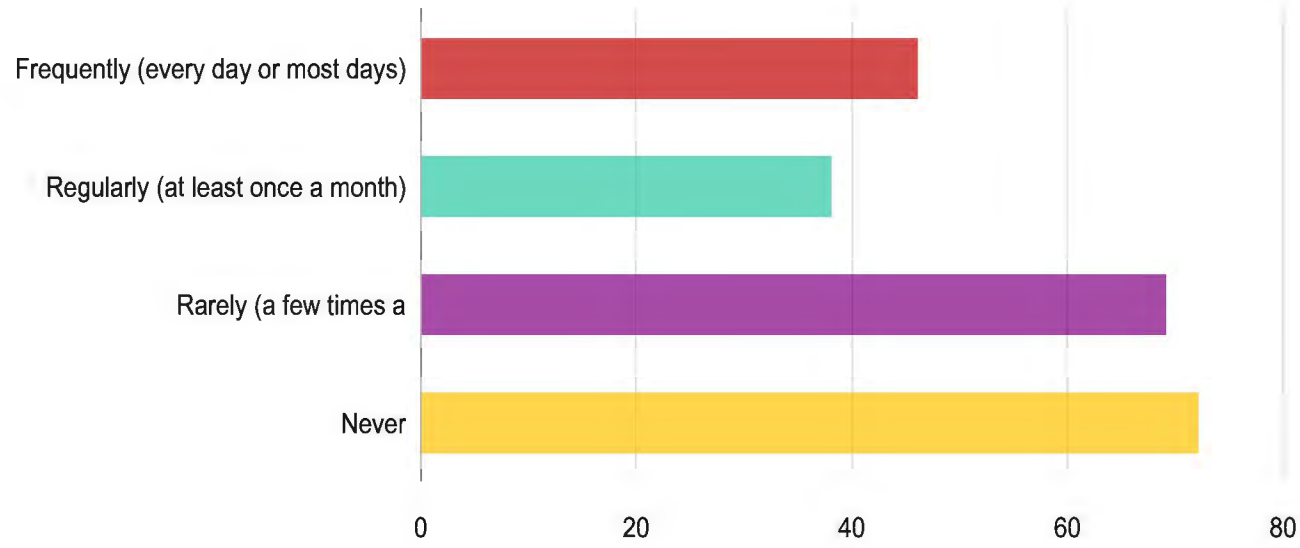


- Yes
- No
- I prefer not to answer.

Answers	Count	Percentage
Yes	113	50%
No	108	47.79%
I prefer not to answer.	4	1.77%

Answered: 225 Skipped: 1

○ How often do you ride a bicycle?



Answers	Count	Percentage
Frequently (every day or most days)	46	20.35%
Regularly (at least once a month)	38	16.81%
Rarely (a few times a year)	69	30.53%
Never	72	31.86%

Answered: 225 Skipped: 1

o Where do you work?

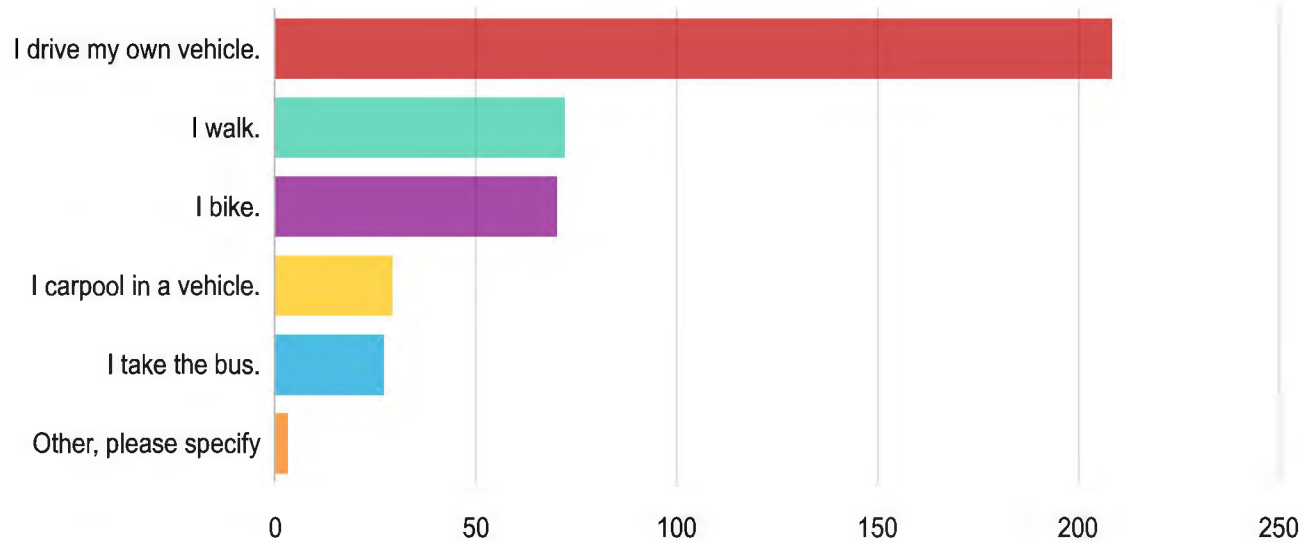


- I work in Lansing
- I work outside of Lansing
- N/A (Not Applicable)

Answers	Count	Percentage
I work in Lansing	138	61.06%
I work outside of Lansing	63	27.88%
N/A (Not Applicable)	25	11.06%

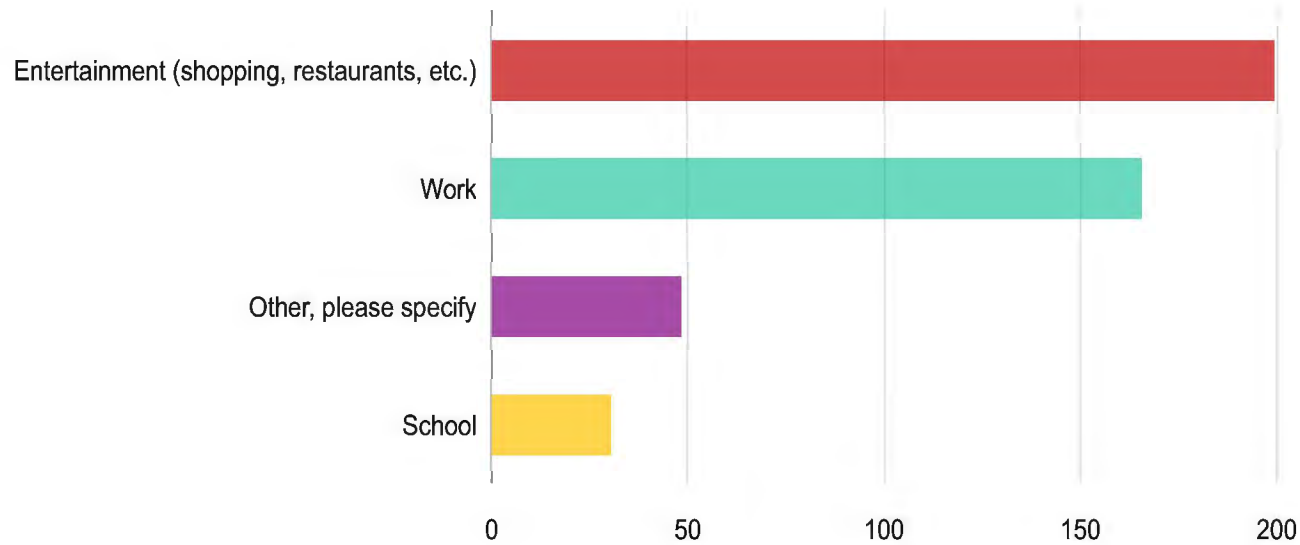
Answered: 226 Skipped: 0

○ How do you typically travel within Lansing?



Answers	Count	Percentage
I drive my own vehicle.	208	92.04%
I walk.	72	31.86%
I bike.	70	30.97%
I carpool in a vehicle.	29	12.83%
I take the bus.	27	11.95%
Other, please specify	3	1.33%
Answered: 226 Skipped: 0		

○ What are your typical destinations when traveling within Lansing?



Answers

Count

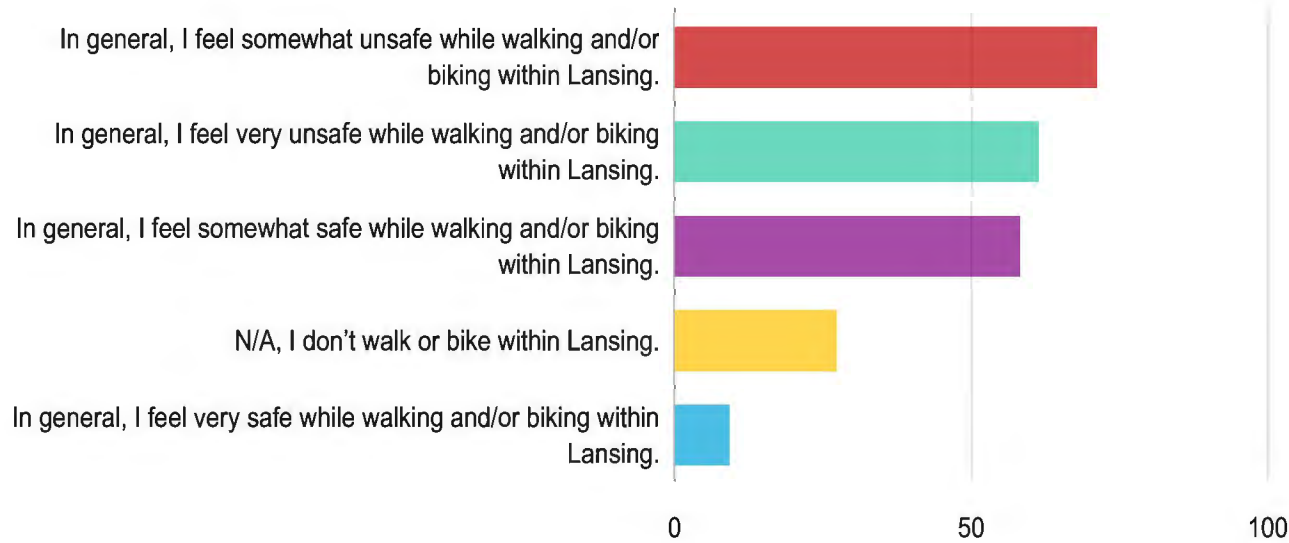
Percentage

Entertainment (shopping, restaurants, etc.)	199	88.05%
Work	165	73.01%
Other, please specify	48	21.24%
School	30	13.27%

Answered: 226 Skipped: 0

•Tell Us About Your Priorities for Safer Roads:

- Generally, how would you rate safety when traveling within Lansing while walki...



Answers

Count

Percentage

In general, I feel somewhat unsafe while walking and/or biking within Lansing.	71	31.42%
In general, I feel very unsafe while walking and/or biking within Lansing.	61	26.99%
In general, I feel somewhat safe while walking and/or biking within Lansing.	58	25.66%
N/A, I don't walk or bike within Lansing.	27	11.95%
In general, I feel very safe while walking and/or biking within Lansing.	9	3.98%

Answered: 226 Skipped: 0

Response	Count
While the trails go most places I want to reach by bike, recent prolonged blockages force me to busy streets where I feel unsafe,	1
While I generally have no issues on walks and bike rides, I do feel the need to be very attentive. I usually walk with my toddler and see vehicles run red lights often near us, particularly at Michigan and Lathrop or Marshall and Jerome. I bike to work at MSU. The bike lane on Kalamazoo, while it has pretty regular bicycle traffic, often has debris in it and cars traveling at high speeds. I'm glad a protected bike lane is coming to Michigan Ave, but disappointed that it ends before reaching campus or downtown.	1

While biking I've been hit by drivers three times, twice while I was in the bike lane on Kalamazoo and once near REO town again in a bike lane. Walking feels unsafe because the road I live on is 35 mph and does not have sidewalks. Once I get to a neighborhood or to the river trail I feel very safe, but getting to those places is challenging	1
When walking most main intersections have crossing lights and guides yet the sidewalks are often uneven making your look at your feet the entire time you're walking.	1
when i lived by sparrow, i would often bike around downtown. intersections always felt very unsafe, especially with cars turning right. a lot of times they wouldn't check if there were pedestrians or bicyclists, and i was almost struck several times. this was also around the time when an lcc staff member was hit and killed by campus. the traffic around east lansing is also terrible once msu is in session. congestion gets so bad around hagadorn and grand river, and areas around campus either have drivers going 20+ over the speed limit, or 20 under, which makes it dangerous with both on the road.	1
Well accepted traffic rules are not adhered to such as stop signs, speed limits, aggressive drivers.	1
We have a real problem with speeding in my neighborhood and drivers ignoring stop signs or yield signs. I try to bike in less traveled roads or trails.	1
Walking: there are not enough lights in the neighborhood streets and lights taken out in last summer's storm have not been replaced. There are multiple parking lots that should be better lit for those who find themselves having to walk in the dark. The tables outside of the neighborhood center pose more of a hazard than they do good. Many people blow through lights and roll into the cross walk. Biking: lack of dedicated and protected bike lanes. The new "lanes" on Michigan Ave are going to pose a threat to pedestrians as well as cyclists.	1
Walking, can't get away fast enough. Biking no traffic enforcement. Total free for all	1

Walking is fine for the most part, but cycling is very unsafe. Cars drive through the bike lanes or don't look before changing lanes. If a cyclist uses the road (when there's no bike lane), then drivers will pass them without giving a safe distance. They speed up often. With Ottawa and Allegan's upgrade to two-way, I doubt cars are going to get over for cyclists. Washington St has low visibility for drivers, especially navigating parking. The sidewalks are too busy for a cyclist to use, but there are no bike lanes on that street downtown. Drivers can't see oncoming traffic from the tightly slanted parking lanes. For the next question: Drivers running red lights!!!! My home has a clear view of Ionia and Pine St intersection. You guys could make a killing by posting a cop nearby because there's always someone running that red. It's scary	1
Vehicular traffic is out of control in this city. Lack of traffic enforcement coupled with three lane one way streets that basically act as urban highways and encourage speeding in excess of 70 mph through residential areas make for a hectic and dangerous bicycle commute. I don't even feel safe in bike lanes.	1
Vehicles speeding and not obeying traffic lights and signals on Michigan Avenue, Kalamazoo Street, and surrounding side streets.	1
Vehicles including CATA & school buses drive too fast on Haag, Balfour & Georgetown around Highland corner. In the same area Edgewood Blvd needs a cleanup of the sidewalk & a sign for warning that Georgetown turning on Edgewood is a blind area. Drivers can't see what's coming on Edgewood.	1
Unsafe sometimes because ppl speed & blow the stop signs throughout the neighborhood	1
Unsafe drivers. No police enforcement of traffic law or safety. Poor built environment for such travel.	1
Typically travel during daylight hours or to major events with lots of people around.	1
Trust nobody, there are no police, it's a free for all.	1
Trash in curb areas, drivers not paying attention with bikes. River trail by Potter Park Zoo curves are sharp & twisty, Mirrors needed, easy to crash into each other. Redesign please.	1

Traffic laws, stop signs, and red lights are routinely ignored with no consequences. Every single day I see a driver run a red light in Lansing or East Lansing. No exaggeration. It's flagrant and disgusting and it's gotten worse and worse over the last few years. I feel like I am just waiting for the day when I will be killed by a driver ignoring a red light or speeding. I'm moving out of the area next month because I'm tired of waiting to be killed.	1
Traffic laws are not enforced. Walkable areas are sparse and poorly designed.	1
Traffic Laws are not enforced leading to people not following them	1
Traffic is always fast and I notice a lot of drivers swerving, going too fast or too slow, braking when they don't know where to turn. Also, there are too many fears of being harassed by other people and it feels unsafe.	1
Too many people not checking all directions when making turns. People ignoring walking lights, as in when the hand says not to cross and they'll cross anyways. Especially, if the light has already changed and cars are already moving.	1
Too many people don't care about traffic rules, posted speeds, even stop lights. When it comes to traffic, the city is lawless.	1
This year I was almost been hit by 3 separate cars in four weeks before deciding to never bike in the road/bike lanes again. I have added an additional 15 minutes to my morning commute to avoid roads outside my neighborhood. I have had numerous cars swerve into the bike lane near me. I have been threatened by drivers on five separate occasions. I have had things thrown at me on multiple occasions. The bike lanes are frequently blocked with cars, including cop cars. No one in this city can drive. The three foot passing rule is almost never followed. People blow through red lights daily and it is common to see people doing 20+mph over the speed limit.	1
There no real bikes lanes. Most "bike lanes" are just a slightly wider shoulder on existing roads and there is not much room between cars and bikes. Most of the time bikers are expected to be in lane with cars and Cars do not respect bike traffic at all	1

there is zero traffic enforcement. i watch vehicles run through stop signs (at least 50% of traffic at one intersection). i see speeding vehicles fail to stop for school buses. The city has unfortunately prioritized motor vehicle traffic (as evident by proposals for removal of islands and boulevards in neighborhoods and on MLK). bike routes were proposed that do not support school children	1
There is zero enforcement of traffic laws by Lansing police. Vehicles are running red lights, speeding an incredible amount, weaving in and out of traffic, racing, and making this a terrible place to drive, walk, or bike. There's no point in doing anything else until our existing traffic laws are actually enforced.	1
There is no enforcement and the people committing moving violations know they can do so with no repercussions.	1
There are very few accommodations for biking in the City that are clear, obvious, inviting and maintained. They appear to get constructed and then forgotten until the biking community won't tolerate it any longer or something bad happens to one of us to get the attention of the City, or another city street project comes along that necessitates redoing a road for other reasons so the bike facilities get redone at that time.	1
There are too many bike lanes that go unused. Saginaw east and west of Capitol is an example. I travel that road several times a day, and I have never seen anyone riding a bike in the bike lane. People get frustrated because traffic backs up, so they use the bike lane as a right-turn lane. It's a waste of space that unnecessarily causes traffic to back up. Put bike lanes where they make sense. if they aren't being used, return them to lanes for cars. We have gone too far with too many bike lanes in Lansing, a city that has snow 7-9 months a year. We need more ability to drive, not to act like we have millions of people biking all over the place.	1
There are times when people have approached me for money or just made comments that were inappropriate.	1
There are not consistent or protected bike lanes, and the ones that exist often have debris and cars don't respect them. I mostly feel safe walking but there are not always sidewalks and the sidewalks are often chunked up by tree roots.	1

There are no places I would wish to bike to (MSU, river trail, old town) that feel safe to reach via main road. I would not cross 127 to get to East Lansing, far too many accidents through frandor.	1
There are many un-houses people on the streets in the morning. If I go to the Meijer downtown or walk dowa ntown I am approached for money and food. Many of these people seem in need of help.	1
The way people drive recklessly	1
The total disregard and enforcement of driving laws.	1
The surface streets are in poor condition, exacerbating reckless driving habits. Lansing has many nice bike t rails, but unfortunately in some parts they go through areas that attract homeless or crime.	1
The spaces allocated to biking is minimal, and with one way streets, motorists do not expect or look for bike riders.	1
The sidewalks are largely 2 feet from cars going 50-60 mph, so walking is "safe" but miserable and loud	1
The roads are rough and covered with debris so I feel unsafe biking	1
The rivertrail is a great resource	1
The river trail is well light and is slowly getting redone making it sturdier. The bike lanes are for the most part clear but the road itself can be improved and in general wider.	1
The quality of infrastructure is rather poor for people of all transportation modes. Roads and lanes are desig ned wider than they really need to be for safe driving. There aren't enough dedicated bike lanes. Beyond tri ps in downtown or directly East-West rides, any other bike ride feels like taking a risk. I strongly feel the city should develop a system of greenways and protected lanes to encourage traffic calming in neighborhoods, slow down drivers and create more comfortable, safe travel options.	1

The poor sidewalk conditions, the large stretches of the block with no vegetation/empty buildings, the amount of incredibly busy roads, and the poor driving (I don't think poor driving is a result of not enforcing road rules, not enough signage, etc. I think people are rushing to get to and from places because they are so stretched thin for time this is the one area in which they can decrease their time being "wasted", residents of Lansing are stretched thin with money and time because they are trying to make enough money to survive.)	1
The needs of cars have been prioritized over all other needs in too many locations throughout the city.	1
The motoring community is use to see bike traffic. It is becoming more regular.	1
The moments when I may not feel safe are due to cars speeding 10 mph over and also occasional homeless people asking for money. Regarding speeding, this will probably require more cameras around town or more ample resources developed on fining severe speeders. RE: Homeless people. I think that they need a robust shelter to stay at which should preferably be available 24/7/365. Other than these complaints, I typically feel fairly safe when walking and driving around Lansing.	1
The likely hood of being kidnapped, trafficked or shot at.	1
The lack of true bike lanes that are more than a "gutter" make most riding unsafe. The road sizes make drivers feel like driving 10 MPH the limit be normal. Outside of the river trail this city feels incredibly dangerous to ride outside of MSUs campus. I would love to take public transit but with most routes outside of the 1 taking longer than riding my bike - it's not realistic.	1
The drivers never obey the speed limits, nor do they give bicyclists enough room when passing.	1
The bike lanes are very small and taking the sidewalk is out of the question because they are falling apart.	1
The bar for driving skill required to have a licence is far too low. I was horrified at how little was required of me to recieve my drivers license. people simply do not have control of their vehicles or themselves.	1
Streets and sidewalks are in poor shape, poor bike infrastructure, homeless and crime are out of control.	1

Speeding, people don't ever pay attention when they drive like they can't believe there might ever be a bike or a person walking	1
Speeding vehicles nearby without protection for buildings, bicycles & pedestrians. I would estimate that several times a day vehicles are going 70+mph & 50 is fairly common although definitely above average. A house nearby was hit twice within a very short time. This is the tax base being devalued. Running stop signs and red lights is also too common & other unpredictable movements like hitting curbs. Traffic calming & separation definitely needs to be looked into. I think it would transform Lansing.	1
Speeding and reckless driving has gotten out of hand these	1
Some very busy intersections. Speeding vehicles. Should be more stop signs at some locations to slow cars. .	1
Some of the most important thoroughfares it is impossible to travel safely along: e.g., crossing Grand River on the west side of town requires biking along a really unsafe stretch of Waverly.	1
Some drivers drive too fast or are distracted.	1
Sidewalks are unkept, litter, homeless people begging, frequent crime in the area.	1
Sidewalks	1
Several times, people approach me asking for money.	1
Seems to be fine as is. No complaints	1
Saginaw and Oakland are two big reasons, having to try and cross them to get to and from work or to various destinations suck- you either have to walk 6 minutes to the intersection from the bus stop and wait another 8 before getting to cross where people turning on red will nearly hit you every single time or the lights are not long enough to make it without running across (if the lights work at all, which many don't) or you risk running across the highway which is laughably sometimes more safe than the intersection as you only have to watch one direction for cars instead of pretending to be a owl and constantly flip back and forth for idiot drivers	1

Roads are poorly designed -- often prioritizing speed over safety in the denser areas of town (like downtown, east side, near south side). Even streets that have bike lanes (like Mt Hope or Kalamazoo), have lanes that are severely degraded, disappear without notice or have major conflict points. There are very few safe pathways to cross 496, and east/west routes are often uncomplete or don't go to major destinations. Even in sections that are "better" for peds and cyclists, they are often overtaken by poor road users, and poor road users are rarely, if ever, reprimanded or ticketed. We constantly have people running red lights, rights on reds with peds there, driving in bike lanes, speeding, and running stop signs -- and there is just no enforcement in this town.

1

Roads are in very bad shape pleasant grove.

1

Potential for injury by being hit or also being shot

1

People run red lights all day long.

1

People just randomly shooting and drivers speeding

1

People in this town drive like assholes. Constantly running red lights, passing in a turn lane, drag racing.

1

People are not obeying traffic laws. Drivers fail to stop for pedestrians, even in marked crosswalks. Condition of streets makes biking hazardous. Continuously veering around damaged roads while biking frequently takes me into the traffic lane. Drivers fail to respect the bike lane. Some roads are unsuitable for sharing cars and bikes. Example: S Waverly Road between Grand River Bridge and Old Lansing Road, it is very narrow and does not realistically support even the motorized traffic through there. I question whether it is within standards for 4 lanes. There isn't any sort of safe pedestrian or bike passage through that spot and the adjacent land is very sloped. Alternative routes around that area are miles out of the way. Public officials need to get out and bike and walk through that area. Snow removal is another problem., for the most part, it isn't done on many publicly owned sidewalks. There are many bridges with sidewalks that I don't ever remember seeing shoveled.

1

Overall, when walking in Lansing I feel unsafe due to people not following "right of way" rules and often complete disregard for pedestrians and bikers.

1

Only painted bike infrastructure (besides river trail). No physical separation between cars and bikes.	1
Not enough lighting. Not enough sidewalks. Unsafe drivers. Not enough safe safe to walk or bike.	1
Not enough crosswalks, and drivers get mad/impatient when I am crossing the road when I have the right of way. Similarly, bike lanes need to be protected because many drivers do not respect the road rules. I have nearly been run off the road or crashed into on numerous occasions. It seems more logical to create physical barriers (protected bike lanes) in the road rather than try to change attitudes about respecting cyclists and pedestrians. When I am walking or biking, cars regularly speed 15+ mph over the speed limit in zones where the speed limit is 25-35mph. Especially with MI Ave construction, cars speed through the neighborhood to detour, sometimes totally ignoring stop signs.	1
Not enough bike lanes, sidewalks are usually damaged or too narrow	1
No traffic enforcement, cars going 10-15+ mph over the speed limit on streets in residential areas, running red lights and stop signs	1
No respect for bikers! So many people speeding, using bike lanes as turn lanes. I bought a car to feel safer. The people blowing red lights make pedestrian safety a joke as well.	1
No protected infrastructure giving pedestrians, bikes and cars their own space at safe speeds for all. Some places don't have side walks. There are few bike 'facilities' and those that exist are painted bike gutters full of debris.	1
No protected bike lanes, fast traffic on roads near me, some with no sidewalks.	1
No one is enforcing the traffic laws	1
My neighborhood (Westside) has occasional gunfire and police chases.	1

Motor vehicles far exceed posted traffic speeds and enforcement of the traffic speeds does not seem to occur for the most part. I watch vehicles run red lights at major intersections at every single light cycle. Traffic signals are not compatible with amount of traffic that backs up at most intersections, nor do they adapt to rush hours traffic trends. Crosswalks at busy intersections are not well delineated and not safe for pedestrians to cross safely. I know of multiple car/pedestrian accidents that have occurred at crosswalks. Traffic backups that occur at high use times don't allow for pedestrians to cross safely as vehicles are rushing to make their turns. Traffic signals with turn signals are not installed in many areas that need them.	1
Most of the time things feel safe, but drivers with erratic behavior especially driving fast through residential streets make me feel unsafe.	1
Most cars obey the law of allowing bicycles space on the road. When walking, there are usually adequate sidewalks.	1
Most bike lanes feel inconsistently placed or not available. Sidewalks are usually poorly maintained and very narrow. If on a road, most drivers do not slow down to pass and only give the minimum 3 feet of clearance. Drivers usually pull up past a stop sign before stopping, and some do not check both ways before pulling out in front of a stop sign.	1
Many sidewalks and nearby infrastructure are in disrepair; litter, trash and abandoned property make neighborhoods feel slightly ominous.	1
Many places in Lansing are very unfriendly to cyclists and pedestrians, there are very few bike lines, and ZERO protected bike lanes, and outside of downtown, pedestrians often have to cross 5-lane intersections. Imagine trying to walk across Saginaw at Frandoor, or crossing cedar street on the south side. I also fear drivers who don't follow traffic laws, because there is very little enforcement of red lights or speed limits. We need cameras for both.	1

Many of the roads do not have good bike and/or pedestrian infrastructure. In addition, drivers tend to exceed the speed limit and drive distracted on main roads. I would like to see improved bike and walking infrastructure including more bike lanes (possibly via road diets), protected bike lanes on major roads, and traffic calming measures (road diets help some with this by reducing the number and width of lanes but there are additional measures that can and should be taken). In addition traffic enforcement should increase, though traffic calming likely plays a larger role. I would love for the entire Greater Lansing Area to become much more friendly to getting around without using a car.

1

Many of the main roads I walk and bike along have car traffic going too fast to feel safe. Even on roads where there are technically bike lanes, they are not protected and do not provide any feeling of safety. Even some roads that pass through residential neighborhoods often have cars driving uncomfortably fast. (e.g. N Cl emens)

1

Lansing needs more infrastructure for biking and walking, especially ways to connect isolated bike lanes that randomly stop into a continuous pathway for nonmotorized transportation. Lansing should also invest more in separated bike lanes that still operate in the street. I am skeptical about the bike lanes being installed along Michigan Avenue, they appear to be just part of a wide sidewalk, and it is more dangerous to ride a bicycle on the sidewalk than in the street. In my personal experience, I have had many more close calls with cars when on the sidewalk than when in the street or in a bike lane.

1

Lansing is building a biking infrastructure, but it is hit or miss. And while the freeways are convenient, they make it VERY difficult to successfully bike without it being unpleasant. ESPECIALLY Cedar/Penn and reaching East Lansing. Also, reformatting Willow to connect to Delta Twp (there's a trail there that goes to Canal-Willow is the part that needs to be reduced to three lanes and bike lanes. Since no one has painted the lines since the Clinton admin, it shouldn't be difficult. The river trail is wonderful. I hope there are positive approaches in the works to offer alternative housing for the unhoused. As a female, it makes it iffy if I feel safe on the trail. Without question when walking. When walking, it would be great if either the city or property owners took responsibility for the hit or miss condition of the sidewalks. When in a high rental area they are NOT maintained. I would guess ordinances are on the books, but landlords seem to be above the law.

1

Lansing has a world class trail system. Lansing does not have a single inch of bike lane I consider safe. I have been hit 3 times while walking in the city and twice while cycling.	1
Lansing drivers regularly drive 10-20mph faster than the speed limit regardless of the street. Lansing needs to consider lower speed limits around areas where the city wants people to feel safe walking or cycling. This has been done in other cities and it works(https://www.iihs.org/topics/bibliography/ref/2168). It has a large effect on people who drive more than 10+mph over the limit. On a daily basis I see drivers completely ignore stop lights and stop signs. Recently somebody crashed into a police vehicle doing this. I don't have any faith that this will lead to any sort of enforcement of driving laws though. Drivers in Lansing are very comfortable risking the safety of others in order to get to their destination 30 seconds faster. I would love to be able to walk more but this is not likely in the near future. The road infrastructure of Lansing incentivizes people to drive dangerously. If we want people to be safer we need to rethink the raceways that our roads have become.	1
Lansing drivers are rude and aggressive, even towards children. They speed through my neighborhood without thinking twice. Bike lanes are frequently full of trash and unprotected from cars.	1
Lansing does not prioritize safety on the roads. The priority is - moving as many cars as possible as quickly as possible. Prioritizing safety means slowing cars down and making space for other types of transit. We've seen a lot of recent projects in the city where lip service is given to complete streets, bike lanes etc. but when the final project is finished none of these are actually implemented. It's not a step forward to "consider alternatives", must actually do them.	1
Lack of sidewalks on all streets and drivers not adhering to the speed limits	1
Lack of safe bike lanes, distracted or aggressive drivers.	1
Lack of protected biking lanes and unsafe drivers. I was almost hit two days ago when going south bound on Washington and a driver going eastbound on Malcolm X ran a red light. Drivers are unpredictable and aggressive.	1
lack of lighting for pedestrians and cyclists	1

Lack of connected bicycle networks, many on road bicycle facilities end before the intersections leaving bicyclists in a quasi danger zone. Many drivers are too impatient and are disrespectful to anyone not in a car. Streets, lanes and intersections are too wide and encourage drivers to drive fast.	1
Lack of bike lines, unprotected bike lanes on high speed roads (i.e. Mount Hope near Crego Park), narrow sidewalks close to high speed roads (i.e. Cedar south of 496)	1
Lack of bike lanes. Drivers not educated that they have to share the road	1
Lack of bicycle lanes and non-motorized paths where I want to go, including Kalamazoo St west of Capital Avenue, or really any other east-west street on that side of the capital. Bicycle lanes on Kalamazoo Avenue are too narrow and in terrible condition. Construction often closes off cycling infrastructure without a safe detour. The City of Lansing asks for feedback and then completely ignores it - see Michigan Ave.	1
Key intersections of crash points where sight lines are poor, facilities for walkers/bikers don't give them dignity or make them welcoming, turning radii is wide to allow speed, lane distance and width make drivers treat streets like highways. Even at signaled crossing vehicles are running reds.	1
It depends where I am in the city as to whether I feel safe or not.	1
Insufficient bicycle infrastructure outside the LRT - need more bike lanes. Need better enforcement for automobile infractions.	1
In my neighborhood, I feel somewhat safe, but the quality of our sidewalks and roads are abhorrent. We live within walking distance of a daycare and a community restaurant/bar, and it's a nightmare to walk them there with the stroller. The sidewalks are atrocious, the city cuts down every single tree they can without any thought, so it gets HOT as a result. My toddler has had severe scrapes to her knees from trying to run on the sidewalks. The cars drive way too fast, and there is no way I would feel comfortable with our kids walking alone or being in our front driveway alone due to the speed at which the cars drive. And bike riding is out of the question. You all put in bike lanes but don't do ANY street sweeping, making the bike lanes impossible to navigate without getting a flat tire. That and cars still use them as turn lanes. It's just a mess.	1

I was crossing the road at a cross walk and a pickup truck driver sped up when they saw me as if they purposely wanted to hit me.	1
I walk on Grand River/E. Cesar E Chavez Ave and there is a light that got taken out there over by Washington. Now it's a total racetrack. Twice I have almost been hit! People fly down that road now and once I was almost hit at Washington, and once at Cedar. It's like frogger over there! Super dangerous and I can't believe nobody has been killed.	1
I usually drive my car	1
I tend to walk in busy areas during the day so I feel safe. When I was growing up in Lansing I would ride my bike around my neighborhood and on the river trail, but never on busy roads or even the sidewalks along busy roads. I don't own a bike now because I would not feel comfortable riding it.	1
I only feel safe riding on the trails, avoiding riding on busy roads at all costs.	1
I only feel fully safe walking on sidewalks. There are too many terrible and entitled drivers for me to ever consider biking.	1
I live on St Joseph 5 foot in the west side neighborhood. My little one-way stretches 30 mph and most cars frequently go 50+. There have been no police in the three years that I've lived here Enforcing a speed limit or parking regulations or any safety issues. I'm near Jenison, which is a speedway through the west side neighborhood, and stop signs, including the one that hits Saint Joseph, are ignored.	1
I live on mlk and there are constantly people driving extremely fast down it. I've seen an accident at least once a month since living here.	1
I live downtown and am harassed and followed by unhoused people on a semi-regularly basis when walking in the area.	1
I have met people in the community. I have a relationship with the neighbors.	1

I have had to cross roads while using the Lansing River Trail & other trail extensions in Lansing and it is always not clear if cars will stop for me even if I have a pedestrian crossing with a traffic signal. This is particularly bad in south Lansing at Cedar and Pennsylvania streets.	1
I frequently witness reckless drivers, regularly running red traffic lights, speeding, using left turn lane as a passing lane thru a lighted intersection, hole shots, wheelies and donuts in the middle of traffic, motorcycles riding in between lanes, phone use and drug use by drivers, horrific noise levels, I frequently ride bike during the summer and I will not ride the road even in a bike lane. I am terrified of even crossing at intersections with traffic lights. I drive as little as possible especially at night when these things seem to increase.	1
I feel unsafe due to high speed driving habits and higher crime areas.	1
I feel unsafe due to excessive speed and inattentive and aggressive drivers, particularly in my neighborhood on Mt. Hope. I have also had drivers threaten me for pressing the button to cross the street, and behavior seems to be escalating. Further, many dogs run loose in our neighborhood and calls to animal control have not helped. All of this combines to make walking unsafe and stressful, which is a shame because we have a beautiful neighborhood, and I want to enjoy it without stress.	1
I feel unsafe biking because of the bad condition of the bike lanes , no barrier between cars and bikes, lack of sharing the road education from drivers, and SO MANY drivers that run red lights, do not check for bikes, seem to be in a rush to get around construction and traffic. I would like to bike more but the lack of infrastructure supporting biking prevents me from doing so. The river trail feels safe but is hard to access from many parts of the city. An expansion of trails would be great! When walking, I feel unsafe for the same reasons. Vehicles seem to run red lights more often, don't obey traffic rules, don't pay attention and speed through residential areas.	1
I feel unsafe because most of the people on these roads are HORRIBLE drivers, especially the young male drivers who speed or street race. Bikers are also inconsiderate and don't watch where they are going.	1
I feel somewhat safe. But I do think people speed too much and don't pay attention to pedestrians.	1

I feel safer driving than I do biking. The amount of distracted drivers on the road is alarming. I feel more protected in my car than my bike. I used to ride my bike to work, but there were too many close calls and I saw so many people on their phones when they shouldn't be. People seem to be in such a hurry to get places that they have no regard for others on the road whether it be bicyclists or other motorists. I don't want to exclude pedestrians, because I have seen way too many times, where drivers don't want to yield to pedestrians who are already within the crosswalk. Some of this comes down to people needing to be schooled better on the right of ways and other times, I think it's blatant disregard for others on the road, or distracted driving	1
I feel safe walking, but would not feel safe biking on the busy main roads due to traffic speeds.	1
I feel safe walking on sidewalks. I do not feel that bikes are safe on our roads, but I do not ride.	1
I feel safe riding my bike along the river trail but anything that crosses Pennsylvania or cedar or Saginaw/Oakland is very intimidating and I avoid those areas and businesses because of the safety concerns	1
I feel most safe on the river trail and sidewalks where there are dedicated, car free spaces to move. I do not feel safe biking in bike lanes or on the road.	1
I don't think drivers are looking or are aware of people walking, running, or on bikes. It makes me uneasy to walk or ride my bike because drivers are so distracted.	1
I don't know why you combined the two items. In good weather, I feel somewhat safe walking, and very unsafe biking. In bad weather, it's very unsafe for both. I don't bike anywhere because I'd have to cross the Kalamazoo bridge, which feels designed to kill a bicyclist, and the bike gutters there are garbage. This also stops me from biking on the river trail, because that bridge is so unpleasant to be on outside of a car. When walking, crossing Grand at Hillsdale is scary because cars speed out of the highway even though that bit is a 25. Sidewalks on bridges and the river trail do not have adequate snow removal in the winter. The sidewalk on the Kalamazoo bridge becomes a mountain of ice. The river trail becomes a skating rink because people still use it a lot. People, including often the police, turn without signaling all the time- that's pretty scary. The police also speed around my neighborhood a lot, including right next to the park which is pretty concerning.	1

I don't do either because it doesn't feel safe due to crime and the speeding/reckless driving that occurs throughout the city.	1
I avoid walking downtown Lansing these days because the streets are deserted, and I feel like an easy target when I am out of my car. Years ago, it was not like this; I walked downtown regularly for lunch.	1
High speeds, and traffic lights that have been removed. We used to bike Grand River in Old Town, and we can't anymore. It's insane and super dangerous. People drive like 60 miles an hour and pedestrians and bikes are always in danger. Downtown has become tougher now that the roads are all 2 way.	1
High crime, high homelessness, seemingly non-existent police presence, and god awful infrastructure make this city feel incredibly unwelcoming. Even if my chances are being harmed are relatively low, the general feel here is extremely unpleasant.	1
Generally, sidewalks are ok in Lansing. But Bike Lanes are rare and safe Bike lanes even rarer	1
Generally safe although I have encountered seemingly dangerous individuals. Specifically this summer under the east side of the river bridge on Shiawassee St.	1
Friend being attacked while walking	1
For the last 5 years, many drivers do not care about people and safety. It seems that people lost the common sense and driving rules. For instance, they do not utilize the lights to indicate turning, cutting cars, do not allow enough room between them and the next car, texting, driving and smoking cannabis.	1
Extremely unsafe driver behavior, especially on one-way roads like Oakland/Saginaw. Speeding and running red lights everywhere. Vehicles aggressively passing other vehicles by going onto shoulders or oncoming traffic, in many cases to run a red light. Even while driving I look for people running a red light before entering the intersection if it just turned green for me. Also people using bike lanes as turn lanes or parking. Almost no protected bike lanes, painted lines don't protect from drivers that are speeding, aggressive, and don't care.	1

During COVID traffic patrols stopped enforcing traffic laws completely, it's never returned to the same level of enforcement for safety. Vehicles speed around the wrong side of the road, run lights, travel 30+ over the posted limit, no enforcement without a licence plate. Not sure if there was a policy change or lack of funding for traffic enforcement. But the City keeps doing road construction to change driving behavior, which just causes congestion and angers drivers more, who have been driving for years without any enforcement after COVID. Lots of illegal Mini-Bikes racing around the City with zero enforcement to protect our kids playing on the sidewalks or riding their bikes. Always loud vehicles street racing at night down Cedar, burnout marks in the morning, zero enforcement. Free	1
Drivers speed excessively everywhere, fail to stop at stop signs, turn left without looking/stopping for pedestrians in crosswalk, and sometimes honk at pedestrians in cross walk. Sidewalks are missing, or narrow, or uneven (I have tripped and hurt myself twice). Biking in Lansing is even worse - the city doesn't have protected bike lanes and drivers are generally hostile towards bikers. A lot of drivers pass too close and too fast. Neighborhoods are disconnected by state roads. The river trail floods and isn't convenient for transportation purposes. Bike lanes that we do have haven't been maintained. The redesign of Michigan Avenue is just another signal the city doesn't care about cyclists.	1
Drivers speed and watch their phones more than the road	1
Drivers respect pedestrians, but often must cross large roads with no crosswalk or bridge.	1
Drivers not attentive to pedestrians or bicyclists (swerving into bike line, driving in bike lane, not looking for pedestrians when approaching intersections/crosswalks)	1
Drivers don't follow traffic laws anymore. Bike lanes are not protected.	1
Drivers don't know or care about motorist-bicycle safety laws, & some even purposely harass cyclists.	1
Drivers do not pay attention the way they used to do. Speeding seems to be the norm on Cedar Street and MLK. Not sure what the solution would be.	1

Drivers are typically impatient and I see them often running yellow and even red lights. They text while driving do are not paying attention and are swerving in their lane while doing so. Plus, many drivers often drive over the speed limit. I live on a street that is often used as a cut through, the speed limit is 25 mph and many driver's not only speed but run the stop sign on the street.	1
Drivers are openly hostile to cyclists in Lansing. Also recent changes to Michigan Ave is overtly hostile to cycling. Making my biking to work difficult for cars to pass me on the road while leaving 3 feet. The changes are trying to force cyclist to ride on the sidewalks which is very dangerous to cyclists and pedestrians.	1
Drivers are often aggressive, unobservant, angry, and violent. The drivers who are none of the above are either drunk or high, and just as dangerous behind the wheel. There is also a rash of drivers who use the road as their own personal racetrack, driving at reckless speeds with no regard for human life or decency to their fellow humans.	1
Drivers always driving above speed limit. Puts the burden of my safety on me when walking especially using crosswalks is dangerous.	1
Driver inattention and unaddressed homelessness	1
Depends on where I walk, I'm careful of my route. On a bike, you are taking your life in your hands due to the dangerous drivers.	1
Depends on the area	1
Damaged or just plain missing sidewalks throughout the city.	1
Crime and poor driving practices/car centric community	1
Cracked sidewalks and potholes on roads. Or debris on roads	1

Close proximity to the street and individuals on the River Trail make both routes feel unsafe. Drivers are erratic and drive well over the speed limit. Despite there being bike lanes on some of the Lansing roadways, it is extremely rare to see them used. To the point I don't think many drivers are familiar with how they work. I don't think many people feel safe enough to ride their bike or walk near a roadway.

1

Certain blocks and area in Lansing are run down with troubled looking people loitering around.

1

Cars. Cars are big and dangerous and I am soft and squishy, a paint stripe on the street is not adequate for bikers to be safe. I was nearly hit by someone turning left from Michigan onto Grand while I was in a crosswalk, I was nearly hit walking into the crosswalk at Cedar and Michigan because someone was only looking to their left to make sure it was clear so he could turn right on red. There is no bike infrastructure at all between downtown and the east side unless I go to Kalamazoo, which is more hilly and torn up. There's a lack of bicycle parking spots on the east side. Cars constantly run red lights especially on Cedar and Larch. You repaired Allegan and Ottawa with no consideration to the complete streets initiative.

1

Cars use bike lanes as turn lanes, and stray over into the lanes to avoid potholes on already crowded roads.

1

Cars speeding, crime seems to be increasing

1

Cars excessively speeding through my neighborhood on the Eastside and running through stop signs.

1

Cars driving in bike lanes to avoid rough road or pot holes. Drivers running red lights at high speed Drivers not turning on headlights at night

1

Cars drive too fast, limited crosswalk markings, roads in poor condition.

1

Cars do not yield to pedestrians

1

car first infrastructure everywhere

1

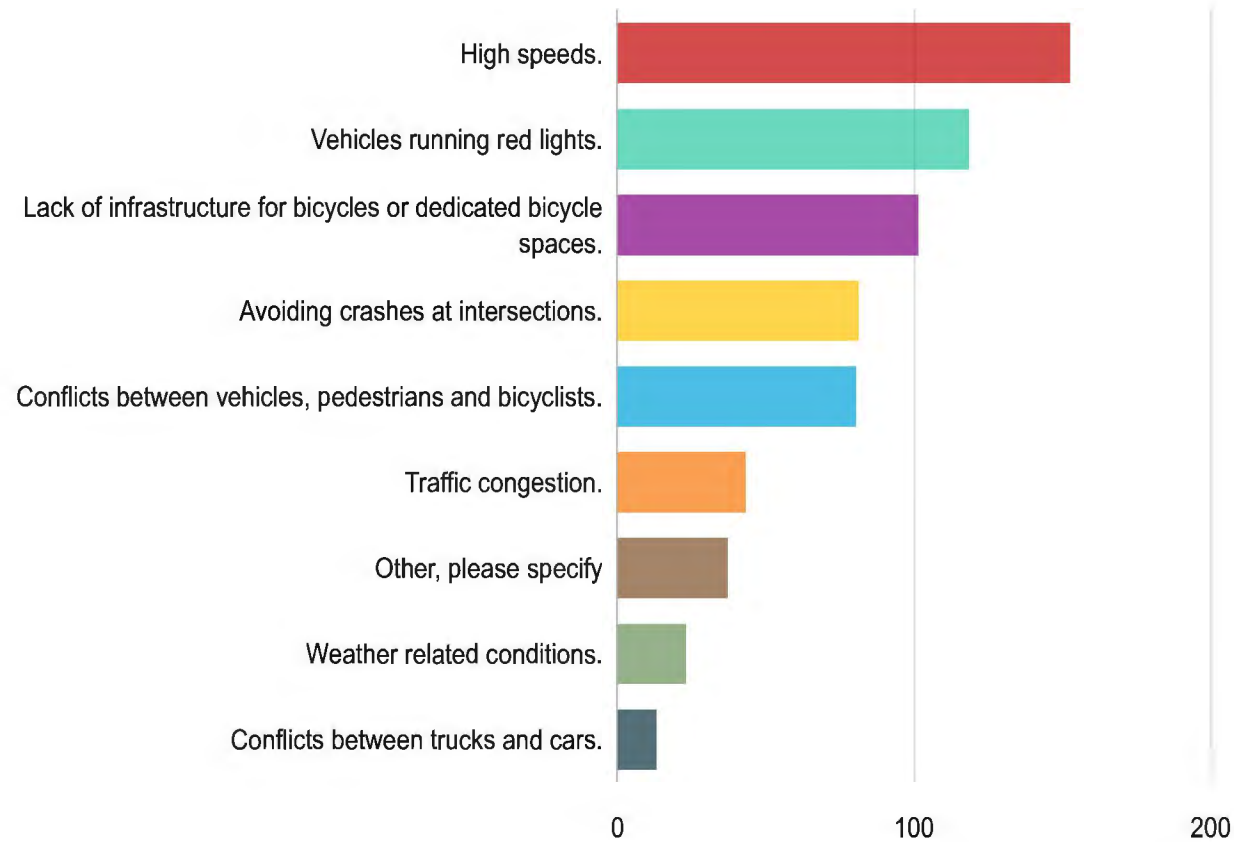
Biking- poorly maintained bike lanes (glass, potholes, etc) or no lanes at all, drivers unaware and speeding
Walking- poorly maintained street lights or no lights

1

Biking on the river trail is very safe, but biking on the roads is less safe because of the heavy traffic and lack of protected bike lanes. Good examples are Kalamazoo, Cesar Chavez, and Pennsylvania	1
Bikers have little to no protection on the road and cars misuse the bike lanes constantly. Also walking in most places after dark except the most active evening entertainment blocks feels unsafe.	1
Bike lanes randomly end on some roads and are not clearly marked for bikes, meaning that people use them as car turning lanes.	1
Bike lanes are too narrow and have no physical barriers to prevent cars from swerving/turning into bikes.	1
Bike lanes are not protected and cars drive faster than the posted speed limit because the lanes are very wide and comfortable for faster driving. Walking is inconvenient because most of the residential areas are too far from any shops or restaurants. More business integration in the residential areas would help the communities be more walkable and billable.	1
Bike lanes are inconsistent or non-existent. Biking or public transit is not a priority in Lansing. Drivers are reckless.	1
Bad drivers, broken pavement	1
As a previous Lansing resident, it was difficult finding safe biking routes. I think it's more a public awareness issue though - I feel automobile drivers in general are ill-equipped with the knowledge of the road-rights bicyclists DO have.	1
As a driver I am incredibly scared of hitting a biker, I do not think there is enough space for them consistently. I would love if there was a bike lane alongside the sidewalks rather than in the road because there is much more likelihood of severe injury and death if an accident were to happen between a car and a bike than between a car and a walking person. Bikes and walking are also easier to maneuver in order to avoid accidents with each other as well.	1

Answered: 180 Skipped: 46

○ In your daily travel, what safety issues are most important to you? *



Answers

Count

Percentage

High speeds.

152

67.26%

Vehicles running red lights.

118

52.21%

Lack of infrastructure for bicycles or dedicated bicycle spaces.

101

44.69%

Avoiding crashes at intersections.	81	35.84%
Conflicts between vehicles, pedestrians and bicyclists.	80	35.4%
Traffic congestion.	43	19.03%
Other, please specify	37	16.37%
Weather related conditions.	23	10.18%
Conflicts between trucks and cars.	13	5.75%

Answered: 226 Skipped: 0

Appendix B: Safety Analysis



Historical Baseline Safety Analysis

The Safe Streets and Roads for All (SS4A) program is a collaborative effort focused on eliminating roadway fatalities and serious injuries within our communities. This report provides an in-depth analysis of crash data from 2014 to 2022 within the City of Lansing jurisdiction, establishing a baseline for fatalities and serious injuries. By examining critical aspects such as the spatial distribution of crashes, contributing factors, severity, and temporal patterns, the analysis offers valuable insights to assist the City of Lansing and its stakeholders in prioritizing safety mitigation strategies and effectively allocating resources.

Data Collection

To perform the crash analysis, Roadsoft crash data from 2014 to 2022 was utilized. Roadsoft is a roadway asset management system specifically designed for collecting, storing, and analyzing data related to transportation infrastructure. As part of a statewide asset management initiative led and supported by the Michigan Department of Transportation (MDOT), it is available to local road agencies across Michigan. A nine-year period was selected to observe trends without being overly skewed by annual variations in crashes. Using this data, various fields were analyzed to assess traffic crashes at different severity levels and to identify potential contributing factors.

Regional Safety Profile

Between 2014 and 2022, a total of 35,849 traffic crashes were reported within the Lansing area. **Figure 1** illustrates the number of traffic crashes per 10,000 population for both Lansing and the State of Michigan during this period, comparing the crash frequencies of each by year. The data shows that Lansing consistently experienced a higher crash rate compared to the statewide average. Crashes in both the City of Lansing and Michigan gradually increased from 2014 to 2016. From 2016 to 2020, Michigan's crash numbers remained stable, while Lansing experienced an overall decline during this period. In 2020, crash numbers dropped significantly in both areas due to the pandemic but began to rebound shortly thereafter. From 2020 onward, both regions saw an overall increase in crashes.

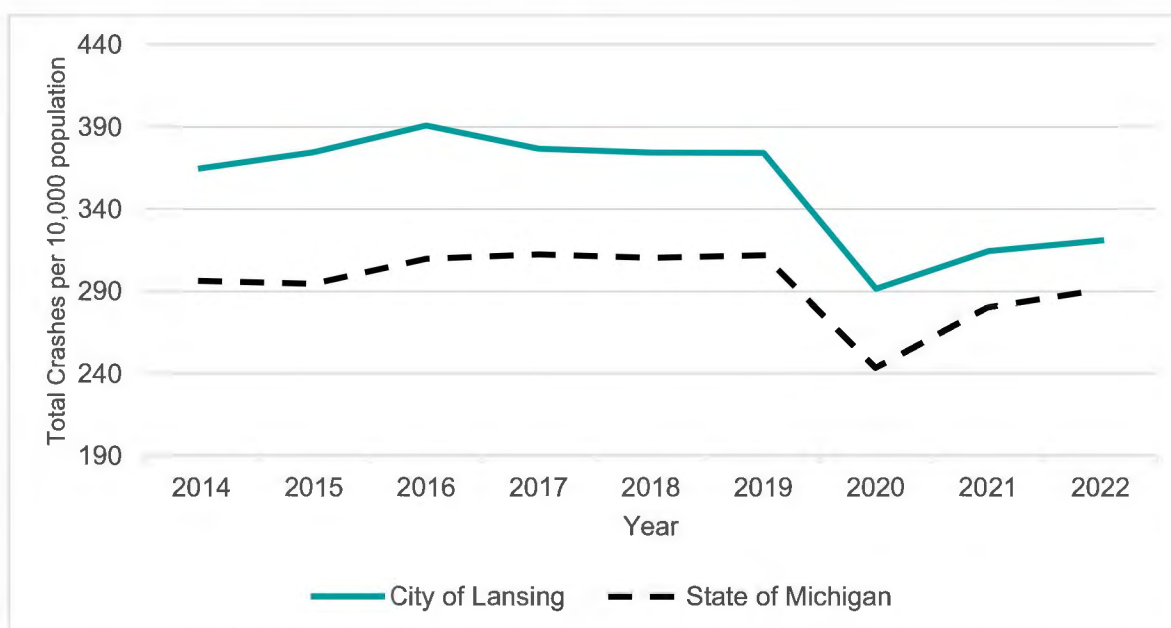


Figure 1: Lansing Traffic Crashes per 10,000 population (2014-2022)

December 2024

From 2014 to 2022, there were a total of 86 fatal crashes, which represents 0.2% of all crashes. Incapacitating injury crashes (A-Injury) accounted for 601 crashes, or 1.68% of all crashes, while non-incapacitating injury crashes (B-Injury) comprised 1,547 crashes, or 4.32% of all crashes. Possible injury crashes (C-Injury) accounted for 5,302 crashes, or 14.8% of the total. The majority of crashes were property damage only (PDO) crashes, accounting for 28,313 (78.98%) of all crashes. **Table 1** summarizes the crashes reported during the 9-year analysis period by severity. **Figure 2** compares fatal and A-Injury crashes per 1 million population in the City of Lansing and the State of Michigan from 2014 to 2022. The graph shows that the fatal crash rate in the Lansing area fluctuated around the Michigan rate during this period. However, the A-Injury crash rate in the Lansing area tended to be consistently higher than the statewide rate.

Table 1: Crashes by Injury Level

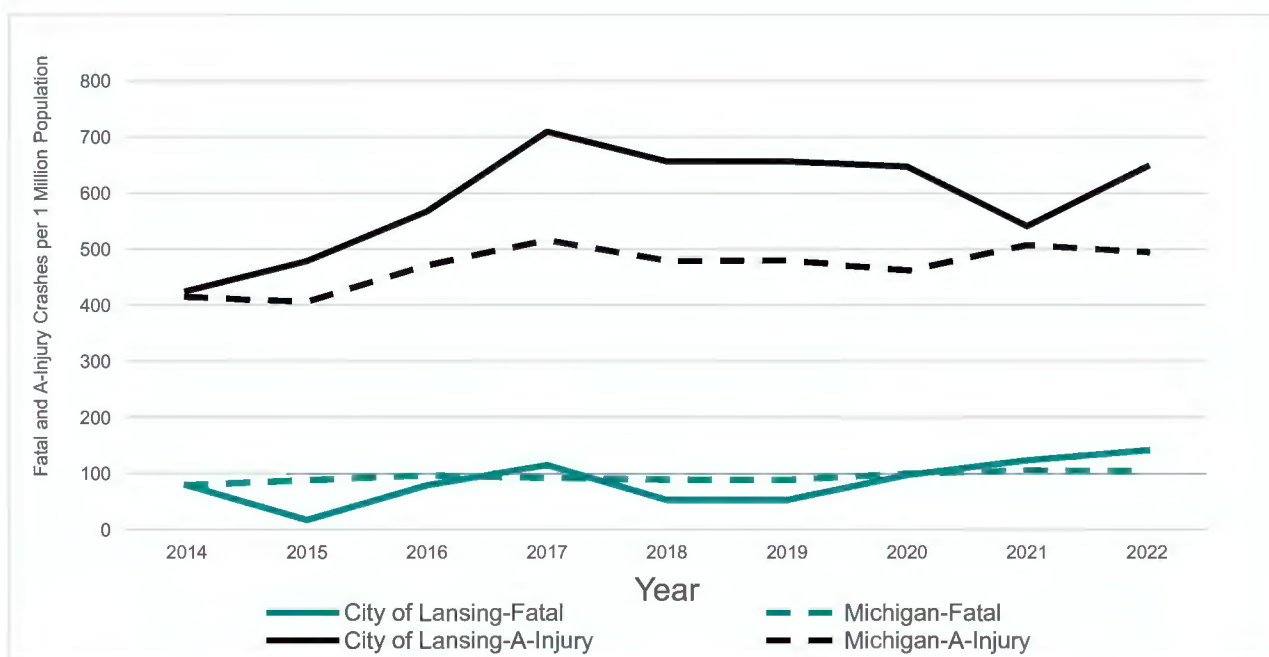
Year	Injury Severity				
	Fatal	A-Injury ¹	B-Injury ²	C-Injury ³	PDO ⁴
2014	9	48	129	588	3336
2015	2	54	118	550	3494
2016	9	64	176	707	3446
2017	13	80	202	653	3296
2018	6	74	171	629	3336
2019	6	74	202	656	3277
2020	11	73	175	503	2523
2021	14	61	207	546	2715
2022	16	73	167	470	2890
Grand Total	86	601	1547	5302	28313
% Total	0.2%	1.7%	4.3%	14.8%	79%

¹An A-level (incapacitating or serious) injury is defined by FHWA as "Is any injury, other than fatal, that prevents the injured person from walking, driving, or normally continuing the activities which he or she was capable of performing prior to the motor vehicle traffic crash."

