

ANN ARBOR
MOVING TOGETHER
TOWARDS VISION ZERO



Traffic Signal Design & Considerations

Presentation to Transportation Commission

November 19, 2025

Agenda

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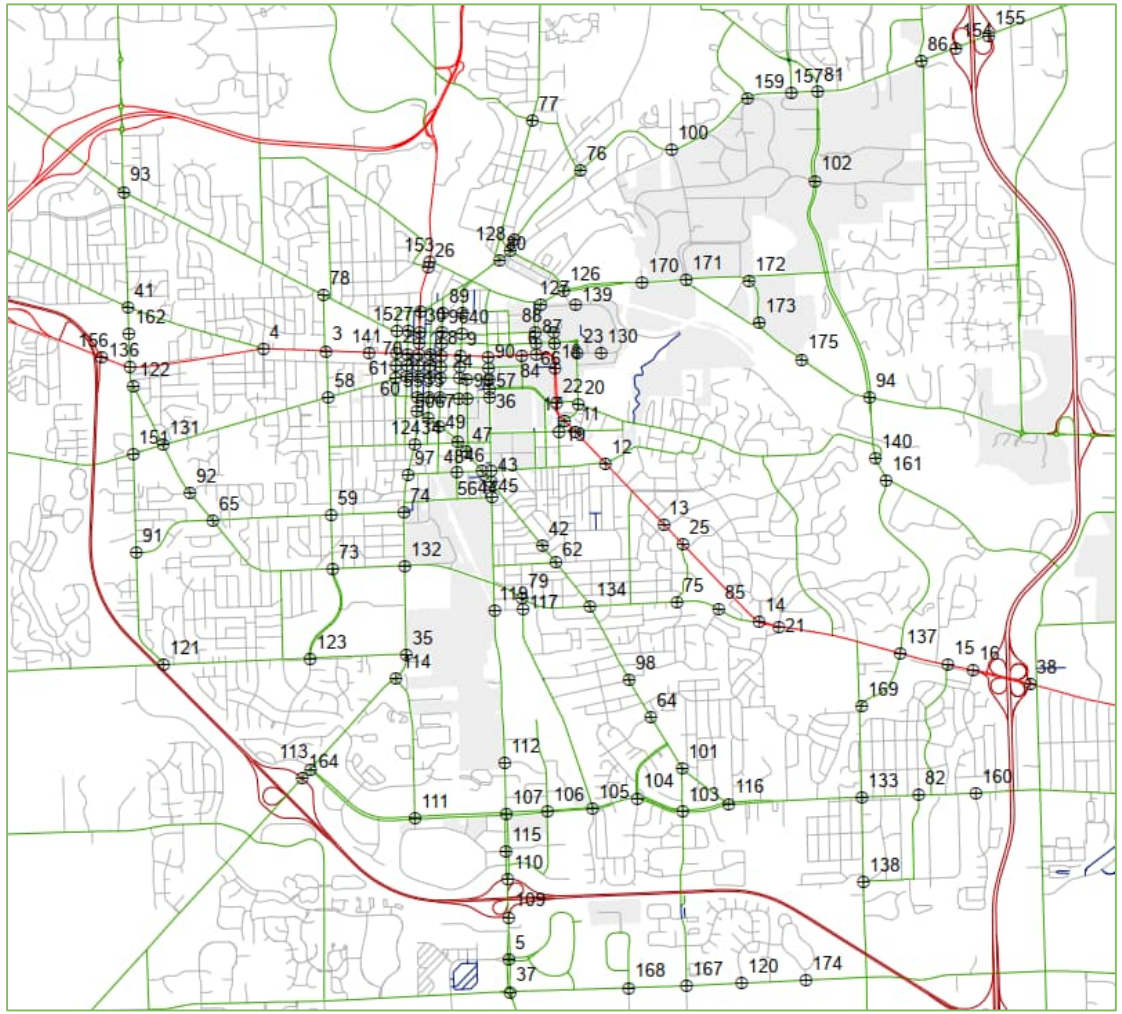
Introduction