²A B-level (non-incapacitating or minor) injury is defined by FHWA as "Any injury that is evident at the scene of the crash, other than fatal and incapacitating injuries."

³A C-level (possible) injury is defined by FHWA as "Any injury reported or claimed which is not fatal, incapacitating, or non-incapacitating evident injury."

⁴Property Damage Only

**Figure 2: Lansing Fatal and A-Injury Crashes per 1 Million Population**

December 2024

Regarding crash types, from 2014 to 2022, a total of 9,242 rear-end straight crashes were recorded, making it the most common crash type in the City of Lansing. Angle straight crashes followed with 5,996 crashes, while side-swipe same direction and fixed object crashes accounted for 5,672 and 3,237 crashes, respectively. **Figure 3** shows the most frequent crash types and their share of FI and FSI crashes. The four most frequently experienced crash types are as follows: (1) Angle straight crashes resulted in the most severe outcomes, accounting for 25% of fatal and injury (FI) crashes, and 22% of fatal and serious injury (FSI) crashes; Rear-end crashes made up 24% of FI and 10% of FSI crashes; (3) Fixed object crashes represent 10% of FI and 16% of FSI crashes; (4) Lastly, Side-Swipe Same Direction crashes account for 7% of FI and 3% of FSI crashes. Together, these four crash types represent 66% of FI crashes and 51% of FSI crashes.

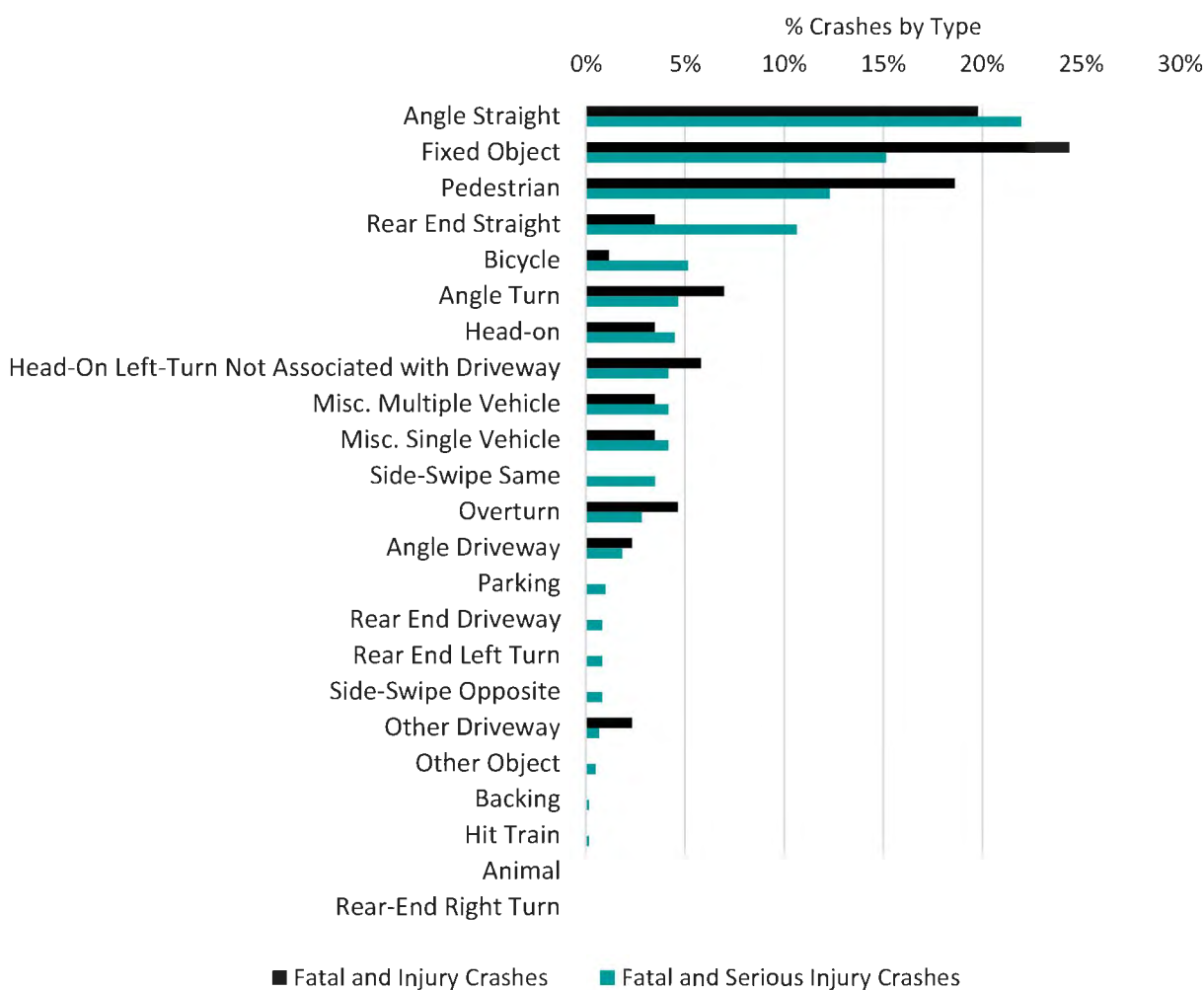


Figure 3: FI and FSI Crashes by Crash Type (2014-2023)

Vulnerable Road Users

Certain types of road users, such as pedestrians and bicyclists, are more vulnerable to death or serious injury when a traffic crash occurs. From 2014 to 2022, there were 706 traffic crashes in the City of Lansing involving vulnerable road users (VRU), 122 of which resulted in fatal or incapacitating injuries. As shown in **Figure 4**, 84.1% of VRU crashes in the city resulted in fatalities or injuries, while only 15.9% of all crashes in the city resulted in no injuries.

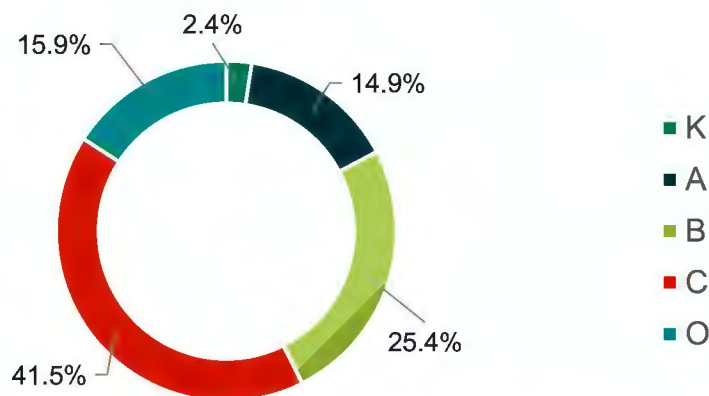


Figure 4: Lansing Ped-Bike Involved Crashes by Severity

Additionally, the role of speed in crash survivability can be crucial. While the exact impact of speed on the severity of VRU crashes in the region is not known, the data (Table 2) suggest that higher posted speed limits where these crashes occurred could lead to more severe outcomes, further emphasizing the importance of speed management in VRU safety. Another key takeaway is the correlation between driver age and VRU crashes. VRU crashes involving younger drivers (under 24) accounted for 37% of VRU crashes, while older drivers (60+) were involved in 20% of VRU crashes. This indicates that specific strategies targeting these age groups could be beneficial in reducing crash risk.

Table 2: Summary of VRU Traffic Crashes by Severity by Posted Speed Limit

Severity	Posted Speed Limit (mph)													Total
	5	10	15	20	25	30	35	40	45	50	55	70	75	
Fatal	0	0	0	0	2	0	4	2	8	0	0	1	0	17
Injury	1	4	5	0	183	50	171	30	131	0	0	3	0	578
All VRU	1	4	5	0	185	50	175	32	139	0	0	4	0	595

Potential Contributing Factors

A primary objective of the Safe Systems Approach is to promote safer, more responsible driving and travel behavior among all road users. Dangerous behaviors, such as impaired driving, significantly increase the risk of crashes. Between 2014 and 2022, there were 550 FI crashes involving alcohol-impaired driving in the City of Lansing. Although alcohol-involved crashes made up only 7.3% of all FI crashes, they accounted for nearly 36% of all fatalities in the region. Figure 5 reveals a strong association between alcohol consumption and the severity of traffic crashes. Specifically, drivers under the influence are involved in a higher proportion of fatal and incapacitating accidents compared to those who are not impaired. This underscores the significant dangers of impaired driving and highlights the urgent need for effective prevention measures, as well as road design measures to provide redundancies to safeguard people when mistakes occur.

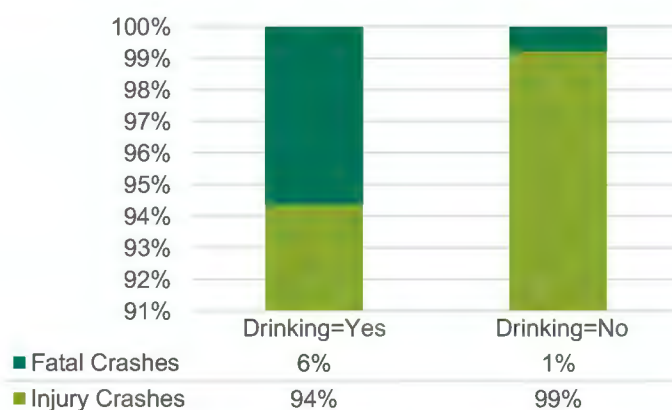


Figure 5: FI Crashes by Drinking Status

Non-behavioral factors also contribute to crashes, including the physical condition of the roadway surface and weather conditions. As shown in **Figure 6** and **Figure 7**, approximately 26% of fatal and injury crashes in the region occurred on adverse surface conditions (icy, snowy, and wet surfaces), and around 15% were linked to adverse weather conditions such as rain and snow. Lighting conditions influence crash risk. **Figure 8** illustrates the distribution of FI crashes by lighting conditions, showing that 30% of FI crashes occurred during dark hours or in dim conditions, where visibility issues for drivers can arise.

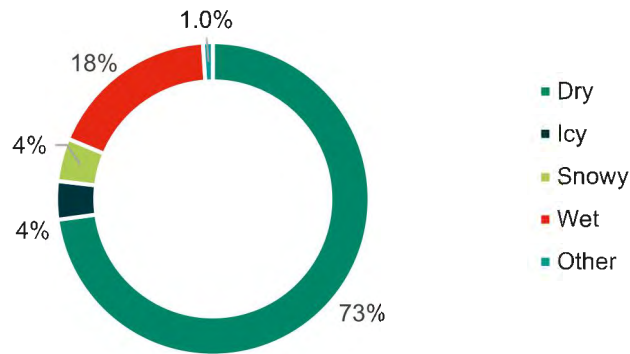


Figure 6: Percent of FI Crashes by Surface Conditions

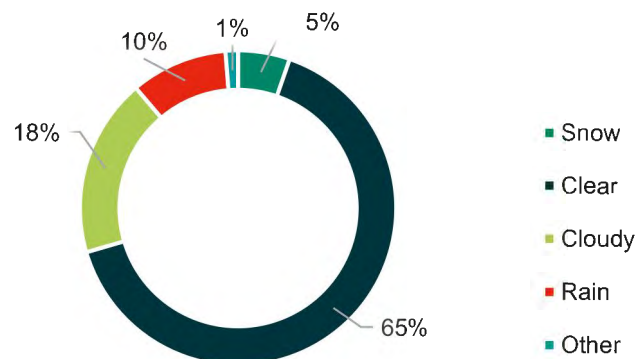


Figure 7: Percent of FI Crashes by Weather Conditions

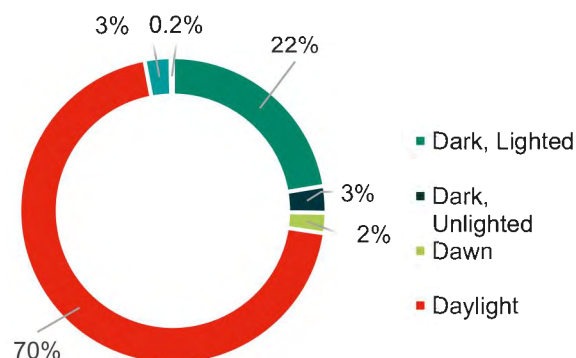


Figure 8: Percent of Traffic Crashes by Lighting Conditions

December 2024

Temporal Analysis

Table 3 highlights the distribution of FI crashes based on the time of day and day of the week. As illustrated in this table, the highest number of crashes is observed between 3 PM and 6 PM from Monday through Friday, with particularly elevated numbers often reaching over 300 crashes during these hours compared to other times of day. On weekends, the crash frequency is highest between 3 PM and 6 PM on Sunday (175 crashes) compared to other times of day on both Saturday and Sunday.

Figure 9 provides a monthly breakdown of FI crashes by three transportation modes: motorized vehicle, bicycle, and pedestrian. Motorized crashes account for the majority of FI crashes throughout the year, peaking from May to October, with the number of crashes exceeding 567 crashes per month, and reaching a maximum of 674 crashes in October. Bicycle crashes reach their highest monthly total in September with 48 crashes, while pedestrian crashes peak in October with 45 crashes.

Table 3: Number of FI Crashes by Time of Day

From To	Time of Day							
	12 AM	3 AM	6 AM	9 AM	12 PM	3 PM	6 PM	9 PM
	3 AM	6 AM	9 AM	12 PM	3 PM	6 PM	9 PM	12 AM
Day of Week Mon	31	23	122	155	215	290	138	85
Tues	43	23	141	156	208	358	172	93
Wed	42	18	151	155	214	322	182	83
Thu	44	17	138	170	229	315	187	103
Fri	45	30	121	171	242	314	180	128
Sat	84	45	49	115	160	158	161	137
Sun	83	36	28	62	159	175	151	73

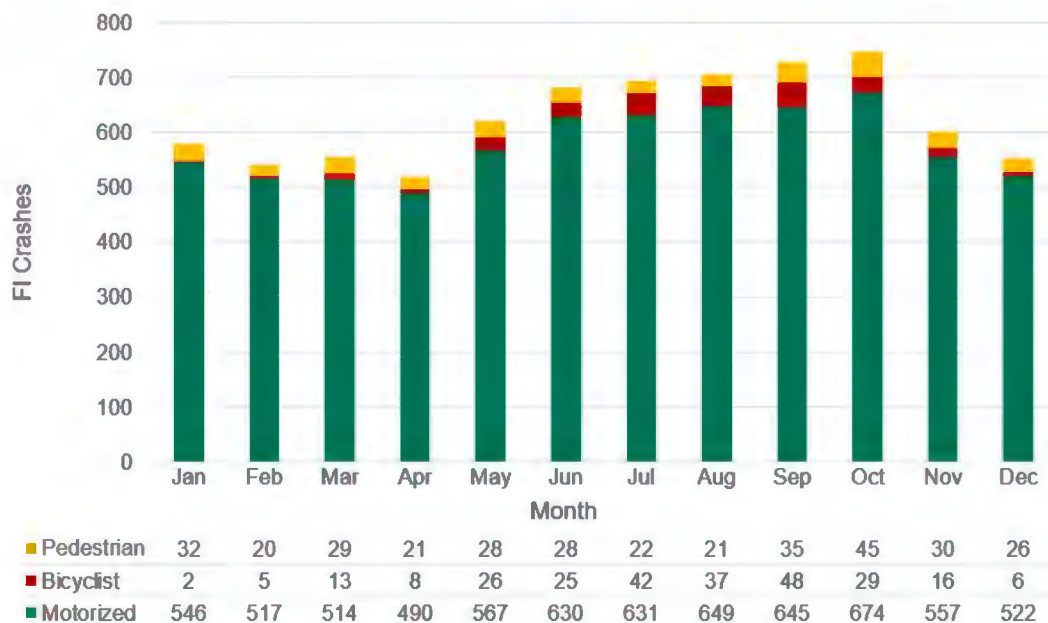


Figure 9: FI Crashes by Month by Mode

Spatial Analysis

Spatial crash analyses offer a powerful approach to understanding the geographical distributions and patterns of crashes within a given region. Examining these aspects of crashes provides valuable insight into the locations, road segments, and intersections that experience higher frequencies of crashes. The spatial analysis can also provide insight into the underlying factors that contribute to crashes in a certain area. Understanding the location and concentration of crashes is instrumental in developing targeted interventions, implementing effective safety measures, and optimizing resource allocation to reduce risks for road users. Within this section, a comprehensive spatial analysis of the crash data is provided, aiming to identify patterns and trends within the City of Lansing.

Figure 10 and **Figure 11** illustrate the heatmap of FI and VRU crashes from 2014 to 2022. Relative density refers to how concentrated crashes are in certain areas compared to others. As shown in the map legend, areas marked as 'most frequent' represent the highest concentration of crashes, while those labeled 'least frequent' indicate very few or no crashes. The map reveals that crash concentrations are predominantly clustered around urban centers, with the highest densities occurring along S MLK Jr Blvd and S Cedar St, including major intersections such as S MLK Jr Blvd and W Saint Joseph St, S MLK Jr Blvd and W Malcolm X St, S Cedar St and E Jolly Rd, and E Edgewood Blvd. Crashes are often more frequent in urban areas due to a combination of factors related to population density, traffic volume, and complex land usage. The higher concentration of vehicles often leads to increased conflicts on the roads, which elevates the risk of crashes. Urban areas also generally experience higher levels of congestion, which can lead to driver frustration and aggressive driver behaviors as well. **Figure 12** and **Figure 13** illustrate the segment and intersection FI crash rates (crashes per million vehicle miles traveled) based on traffic data from Replica. To avoid biased crash rates, particularly for local roadways with low traffic volumes, road segments with an AADT of less than 150 vph and a length of less than 0.15 miles were excluded from the analysis. Similarly, intersections with an entering AADT of less than 150 vph were also excluded.

Fatal and Injury Crashes, 2014 - 2022

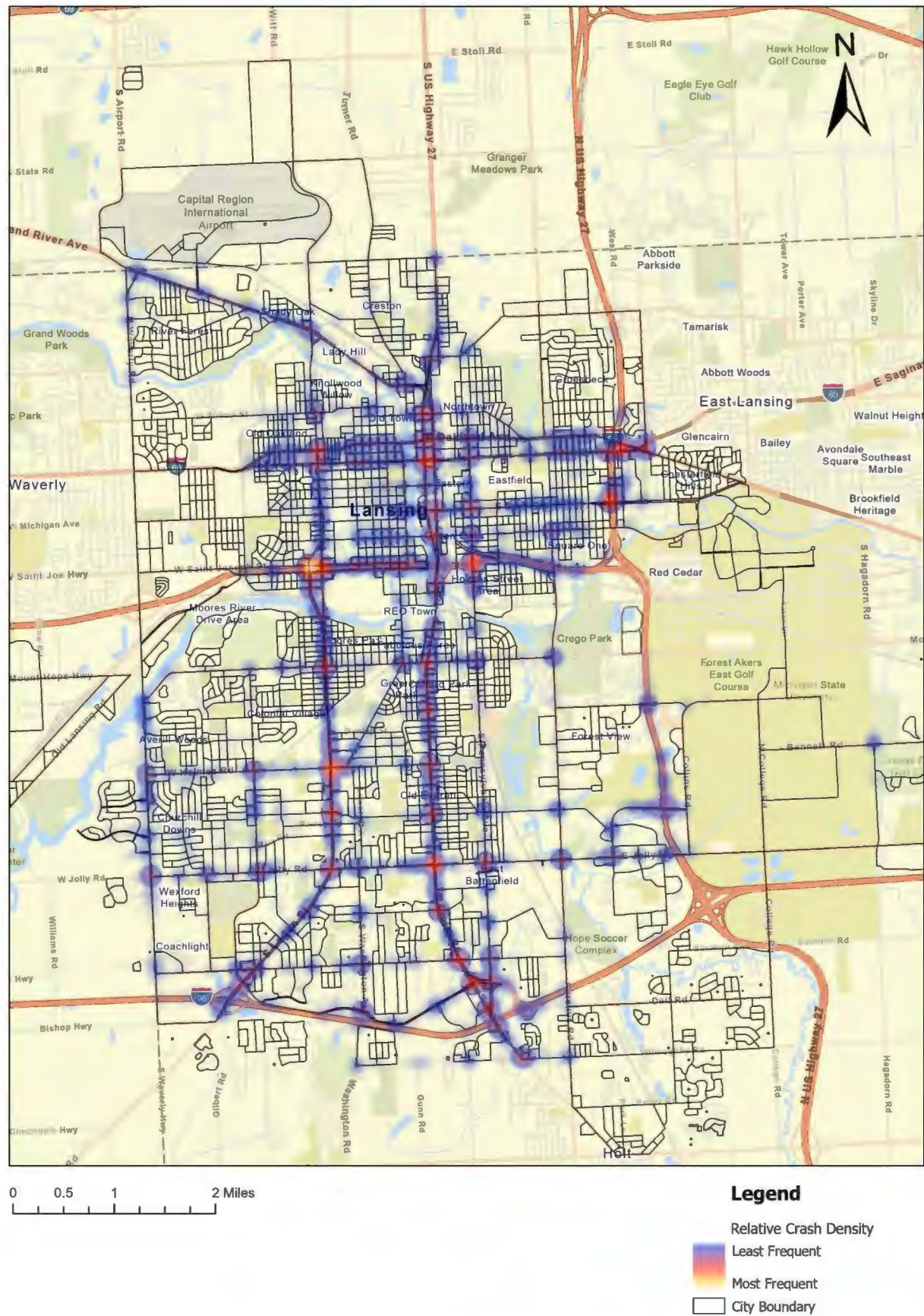


Figure 10: FI Crash Frequency Heat Map

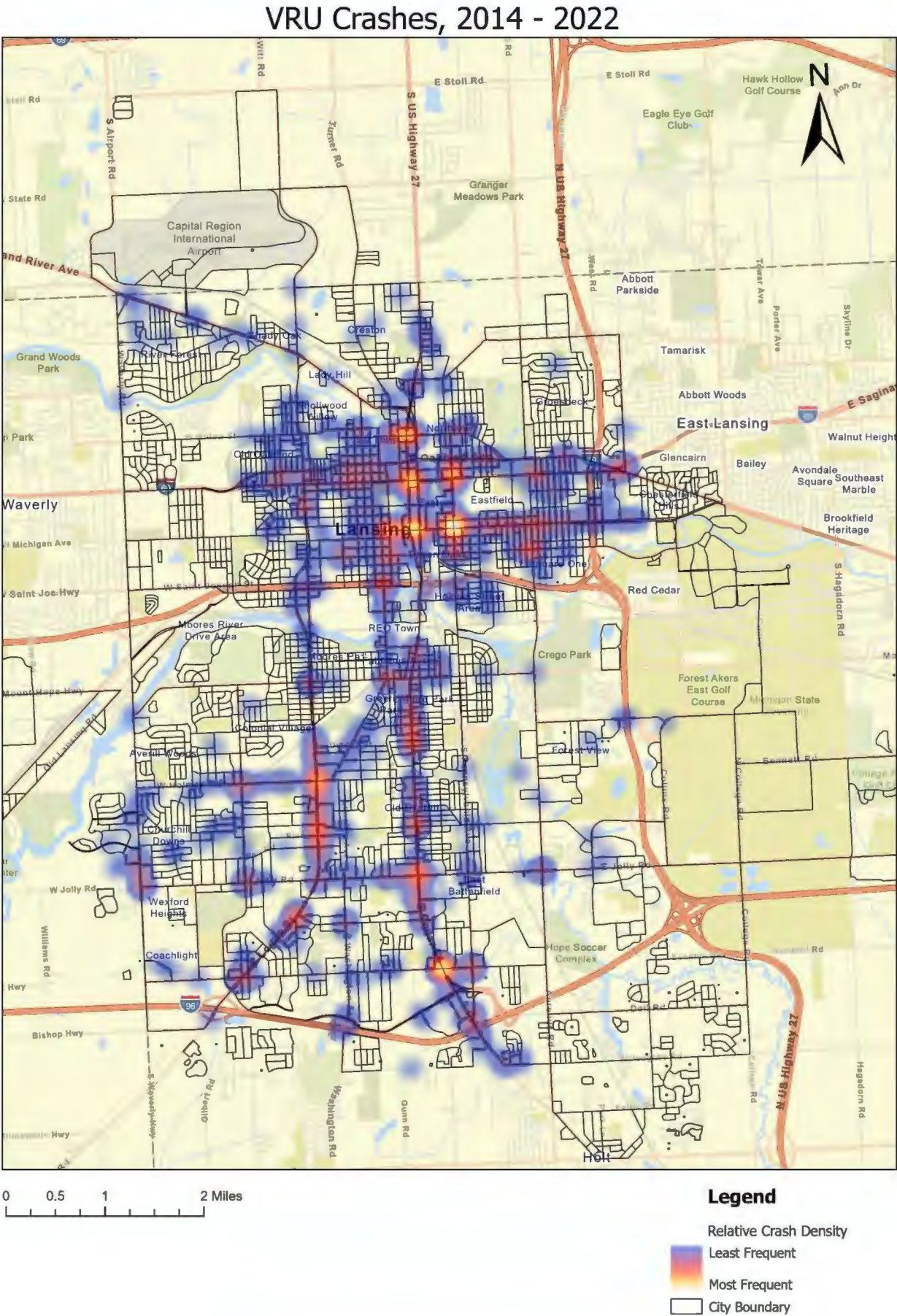


Figure 11: VRU Crash Frequency Heat Map

Segment Fatal and Injury Crash Rate Map

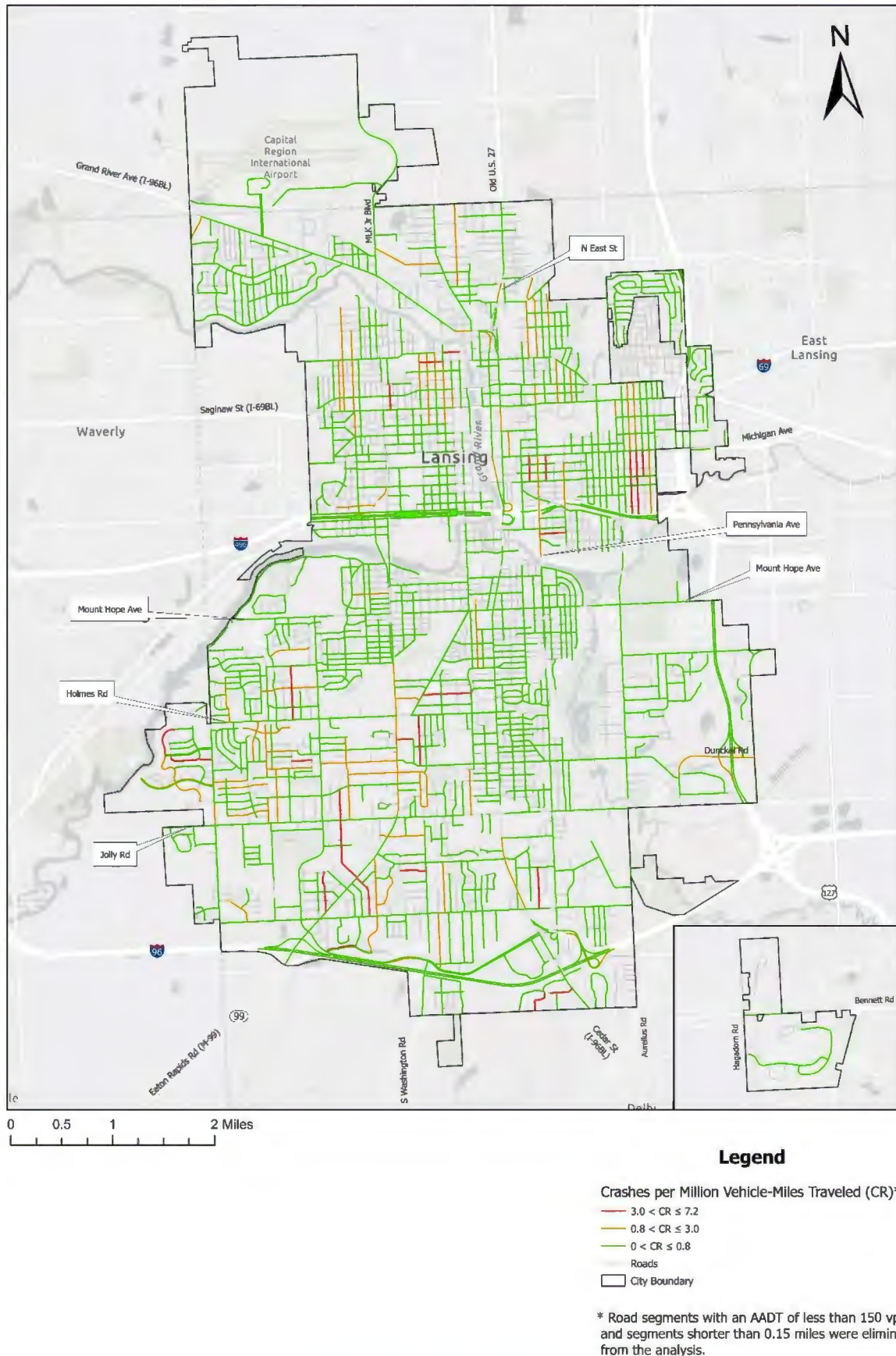
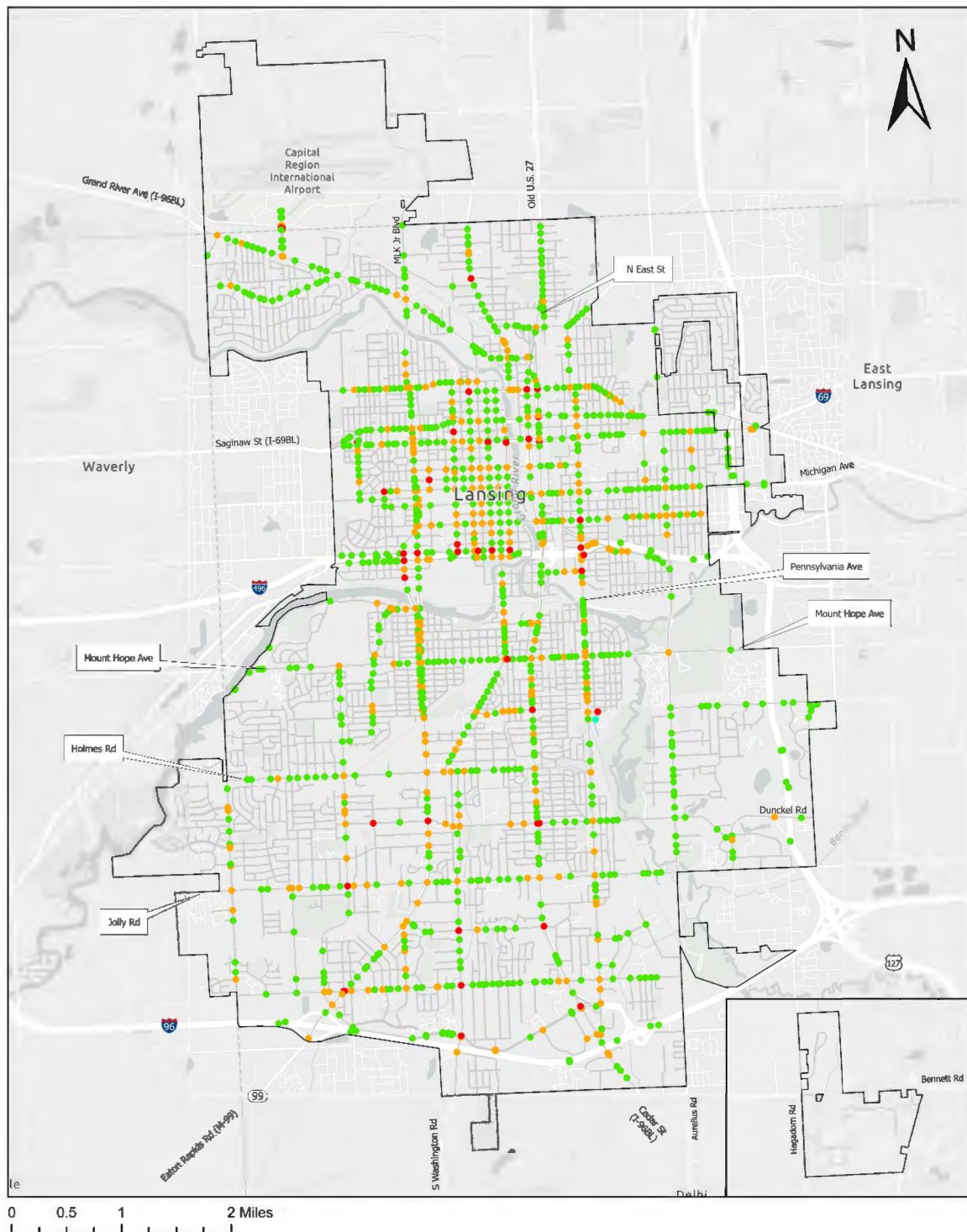


Figure 12: Segment FI Crash Rate Map

Intersection Fatal and Injury Crash Rate Map



Legend

Crashes per Million Entering Vehicles (CR)*

- 1.0 < CR ≤ 4.9
- 0.3 < CR ≤ 1.0
- 0 < CR ≤ 0.3

— Roads
 □ City Boundary

* Intersections with entering vehicles less than 150 vpd were eliminated from the analysis.

Figure 13: Intersection FI Crash Rate Map

December 2024

Figure 14 illustrates that the majority of FI crashes, involving motorized vehicles and VRUs occurred at intersections. Furthermore, as shown in **Figure 15**, these crashes predominantly took place at signalized intersections.

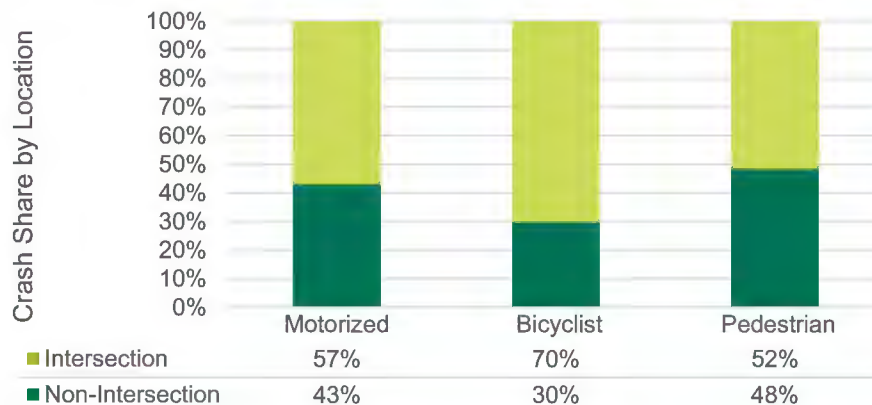


Figure 14: FI Crash by Location

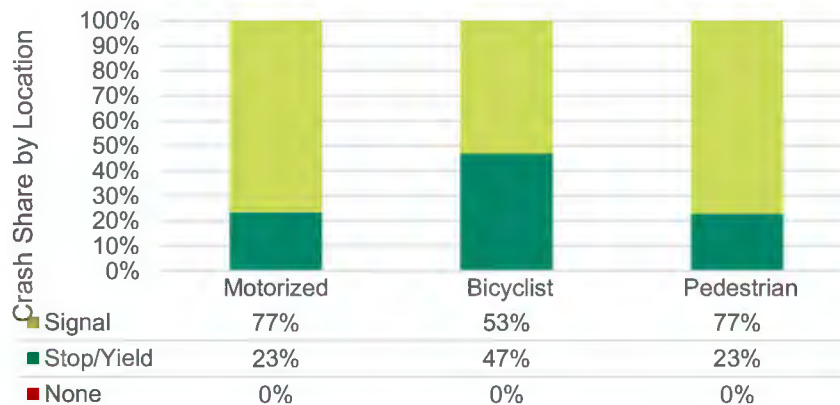


Figure 15: FI Crash by Device Control

Table 4 reveals that from 2014 to 2022, Other principal arterials were the most common locations for motorized, bicyclist, and pedestrian crashes, accounting for 50%, 40%, and 51% of FI crashes, respectively. Minor arterials also contributed significantly, representing 26% of motorized and 20% of pedestrian crashes, while local roads accounted for 31% of bicyclist crashes.

Table 4: FI Crashes by Road Type

Location Type	Motorized		VRU			
	#	%	Bicyclist		Pedestrian	
			#	%	#	%
Interstate	550	8%	0	0%	4	1%
Major Collector	407	6%	22	9%	32	10%
Minor Arterial	1788	26%	51	20%	68	20%
Other Principal Arterial	3426	50%	101	40%	171	51%
Other Freeway	25	0%	0	0%	0	0%
Local	720	10%	79	31%	58	17%
Total	6613	100%	310	100%	190	100%

Equity

The SS4A program, in conjunction with the Justice40 Initiative, emphasizes the critical role of equity in transportation safety and infrastructure investment. These initiatives aim to address disparities in road safety and access to transportation resources by identifying and prioritizing disadvantaged areas. The U.S. Department of Transportation (USDOT) has defined various metrics to classify areas from high advantage to high disadvantage. To support these goals, an analysis was conducted using equity metrics such as Energy Burden, Housing Burden, Life Expectancy, Air Pollution, and Travel Barriers. Using these classifications, the number of tracts in each category that experienced fatal and serious injury crashes were identified. **Table 5** shows that numerous FSI crashes occur in areas classified as either high or somewhat disadvantaged. For metrics such as energy burden and air pollution, a greater proportion of fatal and serious injury crashes occurred in somewhat advantaged areas. Conversely, for housing burden and life expectancy metrics, a higher proportion of these crashes was observed in median-advantage areas. Lastly, for the travel metric, a larger share of fatal and serious injury crashes occurred in high-advantage areas.

Table 5: FSI Crashes by Justice 40 Metrics

Classifications	USDOT Justice 40 Equity Metric									
	Energy Burden		Housing Burden		Life Expectancy		Air Pollution		Travel Barrier	
	#	%	#	%	#	%	#	%	#	%
High Advantage Areas	39	6%	43	6%	116	17%	0	0%	384	56%
Somewhat Advantaged Areas	105	15%	52	8%	29	4%	0	0%	29	4%
Median Areas	368	54%	61	9%	95	14%	687	100%	250	36%
Somewhat Disadvantaged Areas	146	21%	231	34%	68	10%	0	0%	16	2%
High Disadvantage Areas	29	4%	300	44%	379	55%	0	0%	8	1%
Total	687	100%	687	100%	687	100%	687	100%	687	100%

High Injury Network

The existing conditions analysis in the previous sections establishes a baseline understanding of traffic crashes throughout the Lansing area. While documenting current conditions and collision patterns is an essential first step in developing effective traffic safety solutions, many transportation agencies also create High Injury Networks (HINs) to highlight corridors with the largest safety concerns. Specifically, the HIN identifies roadway segments with the highest concentrations of crashes over a three-year period. It represents a prioritized subset of the overall transportation network. HINs are valuable tools for identifying high-need areas, enabling agencies to prioritize investments, infrastructure improvements, and educational campaigns. Additionally, they provide insights into disproportionate crash impacts within underserved communities and promote collaboration between agencies and community partners.

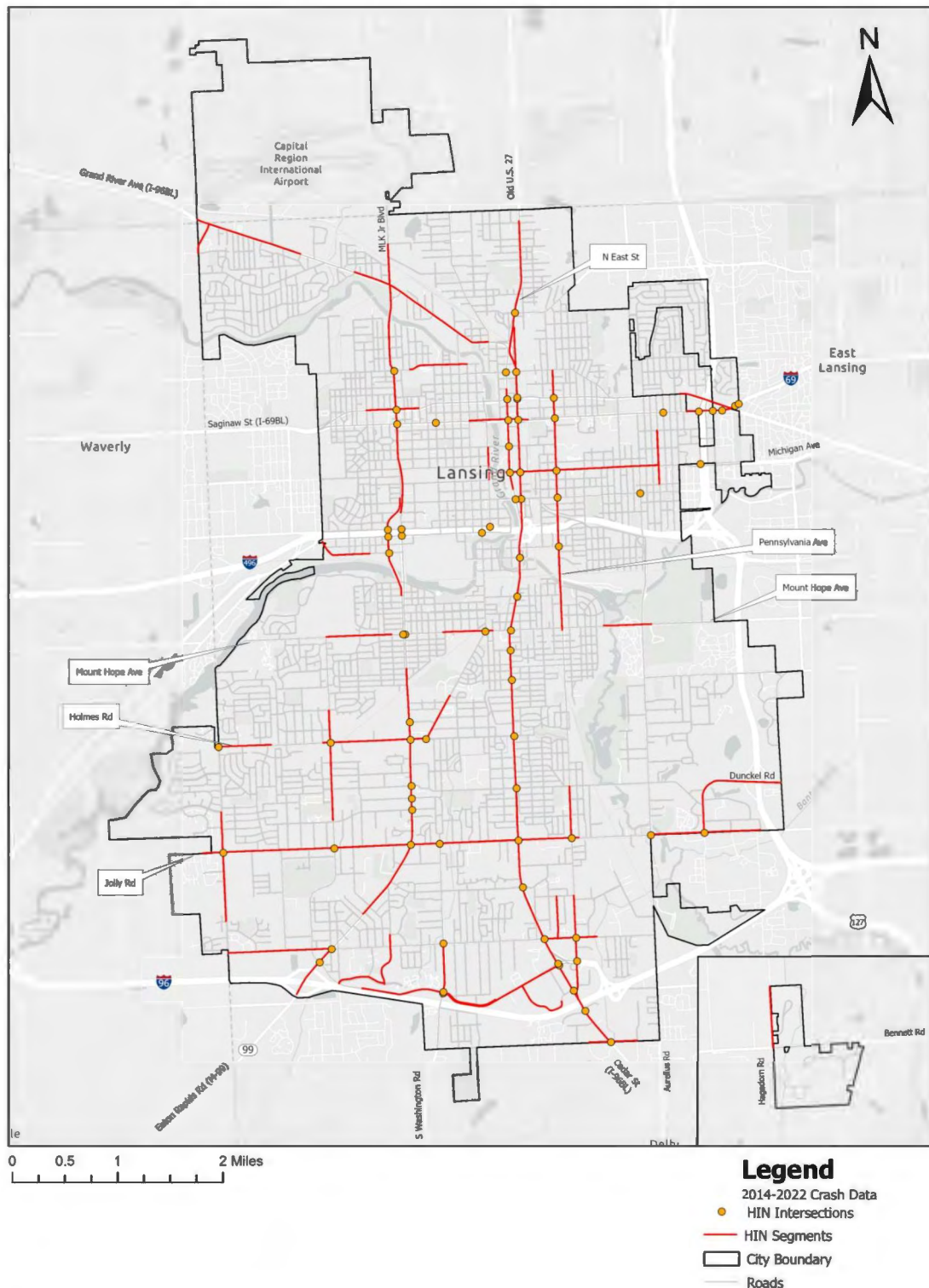
To develop the HIN, methodologies from various agencies nationwide were reviewed, and key elements were integrated to create a unified approach for the City of Lansing. **Table 6** summarizes the core components of the HIN methodology. The HIN was developed using the MIRE road network from Michigan's open data portal and 9 years (2014-2022) of crash data. The analysis focused on all fatal and injury crashes within the road network. First, a GIS-based approach was used to dissolve the road network by route ID, creating a connected network. The road network was then split into half-mile segments. Segment ends within 0.25 miles of intersections were extended or shortened as needed. Next, crash data was spatially joined to the street segments to enable segment-level analysis. Crashes were counted by severity for each roadway segment, and a weighted sum was calculated using a 3:3:2:1 ratio for K-fatal, A-injury, B-injury, and C-injury crashes, respectively. Finally, segments were ranked from highest to lowest based on these weighted sums, and the top segments were selected as the HIN.

Table 6: Lansing HIN Core Components

Component	Description
Data Period	9 years (2014-2022) of statewide crash data.
Level of Analysis	Traffic crashes were analyzed at both the segment and intersection levels.
Consideration of Severity	All crashes resulted in fatal and injury crashes were analyzed.
Consideration of Mode	All transportation modes were considered in the analysis
Roadway Network and Road Type	The MIRE road network was pulled from Michigan's open data portal. Limited access freeways were not included in the HIN.
Threshold	The HIN covers at least 65% of fatal and Injury crashes
Weighting	For each segment, a weighted sum was calculated using a 3:3:2:1 ratio for fatal, A-injury, B-injury, and C-injury crashes, respectively.

As shown in **Figure 16**, the HIN covers 10% of the road network and accounts for 71% of FSI crashes in the city. Several corridors and intersections are of particular concern for safety issues, spanning North-South (e.g., Pennsylvania Ave, MLK Jr Blvd, and Cedar St) and East-West (e.g., Jolly Rd, Holmes Rd, and Mount Hope Ave) directions. Additionally, **Figure 17** illustrates the variations in scores for both the high injury network and intersections.

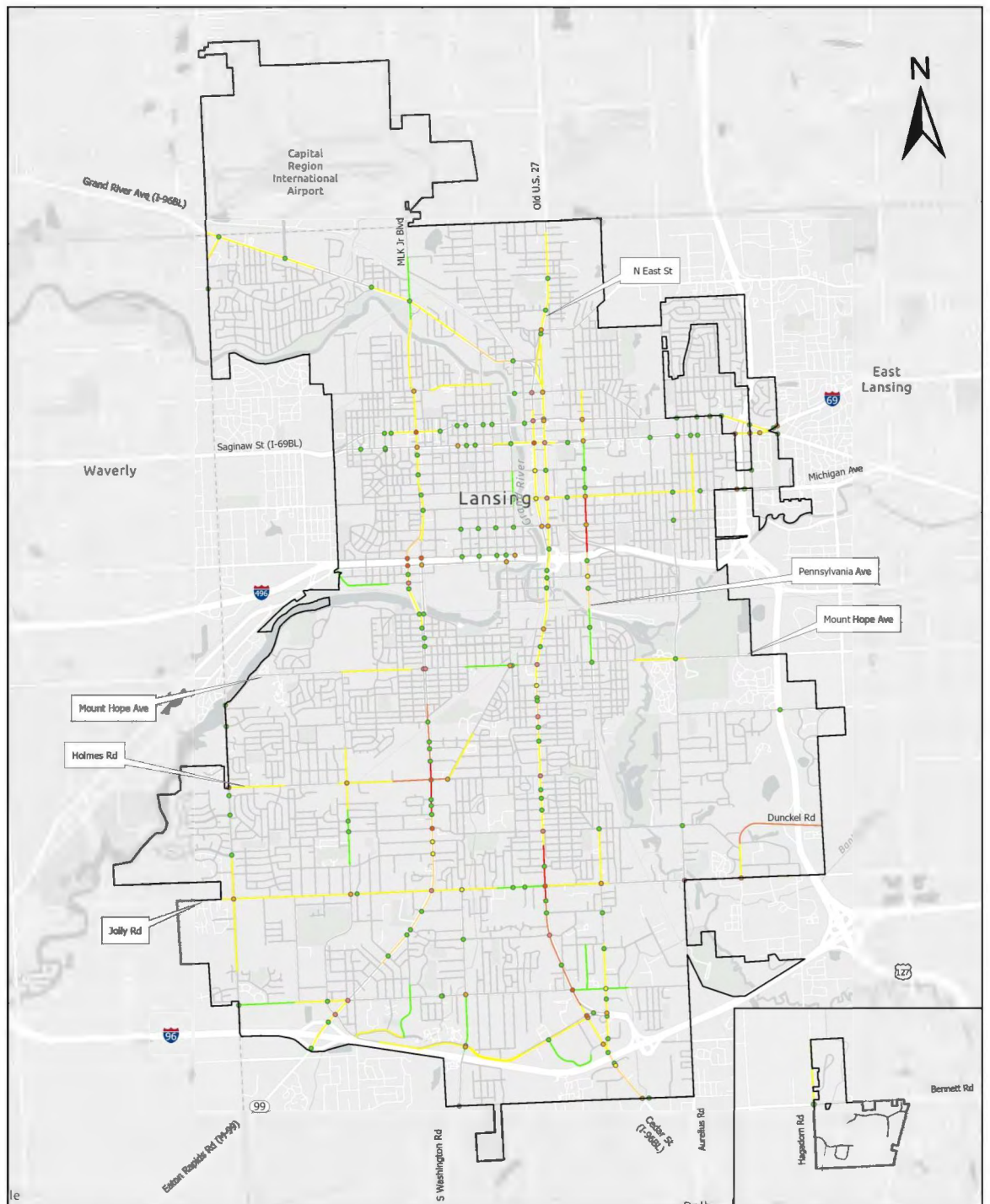
City of Lansing-High Injury Network



Percentage of Roadway Network Covered by HIN= 9.9%
 Percentage of Fatal and Injury Crashes Covered by HIN: 65%
 Percentage of Fatal and Serious Injury Covered by HIN: 71%

Figure 16: Segment-Based High Injury Network

City of Lansing-High Injury Network



Legend

2014-2022 Crash Data

High Injury Networks

Wighted Score

- Tier 1: 44 - 67
- Tier 2: 30 - 44
- Tier 3: 19 - 29
- Tier 4: 7 - 18
- Others

High Injury Intersections

Wighted Score

- Tier 1: 56 - 95
- Tier 2: 42 - 55
- Tier 3: 29 - 41
- Tier 4: 24 - 28
- Others

City Boundary

City Boundary

Roads

Roads

Figure 17: High Injury Network and Intersection Categorized by Score

Conclusion

This historical baseline safety analysis provides a comprehensive overview of traffic crash data in the City of Lansing from 2014 to 2022. By examining key aspects such as crash frequency, types, and contributing factors, the analysis offers insights into regional safety challenges. A key takeaway is the overall increase in crash rates since 2020. The data also highlights angle and rear-end crashes as the most frequently occurring and most likely to result in injuries, while certain road users, such as pedestrians and bicyclists, are at higher risk.

Contributing factors such as impaired driving, adverse surface and weather conditions, and poor lighting play a substantial role in crash severity, with impaired driving alone accounting for nearly 26% of all fatalities. Time-based analysis reveals that between 3 PM and 6 PM on weekdays experience the highest concentration of crashes, suggesting that congestion and commuter behavior contribute to elevated crash risks. Spatial analysis further identifies urban centers and high-traffic corridors, particularly in S MLK Jr Blvd and S Cedar St, emphasizing the need for targeted safety interventions in these areas.

Lastly, the produced HIN highlights several corridors running North-South (e.g., Pennsylvania Ave, MLK Jr Blvd, and Cedar St) and East-West (e.g., Jolly Rd, Holmes Rd, and Mount Hope Ave) that require safety attention.

Overall, these results provide the City of Lansing and its stakeholders with valuable insights to shape safety strategies, prioritize resource allocation, and reduce traffic fatalities and injuries. The findings underscore the importance of addressing key risk factors such as impaired driving, adverse road surface and weather conditions, and high-risk locations, particularly urban intersections and arterial roads. As the City of Lansing continues its efforts under the SS4A program, these insights serve as a foundation for building safer streets and reducing risk in the community.



Road Safety Audit

Jolly Road from Jolly Cedar Court to Oakbrook Drive

City of Lansing

December 19, 2024

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Revision History

Revision	Revision date
Draft	N/A
Final	12/19/2025

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1. Introduction

The Jolly Road corridor from Jolly Cedar Court to Oakbrook Drive is located in southeast City of Lansing, Michigan. The east-west corridor contains north-south crossings with major roads, including Cedar Street (I-96BL), S Pennsylvania Avenue, Aurelius Road, and Dunckel Road, all of which experience high volumes of both vehicular traffic and non-motorized traffic. There are several trails surrounding the RSA corridor, popular pathways for non-motorized users. One trail runs parallel to the corridor between S Pennsylvania Avenue and Dunckel Road and another terminates at Jolly Road west of Aurelius Road.

A road safety audit (RSA) was conducted to review the corridor and provide safety improvement recommendations for possible implementation as part of future projects. The Jolly Road corridor was selected for a RSA through discussions with the City of Lansing's Safe Streets and Roads for All (SS4A) staff. The identified Jolly Road corridor is included on the City's High Injury Network (HIN) which was determined using historical crash data. **Figure 1** is a map of where the corridor is located in Ingham County.

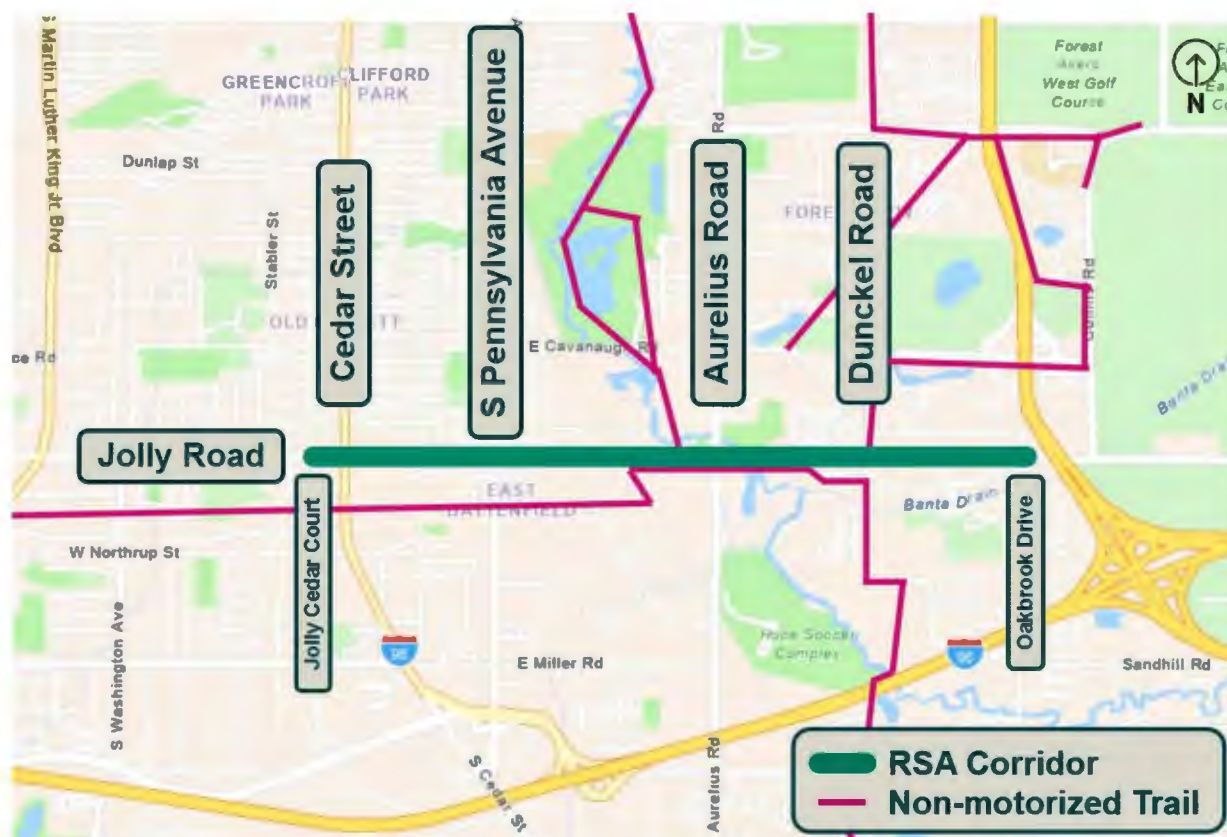


Figure 1 - RSA corridor location

1.1 RSA Framework

The RSA was performed utilizing a framework that was derived from the Federal Highway Administration's (FHWA) Road Safety Audit Guidelines and the associated National Highway Institute (NHI) training course. Safety concerns that were identified during the RSA process were specific to the project extents and influence area. Safety concerns, risk ratings, and suggested treatments and countermeasures aimed to address the identified safety concerns were developed by the RSA team. Additionally, a project-level safety analysis was performed to supplement findings by providing quantifiable impacts associated with the implementation of the suggested countermeasures included within this report.

1.1.1 RSA Safety Risk Framework

Safety concerns that were identified as part of the RSA process were assigned a risk rating according to the RSA Safety Risk Matrix presented in **Figure 2**. The rating represents the relative risk and priority (based on information in **Table 1** and **Table 2**) that the risk should be given between a rating of A, which represents the lowest risk and lowest priority, and a rating of F, which represents the highest risk and highest priority. The ratings included in **Figure 3** were derived from the combination of the likely frequency or exposure and the expected resulting severity of crashes that are associated with each safety concern based on the RSA team members' experience and expectations. Each risk category was qualitatively estimated by the RSA team and not solely based on historical crash data. Risk categories for each safety concern are listed in **Table 9**.

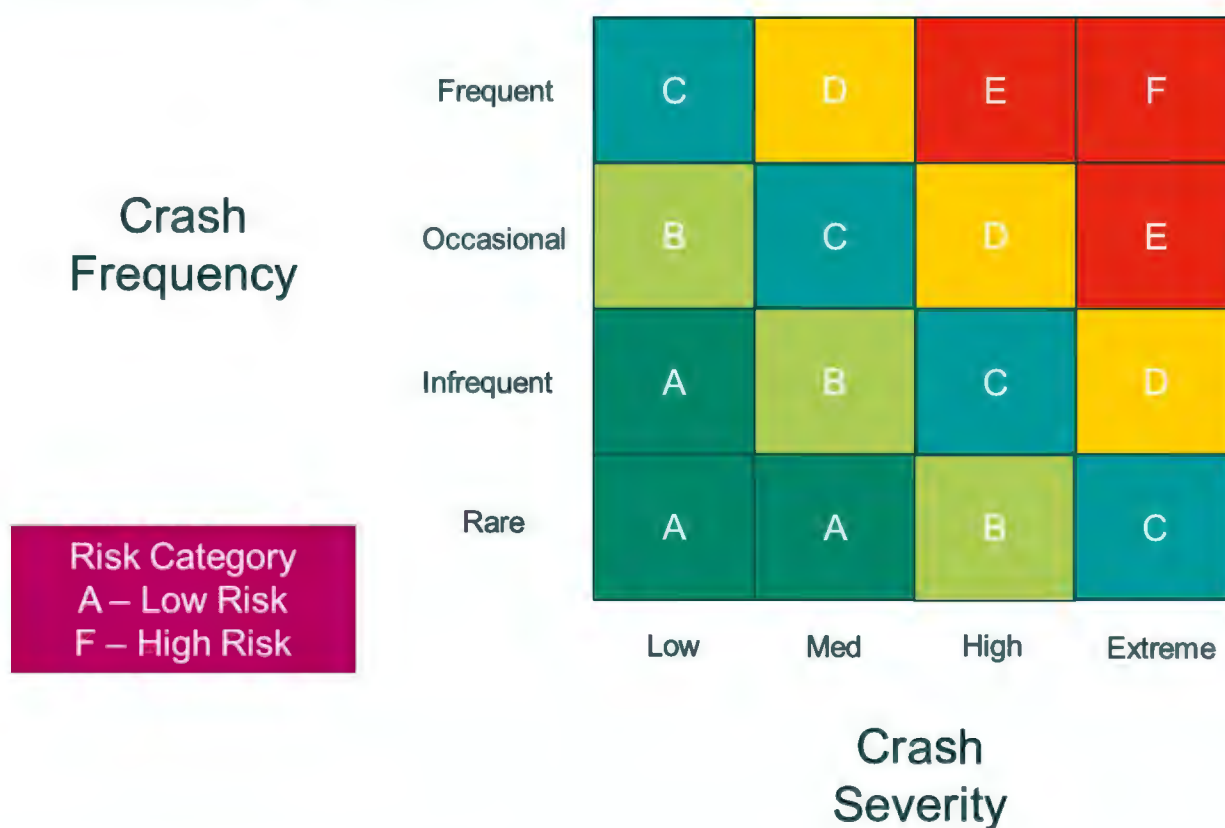


Figure 2 - RSA safety risk matrix

Table 1 - Crash frequency rating description

Estimated Exposure	Estimated Probability	Expected Crash Frequency	Frequency Rating
High	High	10 or more crashes per year	Frequent
Medium	High		
High	Medium	1 to 9 crashes per year	Occasional
Medium	Medium		
Low	High		
High	Low	<1 crash per year, but more than 1 crash every 5 years	Infrequent
Low	Medium		
Medium	Low	<1 crash every 5 years	Rare
Low	Low		

Table 2 - Crash severity rating description

Typical Crashes Expected	Expected Crash Severity	Severity Rating
Crashes involving high speeds or heavy vehicles, pedestrians, or bicycles	Probable fatality or incapacitating injury	<i>Extreme</i>
Crashes involving medium to high speed; Head-on, crossing, or off-road crashes	Moderate to severe injury	<i>High</i>
Crashes involving medium to low speeds; Left-turn and right-turn crashes	Minor to moderate injury	<i>Moderate</i>
Crashes involving low to medium speeds; Rear-end or sideswipe crashes	Property damage only or minor injury	<i>Low</i>

1.2 RSA Details

The RSA was facilitated by AECOM staff on October 17, 2024. The RSA team gathered on-site to perform a field review. Conditions were assessed by driving the corridor during afternoon and nighttime conditions. Each intersection was also thoroughly assessed by the RSA team. Throughout the field review, the RSA team compiled numerous photos, videos, and notes to share with the project owner. Additional details pertaining to the RSA can be referenced in **Table 3**.

Table 3 - RSA details

Item	Details
Project Limits	Jolly Road from Jolly Cedar Court to Oakbrook Drive
Project Location	Lansing, MI (Ingham County)
Project Environment	Urban Corridor
Project Owner	City of Lansing (Nicole McPherson – Project Manager)
RSA Date	October 17, 2024
RSA Stage	Existing facility; future project
RSA Team Members	Sterling Frazier, PE, PTOE, RSP ₁ – AECOM (RSA Facilitator) Odai Alhouz, PE, PTOE – AECOM Peyton Smith, EIT – AECOM

2. Study Area Background

The primary focus area of the RSA is the 2.4-mile corridor of Jolly Road from Jolly Cedar Court to Oakbrook Drive, which is located in Lansing, Ingham County. The land use surrounding the corridor is a mix of residential, commercial, and recreational areas. Jolly Road is an east-west arterial providing connectivity between I-96 BL (Cedar Street) and I-496. The cross section of the RSA corridor is 4 lanes, two in each direction, with an added center turn lane east of Five Oaks Drive. The posted speed limits are 35 mph at the western limit, increasing to 50 mph at the east end as shown in **Figure 3**, along with 2023 AADTs for Jolly Road and the major cross streets. The RSA focuses on identifying safety concerns for both motorized and non-motorized users, especially where the corridor interacts with a portion of Sycamore Trail and the Lansing pathway, non-motorized pathways that follows Jolly Road from Jackson and Lansing Railroad to Five Oaks Drive, attracting pedestrians, cyclists, and other non-motorized users. The non-motorized Lansing River Trail also intersects Jolly Road near Aurelius Road. The goal of this RSA is to assess the risks for all users on the Jolly Road corridor and recommend improvements. **Figure 4** provides a regional perspective of the transportation network and its relation to the RSA corridor.

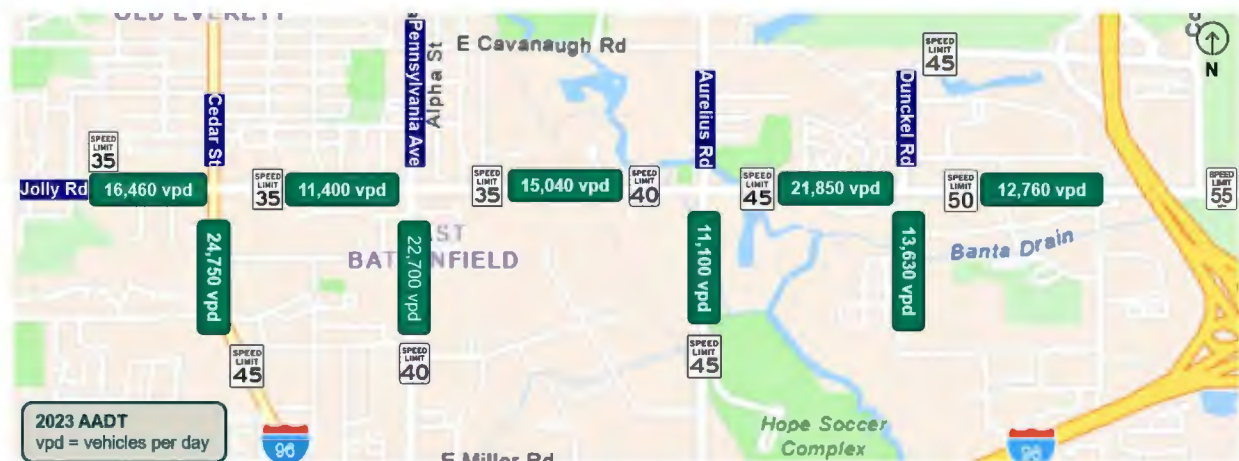


Figure 3 - AADT and speed limit map



Figure 4 - Regional map

3. Historical Crash Analysis

AECOM completed an analysis of historical crash data to supplement findings discovered during the RSA process. Traditional crash metrics, including crash pattern and injury statistics for segments and intersections, were developed and can be referenced in the sections below. Additionally, a state-of-the-art safety analysis was performed utilizing Empirical Bayes (EB) methodology outlined in the American Association of State Highway Transportation Officials' (AASHTO) Highway Safety Manual (HSM). Crash data for the following analyses were collected for the most recent five-year period available, 2019-2023 from the Michigan Traffic Crash Facts (MTCF) website.

3.1 Traditional Crash Analysis

Crash data was gathered from UD-10s and spatially mapped within a geographic information system (GIS) and assigned to the appropriate location based upon the coordinates that were associated with each record. **Figure 5** shows a heat map of all crashes in the RSA corridor, and **Figure 6** shows a heat map of all injury crashes. There were no fatal crashes in the RSA corridor during the study period. Crashes are concentrated at the Jolly Road intersections with Cedar Street, Pennsylvania Avenue, Aurelius Road, and Dunkel Road for both overall and Fatal and Injury (FI) crash maps.



Figure 5 - Total crash heat map



Figure 6 - Injury crash heat map

Table 4 and **Figure 7** provide a summary of the crash data broken down by injury level, crash type, and year. A total of 645 crashes occurred within the RSA limits during the five-year study period, with no fatal crashes, nine severe injury crashes (1.4%), and 126 total crashes that resulted in some level of injury (19.5%). The most frequent crash type in the corridor is rear end, totaling 40.8% of all crashes and 31.8% of injury crashes. The most frequent type of crash for injury crashes is angle, making up 33.3% of all injury crashes but only 25.4% of total crashes.

Table 4 - Crashes by injury level and crash type

Crash Type	No Injury (O)	Possible Injury (C)	Suspected Minor Injury (B)	Suspected Serious Injury (A)	Total
Rear-End	223	30	6	4	263
Angle	122	34	6	2	164
Sideswipe	81	4	0	0	85
Single Motor Vehicle	46	7	6	1	60
Head-On - Left Turn	22	6	4	1	33
Other/Unknown	18	6	5	0	29
Head-On	2	2	1	1	6
Backing	5	0	0	0	5
Total	519	89	28	9	645

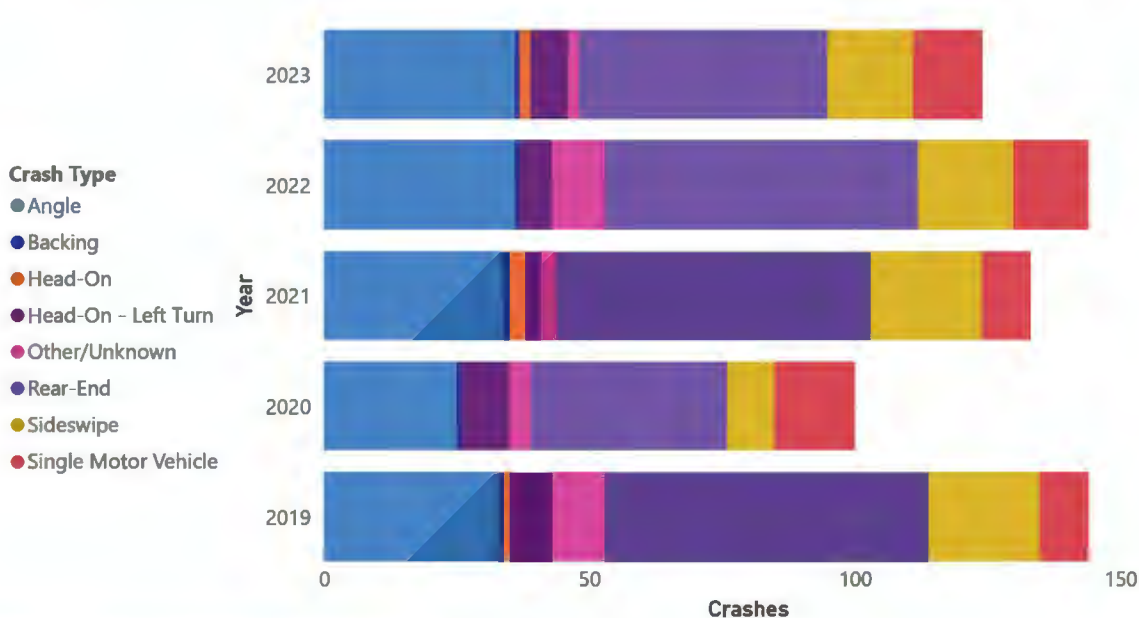


Figure 7 - Crashes by crash type and year

Figure 7 shows the proportion of crashes occurring during different lighting and road conditions. Even though traffic volumes decrease during nighttime hours, 23.1% of crashes occur outside of daylight conditions. Over one quarter (26.6%) of crashes in the study period occurred in non-dry conditions. **Figure 8** shows the crashes by time of day and type of crash, showing that crashes are most likely to occur between 3:00 PM-6:00 PM and least likely to occur between 3:00 AM-5:00 AM, correlating with the high traffic volumes during afternoon rush hour and low volumes during the early morning hours. **Figure 8** also shows a trend in head-on left turn crashes between 1:00-4:00 PM, and a spike in rear end crashes from 5:00-6:00 PM. The City may want to investigate any variation in signal timing during mid-day to understand the head-on left turn crash trend. The rear end increase likely reflects issues with intersection queuing during afternoon rush hour.



Figure 8 - Crashes by lighting conditions (left) crashes by road condition (right)

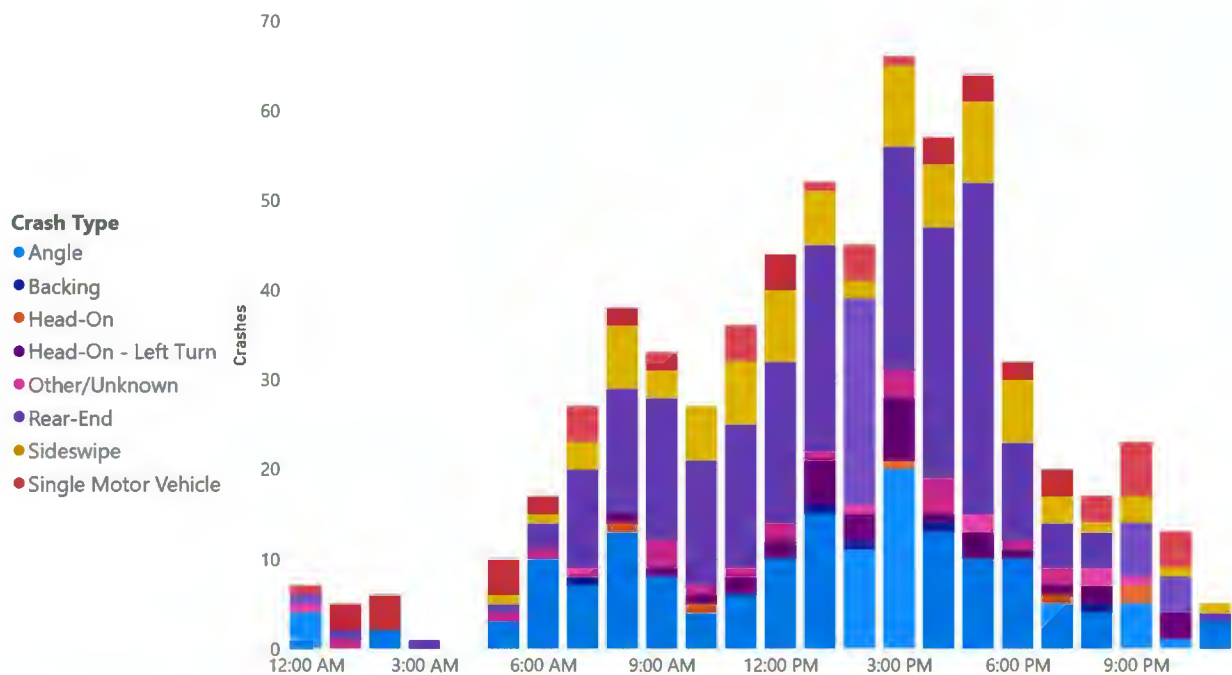


Figure 9 - Crashes by time of day and crash type

Below, **Table 5** summarizes the circumstances for each severe injury crash during the study period as described by law enforcement on the UD-10 crash reports. One noticeable commonality found in the summaries is driver frustration and conflicts caused from corridor queuing.

Table 5 - Severe injury crash UD-10 summaries

Crash Year	Location	Description
2019	West of Dunckel Road	A vehicle was waiting in the left turn lane before deciding to instead turn right, crossing two lanes of traffic in front of a motorcycle who was unable to stop.
2019	Cedar Street intersection	A vehicle was travelling south on Cedar Street when they lost control during winter conditions, left the roadway, and struck a power pole.
2021	East of Southgate Road	A vehicle was travelling west, stopped in the inside through lane waiting for the vehicle in front of them to turn, and the driver behind them did not see the first vehicle braking then was unable to stop in time.
2022	West of Tranter Street	In a lane merge due to construction, 5 vehicles collided. One vehicle raced around three others in the right lane, distracting and cutting them off, creating a chain of inability to stop.
2022	Cedar Street intersection	Three southbound vehicles stopped at a red light were rear ended in a chain reaction caused by a fourth driver who had been drinking, did not notice the other vehicles, and struck the back of the line of cars at high speed.
2022	Dunckel Road intersection	A vehicle was turning left onto northbound Dunckel Road with a yellow arrow that turned red before their turn, but they completed the turn since they were already in the intersection. They did not see an oncoming vehicle and collided in an angle crash.
2023	Pine Tree Road intersection	A vehicle was stopped facing north on Pine Tree Road, then attempted a left turn. A bus was stopped in the outside eastbound lane, blocking the view of the inside eastbound lane and the oncoming vehicle in it. The resulting angle crash caused the turning vehicle to roll multiple times.
2023	West of Cedar Street	One vehicle was attempting to turn left out of a parking lot while a motorcycle was stopped at a red light. When the light turned green the motorcycle changed lanes to the inside through lane and quickly sped up to go around a vehicle ahead of them, at the same time the first vehicle attempted to complete the turn, resulting in an angle collision.
2023	Cedar Street intersection	A vehicle was travelling south on Cedar Street and stopped at a red light behind several other vehicles in the inside through lane. When the light turned green they swerved into oncoming traffic to go around the queue and hit a vehicle in the oncoming lane. The first vehicle was then pushed in front of the left turn lane where a third vehicle was unable to stop and T-boned the first vehicle.

3.2 Empirical Bayes (EB) Analysis

Traditional safety analyses and statistics generally provide a high-level understanding of the existing safety performance of a given facility; however, inherent bias and overdispersion of crash data are present when solely using traditional methodologies. AASHTO developed a state-of-the-art EB methodology outlined in the 2010 HSM, which considers the impact of changing traffic volumes, regression-to-the-mean bias, and other factors that could potentially affect the frequency of traffic crashes.

The EB-method combines the predicted crash frequency of a facility developed using a safety performance function (SPF) and a facility's observed crash frequency to estimate an expected average yearly crash frequency, as shown in **Figure 10**. Ultimately, the estimated predicted crash frequency is subtracted from the expected crash frequency to determine the number of excess expected crashes, which can be defined as the number of expected crashes above or below the predicted crash frequencies of similar facilities. The greater the number of excess expected crashes, the larger the potential is for safety improvements.

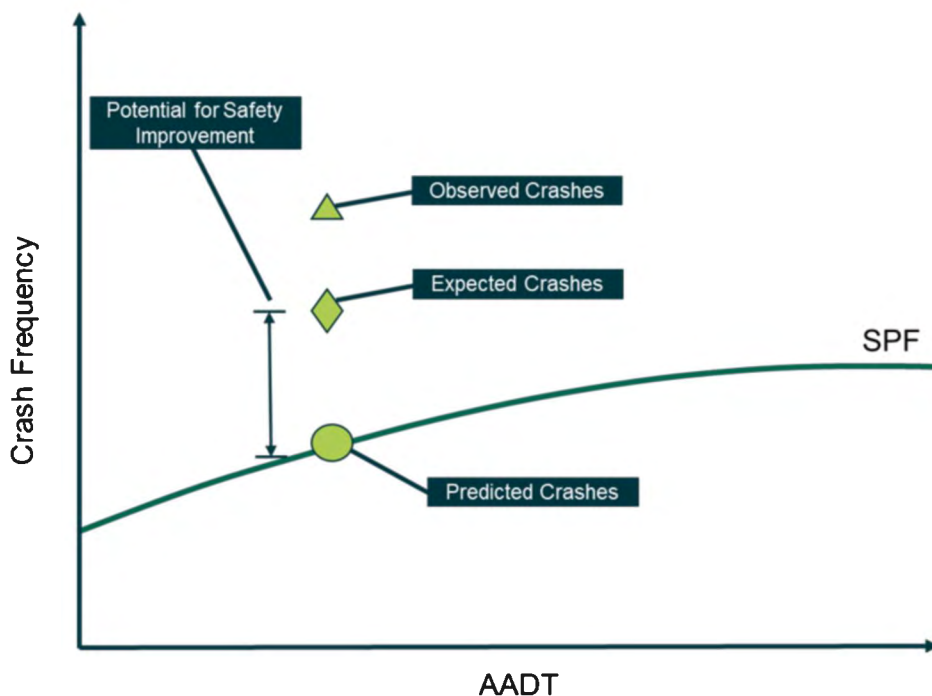


Figure 10 - EB methodology

The following results were developed using SPFs specific to the State of Michigan as outlined in *Michigan Urban Trunkline Segments Safety Performance Functions (SPFs) Development and Support* and *Michigan Urban Trunkline Intersections Safety Performance Functions (SPFs) Development and Support*, *Safety Performance Functions for Rural Road Segments and Rural Intersections in Michigan* following methodology established within the HSM. Traffic volumes from 2023 (obtained from the MDOT AADT map) were utilized in this analysis alongside 2019-2023 traffic crash data. **Table 6** and **Table 8** provide annualized results of the analysis.

Table 6 - EB analysis results for segments

Jolly Road Segment	Predicted Crashes			Expected Crashes			Excess Expected Crashes		
	FI	PDO	TOT	FI	PDO	TOT	FI	PDO	TOT
Jolly Cedar Ct to Cedar St	0.08	0.52	0.60	0.14	2.41	2.55	0.06	1.88	1.94
Five Oaks Dr to Dunckel Rd	0.34	1.61	1.95	0.75	2.81	3.56	0.41	1.19	1.60
Aurelius Rd to Five Oaks Dr	0.24	1.68	1.92	0.45	2.23	2.68	0.21	0.55	0.76
Cedar St to Battenfield Rd	0.12	0.69	0.81	0.40	0.85	1.25	0.29	0.15	0.44
S Pennsylvania Ave to Alpha St	0.07	0.44	0.51	0.23	0.71	0.94	0.16	0.26	0.42
Ascension Michigan Pharmacy to S Pennsylvania Ave	0.19	0.74	0.93	0.47	0.86	1.33	0.28	0.12	0.40
Contec Dr to Jet Dr	0.05	0.30	0.35	0.06	0.50	0.56	0.02	0.20	0.22
Dunckel Rd to Belle Chase Blvd	0.13	0.65	0.78	0.21	0.75	0.96	0.08	0.09	0.17

Jet Dr to Aurelius Rd	0.11	0.70	0.81	0.14	0.76	0.9	0.04	0.07	0.11
Belle Chase Blvd to Pine Tree Rd	0.13	0.64	0.77	0.17	0.69	0.86	0.04	0.05	0.09
Tranter St to Contec Dr	0.17	1.20	1.37	0.27	1.17	1.44	0.10	-0.03	0.07
Battenfield Rd to Southgate Ave	0.05	0.24	0.29	0.06	0.29	0.35	0.01	0.05	0.06
Alpha St to Devonshire Ave	0.05	0.30	0.35	0.06	0.33	0.39	0.02	0.03	0.05
Southgate Ave to Ascension Michigan Pharmacy	0.04	0.23	0.27	0.05	0.26	0.31	0.01	0.03	0.04
Devonshire Ave to Tranter St	0.02	0.15	0.17	0.03	0.16	0.19	0.01	0.02	0.03
Pine Tree Rd to Oakbrook Dr	0.02	0.09	0.11	0.02	0.09	0.11	0.01	0.01	0.02
Total	1.81	10.18	11.99	3.51	14.87	18.38	1.75	4.67	6.42

Table 7 - EB analysis results for intersections

Intersecting Road	Predicted Crashes			Expected Crashes			Excess Expected Crashes		
	FI	PDO	TOT	FI	PDO	TOT	FI	PDO	TOT
Cedar St	1.46	4.70	6.16	2.51	18.15	20.65	1.05	13.45	14.49
S Pennsylvania Ave	1.43	4.57	6.00	2.06	8.90	10.96	0.63	4.33	4.96
Aurelius Rd	1.61	4.83	6.44	1.98	8.91	10.89	0.37	4.08	4.45
Pine Tree Rd	0.02	0.09	0.11	0.03	0.39	0.42	-0.14	3.11	2.97
Dunckel Rd	2.74	7.67	10.41	2.60	10.78	13.38	0.02	0.52	0.54
Jolly Cedar Ct	0.05	0.24	0.29	0.07	0.76	0.83	0.01	0.44	0.45
Five Oaks Dr	0.05	0.23	0.28	0.06	0.67	0.73	0.01	0.30	0.31
Oakbrook Dr	0.03	0.11	0.14	0.04	0.10	0.15	0.00	0.28	0.27
Battenfield Rd	0.04	0.15	0.19	0.04	0.37	0.40	-0.01	0.22	0.21
Alpha St	0.05	0.22	0.27	0.05	0.43	0.48	0.00	0.21	0.21
Contec Dr	0.05	0.20	0.25	0.05	0.48	0.52	0.00	0.20	0.20
Belle Chase Blvd	0.10	0.22	0.32	0.11	0.34	0.45	0.01	0.12	0.13
Tranter St	0.05	0.22	0.27	0.05	0.42	0.47	0.00	0.12	0.12
Devonshire Ave	0.05	0.22	0.27	0.05	0.34	0.39	0.00	0.07	0.07
Ascension Michigan Pharmacy	0.04	0.15	0.19	0.04	0.22	0.26	0.00	0.04	0.04
Jet Dr	0.05	0.20	0.25	0.05	0.24	0.29	0.01	-0.01	0.01
Southgate Ave	0.04	0.15	0.19	0.03	0.16	0.19	-0.01	0.01	0.00
Total	7.86	24.17	32.03	9.81	51.65	61.47	1.95	27.48	29.44

Excess expected crashes is a metric that demonstrates how an intersection or segment is performing compared to similar facilities, showing the number of crashes over the expected value. Higher excess expected crashes indicates more opportunity for improvement. Overall, intersections have nearly eight times the total excess expected crashes compared to segments, demonstrating that safety improvements focused on intersections could have the most benefit in the corridor. The intersection with the most excess expected crashes in the corridor is at Cedar Street, with a high excess of both injury and PDO crashes.

4. Existing Safety Features and Observations

The RSA team noticed several positive safety features throughout the limits of the RSA, including:

1. Signs and lane markings in good condition
2. Bike stop signs on multi use path east of railroad
3. No noticeable speeding
4. High police presence
5. Intersection lighting
6. Box spans at signalized intersections
7. Good access management
8. Good sight distance at intersections
9. Left turn signal phasing

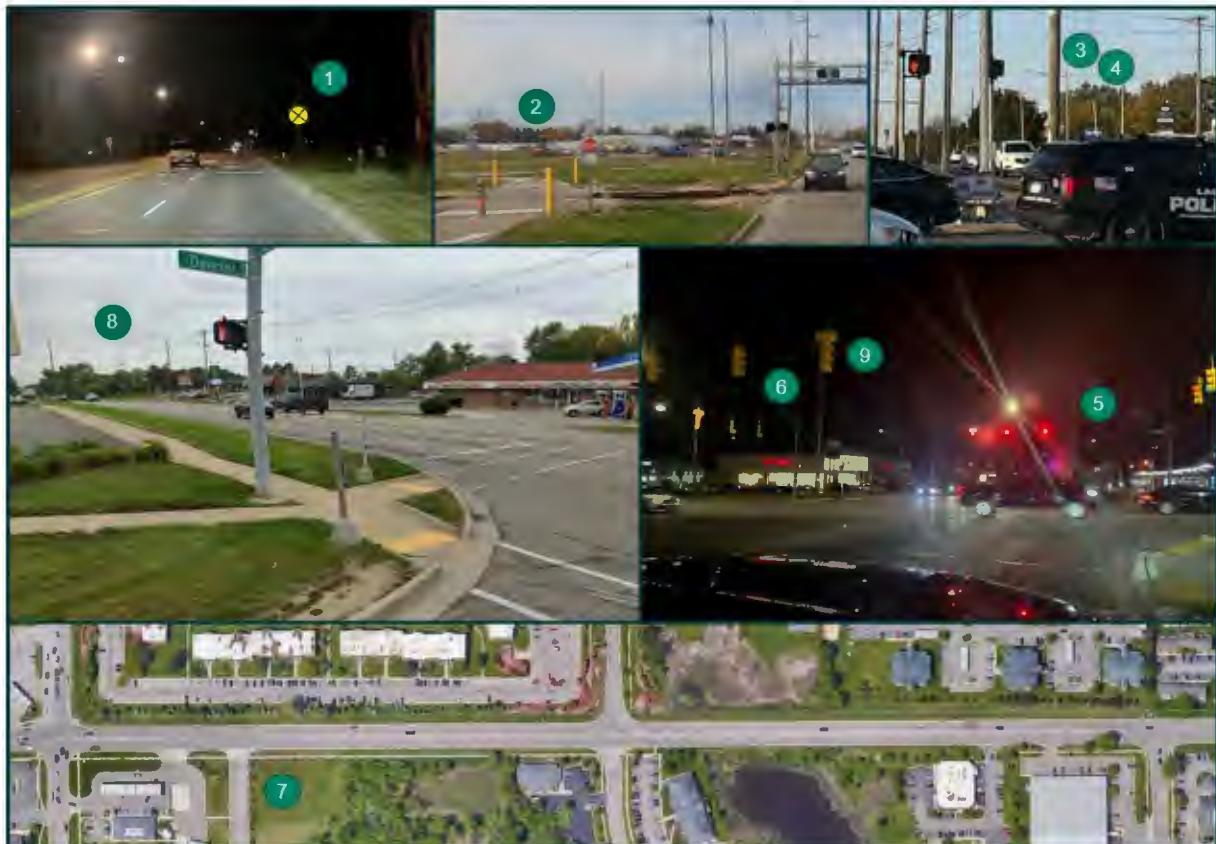


Figure 11 - Positive findings along the RSA corridor. Number corresponds to the feature(s) listed above.

5. Improvement Opportunities and Strategies

5.1 Signal Timing (Risk Category D)

During the field Review, the RSA team noticed motorists on Jolly Road frequently entering the intersection during the clearance interval at all major intersections. This is likely due to driver impatience caused by the minimal green times. The RSA team encountered red lights at almost every intersection along the corridor and often were queued through multiple signal cycles, particularly at Cedar Street. The green time at the Cedar Street intersection was observed to be less than 10 seconds, with 3 seconds of yellow time, allowing no more than approximately 10 vehicles per lane through the intersection. Drivers attempting to clear the intersection during the yellow or all-red clearance interval increases the risk for angle crashes, which are often high severity. The estimated resulting occasional, high severity crashes from running red lights gives this safety concern a risk category of D.

The UD-10 review in **Table 5** in **Section 3.1** reflects driver frustrations with queuing in the RSA corridor, as it was a contributing factor to one third of the severe injury crashes. Two of those three crashes occurred at the Cedar Street intersection, which experienced excessive queuing.

To mitigate the number of motorists navigating the intersection during the clearance interval, the RSA team recommends evaluating the signal timing in the corridor to optimize the traffic flow and minimize the time vehicles queued at the signal. The City could also consider discouraging these behaviors through increased police enforcement. Alternatively, the City could evaluate the feasibility of a roundabout installation at major intersections to facilitate operational efficiency at intersections. Considering the number of lanes and ADT on Cedar Street, a single lane roundabout may not be feasible at that intersection, but the City could evaluate the use of a multi-lane roundabout or a turbo roundabout, shown in **Figure 12**.

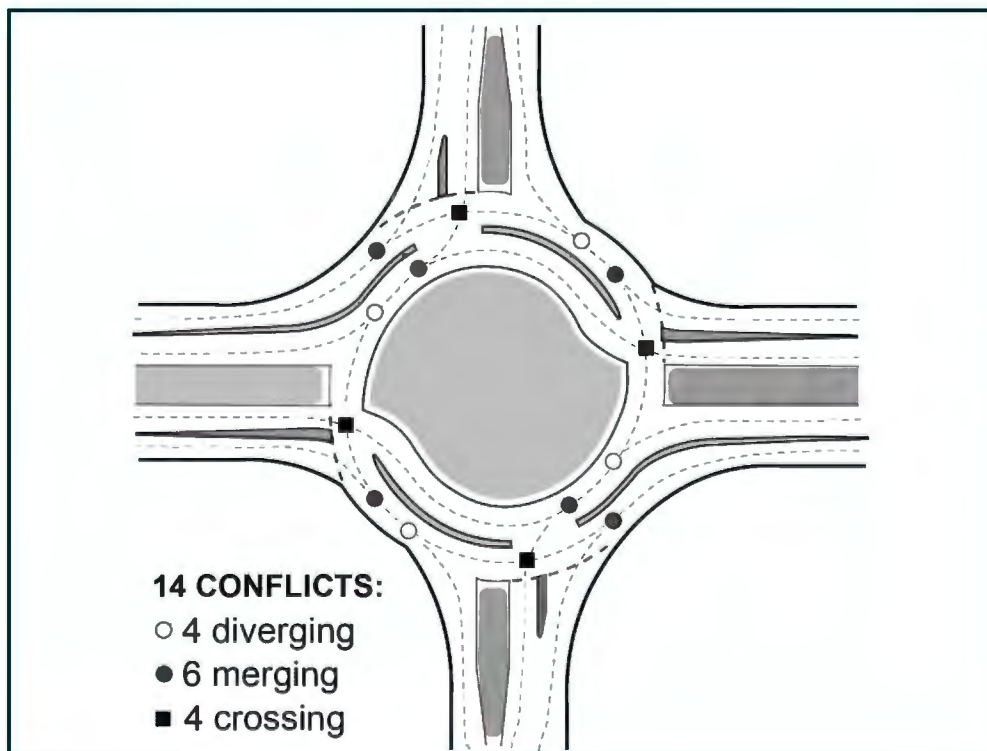


Figure 12 - Example of turbo roundabout from FHWA

5.2 Corridor Design Vehicle (Risk Category C)

Drivers may experience discomfort when driving the corridor due to multiple eleven-foot lanes in the same direction with no shoulders, leaving little lateral buffer between adjacent lanes. This discomfort increases due to the presence of large vehicles, such as trucks and buses. The RSA team noticed a high number of school buses, semis, tractor trailers, vans, and other wide vehicles throughout the corridor (**Figure 13**). While narrow lanes help to control speeding through the corridor, it also can increase the chances of sideswipe or head-on crashes. The estimated resulting crashes from this safety concern are occasional and medium severity, with a risk rating of C.

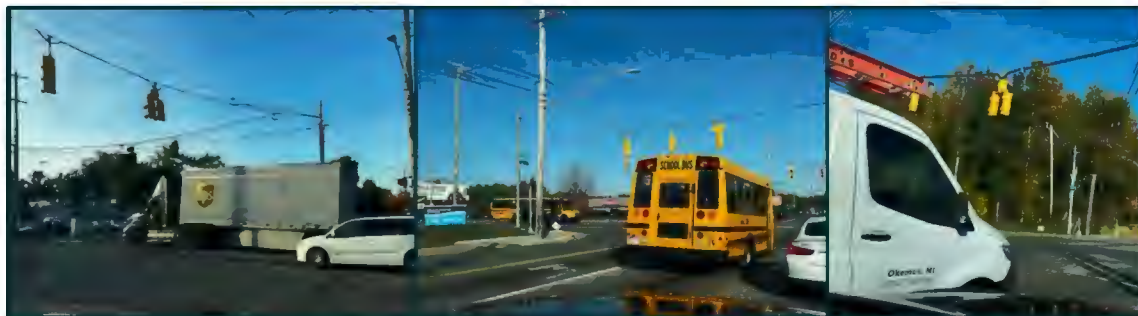


Figure 13 - Large vehicles along the RSA corridor

The RSA team recommends reevaluating the cross section of Jolly Road to determine if the lanes can be widened. If right-of-way allows, the City could consider widening the roadway, or a road diet could be evaluated to reduce the number of lanes to one each way plus a center turn lane, shown in **Figure 14**. A road diet could present solutions for many of the safety concerns in the following sections, including creating space for bike lanes, increasing turn radii, distancing the through lanes from fixed objects, creating space for mid-block crossings with pedestrian refuge islands, and reducing the risk of sideswipe crashes. The City could evaluate the road diet option and implement if an operational analysis determines that it does not drastically impact the signal queuing and through capacity of the corridor.

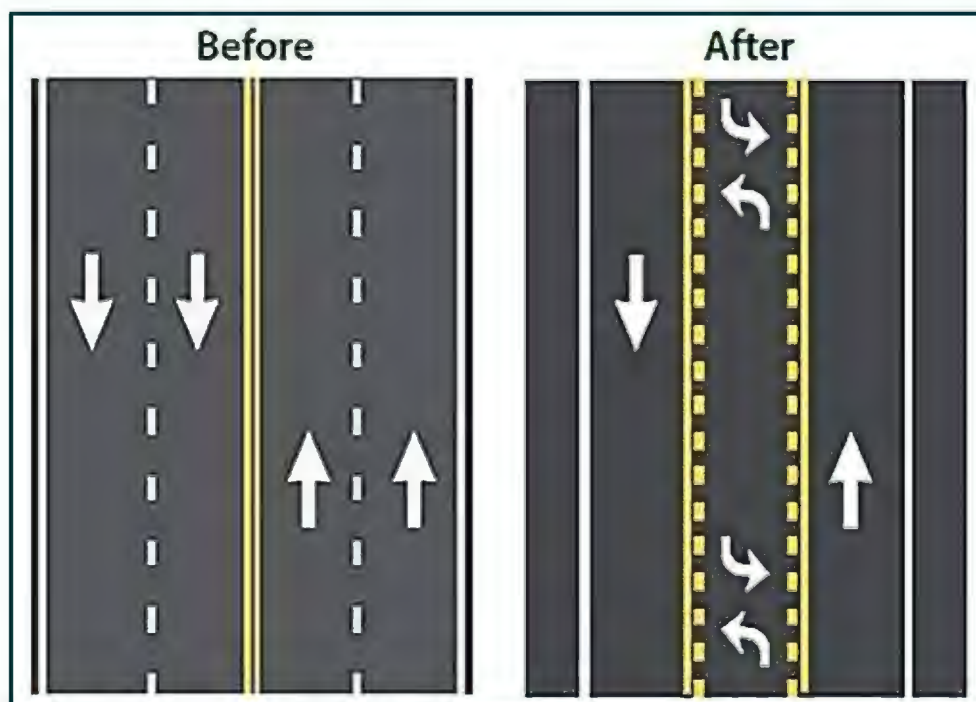


Figure 14 - Road diet countermeasure

5.3 Intersection Turning Movements (Risk Category C)

The RSA team noticed tire marks or broken curb in multiple intersection quadrants throughout the corridor, shown in **Figure 15**, indicating that vehicles are overtaking the curb while turning. Pennsylvania Avenue, Aurelius Road, and Dunckel Road all had evidence of this behavior. Vehicles may be coming onto the curb because they are attempting to complete the turn quickly, either maneuvering into a small gap while turning right on red or not decelerating enough to traverse through the turn during the green interval. These right turns not only can lead to broken and deteriorated curbs and ramps, but they can also put pedestrians in those quadrants into danger of collisions, an estimated infrequent but high severity crash with the risk rating of C. This issue may also be occurring due to the turning radius in these intersections being too small for the large vehicles in the corridor



Figure 15 - Tire tracks outside the roadway at Aurelius Road (left), broken curb ramps at Dunckel Road (Center), and tire tracks outside the roadway at Pennsylvania Avenue (right)

Furthermore, drivers attempting to turn quickly were observed not waiting for the crosswalks to clear before turning, as shown in **Figure 16**. This maneuver may be unsafe for the pedestrian, who should have right-of-way through the intersection. The risks from this behavior could potentially be mitigated by implementing a leading pedestrian interval (LPI) to allow pedestrians to begin crossing before the motorized traffic enters the intersection, increasing pedestrian visibility for turning vehicles. However, this may exacerbate the previous intersection delay issue if that is not previously mitigated.

One potential solution for this safety concern is to consider increasing green time at intersections to reduce the need for vehicles to move quickly through the turning maneuvers. Alternatively, where right-of-way will allow, increasing the turn radius at these intersections would reduce the chances of deteriorating ramps and creating conflicts with waiting pedestrians.



Figure 16 - Vehicle turning ahead of pedestrian in the crosswalk

5.4 Faded Stop Bars and Crosswalk Markings (Risk Category C)

Stop bars and crosswalk markings exhibit signs of wear at a majority of the intersections throughout the corridor, some to the point where they are no longer visible to drivers, as shown in **Figure 17**. Visibility is further reduced during dark conditions as the markings have lost most of the reflectivity over time. Without the visible crosswalk markings, motorists may be unaware that the crossing exists and be less likely to spot a crossing pedestrian. The faded stop bars may make stopping position unclear for drivers, leading them to block the pedestrian crossing or even creep into the intersection. The estimated resulting crashes from this safety concern are infrequent and high severity, with a risk rating of C.

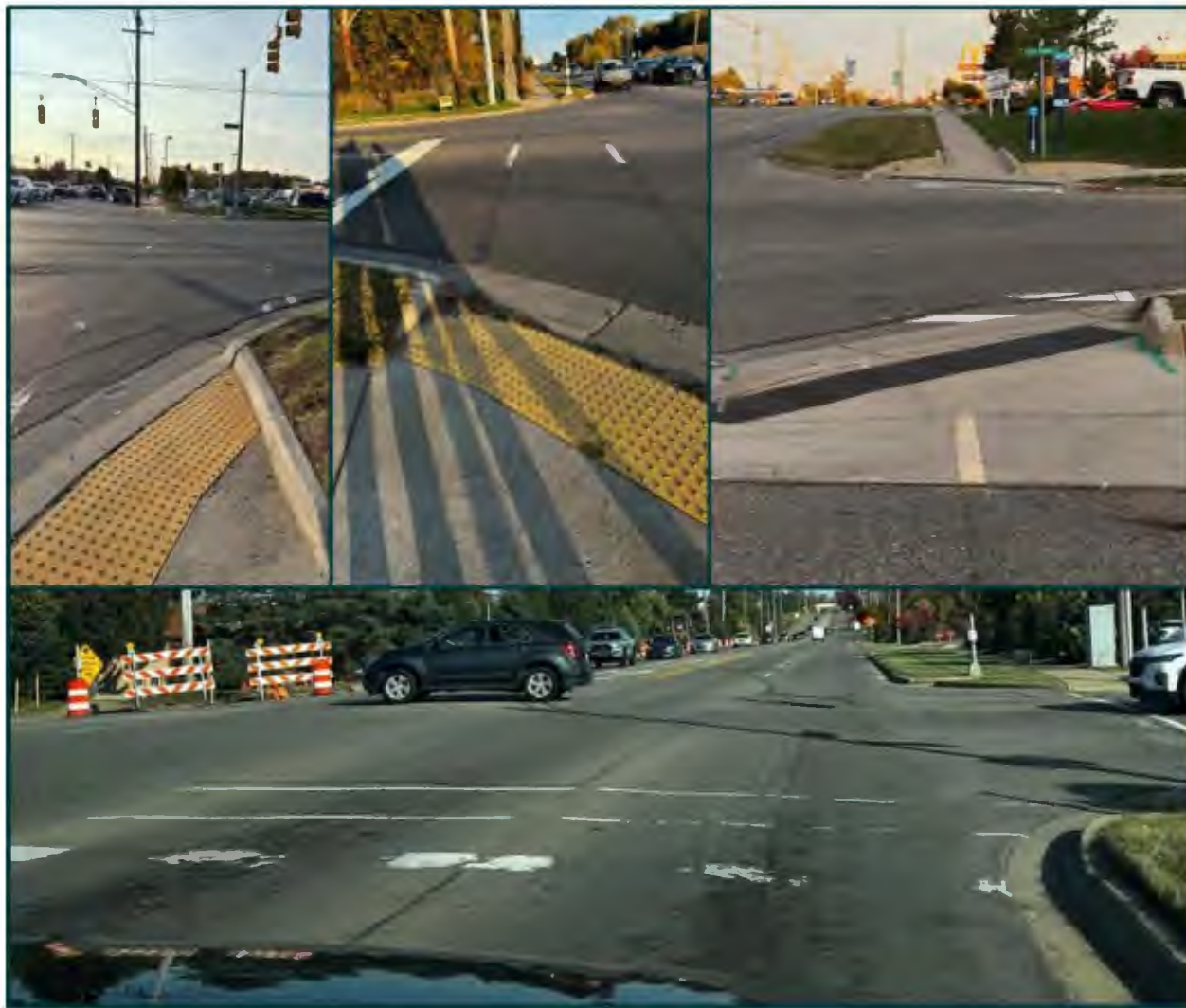


Figure 17 - Faded crosswalk and stop bar markings throughout the RSA corridor

To increase the clarity of stopping positions for drivers, the RSA team recommends repainting and maintaining the crosswalks and stop bars throughout the corridor. For further increased pedestrian visibility, the City could consider adding crosswalk striping at minor street crossings as well.

5.5 Fixed Objects in Close Proximity to Through Lanes (Risk Category C)

Many of the utility poles along Jolly Road are placed within a few feet of the back of curb (**Figure 18**). This proximity increases the chances of fixed object crashes, which are often severe crashes, as the poles are not breakaway roadside fixed objects. The RSA team also noticed a high volume of poles along this corridor, sometimes crowding pedestrian spaces near intersections and may restrict sight distance, such as the northeast quadrant of the Cedar Street intersection, shown in **Figure 18**. The estimated resulting crashes from this safety concern are occasional and medium severity, with a risk rating of C.



Figure 18 - Crowded quadrant at Aurelius Road (top left), Pole close to curb at Cedar Street (top right), Utility poles inside of sidewalk along Jolly Road (bottom)

To mitigate this safety concern, the RSA team recommends evaluating alternative locations for the utility poles along this corridor. The city could evaluate the feasibility of moving the utility poles further from the curb to minimize the risk of collision, or potentially consider burying utilities to minimize the number of necessary poles.

5.6 Lack of Physical Barrier at Railroad Tracks (Risk Category B)

The Jolly Road corridor has one railroad crossing between Tranter Street and Contec Drive (**Figure 19**). The existing crossing has flashing lights and signing, but no lowering arm to create a physical barrier between traffic and the railroad tracks. Without the barrier, there may be increased risk of collisions from vehicles crossing the tracks in front of an oncoming train. For pedestrians at the crossing, there are markings and signs on the multiuse trail along the south side of Jolly Road, but the sidewalk along the north side of the road has sidewalk markings but no signage at the crossing. Train collisions are rare but high severity, giving this safety concern a risk rating of B.



Figure 19 - Railroad crossing on Jolly Road, viewing west

The City could consider coordinating with the owner of the Jackson and Lansing Railroad to have a Diagnostic Safety Team Review completed. Safety may be increased by installing railroad barricades for both bounds of vehicle traffic on Jolly Road at the crossing to reduce the risk of train collisions. For the non-motorized crossings, the city could consider adding signing to the north sidewalk, and the safety at both crossings could be further improved by the installation of pedestrian railroad barricades requiring users to stop or bedstead barriers encouraging users to slow down and look in the direction of an oncoming train. Examples of each are shown in **Figure 20**.



Figure 20 - Example of pedestrian railroad barricade (left) and bedstead barrier (right)

5.7 Detectable Warning Surfaces (Risk Category B)

At the minor street crossings along the RSA corridor west of Pennsylvania Avenue, the sidewalk ramps do not have detectable warning surfaces. Jolly Cedar Court, Battenfield Road, and Southgate Avenue are all missing these surfaces, as shown in **Figure 21**. Other intersections throughout the corridor have the warning surfaces installed, but some are covered by dirt (**Figure 21**), making them more difficult to detect for disabled pedestrians. The lack of warning from missing or covered strips for the upcoming crossing may cause pedestrians with a disability to unknowingly enter the roadway, creating risk of vehicle collisions. The estimated resulting crashes are rare but high frequency, with a risk rating of B.



Figure 21 - Jolly Road crossing at Jolly Cedar Court (top), Battenfield Road (middle), and Southgate Avenue (bottom), covered detectable warning surface at Dunckel Road (right)

To increase safety for pedestrians with disabilities, the RSA team recommends installing detectable warning surfaces on all sidewalk ramps per ADA standards. The City could consider a regular cleaning and maintenance schedule to ensure the surfaces maintain visibility and detectability.

5.8 Non-Countdown Pedestrian Signals (Risk Category B)

At the intersection of Pennsylvania Avenue and Jolly Road, the existing pedestrian signals shown in **Figure 22** do not have countdown timers alerting pedestrians to how long they have to cross the road. Estimating walk times may lead to pedestrians rushing to cross the street and they may misjudge their ability to reach the other side safely. Specific populations that are more vulnerable such as elderly, children or individuals with disabilities. These estimated resulting pedestrian crashes due to non-countdown signals are rare but high severity, with a risk rating of B.

The RSA team recommends installing updated pedestrian signals in this intersection with countdown timers. This may give pedestrians better expectations on the signal timing and allow for safer crossings.



Figure 22 - Pedestrian signal at Pennsylvania Avenue

5.9 Non-Motorized Connectivity (Risk Category B)

During the field review, the RSA team noticed a number of non-motorized users throughout the corridor (**Figure 23**), showing a need for connection through the corridor for pedestrians and bicyclists. The existing non-motorized facilities along the corridor are illustrated in **Figure 24**.



Figure 23 - Sidewalk users along the RSA corridor



Figure 24 - Map of existing nonmotorized facilities along Jolly Road

Existing sidewalk is located north and south of Jolly Road with gaps in pedestrian facilities along the south side between Pennsylvania Avenue and the railroad as well as east of Belle Chase Boulevard. A multi-use path, Sycamore Trail, runs along Jolly Road from the railroad to Five Oaks Drive, connecting to sidewalk east from that intersection to Belle Chase Boulevard. East of where the sidewalk ends at Belle Chase Boulevard there are townhomes and condos that are disconnected from pedestrian walkways south of Jolly Road, but were recently connected north of Jolly Road by the installation of a pathway along Dunkel Road.. Furthermore, due to the sidewalk disconnect on the south side of Jolly Road between Pennsylvania Avenue and the railroad track, if pedestrians at the Sycamore Trail trailhead want to travel west, their options are to travel 1500 feet east out of their way to cross at Aurelius Road and use the sidewalk on the north side of Jolly Road, cross unprotected mid-block to reach the north sidewalk, or walk along the side of the road with no sidewalk for 2200 feet.

Where the non-motorized trails converge near Aurelius Road, the RSA team noticed that the directions may be unclear for path users on how to navigate to other pathways. The City could consider implementing a mid-block crossing where Lansing River Trail meets Jolly Road, connecting the trail to Sycamore Trail south of Jolly Road, with high visibility signing and markings. If a mid-block crossing is added, it could be supplemented by features such as rectangular rapid flashing beacons (RRFB) and pedestrian hybrid beacons to further increase pedestrian visibility in the crossing. The trails could be supplemented with improved wayfinding signs for path users, making it easier for users to navigate the trails and minimizing confusion where S Lansing Pathway turns to follow Jolly Road.

Throughout the RSA corridor, the RSA team noticed that a number of bus stops lacked concrete pads connecting the sidewalk to the back of the curb. This may be a safety concern for transit users with wheelchairs or other mobility issues, as they may be unable to transverse the natural ground, which may cause them to travel into the vehicular lanes from the nearest curb cut. The City could consider adding bus pads where they are missing to increase transit accessibility.

For bicyclists traveling along the RSA corridor, there are no bikes lanes, and the multi-use path only covers one quarter of the corridor. Signing west of the RSA corridor, at the end of the bike lane, instructs drivers to share the road with bicyclists as shown in **Figure 25**. However, this signing is not continued through the corridor so motorists may only know to share the road if they are traveling east and entered the corridor before the signing. Estimated conflicts between non-motorized users and drivers due to disconnected or confusing pathways are rare but have potential to create high severity collisions, with a risk rating of B.



Figure 25 - Bike lane end signing west of RSA limits

To improve pedestrian accessibility throughout the corridor, the RSA team recommends that the city assesses the feasibility of connecting the sidewalk between Pennsylvania Avenue and Sycamore Trail on the south side of the road, as well as extending the sidewalk east of Belle Chase Boulevard to Pine Tree Drive to improve walkability for the residents of the nearby homes.

To mitigate safety concerns for bicyclists in the corridor, the RSA team recommends increasing the number of share the road signs and sharrows (**Figure 26**) along the corridor to clearly communicate the expectation that bicyclists should use the vehicle lanes instead of the sidewalks, and that motorists should expect to make room on the roadway. Alternatively, the city could assess the feasibility of adjusting the cross section of the road to extend bike lanes into the corridor or converting existing sidewalks into multi-use paths that can be shared by pedestrians and bicyclists.



Figure 26 - Example of a sharrow (left) and W11-1 and W16-1 signs (right)

5.10 Hidden or Missing Signage (Risk Category B)

Throughout the RSA corridor, the RSA team noticed a number of signs that were difficult to read from the roadway. As shown in **Figure 27**, a number of signs were hidden behind poles, other signs, or vegetation. Signing may be less effective if it is difficult for motorists to read fully or see from a distance and it may no longer serve the purpose of advanced warning. During the nighttime review, some other signs were inconspicuous to drivers due to a lack of reflectivity, such as the overhead lane designation signs before Cedar Street, shown in the bottom of **Figure 24**.

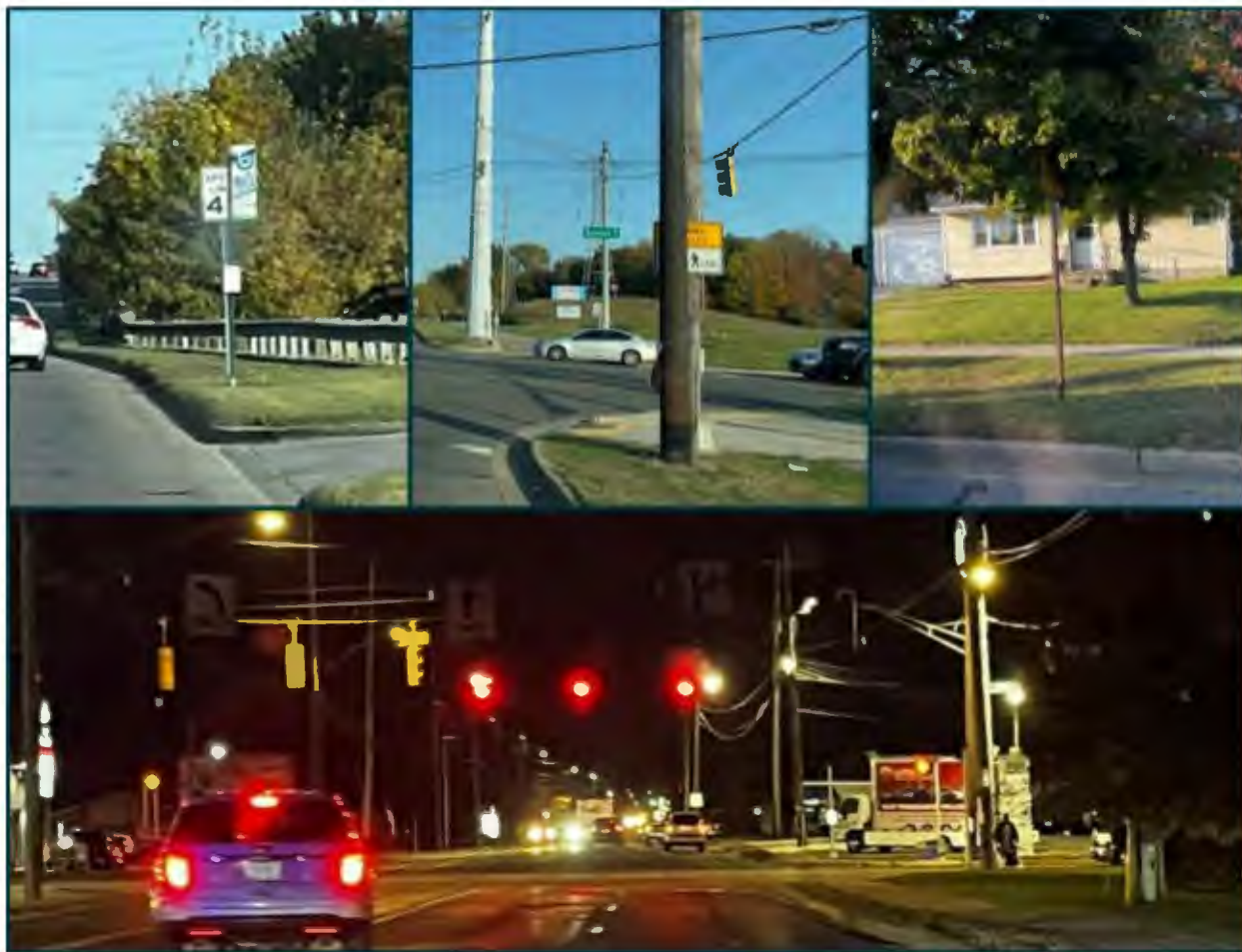


Figure 27 - Hidden signing throughout the RSA corridor; blocked speed limit sign east of Aurelius Road viewing east (top left), blocked yield to bicycles sign at Aurelius Road viewing east (top center), covered crosswalk sign east of Pennsylvania Avenue (top right), non-reflective overhead lane designation signing west of Cedar Street (bottom)

Furthermore, west of Dunckel Road, travelling eastbound, there is a trail crossing ahead sign (**Figure 28**) seeming to indicate that there is a crossing of Jolly Road, when the trail actually crosses Dunckel Road. There is also no sign warning the westbound traffic before the same intersection, and there is no sign on either bound at the actual crossing. The same issue occurs with the pedestrian crossing sign east of Pennsylvania Avenue; there is no sign for the opposite bound on Jolly Road. Estimated resulting crashes due to inconspicuous signing are infrequent and medium severity, with a risk rating of B.