Totally +/- 162 Traffic Signals within City Boundary

- City Owned
- MDOT Owned
- U-M Owned
- Projects with Removal
- Projects with Addition

Traffic Signal Outside City Boundary

- WCRC Owned

Introduction – Transportation Systems Management and Operations (TSM&O) Lifecycle

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Planning	Capital Project Planning
Programming	Resource allocation, funding application
Design & Implementation	Project Delivery
Operations	Signal Shop / TOC Event Operations
Monitoring & Improvement	Customer Requests, Partial Upgrades

Traffic Signal Design & Modernization

- Policy & Programming
- Triggers for Traffic Signal Design & Modernization

Traffic Signal Design & Modernization

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- Policy and Programming
  - Comprehensive Transportation Master Plan
    - Strategies on investment, dangerous behavior
    - Strategies on all ages and abilities network, intersection safety for cyclists
    - Strategies on transit service
    - Strategies on adaptive signal technology and connected vehicle technology
  - Previous Transportation Commission Discussions
    - March 2024 presentation on Pedestrian Services at Signalized Intersections
    - FYA (flash yellow arrow) cancellation during pedestrian service updates
  - MMUTCD
    - Signing, Pavement Markings, Traffic Signals
    - (Signalized vs Unsignalized) Traffic Control
  - MDOT Guidelines

Traffic Signal Design & Modernization

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- Triggers to Traffic Signal Design / Modernization
  - Capital Improvement Project
    - ‘Street & Bridges’ projects
    - ‘Active Transportation’ projects
    - ‘Other Infrastructure’ projects
  - Land Development Project
    - Example private dev proj – Five Coners, Broadway Park West
    - Example public institution dev proj – Kahn Pavilion
    - Example public agency proj – Wheeler Service Center
  - Measures to Mitigate Traffic Safety Concern
    - Example – Huron & Seventh
  - Asset Approaching End of Service Life
  - Emergency Repair Projects
  - Research Projects

Types of Traffic Signals

- Pedestrian Signals
- Cycle Track Signals
- Vehicular Signals
- Mid-block Crossings
  - Pedestrian Hybrid Beacon
  - RRFB
  - Full Traffic Signal
- Transit Signals

Types of Traffic Signals

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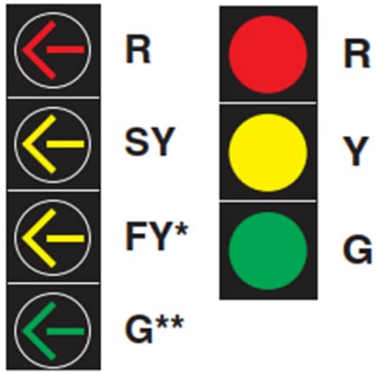
Pedestrian Signal

Bicycle Signal



Vehicular Signal

Pedestrian Hybrid Beacon

RRFB (Rectangular Rapid-Flashing Beacon)

Transit Signal

Design Steps

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Design Initiation and Scope Verification
- Stakeholder input

Prepare Base Plans
- Locations of devices
- Identify ROW (right of way) constraints