Figure 28 - Trail crossing ahead sign west of Dunckel Road

To increase sign visibility and better communicate the warnings and regulations to motorists, the RSA team recommends adjusting the sign locations to ensure they are unobstructed by poles, signs, or other fixed objects. Sign visibility can also be improved by regular maintenance of trees and other vegetation. Updating signs to reflective ones can help ensure visibility in dark conditions. The City could consider replacing the crosswalk ahead signing with “turning vehicles yield to pedestrians” to better communicate the placement of the crossings.

5.11 Sidewalk Obstructions (Risk Category A)

The RSA team noticed a number of locations along the sidewalks where the walkway or the pushbuttons were obstructed (**Figure 29**). At the southeast quadrant of the Pennsylvania Avenue intersection, the westbound pushbutton is surrounded by overgrown vegetation which may make it difficult for some pedestrians to reach the pushbutton. In the northwest quadrant of the same intersection, an old pole foundation remains in the ground and may be a tripping hazard for pedestrians. In the northwest quadrant of the Cedar Street intersection, a bench sits in the landing, blocking the pushbutton for southbound pedestrians. In the northeast quadrant of the Aurelius intersection, a guy wire crosses over the sidewalk which may be a hazard for tall pedestrians or bicyclists. Estimated resulting crashes due to these sidewalk concerns are rare and low severity, with a risk rating of A.

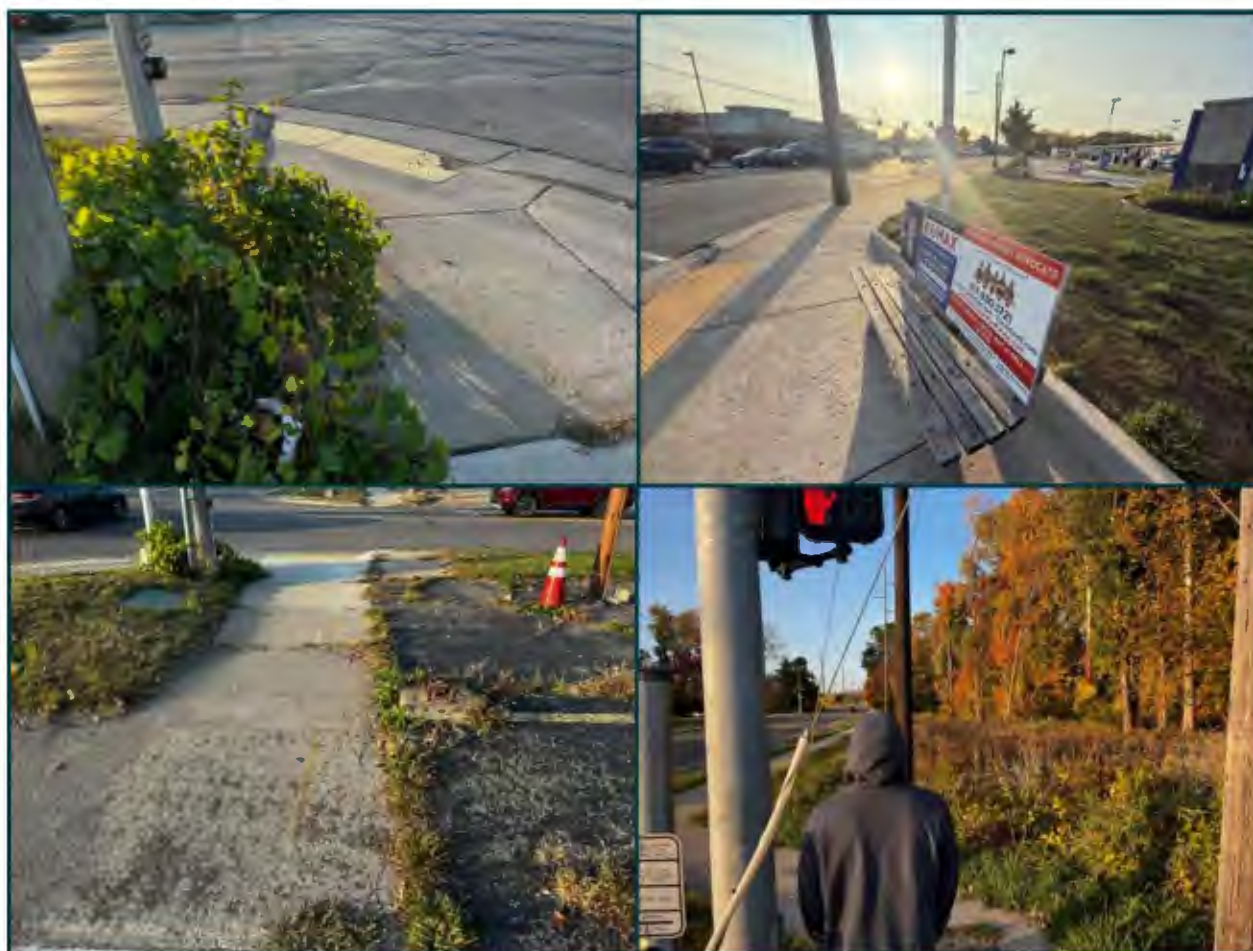


Figure 29 - Sidewalk obstructions throughout the RSA corridor; blocked pushbutton at Pennsylvania Avenue (top left), blocked pushbutton at Cedar Street (top right), old pole foundation tripping hazard (bottom left), Guy wire at Aurelius Road (bottom right).

To improve accessibility for pedestrians through the Jolly Road corridor, the RSA team recommends maintaining vegetation to keep walkways unobstructed and removing any fixed objects on or around the sidewalks that may be blocking paths, blocking pushbuttons, or creating hazards to pedestrians.

5.12 Inconsistent Street Name Signs (Risk Category A)

Figure 30 shows that in the same intersection along the Jolly Road corridor, not all street names signs are the same size and style. While the signs mounted over the pedestrian signals are large and clear to read, the smaller signs may be difficult for motorists to read from a distance. At the Dunckel Road intersection, Jolly Road has a posted speed limit of 45 mph. Per Michigan Manual on Uniform Traffic Devices (MMUTCD) standards (**Table 8**), at this posted speed limit, street name signs are recommended to have a minimum of eight-inch-tall upper-case letters and 6-inch-tall lower-case letters. Unclear street name signs may cause confusion for drivers, unpredictable slowing in the intersection, or last-minute turning maneuvers. Estimated resulting crashes caused by inconsistent street name signs are rare and low severity, with a risk rating of A.



Figure 30 - Two different styles of street name sign at Dunckel Road

For clear communication with motorists on Jolly Road, the RSA team recommends coordinating with Ingham County to update all street name signs along the RSA corridor to meet current MMUTCD standards list in **Table 8**.

Table 8 - MMUTCD recommended minimum letter heights on street name signs

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height	
			Initial Upper-Case	Lower-Case
Overhead	All types	All speed limits	12 inches	9 inches
Post-mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post-mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-mounted	2-lane	All speed limits	6 inches*	4.5 inches*

5.13 Unused Driveway Openings (Risk Category A)

The RSA team counted seven unused driveway openings in the 1.1-mile segment between Cedar Street and Tranter Street. The locations of the unused driveways are shown in **Figure 31** and **Figure 32**. These seemingly abandoned driveways may create confusion for motorists as they try to determine which driveway opening to use for their destination. This can lead to slowing or stopping in the through lanes or unexpected turning maneuvers.

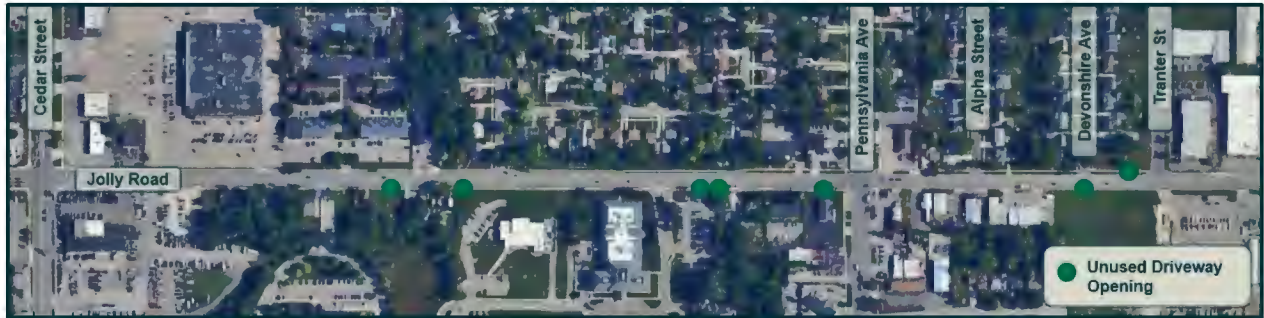


Figure 31 - Map of unused driveway openings on Jolly Road



Figure 32 - Examples of unused driveway openings in the RSA corridor

To mitigate concerns of driver confusion from the excess driveway openings, the RSA team recommends closing any unnecessary curb openings in the corridor. The City could review any local regulations on required access to empty parcels of land and close any driveways that are not necessary.

5.15 Safety Concern Summary

The information provided above regarding safety concerns is summarized with crash risk categorization in **Table 9**.

Table 9 – Intersection safety concern summary and risk category assessment

Safety Concern	Crash Frequency	Crash Severity	Risk Category
Signal timing	Occasional	High	D
Corridor design vehicle	Occasional	Med	C
Intersection turning movements	Infrequent	High	C
Faded stop bars and crosswalk markings	Infrequent	High	C
Fixed objects in close proximity to through lanes	Occasional	Med	C
Lack of physical barrier at railroad tracks	Rare	High	B
Detectable warning surfaces	Rare	High	B
Non-countdown pedestrian signals	Rare	High	B
Non-motorized connectivity	Rare	High	B
Hidden or missing signage	Infrequent	Med	B
Sidewalk obstructions	Rare	Low	A
Inconsistent street name signs	Rare	Low	A
Unused driveway openings	Rare	Low	A

5.16 Conclusion

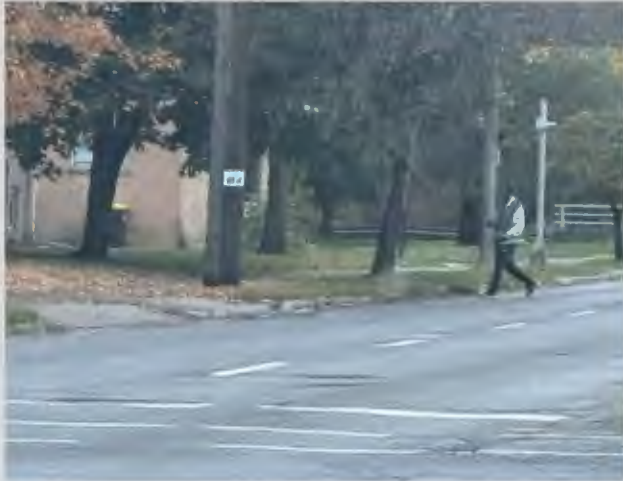
Table 10 summarizes the safety issues with risk ratings and mitigation strategies listed in **Section 5**, as well as the corresponding crash modification factors (CMF) for each suggested countermeasure. The RSA team found that the highest risk safety issue in the Jolly Road RSA corridor is the signal timing, followed by intersection turning movements, faded stop bars and crosswalk markings, and fixed objects and poles in close proximity to the roadway. The strongest suggestions for the corridor to address multiple of these concerns are for the city to evaluate implementation of a road diet and roundabouts. A road diet, reducing the number of lanes from four to three, would allow for widening the lanes, increasing turn radii, and leaving room for bike lane connectivity. Converting major intersections into roundabouts could minimize risks from turning movements, eliminate the need to reevaluate signal timing, and lower the probability of high severity crashes in the major intersections. Non-motorized connectivity is also a priority in this corridor due to the proximity to recreational trails and high frequency of non-motorized users observed. The RSA team recommends improving through increased path connection through the corridor, a mid-block crossing at the path convergence, and increased signing and markings for wayfinding and communication to motorists.

Enhancing safety measures is an ethical imperative, reflecting a commitment to the well-being of individuals and the community at large. The inherent value of safeguarding all road users and preventing injuries underscores the importance of investing in safety measures to mitigate the safety concerns in the RSA corridor.

Table 10 – Suggested countermeasures

Safety Issue	Risk Rating	Suggested Countermeasure	CMF
Signal timing	D	Adjust signal timing	N/A
		Enforcement	N/A
		Roundabout	0.52 ¹
Corridor design vehicle	C	Road Diet	0.71 ¹
Intersection turning movements	C	Increase turning radius	N/A
		Increase green time	N/A
Faded stop bars and crosswalk markings	C	Repaint and maintain markings	N/A
		Stripe minor crossings	N/A
Fixed objects in close proximity to through lanes	C	Relocate utility poles	0.62 ²
		Bury Utilities	N/A
Lack of physical barrier at railroad tracks	B	Install railroad gate	0.55 ³
		Place signing for north sidewalk	N/A
Detectable warning surfaces	B	Install ADA warning strips where they are missing	N/A
Non-Countdown pedestrian signals	B	Install countdown pedestrian signals	0.95 ¹
Non-Motorized Connectivity	B	Connect sidewalk through the corridor	0.598 ⁴
		Extend sidewalk east of Belle Chase Boulevard	0.598 ⁴
		Clear direction for non-motorized path users	N/A
		Mid-block trail crossing	0.82 ⁵
		Implement sharrows and share the road signing	N/A
		Extend bike lanes east into the RSA corridor	0.435 ⁶
		Convert sidewalks to multi use pathways	N/A
Hidden or missing signage	B	Maintain vegetation to ensure sign visibility	N/A
		Increase sign reflectivity	0.949 ¹
Sidewalk Obstructions	A	Maintain vegetation to keep walkways clear	N/A
		Remove fixed objects in walkways	N/A
Inconsistent street name signs	A	Update street name signs to meet current MUTCD standards	N/A
Unused driveway openings	A	Remove unnecessary driveway openings	N/A

¹ Highway Safety Manual (Volume 1)² Hovey, P. W. and Chowdhury, M., "Development of Crash Reduction Factors." 14801(0), Ohio Department of Transportation, (2005)³ Elvik, R. and Vaa, T., "Handbook of Road Safety Measures." Oxford, United Kingdom, Elsevier, (2004)⁴ Abou-Senna, H., E. Radwan, and A. Mohamed. "Investigating the Correlation between Sidewalks and Pedestrian Safety". Accident Analysis and Prevention, Vol. 166, (2022) (Pedestrian/Vehicle crashes only)⁵ Kadeha, C., Kitali, AE., Salum JH., and Alluri P. " Safety Performance of Midblock Pedestrian Crossing Treatments". Presented at the 101st Annual Meeting of the Transportation Research Board, Paper No. 22-04437, Washington, D.C., (2022)⁶ Avelar, R., K. Dixon, S. Ashraf, A. Jhamb, and B. Dadashova. "Development of Crash Modification Factors for Bicycle Lane Additions While Reducing Lane and Shoulder Widths" Report No. FHWA-HRT-21-013. Federal Highway Administration, Office of Safety Research and Development. McLean, Virginia. (2021)



ROAD SAFETY AUDIT

PENNSYLVANIA AVENUE: MT. HOPE
AVENUE TO CÉSAR E. CHÁVEZ AVENUE
LANSING, MICHIGAN

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December 17, 2024

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1.0 Project Background

The objective of the road safety audit (RSA) was to review the Pennsylvania Avenue corridor from César E. Chávez Avenue to Mt. Hope Avenue (2.5 miles) in the City of Lansing, Michigan (**Figure 1**). This north-south oriented corridor passes through residential, commercial, and industrial land uses. The posted speed limit is 30 MPH. The Pennsylvania Avenue corridor was selected for a RSA through discussions with the city staff administrating the Lansing Safe Streets and Roads for All (SS4A) program. The identified Pennsylvania Avenue corridor is included in the City's High Injury Network (HIN), as determined by the analysis of historical crash data.

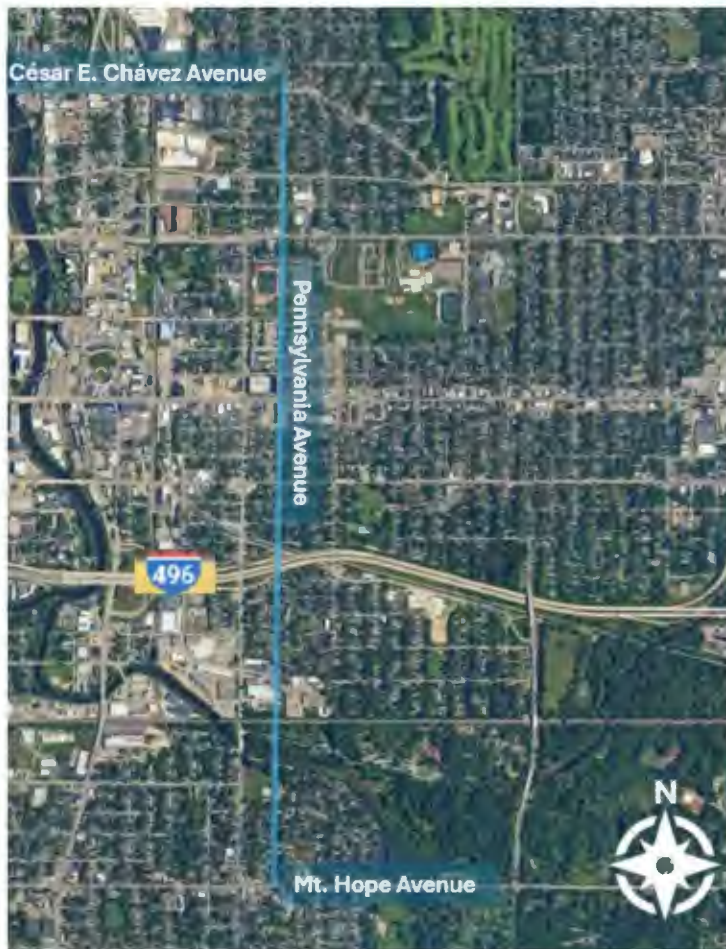


Figure 1: RSA Study Limits – Pennsylvania Avenue from Mt. Hope Avenue to César E. Chávez Avenue

1.1 RSA Analysis Process

After the project was identified and the existing information was inventoried. The safety issues were identified, and the frequency, severity, and risk associated with each safety issue were estimated.

1.1.1 Identify Issues

During the field review, the GORE (geometrics, operations, roadway users, and environment) was referenced to help identify safety issues. The review was performed to make systematic observations through both windshield (i.e., driving) and walking surveys during dark and daylight conditions.

1.1.2 Estimate Risk

Each safety issue identified was assigned a crash frequency (**Table 1**) and crash severity (**Table 2: Estimating Crash Severity**) rating using the FHWA guidance outlined. Items considered when assigning crash frequency include traffic volume, roadway geometry, traffic congestion, environment, and road user characteristics. Items considered when assigning crash severity include speed, crash types, vulnerability of road users, and vehicle composition. Once the crash frequency and severity associated with a safety issue were assigned, the values were placed into the Crash Risk Assessment matrix (**Table 3**) and a risk factor was estimated. A risk factor that identifies as “A” has the lowest risk priority and “F” has the highest risk priority.

Table 1: Estimating Crash Frequency

Estimated		Frequency Rating
Exposure	Probability	
Medium → High	High	Frequent
Low → High	Medium → High	Occasional
Low → Medium	Low	Rare

Table 2: Estimating Crash Severity

Typical Collisions Expected	Expected Collision Severity	Severity Rating
High speeds or heavy vehicles, pedestrians, or bicycles	Probable fatality or incapacitating injury	High
Medium to high speed; head-on, crossing, or off-road collisions	Moderate to severe injury	Moderate
Medium to low speeds; left-turn and right-turn collisions	Minor to moderate injury	Low
Low to medium speeds; rear-end or sideswipe collisions	Property damage only	Negligible

Table 3: Crash Risk Assessment

Crash Frequency	Crash Severity			
	<i>Negligible</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>
<i>Frequent</i>	C	D	E	F
<i>Occasional</i>	B	C	D	E
<i>Rare</i>	A	B	C	D

A = lowest priority, F = highest priority

By identifying risk factors for each safety issue, the RSA team was able to prioritize the safety issues from highest to lowest priority. The final stage was to develop potential mitigations that would enhance safety within the project area. Recommendations made through an RSA process should be realistic, constructive, and appropriate for all road users. Identified safety issues, associated risks, and recommendations for this project are presented in Section 4.0.

2.0 Corridor Characteristics

Pennsylvania Avenue within the study corridor has two travel lanes in each direction of travel with a two-way left turn lane (TWLTL) through most of the corridor. A few segments of Pennsylvania Avenue located at the southern end of the study are divided by boulevard islands and the north end of the study corridor (from E Oakland Avenue to César E. Chávez Avenue) is undivided. The study corridor includes a railroad crossing, a pedestrian crossing, a bridge (over the Red Cedar River), an interchange (with access to I-496), and multiple signalized and unsignalized intersections. **Figure 2: Roadway Characteristics** shows images of the corridor highlighting a few of these characteristics. Roadway characteristics including road geometry, parking, and traffic volumes are illustrated in depth in **Table 4: Pennsylvania Avenue Roadway Characteristics**.



Figure 2: Roadway Characteristics

Table 4: Pennsylvania Avenue Roadway Characteristics

Section	Geometry	Parking	2023 AADT
Mt. Hope Avenue to Potter Park Road	Four-lane divided with curbed boulevard islands	No on-street Parking	12,423
Potter Park Road to Oakland Avenue	Five-lane section undivided with TWLTL	- No on-street Parking: Potter Park Road to Michigan Avenue and Saginaw Street to Oakland Avenue - On-street parking on west side of roadway: Michigan Avenue to Saginaw Street	15,497: Potter Park Road to I-496 EB Exit 13,684: I-496 EB Exit to Kalamazoo Street 17,500: Kalamazoo Street to Michigan Avenue 9,972: Michigan Avenue to Shiawassee Street 11,991: Shiawassee Street to Saginaw Street 7,616: Saginaw Street to Oakland Avenue
Oakland Avenue to César E. Chávez Avenue	Four-lane undivided	Conditional parking i.e. parking on one side of the roadway, parking during the hours of 7:00 AM to 7:00 PM	4,012: Oakland Avenue to César E. Chávez Avenue

2.1 Roadway Users & Adjacent Land Use

The primary modes of travel throughout the corridor consist of passenger cars, trucks, transit, and vulnerable road users (VRU) such as bicyclists and pedestrians. The Pennsylvania AADT ranges from 4,012 to 17,500 vehicles per day. **Figure 3** shows examples of modes of travel employed by the study roadway users. The hospital and local businesses, such as Sparrow Hospital and Lansing Board of Water and Light, are major traffic generators in the corridor.



Figure 3: Roadway Users of Study Corridor Included Multiple Modes of Travel

2.2 Crash Analysis

Crash data along the Pennsylvania Avenue corridor was obtained from the Traffic Crash Analysis Tool (TCAT) for five years from January 1, 2019, to December 31, 2023.

The KABCO injury classification system is used in traffic crash reporting to categorize the severity of injuries sustained by individuals involved in a crash. It consists of five levels:

- K (Killed): Fatal injury resulting in death.
- A (Incapacitating Injury): Severe injuries that prevent normal activity.
- B (Non-Incapacitating Injury): Visible injuries like bruises or minor fractures, but not severe enough to incapacitate.
- C (Possible Injury): Minor or potential injuries, such as complaints of pain or minor discomfort without visible wounds.
- O (No Injury): No injuries reported or observed.

This system helps standardize crash data and supports analysis of roadway safety.

A total of 660 total crashes were reported for the five-year study period. **Table 5** lists the breakdown of crashes by KABCO injury classification.

Table 5: Pennsylvania Avenue Study Area KABCO Crashes

KABCO Crash Type	Pennsylvania Avenue from Mt. Hope Avenue to César E. Chávez Avenue	
	January 1, 2019, to December 31, 2023	
	# Crashes	% of Total
Type K (Fatality)	0	0.0%
Type A (Incapacitating Injury)	14	21.1%
Type B (Non-Incapacitating Injury)	30	4.5%
Type C (Possible Injury)	98	14.8%
Type O (No Injury)	518	78.5%
TOTAL	660	100.0%

Of the 14 incapacitating injury (Type A) crashes reported during the study period, nine of them occurred at intersections. **Figure 4** below is a map of Type A crashes on Pennsylvania Avenue from Prospect Street to César E. Chávez Avenue by location and crash type. The locations of the Type A crashes on Pennsylvania Avenue from Mt. Hope Avenue to Prospect Street are shown in **Figure 5**.



Figure 4: Type A (Incapacitating Injury) Crashes on Pennsylvania Avenue from César E. Chávez Avenue to Prospect Street

Multiple incapacitating injury (Type A) injury crashes occurred at Oakland Avenue and Michigan Avenue. Two angle crashes occurred at Oakland Avenue. Michigan Avenue had three crashes: one each involving a pedestrian, a rear-end, and a single motor vehicle crash at the intersection. The RSA team observed a pedestrian crossing mid-block near Michigan Avenue during the site investigation.



Figure 5: Type A (Incapacitating Injury) Crashes on Pennsylvania Avenue from Prospect Street to Mt. Hope Avenue

Three incapacitating injury (Type A) crashes occurred from Mt. Hope Avenue to Prospect Street: An angle crash occurred at the Fayette Street intersection; a single motor vehicle crash and an angle crash both occurred between Fayette Street and Potter Park Road.

Table 6: Pennsylvania Avenue Study Area Incapacitating Injury (Type A) Crashes Categorized by Type

Crash Type	Pennsylvania Avenue from Mt. Hope Avenue to César E. Chávez Avenue	
	January 1, 2019, to December 31, 2023	
	# Crashes	% of Total
Angle	6	42.9
Head-On	1	7.1
Head-On Left Turn	1	7.1
Rear End	1	7.1
Single Motor Vehicle	4	28.5
Pedestrian	1	7.1
Total	14	100.0

Within the study limits there are nine VRU-involved crashes, involving five bicycles and four pedestrians. One pedestrian crash resulted in an incapacitating injury (Type A) as listed in **Figure 6**. A brief overview of the VRU crashes is as follows:

1. *Pedestrian Crash:* This crash was an incapacitating injury (Type A) crash that occurred in a dark-lit roadway during rain. The vehicle was traveling southbound (SB) on Pennsylvania Avenue in the left-through lane. The pedestrian entered the roadway and attempted to cross Pennsylvania Avenue east to west **not at the crosswalk**. The pedestrian crossed into oncoming traffic.
2. *Pedestrian Crash:* This crash was a Type B injury crash. The crash occurred during daylight and dry roadway conditions. The pedestrian was walking across the street at the intersection of **Pennsylvania Avenue and Kalamazoo Street** when they were struck by a vehicle that fled the scene. The **pedestrian was intoxicated** and could not provide more information.
3. *Pedestrian Crash:* This crash was a Type O injury crash. The crash occurred during dark-lighted and dry roadway conditions. The vehicle was turning onto **Pennsylvania Avenue from Oakland Avenue**. A pedestrian was crossing the street **outside of the crosswalk**. The driver saw the pedestrian and attempted to stop. The driver of the vehicle stated they bumped the pedestrian lightly. The driver checked on the pedestrian and the citizen appeared uninjured and left the scene.
4. *Pedestrian Crash:* This crash was a Type O injury crash. The crash occurred during daylight and dry roadway conditions. The pedestrian stated they were struck by a vehicle turning from **eastbound Saginaw Street onto northbound Pennsylvania Avenue** while **walking in the crosswalk**. The pedestrian was crossing the roadway on a red indication. Witnesses stated the driver of the vehicle would not have been able to see the pedestrian in the roadway due to the position of the other vehicles.
5. *Bicyclist Crash:* This crash was a Type C injury crash. The crash occurred during daylight and dry roadway conditions. The bicyclist was traveling EB on **César E. Chávez Avenue near Pennsylvania Avenue** when a vehicle struck the bicyclist from behind causing a loss of control and pain in the cyclists wrist and leg. The vehicle fled the scene, and no one witnessed the crash.
6. *Bicyclist Crash:* This crash was a Type B injury crash at **Saginaw Street and Pennsylvania Avenue**. The crash occurred during daylight and dry roadway conditions. The bicyclist was waiting to cross Pennsylvania Avenue and proceeded through the intersection when the walk signal was on. The pedestrian stated that a vehicle appeared in the right turn lane and rolled into him without stopping. The vehicle fled the scene, and the bicyclist was knocked off his bike into the roadway.
7. *Bicyclist Crash:* This crash was a Type B injury crash. The crash occurred during daylight and dry roadway conditions. The bicyclist was riding on the sidewalk on **Pennsylvania Avenue at Saginaw Street**. The bicyclist began crossing Saginaw Street when struck by a vehicle. Witnesses stated the vehicle was driving aggressively speeding around another vehicle and hit the bicyclist causing an injury to the cyclist's leg.
8. *Bicyclist Crash:* This crash was a Type O injury crash. The crash occurred during daylight and dry roadway conditions. Vehicle one was traveling EB on **Saginaw Street approaching Pennsylvania Avenue**. The vehicle had a green light and was proceeding through the intersection when they were struck by a bicyclist. A witness stated the

bicyclist was swerving past vehicles and crossing multiple lanes of traffic before striking vehicle one.

9. **Bicyclist Crash:** This crash was a Type O injury crash. The crash occurred during daylight and dry roadway conditions. Vehicle one was traveling EB on **Kalamazoo Avenue approaching Pennsylvania Avenue**. The vehicle stopped at the red light and they began inching forward to make a right when they were struck by a bicyclist.

To further analyze crash trends, crashes throughout the study area were sorted and compared by collision type, time of day, month of year, and roadway condition. Figure 6 shows a breakdown of crashes by crash type. The top three crash types seen along Pennsylvania Avenue in the five-year study period (2019-2023) were rear-ends (205 or 31.1% of total), angle (195 or 29.5% of total), and sideswipe in the same direction (106 or 16.1% of total).

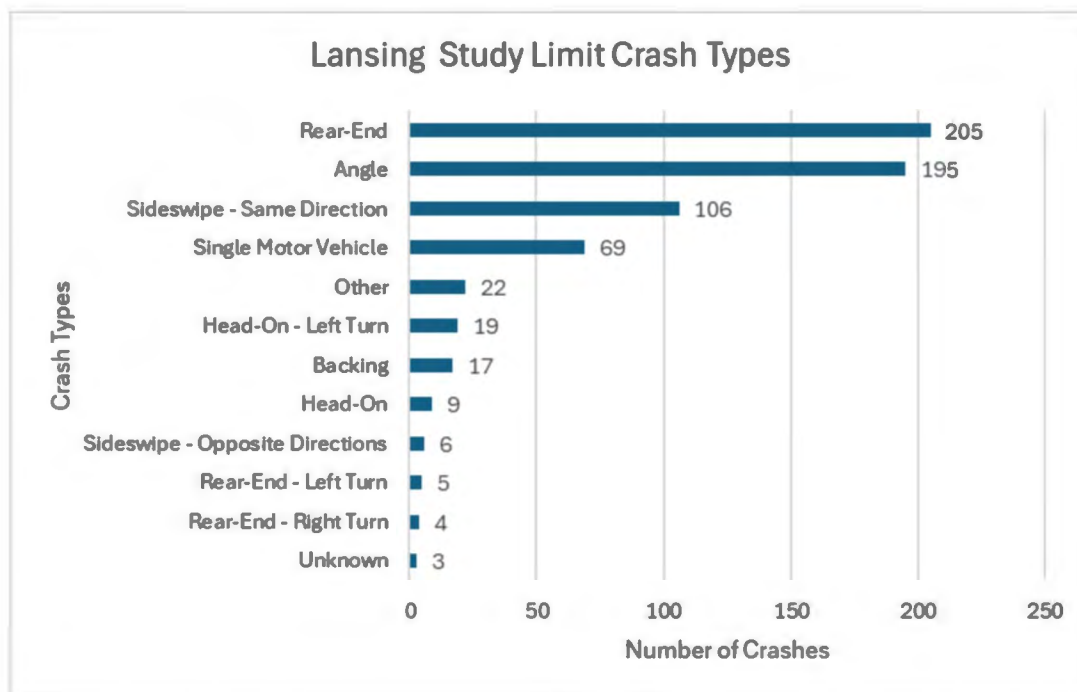


Figure 6: Pennsylvania Avenue Study Area Crash Types, 2019-2023

Crashes were also analyzed by the time of day they occurred (**Figure 7**). The highest aggregation of crashes along Pennsylvania Avenue five-year occurred between 11:00 AM and 6:00 PM. The highest concentration of crashes occurred between 3:00 PM and 4:00 PM (59 or 8.9% of all crashes). This coincides with a period of high exposure between the release of public schools and the traditional afternoon rush hour. The influx of high school drivers during this hour may be a contributing factor.

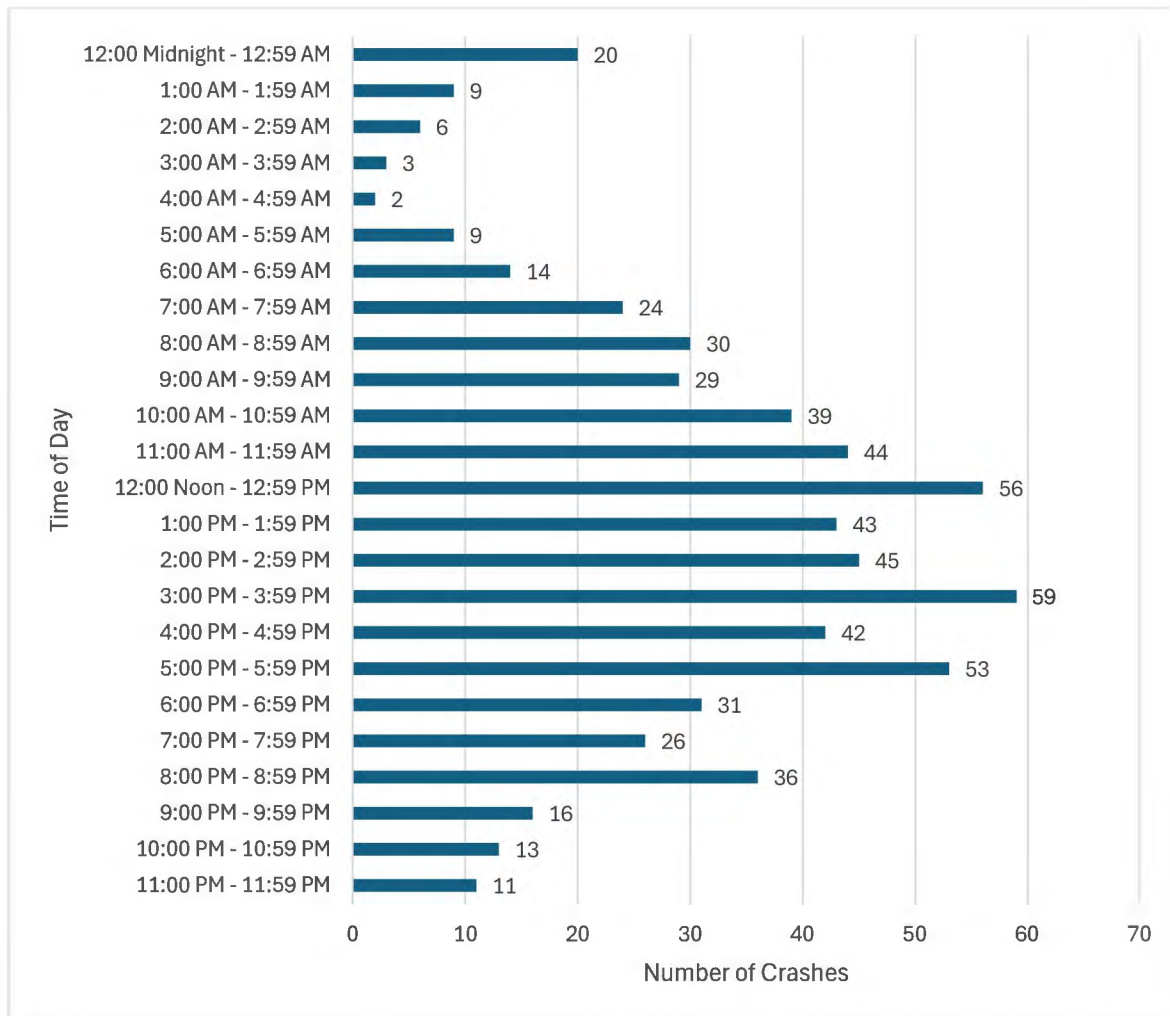


Figure 7: Pennsylvania Avenue Study Area Crashes per Time of Day, 2019-2023

Analysis of crashes by month showed some variability in crashes ranging from 45 to 67 crashes per month (an average of 55 and a standard deviation of 7.7). The top three months as shown in **Figure 8** were 67 crashes in June (10.2%), 65 crashes in October (9.8%), and 62 crashes in August (9.4%). The month with the fewest number of crashes was March with 45 crashes (6.8%), possibly due to a reduction in winter weather conditions.

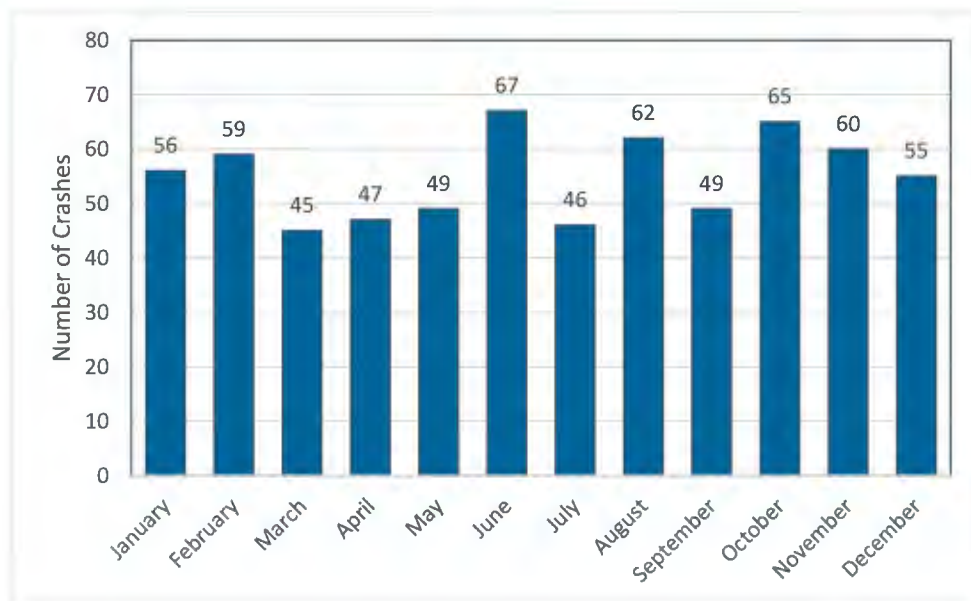


Figure 8: Pennsylvania Avenue Study Area Crashes by Month, 2019-2023

Most crashes occurred during the highest concentration of vehicles during daylight conditions (**Figure 9**) with 472 (71.5% of total crashes). The next highest lighting condition was “Dark - lighted” with 140 or (21.2%) of the total reported crashes. Crashes listed as occurring during “Dark - lighted” conditions refer to night but the area that are illuminated by streetlights.

Dark hours are associated with significantly lower volumes and non-congested conditions which lowers exposure. Some contributing human factors associated with crashes in dark conditions include:

- Increased speeds
- Increased likelihood of compromised drivers
 - Drowsy/Sleepy
 - Under the influence
- Diminished visual acuity

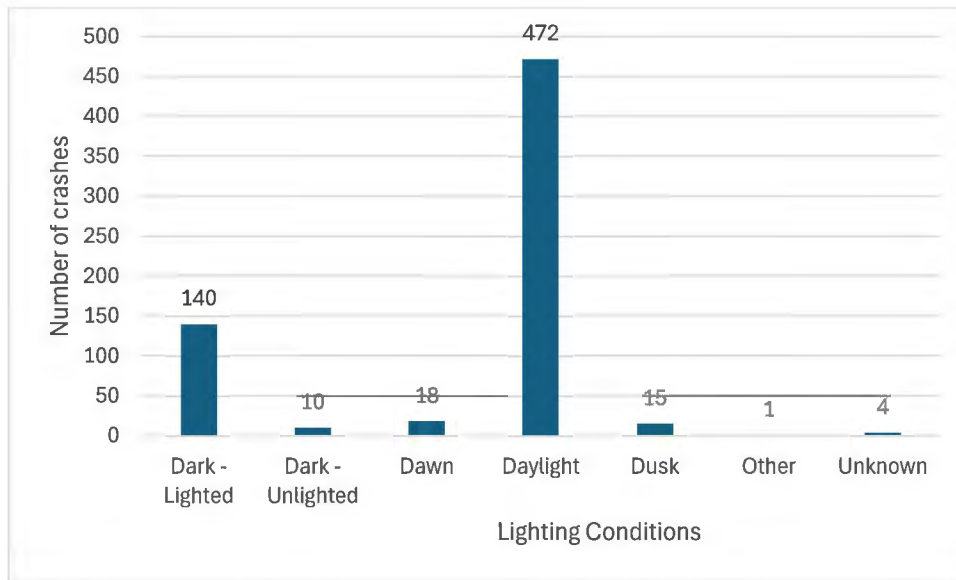


Figure 9: Pennsylvania Avenue Study Area Crashes by Lighting Condition, 2019-2023

Crashes on Pennsylvania Avenue in the study area were also evaluated by road conditions (**Figure 10**). The top three most common road conditions during crashes were dry conditions (491 or 74.4% of the total), wet conditions (119 or 18.0% of the total), and snowy conditions (29 or 4.4% of the total). This is not an atypical distribution. Analyzing roadway conditions during crashes is used to recommend countermeasures such as resurfacing or other means to increase pavement friction or clearing storm drains to improve drainage.

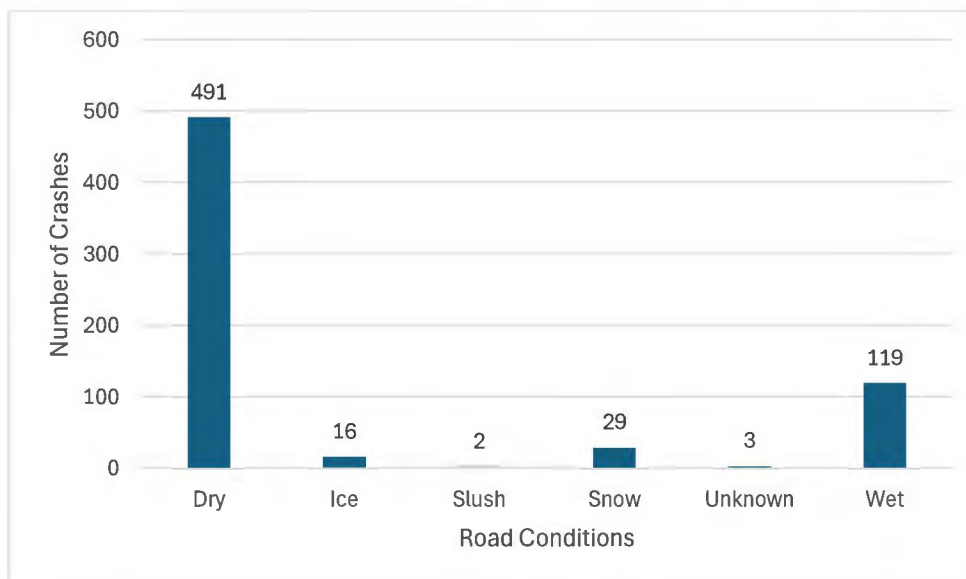


Figure 10: Pennsylvania Avenue Study Area Crashes by Roadway Condition, 2019-2023

Other notable crash factors include human factors such as distracted driver (49 or 7.4% of total crashes), drinking involved (17 or 2.6% of total crashes), and drugs involved (10 or 1.5% of total crashes).

2.3 Highway Safety Manual Predictive Analysis of Existing Conditions

The Highway Safety Manual (HSM), developed by the American Association of State Highway and Transportation Officials (AASHTO) and published in 2010, provides guidance for incorporating quantitative safety analysis for planning and the project development processes. The predictive method outlined in the HSM uses safety performance models to predict crashes by severity based on specific roadway types and safety performance functions (SPF).

The Michigan Department of Transportation (MDOT) makes available a spreadsheet that computes predicted crash frequency for roadway facilities based on SPFs specific to the State of Michigan. The expected average crash frequency is computed using the observed average crash data with the Empirical Bayes (EB) adjustment methodology. This predictive method uses traffic volumes and roadway characteristics to estimate crash frequency and severity to make informed decisions.

Pennsylvania Avenue within the study area was divided into segments between intersections for this HSM analysis of existing conditions. Data for roadway segments in terms of Annual Average Daily Traffic (AADT) and roadway characteristics (such as number of lanes, lane & shoulder widths, driveways, presence of on-street parking, presence of lighting, roadside fixed objects density, etc.) was used to estimate predicted and expected crashes from the observed, i.e., historic crash data (annualized from the 2019-2023 5-year crashes).

A similar analysis was conducted for intersections within the study area. AADT was located using 2023 data values from MDOT's Michigan Traffic AADT map. Some residential side streets within the study area did not have a recorded AADT. Similar roadways adjacent to the study area were referenced and unknown AADT values were set conservatively at 1,000.

Table 7 documents the results of this analysis for the roadway segments and **Table 8** documents the results for the intersections in the study area.

Table 7: HSM Predictive Analysis of Existing Conditions for Pennsylvania Avenue Study Segments

Pennsylvania Avenue Study Segments	SPF Predicted Average Crash Frequency Crashes / Year			Empirical Bayes Adjusted Expected Average Crash Frequency Crashes / Year			Excess Expected Crashes Crashes / Year		
	Fatality/ Injury	PDO	Total	Fatality/ Injury	PDO	Total	Fatality/ Injury	PDO	Total
César E. Chávez Ave. to Persons Ct	0.02	0.09	0.11	0.02	0.14	0.16	0.00	0.05	0.05
Person Ct to Porter St	0.02	0.11	0.13	0.09	0.35	0.43	0.07	0.23	0.30
Porter St to Cady Ct	0.02	0.10	0.12	0.12	0.34	0.45	0.10	0.23	0.33
Cady Ct to Oakland Ave.	0.02	0.11	0.14	0.06	1.63	1.69	0.04	1.51	1.55
Oakland Ave. to May St.	0.04	0.15	0.19	0.09	1.32	1.42	0.05	1.18	1.23
May St. to Saginaw St	0.04	0.15	0.18	0.20	1.50	1.70	0.16	1.36	1.52
Saginaw St. to Orchard St.	0.05	0.22	0.27	0.36	1.17	1.53	0.32	0.95	1.27
Orchard St. to Linden Grove Ave	0.02	0.08	0.09	0.18	0.11	0.29	0.16	0.03	0.20
Linden Grove Ave. to Shiawasee St.	0.06	0.36	0.42	0.12	0.45	0.57	0.06	0.09	0.15
Shiawasee St. to Vine St.	0.03	0.14	0.17	0.19	0.95	1.14	0.16	0.81	0.97
Vine St. to Jerome St.	0.03	0.13	0.15	0.13	0.16	0.29	0.10	0.03	0.13
Jerome St to Michigan Ave.	0.03	0.17	0.20	0.53	1.40	1.94	0.51	1.24	1.74
Michigan Ave. to Eureka St.	0.06	0.42	0.48	0.35	1.27	1.63	0.29	0.85	1.14
Eureka St. to Prospect St.	0.06	0.24	0.30	0.21	0.84	1.06	0.16	0.60	0.76
Prospect St. to Kalamazoo St.	0.07	0.26	0.33	0.40	1.88	2.28	0.34	1.62	1.95
Kalamazoo St. to Hickory St.	0.04	0.23	0.27	0.20	1.51	1.71	0.16	1.28	1.44
Hickory St. to Bement St.	0.03	0.13	0.16	0.19	0.35	0.54	0.16	0.21	0.38
Bement St. to Euclid Pl.	0.02	0.10	0.11	0.32	0.45	0.77	0.30	0.36	0.65
Euclid Pl. to Heald Pl.	0.01	0.07	0.08	0.01	0.13	0.14	0.00	0.07	0.07
Heald Pl. to I-496 WB On-Ramp	0.05	0.31	0.35	0.67	2.65	3.32	0.62	2.35	2.96
I-496 WB Ramp to I-496 EB Ramp	0.03	0.19	0.23	0.83	3.36	4.19	0.80	3.16	3.96
I-496 EB On-Ramp to Climax St.	0.03	0.16	0.20	0.19	1.84	2.03	0.16	1.68	1.84
Climax St. to Hazel St.	0.06	0.24	0.30	0.26	1.72	1.98	0.21	1.47	1.68
Hazel St. to Walsh St.	0.03	0.13	0.16	0.33	1.13	1.46	0.30	1.00	1.30
Walsh St. to Haco Dr.	0.04	0.31	0.35	0.09	0.63	0.72	0.05	0.31	0.37
Haco Dr. to Potter Park Rd.	0.11	0.77	0.88	0.26	3.34	3.60	0.15	2.57	2.73
Potter Park Rd. to Fayette St.	0.20	1.09	1.29	0.25	1.27	1.52	0.05	0.18	0.23
Fayette St. to Lindberg Dr.	0.01	0.05	0.06	0.01	0.17	0.18	0.00	0.12	0.12
Lindberg St. to Baker St.	0.34	1.81	2.15	0.41	1.82	2.23	0.07	0.01	0.08
Baker St. to Motor Ave.	0.05	0.14	0.18	0.05	0.26	0.31	0.01	0.12	0.13
Motor Ave. to Parkdale Ave.	0.05	0.32	0.37	0.07	0.35	0.42	0.02	0.03	0.05
Parkdale Ave. to Pershing Dr.	0.06	0.16	0.22	0.07	0.20	0.27	0.01	0.04	0.05
Pershing Dr. to Mt. Hope Ave	0.09	0.38	0.47	0.13	1.15	1.28	0.04	0.77	0.81
TOTAL	1.82	9.32	11.1	7.39	35.8	43.2	5.63	26.5	32.1

Table 8: HSM Predictive Analysis of Existing Conditions for Pennsylvania Avenue Intersections

Intersection	SPF Predicted Average Crash Frequency Crashes / Year			Empirical Bayes Adjusted Expected Average Crash Frequency Crashes / Year			Excess Expected Crashes Crashes / Year		
	Fatality/ Injury	PDO	Total	Fatality/ Injury	PDO	Total	Fatality/ Injury	PDO	Total
Pennsylvania Ave. at César E. Chávez Ave.	0.19	0.60	0.78	0.19	0.63	0.82	0.01	0.03	0.04
Pennsylvania Ave. and Person Ct.	0.02	0.08	0.10	0.02	0.11	0.12	0.00	0.02	0.02
Pennsylvania Ave. and Porter St.	0.10	0.41	0.51	0.11	0.59	0.70	0.01	0.19	0.20
Pennsylvania Ave. and Cady Ct.	0.10	0.41	0.51	0.10	0.37	0.47	0.00	-0.03	-0.04
Pennsylvania Ave. and Oakland Ave.	0.97	3.84	4.81	1.12	7.92	9.03	0.14	4.08	4.22
Pennsylvania Ave. and May St.	0.16	0.59	0.75	0.17	0.65	0.82	0.01	0.06	0.07
Pennsylvania Ave. and Saginaw St.	1.14	4.77	5.91	1.48	6.11	7.59	0.34	1.34	1.68
Pennsylvania Ave. and Orchard St.	0.06	0.29	0.36	0.06	0.38	0.44	0.00	0.08	0.08
Pennsylvania Ave. and Linden Grove Ave.	0.05	0.22	0.26	0.04	0.22	0.26	0.00	0.00	0.00
Pennsylvania Ave. and Shiawasee St.	0.60	1.78	2.38	0.62	2.05	2.66	0.02	0.26	0.28
Pennsylvania Ave. and Vine St.	0.05	0.24	0.29	0.05	0.27	0.32	0.00	0.04	0.03
Pennsylvania Ave. and Jerome St.	0.51	1.47	1.99	0.43	1.36	1.79	-0.08	-0.11	-0.20
Pennsylvania Ave. and Michigan Ave.	1.38	4.77	6.14	1.51	6.80	8.31	0.13	2.03	2.17
Pennsylvania Ave. and Eureka St.	0.27	0.94	1.21	0.27	0.91	1.17	0.00	-0.03	-0.03
Pennsylvania Ave. and Prospect St.	0.27	0.94	1.21	0.24	1.06	1.30	-0.03	0.12	0.09
Pennsylvania Ave. and Kalamazoo St.	1.08	3.41	4.49	1.14	5.91	7.04	0.05	2.50	2.55
Pennsylvania Ave. and Hickory St.	0.23	0.82	1.05	0.23	0.96	1.19	0.01	0.14	0.14
Pennsylvania Ave. and Bement St.	0.23	0.82	1.05	0.28	1.10	1.38	0.06	0.28	0.34
Pennsylvania Ave. and Euclid Pl.	0.23	0.82	1.05	0.26	1.42	1.68	0.03	0.61	0.64
Pennsylvania Ave. and Heald Pl.	0.23	0.82	1.05	0.26	1.23	1.49	0.03	0.41	0.44
Pennsylvania Ave. and I-496 WB	0.96	3.83	4.79	1.73	9.21	10.94	0.77	5.38	6.15
Pennsylvania Ave. and I-496 EB	1.01	4.12	5.14	1.31	7.37	8.68	0.30	3.25	3.55
Pennsylvania Ave. and Climax St.	0.08	0.40	0.49	0.18	2.87	3.05	0.10	2.47	2.57
Pennsylvania Ave. and Hazel St.	0.74	2.22	2.96	0.95	2.51	3.46	0.21	0.29	0.50
Pennsylvania Ave. and Walsh St.	0.08	0.40	0.49	0.09	0.87	0.96	0.01	0.47	0.48
Pennsylvania Ave. and Haco Dr.	0.49	1.66	2.15	0.52	1.34	1.86	0.03	-0.31	-0.29
Pennsylvania Ave. and Potter Park Rd.	0.12	0.52	0.64	0.11	0.59	0.70	-0.01	0.07	0.06
Pennsylvania Ave. and Fayette St.	0.05	0.24	0.29	0.04	0.42	0.46	-0.01	0.18	0.17
Pennsylvania Ave. and Lindberg St.	0.05	0.24	0.29	0.04	0.46	0.51	0.00	0.22	0.22
Pennsylvania Ave. and Baker St.	0.29	1.07	1.36	0.29	1.32	1.61	0.00	0.25	0.25
Pennsylvania Ave. and Motor Ave.	0.05	0.24	0.29	0.04	0.20	0.23	-0.01	-0.05	-0.06
Pennsylvania Ave. and Parkdale Ave.	0.05	0.24	0.29	0.04	0.19	0.23	-0.01	-0.05	-0.06
Pennsylvania Ave. and Pershing Dr.	0.05	0.24	0.29	0.04	0.19	0.23	-0.01	-0.05	-0.06
Pennsylvania Ave. and Mt. Hope St.	0.77	2.71	3.49	0.70	5.41	6.11	-0.07	2.69	2.62
TOTAL	12.63	46.18	58.80	14.63	72.99	87.62	2.01	26.81	28.82

The highest excess expected crashes are seen for the Pennsylvania Avenue segments around the I-496 interchange ramps. Most of the segments show a potential for improving safety by reducing around two crashes per year per study segment. For the entire 2.5-mile study area of Pennsylvania Avenue from Mt. Hope Street to César E. Chávez Avenue, this amounts to a potential for reducing over 32 total crashes per year.

Among the study intersections, the Pennsylvania Avenue and the I-496 interchange intersections have most excess expected crashes per year. This interchange has the potential to reduce over six crashes per year. The intersection of Pennsylvania Avenue and Oakland Avenue (signalized) has the potential to reduce over 4 crashes per year as per the predictive crash analysis.

Overall, the HSM predictive crash analysis shows that are excess expected crashes at both the segment and intersection levels that have the potential for safety mitigation.

3.0 Existing Safety Measures

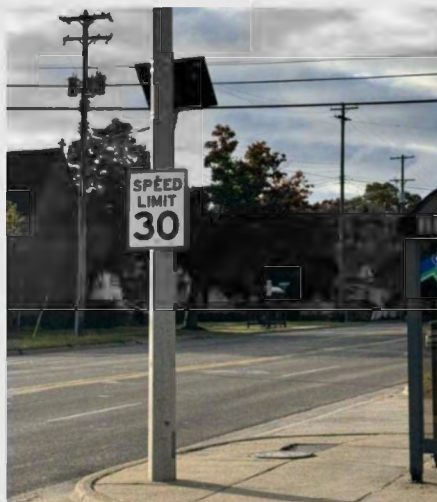
3.1 Field Observations

Observations of the site were conducted on Monday, October 14, 2024. The corridor was observed from 6:00 AM to 11:00 AM including a review of the dark and AM peak conditions. This site review was conducted while school was in session. Observations were documented using photographs taken while conducting driving and walking surveys around the site. Key corridor observations focused on:

- Roadway Geometry
- Pavement Markings
- Traffic Control types
- Intersection Geometry
- ADA Compliance
- Lighting

Several positive safety measures are currently present along the project corridor (**Table 9**) that are intended to enhance the overall safety of both motorized and non-motorized travelers.

Table 9: Existing Safety Measures

Existing Safety Measures	
Roadway Elements Posted Speed Limit: 30 MPH Lighting: There is street lighting throughout the corridor Roadway Geometry: The roadway is a boulevard south of Lindburg Street to Mt. Hope Avenue Signage: Advanced warning bridge clearance sign; good reflectivity Railroad: Railroad gates, proper signage, and pavement markings	

Existing Safety Measures	
VRU Facilities and Amenities: Bus shelters: Multiple bus shelters within the study area including benches Connected Sidewalk Networks: • Marked crosswalks • Special emphasis crosswalks	
Signalized Intersections Special emphasis crosswalks: • Saginaw Street, Shiawassee Street, Michigan Avenue, Jerome Street Signal Backplates: • Saginaw Street, Oakland Avenue Pedestrian Push Buttons: • Mt. Hope Avenue, Baker Street, Haco Drive, Michigan Avenue, Saginaw Street, Oakland Avenue Turning vehicles Yield to Pedestrian's sign: • Oakland Avenue	

4.0 Safety Issues and Recommendations

This section details the safety risks identified based on the crash analysis, field observations of the study area crashes, and the RSA Risk Priority Ranking. The identified safety issues are presented in order from those with the highest risk (Risk Rating F) to the lowest risk (Risk Rating A). Recommendations presented include short and long-term mitigations and a range of investment levels needed for implementation. This will enable the project owner to prioritize mitigation measures.

4.1 Safety Issue #1 – Vulnerable Road Users

SAFETY ISSUES

Some trends in safety issues were noted across the study area. The following four issues were found to be affecting VRU across the corridor:

- Sidewalk width and condition
- Vehicle-VRU Crosswalk Conflicts
- ADA tactile warning surfaces and ramps
- Pedestrians crossing outside of designated crosswalk

The sidewalk is in need of maintenance in portions of the study area. Poor to fair sidewalk conditions were noted in the following areas:

- 1100 block east side of N Pennsylvania Ave
- 900 block west side of N Pennsylvania Ave
- 100 block east side of S Pennsylvania Ave (Narrow at Pilgrim Congregational United Church of Christ)
- 600 block east side of S Pennsylvania Ave (Railroad crossings are not ADA compliant)
- 1400 block west side of S Pennsylvania Ave
- 1500 block west side of S Pennsylvania Ave

Common maintenance issues perceived to create tripping hazards in these areas include:

- Sprawling and cracking of the concrete surface
- Sudden elevation changes created by
 - Sinking concrete
 - Heaving concrete from the roots of street trees
- Vegetation growing in sidewalk joints

An example of unlevel sidewalk conditions is shown in the photo below (**Figure 11**).

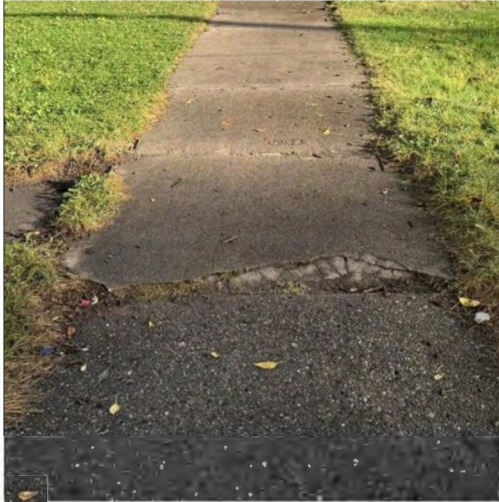


Figure 11: Example of Uneven Sidewalk

ADA tactile warning surfaces and ramps are a standard requirement to alert persons with visual impairments to changes in walking surfaces. Throughout the study area ADA tactile warning surfaces and ramps were found to not adhere to current design standards or require maintenance (**Figure 12**).



Figure 12: Missing ADA Tactile Warning Surface

Additionally, several pedestrians were observed to be crossing Pennsylvania Avenue illegally outside of crosswalks (**Figure 13**). Failing to use a crosswalk can put pedestrians in danger as drivers are less likely to expect pedestrians outside of crosswalks.

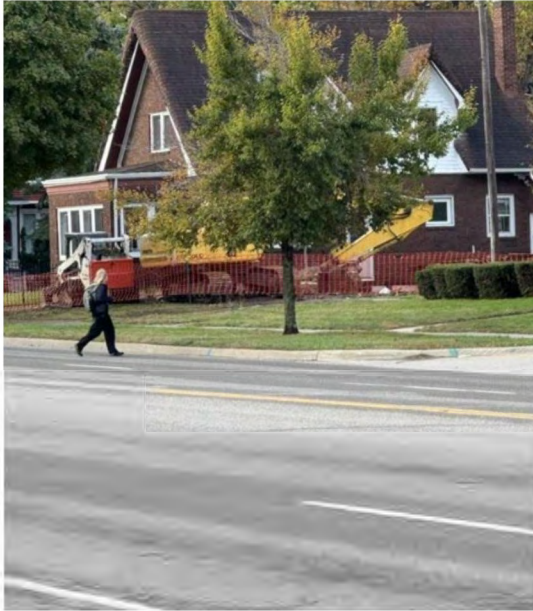


Figure 13: Example of Pedestrian Crossing Pennsylvania Avenue Mid-Block

RISK RATING

Taking into consideration the existing infrastructure and VRU accommodations throughout the study area, as well as the crash analysis showing multiple crashes involving VRU throughout the study area, the crash frequency was rated as **Occasional**. Due to the risks associated with crashes that involve VRU, the crashes are assigned **High** severity. Accordingly, the VRU safety issue is assigned a crash risk assessment Rating E.

Crash Frequency	Crash Severity
Occasional	High
	E

RECOMMENDATIONS

- **Widen and Repair Sidewalks:** Widen, replace, or repair sidewalks to maintain a good state of repair in those areas previously mentioned.
- **Improve Pedestrian Crossings at Intersections:** Ensure that intersection design accommodates ADA requirements, proper signs and pavement markings, and other safety enhancements.
 - **Leading Pedestrian Interval at Signalized Intersections:** Consider implementing a leading pedestrian interval that will allow pedestrians to enter the crosswalk before vehicles are given a green indication. This may be specifically helpful in preventing VRU crashes involving turning vehicles.
 - **Standardize Ramp Design:** Improve as needed, intersections crossings to meet current ADA requirements.
 - **Provide Additional Lighting:** Enhance pedestrian visibility to vehicular traffic as they wait to cross the road, especially during dark conditions by providing pedestrian level lighting at crosswalks.

- **Midblock Pedestrian Crossing:** Identify locations where pedestrians routinely crossing for the consideration of midblock crossings. Where suitable (i.e., where there is a median or center turn lane), a pedestrian refuge island could help to mitigate midblock crossings. This can improve VRU safety by splitting the roadway and reducing crossing distances.
- **Accommodate Bicyclists:** The inclusion of bike-specific design along the roadway, whether the addition of a bike lane or sharrow, will give bicyclists a needed place along the corridor as well as increase drivers' awareness of bicyclists traveling along Pennsylvania Avenue.
- **Evaluate using the SEMCOG/MDOT Multimodal Tool:** This tool is used to evaluate complete street designs and score how they serve people walking, biking, driving, riding transit, and moving freight. This tool could be used for Pennsylvania Avenue in the study area to evaluate which changes along the roadway might positively affect how the roads serve VRU's, like bicyclists and pedestrians.

4.2 Safety Issue #2 – Intersections

SAFETY ISSUES

Multiple safety issues were identified regarding the intersections along Pennsylvania Avenue within the RSA study area:

- Diagonal span traffic signals (example shown in **Figure 14**)
- Signal visibility
- Worn or non-existent pavement markings
- Frequent stops on red at signalized intersections

Diagonal span wire traffic signals were found at the following intersections:

- Pennsylvania Avenue and Baker Street
- Pennsylvania Avenue and Haco Drive
- Pennsylvania Avenue and Hazel Street
- Pennsylvania Avenue and Jerome Street
- Pennsylvania Avenue and Shiawassee Street
- Pennsylvania Avenue and César E. Chávez Avenue

Diagonal traffic signal designs do not always provide roadway users with adequate visual angle of the traffic signal heads. As per the MDOT Time of Return spreadsheet, when diagonal span traffic signals are replaced with box span signals there is a 10% reduction in applicable crashes. The primary attribute of a box span leading to this reduction is the realignment of the left traffic signal to be in line with the approaching vehicle lane, thus increasing the target value of the traffic signal.



Figure 14: Diagonal Span Traffic Signal at Pennsylvania Avenue and Haco Street

Signal heads equipped with backplates and retroreflective borders are more visible in daytime and nighttime conditions. This treatment addresses human factors enhancing the traffic signal's visibility, and orientation for both older and color vision-deficient drivers (Figure 15).



Figure 15: Example of a Traffic Signal With and Without Backplates in Dark Conditions.

Additionally, pavement markings throughout the study area are worn, or nonexistent in some places. This can be seen at multiple crosswalks throughout the study area (Figure 16).



Figure 16: Significantly Worn Stop Bar and Crosswalk

As RSA team drove the corridor from end to end, numerous stops at traffic signals were made. This indicates that the traffic signals were:

- Operating in a “free” mode independent of each other
- Coordinated timing plans out of sync due to disrupted traffic signal communications

- Multiple intersections were experiencing faulty detection (broken inductance loops)

Any or all of these conditions can result in less than optimal traffic flow.

Frequent stops along signalized corridors can increase the occurrence of rear-end crashes and cause driver frustration leading to red light running. Improved coordinated traffic signal timing can significantly reduce the number of stops in a corridor.

RISK RATING

Due to the history of reported crashes at intersections along this roadway the RSA team members assigned crash frequency as **Occasional**. The RSA team observed many vehicles stopping beyond the worn stop bars in the crosswalk areas. Freshly remarked stop bars and crosswalks will effectively communicate to motorists the proper stopping location and delineate the area reserved for pedestrians. Every incapacitating injury (Type A) crash along the corridor was at an intersection, and because of this, crash severity was labeled as **Moderate**. The final risk rating is D.

Crash	Crash Severity
Frequency	Moderate
Occasional	D

RECOMMENDATIONS

- **Installation of box span or mast arm traffic signals:** Replacing diagonal span traffic signals with mast arm or box span traffic signals can increase visibility.
- **Traffic Signal backplates:** Adding backplates to traffic signals can improve visibility by introducing contrast against a daylit sky and retroreflective border at night.
- **Pavement marking maintenance:** Pavement marking updates can be made using retroreflective lines as per relevant standards, and crosswalks can be updated with special emphasis markings at high VRU crossing locations.
- **Traffic signal coordination:** The coordination of traffic signals along the corridor can reduce stops and delays by allowing vehicles to move continuously through a corridor. Updating the clearance intervals (yellow, red, and pedestrian) during the optimization can also increase safety for all users.

4.3 Safety Issue #3 – Corridor wide

SAFETY ISSUES

Throughout the corridor, observations were made regarding lighting and roadway geometry. The lighting along the roadway is in transition, there is a mixture of newer LED lighting fixtures with older high-pressure sodium lamps (**Figure 17**).

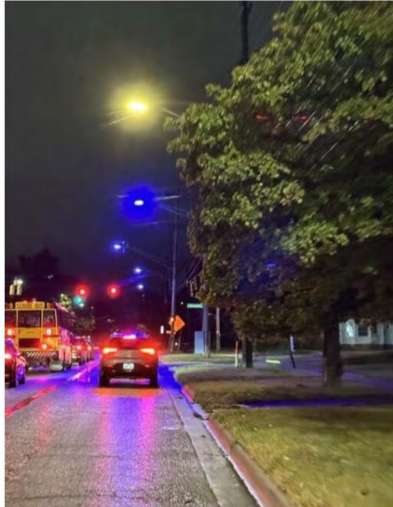


Figure 17: Inconsistent Lighting Along Pennsylvania Avenue

The roadway geometry changes throughout the corridor from four lanes divided to five lanes undivided with a TWLTL, to four lanes undivided. Varying cross sections can negatively impact driver expectations which may lead to negative effects on traffic operations and safety at the transitions.

RISK RATING

Due to the history of reported crashes along this roadway the crash frequency was assigned as **Occasional**. These safety issues tend to involve motor vehicles with an slight risk for injury crashes, so it was assigned **Low** severity. The final risk rating is C.

Crash Frequency	Crash Severity
Occasional	Low
	C

RECOMMENDATIONS

- **Establish Uniform Lighting:** Continue program to update all luminaires to LED lamps.
- **Consistent Roadway Geometry:** Analyze and define a consistent cross section, where possible, to improve uniformity along the corridor. A road diet is a possible alternative.
- **Road Diet:** Reconfigure the existing roadway by removing or repurposing lanes to better accommodate VRUs.

4.4 Safety Analysis

The Highway Safety Manual (HSM) introduces a science-based technical approach to incorporating safety into traditional roadway planning and safety analyses. The first edition of the HSM (2010) provides the best information and tools in a useful form to facilitate roadway planning, design, operations, and maintenance decisions based on precise consideration of their safety consequences. The primary focus of the HSM is the introduction

and development of analytical tools for predicting the impact of transportation projects and program decisions on road safety.

MDOT has a HSM Analysis spreadsheet that predicts the number of crashes to be proportionally increased or decreased based on calibrated conditions in Michigan. This spreadsheet is geared towards corridor-wide improvements and not as much for multiple short segments with varying geometry; hence, no CMFs for reduction were used for the corridor. Due to these existing limitations in the HSM methodology and the recommendations identified to address concerns in the study area, not all suggested treatments may be applicable.

Some of the suggested treatments have a quantifiable impact on specific crash types or locations. These are summarized in **Table 10**. Other recommendations not listed here may not be quantifiable but nevertheless are expected to have a positive impact on corridor safety.

Table 10: Other Crash Reduction Factors

Treatment	Source	Est. Crash Reduction	Applicable Crashes
Multiple Low-Cost Improvements (Traffic Signal Timing / Hardware Enhancements)	MDOT TOR Spreadsheet	3-12%	Rear-End Right Angle Nighttime
Install Reflectorized Backplates	MDOT TOR Spreadsheet	15%	Rear End, Angle Crashes, and Sideswipe Same
Box-Span Traffic Signal-Upgrade from Diagonal Span	MDOT TOR Spreadsheet	10%	Rear End, Angle Crashes, and Sideswipe Same
Traffic Signal Optimization and timing updates	MDOT TOR Spreadsheet	10%	Rear End, Angle Crashes, and Sideswipe Same
Pavement markings - Improve	MDOT TOR Spreadsheet	30%	Angle, rear-end crashes
Pedestrian Refuge Island	MDOT TOR Spreadsheet	50%	Pedestrian Crashes
Bicycle Lanes	MDOT TOR Spreadsheet	50%	Bicycle Crashes
Road Diet (4-3 Lane Conversion)	MDOT TOR Spreadsheet	50%	Suburban-All Applicable Crashes

5.0 Summary

The objective of the study was to perform a safety review of Pennsylvania Avenue from Mt. Hope Avenue to César E. Chávez Avenue for any safety issues that could be mitigated. AADT ranges from 4,012 to 17,500, and the primary roadway users are passenger vehicles, VRU, transit, and freight.

A crash analysis was performed for a five-year period ranging from 2019-2023 to review applicable trends and a field visit was conducted. Below is a summary of the safety issues observed and voiced by community members, the RSA risk rating, and the potential countermeasures identified.

A variety of short-term and long-term recommendations with a range of cost implications has been presented in **Table 11**. Issues are linked to the discussion sections above. It is up to the Project Owner to determine which recommendations to implement and how to fund.

Table 11: Summary of Recommendations

Safety Issue	Risk Rating	Identified Countermeasures
Safety Issue #1 Vulnerable Road Users - Sidewalk state of repair - ADA tactile warning surfaces and ramps - Pedestrians crossing outside the crosswalk	E	- As needed repairs to sidewalk - Leading pedestrian intervals - Standardize ADA ramps - Pedestrian refuge island - Accommodate bicyclists - SEMCOG/MDOT Multimodal Tool
Safety Issue #2 – - Diagonal Span Traffic Signals (Figure 14) - Traffic Signal visibility - Faded or non-existent pavement markings - Uncoordinated traffic signals	D	- Installing box span or mast arm traffic signals - Signal backplates - Improve or refresh pavement markings - Traffic signal coordination
Safety Issue #3 Corridor wide - Lighting - Road Geometry	C	- Establish uniform lighting - Consistent roadway geometry - Road diet

TRANSIT ANALYSIS

Object ID	Stop_ID	Bike and Pedestrian Crashes				Fatal and Serious Injury Crashes				Identified as Disadvantage		Replica Equity Score				Replica Demand Score				Total Scores	WEIGHTED Score	Presented Score		Rank	Rank2			
	Data Type	Raw Data	Scores				Raw Data	Scores				Raw Data	Scores	Raw Data	Scores				Raw Data	Scores								
	Range		0	1-2	3-5	>5		0	1-2	3-5	>5		0	1		0	1-45	46-75	>75		<5	5-10	10-30	>30				
	Upper Limit		0	2	5	5		0	2	5	5		0	1		0	45	75	75		4	10	30	30				
	Points Assinged		0	5	10	15		0	5	10	15		0	15		0	5	10	15		0	5	10	15				
	Weights Assigned		25%				25%				10%		15%				25%											
1	3036	0	0				0	0			1	15	45	5		10	5			25	3.5	35	148	170				
2	3040	0	0				0	0			1	15	0	0		10	5			20	2.75	27.5	235	259				
3	3038	0	0				0	0			1	15	45	5		10	5			25	3.5	35	148	170				
4	3037	0	0				0	0			1	15	45	5		10	5			25	3.5	35	148	170				
5	3039	0	0				0	0			1	15	0	0		10	5			20	2.75	27.5	235	259				
6	4418	0	0				0	0			1	15	25	5		4	0			20	2.25	22.5	235	278				
7	3386	0	0				0	0			0	0	70	10		1	0			10	1.5	15	350	370				
8	3374	0	0				1	5			0	0	10	5		1	0			10	2	20	350	345				
9	6107	0	0				0	0			1	15	60	10		2	0			25	3	30	148	226				
10	3385	0	0				0	0			0	0	5	5		1	0			5	0.75	7.5	388	391				
11	3375	0	0				0	0			0	0	5	5		1	0			5	0.75	7.5	388	391				
12	3388	0	0				0	0			0	0	45	5		1	0			5	0.75	7.5	388	391				
13	3371	0	0				0	0			0	0	45	5		1	0			5	0.75	7.5	388	391				
14	4851	0	0				0	0			0	0	5	5		1	0			5	0.75	7.5	388	391				
15	3373	0	0				0	0			0	0	45	5		1	0			5	0.75	7.5	388	391				
16	3387	1	5				1	5			0	0	45	5		1	0			15	3.25	32.5	322	213				
17	3372	1	5				0	0			0	0	45	5		1	0			10	2	20	350	345				
18	3394	1	5				2	5			0	0	90	15		0	0			25	4.75	47.5	148	102				
19	3363	1	5				1	5			0	0	90	15		0	0			25	4.75	47.5	148	102				
20	6106	0	0				0	0			1	15		0		2	0			15	1.5	15	322	370				
21	4739	0	0				0	0			1	15	30	5		1	0			20	2.25	22.5	235	278				
22	4701	0	0				0	0			1	15	30	5		1	0			20	2.25	22.5	235	278				
23	4578	0	0				0	0			1	15	30	5		1	0			20	2.25	22.5	235	278				
24	5758	0	0				0	0			0	0	60	10		6	5			15	2.75	27.5	322	259				
25	48	0	0				0	0			0	0	60	10		4	0			10	1.5	15	350	370				
26	3380	0	0				0	0			0	0	60	10		4	0			10	1.5	15	350	370				
27	4471	0	0				0	0			0	0	75	10		6	5			15	2.75	27.5	322	259				
28	3381	0	0				1	5			0	0	50	10		6	5			20	4	40	235	160				
29	4472	0	0				0	0			0	0	60	10		1	0			10	1.5	15	350	370				
30	2995	0	0				0	0			0	0	75	10		0	0			10	1.5	15	350	370				
31	4473	0	0				0	0			0	0	60	10		0	0			10	1.5	15	350	370				
32	6082	0	0				0	0			1	15	45	5		1	0			20	2.25	22.5	235	278				
33	5996	0	0				0	0			1	15	45	5		1	0			20	2.25	22.5	235	278				
34	4429	1	5				0	0			1	15	94	15		33	15			50	8.75	87.5	8	16				
35	15	2	5				1	5			1	15	61	10		33	15			50	9.25	92.5	8	13				
36	5742	0	0				0	0			1	15	60	10		0	0			25	3	30	148	226				
37	2421	0	0				0	0			0	0	60	10			0			10	1.5	15	350	370				
38	82	0	0				0	0			0	0		0			0			0	0	0	431	431				
39	4552	0	0				0	0			0	0		0			0			0	0	0	431	431				
40	2424	0	0				0	0			0	0	60	10			0			10	1.5	15	350	370				
41	3013	0	0				0	0			1	15	0	0		10	5			20	2.75	27.5	235	259				
42	1610	0	0				0	0			1	15	40	5		8	5			25	3.5	35	148	170				
43	1615	0	0				0	0			1	15	0	0		10	5			20	2.75	27.5	235	259				
44	3012	0	0				0	0			1	15	40	5		8	5			25	3.5	35	148	170				
45	1614	1	5				0	0			1	15	0	0		10	5			25	4	40	148	160				
46	2390	1	5				1	5			1	15	40	5		8	5			35	6	60	56	62				
47	1609	0	0				0	0			1	15	40	5		8	5			25	3.5	35	148	170				
48	3014	0	0				0	0			1	15	0	0		10	5			20	2.75	27.5	235	259				
49	2446	0	0				0	0			1	15	35	5		9	5			25	3.5	35	148	170				
50	2441	0	0				0	0			1	15	35	5		9	5			25	3.5	35	148	170				
51	159	0	0				0	0			1	15	40	5		3	0			20	2.25	22.5	235	278				
52	5906	0	0				0	0			0	0	70	10		1	0			10	1.5	15	350	370				
53	6062	5	10				2	5			1	15	50	10		9	5			45	8	80	18	29				
54	4733	3	10				2	5			0	0	35	5		4	0			20	4.5	45	235	137				

55	1899	0	0	2	5	1	15	65	10	4	0	30	4.25	42.5	93	144
56	1916	5	10	3	10	0	0	50	10	1	0	30	6.5	65	93	58
57	4457	5	10	3	10	1	15	50	10	1	0	45	8	80	18	29
58	3351	1	5	2	5	1	15	40	5	4	0	30	4.75	47.5	93	102
59	3258	3	10	4	10	1	15	40	5	4	0	40	7.25	72.5	31	34
60	3344	0	0	0	0	1	15	40	5	6	5	25	3.5	35	148	170
61	1911	7	15	6	15	0	0	30	5	2	0	35	8.25	82.5	56	26
62	1976	1	5	2	5	0	0	30	5	2	0	15	3.25	32.5	322	213
63	3265	0	0	0	0	1	15	40	5	6	5	25	3.5	35	148	170
64	6033	2	5	1	5	0	0	55	10	6	5	25	5.25	52.5	148	98
65	1990	0	0	3	10	1	15	65	10	4	0	35	5.5	55	56	92
66	1905	5	10	8	15	1	15	50	10	6	5	55	10.5	105	3	3
67	3342	2	5	2	5	0	0	25	5	3	0	15	3.25	32.5	322	213
68	3343	1	5	5	10	1	15	25	5	6	5	40	7.25	72.5	31	34
69	1908	2	5	5	10	0	0	25	5	6	5	25	5.75	57.5	148	89
70	1901	0	0	0	0	1	15	40	5	4	0	20	2.25	22.5	235	278
71	3350	1	5	1	5	1	15	40	5	4	0	30	4.75	47.5	93	102
72	4459	7	15	6	15	0	0	25	5	2	0	35	8.25	82.5	56	26
73	36	1	5	0	0	1	15	35	5	6	5	30	4.75	47.5	93	102
74	4458	1	5	0	0	1	15	35	5	2	0	25	3.5	35	148	170
75	4454	0	0	0	0	0	0	40	5	4	0	5	0.75	7.5	388	391
76	5646	0	0	0	0	0	0	40	5	4	0	5	0.75	7.5	388	391
77	5443	0	0	0	0	1	15	55	10	3	0	25	3	30	148	226
78	3336	1	5	2	5	0	0	15	5	5	5	20	4.5	45	235	137
79	1918	1	5	2	5	0	0	15	5	5	5	20	4.5	45	235	137
80	6158	0	0	0	0	0	0	15	5	1	0	5	0.75	7.5	388	391
81	3279	1	5	0	0	0	0	40	5	4	0	10	2	20	350	345
82	3268	0	0	0	0	0	0	25	5	2	0	5	0.75	7.5	388	391
83	3335	1	5	2	5	1	15	25	5	4	0	30	4.75	47.5	93	102
84	1902	0	0	0	0	0	0	40	5	6	5	10	2	20	350	345
85	3349	1	5	0	0	1	15	40	5	4	0	25	3.5	35	148	170
86	1917	4	10	4	10	0	0	15	5	1	0	25	5.75	57.5	148	89
87	3337	2	5	3	10	1	15	15	5	1	0	35	6	60	56	62
88	3584	2	5	3	10	1	15	25	5	8	5	40	7.25	72.5	31	34
89	3345	6	15	6	15	1	15	50	10	6	5	60	11.75	117.5	1	1
90	1906	5	10	6	15	1	15	50	10	6	5	55	10.5	105	3	3
91	4460	5	10	8	15	1	15	50	10	6	5	55	10.5	105	3	3
92	1912	0	0	0	0	0	0	30	5	2	0	5	0.75	7.5	388	391
93	4509	2	5	1	5	1	15	25	5	8	5	35	6	60	56	62
94	3348	2	5	1	5	0	0	40	5	6	5	20	4.5	45	235	137
95	1915	6	15	3	10	0	0	35	5	6	5	35	8.25	82.5	56	26
96	3333	2	5	1	5	0	0	35	5	4	0	15	3.25	32.5	322	213
97	1909	1	5	2	5	0	0	25	5	3	0	15	3.25	32.5	322	213
98	3585	1	5	0	0	1	15	25	5	8	5	30	4.75	47.5	93	102
99	3340	0	0	0	0	0	0	30	5	2	0	5	0.75	7.5	388	391
100	6066	0	0	2	5	1	15	5	5	8	5	30	4.75	47.5	93	102
101	1913	1	5	0	0	0	0	35	5	2	0	10	2	20	350	345
102	3347	3	10	2	5	0	0	55	10	6	5	30	6.5	65	93	58
103	3331	1	5	2	5	0	0	40	5	4	0	15	3.25	32.5	322	213
104	6079	8	15	5	10	1	15	50	10	3	0	50	9.25	92.5	8	13
105	5579	0	0	0	0	1	15	25	5	10	5	25	3.5	35	148	170
106	2305	1	5	2	5	0	0	20	5	3	0	15	3.25	32.5	322	213
107	4636	0	0	0	0	0	0	40	5	1	0	5	0.75	7.5	388	391
108	1732	0	0	0	0	0	0	40	5	1	0	5	0.75	7.5	388	391
109	5885	1	5	0	0	0	0	40	5	8	5	15	3.25	32.5	322	213
110	6086	0	0	0	0	0	0	45	5	1	0	5	0.75	7.5	388	391
111	5989	0	0	0	0	0	0	45	5	1	0	5	0.75	7.5	388	391
112	5934	0	0	0	0	0	0	40	5	1	0	5	0.75	7.5	388	391
113	5935	0	0	0	0	0	0	40	5	1	0	5	0.75	7.5	388	391
114	160	0	0	0	0	1	15	15	5	2	0	20	2.25	22.5	235	278
115	2474	0	0	0	0	0	0	35	5	0	0	5	0.75	7.5	388	391

116	2475	0	0	0	0	0	0	35	5	1	0	5	0.75	7.5	388	391
117	2473	1	5	1	5	0	0	35	5	0	0	15	3.25	32.5	322	213
118	7	1	5	0	0	1	15	0	0	10	5	25	4	40	148	160
119	3607	0	0	0	0	1	15	55	10	1	0	25	3	30	148	226
120	3608	0	0	0	0	1	15	55	10	1	0	25	3	30	148	226
121	5757	0	0	0	0	1	15	55	10	1	0	25	3	30	148	226
122	3609	0	0	0	0	1	15	55	10	14	10	35	5.5	55	56	92
123	81	0	0	0	0	1	15	60	10	0	0	25	3	30	148	226
124	2412	1	5	2	5	1	15	90	15	92	15	55	10	100	3	7
125	2408	1	5	0	0	1	15	25	5	0	0	25	3.5	35	148	170
126	2409	0	0	0	0	1	15		0	0	0	15	1.5	15	322	370
127	2411	0	0	0	0	1	15	100	15	92	15	45	7.5	75	18	33
128	2410	0	0	0	0	1	15		0	92	15	30	5.25	52.5	93	98
129	4491	0	0	0	0	1	15	90	15	8	5	35	5	50	56	101
130	4474	0	0	0	0	0	0	80	15	0	0	15	2.25	22.5	322	278
131	2797	0	0	0	0	1	15	40	5	9	5	25	3.5	35	148	170
132	4784	2	5	2	5	1	15	50	10	9	5	40	6.75	67.5	31	47
133	2213	1	5	3	10	1	15	25	5	9	5	40	7.25	72.5	31	34
134	4053	0	0	0	0	1	15	40	5	1	0	20	2.25	22.5	235	278
135	3561	0	0	0	0	1	15	36	5	9	5	25	3.5	35	148	170
136	6039	0	0	1	5	0	0	65	10	4	0	15	2.75	27.5	322	259
137	4603	1	5	1	5	0	0	40	5	2	0	15	3.25	32.5	322	213
138	4388	1	5	1	5	0	0	50	10	4	0	20	4	40	235	160
139	5723	0	0	0	0	0	0	40	5	4	0	5	0.75	7.5	388	391
140	5712	0	0	0	0	0	0	40	5	4	0	5	0.75	7.5	388	391
141	6064	0	0	0	0	0	0	40	5	4	0	5	0.75	7.5	388	391
142	5689	0	0	1	5	0	0	65	10	4	0	15	2.75	27.5	322	259
143	5684	0	0	0	0	0	0	40	5	4	0	5	0.75	7.5	388	391
144	5691	0	0	1	5	1	15	70	10	1	0	30	4.25	42.5	93	144
145	5692	1	5	3	10	0	0	70	10	1	0	25	5.25	52.5	148	98
146	5690	0	0	0	0	1	15	70	10	1	0	25	3	30	148	226
147	5680	1	5	2	5	0	0	40	5	2	0	15	3.25	32.5	322	213
148	5679	1	5	0	0	0	0	50	10	4	0	15	2.75	27.5	322	259
149	5678	1	5	0	0	0	0	30	5	4	0	10	2	20	350	345
150	3636	0	0	0	0	1	15	80	15	1	0	30	3.75	37.5	93	168
151	3596	0	0	0	0	1	15	80	15	1	0	30	3.75	37.5	93	168
152	2292	0	0	0	0	1	15	35	5	1	0	20	2.25	22.5	235	278
153	2249	0	0	0	0	1	15	35	5	1	0	20	2.25	22.5	235	278
154	161	0	0	0	0	1	15	25	5	6	5	25	3.5	35	148	170
155	5543	1	5	0	0	1	15	35	5	6	5	30	4.75	47.5	93	102
156	4852	0	0	0	0	0	0	30	5	1	0	5	0.75	7.5	388	391
157	2002	0	0	1	5	0	0	15	5	0	0	10	2	20	350	345
158	3393	0	0	0	0	0	0	10	5	0	0	5	0.75	7.5	388	391
159	2003	0	0	0	0	0	0	10	5	0	0	5	0.75	7.5	388	391
160	2038	0	0	0	0	0	0	10	5	0	0	5	0.75	7.5	388	391
161	4853	0	0	0	0	0	0	30	5	1	0	5	0.75	7.5	388	391
162	6095	1	5	0	0	0	0		0	1	0	5	1.25	12.5	388	388
163	6097	1	5	0	0	0	0		0	1	0	5	1.25	12.5	388	388
164	9	0	0	0	0	0	0	40	5	8	5	10	2	20	350	345
165	4	0	0	0	0	0	0	40	5	8	5	10	2	20	350	345
166	4738	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
167	4704	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
168	3573	0	0	1	5	1	15	40	5	1	0	25	3.5	35	148	170
169	3575	0	0	0	0	1	15	50	10	5	5	30	4.25	42.5	93	144
170	1599	1	5	0	0	1	15	35	5	10	5	30	4.75	47.5	93	102
171	1596	1	5	0	0	1	15	25	5	10	5	30	4.75	47.5	93	102
172	1600	9	15	1	5	1	15	40	5	8	5	45	8.5	85	18	18
173	1604	3	10	1	5	1	15	30	5	8	5	40	7.25	72.5	31	34
174	1601	0	0	0	0	1	15	40	5	8	5	25	3.5	35	148	170
175	1603	0	0	0	0	1	15	30	5	8	5	25	3.5	35	148	170
176	4800	2	5	1	5	0	0	30	5	6	5	20	4.5	45	235	137

177	4780	0	0	0	0	1	15	70	10	0	0	25	3	30	148	226
178	3778	0	0	2	5	1	15	25	5	0	0	25	3.5	35	148	170
179	6005	0	0	0	0	1	15	35	5	3	0	20	2.25	22.5	235	278
180	5999	0	0	0	0	1	15	0	0	3	0	15	1.5	15	322	370
181	5997	8	15	5	10	1	15	50	10	3	0	50	9.25	92.5	8	13
182	5998	1	5	1	5	1	15	50	10	3	0	35	5.5	55	56	92
183	3785	0	0	0	0	1	15	40	5	3	0	20	2.25	22.5	235	278
184	3786	1	5	0	0	1	15	40	5	3	0	25	3.5	35	148	170
185	3758	0	0	1	5	1	15	20	5	2	0	25	3.5	35	148	170
186	3782	0	0	1	5	0	0	20	5	2	0	10	2	20	350	345
187	3720	0	0	1	5	1	15	25	5	0	0	25	3.5	35	148	170
188	3779	1	5	0	0	0	0	60	10	0	0	15	2.75	27.5	322	259
189	3780	1	5	1	5	0	0	20	5	0	0	15	3.25	32.5	322	213
190	3755	0	0	1	5	1	15	40	5	3	0	25	3.5	35	148	170
191	3777	1	5	0	0	1	15	25	5	0	0	25	3.5	35	148	170
192	3757	0	0	0	0	1	15	45	5	2	0	20	2.25	22.5	235	278
193	3783	0	0	0	0	0	0	45	5	2	0	5	0.75	7.5	388	391
194	6004	3	10	2	5	1	15	20	5	3	0	35	6	60	56	62
195	5729	0	0	0	0	1	15	40	5	2	0	20	2.25	22.5	235	278
196	3756	0	0	0	0	1	15	40	5	2	0	20	2.25	22.5	235	278
197	3787	0	0	0	0	1	15	50	10	3	0	25	3	30	148	226
198	3753	0	0	0	0	1	15	35	5	3	0	20	2.25	22.5	235	278
199	3788	0	0	0	0	1	15	35	5	3	0	20	2.25	22.5	235	278
200	3771	0	0	0	0	1	15	70	10	92	15	40	6.75	67.5	31	47
201	3754	0	0	0	0	1	15	50	10	3	0	25	3	30	148	226
202	3759	0	0	2	5	1	15	20	5	2	0	25	3.5	35	148	170
203	3781	0	0	2	5	0	0	20	5	2	0	10	2	20	350	345
204	3748	0	0	0	0	1	15	50	10	9	5	30	4.25	42.5	93	144
205	6006	0	0	0	0	1	15	50	10	9	5	30	4.25	42.5	93	144
206	3792	0	0	0	0	1	15	35	5	9	5	25	3.5	35	148	170
207	3770	1	5	0	0	1	15	80	15	8	5	40	6.25	62.5	31	61
208	3760	0	0	0	0	1	15	20	5	0	0	20	2.25	22.5	235	278
209	2385	0	0	0	0	0	0	25	5	6	5	10	2	20	350	345
210	3772	0	0	0	0	1	15	70	10	92	15	40	6.75	67.5	31	47
211	3579	1	5	1	5	1	15	0	0	1	0	25	4	40	148	160
212	3551	2	5	0	0	1	15	0	0	1	0	20	2.75	27.5	235	259
213	4705	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
214	4737	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
215	4563	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
216	4702	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
217	4510	0	0	0	0	1	15	50	10	5	5	30	4.25	42.5	93	144
218	4891	2	5	0	0	1	15	0	0	1	0	20	2.75	27.5	235	259
219	2801	2	5	0	0	1	15	0	0	1	0	20	2.75	27.5	235	259
220	2230	1	5	1	5	1	15	60	10	5	5	40	6.75	67.5	31	47
221	5590	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
222	4890	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
223	4045	1	5	1	5	1	15	60	10	5	5	40	6.75	67.5	31	47
224	5914	0	0	0	0	1	15		0	2	0	15	1.5	15	322	370
225	5642	0	0	0	0	1	15	25	5	2	0	20	2.25	22.5	235	278
226	4501	1	5	0	0	1	15	15	5	5	5	30	4.75	47.5	93	102
227	5816	0	0	0	0	1	15	20	5	5	5	25	3.5	35	148	170
228	1801	2	5	1	5	1	15	20	5	5	5	35	6	60	56	62
229	4712	0	0	1	5	1	15	90	15	31	15	50	8.75	87.5	8	16
230	5450	2	5	0	0	1	15	20	5	5	5	30	4.75	47.5	93	102
231	5716	2	5	0	0	1	15	20	5	5	5	30	4.75	47.5	93	102
232	3795	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
233	4711	0	0	0	0	1	15	55	10	14	10	35	5.5	55	56	92
234	2490	1	5	1	5	1	15	30	5	3	0	30	4.75	47.5	93	102
235	3794	1	5	0	0	1	15	30	5	3	0	25	3.5	35	148	170
236	1760	8	15	4	10	1	15	20	5	5	5	50	9.75	97.5	8	8
237	1798	0	0	0	0	1	15	60	10	1	0	25	3	30	148	226

238	1761	1	5	2	5	1	15	60	10	1	0	35	5.5	55	56	92
239	4430	1	5	1	5	1	15	20	5	5	5	35	6	60	56	62
240	4500	1	5	1	5	1	15	20	5	5	5	35	6	60	56	62
241	1758	1	5	1	5	1	15	20	5	5	5	35	6	60	56	62
242	3838	1	5	1	5	1	15	40	5	1	0	30	4.75	47.5	93	102
243	4713	0	0	0	0	1	15	72	10	31	15	40	6.75	67.5	31	47
244	1797	0	0	1	5	1	15	60	10	1	0	30	4.25	42.5	93	144
245	4804	0	0	0	0	0	0	5	5	8	5	10	2	20	350	345
246	3642	1	5	0	0	0	0	25	5	1	0	10	2	20	350	345
247	3590	1	5	0	0	0	0	25	5	1	0	10	2	20	350	345
248	2243	0	0	0	0	0	0	25	5	1	0	5	0.75	7.5	388	391
249	3384	0	0	1	5	0	0	60	10	4	0	15	2.75	27.5	322	259
250	4585	0	0	0	0	0	0	30	5	1	0	5	0.75	7.5	388	391
251	3452	2	5	1	5	1	15	10	5	1	0	30	4.75	47.5	93	102
252	5647	0	0	0	0	1	15	35	5	2	0	20	2.25	22.5	235	278
253	3499	0	0	1	5	1	15	70	10	33	15	45	8	80	18	29
254	3494	2	5	1	5	1	15	10	5	1	0	30	4.75	47.5	93	102
255	3449	0	0	0	0	1	15	70	10	1	0	25	3	30	148	226
256	3497	0	0	0	0	1	15	70	10	1	0	25	3	30	148	226
257	3492	0	0	0	0	1	15	45	5	3	0	20	2.25	22.5	235	278
258	4345	1	5	0	0	1	15	15	5	2	0	25	3.5	35	148	170
259	4866	1	5	2	5	1	15	15	5	2	0	30	4.75	47.5	93	102
260	3495	0	0	0	0	1	15	20	5	1	0	20	2.25	22.5	235	278
261	3450	0	0	0	0	1	15	20	5	1	0	20	2.25	22.5	235	278
262	3496	0	0	0	0	1	15	20	5	1	0	20	2.25	22.5	235	278
263	3493	0	0	0	0	1	15	75	10	1	0	25	3	30	148	226
264	3498	0	0	0	0	1	15	70	10	33	15	40	6.75	67.5	31	47
265	3446	4	10	3	10	1	15	61	10	33	15	60	11.75	117.5	1	1
266	5638	0	0	0	0	1	15	61	10	33	15	40	6.75	67.5	31	47
267	3447	0	0	0	0	1	15	70	10	33	15	40	6.75	67.5	31	47
268	3448	0	0	0	0	1	15	70	10	33	15	40	6.75	67.5	31	47
269	3451	4	10	1	5	1	15	20	5	1	0	35	6	60	56	62
270	3453	0	0	0	0	1	15	75	10	1	0	25	3	30	148	226
271	6003	1	5	0	0	0	0		0	1	0	5	1.25	12.5	388	388
272	2046	2	5	0	0	1	15	35	5	6	5	30	4.75	47.5	93	102
273	3353	0	0	0	0	1	15	5	5	3	0	20	2.25	22.5	235	278
274	3405	0	0	0	0	1	15	5	5	3	0	20	2.25	22.5	235	278
275	3047	1	5	0	0	1	15	5	5	10	5	30	4.75	47.5	93	102
276	1642	2	5	1	5	1	15	5	5	39	15	45	8.5	85	18	18
277	5739	1	5	1	5	1	15	45	5	4	0	30	4.75	47.5	93	102
278	3805	0	0	0	0	1	15	50	10	8	5	30	4.25	42.5	93	144
279	3831	0	0	1	5	0	0	50	10	8	5	20	4	40	235	160
280	3356	2	5	0	0	1	15	45	5	11	10	35	6	60	56	62
281	3402	1	5	0	0	1	15	45	5	11	10	35	6	60	56	62
282	3354	0	0	0	0	1	15	30	5	3	0	20	2.25	22.5	235	278
283	2050	0	0	0	0	1	15	30	5	3	0	20	2.25	22.5	235	278
284	1995	0	0	0	0	1	15	35	5	4	0	20	2.25	22.5	235	278
285	4856	0	0	0	0	1	15	35	5	6	5	25	3.5	35	148	170
286	3804	0	0	1	5	1	15	45	5	4	0	25	3.5	35	148	170
287	5578	1	5	1	5	1	15	45	5	4	0	30	4.75	47.5	93	102
288	3355	5	10	2	5	1	15	30	5	3	0	35	6	60	56	62
289	5683	4	10	1	5	1	15	30	5	3	0	35	6	60	56	62
290	3046	3	10	1	5	1	15	5	5	10	5	40	7.25	72.5	31	34
291	4855	2	5	0	0	1	15	45	5	6	5	30	4.75	47.5	93	102
292	1644	0	0	0	0	1	15	0	0	10	5	20	2.75	27.5	235	259
293	3045	1	5	0	0	1	15	0	0	10	5	25	4	40	148	160
294	5386	1	5	1	5	1	15	25	5	8	5	35	6	60	56	62
295	4638	2	5	1	5	1	15	5	5	8	5	35	6	60	56	62
296	6069	6	15	2	5	1	15	5	5	8	5	45	8.5	85	18	18
297	6070	0	0	1	5	1	15	5	5	8	5	30	4.75	47.5	93	102
298	5697	0	0	0	0	1	15	50	10	5	5	30	4.25	42.5	93	144

299	5705	0	0	0	0	1	15	50	10	5	5	30	4.25	42.5	93	144
300	4639	0	0	0	0	1	15	50	10	5	5	30	4.25	42.5	93	144
301	5696	0	0	0	0	1	15	50	10	5	5	30	4.25	42.5	93	144
302	5706	0	0	0	0	1	15	50	10	5	5	30	4.25	42.5	93	144
303	1898	0	0	2	5	1	15	25	5	9	5	30	4.75	47.5	93	102
304	2442	0	0	0	0	1	15	30	5	3	0	20	2.25	22.5	235	278
305	6083	0	0	0	0	0	0	30	5	1	0	5	0.75	7.5	388	391
306	6084	0	0	0	0	0	0	30	5	1	0	5	0.75	7.5	388	391
307	3639	0	0	0	0	1	15	35	5	1	0	20	2.25	22.5	235	278
308	3593	0	0	0	0	1	15	35	5	1	0	20	2.25	22.5	235	278
309	3638	0	0	0	0	1	15	35	5	1	0	20	2.25	22.5	235	278
310	3594	0	0	0	0	1	15	35	5	5	5	25	3.5	35	148	170
311	3592	0	0	0	0	0	0	60	10	1	0	10	1.5	15	350	370
312	4634	0	0	0	0	1	15	60	10	1	0	25	3	30	148	226
313	1670	0	0	0	0	1	15	30	5	4	0	20	2.25	22.5	235	278
314	5909	0	0	0	0	1	15	30	5	4	0	20	2.25	22.5	235	278
315	5927	0	0	0	0	1	15	30	5	4	0	20	2.25	22.5	235	278
316	5928	0	0	0	0	1	15	30	5	4	0	20	2.25	22.5	235	278
317	6068	3	10	0	0	1	15	5	5	8	5	35	6	60	56	62
318	1673	5	10	3	10	1	15	5	5	8	5	45	8.5	85	18	18
319	3675	0	0	0	0	0	0	45	5	1	0	5	0.75	7.5	388	391
320	3656	0	0	0	0	0	0	45	5	1	0	5	0.75	7.5	388	391
321	1681	2	5	1	5	1	15	35	5	6	5	35	6	60	56	62
322	1738	4	10	2	5	1	15	35	5	6	5	40	7.25	72.5	31	34
323	1740	2	5	0	0	1	15	35	5	6	5	30	4.75	47.5	93	102
324	1683	3	10	1	5	0	0	35	5	6	5	25	5.75	57.5	148	89
325	1736	2	5	1	5	0	0	35	5	6	5	20	4.5	45	235	137
326	1730	0	0	0	0	0	0	5	5	19	10	15	3.25	32.5	322	213
327	1672	0	0	0	0	1	15	5	5	8	5	25	3.5	35	148	170
328	5675	8	15	1	5	1	15	40	5	8	5	45	8.5	85	18	18
329	1678	3	10	0	0	1	15	20	5	6	5	35	6	60	56	62
330	1741	0	0	0	0	1	15	20	5	3	0	20	2.25	22.5	235	278
331	1675	2	5	1	5	1	15	30	5	3	0	30	4.75	47.5	93	102
332	1743	3	10	3	10	1	15	5	5	3	0	40	7.25	72.5	31	34
333	1734	1	5	6	15	0	0	50	10	1	0	30	6.5	65	93	58
334	3591	0	0	0	0	0	0	60	10	1	0	10	1.5	15	350	370
335	1677	0	0	0	0	1	15	20	5	3	0	20	2.25	22.5	235	278
336	1735	1	5	0	0	0	0	50	10	8	5	20	4	40	235	160
337	1674	8	15	3	10	1	15	5	5	8	5	50	9.75	97.5	8	8
338	1744	9	15	3	10	1	15	5	5	8	5	50	9.75	97.5	8	8
339	1679	0	0	0	0	1	15	35	5	6	5	25	3.5	35	148	170
340	1682	2	5	1	5	1	15	45	5	6	5	35	6	60	56	62
341	1737	2	5	1	5	1	15	45	5	6	5	35	6	60	56	62
342	1739	4	10	0	0	1	15	35	5	6	5	35	6	60	56	62
343	3641	0	0	0	0	1	15	60	10	1	0	25	3	30	148	226
344	6045	2	5	0	0	0	0	5	5	1	0	10	2	20	350	345
345	1745	0	0	0	0	1	15	5	5	8	5	25	3.5	35	148	170
346	1676	9	15	1	5	1	15	20	5	3	0	40	7.25	72.5	31	34
347	1742	7	15	1	5	1	15	20	5	3	0	40	7.25	72.5	31	34
348	1680	4	10	0	0	1	15	35	5	6	5	35	6	60	56	62
349	6048	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
350	6072	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
351	4395	1	5	0	0	0	0	25	5	4	0	10	2	20	350	345
352	4559	0	0	0	0	0	0	65	10	1	0	10	1.5	15	350	370
353	4582	0	0	0	0	0	0	30	5	1	0	5	0.75	7.5	388	391
354	6073	0	0	0	0	1	15		0	2	0	15	1.5	15	322	370
355	4584	1	5	0	0	0	0	25	5	4	0	10	2	20	350	345
356	3275	0	0	0	0	1	15	30	5	4	0	20	2.25	22.5	235	278
357	5585	0	0	0	0	1	15	30	5	2	0	20	2.25	22.5	235	278
358	5586	0	0	0	0	1	15	30	5	2	0	20	2.25	22.5	235	278
359	4557	0	0	1	5	0	0	25	5	1	0	10	2	20	350	345

360	4396	0	0	0	0	0	0	25	5	5	5	10	2	20	350	345
361	4561	0	0	1	5	1	15	35	5	1	0	25	3.5	35	148	170
362	4558	0	0	1	5	0	0	30	5	1	0	10	2	20	350	345
363	4583	0	0	0	0	0	0	25	5	5	5	10	2	20	350	345
364	4576	1	5	1	5	1	15	50	10	0	0	35	5.5	55	56	92
365	4564	1	5	0	0	0	15	50	10	0	0	30	4.25	42.5	93	144
366	4746	0	0	0	0	0	0	65	10	1	0	10	1.5	15	350	370
367	4565	0	0	1	5	1	15	50	10	0	0	30	4.25	42.5	93	144
368	4575	0	0	0	0	1	15	50	10	0	0	25	3	30	148	226
369	4581	0	0	1	5	0	0	30	5	1	0	10	2	20	350	345
370	4580	0	0	0	0	1	15	35	5	2	0	20	2.25	22.5	235	278
371	4745	0	0	0	0	0	0	75	10	6	5	15	2.75	27.5	322	259
372	5584	0	0	0	0	1	15	30	5	2	0	20	2.25	22.5	235	278
373	5587	0	0	0	0	1	15	30	5	2	0	20	2.25	22.5	235	278
374	4744	1	5	0	0	1	15	35	5	1	0	25	3.5	35	148	170
375	4566	0	0	0	0	1	15	25	5	2	0	20	2.25	22.5	235	278
376	4743	0	0	0	0	1	15	25	5	2	0	20	2.25	22.5	235	278
377	4577	0	0	0	0	1	15	50	10	0	0	25	3	30	148	226
378	4742	0	0	0	0	1	15	50	10	0	0	25	3	30	148	226
379	6050	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
380	6049	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
381	6051	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
382	4560	0	0	0	0	1	15	75	10	6	5	30	4.25	42.5	93	144
383	4562	0	0	0	0	1	15	35	5	1	0	20	2.25	22.5	235	278
384	5895	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
385	5894	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
386	3491	1	5	0	0	1	15	45	5	3	0	25	3.5	35	148	170
387	3480	0	0	0	0	1	15	50	10	1	0	25	3	30	148	226
388	3461	2	5	1	5	1	15	20	5	5	5	35	6	60	56	62
389	3484	2	5	1	5	1	15	20	5	5	5	35	6	60	56	62
390	5907	0	0	0	0	1	15	50	10	1	0	25	3	30	148	226
391	3481	0	0	0	0	1	15	50	10	1	0	25	3	30	148	226
392	3240	0	0	0	0	1	15	40	5	2	0	20	2.25	22.5	235	278
393	5600	2	5	2	5	1	15	20	5	5	5	35	6	60	56	62
394	3469	1	5	1	5	1	15	35	5	2	0	30	4.75	47.5	93	102
395	3458	1	5	3	10	1	15	20	5	5	5	40	7.25	72.5	31	34
396	3459	4	10	2	5	1	15	20	5	5	5	40	7.25	72.5	31	34
397	3486	9	15	5	10	1	15	20	5	5	5	50	9.75	97.5	8	8
398	4570	0	0	0	0	1	15	45	5	3	0	20	2.25	22.5	235	278
399	3470	1	5	1	5	1	15	35	5	2	0	30	4.75	47.5	93	102
400	3472	0	0	1	5	1	15	35	5	2	0	25	3.5	35	148	170
401	3482	0	0	1	5	1	15	15	5	1	0	25	3.5	35	148	170
402	4876	1	5	1	5	1	15	35	5	2	0	30	4.75	47.5	93	102
403	3457	5	10	4	10	1	15	20	5	5	5	45	8.5	85	18	18
404	3489	6	15	10	15	1	15	60	10	3	0	55	10.5	105	3	3
405	3467	0	0	0	0	1	15	30	5	1	0	20	2.25	22.5	235	278
406	3465	1	5	2	5	1	15	35	5	2	0	30	4.75	47.5	93	102
407	3479	4	10	2	5	1	15	35	5	1	0	35	6	60	56	62
408	3468	0	0	0	0	0	0	35	5	1	0	5	0.75	7.5	388	391
409	3456	3	10	5	10	1	15	60	10	3	0	45	8	80	18	29
410	3464	0	0	0	0	1	15	50	10	1	0	25	3	30	148	226
411	3476	0	0	3	10	1	15	30	5	1	0	30	4.75	47.5	93	102
412	3490	2	5	2	5	1	15	45	5	3	0	30	4.75	47.5	93	102
413	3462	0	0	0	0	1	15	20	5	1	0	20	2.25	22.5	235	278
414	3483	0	0	0	0	1	15	20	5	5	5	25	3.5	35	148	170
415	3460	4	10	4	10	1	15	20	5	5	5	45	8.5	85	18	18
416	3485	2	5	4	10	1	15	20	5	5	5	40	7.25	72.5	31	34
417	3455	5	10	6	15	1	15	45	5	3	0	45	8.5	85	18	18
418	6081	1	5	2	5	1	15	45	5	3	0	30	4.75	47.5	93	102
419	3487	6	15	5	10	1	15	20	5	5	5	50	9.75	97.5	8	8
420	5608	0	0	0	0	1	15	35	5	2	0	20	2.25	22.5	235	278