Develop Preliminary Plans
- Utility coordination

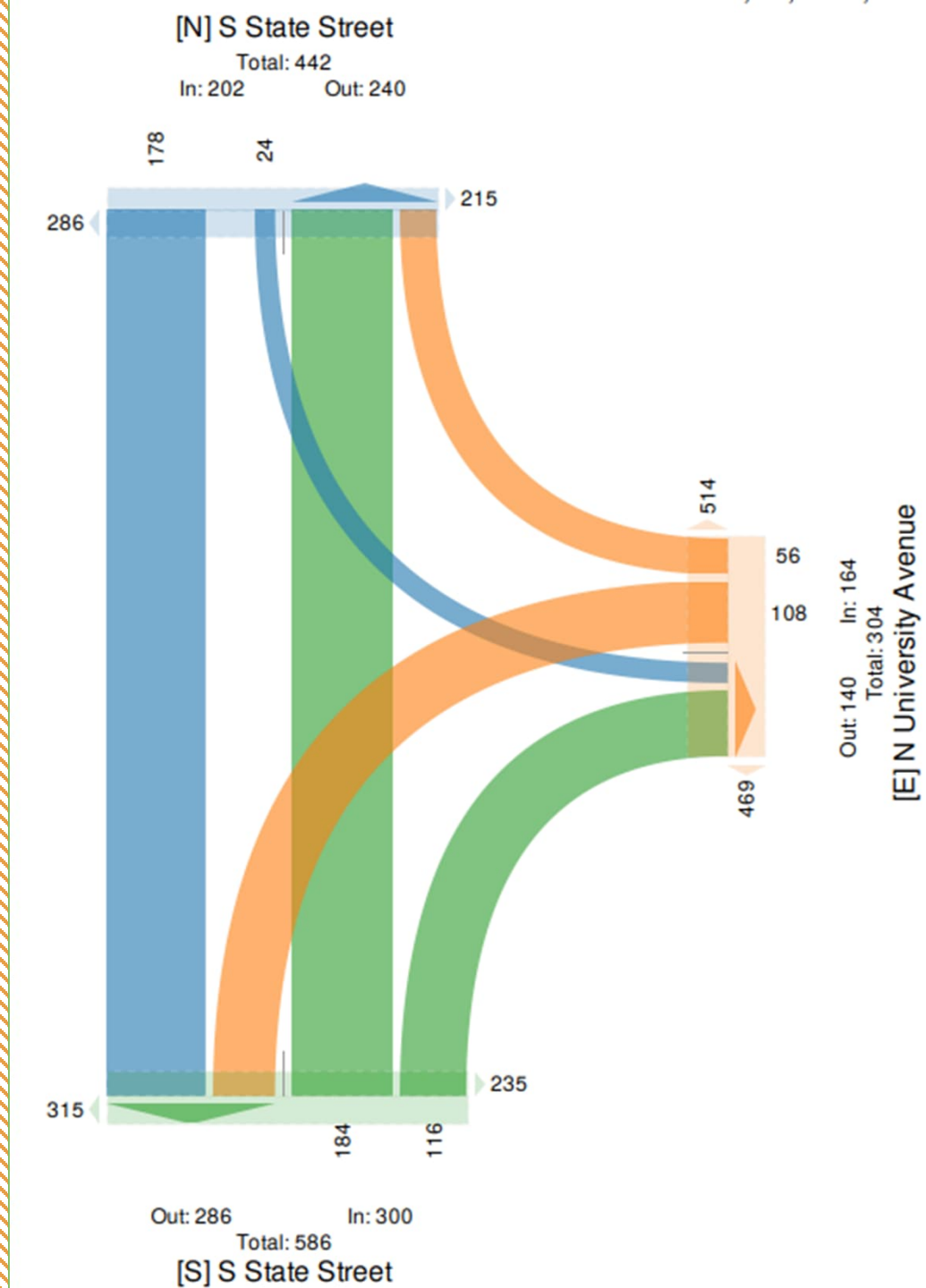
Develop Final Plans & Specifications
- Constructability review
- Final cost estimate

Omissions/Errors Check

Prepare Final Bid Package

Types of Traffic Signals

- Multimodal Demand
- Signal Phasing Design
- Intersection Geometry & Space Allocation
- Transit Vehicles
- Emergency Vehicle Preemption
- Railroad Preemption