421	3474	0	0	0	0	0	0	35	5	1	0	5	0.75	7.5	388	391
422	3463	0	0	0	0	1	15	50	10	1	0	25	3	30	148	226
423	6043	0	0	0	0	0	0	5	5	8	5	10	2	20	350	345
424	3616	0	0	0	0	1	15	65	10	31	15	40	6.75	67.5	31	47
425	6099	0	0	1	5	0	0	20	5	0	0	10	2	20	350	345
426	6103	0	0	1	5	1	15		0	2	0	20	2.75	27.5	235	259
427	6088	0	0	0	0	1	15	45	5	1	0	20	2.25	22.5	235	278
428	2868	2	5	4	10	0	0	40	5	4	0	20	4.5	45	235	137
429	6087	2	5	3	10	1	15	40	5	4	0	35	6	60	56	62
430	6092	0	0	0	0	0	0	20	5	1	0	5	0.75	7.5	388	391
431	6100	0	0	0	0	1	15	20	5	1	0	20	2.25	22.5	235	278
432	6094	0	0	1	5	0	0	50	10	0	0	15	2.75	27.5	322	259
433	6098	0	0	1	5	0	0	50	10	0	0	15	2.75	27.5	322	259
434	6111	2	5	0	0	1	15	35	5	1	0	25	3.5	35	148	170
435	6110	0	0	0	0	1	15	35	5	2	0	20	2.25	22.5	235	278
436	3618	0	0	0	0	1	15	45	5	0	0	20	2.25	22.5	235	278
437	3619	0	0	0	0	1	15	45	5	0	0	20	2.25	22.5	235	278
438	5759	0	0	0	0	1	15	45	5	30	10	30	4.75	47.5	93	102
439	3617	0	0	0	0	1	15	50	10	30	10	35	5.5	55	56	92
440	6104	0	0	0	0	1	15	45	5	1	0	20	2.25	22.5	235	278
441	6093	0	0	1	5	0	0	20	5	0	0	10	2	20	350	345
442	5919	0	0	0	0	1	15	55	10	0	0	25	3	30	148	226
443	5920	0	0	0	0	1	15	45	5	1	0	20	2.25	22.5	235	278
444	6085	1	5	0	0	1	15	40	5	4	0	25	3.5	35	148	170
445	6091	0	0	0	0	0	0	40	5	4	0	5	0.75	7.5	388	391
446	6101	0	0	0	0	1	15	40	5	4	0	20	2.25	22.5	235	278
447	6089	1	5	1	5	1	15		0	2	0	25	4	40	148	160
448	6090	0	0	0	0	1	15	40	5	3	0	20	2.25	22.5	235	278
449	6102	0	0	0	0	1	15	40	5	3	0	20	2.25	22.5	235	278
450	3752	0	0	0	0	1	15	35	5	3	0	20	2.25	22.5	235	278
451	4511	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
452	4496	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
453	4512	0	0	0	0	1	15	60	10	1	0	25	3	30	148	226
454	5731	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
455	80	0	0	1	5	1	15	60	10	3	0	30	4.25	42.5	93	144
456	4494	0	0	0	0	1	15	60	10	1	0	25	3	30	148	226
457	3789	0	0	1	5	1	15	35	5	3	0	25	3.5	35	148	170
458	3648	0	0	0	0	1	15	35	5	5	5	25	3.5	35	148	170
459	3649	0	0	1	5	0	0	20	5	5	5	15	3.25	32.5	322	213
460	3583	0	0	0	0	1	15	0	0	5	5	20	2.75	27.5	235	259
461	3742	0	0	0	0	1	15	0	0	5	5	20	2.75	27.5	235	259
462	3740	0	0	0	0	0	0	35	5	4	0	5	0.75	7.5	388	391
463	3741	2	5	0	0	0	0	40	5	3	0	10	2	20	350	345
464	3647	1	5	3	10	1	15	35	5	2	0	35	6	60	56	62
465	3645	0	0	0	0	1	15	40	5	2	0	20	2.25	22.5	235	278
466	3644	1	5	1	5	1	15	35	5	2	0	30	4.75	47.5	93	102
467	3643	0	0	0	0	1	15	40	5	8	5	25	3.5	35	148	170
468	3646	1	5	1	5	1	15	35	5	2	0	30	4.75	47.5	93	102
469	3033	0	0	0	0	1	15	40	5	10	5	25	3.5	35	148	170
470	3034	0	0	0	0	1	15	40	5	10	5	25	3.5	35	148	170
471	4389	0	0	0	0	1	15	0	0	2	0	15	1.5	15	322	370
472	4378	1	5	0	0	1	15	15	5	2	0	25	3.5	35	148	170
473	4369	0	0	0	0	0	0	40	5	0	0	5	0.75	7.5	388	391
474	4381	0	0	0	0	1	15	0	0	2	0	15	1.5	15	322	370
475	4384	6	15	0	0	1	15	30	5	2	0	35	6	60	56	62
476	3533	0	0	0	0	1	15	0	0	0	0	15	1.5	15	322	370
477	3417	0	0	1	5	0	0	0	0	0	0	5	1.25	12.5	388	388
478	4383	0	0	0	0	1	15	30	5	2	0	20	2.25	22.5	235	278
479	3521	0	0	0	0	1	15	30	5	2	0	20	2.25	22.5	235	278
480	4380	0	0	1	5	1	15	0	0	5	5	25	4	40	148	160
481	4367	0	0	2	5	1	15	20	5	1	0	25	3.5	35	148	170

482	3542	0	0	0	0	1	15	30	5	3	0	20	2.25	22.5	235	278
483	3528	1	5	1	5	1	15	30	5	0	0	30	4.75	47.5	93	102
484	4376	1	5	1	5	1	15	30	5	0	0	30	4.75	47.5	93	102
485	3523	0	0	1	5	1	15	0	0	6	5	25	4	40	148	160
486	4373	1	5	0	0	0	0	0	0	0	0	5	1.25	12.5	388	388
487	3544	0	0	1	5	1	15	20	5	3	0	25	3.5	35	148	170
488	4366	0	0	0	0	1	15	20	5	1	0	20	2.25	22.5	235	278
489	3580	1	5	0	0	1	15	0	0	1	0	20	2.75	27.5	235	259
490	3540	0	0	1	5	1	15	30	5	1	0	25	3.5	35	148	170
491	3541	2	5	0	0	1	15	30	5	3	0	25	3.5	35	148	170
492	4365	2	5	0	0	1	15	30	5	3	0	25	3.5	35	148	170
493	4364	0	0	0	0	1	15	30	5	3	0	20	2.25	22.5	235	278
494	3534	0	0	0	0	0	0	45	5	0	0	5	0.75	7.5	388	391
495	2182	0	0	0	0	1	15	30	5	0	0	20	2.25	22.5	235	278
496	4374	0	0	0	0	1	15	30	5	0	0	20	2.25	22.5	235	278
497	3525	2	5	1	5	1	15	15	5	2	0	30	4.75	47.5	93	102
498	4379	3	10	1	5	1	15	15	5	2	0	35	6	60	56	62
499	3543	6	15	2	5	1	15	20	5	3	0	40	7.25	72.5	31	34
500	4363	5	10	2	5	1	15	30	5	3	0	35	6	60	56	62
501	3536	0	0	0	0	0	0	40	5	0	0	5	0.75	7.5	388	391
502	3526	1	5	0	0	1	15	15	5	2	0	25	3.5	35	148	170
503	3522	0	0	0	0	1	15	0	0	2	0	15	1.5	15	322	370
504	4382	0	0	1	5	1	15	0	0	2	0	20	2.75	27.5	235	259
505	3539	0	0	2	5	0	0	20	5	1	0	10	2	20	350	345
506	4477	2	5	1	5	1	15	30	5	3	0	30	4.75	47.5	93	102
507	2181	0	0	0	0	1	15	30	5	0	0	20	2.25	22.5	235	278
508	4375	0	0	0	0	1	15	30	5	0	0	20	2.25	22.5	235	278
509	4478	4	10	2	5	1	15	20	5	3	0	35	6	60	56	62
510	4361	8	15	1	5	1	15	20	5	3	0	40	7.25	72.5	31	34
511	3520	0	0	0	0	1	15	30	5	2	0	20	2.25	22.5	235	278
512	3276	6	15	0	0	1	15	30	5	2	0	35	6	60	56	62
513	4368	0	0	0	0	1	15	20	5	1	0	20	2.25	22.5	235	278
514	54	0	0	1	5	0	0	20	5	0	0	10	2	20	350	345
515	53	0	0	1	5	0	0	20	5	0	0	10	2	20	350	345
516	3549	3	10	4	10	1	15	0	0	5	5	40	7.75	77.5	31	#N/A
517	5649	3	10	4	10	1	15	0	0	5	5	40	7.75	77.5	31	#N/A
518	3535	0	0	0	0	0	0	40	5	0	0	5	0.75	7.5	388	391
519	4370	0	0	0	0	0	0	45	5	0	0	5	0.75	7.5	388	391
520	3538	0	0	0	0	0	0	20	5	1	0	5	0.75	7.5	388	391
521	3334	1	5	1	5	1	15	35	5	4	0	30	4.75	47.5	93	102
522	3277	1	5	1	5	1	15	35	5	4	0	30	4.75	47.5	93	102
523	3550	0	0	1	5	1	15	0	0	5	5	25	4	40	148	160
524	2235	0	0	2	5	1	15	0	0	5	5	25	4	40	148	160
525	4362	2	5	0	0	1	15	20	5	3	0	25	3.5	35	148	170
526	3548	8	15	1	5	1	15	65	10	5	5	50	9.25	92.5	8	13
527	3527	0	0	1	5	1	15	30	5	2	0	25	3.5	35	148	170
528	4377	0	0	1	5	1	15	30	5	2	0	25	3.5	35	148	170
529	4371	0	0	0	0	0	0	45	5	0	0	5	0.75	7.5	388	391
530	4390	0	0	1	5	1	15	0	0	0	0	20	2.75	27.5	235	259
531	3524	0	0	0	0	1	15	0	0	6	5	20	2.75	27.5	235	259
532	3836	1	5	0	0	1	15		0	1	0	20	2.75	27.5	235	259
533	3798	1	5	0	0	1	15	65	10	1	0	30	4.25	42.5	93	144
534	3796	0	0	0	0	1	15	40	5	1	0	20	2.25	22.5	235	278
535	3835	0	0	0	0	1	15	65	10	1	0	25	3	30	148	226
536	3799	0	0	0	0	1	15	65	10	1	0	25	3	30	148	226
537	5786	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
538	5787	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
539	3833	0	0	0	0	1	15	60	10	0	0	25	3	30	148	226
540	3834	0	0	0	0	1	15	60	10	3	0	25	3	30	148	226
541	6161	1	5	0	0	1	15	5	5	10	5	30	4.75	47.5	93	102
542	6162	0	0	0	0	1	15	5	5	10	5	25	3.5	35	148	170

543	1619	0	0	0	0	1	15	25	5	10	5	25	3.5	35	148	170
544	3230	0	0	0	0	1	15	35	5	2	0	20	2.25	22.5	235	278
545	1874	0	0	0	0	1	15	40	5	2	0	20	2.25	22.5	235	278
546	1622	0	0	1	5	1	15	45	5	10	5	30	4.75	47.5	93	102
547	4342	2	5	3	10	1	15	50	10	10	5	45	8	80	18	29
548	1872	0	0	0	0	1	15	35	5	2	0	20	2.25	22.5	235	278
549	3622	0	0	0	0	1	15	85	15	1	0	30	3.75	37.5	93	168
550	3621	0	0	0	0	1	15	55	10	1	0	25	3	30	148	226
551	1795	1	5	1	5	1	15	60	10	1	0	35	5.5	55	56	92
552	1796	1	5	1	5	1	15	60	10	1	0	35	5.5	55	56	92
553	1763	3	10	4	10	1	15	60	10	1	0	45	8	80	18	29
554	1794	0	0	0	0	1	15	50	10	2	0	25	3	30	148	226
555	1765	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
556	1792	1	5	1	5	1	15	20	5	3	0	30	4.75	47.5	93	102
557	1793	1	5	2	5	1	15	50	10	2	0	35	5.5	55	56	92
558	1766	1	5	2	5	1	15	50	10	2	0	35	5.5	55	56	92
559	1764	0	0	1	5	1	15	60	10	1	0	30	4.25	42.5	93	144
560	45	0	0	0	0	0	0	60	10	1	0	10	1.5	15	350	370
561	3370	0	0	0	0	0	0	45	5	1	0	5	0.75	7.5	388	391
562	3369	0	0	0	0	0	0	35	5	0	0	5	0.75	7.5	388	391
563	4854	0	0	0	0	0	0	45	5	1	0	5	0.75	7.5	388	391
564	4795	0	0	0	0	1	15	60	10	0	0	25	3	30	148	226
565	3802	0	0	0	0	1	15	60	10	0	0	25	3	30	148	226
566	3801	0	0	0	0	1	15	60	10	0	0	25	3	30	148	226
567	1790	0	0	1	5	1	15	70	10	1	0	30	4.25	42.5	93	144
568	1769	0	0	0	0	1	15	70	10	1	0	25	3	30	148	226
569	3159	0	0	0	0	1	15	20	5	3	0	20	2.25	22.5	235	278
570	1768	0	0	0	0	1	15	20	5	3	0	20	2.25	22.5	235	278
571	1789	0	0	0	0	1	15	65	10	4	0	25	3	30	148	226
572	1770	0	0	0	0	1	15	65	10	4	0	25	3	30	148	226
573	1788	0	0	0	0	1	15	25	5	4	0	20	2.25	22.5	235	278
574	2338	0	0	0	0	0	0	25	5	5	5	10	2	20	350	345
575	3680	1	5	1	5	0	0	20	5	3	0	15	3.25	32.5	322	213
576	5740	0	0	1	5	1	15	25	5	8	5	30	4.75	47.5	93	102
577	3687	0	0	0	0	1	15	40	5	6	5	25	3.5	35	148	170
578	3690	0	0	0	0	1	15	25	5	6	5	25	3.5	35	148	170
579	4799	0	0	0	0	0	0	20	5	8	5	10	2	20	350	345
580	5753	2	5	3	10	1	15	40	5	10	5	40	7.25	72.5	31	34
581	5754	1	5	0	0	1	15	40	5	10	5	30	4.75	47.5	93	102
582	2349	1	5	1	5	0	0	5	5	8	5	20	4.5	45	235	137
583	3685	4	10	3	10	1	15	25	5	8	5	45	8.5	85	18	18
584	3691	5	10	2	5	0	0	25	5	6	5	25	5.75	57.5	148	89
585	3688	0	0	0	0	1	15	40	5	6	5	25	3.5	35	148	170
586	978	1	5	0	0	1	15	35	5	5	5	30	4.75	47.5	93	102
587	2348	0	0	2	5	0	0	5	5	6	5	15	3.25	32.5	322	213
588	4696	6	15	1	5	1	15	65	10	5	5	50	9.25	92.5	8	13
589	3681	3	10	0	0	0	0	25	5	5	5	20	4.5	45	235	137
590	2340	0	0	0	0	1	15	35	5	5	5	25	3.5	35	148	170
591	4428	0	0	0	0	1	15	94	15	32	15	45	7.5	75	18	33
592	1781	0	0	0	0	1	15	100	15	23	10	40	6.25	62.5	31	61
593	1780	0	0	0	0	1	15	89	15	23	10	40	6.25	62.5	31	61
594	1778	0	0	0	0	1	15	78	15	13	10	40	6.25	62.5	31	61
595	1779	0	0	0	0	1	15	78	15	23	10	40	6.25	62.5	31	61
596	1777	0	0	0	0	1	15	78	15	13	10	40	6.25	62.5	31	61
597	1776	2	5	1	5	1	15	78	15	13	10	50	8.75	87.5	8	16
598	4643	0	0	0	0	0	0	25	5	5	5	10	2	20	350	345
599	3029	0	0	0	0	1	15	35	5	5	5	25	3.5	35	148	170
600	3587	0	0	0	0	0	0	25	5	1	0	5	0.75	7.5	388	391
601	1624	0	0	0	0	1	15	5	5	8	5	25	3.5	35	148	170
602	3024	0	0	3	10	1	15	5	5	8	5	35	6	60	56	62
603	5751	0	0	0	0	1	15	40	5	10	5	25	3.5	35	148	170

604	2198	1	5	0	0	1	15	45	5	8	5	30	4.75	47.5	93	102
605	4359	0	0	0	0	1	15	40	5	8	5	25	3.5	35	148	170
606	4642	0	0	0	0	0	0	25	5	1	0	5	0.75	7.5	388	391
607	4479	0	0	0	0	1	15	5	5	8	5	25	3.5	35	148	170
608	2240	3	10	4	10	1	15	25	5	5	5	45	8.5	85	18	18
609	3586	4	10	4	10	0	0	25	5	5	5	30	7	70	93	#N/A
610	3028	0	0	0	0	1	15	25	5	10	5	25	3.5	35	148	170
611	5752	0	0	0	0	1	15	40	5	8	5	25	3.5	35	148	170
612	1626	0	0	0	0	1	15	40	5	8	5	25	3.5	35	148	170
613	4644	0	0	0	0	1	15	25	5	10	5	25	3.5	35	148	170
614	1627	1	5	0	0	1	15	40	5	10	5	30	4.75	47.5	93	102
615	1625	0	0	0	0	1	15	40	5	8	5	25	3.5	35	148	170
616	3588	0	0	0	0	0	0	25	5	1	0	5	0.75	7.5	388	391
617	4360	0	0	1	5	1	15	30	5	3	0	25	3.5	35	148	170
618	4870	0	0	0	0	0	0	60	10	1	0	10	1.5	15	350	370
619	6118	0	0	0	0	0	0	55	10	3	0	10	1.5	15	350	370
620	1772	1	5	0	0	1	15	25	5	14	10	35	6	60	56	62
621	4431	0	0	1	5	1	15	0	0	10	5	25	4	40	148	160
622	3367	0	0	0	0	0	0	50	10	0	0	10	1.5	15	350	370
623	3368	0	0	0	0	0	0	35	5	0	0	5	0.75	7.5	388	391
624	3390	0	0	0	0	0	0	50	10	0	0	10	1.5	15	350	370
625	3366	0	0	0	0	0	0	10	5	1	0	5	0.75	7.5	388	391
626	5551	0	0	0	0	0	0	50	10	1	0	10	1.5	15	350	370
627	3389	0	0	0	0	0	0	35	5	0	0	5	0.75	7.5	388	391
628	3391	0	0	0	0	0	0	10	5	1	0	5	0.75	7.5	388	391
629	1786	0	0	0	0	1	15	25	5	14	10	30	4.75	47.5	93	102
630	1773	0	0	0	0	1	15	25	5	14	10	30	4.75	47.5	93	102
631	1787	0	0	0	0	1	15	25	5	14	10	30	4.75	47.5	93	102
632	1785	0	0	0	0	1	15	94	15	14	10	40	6.25	62.5	31	61
633	1774	0	0	0	0	1	15	94	15	14	10	40	6.25	62.5	31	61
634	2224	0	0	0	0	1	15	40	5	3	0	20	2.25	22.5	235	278
635	2225	0	0	0	0	1	15	40	5	1	0	20	2.25	22.5	235	278
636	2223	0	0	0	0	1	15	25	5	3	0	20	2.25	22.5	235	278
637	5950	0	0	1	5	1	15	15	5	3	0	25	3.5	35	148	170
638	5673	0	0	0	0	1	15	40	5	3	0	20	2.25	22.5	235	278
639	5745	0	0	0	0	0	0	60	10	0	0	10	1.5	15	350	370
640	5746	0	0	0	0	0	0	75	10	0	0	10	1.5	15	350	370
641	5747	0	0	0	0	0	0	75	10	1	0	10	1.5	15	350	370
642	5748	0	0	1	5	0	0	75	10	6	5	20	4	40	235	160
643	5749	0	0	0	0	0	0	75	10	6	5	15	2.75	27.5	322	259
644	5750	0	0	0	0	0	0	60	10	6	5	15	2.75	27.5	322	259
645	3708	0	0	0	0	0	0	15	5	0	0	5	0.75	7.5	388	391
646	3728	0	0	0	0	0	0	15	5	0	0	5	0.75	7.5	388	391
647	3709	0	0	0	0	0	0	0	0	0	0	0	0	0	431	431
648	3727	0	0	0	0	0	0	20	5	0	0	5	0.75	7.5	388	391
649	3750	0	0	0	0	1	15	50	10	3	0	25	3	30	148	226
650	3568	1	5	1	5	1	15	35	5	8	5	35	6	60	56	62
651	3566	0	0	0	0	1	15	35	5	8	5	25	3.5	35	148	170
652	2395	5	10	2	5	1	15	50	10	3	0	40	6.75	67.5	31	47
653	79	0	0	1	5	1	15	50	10	3	0	30	4.25	42.5	93	144
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655	3569	0	0	1	5	1	15	25	5	3	0	25	3.5	35	148	170
656	3565	0	0	0	0	1	15	80	15	8	5	35	5	50	56	101
657	5719	0	0	0	0	1	15	55	10	1	0	25	3	30	148	226
658	3679	0	0	2	5	0	0	20	5	3	0	10	2	20	350	345
659	3651	0	0	0	0	0	0	20	5	3	0	5	0.75	7.5	388	391
660	3676	0	0	0	0	0	0	60	10	1	0	10	1.5	15	350	370
661	3652	0	0	0	0	0	0	20	5	3	0	5	0.75	7.5	388	391
662	3552	1	5	0	0	1	15	0	0	1	0	20	2.75	27.5	235	259
663	3655	0	0	0	0	0	0	45	5	1	0	5	0.75	7.5	388	391
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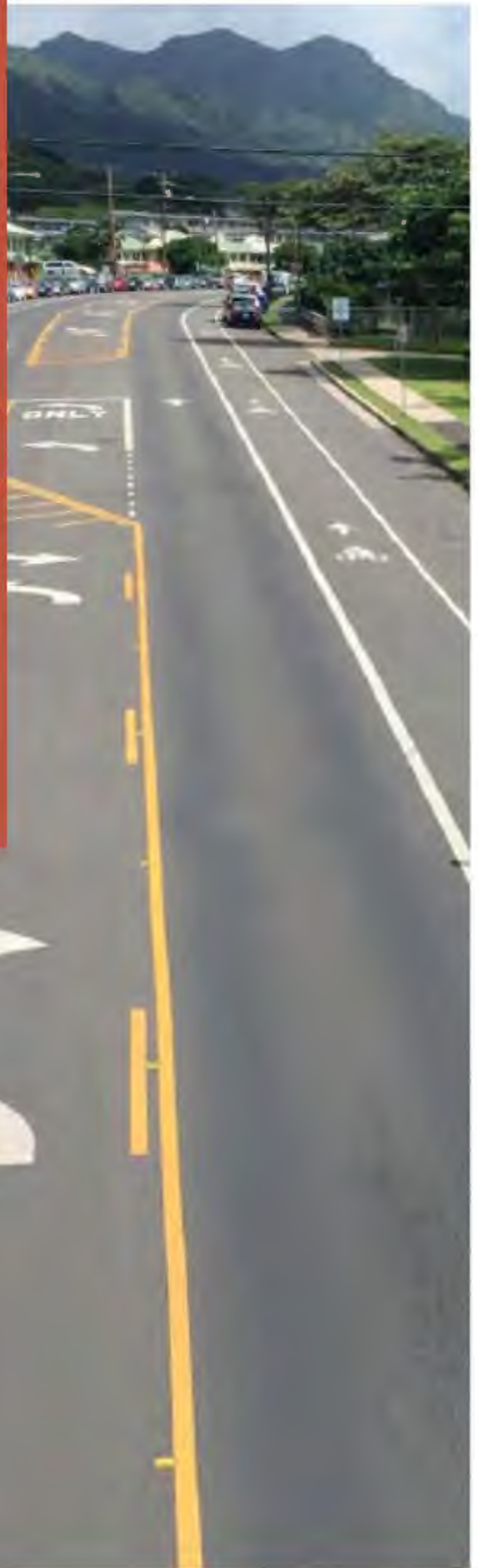
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667	3677	0	0	0	0	0	0	20	5	1	0	5	0.75	7.5	388	391
668	3653	0	0	0	0	0	0	20	5	1	0	5	0.75	7.5	388	391
669	3606	0	0	0	0	1	15	55	10	1	0	25	3	30	148	226
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671	3605	0	0	0	0	1	15		0	1	0	15	1.5	15	322	370
672	5823	0	0	0	0	0	0	40	5	8	5	10	2	20	350	345
673	4439	0	0	0	0	1	15	0	0	10	5	20	2.75	27.5	235	259
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675	1817	1	5	1	5	1	15	35	5	2	0	30	4.75	47.5	93	102
676	1816	1	5	0	0	1	15	40	5	10	5	30	4.75	47.5	93	102
677	1618	1	5	0	0	1	15	40	5	10	5	30	4.75	47.5	93	102
678	1819	0	0	1	5	1	15	35	5	3	0	25	3.5	35	148	170
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681	1812	2	5	0	0	1	15	40	5	3	0	25	3.5	35	148	170
682	1749	1	5	0	0	1	15	50	10	3	0	30	4.25	42.5	93	144
683	1810	1	5	1	5	1	15	40	5	4	0	30	4.75	47.5	93	102
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691	1814	3	10	1	5	1	15	25	5	3	0	35	6	60	56	62
692	5810	3	10	1	5	1	15	45	5	3	0	35	6	60	56	62
693	1805	1	5	0	0	1	15	35	5	5	5	30	4.75	47.5	93	102
694	1754	1	5	0	0	1	15	35	5	5	5	30	4.75	47.5	93	102
695	1815	0	0	0	0	1	15	25	5	3	0	20	2.25	22.5	235	278
696	1746	0	0	0	0	1	15	25	5	3	0	20	2.25	22.5	235	278
697	1756	0	0	1	5	1	15	15	5	5	5	30	4.75	47.5	93	102
698	1806	0	0	0	0	0	0	35	5	6	5	10	2	20	350	345
699	1803	1	5	0	0	1	15	15	5	5	5	30	4.75	47.5	93	102
700	3747	0	0	0	0	1	15	50	10	9	5	30	4.25	42.5	93	144
701	5772	1	5	0	0	1	15	0	0	10	5	25	4	40	148	160
702	1809	1	5	0	0	0	0	40	5	3	0	10	2	20	350	345
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706	1813	0	0	1	5	1	15	45	5	3	0	25	3.5	35	148	170
707	1748	0	0	1	5	1	15	45	5	3	0	25	3.5	35	148	170
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711	1753	0	0	0	0	1	15	35	5	6	5	25	3.5	35	148	170
712	6056	1	5	0	0	1	15	40	5	8	5	30	4.75	47.5	93	102
713	5588	0	0	1	5	1	15	30	5	2	0	25	3.5	35	148	170
714	5583	0	0	1	5	0	0	30	5	2	0	10	2	20	350	345
715	3767	0	0	0	0	1	15	90	15	8	5	35	5	50	56	101
716	3769	0	0	0	0	1	15	80	15	8	5	35	5	50	56	101
717	3615	0	0	0	0	1	15	50	10	31	15	40	6.75	67.5	31	47
718	3445	0	0	2	5	1	15	61	10	33	15	45	8	80	18	29
719	3502	0	0	2	5	0	0	61	10	33	15	30	6.5	65	93	58
720	3613	0	0	0	0	1	15	50	10	31	15	40	6.75	67.5	31	47
721	3501	3	10	3	10	0	0	61	10	33	15	45	10.25	102.5	18	#N/A
722	4422	0	0	0	0	1	15	78	15	14	10	40	6.25	62.5	31	61
723	3444	0	0	0	0	1	15	20	5	33	15	35	6	60	56	62
724	4572	0	0	0	0	0	0	20	5	33	15	20	4.5	45	235	137
725	3614	0	0	0	0	1	15	50	10	31	15	40	6.75	67.5	31	47

726	3768	0	0	0	0	1	15	90	15	8	5	35	5	50	56	101
727	4763	0	0	0	0	1	15	65	10	1	0	25	3	30	148	226
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734	1825	1	5	0	0	1	15	20	5	4	0	25	3.5	35	148	170
735	1824	1	5	0	0	1	15	60	10	4	0	30	4.25	42.5	93	144
736	1867	0	0	0	0	1	15	30	5	4	0	20	2.25	22.5	235	278
737	1822	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
738	1868	0	0	0	0	1	15	60	10	4	0	25	3	30	148	226
739	1869	0	0	0	0	1	15	60	10	2	0	25	3	30	148	226
740	1865	0	0	1	5	0	0	20	5	3	0	10	2	20	350	345
741	1827	0	0	1	5	0	0	20	5	3	0	10	2	20	350	345
742	3711	0	0	0	0	0	0	0	0	0	0	0	0	0	431	431

Top 41 Bus Stops

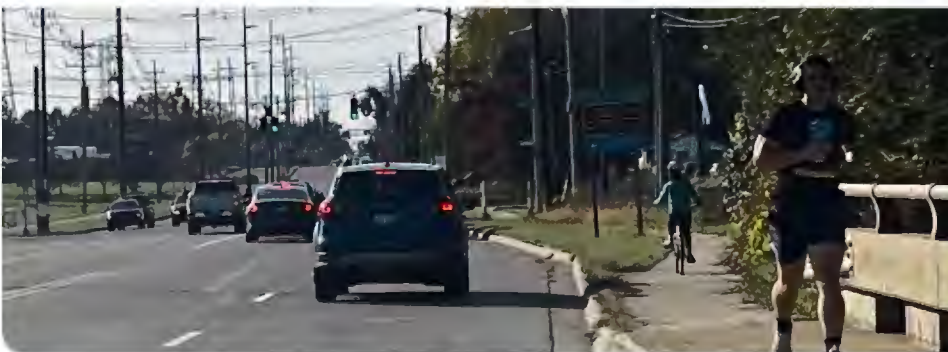
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265	3446	10	10	15	10	15	60	11.75	117.5	1	2	9
66	1905	10	15	15	10	5	55	10.5	105	3	3	5
90	1906	10	15	15	10	5	55	10.5	105	3	4	5
91	4460	10	15	15	10	5	55	10.5	105	3	5	5
404	3489	15	15	15	10	0	55	10.5	105	3	6	9
721	3501	10	10	0	10	15	45	10.25	102.5	18	7	9
124	2412	5	5	15	15	15	55	10	100	3	8	14
236	1760	15	10	15	5	5	50	9.75	97.5	8	9	2
337	1674	15	10	15	5	5	50	9.75	97.5	8	10	1
338	1744	15	10	15	5	5	50	9.75	97.5	8	11	1
397	3486	15	10	15	5	5	50	9.75	97.5	8	12	9
419	3487	15	10	15	5	5	50	9.75	97.5	8	13	9
35	15	5	5	15	10	15	50	9.25	92.5	8	14	2
104	6079	15	10	15	10	0	50	9.25	92.5	8	15	16
181	5997	15	10	15	10	0	50	9.25	92.5	8	16	16
526	3548	15	5	15	10	5	50	9.25	92.5	8	17	10
588	4696	15	5	15	10	5	50	9.25	92.5	8	18	13
34	4429	5	0	15	15	15	50	8.75	87.5	8	19	2
229	4712	0	5	15	15	15	50	8.75	87.5	8	20	11
597	1776	5	5	15	15	10	50	8.75	87.5	8	21	2
172	1600	15	5	15	5	5	45	8.5	85	18	22	1
276	1642	5	5	15	5	15	45	8.5	85	18	23	5
296	6069	15	5	15	5	5	45	8.5	85	18	24	17
318	1673	10	10	15	5	5	45	8.5	85	18	25	1
328	5675	15	5	15	5	5	45	8.5	85	18	26	4
403	3457	10	10	15	5	5	45	8.5	85	18	27	9
415	3460	10	10	15	5	5	45	8.5	85	18	28	9
417	3455	10	15	15	5	0	45	8.5	85	18	29	9
583	3685	10	10	15	5	5	45	8.5	85	18	30	13
608	2240	10	10	15	5	5	45	8.5	85	18	31	11
61	1911	15	15	0	5	0	35	8.25	82.5	56	32	5
72	4459	15	15	0	5	0	35	8.25	82.5	56	33	46
95	1915	15	10	0	5	5	35	8.25	82.5	56	34	5
53	6062	10	5	15	10	5	45	8	80	18	35	16
57	4457	10	10	15	10	0	45	8	80	18	36	5
253	3499	0	5	15	10	15	45	8	80	18	37	9
409	3456	10	10	15	10	0	45	8	80	18	38	9
547	4342	5	10	15	10	5	45	8	80	18	39	3
553	1763	10	10	15	10	0	45	8	80	18	40	2
718	3445	0	5	15	10	15	45	8	80	18	41	9

Appendix C: Countermeasure Toolkit





Countermeasure Toolkit



City of Lansing Michigan

April 2025

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Countermeasure Toolkit Summary



To help stakeholders quickly identify and apply the most effective and context-appropriate safety solutions, each countermeasure was categorized by targeted crash type, implementation timeframe, land use context, crash reduction factor, and estimated per-unit cost range.

Countermeasure Types

Four (4) main countermeasure types were identified for implementation in St. Joseph County. Some countermeasures apply to more than one type. When this applies, both icons are displayed in the countermeasure name title block. Countermeasure types include the following:



Intersection Countermeasures



General Segment Elements Countermeasures
(Including roadway departures)

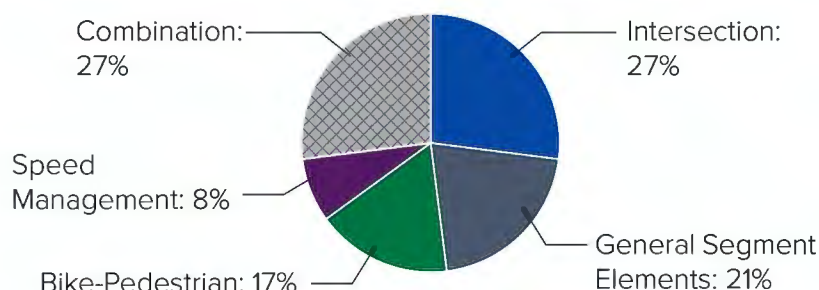


Bike-Pedestrian Countermeasures



Speed Management Countermeasures

Figure 1: Percentage of Countermeasures by Type



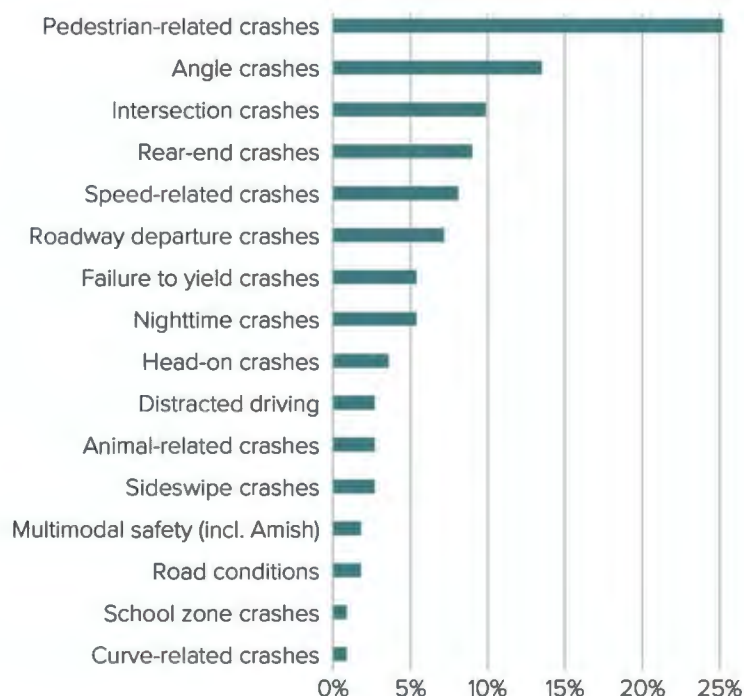
Almost a third of the countermeasures (27%) were categorized as meeting multiple criteria, and therefore categorized as a combination countermeasure.

Targeted Safety Issues

The countermeasures developed under this effort addresses a wide range of safety issues. The most common types of safety issues addressed by the countermeasures include those related to non-motorized crashes (25%), angle crashes (14%), intersection crashes (10%), rear-end crashes (9%), speed-related crashes (8%), and roadway departure crashes (7%). Other issues addressed by the countermeasures include:

- Failure to yield
- Night/dark conditions
- Head-on crashes
- Distracted driving
- Animal/wildlife collisions
- Sideswipe crashes
- Multimodal safety (including Amish)
- General roadway surface safety
- School zone safety
- Curve-related safety

Figure 2: Percent of Countermeasures Addressing Each Safety Issue

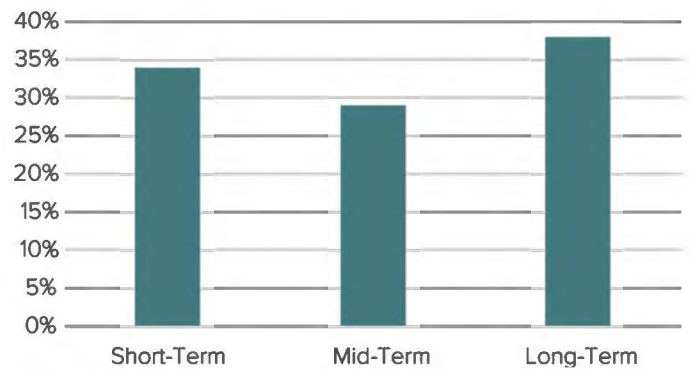


Implementation Timeframes

The countermeasures developed through this effort include twenty-six (26) that could be developed in the short-term¹, twenty-two (22) that could be implemented in the mid-term², and twenty-nine (29) that would most likely be implemented in the long-term³.

1. Short-term defined here as within the first five years
2. Mid-term defined here as between five and ten years
3. Long-term defined here as ten years or more into the future

Figure 3: Percentage of countermeasures by implementation timeframe



Land Use Context

Land use and development intensity influence the character and needs of an area, impacting factors like travel speeds, parking needs, recreational events, and commercial activities. Not all countermeasures are most effective in every land use or development context. Tailoring countermeasures to various land use and development contexts can be an effective way to ensure implementation aligns with the character and needs of the area. In alignment with Evaluating Transportation Land Use Impacts, Victoria Transport Policy Institute (March 2023), St. Joseph County was divided into the following discrete criteria, aligning with their corresponding land use and development intensity:



Urban Core

Considered the typical downtown or central business district area, this context is defined by a high diversity of uses, including multi-family residential, office, retail, entertainment, civic, and cultural facilities. Development is high-density and includes high-rise structures with minimal setbacks, high street wall frontage, minimal building gaps, and off-street structured parking. Because of its development density and diversity of uses, this land-use pattern generates a high proportion of non-motorized trips, including walking, transit, and bicycling.



Urban Center

Similar to Urban Core, this context is characterized by a high diversity of uses, including multi-family residential, office, retail, entertainment, civic, and cultural facilities, while having a moderately high-density of development. Urban Centers are typically characterized by mid-rise structures, minimal setbacks, a variety of street wall frontages, and off-street parking. Urban Centers may be either large commercial business districts in historic towns or newer, transit-oriented developments centered around a transit station. Because of its development density and diversity of uses, this land-use pattern generates a moderate to high volume of non-motorized trips.



Town Center

While smaller and less dense than either of the urban contexts, the Traditional Town Center is still characterized by a high diversity of use types, including residential, office, retail, civic, and cultural facilities. Structures are typically mid- to low-rise buildings and are oriented toward the street with no setbacks. Parking is often provided on-street along the main thoroughfare, with additional parking at the rear of the building accessible by alleys or other minor streets. These areas often serve the dual purpose of accommodating both short trips in the areas surrounding the commercial corridor as well as longer pass-through trips.



Suburban Activity Center

Located outside of the major Urban Centers, the Suburban Activity Center is typically found along or at the intersection of major arterials. They feature a medium diversity of uses, including residential (both multi-family and single-family), office, and retail facilities. Development is at a much lower density than that in the Urban Core, Urban Center, and Traditional Town Center, and typically consists of detached low-rise structures with a range of setbacks.



Suburban

With a moderate to low diversity of uses, the suburban context typically contains primarily single-family residential development on lot sizes ranging from one-eighth of an acre to one acre. Office parks and small commercial strip retail are scattered throughout the area, along with neighborhood-level civic and cultural facilities. Developments are typically larger in area and single-use, discouraging non-automobile trips. Buildings are primarily oriented toward parking, which is usually provided off-street.



Rural

Rural areas are the lowest density of the six contexts. These areas are primarily a mix of agricultural uses and green space, with some scattered development in large-lot residential clusters. Trip distances are long, as origins and destinations are few and far between. Mobility is the primary transportation need.

Each countermeasure was assigned the appropriate land use and development intensity in which it would be considered most effective. All of the countermeasures identified in this study align with at least two of these land use and development intensity categories and several of them are suitable for implementation across all land use and development intensities.

Crash Reduction Factor

Crash Reduction Factors (CRF) measure the expected percentage reduction in fatal and serious injury crashes after implementing a specified safety improvement. For this study, CRFs were collected from National or State research organizations such as the Federal Highway Administration (FHWA), the National Cooperative Highway Research Program (NCHRP), and various State Departments of Transportation (DOT) to provide an effective platform for comparing the countermeasures. Information was not available in every instance, but in the end, a CRF was identified for about 70% (52) of the identified countermeasures.

The median CRF predicted for countermeasures in this study is 35%, with a minimum CRF of 3% and a maximum CRF of 90%.

Figure 4: Example CRF range, roundabouts countermeasure

High Level Safety Benefit (CRF) - Total

58-67%

Fatality/Injury

78-82%



Property Damage Only

NA



Estimated Per-Unit Cost Range

Cost is a critical factor in selecting safety countermeasures. Agencies must allocate limited resources to projects with the greatest safety impacts. An estimated per unit cost range for each countermeasure helps understand its relative cost and cost-effectiveness. This approach ensures transparency, aids in cost-benefit analysis, and supports efficient resource allocation

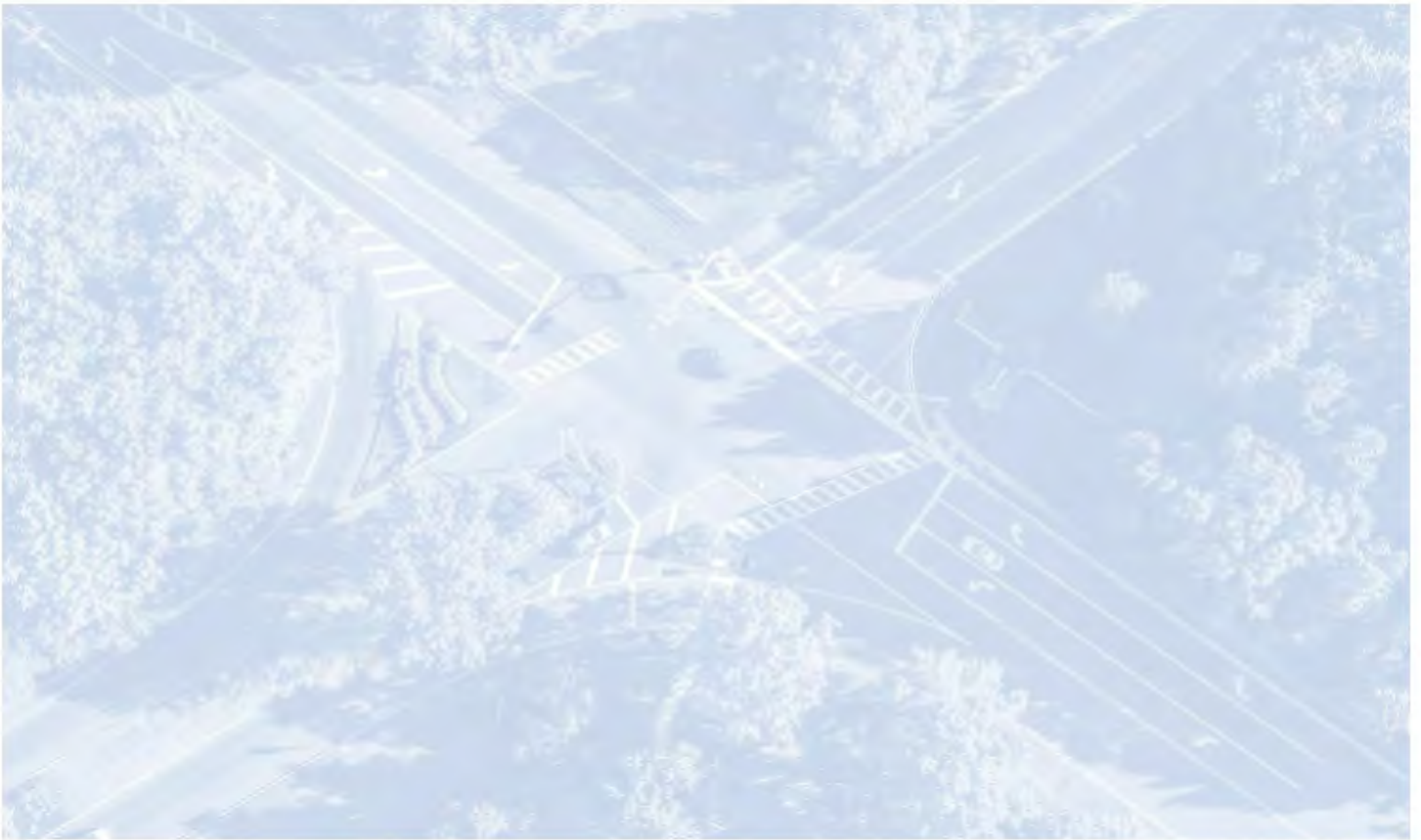
Cost can vary greatly based on the size and scope of a roadway safety project. Starting with a survey of background and field research, a cost range was estimated per unit for each countermeasure. These cost ranges were categorized into three tiers.

- 💰 Tier 1: Up to \$149,999
- 💰💰 Tier 2: From \$150,000 to \$499,999
- 💰💰💰 Tier 3: \$500,000 or greater

Ascribing a per unit cost range allows an agency to estimate planning-level cost estimates using the cost tiers and the dimensions for per-unit cost estimate ranges based on 2024 dollars.

- Tier 1 cost countermeasures are mostly comprised of signs, striping, delineators, minor lighting upgrades, modest intersection updates, and weather/vegetation mitigation.
- Tier 2 cost countermeasures include signal upgrades, bus stop extensions, chicanes, mid-block crossings, smaller roundabouts, driveway closures, shoulder improvements, and speed safety cameras.
- Tier 3 cost countermeasures include road diets, new turn lanes and interchanges, center concrete medians, new sidewalks and shared use paths, larger or more complex roundabouts, corridor lighting, variable speed limits, corridor lighting, and corridor access management.





Intersection Countermeasures





Technology that detects vehicles approaching an intersection at unsafe speeds and adjusts signal timing to prevent sudden stops or red-light entries.



Advance Dilemma Zone Detection

Targeted Crash Type and/or Behavior

Traffic safety; failure to stop at red traffic signal lights

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

8.2% (All); 43.6% (Angle)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

Site and need specific each intersection

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=4854>



Markings set back from crosswalks to guide vehicles on where to stop or yield. They reduce multiple threat crashes resulting from having multiple travel lanes in the same direction by improving visibility for both drivers and pedestrians.



Advanced Stop/Yield Markings

Photo courtesy of Free Ronge Stock, www.freerangestock.com

Targeted Crash Type and/or Behavior

Failure to stop crashes; failure to yield crashes; pedestrian and bicycle-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

90%

Fatality/Injury

96%



Property Damage Only

100%



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

New Markings, Signs & Posts: \$500 - \$1,000 per unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9070>



Extending curbs into the roadway at intersections narrows the road, shortens crossing distances, and tightens turning radii, improving pedestrian safety by enhancing visibility and slowing traffic.



Concrete Curb Extension
Original photo taken in field

Targeted Crash Type and/or Behavior

Speed-related crashes;
pedestrian-related crashes;
angle crashes

Facility Type



Intersection



Street

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness
and Awareness

Applicable Context Zone



Urban
Core



Urban
Center



Town
Center



Suburban
Activity Center

High Level Safety Benefit (CRF) - Total

35%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

>\$150,000 per
unit

Source: <https://menlopark.gov/files/sharedassets/public/v/3/public-works/documents/transportation/transportation-projects/menloparkvzap-countermeasuretoolbox.pdf>



Signs placed at stop-controlled intersections to alert drivers that cross-traffic does not stop, reducing the risk of collisions due to misinterpretation of traffic flow.



Cross Traffic Does Not Stop Sign
Photo courtesy of Wikimedia Commons,
<https://commons.wikimedia.org/>

Targeted Crash Type and/or Behavior

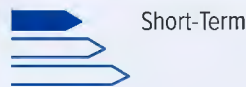
Unsignalized intersection
safety

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness
and Awareness

Applicable Context Zone



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500 - \$1,000 per
intersection

Source: NA



Restricting parking near intersections improves sightlines, enhancing safety for drivers and pedestrians.



Daylighting/Intersection Parking Restrictions

Photo courtesy of Wirestock Creators/Adobe Stock

Targeted Crash Type and/or Behavior

Angle crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

11%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$2,000-\$20,000 per intersection

Source: CMF Clearinghouse;

<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=161>



Dedicated lanes for left and right-turns help organize traffic flow and reduce conflicts between turning vehicles and other road users.



Dedicated Left and Right Turn at Intersections

Photo courtesy of Vitakot/stock photo

Targeted Crash Type and/or Behavior

Rear end crashes; angle crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

14%

Fatality/Injury

23%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to
Tier 2: \$ \$ \$150,000 - \$499,999



Estimated Cost:

\$120,000 to
\$499,999 per intersection

Source: CMF Clearinghouse;

<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=285>



Intersection design that relocates the left-turn movements from the main intersection to an upstream signalized crossover intersection. This eliminates the left-turn signal phase at the main intersection and allows execution of the left-turn simultaneously with the through traffic at the main intersection.



Displaced Left-Turn

Targeted Crash Type and/or Behavior

Speed-related crashes; run-off-road crashes; head-on crashes; nighttime crashes

Facility Type



Intersection

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 3: Manage Conflicts in Time

Applicable Context Zone



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

TBD

Fatality/Injury

TBD



Property Damage Only

TBD



Cost

Cost Tier Level (1-3):



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$3-5M per intersection

Source: FHWA, FHWA-SA-14-068 <https://safety.fhwa.dot.gov/intersection/crossover/fhwasa14068.pdf>



Intersection design that eliminates the need for left-turns across opposing traffic by creating crossovers that transition traffic from the right side of the road to the left side and back again. DDIs are best utilized in locations with high volumes of left-turns.



Diverging Diamond Interchange (DDI)

Photo courtesy of George/Adobe Stock

Targeted Crash Type and/or Behavior

Left-turn crashes at intersections; lack of pedestrian and bicyclists separated facilities

Facility Type



Intersection

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

14.2%

Fatality/Injury

44.2%



Property Damage Only

8.0%



Cost

Cost Tier Level (1-3):



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$2,000,000-
\$10,000,000
per interchange

Source: CMF Clearinghouse;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10762>



Improved intersection lighting increases visibility during low-light conditions. Adequate illumination reduces crash rates by helping drivers and pedestrians see each other more clearly.



Intersection Lighting/Illumination

Photo courtesy of Peter de Kievith/Adobe Stock

Targeted Crash Type and/or Behavior

Nighttime crashes; angle crashes; rear-end crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe

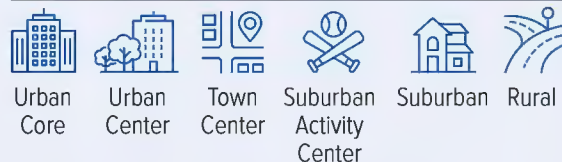


Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

32.6% (Angle); 43.8% (Vehicle/Pedestrian)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$2,000-\$4,000 per unit

Source: CMF Clearinghouse; CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=2376>; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=2379>



Intersections realigned to improve sightlines, enhance predicability, and reduce conflict points to elevate safety.



Intersection Realignment

Photo courtesy of Ceogh/Freerange Stock

Targeted Crash Type and/or Behavior

Rear-end crashes; angle crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe

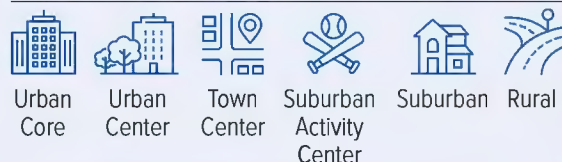


Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Tier 3 \$ \$ \$ \$ >\$500,000

Estimated Cost:

\$100,000-\$2.5M per intersection

Source: https://cmfclearinghouse.fhwa.dot.gov/study_detail.php?stid=565

11 Intersection Signal Coordination



A timing system that synchronizes traffic signals along a corridor or within a network of intersections, helping to reduce stop-and-go traffic, improve flow, and enhance safety by reducing vehicle conflicts.



Intersection Signal Coordination
Photo courtesy of Max Safaniuk/Adobe Stock

Targeted Crash Type and/or Behavior

Rear-end crashes; angle crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban

High Level Safety Benefit (CRF) - Total

62%

Fatality/Injury

NA



Property Damage Only

59%



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$2,000 per phase
or \$10,000-\$65,000
per signal

Source: <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9859>;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9861>

12 Intersection Stop Ahead or Yield Ahead Warning Signs



Regulatory signs placed at intersections to control vehicle movements reduce conflicts and provide clear guidance for yielding or stopping, thereby minimizing crash risks.



Intersection Stop Ahead Warning Sign
Photo courtesy of Carlos Santa Maria/Adobe Stock

Targeted Crash Type and/or Behavior

Failure to stop crashes;
failure to yield crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness
and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

27%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500 - \$1,000
per intersection

Source: <https://highways.dot.gov/safety/proven-safety-countermeasures/systemic-application-multiple-low-cost-countermeasures-stop>





Stop signs with LED lights along the edge that flash continuously to increase visibility, especially in low-light or high-speed areas.



LED Bordered Stop Sign

Photo courtesy of knelson20/Adobe Stock

Targeted Crash Type and/or Behavior

Nighttime crashes; angle crashes; rear-end crashes; pedestrian-related crashes; distracted driving and attentiveness mitigation

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban

High Level Safety Benefit (CRF) - Total

9.1%

Fatality/Injury

9.4%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500-\$1,500 per unit

Source: CMF Clearinghouse;

<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=6051>

<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=6052>



Prohibited right-turns on red at intersections reduce conflicts with pedestrians and other motorists.



No Turn on Red Sign

Photo courtesy of rnl/Adobe Stock

Targeted Crash Type and/or Behavior

Angle crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

3%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$200-\$3,500 per unit

Source: https://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa18041/#ref

15 Overhead Flashing Beacon Signal



Flashing beacons positioned above the roadway to warn of hazards or intersections, increasing visibility and alerting drivers to potential conflicts.



Overhead Flashing Beacon Signal
Photo courtesy of Christina Xu/flickr Creative Commons

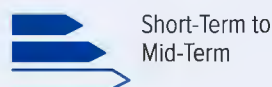
Targeted Crash Type and/or Behavior

Nighttime crashes; angle crashes; rear-end crashes; pedestrian-related crashes; distracted driving and attentiveness mitigation

Facility Type



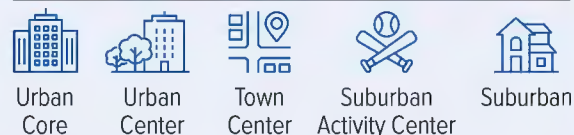
Timeframe



Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

10.2%



Property Damage Only

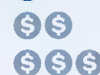
NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$10,000 - \$150,000 per unit

Source: <https://highways.dot.gov/sites/fhwa.dot.gov/files/FHWA-HRT-08-044.pdf>

16 Radar Activated Flashing Border Stop Signs



Stop signs that flash when a vehicle approaches too quickly, warning drivers to slow down in time to stop safely.



Radar Activated Flashing Border Stop Sign
Photo courtesy of knelson20/Adobe Stock

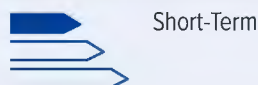
Targeted Crash Type and/or Behavior

Nighttime crashes; angle crashes; rear-end crashes; pedestrian-related crashes; distracted driving and attentiveness mitigation

Facility Type



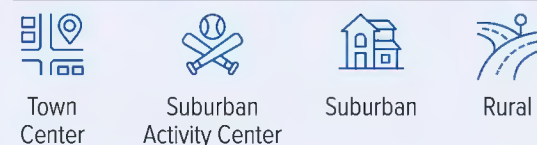
Timeframe



Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

41.1% (Angle Crashes)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$1,500-\$2,500 per unit

Source: CMF Clearinghouse;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=4074>





Design adjustments, such as restricted or modified left-turn lanes and signals, installed to reduce the risk of collisions between turning vehicles and oncoming traffic or pedestrians.



Reduced Left-Turn Conflict

Source: <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa14062.pdf>

Targeted Crash Type and/or Behavior

Angle crashes; rear-end crashes; head-on crashes

Facility Type



Intersection

Timeframe



Mid-Term to Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

54% - RCUT;
63% - Unsignalized RCUT;
30% - MUT



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$100,000-\$2.5M per intersection

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/reduced-left-turn-conflict-intersections>



Backplates added to signal heads with reflective material or LED borders to enhance signal visibility and to increase driver awareness and compliance, especially in low light conditions.



Reflective Signal Backplate

Photo courtesy of Tracy Elford/Pexels

Targeted Crash Type and/or Behavior

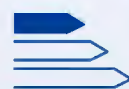
Intersection crashes; angle crashes; rear-end crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

15%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$6,000 - \$12,000 per unit

Source: FHWA; <https://safety.fhwa.dot.gov/provencountermeasures/backplate.cfm#psc-footnote>

19 Roundabouts



Roundabouts are circular intersections where traffic flows counterclockwise around a central island, reducing speeds and greatly reducing many severe crash types, including head-on, rear-end, and angle crashes by reducing crossing conflict points.



Roundabout

Photo courtesy of Covon Images/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes; angle crashes; rear-end crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

58-67%

Fatality/Injury

78-82%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$500,000
-\$2.5M site and location specific

Source: FHWA;

<https://highways.dot.gov/safety/proven-safety-countermeasures/roundabouts>

20 Signal Ahead Signs



Signs placed in advance of traffic signals to warn drivers of an upcoming signal, giving them time to adjust speed and reducing rear-end collisions.



Signal Ahead Sign

Photo courtesy of jeffwqc/Adobe Stock

Targeted Crash Type and/or Behavior

Failure to stop at signalized intersections

Facility Type



Intersection



Street

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

10-27%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):



Tier 1: \$ <\$149,999

Estimated Cost:

\$500-\$1,000 per intersection

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/systemic-application-multiple-low-cost-countermeasures-stop>



21 Turbo Roundabouts



The turbo roundabout operates like a standard roundabout but features distinct geometry and traffic controls, effectively reducing lane-change conflicts and addressing crash types common in traditional multilane roundabouts.



Turbo Roundabout

Photo courtesy of livq/Wikimedia Creative Commons

Targeted Crash Type and/or Behavior

Speed-related crashes; angle crashes; rear-end crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

76%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):



Tier 3: \$ \$ \$ >\$500,000

Estimated Cost:

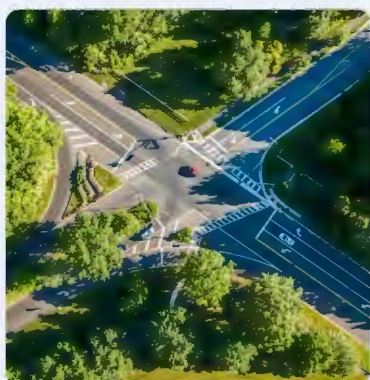
\$2M-\$5M Site/
project specific

Source: <https://safety.fhwa.dot.gov/intersection/roundabouts/fhwasa20019.pdf>

22 Vegetation Control Near Intersections



Vegetation control around intersections to ensure clear sightlines for drivers and pedestrians, reducing the risk of crashes due to obstructed views.



Vegetation near Intersection

Photo courtesy of oldmn/Adobe Stock

Targeted Crash Type and/or Behavior

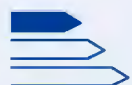
Angle crashes; failure to yield crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$100-\$600 per
acre

Source: https://safety.fhwa.dot.gov/local_rural/training/fhwasa07018/vegetationfv1108.pdf





Extended or decreased yellow light durations to reduce red-light violations and enhance safety at signalized intersections.



Yellow Change Interval

Photo courtesy of Luis/Adobe Stock

Targeted Crash Type and/or Behavior

Intersection crashes; failure to yield crashes; rear-end crashes; angle crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

8-14%

Fatality/Injury

12%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$25,000 - \$50,000 per intersection

Source: FHWA;

<https://highways.dot.gov/safety/proven-safety-countermeasures/yellow-change-intervals>



General Segment Elements Countermeasures





Weather data from nearby stations used to activate de-icing mechanisms on roadways or to display dynamic message signs (DMS) alerting drivers to road conditions, such as ice or snow, enhancing safety by preemptively managing hazardous conditions.



Automated Message on DMS Sign
Photo courtesy of spiritofamerica/Adobe Stock

Targeted Crash Type and/or Behavior

Road condition safety

Facility Type



Street

Timeframe



Long-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 2: \$ \$ \$ \$ 150,000 - \$499,999

Estimated Cost:

\$150,000-\$200,000 per installation

Source: NA



Center turn lanes enable left-turns from both directions, improving predictability, and keeping turning vehicles out of through traffic to reduce congestion and rear-end collision risks.



Center Left-Turn Lane

Photo courtesy of Charmack.org/Flickr Creative Commons

Targeted Crash Type and/or Behavior

Speed-related crashes

Facility Type



Street

Timeframe



Mid-Term to Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

36%

Fatality/Injury

34.8%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999
Tier 3: \$ \$ \$ \$ >\$500,000

Estimated Cost:

\$125,000-\$1M per mile

Source: FHWA; <https://www.fhwa.dot.gov/publications/research/safety/08046/index.cfm>



Strategies to control access to major roads to improve safety by managing access points along corridors, which minimizes conflict points, reduces potential crashes, and enhances flow.



Corridor Access Management

Photo courtesy of Song_about_summer/Adobe Stock

Targeted Crash Type and/or Behavior

Rear end crashes; angle crashes

Facility Type



Street

Timeframe



Mid-Term to
Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Urban
Core



Urban
Center



Town
Center



Suburban
Activity
Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

11% (A,B,C)



Property Damage Only

5%



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$50,000-\$500,000
per unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=586>



Replacement of traditional lights with LEDs for better roadway illumination, enhanced visibility and reduced energy costs.



LED Lighting Fixture

Photo courtesy of Peter de Kievith/Adobe Stock

Targeted Crash Type and/or Behavior

Nighttime crashes; angle crashes; rear end crashes; pedestrian-related crashes

Facility Type



Street



Intersection

Timeframe



Mid-Term to
Long-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban
Core



Urban
Center



Town
Center



Suburban
Activity
Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

28%-nighttime injury crashes; 42%-nighttime injury pedestrian crashes at intersections



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$2,500-\$3,000 per unit,
assume fewer than 50
new units

Source: FHWA; <https://safety.fhwa.dot.gov/provencountermeasures/lighting.cfm>



Additional lighting fixtures along roads to improve visibility for both drivers and pedestrians, particularly in high-use areas.



Continuous Corridor Lighting
Photo courtesy of rh2010/Adobe Stock

Targeted Crash Type and/or Behavior

Nighttime crashes; roadway departure crashes; pedestrian-related crashes

Facility Type



Street

Timeframe



Long-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

21%

Fatality/Injury

27%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):



Tier 2: \$ \$ \$150,000 - \$499,999 to

Tier 3: \$ \$ \$ >\$500,000

Estimated Cost:
\$1,000 per unit, assumed over 150 new units

Source: https://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepd/#crash



Rows of vegetation planted along roadways to reduce snow drifting onto roads, improving visibility and road safety in snowy regions.



Living Snow Fence
Photo courtesy of Ilya Yurkin/Pxhere

Targeted Crash Type and/or Behavior

Road condition safety and visibility

Facility Type



Street

Timeframe



Mid-Term to Long-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

11%

Fatality/Injury

NA



Property Damage Only

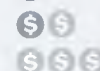
NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:
\$5,000 per mile

Source: <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=189>; CMF Clearinghouse



Community-specific plans designed to address unique traffic safety challenges through tailored interventions along specific roadways.



Local Road Safety Plans

Photo courtesy of troyanphoto/Adobe Stock

Targeted Crash Type and/or Behavior

Roadway departure crashes; intersection crashes; pedestrian and bicycle-related crashes; driver behavior concerns

Facility Type



Street

Timeframe



Mid-Term to Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds
Tier 3: Manage Conflicts in Time
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

17%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$10,000 - \$1M+ per unit

Cost Specific to location and needs

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/local-road-safety-plans>



Raised strips along road edges or centerlines that create noise and vibrations when driven over, alerting drivers who may be veering out of lanes.



Longitudinal Rumble Strips

Photo courtesy of MarekPhotoDesign/Adobe Stock

Targeted Crash Type and/or Behavior

Run-off road crashes; head-on crashes

Facility Type



Street

Timeframe



Short-Term to Medium-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

Centerline rumble strips (44-64%-) head-on fatal and injury crashes; Shoulder Rumble strips (13-51%) - single vehicle, run-off-road fatal and injury crashes



Property Damage Only

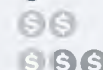
NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500 - \$6,000 per mile

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/longitudinal-rumble-strips-and-stripes-two-lane-roads>





Physical barriers in the center of multi-lane roads that prevent head-on collisions by separating opposing traffic flows. Barriers may be rigid (concrete), semi-rigid (guardrail) or flexible (high tension cable) based on roadway context.



Median Barriers

Photo courtesy of Kenneth Sponsler/Adobe Stock

Targeted Crash Type and/or Behavior

Head-on crashes; opposite-direction sideswipe crashes

Facility Type



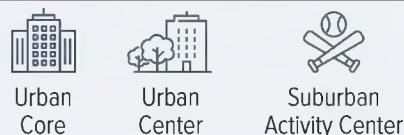
Timeframe



Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

86%

Fatality/Injury

88%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$500,000 per mile

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=974>



Increased pavement friction, especially in high-risk areas like curves or intersections. Techniques include high-friction surface treatments to reduce skidding and enhance control during adverse weather.



Pavement Friction Management

Photo courtesy of ArtificialHorizons/Adobe Stock

Targeted Crash Type and/or Behavior

Roadway departure crashes; intersection crashes; pedestrian-related crashes

Facility Type



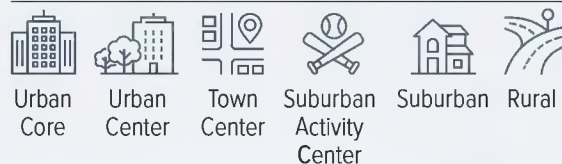
Timeframe



Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

20%

Fatality/Injury

63%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$20-\$30 per sq. yard

Source: FHWA; https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/walkways_brochure.pdf



Formal examination of the safety performance of an existing or future road segment or intersection by an independent team to identify potential safety concerns and recommend improvements.

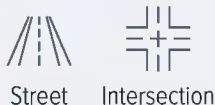


Road Safety Audit

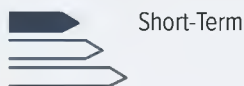
Targeted Crash Type and/or Behavior

Rear-end crashes; angle crashes; pedestrian-related crashes

Facility Type



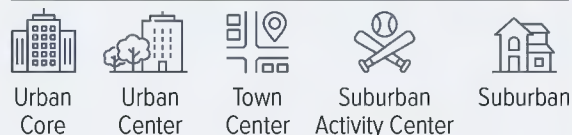
Timeframe



Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds
Tier 3: Manage Conflicts in Time
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

10-60%

Fatality/Injury

NA



Property Damage Only

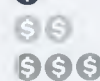
NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$25,000-\$50,000 per specific needs

Source: FHWA;

<https://highways.dot.gov/safety/proven-safety-countermeasures/road-safety-audit>



Enhanced roadside environment near curves with features like clear zones, barriers, or improved signage to reduce risks of road departure crashes.



Roadsign Design at Curves

Photo courtesy of sumroeng/Adobe Stock

Targeted Crash Type and/or Behavior

Run-off road crashes

Facility Type



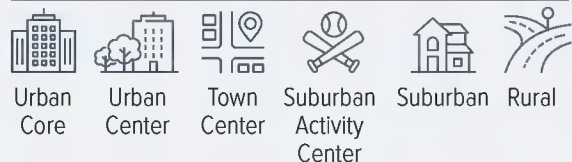
Timeframe



Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

27%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

Site and need specific

Source: FHWA; <https://safety.fhwa.dot.gov/provencountermeasures/fhwasa18029/ch4.cfm>



A sloped pavement edge applied during road construction or resurfacing, allowing vehicles that drift off the road to return safely by reducing the risk of tire scrubbing against a vertical edge.



Safety Edge

Photo courtesy of Fenny/Adobe Stock

Targeted Crash Type and/or Behavior

Run-off road crashes

Facility Type



Street

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Suburban



Rural

High Level Safety Benefit (CRF) - Total

21%-Run-off road crashes; 19%- Head-On crashes

Fatality/Injury

11%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$2,000-\$5,000 per mile

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/safetyedgesm>



Targeted use of herbicides in areas where mowing alone isn't sufficient to manage vegetation, helping to keep sightlines clear along rural or suburban roads.



Countywide Spray Program

Photo courtesy of Kristina Blokhin/Adobe Stock

Targeted Crash Type and/or Behavior

Run-off road crashes; wildlife collisions

Facility Type



Street

Timeframe



Short-Term and

Long-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$100-\$600 per acre

Source: https://safety.fhwa.dot.gov/local_rural/training/fhwasa07018/vegetationfv1108.pdf



A wide shoulder area provides a safe space for vehicles to pull over, emergency stops, or non-motorized use. Using a consistent material, either gravel or paved, prevents uneven surfaces that could affect vehicle control when exiting or re-entering the roadway.



Wide Shoulder Area

Photo courtesy of Ravi/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes; run-off-road crashes; head-on crashes; nighttime crashes

Facility Type



Street

Timeframe



Mid-Term to
Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe
Conflicts

Applicable Context Zone



Suburban
Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

34%

Fatality/Injury

49%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to

Tier 2: \$ \$ \$150,000 - \$499,999



Estimated Cost:

\$5,000-

\$150,000 per
mile

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=7755>; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=7757>



Bike-Pedestrian Countermeasures





Pavement marking boxes placed at intersections allow cyclists to wait in front of vehicles during red lights, reducing conflicts and giving cyclists a head start when the light turns green.



Bicycle Box

Photo courtesy of itdp/Flickr Creative Commons

Targeted Crash Type and/or Behavior

Bicycle-related intersection crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

15% (Pedestrian, Bicycle)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$15 per square foot

Source: <https://menlopark.gov/files/sharedassets/public/v3/public-works/documents/transportation/transportation-projects/menloparkvzap-countermeasuretoolbox.pdf>



Dedicated traffic signals for cyclists to provide safe and efficient movement through intersections.



Bicycle Signal

Photo courtesy of Adam L. Coppola/Flickr Creative Commons

Targeted Crash Type and/or Behavior

Bicycle-related intersection crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

87.5%

Fatality/Injury

NA



Property Damage Only

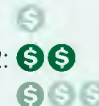
NA



Cost

Cost Tier Level (1-3):

Tier 2: \$ \$ \$150,000 - \$499,999



Estimated Cost:

\$250,000 per four-leg intersection (includes APS/CPS)

Source: NACTO;
<https://nacto.org/case-study/bicycle-signal-at-russell-boulevard-at-sycamore-lane-davis-ca/>



Coordinating pedestrian and cyclist signals/phases to provide adequate crossing time.



Bike/Ped Signal Concurrence Sign

Photo courtesy of Isaac Mitchell/Pexels Public Domain

Targeted Crash Type and/or Behavior

Bicycle-pedestrian-related intersection crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

Signal time adjustment
\$2,000 - \$5,000 per
phase

Source: NA



Extending bus stop zones (increasing pedestrian space) improves access and safety for transit riders, pedestrians, and bicyclists while boarding or exiting buses.



Bus Stop Extensions/Safety Improvements

Photo courtesy of Austin Transportation and Public Works/Flickr Public Domain

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Street



Intersection

Timeframe



Mid-Term to
Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban
Activity Center

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

50%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999

Tier 2: \$ \$ \$150,000 - \$499,999



Estimated Cost:

\$35,000-
\$50,000 site
and location
specific

Source: http://pedbikesafe.org/PEDSAFE/casestudies_detail.cfm?CM_NUM=5&CS_NUM=50



High-visibility markings, such as ladder or zebra patterns, increasing the visibility of crosswalks, alerting drivers to potential pedestrian crossings.



Crosswalk Visibility Enhancements

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

19%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500-\$15,000 per crossing

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=4124>



Ramps provide smooth, safe transitions between sidewalks and crosswalks, benefiting pedestrians with mobility aids. Coordinating utilities on sidewalks maintains clear walk zones and proper delineation.



Curb Ramps/Sidewalk Utility Coordination

Photo courtesy of knelson20/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Intersection

Timeframe



Med-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500 - \$10,000 per square foot

Source: NA



Physical barriers in the centerline of a road discourage vehicles from crossing into opposing lanes, reducing head-on collision risks, and slowing driver turning movements by delineating tighter turning radii.



Hardened Centerline

Photo courtesy of Portland Bureau of Transportation/
Creative Commons

Targeted Crash Type and/or Behavior

Speed-related crashes at intersections; angle crashes; pedestrian-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

67%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500-\$5,000
per leg of the
intersection

Source: CMF Clearinghouse;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=1692>



Signs placed at pedestrian crossings to increase driver awareness and encourage yielding to pedestrian.



In-street Pedestrian Crossing Sign

Photo courtesy of karagrubis/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Street

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

18%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500-\$1,000
per unit

Source: CMF Clearinghouse;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9022>

47 Leading Pedestrian Intervals (LPI)



Traffic signal strategy that gives pedestrians and bicyclists a head start at crosswalks before vehicles receive a green light, improving their visibility and reducing conflicts with turning vehicles.



Leading Pedestrian Interval
Photo courtesy of methaphum/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian-related crashes;
Bicycle-related crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

13%

Fatality/Injury

14%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$2,000-\$100,000 per phase or signal (APS/CPS may be needed)

Source: CMF Clearinghouse;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9918>

48 Medians and Refuge Crossing Islands



Raised barriers in the middle of the road provide pedestrian refuge, allowing them to cross one direction of traffic at a time.



Crossing Island
Josip Ivankovic/Unsplash

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Street



Intersection

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

46-56% (pedestrian crashes)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Tier 3: \$ >\$500,000

Estimated Cost:

\$50,000 -
\$500,000 per unit

Source: <https://highways.dot.gov/safety/proven-safety-countermeasures/medians-and-pedestrian-refuge-islands-urban-and-suburban-areas>





Curb extensions, or “bulb-outs,” narrow the roadway, shorten pedestrian crossings, slow vehicles, and improve pedestrian visibility at intersections.



Intersection/Mid-block Curb Extension/
Bulb-out

Photo courtesy of Richard Drdul/Wikimedia Commons

Targeted Crash Type and/or Behavior

Pedestrian-related crashes;
angle crashes

Facility Type



Street Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness
and Awareness

Applicable Context Zone



Urban
Core



Urban
Center



Town
Center



Suburban
Activity Center

High Level Safety Benefit (CRF) - Total

35%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to \$5,000

Tier 2: \$ \$ \$150,000 - \$499,999 -\$150,000 per unit



Estimated Cost:

Source: NA



Increased separation between vehicle and pedestrian spaces or bike lanes enhances safety by minimizing conflicts.



New/Wider Buffers Between Traffic/
User Types

Photo courtesy of alpegor/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian and bicycle-related
crashes

Facility Type



Street Intersection

Timeframe



Short-Term to
Med-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 4: Increase Attentiveness
and Awareness

Applicable Context Zone



Urban
Center



Town
Center



Suburban
Activity
Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

50-56% (bicycle crashes)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to \$5,000 -



Estimated Cost:

\$30,000 per mile

Tier 3: \$ \$ \$ \$ >\$500,000

Source: FHWA; <https://highways.dot.gov/sites/fhwa.dot.gov/files/FHWA-HRT-23-025.pdf>



Strategically placed parking along streets helps create a buffer for pedestrians and manage traffic speeds.



On-Street Parking

Photo courtesy of Kirk Fisher/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes;
sideswipe crashes; pedestrian-related crashes

Facility Type



Street

Timeframe



Mid-Term to
Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban
Core



Urban
Center



Town
Center

High Level Safety Benefit (CRF) - Total

52%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



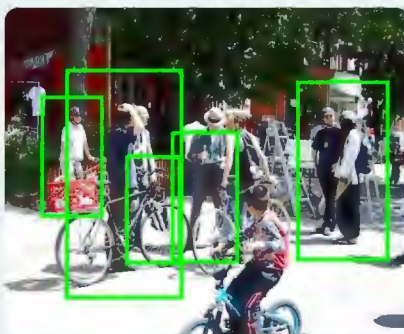
Estimated Cost:

\$5,000-\$10,000 per
parking space

Source: CMF Clearinghouse;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9253>



Automatic pedestrian detection at intersections or crosswalks without requiring a push button. Using sensors, cameras, or thermal imaging, the system detects when a pedestrian is waiting to cross, triggering the pedestrian signal phase accordingly.



Passive Pedestrian Detection

Photo courtesy of Greg Borenstein/Flickr

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Street

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 4: Increase Attentiveness
and Awareness

Applicable Context Zone



Urban
Core



Urban
Center



Town
Center



Suburban
Activity Center

High Level Safety Benefit (CRF) - Total

22% (pedestrian)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$2,000-\$10,000
per unit

Source: <http://www.pedbikesafe.org/pedsafe/>



Paved shoulder areas provide a separate space for bicyclists and pedestrians. It also provides space for vehicles to recover, reducing roadway departure crashes and space for vehicles needing to pull over.



Paved Shoulder

Photo courtesy of Balser/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian and bicycle-related crashes

Facility Type



Street

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Suburban
Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

71% (pedestrian)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Tier 3: \$ \$ \$ >\$500,000

Estimated Cost:

\$100,000-
\$500,000 per
mile

Source: FHWA; https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/walkways_brochure.pdf



Traffic control devices activated by pedestrians at mid-block crossings or unsignalized intersections. The unique PHB red lights flash to alert drivers and provides a safe crossing interval for pedestrians.



Pedestrian Hybrid Beacon (PHB)

Photo courtesy of Austin Transportation and Public Works/Flickr

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Street



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban
Core



Urban
Center



Town
Center



Suburban
Activity Center

High Level Safety Benefit (CRF) - Total

29%

Fatality/Injury

15%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to

Tier 2: \$ \$ \$ \$150,000 - \$499,999



Estimated Cost:

\$125,000 -
\$250,000 per
unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=2911>



Warning signs that alert drivers to upcoming pedestrian crossings or other conditions, improving driver awareness and reducing collision risks.



Pedestrian Crossing Sign

Photo courtesy of Arvind Boloromon/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian-related crashes; animal-related crashes; intersection-related crashes; curve-related crashes; school zone crashes

Facility Type



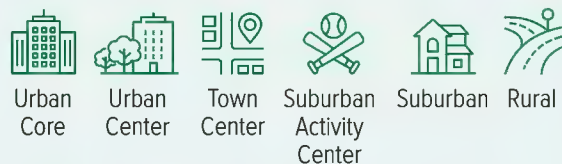
Timeframe



Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

12.1%

Fatality/Injury

18.6%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500- \$1,000 per unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=8892>; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=8893>



Lighting positioned to illuminate sidewalks and crosswalks, specifically enhancing pedestrian visibility at night.



Pedestrian-Scale Lighting

Photo courtesy of Fotolyse/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



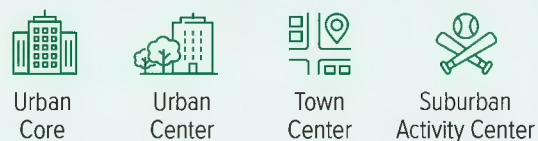
Timeframe



Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



High Level Safety Benefit (CRF) - Total

60%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Tier 3: \$ \$ \$ >\$500,000

Estimated Cost:

\$2,500-\$4,000 per unit

Source: http://www.pedbikesafe.org/pedsafe/casestudies_detail.cfm?CM_NUM=8&CS_NUM=86



Dedicated signal phase that halts all vehicle movement to allow pedestrians to cross in all directions simultaneously, reducing conflicts with turning vehicles.



Pedestrian Scramble

Photo courtesy of anayo/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 3: Manage Conflicts in Time
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

51%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$50,000-\$100,000 per unit

Source: CMF Clearinghouse;
<https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=4117>



Intersection designs that separate cyclists, pedestrians, and motor vehicles using physical barriers or islands to reduce collision risks, particularly between turning vehicles and vulnerable road users.



Protected Intersection

Photo courtesy of Beyond DC/Flickr

Targeted Crash Type and/or Behavior

Bicycle-related intersection crashes

Facility Type



Intersection

Timeframe



Mid-Term to Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to



Estimated Cost:

\$50,000-250,000+ per intersection

Tier 3: \$ >\$500,000

Source: <https://www.arlingtonva.us/Government/Programs/Transportation/Vision-Zero/Tools-and-Guidelines/Multimodal-Safety-Engineering-Toolbox-Web-Format/Protected-Intersections>



Street space repurposed into pedestrian-friendly areas such as plazas or small parks (parklets), often in urban settings, to enhance public space while improving delineation for driving lanes.



Public Plaza/Parklet

Photo courtesy of Seattle DOT Photos/Flickr

Targeted Crash Type and/or Behavior

Pedestrian-related crashes; angle crashes, rear-end crashes; speed-related crashes

Facility Type



Street Intersection

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts
Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$

<\$149,999 to

Estimated Cost:

\$20,000-

Tier 2: \$ \$

\$150,000 - \$499,999

\$150,000 per unit



Source: <https://nacto.org/publication/urban-street-design-guide/interim-design-strategies/parklets/>



A Raised Crosswalk is an elevated pedestrian crossing designed to slow vehicle speeds, improve visibility of pedestrians, and enhance safety by aligning the crossing with the sidewalk level. It acts as a traffic calming measure.



Raised Crosswalk

Photo courtesy of Arnold Reinhold/Wikimedia Commons

Targeted Crash Type and/or Behavior

Pedestrian and bicycle-related crashes

Facility Type



Street Intersection

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

46% (pedestrian crashes)

Fatality/Injury

46%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$

<\$149,999

Estimated Cost:

\$5,000-

\$30,000 per unit



Source: CMF Clearinghouse: <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=136>

61 Rectangular Rapid Flashing Beacons (RRFB)



Flashing beacons activated by pedestrians at unsignalized crosswalks to alert drivers of pedestrian presence, increasing crossing visibility and safety.



Flashing Rectangular Beacon

Photo courtesy of Seattle Lara Justine/Flickr

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Street Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

47.4% (pedestrian)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$10,000 - \$100,000 per unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9024>

62 Restripe Crosswalks and Stop Bars



Crosswalks and stop bars repainted to improve visibility and encourage drivers to be aware of pedestrian crossing areas and where to stop.



Restripe crosswalks/stop bars

Photo courtesy of Mario Cuadros/Pexels

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

8.3%-18.9%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$1,000-\$5,000 per unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=8955>



63 Separated Bicycle Lanes



Physically separated bicycle lanes prevent interactions with motor vehicles, improving safety for cyclists by reducing collision risks.



Separated Bicycle Lane

Targeted Crash Type and/or Behavior

Bicycle-related crashes

Facility Type



Street

Timeframe



Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

30-49%; 53%- Bicycle/Vehicle crashes

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$50,000-
\$500,000 per
mile

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/bicycle-lanes>

64 Shorter Signal Cycle Length



Reduced cycle length to decrease pedestrian and bicyclist wait times, making it safer and more efficient for pedestrians to cross intersections, and ultimately reducing non-intersection pedestrian crossings.



Shorter Signal Cycle Length
Photo courtesy of Ryan Smith/Flickr

Targeted Crash Type and/or Behavior

Bicycle and pedestrian-related intersection crashes

Facility Type



Intersection

Timeframe



Design Hierarchy Tier

Tier 3: Manage Conflicts in Time

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

37%

Fatality/Injury

12%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Tier 2: \$\$\$ \$150,000 - \$499,999



Estimated Cost:

\$30,000 to
\$250,000 per
intersection
(if new signal
required to add
APS/CPS)

Source: CCMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=383>



65 Sidewalks and Shared-Use Paths



Designated pathways for pedestrians or multiple users (e.g., cyclists and pedestrians), often separated from traffic to provide safe travel alternatives for non-motorized users.



Sidewalks/Shared-Use Path

Photo courtesy of Phil Champion/Wikimedia Commons

Targeted Crash Type and/or Behavior

Pedestrian and bicycle-related crashes

Facility Type



Street

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

Sidewalks (65-89%)- Pedestrians; Paved Shoulders (71%) - Pedestrian crashes

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$100,000-\$4.5M per mile

Source: FHWA; https://highways.dot.gov/sites/fhwa.dot.gov/files/Walkways_508.pdf

66 Transverse Striping and Curb Extensions Using Flex-Posts or Bollards



Transverse striping and flex posts used to change the dimensions of driving lanes within the right-of-way. Typical applications include temporary islands, median extensions, chicanes, tightened intersection turning radii, and buffers between different user types.



Transverse Striping and Flex-Post/Bollard Curb Extensions

Photo courtesy of Tricky Shork/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes; pedestrian-related crashes; angle crashes

Facility Type



Street



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

34%

Fatality/Injury

36% (A,B,C)



Property Damage Only

28%



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500- \$5,000 per unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=138>





Signs (MUTCD R10-15) remind drivers to yield to pedestrians when turning at intersections, enhancing safety by reducing conflicts between vehicles and crossing pedestrians.



Turning Vehicles Yield To Pedestrians

Photo courtesy of elvis901/Adobe Stock

Targeted Crash Type and/or Behavior

Pedestrian-related crashes

Facility Type



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

25% (Pedestrian crashes)

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



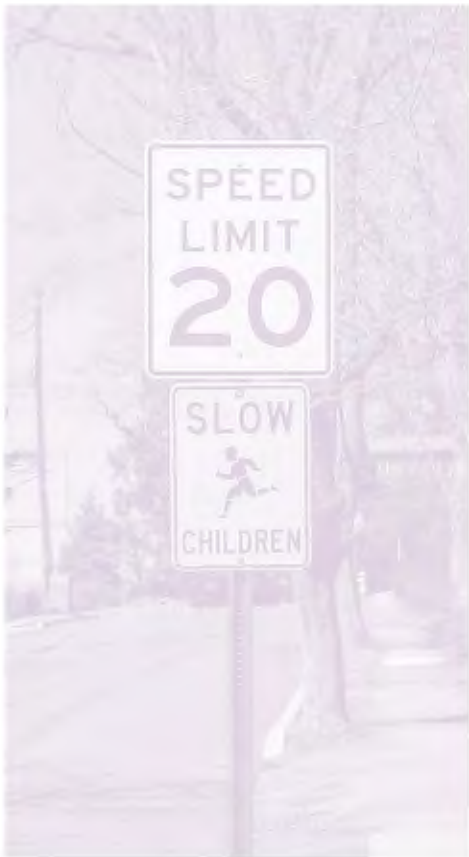
Estimated Cost:

\$500 - \$2,000
per unit
(overhead/mast-mounted signs
will cost more)

Source: <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9017>



Speed Management Countermeasures





This measure equips horse-drawn buggies with visibility aids like lights, reflective triangles, and vests. These additions help motor vehicles spot and safely navigate around buggies on shared roads, reducing collision risks.



Amish Safety Feature: Buggy Sign
Photo courtesy of Aaron J Hill/Adobe Stock

Targeted Crash Type and/or Behavior

Safety for motorized and non-motorized vehicles within the Amish community

Facility Type



Street

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$500 per community member or \$1,500 per mile for signs on both sides of roadway

Source: NA



Speed limits that reflect road type, surrounding environment/land use, and traffic volume help manage driving speeds, reduce crash severity, and accommodate all road users safely.



Appropriate Speed Limits for All Road Users
Photo courtesy of ansyvan/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes

Facility Type



Street

Timeframe



Med-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

26%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

New signs & posts \$500 - \$1,500 per unit

Source: <https://safety.fhwa.dot.gov/provencountermeasures/appropriate-speed-limits.cfm>

70 Chicanes



Alternating curb extensions or other design features along a road create a winding pattern, slowing traffic by encouraging drivers to reduce speed.



Chicanes

Photo courtesy of Zigmunds/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes

Facility Type



Street

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999

Tier 2: \$ \$ \$150,000 - \$499,999



Estimated Cost:

\$10,000-\$50,000 per unit, assume multiple units installed

Source: NA

71 Horizontal Curve Delineation incl. Chevron Signs (Optional Radar Activated Flashing Border)



Visual cues and markings that enhance the visibility of curved road sections, guiding drivers safely through these areas. Chevron-shaped signs marking curves, often with radar-activated flashing features, to alert drivers to reduce speed in advance of sharp turns.



Horizontal Curves/Chevron Signing

Photo courtesy of Suthin/Adobe Stock

Targeted Crash Type and/or Behavior

Roadway departure crashes

Facility Type



Street

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Suburban



Rural

High Level Safety Benefit (CRF) - Total

35%-44%

Fatality/Injury

15%-60%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

Static signs \$500-\$1,000 per unit, radar-activated flashing signs \$2,500-\$8,000 per unit, pavement markings \$10,000 per mile

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10362> FHWA; https://safety.fhwa.dot.gov/provencountermeasures/enhanced_delineation.cfm#psc-footnote





Reconfiguration of travel lanes, often converting a four-lane road to two through lanes and a center left-turn lane, which calms traffic, improves safety, and creates space for bike lanes or wider sidewalks.



Road Diet

Photo courtesy of Complete Streets/Flickr

Targeted Crash Type and/or Behavior

Speed-related crashes; rear-end crashes; sideswipe crashes; pedestrian-related crashes

Facility Type



Street

Timeframe



Long-Term

Design Hierarchy Tier

Tier 1: Remove Severe Conflicts

Tier 2: Reduce Vehicle Speeds

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

19-47%

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):



Tier 2: \$ \$ \$150,000 - \$499,999 to

Tier 3: \$ \$ \$ \$ >\$500,000

Estimated Cost:

\$150,000 - \$1M per mile

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/road-diets-roadway-reconfiguration>



Raised sections of pavement used on low-speed roads (usually <5,000 annual average daily traffic) to slow vehicles and improve safety in residential or pedestrian-heavy areas.



Speed Hump

Photo courtesy of Richard Drdul/Wikimedia Commons

Targeted Crash Type and/or Behavior

Speed-related crashes; intersection crashes; rear-end crashes; pedestrian-related crashes

Facility Type



Street

Timeframe



Short-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

NA

Fatality/Injury

NA



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$1,000 - \$10,000 per unit

Source: <https://nacto.org/publication/urban-street-design-guide/street-design-elements/vertical-speed-control-elements/speed-cushion/>



Cameras or radar systems that monitor vehicle speeds, helping to enforce speed limits and reduce speeding-related crashes by deterring violations.



Speed Safety Cameras

Photo courtesy of Andrei Armiogov/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes

Facility Type



Street

Timeframe



Mid-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

54%

Fatality/Injury

48%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999 to

Tier 2: \$ \$ \$ \$150,000 - \$499,999



Estimated Cost:

\$100,000 -

\$350,000 per unit

Source: FHWA; https://highways.dot.gov/sites/fhwa.dot.gov/files/Speed%20Safety%20Cameras_508.pdf



Strips running across the roadway (typically before intersections or stop signs) to alert drivers with sound and vibration, helping to reduce speeds and increase awareness. Strips can either be traditional rumble strip grooves in pavement or installed raised rubber or plastic strips.



Transverse Rumble Strips

Photo courtesy of trainmon111/Adobe Stock

Targeted Crash Type and/or Behavior

Nighttime crashes; speed-related crashes; pedestrian-related crashes; distracted driving and attentiveness mitigation

Facility Type

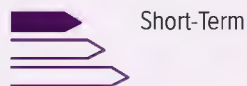


Street



Intersection

Timeframe



Short-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

13%

Fatality/Injury

29%



Property Damage Only

14%



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$2,000 -

\$3,000 per unit

Source: CMF Clearinghouse; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9046>

76 Variable Speed Limits



Speed limits that adjust based on real-time road conditions (e.g., weather, traffic volume), enhancing safety by reducing speed differentials between vehicles.



Variable Speed Limits

Photo courtesy of Wonderlane/Flickr

Targeted Crash Type and/or Behavior

Speed-related crashes

Facility Type



Street

Timeframe



Mid-Term to Long-Term

Design Hierarchy Tier

Tier 2: Reduce Vehicle Speeds
Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Core



Urban Center



Suburban Activity Center

High Level Safety Benefit (CRF) - Total

34%

Fatality/Injury

51%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Tier 3: \$\$\$ >\$500,000

Estimated Cost:

\$50,000-\$500,000 per unit

Source: FHWA; <https://highways.dot.gov/safety/proven-safety-countermeasures/variable-speed-limits>

77 Wider Edge Lines



Wider white edge lines improve lane visibility and support lane-keeping, particularly in low-light or adverse weather conditions.



Wider Edge Lines

Photo courtesy of Ionu Arius/Adobe Stock

Targeted Crash Type and/or Behavior

Speed-related crashes; run-off-road crashes; head-on crashes; nighttime crashes

Facility Type



Street

Timeframe



Short-Term

Design Hierarchy Tier

Tier 4: Increase Attentiveness and Awareness

Applicable Context Zone



Urban Center



Town Center



Suburban Activity Center



Suburban



Rural

High Level Safety Benefit (CRF) - Total

37%

Fatality/Injury

42%



Property Damage Only

NA



Cost

Cost Tier Level (1-3):

Tier 1: \$ <\$149,999



Estimated Cost:

\$1,500 - \$2,500 per mile

Source: FHWA; <https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=4737>





Resolution #2025-###

By the Committee of the Whole
Resolved by the City Council of the City of Lansing

WHEREAS, traffic-related fatalities and serious injuries are preventable and represent a significant public health concern; and

WHEREAS, the City of Lansing is committed to ensuring the safety and well-being of all roadway users, including pedestrians, cyclists, motorists, and transit riders; and

WHEREAS, the City received Safe Streets for All grant funding from the United States Department of Transportation for the development of a citywide Safety Action Plan; and

WHEREAS, Lansing's Safety Action Plan has been developed through a data-driven, community-informed process that identifies high-risk corridors, vulnerable populations, and evidence-based strategies to reduce traffic-related impacts; and

WHEREAS, the Plan outlines a goal to eliminate traffic fatalities and serious injuries by 2050, and includes actionable steps such as infrastructure improvements, speed management, public education, and enhanced enforcement;

WHEREAS, the City held stakeholder and community meetings as well as an online survey and mapping tool to obtain input on the citywide Plan; and

WHEREAS, the draft Safety Action Plan was published on the City's website for public input and comment through an online survey; and

WHEREAS, the grant requires adoption of the Plan no later than June 30, 2025; and

WHEREAS, the City will monitor progress regularly, engage the public in ongoing safety efforts, and update the Plan as needed to reflect new data, technologies, and community priorities.

NOW, THEREFORE, BE IT RESOLVED, that the Lansing City Council hereby adopts the Lansing Safety Action Plan as the guiding framework for roadway safety improvements across the city; and

BE IT FINALLY RESOLVED, that the City include a copy of this resolution in its submittal of the Safety Action Plan to the USDOT.

Resolution #2025-###

By the Committee of the Whole
Resolved by the City Council of the City of Lansing

WHEREAS, the City of Lansing (the “City”) and the City of East Lansing (“East Lansing”) established a Local Development Finance Authority (the “LDFA”) in 2005, and renewed the same in 2022 pursuant to Act 57 of 2018 (the “Act”); and

WHEREAS, the City and East Lansing entered into an Amendment and Restated Agreement Regarding the Operation of the Local Development Finance Authority of the Cities of Lansing and East Lansing (the “Agreement”) in 2022; and

WHEREAS, the Agreement, consistent with the Act, requires that the City and East Lansing both approve the annual budget of the LDFA; and

WHEREAS, the LDFA has preliminarily approved its budget for Fiscal Year Ending 2026 (the “Budget”) and submitted it to the City for approval, attached hereto; and

WHEREAS, upon review the Lansing Economic Development Corporation finds that the Budget reflects no capture of City taxes or use of City funds.

NOW, THEREFORE BE IT RESOLVED, that the Lansing City Council hereby approves the adoption of the Budget by the LDFA.

Lansing Regional SmartZone - Joint Local Development Finance Authority

Fiscal Year July 1, 2025 - June 30, 2026

Affiliated Agency Budget - LDFA/SmartZone

		FYE 2024 - Adopted Budget	FYE 2024 - Actuals	FYE 2025 - Adopted Budget	FYE 2025 - Projected Budget	FYE 2026 - Proposed Budget
General Operating Income						
42000	Property Tax Capture	\$ 478,110.00	\$ 477,112.88	\$ 482,891.10	\$ 482,891.10	\$ 487,720.01
	- City of East Lansing capture	\$ 478,110.00	\$ 477,112.88	\$ 482,891.10	\$ 482,891.10	\$ 487,720.01
	- City of Lansing capture	\$ -		\$ -		\$ -
	- TIF Capture Adjustment (Adjustment factor)	\$ (47,811.00)		\$ (48,289.11)		\$ (48,772.00)
45030	Investments	\$ -	\$ 145.33			
Total General Operating Income		\$ 430,299.00	\$ 477,258.21	\$ 434,601.99	\$ 482,891.10	\$ 438,948.01
General Operating Expenditures						
60290	Business Registration Fees	\$ 50.00	\$ 20.00	\$ 50.00	\$ 20.00	\$ 50.00
62110	Accounting Fees	\$ 15,000.00	\$ 12,455.00	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00
62140	Legal Fees	\$ 10,000.00	\$ 900.00	\$ 10,000.00	\$ 1,500.00	\$ 10,000.00
62895	Facilities Management	\$ -	\$ 0	\$ -		\$ -
63200	LEAP Contracts (Services and Staff)	\$ 145,000.00	\$ 141,750.00	\$ 152,250.00	\$ 148,837.50	\$ 156,279.38
63300	TIF Capture Adjustment	\$ -	\$ 10,000.00	\$ -		\$ -
63400	LDFA TIC Sponsorship (Base)	\$ 10,000.00	\$ -	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00
63500	LDFA TIC Additional Sponsorship	\$ 10,000.00	\$ -	\$ 10,000.00	\$ -	\$ 10,000.00
63600	TIC development support	\$ 10,000.00	\$ 7,817.00	\$ 10,000.00	\$ 2,500.00	\$ 10,000.00
65020	Postage, Mailing Service	\$ 50.00	\$ -	\$ 50.00	\$ -	\$ 50.00
65040	Supplies	\$ 500.00	\$ 609.84	\$ 500.00	\$ -	\$ 500.00
65070	Bank Fees	\$ 100.00	\$ -	\$ 100.00	\$ -	\$ 100.00
65120	Insurance - Liability, D&O	\$ 3,200.00	\$ 2,513.00	\$ 3,200.00	\$ 3,200.00	\$ 3,200.00
65130	Programs and services (including unrestricted net)	\$ 325,000.00	\$ 311,559.28	\$ 385,000.00	\$ 382,600.00	\$ 383,000.00
65140	Discretionary Payment	\$ 5,000.00	\$ 4,197.54	\$ 5,000.00	\$ 2,000.00	\$ 5,000.00
65145	Unrestricted net position spend down	\$ -	\$ 15,600.00	\$ -		\$ -
65150	LDFA Strategic planning facilitation	\$ -	\$ -	\$ 70,000.00	\$ 2,000.00	\$ 50,000.00
65155	SmartZone development fund (including marketin	\$ 50,000.00	\$ 32,973.62	\$ 80,000.00	\$ 50,000.00	\$ 70,000.00
65160	2021 TIF Plan	\$ -		\$ -		
65165	Staff Support	\$ -	\$ -	\$ -		
65170	Rising Tide fund	\$ 47,811.00	\$ 47,500.00	\$ 48,289.11	\$ 29,500.00	\$ 48,772.00
68320	Travel and Meetings	\$ -	\$ 49.78			
Total Year Spending		\$ 631,711.00	\$ 587,945.06	\$ 799,439.11	\$ 647,157.50	\$ 771,951.38
Net Income		\$ (201,412.00)	\$ (110,686.85)	\$ (364,837.12)	\$ (164,266.40)	\$ (333,003.37)

**AMENDMENT NO. 8 TO AGREEMENT
BETWEEN THE CITY OF LANSING AND
THE BOARD OF WATER & LIGHT**

This Amendment No. 8 is entered as of this 22nd day of May, 2025, by and between the City of Lansing, 124 W. Michigan Ave., Lansing, MI 48933, hereinafter referred to as “City,” and the Board of Water & Light, 1201 South Washington Ave., Lansing, Michigan 48910, hereinafter referred to as “Board.” The City and the Board are each a “Party” and, collectively are the “Parties.”

STATEMENT OF PURPOSE

- A. The Parties entered into an Agreement dated June 30, 1992 (the “Agreement”), a copy of which is attached as **Exhibit A**;
- B. The Parties entered into Amendment No. 1 to the Agreement on December 17th, 2001, which expired June 30, 2012, a copy of which is attached as **Exhibit B**;
- C. The Parties entered into Amendment No. 2 to the Agreement on June 30, 2012, which expired June 30, 2017, a copy of which is attached as **Exhibit C**;
- D. The Parties entered into Amendment No. 3 to the Agreement on December 23, 2013, which increased the Board’s annual payment to the City to 6.1% of its revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12-month period ending May 31st of each year (the “Payment”). A copy of Amendment No. 3 is attached as **Exhibit D**;
- E. Amendment No. 3 also extended the term of the Agreement for an additional year beyond that provided for in Amendment No. 2, such that the Agreement expired June 30, 2018, unless extended in writing by the Board of Commissioners and the City Council of Lansing;
- F. The Parties entered into Amendment No. 4 to the Agreement on July 1, 2018. Amendment No. 4 extended the terms and provisions of the Agreement by an additional two years such that the Agreement expired June 20, 2020, unless extended in writing by the Commissioners of the Board and the City Council of Lansing. A copy of Amendment No. 4 is attached as **Exhibit E**; and
- G. The Parties entered into Amendment No. 5 to the Agreement on July 1, 2020. Amendment No. 5 extended the terms and provisions of the Agreement by an additional two (2) years. Further, the Parties agreed that the Board would pay to the City a fixed dollar amount for each of the Fiscal Years 2020, 2021, and 2022 as follows: FY2020 \$23,100,000; FY2021 \$25,000,000; and FY2022 \$25,000,000. It was also agreed that in addition to the amounts described in the preceding paragraph, for each of FY2021 and FY2022, the Board would pay to the City an amount determined as follows: (the Board’s revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12-month period ending May 31st minus

\$409,836,066) multiplied by 3%). A copy of Amendment No. 5 is attached as **Exhibit F**.

- H. The Parties entered into Amendment No. 6 to the Agreement on July 20, 2022. Amendment No. 6 extended the terms and provisions of the Agreement by an additional two (2) years. Further, the Parties agreed that the Board would pay to the City for the two fiscal years commencing on July 1, 2022, 6% of total Board operating revenues, excluding inter-utility sales, as reported in the Board's audited financial statements. The Parties also agreed that payments by the Board would be made quarterly within 30 days after each quarter's end and any changes to operating revenues or inter-utility sales after a quarterly payment has been made, would be adjusted for in the subsequent quarter's payment. A copy of Amendment No. 6 is attached as **Exhibit G**.
- I. The Parties entered into Amendment No. 7 to the Agreement on August 16, 2024, which extended the term of the Agreement for an additional year. Further, the Parties agreed that the Board would pay to the City for the two fiscal years commencing on July 1, 2023 and July 1, 2024, 6% of total budgeted Board operating revenues, excluding inter-utility sales, as is in effect at the start of each respective fiscal year. The Parties also agreed that payments by the Board would "... be made quarterly by the end of the month following each quarter's end. If this date falls on a weekend or holiday, payment may be made on the next business day. Q4 payment of FY2024 will incorporate the terms above including any difference between payments to date and the total fiscal year amount." A copy of Amendment No. 7 is attached as **Exhibit H**.

Including as modified by this Amendment No. 8, and by the prior Amendments Nos. 1-7, the Parties desire to extend the term of the Agreement.

AGREEMENT

The Parties therefore agree as follows:

- 1) The term of the Agreement is extended by an additional year, such that the Agreement shall automatically terminate on June 30, 2026, unless extended further by the Commissioners of the Board and the City Council of Lansing.
- 2) The Agreement is amended to state that the Board shall make return on equity payments to the City for the fiscal year commencing on July 1, 2025, in the amount of 6% of total budgeted Board operating revenues, as is in effect at the start of fiscal year 2026. If actual operating revenues are higher than budgeted operating revenues, the return on equity payments will be calculated in the amount of 6% of actual operating revenues.
- 3) Payments shall be made quarterly by the end of the month following each quarter's end. If this date falls on a weekend or holiday, payment may be made on the next business day. Q4 payment of FY2026 will incorporate the terms above including any difference between payments to date and the total fiscal year amount.
- 4) This Agreement as amended contains the entire Agreement and any terms, conditions or

provisions not contained in this Agreement as amended are not binding on either Party.

- 5) This Agreement shall inure to the benefit of the Parties to the Agreement.
- 6) This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered except as agreed in writing and executed by both Parties.
- 7) Except as modified in this Amendment No. 8, the Agreement shall remain in full force and effect. Nothing herein releases the Board from any payments it is obligated to make pursuant to the previous amendments to the Agreement.

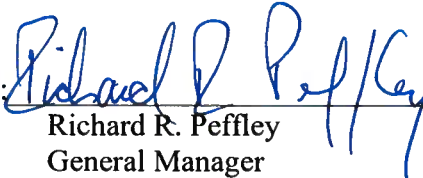
IN WITNESS WHEREOF, the Parties have signed this Amendment No. 8, and it shall become effective on the date first above written.

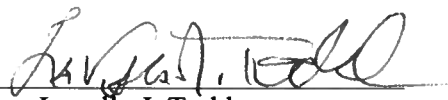
CITY OF LANSING

By: _____
Andy Schor, Mayor

By: _____
Chris Swope, City Clerk

BOARD OF WATER & LIGHT

By: 
Richard R. Peffley
General Manager

By: 
Lavella J. Todd
Corporate Secretary

Approved as to form only:

City Attorney

Approved as to form:


Board of Water & Light
Legal Counsel

Approved as availability of funds:
Account No. 101-674100

Controller

Amc

EXHIBIT A

AGREEMENT
BETWEEN THE CITY OF LANSING AND
THE BOARD OF WATER & LIGHT

AGREEMENT dated the 3rd day of June, 1992, by and between the City of Lansing, hereinafter referred to as "City", and the Board of Water & Light, 123 West Ottawa, Lansing, Michigan 48933, hereinafter referred to as "Board".

WITNESSETH:

WHEREAS, pursuant to the 1978 City Charter, the Board and the City are encouraged to cooperate with each other; and

WHEREAS, Michigan law, specifically, Act 94, Public Acts of 1933, as amended, and various revenue bond covenants contained in revenue bonds issued by the Board provide that the Board shall not offer or furnish free utility service to any entity including the City; and

WHEREAS, pursuant to the 1978 City Charter the City provides to the Board, among other things, use of its streets, alleys, bridges and other public places of the City without compensation and the Board, as an agency of the City, is exempt from property taxation; and

WHEREAS, since 1972 the Board has contributed to the City an annual amount as a return on equity and City Council has now requested the Board to increase the amount it contributes to the City; and

WHEREAS, the Commissioners of the Board of Water & Light have agreed that the payment of a return on equity to the City is in the best interest of its ratepayers; and

WHEREAS, the Commissioners of the Board of Water & Light have offered to the City a proposal to modify the percentage used to calculate the Board's return on equity to the City and has requested the City to deed to the Board the parcel located at 123 W. Ottawa Street in a manner consistent with the City Charter; and

WHEREAS, the Mayor and his staff have reviewed the Board's proposal and recommend that the City Council approve of the Board's proposal;

NOW, THEREFORE, IT IS AGREED:

1. The Board's annual payment of a return on equity to the City for the next ten (10) years commencing on July 1, 1992 shall be 4.0 percent of net billed retail sales from its water, steam heat, and electric utilities for the preceding 12 month period ending May 31 of each year. Subject to the provisions of Act 94 Public Acts of 1933, as amended, and the Board's various bond covenants this amount shall be payable to the City no later than June 30th of each year.
2. In addition to any sums mentioned in paragraphs 1 and 2 of this Agreement the Board shall pay to the City the total sum of \$1,850,000.00 as consideration for a quitclaim deed from the City for the parcel at 123 West Ottawa Street. The quitclaim deed shall be in a form consistent with the 1978 City Charter and the parcel shall be held by the Board for its purposes. The sum of \$1,850,000.00 shall be payable as follows:
 - a. \$1,600,000 shall be paid to the City by the Board no later than June 30, 1992; and
 - b. \$250,000 shall be payable to the City by the Board no later than July 15, 1992.

3. The initial payment of 4.0 percent of the net billed retail sales from the Board's water, steam heat and electric utilities shall be made to the City no later than June 30, 1993, and this initial payment shall be in addition to the sum of \$250,000 which shall be paid to the City no later than July 15, 1992.
4. The City shall convey to the Board by quitclaim deed the parcel at 123 West Ottawa Street no later than June 30, 1992 in a manner consistent with the 1978 City Charter and the parcel shall be held by the Board for its purposes.
5. This Agreement shall automatically terminate on June 30, 2002, unless extended in writing by the Commissioners of the Board and the City Council of the City of Lansing.
6. This Agreement contains the entire Agreement and any terms, conditions or provisions not contained in this Agreement are not binding on either party.
7. This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered unless in writing and executed by both parties to this Agreement.

IN WITNESS WHEREOF the parties have signed this Agreement on the date first above written.

WITNESS:

James E. Ryan
Carolyn L. Hartnuff

CITY OF LANSING

By:

Terry J. McKee
Terry J. McKee, Mayor

By:

James D. Blair
for James D. Blair, City Clerk

WITNESS:

Beverly A. Bishop
Rosemary Sullivan

Approved as to form only:

Alvan P. Knot
Alvan P. Knot
City Attorney

BOARD OF WATER & LIGHT

By: Joseph Pandy, Jr.
Joseph Pandy, Jr.,
Director & General Manager

By: Mary E. Sova
Mary E. Sova,
Corporate Secretary

I hereby certify as to the availability of funds in Account
none required.

Stephen W. Duarte
for STEPHEN W. DUARTE
City Controller

APPROVED AS TO FORM
Laurence F. White
BOARD OF WATER & LIGHT
LEGAL COUNSEL

Resolution No. 92-8-2

ADMINISTRATIVE

WHEREAS, at the regular meeting of June 16, 1992, the Board adopted a resolution authorizing the General Manager and Corporate Secretary to enter into a Return on Equity Agreement with the City of Lansing subject to confirmation by a majority vote of the Board of Commissioners at the next regularly scheduled Board meeting, be it

RESOLVED, That the Agreement between the City of Lansing and the Board of Water and Light, dated June 30, 1992, governing the transfer of a parcel located at 123 W. Ottawa Street and a Return on Equity payment is hereby ratified, confirmed, and approved.

Recommended by Mary E. Sova 8/6/92
Mary E. Sova, Secretary Date

Approved by: Joe Pandey 8/11/92
Joseph Pandey, Jr., General Manager Date

Date Resolved by Board Action: August 25, 1992

**AMENDMENT NO. 1 TO AGREEMENT
BETWEEN THE CITY OF LANSING AND
THE BOARD OF WATER AND LIGHT**

This Amendment No. 1 is entered into as of this 17th day of December by and between the City of Lansing, 124 W. Michigan Avenue, Lansing, Michigan 48933, hereinafter referred to as "City", and the Board of Water and Light, 1232 Haco Drive, Lansing, Michigan 48912, hereinafter referred to as the "Board".

STATEMENT OF PURPOSE

The Parties have entered into an agreement (Agreement) dated June 30, 1992 which is set to expire June 30, 2002, a copy of which is attached as Exhibit A; and

Except as modified by this Amendment No. 1, the Parties desire to extend the terms and provisions of the Agreement (both this Amendment No. 1 and the Agreement are hereinafter referred to as Agreement); and

The Parties acknowledge that ownership of a utility entitles the City to receive certain benefits associated with that ownership; and

The Parties also acknowledge that it is generally accepted practice in the municipal utility industry for municipal utilities, being exempt from property taxes, to make payments to the state or local government.

AGREEMENT

The Parties therefore agree as follows:

- 1) The Board shall make an annual payment to the City for the next ten (10) years commencing on July 1, 2002, in the amount of 4.0 percent of its revenue from retail and wholesale sales of chilled water, electric, steam heat, and water utilities

for the preceding 12 month period ending May 31st of each year. Subject to the provisions of Act 94 Public Acts of 1933, as amended, and the Board's various bond covenants this amount shall be payable to the City no later than June 30th of each year.

- 2) In further consideration of this Agreement, the Board shall additionally pay to the City 4% of its wholesale sales for electricity and water for March-April-May of 2002; such payment will be made before June 30, 2002.
- 3) This Agreement shall automatically terminate on June 30, 2012, unless extended in writing by the Commissioners of the Board and the City Council of the City of Lansing.
- 4) This Agreement contains the entire Agreement and any terms, conditions or provisions not contained in this Agreement are not binding on either party.
- 5) This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered unless in writing and executed by both parties to this Agreement.
- 6) This Agreement shall inure to the benefit of the Parties.
- 7) Except as modified by this Amendment No. 1, the Agreement shall remain in full force and effect.

IN WITNESS WHEREOF the parties have signed this Agreement on the date first above written.

WITNESS:

Linda M. Sanchez
Robert K. Miner

CITY OF LANSING

By: David C. Hollister
David Hollister, Mayor

By: Steve Dougan
Steve Dougan, City Clerk

WITNESS:

Barry A. Bishop
Rosemary Sullivan

BOARD OF WATER & LIGHT

By: Joseph M. Pandey, Jr.
Joseph Pandey, Jr.
Director and General Manager

By: Mary E. Sova
Mary E. Sova
Corporate Secretary

Approved as to form only:

James S. Sienka
James Sienka
City Attorney

I hereby certify that funds are available

Acct. No. none required

James E. Sova
James E. Sova, Principal Accountant
for City Controller

Approved as to form:

Lawrence H. Wilhite
Lawrence H. Wilhite
Board of Water & Light
Legal Counsel

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**AMENDMENT NO. 2 TO AGREEMENT
BETWEEN THE CITY OF LANSING AND
THE BOARD OF WATER AND LIGHT**

This Amendment No. 2 is entered into as of this 30th day of June, 2012, by and between the City of Lansing, 124 W. Michigan Ave., Lansing, MI 48933, hereinafter referred to as "City", and the Board of Water and Light, 1232 Haco Drive, Lansing, Michigan 48912, hereinafter referred to as "Board".

STATEMENT OF PURPOSE

The Parties have entered into an agreement dated June 30, 1992, a copy of which is attached as **Exhibit A**; and

The Parties entered into Amendment No. 1 to the original agreement on December 17th, 2002, which is set to expire June 30, 2012, a copy of which is attached as **Exhibit B**; and

Except as modified by this Amendment No. 2, the parties desire to extend the terms and provisions of the Agreement (this Amendment No. 2, Amendment No. 1, and the original agreement are hereinafter referred to collectively as the "Agreement"); and

The parties acknowledge that ownership of a utility entitles the City to receive certain benefits associated with that ownership; and

The Parties acknowledge that it is generally accepted practice in the municipal utility industry for municipal utilities, being exempt from taxes, to make payments to the state or local government.

AGREEMENT

The Parties therefore agree as follows:

- 1) The Board shall make an annual payment to the City for five (5) years

commencing on July 1, 2012, in the amount of five (5.0%) percent of its revenue from retail and wholesale sales of chilled water, electric, steam heat, and water utilities for the preceding 12 month period ending May 31st of each year (the "Payment").