Design Considerations
Multimodal Demand

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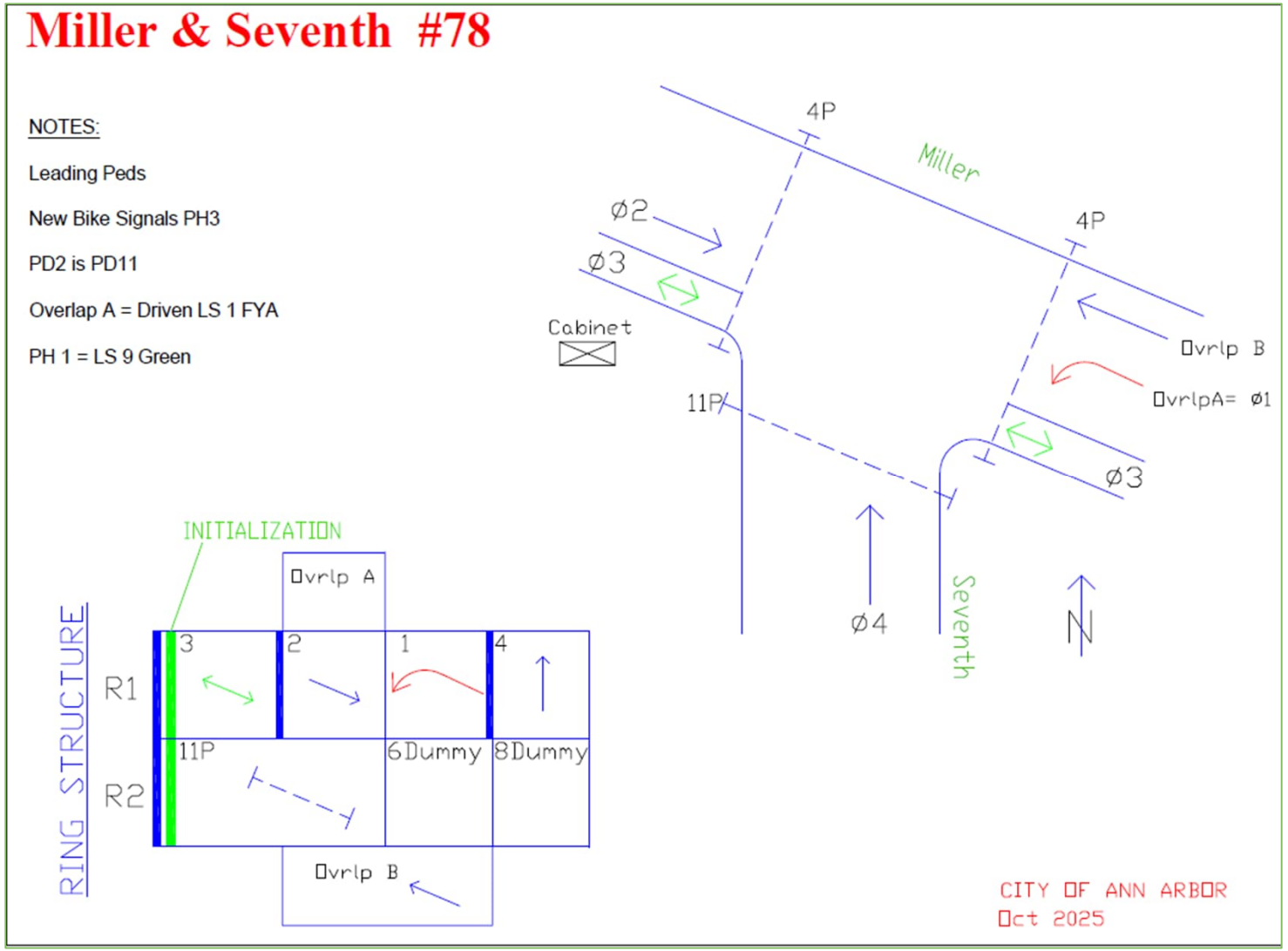
- Pedestrians
  - Accessible Pedestrian Signals
  - Exclusive Pedestrian Phase
- Cyclists
  - Use Vehicular Signals
  - Use Pedestrian Signals
  - Use Bicycle Signals
- Vehicular Lane Use
- Conflict Separation