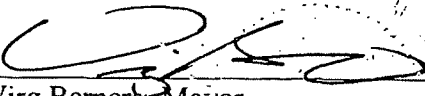
- 2) Subject to the provisions of Act 94 Public Acts of 1933, as amended, and the Board's various bond covenants, the Payment shall be payable to the City no later than June 30th of each year.
- 3) This Agreement shall automatically terminate on June 30, 2017, unless extended in writing by the Commissioners of the Board and the City Council of the City of Lansing.
- 4) This Agreement contains the entire Agreement and any terms, conditions or provisions not contained in this Agreement are not binding on either party.
- 5) This Agreement shall inure to the benefit of the Parties.

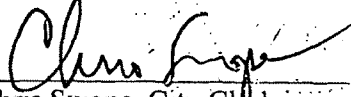
This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered unless in writing and executed by both parties to this agreement.

- 6) Except as modified in this Amendment No. 2, the original agreement and Amendment No. 2 shall remain in full force and effect. Nothing herein releases the Board from any payments it is obligated to make pursuant to the previously entered agreement and amendment.

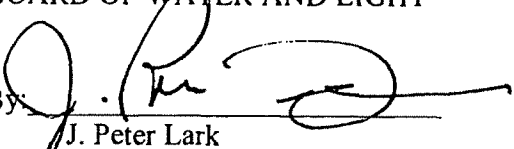
IN WITNESS WHEREOF the parties have signed this Agreement on the date first above written.

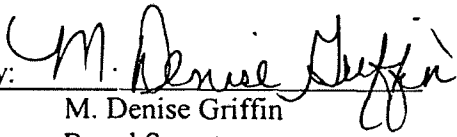
CITY OF LANSING

By: 
Virg Bernero, Mayor

By: 
Chris Swope, City Clerk

BOARD OF WATER AND LIGHT

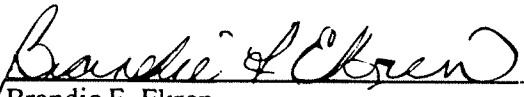
By: 
J. Peter Lark
Director and General Manager

By: 
M. Denise Griffin
Board Secretary

Approved as to form only:


City Attorney

Approved as to form:


Brandie F. Ekren
Board of Water and Light
Legal Counsel

**AMENDMENT NO. 3 TO AGREEMENT
BETWEEN THE CITY OF LANSING AND
THE BOARD OF WATER AND LIGHT**

This Amendment No. 3 ("Amendment #3") is entered into as of this 23rd day of December, 2013, by and between the City of Lansing, 124 W. Michigan Ave., Lansing, MI 48933, hereinafter referred to as "City", and the Board of Water and Light, 1232 Haco Drive, Lansing, Michigan 48912, hereinafter referred to as "Board".

STATEMENT OF PURPOSE

The Parties have entered into an agreement dated June 30, 1992, a copy of which is attached as **Exhibit A**; and

The Parties entered into Amendment No. 1 to the original agreement on December 17th, 2002, which was set to expire June 30, 2012, a copy of which is attached as **Exhibit B** ("Amendment #1"); and

The Parties entered into Amendment No. 2 to the original agreement on June 30, 2012, which was set to expire June 30, 2017, a copy of which is attached as **Exhibit C** ("Amendment #2"); and

Except as modified by this Amendment No. 3, the parties desire to extend the terms and provisions of the Agreement (this Amendment No. 3, Amendment No. 2, Amendment No. 1 and the original agreement are hereinafter referred to collectively as the "Agreement") by an additional year and increase the annual payment to the City for the remainder of the term; and

The parties acknowledge that ownership of a utility entitles the City to receive certain benefits associated with that ownership; and

The Parties acknowledge that it is generally accepted practice in the municipal utility industry for municipal utilities, being exempt from taxes, to make payments to the state or local government.

AGREEMENT

The Parties therefore agree as follows:

- 1) The term of Amendment No. 2, which is currently set to expire June 30, 2017, is extended to June 30, 2018.
- 2) The Board shall make payments to the City for the remaining five (5) years commencing on July 1, 2013, in the amount of six point one (6.1%) percent of its revenue from retail and wholesale sales of chilled water, electric, steam heat, and water utilities for the preceding 12 month period ending May 31st of each year (the "Payment").
- 3) Subject to the provisions of Act 94 Public Acts of 1933, as amended, and the Board's various bond covenants, the Payment shall be payable to the City in semi-annual installments due no later than thirty (30) days following each one-half (1/2) year this Agreement is in effect:

December 1 (estimated)
June 30 – to include reconciliation for entire fiscal year

The June 1 payment shall constitute the difference between the estimated payment for the first one-half (1/2) year and the actual calculated amount for the entire fiscal year.
- 4) This Agreement shall automatically terminate on June 30, 2018, unless extended in writing by the Commissioners of the Board and the City Council of the City of Lansing.

5) This Agreement contains the entire Agreement and any terms, conditions or provisions not contained in this Agreement are not binding on either party.

6) This Agreement shall inure to the benefit of the Parties.

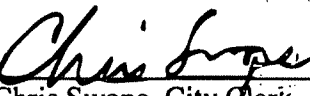
This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered unless in writing and executed by both parties to this agreement.

7) Except as modified in this Amendment No. 3, the original agreement and amendments shall remain in full force and effect. Nothing herein releases the Board from any payments it is obligated to make pursuant to the previously entered agreement and amendments.

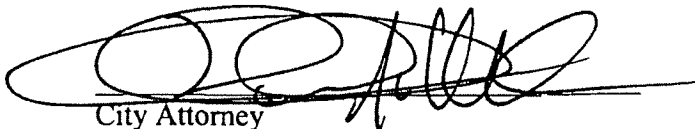
IN WITNESS WHEREOF the parties have signed this Agreement on the date first above written.

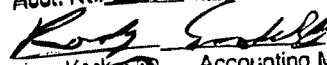
CITY OF LANSING

By: 
Virg Bernero, Mayor

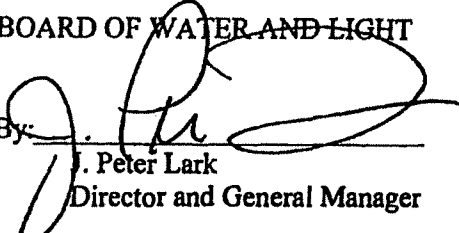
By: 
Chris Swope, City Clerk

Approved as to form only:


City Attorney

I hereby certify that funds are available
Acct. No. 101-674100

Tom Korkoske Accounting Manager

BOARD OF WATER AND LIGHT

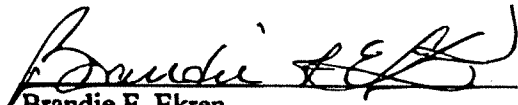
By: 

J. Peter Lark
Director and General Manager

By: 

M. Denise Griffin
Board Secretary

Approved as to form only:



Brandie F. Ekren
Board of Water and Light Legal Counsel

**AMENDMENT NO. 4 TO AGREEMENT
BETWEEN THE CITY OF LANSING AND
THE BOARD OF WATER AND LIGHT**

This Amendment No. 4 ("Amendment No. 4") is entered into as of this 1ST day of JULY, 2018 by and between the City of Lansing, 124 W. Michigan Ave., Lansing, MI 48933, hereinafter referred to as "City", and the Board of Water and Light, 1232 Haco Drive, Lansing, Michigan 48912, hereinafter referred to as "Board".

STATEMENT OF PURPOSE

- A. The Parties entered into an original agreement, dated June 30, 1992, a copy of which is attached as **Exhibit A**.
- B. The Parties extended the original agreement by Amendment No. 1, dated December 17th, 2002, which expired June 30, 2012; by Amendment No. 2, dated June 30, 2012, which expired June 30, 2017; and by Amendment No. 3, dated December 23, 2013, which is set to expire June 30, 2018. A copy of Amendment No. 3 is attached as **Exhibit B**.
- C. As modified by this Amendment No. 4, the Parties desire to extend the terms and provisions of the original agreement, as extended and modified by Amendments No. 1, No. 2, and No. 3, by this Amendment No. 4 (collectively "this Agreement") through June 30, 2020 to and continue the annual 6.1% Payment to the City for the remainder of this term.
- D. The Parties acknowledge that ownership of a utility entitles the City to receive certain benefits associated with that ownership, and that it is generally acceptable practice in

the municipal utility industry for municipal utilities, being exempt from taxes, to make payments to the state or local government.

AGREEMENT

The Parties, therefore, in acknowledgement and reliance on the Statement of Purpose and in consideration of the mutual covenants herein contained, agree as follows:

- 1) The term of Amendment No. 3, which is currently set to expire June 30, 2018, is extended to June 30, 2020.
- 2) The Board shall extend its payments to the City, under this Agreement, commencing on July 1, 2018 through June 30, 2020, in the continued amount equal to six point one (6.1%) percent of its revenue from retail and wholesale sales of chilled water, electric, steam heat, and water utilities for the proceeding 12 month period ending May 31st of each year (the "Payment").
- 3) Subject to the provisions of Act 94 Public Acts of 1933, as amended, and the Board's various bond covenants, the Payment shall be payable to the City in semi-annual installments due no later than thirty (30) days following each one/half (1/2) year that this Agreement is in effect as follows:

First ½ year – June 1 to December 1 of each Payment year – to be an estimated payment;

Second ½ year – December 2 to May 31 of each Payment year – to include reconciliation payment for entire fiscal year.

The May 31 payment date calculation shall constitute the difference between the estimated payment for the first one-half (1/2) year and the actual calculated amount for the entire fiscal year.

- 4) This Agreement shall automatically terminate on June 30, 2020, unless extended in writing by the Commissioners of the Board and the City Council of the City of Lansing.
- 5) This Agreement contains the entire agreement and any terms, conditions or provisions not contained in this Agreement are not binding on either party.
- 6) This Agreement shall inure the benefit of the Parties. This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered unless in writing and executed by both parties to this Agreement.
- 7) Except as modified in this Amendment No. 4, the original agreement and Amendments No. 1, No. 2 and No. 3 shall remain in full force and effect. Nothing herein releases the Board from any payments it is obligated to make pursuant to the previously entered original agreement and Amendments No. 1, No. 2 and No. 3.

IN WITNESS WHEREOF the parties have signed this Agreement on the date first above written.

CITY OF LANSING

By: _____

Andy Schor, Mayor

By: _____

Chris Swope, City Clerk

Approved as to form only:

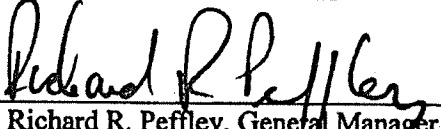

James D. Smerka, City Attorney

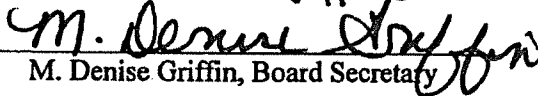
I hereby certify that funds are available

Acct. No. N/A


Randy Endsley, Accounting Manager

BOARD OF WATER AND LIGHT

By: 
Richard R. Peffley, General Manager

By: 
M. Denise Griffin, Board Secretary

Approved as to form only:

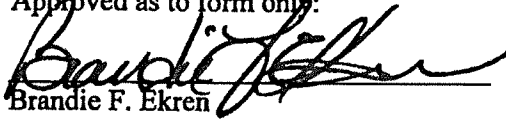

Brandie F. Ekren
Board of Water and Light Legal Counsel

EXHIBIT F

AMENDMENT NO. 5 TO AGREEMENT BETWEEN THE CITY OF LANSING AND THE BOARD OF WATER AND LIGHT

This Amendment No. 5 is entered as of this 1st day of July, 2020, by and between the City of Lansing, 124 W. Michigan Ave., Lansing, MI 48933, hereinafter referred to as "City", and the Board of Water and Light, 1201 South Washington Ave., Lansing, Michigan 48910, hereinafter referred to as "Board". The City and the Board are each a "Party" and, collectively are the "Parties".

STATEMENT OF PURPOSE

- A. The Parties entered into an Agreement dated June 30, 1992 (the "Agreement"), a copy of which is attached as **Exhibit A**; and
- B. The Parties entered into Amendment No. 1 to the Agreement on December 17th, 2001, which expired June 30, 2012, a copy of which is attached as **Exhibit B**; and
- C. The Parties entered into Amendment No. 2 to the Agreement on June 30, 2012, which expired June 30, 2017, a copy of which is attached as **Exhibit C**;
- D. The Parties entered into Amendment No. 3 to the Agreement on December 23, 2013, which increased the Board's annual payment to the City to 6.1% of its revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12 months period ending May 31st of each year (the "Payment"). A copy of Amendment No. 3 is attached as **Exhibit D**, and
- E. Amendment No. 3 also extended the term of the Agreement for an additional year beyond that provided for in Amendment No.2, such that the Agreement expired June 30, 2018, unless extended in writing by the Board of Commissioners and the City Council of Lansing.
- F. The Parties entered into Amendment No. 4 to the Agreement on July 1, 2018. Amendment No. 4 extended the terms and provisions of the Agreement by an additional two years such that the Agreement expires June 20, 2020, unless extended in writing by the Commissioners of the Board and the City Council of Lansing. A copy of Amendment No. 4 is attached as **Exhibit E**.

Including as modified by this Amendment No. 5, and by the prior Amendments No.s 1 – 4, the Parties desire to extend the terms and provisions of the Agreement by an additional two (2) years. Further, the Parties agree that the Board will pay to the City a fixed dollar amount for each of the Fiscal Years 2020, 2021, and 2022 as follows: FY2020 \$23,100,000; FY2021 \$25,000,000; and FY2022 \$25,000,000.

In addition to the amounts described in the preceding paragraph, for each of FY2021 and FY2022, the Board shall pay to the City an amount determined as follows:

(the Board's revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12 months period ending May 31st minus \$409,836,066) multiplied by 3%.

For purposes of illustration only:

In FY 2021, the Board will pay to the City \$25,000,000.

In addition, assuming the Board's revenues for the prior year ending May 2021 are \$420,000,000, the additional revenue calculation payable to the City would be:

$$\$420,000,000 - \$409,836,066 = \$10,163,934.$$

$$\$10,163,934 \times 3\% = \$304,918 \text{ payable to the city, in addition to } \$25,000,000.$$

If this calculation results in a negative number or zero (0), no additional payment will be required.

AGREEMENT

The Parties therefore agree as follows:

- 1) The terms of the Agreement are extended by an additional two years, such that the Agreement shall automatically terminate on June 30, 2022, unless extended further by the Commissioners of the Board and the City Council of Lansing.
- 2) The Agreement as amended contains the entire Agreement and any terms, conditions or provisions not contained in this Agreement as amended are not binding on either Party.
- 3) This Agreement shall inure to the benefit of the Parties to the Agreement.
- 4) This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered except as agreed in writing and executed by both Parties.
- 5) Except as modified in this Amendment No. 5, the Agreement shall remain in full force and effect. Nothing herein releases the Board from any payments it is obligated to make pursuant to the previous amendments to the Agreement.

[Signature page follows]

IN WITNESS WHEREOF the parties have signed this Amendment No. 5, and it shall become effective on the date first above written.

CITY OF LANSING

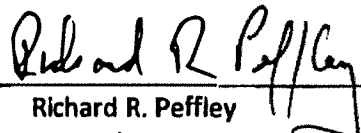
By: 

Andy Schor, Mayor

By: 

for Chris Swope, City Clerk

BOARD OF WATER AND LIGHT

By: 

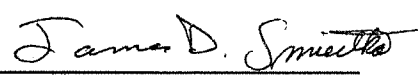
Richard R. Peffley
General Manager

By: 

M. Denise Griffin
Corporate Secretary

Digitally signed by M. Denise Griffin
DN: cn=M. Denise Griffin, o=Lansing
Board of Water and Light, ou,
email=MDenise.Griffin@lbwl.com,
c=US
Date: 2020.07.23 15:02:05 -04'00'

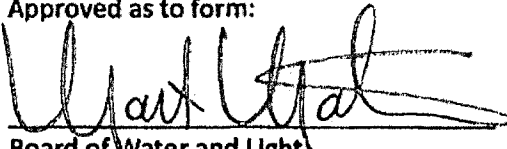
Approved as to form only:



City Attorney and Number P20608

076492.000026 4822-8219-0010.3

Approved as to form:



Board of Water and Light
Legal Counsel

EXHIBIT G

AMENDMENT NO. 6 TO AGREEMENT BETWEEN THE CITY OF LANSING AND THE BOARD OF WATER & LIGHT

This Amendment No. 6 is entered as of this 20th day of July, 2022, by and between the City of Lansing, 124 W. Michigan Ave., Lansing, MI 48933, hereinafter referred to as "City," and the Board of Water & Light, 1201 South Washington Ave., Lansing, Michigan 48910, hereinafter referred to as "Board." The City and the Board are each a "Party" and, collectively are the "Parties."

STATEMENT OF PURPOSE

- A. The Parties entered into an Agreement dated June 30, 1992 (the "Agreement"), a copy of which is attached as **Exhibit A**;
- B. The Parties entered into Amendment No. 1 to the Agreement on December 17th, 2001, which expired June 30, 2012, a copy of which is attached as **Exhibit B**;
- C. The Parties entered into Amendment No. 2 to the Agreement on June 30, 2012, which expired June 30, 2017, a copy of which is attached as **Exhibit C**;
- D. The Parties entered into Amendment No. 3 to the Agreement on December 23, 2013, which increased the Board's annual payment to the City to 6.1% of its revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12-month period ending May 31st of each year (the "Payment"). A copy of Amendment No. 3 is attached as **Exhibit D**;
- E. Amendment No. 3 also extended the term of the Agreement for an additional year beyond that provided for in Amendment No. 2, such that the Agreement expired June 30, 2018, unless extended in writing by the Board of Commissioners and the City Council of Lansing;
- F. The Parties entered into Amendment No. 4 to the Agreement on July 1, 2018. Amendment No. 4 extended the terms and provisions of the Agreement by an additional two years such that the Agreement expired June 20, 2020, unless extended in writing by the Commissioners of the Board and the City Council of Lansing. A copy of Amendment No. 4 is attached as **Exhibit E**; and
- G. The Parties entered into Amendment No. 5 to the Agreement on July 1, 2020. Amendment No. 5 extended the terms and provisions of the Agreement by an additional two (2) years. Further, the Parties agreed that the Board would pay to the City a fixed dollar amount for each of the Fiscal Years 2020, 2021, and 2022 as follows: FY2020 \$23,100,000; FY2021 \$25,000,000; and FY2022 \$25,000,000. It was also agreed that in addition to the amounts described in the preceding paragraph, for each of FY2021 and FY2022, the Board would pay to the City an amount determined as follows:

(the Board's revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12-month period ending May 31st minus \$409,836,066) multiplied by 3%). A copy of Amendment No. 5 is attached as Exhibit F.

Including as modified by this Amendment No. 6, and by the prior Amendments Nos. 1-5, the Parties desire to extend the term and modify the return on equity payment calculation of the Agreement.

AGREEMENT

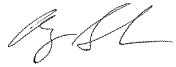
The Parties therefore agree as follows:

- 1) The term of the Agreement is extended by an additional two (2) years, such that the Agreement shall automatically terminate on June 30, 2024, unless extended further by the Commissioners of the Board and the City Council of Lansing.
- 2) The Board shall make return on equity payments to the City for the two fiscal years commencing on July 1, 2022, in the amount of 6% of total Board operating revenues, excluding inter-utility sales, as reported in the Board's audited financial statements.
- 3) Payments shall be made quarterly within 30 days after each quarter's end. Any changes to operating revenues or inter-utility sales after a quarterly payment has been made, such as in the case of a year-end audit adjustment, will be adjusted for in the subsequent quarter's payment.
- 4) This Agreement as amended contains the entire Agreement and any terms, conditions or provisions not contained in this Agreement as amended are not binding on either Party.
- 5) This Agreement shall inure to the benefit of the Parties to the Agreement.
- 6) This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered except as agreed in writing and executed by both Parties.
- 7) Except as modified in this Amendment No. 6, the Agreement shall remain in full force and effect. Nothing herein releases the Board from any payments it is obligated to make pursuant to the previous amendments to the Agreement.

[Signature page follows]

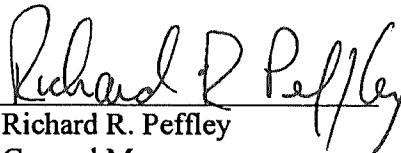
IN WITNESS WHEREOF the parties have signed this Amendment No. 6, and it shall become effective on the date first above written.

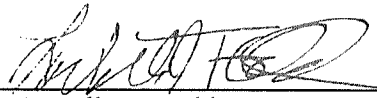
CITY OF LANSING

By: 
Andy Schor, Mayor

By:  7/20/2022
For Chris Swope, City Clerk

BOARD OF WATER & LIGHT

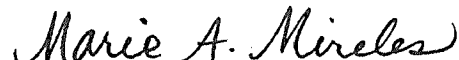
By: 
Richard R. Peffley
General Manager

By: 
LaVella J. Todd
Corporate Secretary

Approved as to form only:


City Attorney

Approved as to form:


Board of Water & Light
Legal Counsel

Approved as availability of funds:

Account No. 101-674100


Controller

AMENDMENT NO. 7 TO AGREEMENT BETWEEN THE CITY OF LANSING AND THE BOARD OF WATER & LIGHT

This Amendment No. 7 is entered as of this 16th day of August, 2024, by and between the City of Lansing, 124 W. Michigan Ave., Lansing, MI 48933, hereinafter referred to as “City,” and the Board of Water & Light, 1201 South Washington Ave., Lansing, Michigan 48910, hereinafter referred to as “Board.” The City and the Board are each a “Party” and, collectively are the “Parties.”

STATEMENT OF PURPOSE

- A. The Parties entered into an Agreement dated June 30, 1992 (the “Agreement”), a copy of which is attached as **Exhibit A**;
- B. The Parties entered into Amendment No. 1 to the Agreement on December 17th, 2001, which expired June 30, 2012, a copy of which is attached as **Exhibit B**;
- C. The Parties entered into Amendment No. 2 to the Agreement on June 30, 2012, which expired June 30, 2017, a copy of which is attached as **Exhibit C**;
- D. The Parties entered into Amendment No. 3 to the Agreement on December 23, 2013, which increased the Board’s annual payment to the City to 6.1% of its revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12-month period ending May 31st of each year (the “Payment”). A copy of Amendment No. 3 is attached as **Exhibit D**;
- E. Amendment No. 3 also extended the term of the Agreement for an additional year beyond that provided for in Amendment No. 2, such that the Agreement expired June 30, 2018, unless extended in writing by the Board of Commissioners and the City Council of Lansing;
- F. The Parties entered into Amendment No. 4 to the Agreement on July 1, 2018. Amendment No. 4 extended the terms and provisions of the Agreement by an additional two years such that the Agreement expired June 20, 2020, unless extended in writing by the Commissioners of the Board and the City Council of Lansing. A copy of Amendment No. 4 is attached as **Exhibit E**; and
- G. The Parties entered into Amendment No. 5 to the Agreement on July 1, 2020. Amendment No. 5 extended the terms and provisions of the Agreement by an additional two (2) years. Further, the Parties agreed that the Board would pay to the City a fixed dollar amount for each of the Fiscal Years 2020, 2021, and 2022 as follows: FY2020 \$23,100,000; FY2021 \$25,000,000; and FY2022 \$25,000,000. It was also agreed that in addition to the amounts described in the preceding paragraph, for each of FY2021 and FY2022, the Board would pay to the City an amount determined as follows:

(the Board's revenue from retail and wholesale sales of chilled water, electric, steam, heat and water utilities for the preceding 12-month period ending May 31st minus \$409,836,066) multiplied by 3%). A copy of Amendment No. 5 is attached as **Exhibit F**.

- H. The Parties entered into Amendment No. 6 to the Agreement on July 20, 2022. Amendment No. 6 extended the terms and provisions of the Agreement by an additional two (2) years. Further, the parties agreed that the Board would pay to the City for the two fiscal years commencing on July 1, 2022, 6% of total Board operating revenues, excluding inter-utility sales, as reported in the Board's audited financial statements. The parties also agreed that payments by the Board would be made quarterly within 30 days after each quarter's end and any changes to operating revenues or inter-utility sales after a quarterly payment has been made, would be adjusted for in the subsequent quarter's payment.

Including as modified by this Amendment No. 7, and by the prior Amendments Nos. 1-6, the Parties desire to extend the term of the Agreement.

AGREEMENT

The Parties therefore agree as follows:

- 1) The term of the Agreement is extended by an additional year, such that the Agreement shall automatically terminate on June 30, 2025, unless extended further by the Commissioners of the Board and the City Council of Lansing.
- 2) The Agreement is amended that the Board shall make return on equity payments to the City for the fiscal years commencing on July 1, 2023 and July 1, 2024, in the amount of 6% of total budgeted Board operating revenues, excluding inter-utility sales, as is in effect at the start of each respective fiscal year.
- 3) Payments shall be made quarterly by the end of the month following each quarter's end. If this date falls on a weekend or holiday, payment may be made on the next business day. Q4 payment of FY2024 will incorporate the terms above including any difference between payments to date and the total fiscal year amount.
- 4) This Agreement as amended contains the entire Agreement and any terms, conditions or provisions not contained in this Agreement as amended are not binding on either Party.
- 5) This Agreement shall inure to the benefit of the Parties to the Agreement.
- 6) This Agreement, or any of its terms or provisions, shall not be waived, modified or otherwise altered except as agreed in writing and executed by both Parties.
- 7) Except as modified in this Amendment No. 7, the Agreement shall remain in full force and effect. Nothing herein releases the Board from any payments it is obligated to make

pursuant to the previous amendments to the Agreement.

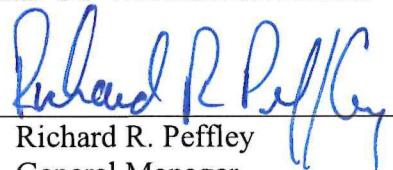
IN WITNESS WHEREOF the parties have signed this Amendment No. 7, and it shall become effective on the date first above written.

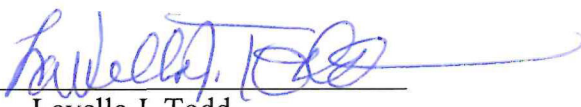
CITY OF LANSING

By: 
Andy Schor, Mayor

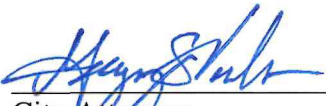
By: 
Chris Swope, City Clerk

BOARD OF WATER & LIGHT

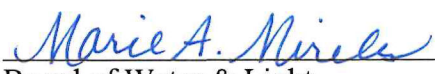
By: 
Richard R. Peffley
General Manager

By: 
Lavella J. Todd
Corporate Secretary

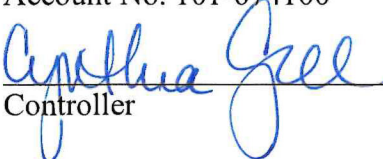
Approved as to form only:


City Attorney

Approved as to form:


Board of Water & Light
Legal Counsel

Approved as availability of funds:
Account No. 101-674100


Controller

RESOLUTION 2025-05-05
Return on Equity (ROE) Renewal

WHEREAS, the City of Lansing has expressed a desire to continue the Agreement Between the City of Lansing and The Board of Water & Light dated June 30, 1992 (the Agreement), which has been subsequently extended by means of seven Amendments thereto in 2001, 2012, 2013, 2018, 2020, 2022 and 2024, respectively; and

WHEREAS, the Board of Commissioners Committee of the Whole (COW) considered the City of Lansing's request on May 13, 2025; and

WHEREAS, the General Manager recommended the Agreement be amended and extended by 1 year at a rate of 6% of total budgeted Board operating revenues. If actual operating revenues are higher than budgeted operating revenues, the return on equity payments will be calculated in the amount of 6% of actual operating revenues, effective July 1, 2025, and will be memorialized as Amendment No. 8; and

WHEREAS, the COW has considered the proposed Amendment No. 8, agreed with the General Manager's recommendation and approved the Amendment, including authorization for the General Manager to execute the Amendment, and the Amendment shall be forwarded to the Board of Commissioners for approval at the May 20, 2025 Board meeting.

THEREFORE, be it:

RESOLVED, the proposed Amendment No. 8 to the Agreement Between the City of Lansing and The Board of Water & Light dated June 30, 1992 is approved, including authorization for the General Manager to execute the Amendment.

Motion by Commissioner Semone James, Seconded by Commissioner Beth Graham, to approve the Return on Equity (ROE) Renewal at a Board meeting held on May 20, 2025.

Roll Call Vote:

Yeas: Commissioners Semone James, Beth Graham, Chris Harkins, DeShon Leek, Tony Mullen, David Price, Dale Schrader, and Sandra Zerkle

Nays: None

Action: Motion Carried.

Resolution #2025-

By the Committee of the Whole
Resolved by the City Council of the City of Lansing

WHEREAS, the City of Lansing ("City") and the Lansing Board of Water and Light ("BWL") entered into an agreement dated June 30, 1992, regarding return on equity payments (the "Agreement"); and

WHEREAS, the Agreement has been amended from time to time for a total of seven amendments; and

WHEREAS, the City and BWL desire to enter into an eighth amendment (the "Eighth Amendment") to extend the term of the Agreement for an additional year commencing July 1, 2025, and terminating on June 30, 2026; and

WHEREAS, the BWL shall make return on equity payments to the City for FY 2026 in the amount of 6% of BWL total budgeted operating revenues, or if actual operating revenues are higher than budgeted, 6% of BWL total actual operating revenues.

NOW, THEREFORE BE IT RESOLVED, that the Eighth Amendment is hereby approved and the Mayor is authorized to execute the same, subject to approval by the City Attorney as to form.

INVESTMENT POLICY

CITY OF LANSING

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The purpose of this Investment Policy (the Policy) is to establish the investment objectives, delegation of authority, standards of prudence, eligible investments and transactions, internal controls, reporting requirements, safekeeping and custodial procedures necessary for the prudent management of City funds.

This Policy has been adopted by Resolution of the Council of the City of Lansing and replaces all previous Investment Policies or Resolutions pertaining to the City's cash and investment management program.

I. Policy:

It is the policy of the City of Lansing (City) to invest public funds in a prudent manner which will provide the preservation of capital, meet the daily liquidity needs of the city, conform to all local laws and state statutes governing the investment of public funds and generate at least market rate or better of return.

II. Scope

This investment policy applies to all investment activities/financial assets of the City of Lansing. These assets are accounted for in the various funds of the City's Comprehensive Annual Financial Report and include:

- General Fund
- Special Revenue Funds
- Internal Service Funds
- Capital Projects Funds
- Debt Service Funds
- Enterprise Funds
- Trust and Agency Funds
- Component Units
- Any new fund created by the city, unless specifically exempted.

This policy does not apply to Defined Benefit Pension funds, Employee Defined Contribution funds, Deferred Compensation funds and VEBA/Retiree Healthcare Trust Fund assets which are administered and invested separately. These funds are not subject to Act 20, P.A. of 1943 as amended.

III. Pooling of Cash and Investments

Cash may be pooled for investment purposes. The investment income derived from the pooled investment account shall be allocated to the contributing funds based upon the proportion of the respective contributing funds average daily balances relative to the total pooled balance in the investment portfolio.

IV. Prudence

Investments shall be made with judgment and care, under circumstances then prevailing, which persons of prudence, discretion and intelligence exercise in the management of their own affairs, not for speculation, but for investment, considering the probable safety of their capital as well as the probable income to be derived.

City Treasurer and/or the City's authorized Investment Advisor Investment Officers acting in accordance with State statute, this Investment Policy and exercising due diligence shall be relieved of personal responsibility for an individual security's risk or market priced changes, provided deviations from expectations are reported to the chief executive in a timely manner and appropriate action is taken to control adverse developments.

V. Investment Objectives

Funds of the City of Lansing shall be invested in accordance with Michigan Public Act 20 of 1943, as amended, MCL 129.91 et seq., and in accordance with the following primary objectives in priority order:

- **Conformance:** Conformance with all applicable Federal regulations, State Statutes and City policies and local rules.
- **Safety:** Investments shall be undertaken in a manner that seeks to preserve capital and protect the investment principal.
- **Liquidity:** The investment portfolio shall remain sufficiently liquid to meet all operating requirements that may be reasonably anticipated.
- **Return on Investment:** The investment portfolio shall be designed with the objective of obtaining a rate of return throughout the budgetary and economic cycles, taking into account the investment risk constraints and the cash flow characteristics of the portfolio.
- **Diversification:** The investments will be diversified by security type and institution in order that potential losses on individual securities do not exceed the income generated from the remainder of the portfolio.

VI. Delegation of Authority to Make Investments

The Treasurer is designated as the City's Investment Officer. The Investment Officer is responsible for managing the City's investment program and for implementing this Investment Policy, together with input, review, and approval of the Director of Finance, or his or her designee, consistent with internal controls.

The Investment Officer may delegate authority to conduct investment transactions and to manage the operation of the investment portfolio to other authorized staff members.

No person may engage in an investment transaction except as provided for in the Investment Policy.

The Investment Officer shall establish procedures and internal controls for the operation of the City's investment program. These procedures and controls are designed to prevent loss of public funds due to fraud, error and imprudent actions.

The City may engage the support services of outside investment advisors with respect to its investment program, so long as it can be demonstrated that these services produce a net financial advantage or necessary financial protection of the city's financial resources.

The Investment Officer is responsible for all transactions undertaken.

VII. Ethics and Conflict of Interest

The Investment Officer and the City's authorized Investment Advisor (if used) shall disclose to the Mayor any material financial interests in financial institutions that conduct business with the City and they shall further disclose any large personal financial investment positions that could be related to the performance of the City's portfolio. The Investment Officer and/or authorize Investment Advisors shall subordinate their personal investment transactions to those of the City, particularly with regard to the timing of purchases and sales.

VIII. Authorized Financial Dealers and Institutions

The Investment Officer will maintain a list of financial institutions and broker/dealers authorized to provide investment services. It shall be the policy to purchase securities only from those authorized firms and agents.

Financial institutions on this list shall be reviewed periodically (not less than yearly) based on rating agency reports.

Financial institutions and broker/dealers who desire to become qualified bidders for investment transactions must supply the Investment Officer with the following:

- audited financial statements,
- proof of National Association of Security Dealers certification, trading resolution, proof of state registration,

Per Section 6 of Michigan's Act 20 of 1943, before executing an investment transaction, an approved financial institution, intermediary, broker or dealer shall be provided with a copy of the City's Investment Policy and shall do the following;

- Acknowledge receipt of the City's Investment Policy
- Agree to comply with the terms of the Investment Policy regarding buying or selling of securities.
- Complete a broker/dealer questionnaire,

A current audited financial statement is required to be on file for each financial institution and broker/dealer through which the City of Lansing invests with.

IX. Authorized and Suitable Investments

Investments for the City of Lansing shall be made in accordance with Act 20 of 1943 as amended, MCL 129.91-129.96, Investment of Surplus Funds of Political Subdivisions, and Act 40 of 1932, as amended, MCL 129.12-129.14, Depositories for Public Moneys. Any revisions or extensions of these statutes will be assumed to be part of this Investment Policy immediately upon being enacted.

This Investment Policy further restricts the investment of City funds to only those securities and transaction as listed below:

- a. U.S. Treasury and U.S. Agency Obligations: Treasury bills, Treasury bonds and Treasury notes, debt securities and other obligations of the United States or an agency or instrumentality of the United States issued by the following: Federal National Mortgage Association (FNMA), Federal Farm Credit Banks (FFCB), Federal Home Loan Banks (FHLB) and Federal Home Loan Mortgage Corporation (FHLMC).
- b. Federal & Agency Instrumentality Securities: Debentures, discount notes, step-up and callable securities, stripped principal or coupons with maturities not exceeding five years from the date of trade settlement issued by the following: Federal National Mortgage Association (FNMA), Federal Farm Credit Banks (FFCB), Federal Home Loan Banks (FHLB) and Federal Home Loan Mortgage Corporation (FHLMC).
- c. Municipal Securities: Obligations of the State of Michigan or any of its subdivisions that are rated at least AA or the equivalent at the time of purchase. Maturities in these investments shall not exceed three years for trade settlement.
- d. Financial Institutions: Certificates of Deposit, savings accounts or deposit accounts in financial institutions as defined in M.C.L. 129.16 “Depositories for Public Money” that are eligible to be a depository of funds for the State of Michigan and Certificates of Deposit that are purchased in accordance with M.C.L. 129.91 guidelines. Certificate of Deposit, savings accounts or deposit accounts exceeding the federally insured amount may be acquired only from financial institutions having a Highline Data Rating of 30 or better for the most recent reporting quarter.
- e. Commercial Paper with an original maturity of 270 days or less, rated at least A2, P-2 or the equivalent at the time of purchase by at least two Nationally Recognized Statistical Rating Organizations (NRSRO)s.

- f. Urban Cooperation Act organized under Act 7 of 1967, MCL 124.501 to 124.512, Urban Cooperation Act of 1967 (Ex Sess.), that are “no-load”; have a constant net asset value per share of \$1.00; limit assets of the fund to securities authorized in MCL 129.91 as legal investments; have a maximum stated maturity and weighted average maturity in accordance with Rule 2a-7 of the Investment Company Act of 1940; and are rated AAA, Aaa or the equivalent by a NSRO.
- g. Investment Pools organized under Act 367 of 1982, MCL 129.111 to 129.118, Surplus Funds Investment Pool Act, that are “no-load”; have a constant net asset value per share of \$1.00; limit assets of the fund to securities authorized in MCL 129.91 as legal investments; have a maximum stated maturity and weighted average maturity in accordance with Rule 2a-7 of the Investment Company Act of 1940; and are rated AAA, Aaa or the equivalent by a NRSRO.
- h. Investment Pools organized under Act 121 of 1985, MCL 129.141 to 129.150, Local Government Investment Pool Act that are “no-load”; have a constant net asset value per share of \$1.00; limit assets of the fund to securities authorized in MCL 129.91 as legal investments; have a maximum stated maturity and weighted average maturity in accordance with Rule 2a-7 of the Investment Company Act of 1940; and are rated AAA, Aaa or the equivalent by a NRSRO.

It is the intent of the City that the foregoing list of authorized securities be strictly interpreted. Any deviation from this list must be pre-approved by the Mayor.

It is the intent of the City to diversify the investments within the portfolio to avoid incurring unreasonable risks inherent in over-investing in specific instruments, individual financial institutions or maturities. The asset allocation in the portfolio should be flexible depending upon the outlook for the economy, the securities markets and the City’s anticipated cash flow needs.

X. Diversification and Maturity Limits

To the extent possible, investments shall be matched with anticipated cash flow requirements. Unless matched to a specific cash flow requirement, the City will not directly invest in securities maturing more than five years from the date of trade settlement, unless authorized by Mayor. If matched to a specific cash flow requirement up to 15% of the City’s total investment portfolio may be placed in securities maturing in more than five years without specific authorization of the Mayor.

XI. Safekeeping and Custody

All securities purchased by the City of the Lansing under this policy shall be properly designated as an asset of the City of Lansing. No withdrawal of such securities, in whole or

in part, shall be made from safekeeping except by the Investment Officer, as authorized herein, or by other authorized investment designees. Investment Officer shall be bonded to protect the public against possible embezzlement and malfeasance.

XII. Internal Control

The Investment Officer shall maintain a system of internal controls which shall be designed, in addition to conforming to generally accepted accounting principles, to minimize losses of public funds arising from fraud, employee error, misrepresentations by third parties, unanticipated changes in financial markets or imprudent actions by employees and officers of the City of Lansing. The Treasurer shall cooperate with the City's external auditor in the annual audit.

XIII. Performance Standards

The investment portfolio will be designed and managed to obtain at least market average or better rate of return during budgetary and economic cycles, taking into account the City's investment risk constraints and cash flow needs. The basis used by the Investment Officer and the City's authorized Investment Advisor(s) to determine whether market yields are being achieved shall be the appropriate index best matching the asset allocation and maturities of the invested funds.

XIV. Reporting

A monthly report will be maintained by the Investment Officer listing the investments held by the City and the current market value of the investment where they are held and final maturity date.

A quarterly report will be submitted to the Mayor illustrating portfolio size, diversity and yield (compared to benchmark) no later than 34 days after the end of the quarter.

A comprehensive year –end report containing all of the information in the quarterly report will be submitted no later than 60 days following the fiscal year end and will also include the following information:

- A listing of individual securities held at the end of the reporting period by authorized fund, investment type and financial institution.
- Average life and final maturity of all investments listed.
- Percentage of the portfolio represented by each investment category an financial institution.

Investment Policy Adoption

The City of Lansing Investment policy shall be adopted by resolution of the City of Lansing x. the policy shall be reviewed annually by the Treasurer, and any proposed modifications to the policy must be approved by the City of Lansing x

GLOSSARY: In order to facilitate a thorough understanding of this investment policy, a glossary of related investment terminology has been incorporated in Appendix (x).

Effective Date

This policy shall become effective on x/x/201x, the day following adoption by the City of Lansing x.

GLOSSARY

In order to facilitate a thorough understanding of this investment policy, a glossary of related investment terminology has been incorporated as part of this policy.

ACT 20 OF 1943: Michigan Laws, regulating municipal investments, as amended.

ACT 196 OF 1997: amended Public Act 20 of 1943.

AGENCIES: Federal agency securities and/or Government-sponsored enterprises.

BENCHMARK: A comparative base for measuring the performance or risk tolerance of the investment portfolio. A benchmark should represent a close correlation to the level of risk and the average duration of the portfolio's investments.

BID: The price offered by a buyer of securities. (When you are selling securities, you ask for a bid.) See Offer.

BROKER: A broker brings buyers and sellers together for a commission.

CERTIFICATE OF DEPOSIT (CD): A time deposit with a specific maturity evidenced by a certificate. Large-denomination CD's are typically negotiable.

COLLATERAL: Securities, evidence of deposit or other property, which a borrower pledges to secure repayment of a loan. Also refers to securities pledged by a bank to secure depositions of public monies.

COMMERICAL PAPER: Short-term obligations with maturities ranging from 2 to 270 days issued by banks, corporations and other borrowers to investors with temporarily idle cash.

COMPREHENSIVE ANNUAL FINANCIAL REPORT (CAFR): The official annual report for the governmental entity. It is prepared in conformance with the principles and standards for financial reporting as set forth by the Governmental Accounting Standards Board (GSAB). It contains three sections: Introductory, Financial and Statistical. It discusses the financial results for the year, provides information on budgetary performance and includes information on the financial condition of the City.

COUPON: (a) The annual rate of interest that a bond's issuer promises to pay the bondholder on the bond's face value. (b) A certificate attached to a bond evidencing interest due on a payment date.

DEALER: A dealer, as opposed to a broker, acts as a principal in all transactions, buying and selling for his own account.

DEBENTURE: A bond secured only by the general credit of the issuer.

DELIVERY VERSUS PAYMENT or RECEIPT: There are two methods of delivery of securities, delivery versus payment and delivery versus receipt. Delivery versus payment is delivery of securities with an exchange of money for the securities. Delivery versus receipt is delivery of securities with an exchange of a signed receipt for the securities.

DERIVATIVES: (1) Financial instruments whose return profile is linked to, or derived from, the movement of one or more underlying index or security, and may include a leverage factor, or (2) financial contracts based upon estimated amounts whose value is derived from an underlying index or security (interest rates, foreign exchange rates, equities or commodities).

DISCOUNT: The difference between the cost price of a security and its maturity when quoted at lower than face value. A security selling below original offering price shortly after sale also is considered to be at a discount.

DISCOUNT SECURITIES: Non-interest-bearing money market instruments that are issued at a discount and redeemed at maturity for full face value, e.g. U.S. Treasury Bills.

DIVERSIFICATION: Dividing investment funds among a variety of securities offering independent returns.

FEDERAL CREDIT AGENCIES: Agencies of the Federal government set up to supply credit to various classes of institutions and individuals, e.g. S&L's, small business firms, students, farmers, farm cooperatives and exporters.

FEDERAL DEPOSIT INSURANCE CORPORATION (FDIC): A federal agency that insures bank deposits, currently up to \$100,000 per deposit.

FEDERAL FUNDS RATE: The rate of interest at which Federal funds are traded. The Federal Reserve through open-market operations currently pegs this rate.

FEDERAL HOME LOAN BANKS (FHLB): The institutions that regulate and lend to saving and loan associations. The Federal Home Loan Banks plays a role similar to that played by the Federal Reserve Banks vis-à-vis member commercial banks.

FEDERAL NATIONAL MORTGAGE ASSOCIATION (FNMA or Fannie Mae): FNMA, like GNMA was chartered under the Federal National Mortgage Association Act in 1938. FNMA is a federal corporation working under the auspices of the Department of Housing and Urban Development (HUD). It is the largest single provider of residential mortgage funds in the United States. Fannie Mae, as the corporation is called, is a private stockholder-owned corporation. The corporation's purchases include a variety of adjustable mortgages and second loans, in addition to fixed-rate mortgages. FNMA's securities are also highly liquid and are widely accepted. FNMA assumes and guarantees that all security holders will receive timely payment of principle and interest.

Federal Reserve Board and five of the twelve Federal Reserve Bank Presidents. The President of the New York Federal Reserve Bank is a permanent member, while the other Presidents serve on

a rotating basis. The Committee periodically meets to set Federal Reserve guidelines regarding purchases and sales of Government Securities in the open market as a means of influencing the volume of bank credit and money.

FEDERAL RESERVE SYSTEM: The central bank of the United States created by Congress and consisting of a seven member Board of Governors in Washington, D.C., 12 regional banks and about 5,700 commercial banks are members of the system.

FINANCIAL INSTITUTION: A state or nationally chartered bank or a state or federally chartered savings and loan association, savings bank, or credit union whose deposits are insured by an agency of the United State government and that maintains a principal office or branch office located in this state under the laws of this state or the United States.

FUNDS: The money of a public corporation, the investment of which is not otherwise subject to a public act of this state or bond authorizing ordinance or resolution of a public corporation that permits investment in fewer than all of the investment options listed in subsection (1) or imposes one or more conditions upon an investment in an option listed in subsection (1) of Section 1 of Act 196 of 1997, amending Act 20 of 1943.

GOVERNMENT NATIONAL MORTGAGE ASSOCIATION (GNMA or Ginnie Mae): Securities influencing the volume of bank credit guaranteed by GNMA and issued by mortgage bankers, commercial banks, savings and loan associations and other institutions. Security holder is protected by full faith and credit of the U.S. Government. Gennie Mae securities are backed by FHA, VA, of FMHA mortgages. The term “pass-throughs” is often used to describe Ginnie Mae’s.

GOVERNING BODY: The legislative body, council, commission, board, or other body having legislative powers of a public corporation.

INVESTMENT: Investments shall be defined as debt obligations and shall not include Certificate of Deposits which should be considered deposits. This is the same definition used by GASB in their Pronouncement Number 40 for disclosure purposes.

LIQUIDITY: A liquid asset is one that can be converted easily and rapidly into cash without a substantial loss of value.

LOCAL GOVERNMENT INVESTMENT POOL (LGIP): The aggregate of all funds from political subdivisions that are placed in the custody of the State Treasurer for investment and reinvestment.

MARKET VALUE: The price at which security is trading and could presumably be purchased or sold.

MASTER REPURCHASE AGREEMENT: A written contract covering all future transactions between the parties to repurchase – reverse purchase agreements that establish each party’s rights

in the transactions. A master agreement will often specify, among other things, the right of the buyer-lender to liquidate the underlying securities in the event of default by the seller-borrower.

MATURITY: The date upon which the principal or stated value of an investment becomes due and payable.

MONEY MARKET: The market in which short-term debt instruments (bills, commercial paper, banker's acceptances, etc.) are issued and traded.

MUTUAL FUNDS: A fund operated by an Investment Company that raises money from shareholders and invests it in stocks, bonds, options, futures, currencies or money market securities. These funds offer investors the advantages of diversification and professional management.

NATIONAL ASSOCIATIONS OF SECURITIES DEALERS: Nonprofit organizations formed under the joint sponsorship of the Investment Bankers Conference and the Securities and Exchange Commission with the basic purpose to (1) standardize practices in the field, (2) establish high moral and ethical standards in securities trading, (3) provide a representative body to consult with the government and investors on matters of common interest and (4) establish a disciplinary body capable of enforcing the above provisions.

OFFER: The price asked by a seller of securities. (When you are buying securities, you ask for an offer.) See ASKED and BID.

OPEN MARKET OPERATIONS: Purchases and sales of government and certain other securities in the open market by the New York Federal Reserve Bank as directed by the FOMC in order to influence the volume of money and credit in the economy. Purchases inject reserves into the bank system and stimulate growth of money and credit; sales have the opposite effect. Open market operations are the Federal Reserve's most important and most flexible monetary policy tool.

PORTFOLIO: Collection of securities held by an investor.

PRIMARY DEALER: A group of government securities dealers who submit daily reports of market activity and positions and monthly financial statements to the Federal Reserve Bank of New York and are subject to its informal oversight. Primary dealers include Securities and Exchange Commission (SEC)- registered securities broker-dealers, banks, and few unregulated firms.

PRUDENT PERSON RULE: An investment standard. In some states, the law requires that a fiduciary, such as a trustee, may invest money only in a list of securities selected by the custody state-the so-called legal list. In other state, the trustee may invest in a security if it one which would be bought by a prudent person of discretion and intelligence who is seeking a reasonable income and preservation of capital.

PUBLIC CORPORATION: A county, city, village, township, port district, drainage district, special assessment district, or metropolitan district of this state, or a board, commission, or another authority or agency created by or under an act of the legislature of this state.

QUALIFIED PUBLIC DEPOSITORIES: A financial institution which does not claim exemption from the payment of any sales or compensating use or ad valorem taxes under the laws of this state, which has segregated for the benefit of the commission eligible collateral having a value of not less than its maximum liability and which has been approved by the Public Deposit Protection Commission to hold public deposits.

RATE OF RETURN: The yield obtained on a security based on its purchase price or its current market price.

REPURCHASE AGREEMENT (RP OR REPO): An agreement of one party to sell securities at a specified price to a second party and a simultaneous agreement of the first party to repurchase.

SAFEKEEPING: A federal reserve bank or other institution, which is qualified to hold securities for safekeeping. A service to customers rendered by banks for a fee whereby securities and valuables of all types and descriptions are held in the bank's vaults for protection.

SECONDARY MARKET: A market made for the purchase and sale of outstanding issues following the initial distribution.

SECURITIES & EXCHANGE COMMISSION: Agency created by Congress to protect investors in securities transactions by administering securities legislation.

SEC RULE 15C3-1: See Uniform Net Capital Rule.

STRUCTURED NOTES: Notes issued by Government Sponsored Enterprises (FHLB, FNMA, SLMA, etc.) and Corporations, which have imbedded options (e.g. call features, step-up coupons, floating rate coupons, derivative-based returns) into their debt structure. Their market performance is impacted by the fluctuation of interest rates, the volatility of the imbedded options and shifts in the shape of the yield curve.

TREASURY BILLS: A non-interest bearing discount security issued by the U.S. Treasury to finance the national debt. Most bills are issued to mature in three months, six months or one year.

TREASURY BOND: Long-term U.S. Treasury securities having initial maturities of more than ten years.

TREASURY NOTES: Intermediate U.S. government debt securities with maturities of one to ten years.

UNIFORM NET CAPITAL RULE: Securities and Exchange Commission requirement that member firms as well as nonmember broker-dealers in securities maintain a maximum ratio of indebtedness to liquid capital of 15 to 1; also called net capital ratio. Indebtedness covers all money owed to a firm, including margin loans and commitments to purchase securities, one reason new public issues are spread among members of underwriting syndicates. Liquid capital includes cash and assets easily converted into cash.

YIELD: The rate of annual income return on an investment, expressed as a percentage.

CITY OF LANSING INVESTMENT VENDOR QUESTIONNAIRE

1) Broker/Dealer or Financial Institution Name: _____

2) Address: _____

3) Business Phone: _____ Fax Number: _____

4) Do you currently have Michigan public sector clients that may be used as references?

☐ YES ☐ NO

Please list: _____

5) Have you read and do you understand Public Act 20 of 1943 (Michigan Compiled Law 129.91 as amended)? ☐ YES ☐ NO

6) Would you sign a certification indicating that you have read, understand and will never present or sell a security to City of Lansing in violation of Public Act 20 of 1943? ☐ YES ☐ NO

7) Have any of your public sector clients ever sustained a loss on a security transaction based on a misunderstanding or misrepresentation of risk factors? ☐ YES ☐ NO

8) Is your firm a regional or primary dealer in U.S. Treasury securities? ☐ YES ☐ NO

9) Has your firm ever been subject to a regulatory (state or federal) investigation for alleged improper, fraudulent, disreputable or unfair activities related to the sale of government securities or money market instruments? ☐ YES ☐ NO

10) Does your firm participate in the SIPC/FDIC insurance program? ☐ YES ☐ NO

11) How many and what percentage of your transactions failed last month? _____

12) Will you provide updated financial statements along with samples of confirmations, transactions, reports and other documents that will be used for paper trail purposes?

☐ YES ☐ NO

Name and Title of respondent: _____

Signature: _____ Date: _____

CITY OF LANSING GOVERNMENTAL INVESTMENT POOL QUESTIONNAIRE

13) Is this fund a 1940 registered fund? ☐ YES ☐ NO

If no, under what public act was this fund created? _____

14) Does this fund maintain a constant \$1.00 per share value? ☐ YES ☐ NO

15) When was the Investment Pool created? _____

16) What does the pooled fund invest in? _____

17) Please provide the current portfolio composition by investment type:

Commercial Paper % _____

U.S. Treasuries % _____

Bankers Acceptances % _____

Certificates of Deposits % _____

Other (Please list):

_____ % _____

_____ % _____

_____ % _____

%100

18) How many basis points are charged as a management/administrative fee? _____

19) Is it possible to obtain "middle of the month" portfolio listings? ☐ YES ☐ NO

20) Do you charge a fee for wire transfers? ☐ YES ☐ NO If yes, how much? _____

Name and Title of respondent: _____

Signature: _____ Date: _____

ACKNOWLEDGEMENT OF RECEIPT OF THE
INVESTMENT POLICY OF THE CITY OF LANSING MICHIGAN
AND AGREEMENT TO COMPLY

Per Section 129.96 of Michigan's Act 20 of 1943, before executing an investment transaction on behalf of City of Lansing, a financial intermediary, broker or dealer shall be provided with a copy of the City's Investment Policy and shall do both of the following:

- A. Acknowledge receipt of the Investment Policy.
- B. Agree to comply with the terms of the investment policy regarding the buying or selling of securities.

Per Section 129.96 of Michigan's Act 20 of 1943, I certify that I have received the investment policy of the City of Lansing dated x/x14 as amended. Furthermore, I agree to comply with the terms of the investment policy regarding the buying and selling of securities.

I understand the objectives and constraints outlined in the Investment Policy as they relate to the firm's status as a broker/dealer or investment institution.

By: _____

Printed: _____

Title: _____

Company: _____

Date: _____

Resolution #2025-###

By the Committee of the Whole
Resolved by the City Council of the City of Lansing

WHEREAS, Michigan Public Act 20 of 1943, as amended, MCL 129.91, et seq., (the Act) governs the investment of surplus funds of political subdivisions of Michigan, including the City of Lansing; and

WHEREAS, the Act permits the City Council to authorize an employee as the Investment Officer, and to adopt an Investment Policy describing which investments may be made consistent with the Act; and

WHEREAS, the City currently has an Investment Policy and would like to update it with the Policy submitted herewith; and

WHEREAS, the purpose of this Investment Policy is to establish the investment objectives, delegation of authority, standards of prudence, eligible investments and transactions, internal controls, reporting requirements, safekeeping and custodial procedures necessary for the prudent management of City funds; and

WHEREAS, it is the policy of the City of Lansing to invest public funds in a prudent manner which will provide the preservation of capital, meet the daily liquidity needs of the city, conform to all local laws and state statutes governing the investment of public funds and generate at least market rate or better of return; and

WHEREAS, this investment policy applies to all investment activities/financial assets of the City of Lansing; and

WHEREAS, investments shall be made with judgment and care, under circumstances then prevailing, which persons of prudence, discretion and intelligence exercise in the management of their own affairs, not for speculation, but for investment, considering the probable safety of their capital as well as the probable income to be derived; and

WHEREAS, the Investment Policy designates the Treasurer as the City's Investment Officer, who is responsible for managing the City's investment program and for implementing this Investment Policy; and

WHEREAS, the Investment Policy shall be reviewed annually by the Treasurer, and any proposed modifications to the policy must be approved by the Lansing City Council.

NOW, THEREFORE, BE IT RESOLVED, that the Lansing City Council authorizes the City Treasurer as the Investment Officer for the City and adopts the Investment Policy.

BE IT FINALLY RESOLVED, the Administration is authorized to receive the funds, create the necessary accounts, and make necessary transfers for administration in accordance with the requirements of the policy.

2025 Council Member Board and Commission Assignments-

Capital Area Michigan Works Admin. Board: *Council Members Pehlivanoglu, Kost and Carter*

Capital Region Airport Authority: *Council Member Spadafore*

City of Lansing & Charter Township of Lansing Liaison Commission: *Council Member Pehlivanoglu*

Community Corrections Advisory Board: *Council Member Kost*

Downtown Lansing, Inc.: *Council Member Spadafore*

Employee Retirement: *Council Member Garza*

Police & Fire Retirement: *Council Member Garza*

Lansing Entertainment & Public Facilities Authority: *Council Member Jackson*

Planning Commission: *Council Members Kost and Hussain*

Tri-County on Aging Consortium Board: *Council Members Kost and Pehlivanoglu*

Tri-County Regional Planning Commission: *Council Members Hussain, Pehlivanoglu and Spadafore*