Design Considerations
Signal Phasing Design



Design Considerations
Intersection Geometry & Space Allocation

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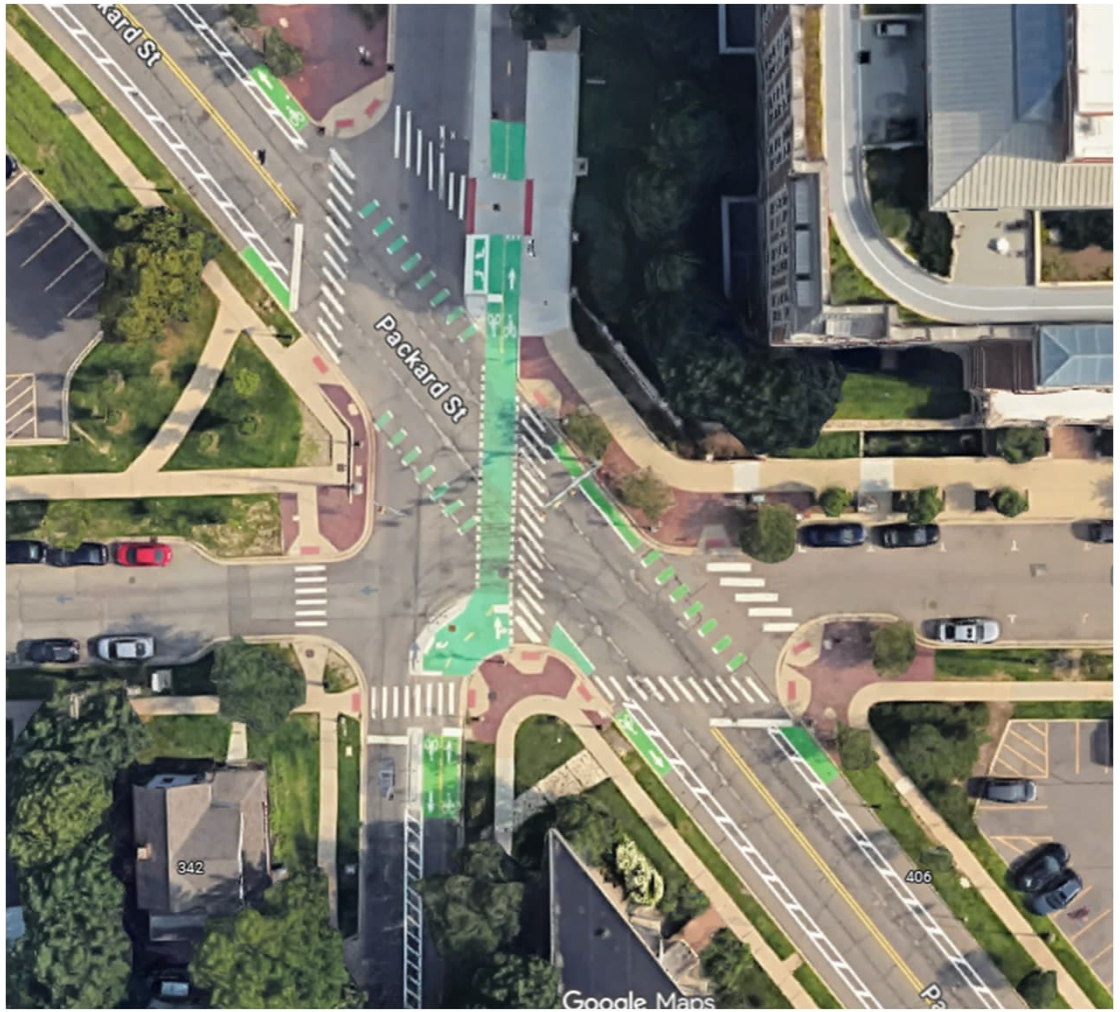

Design Considerations
Transit Vehicles

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Transit Exclusive Facility (Lane + Signal Display)

State & William

Intersections Modified for Transit Consideration

Maple & Scio Church

Catherine & Glen

Transit Signal Priority (TSP)

AAATA Route 4, ongoing TSP project
Phase 1 – Blake to US-23

U-M Research Project
Connected vehicle devices for TSP

Design Considerations
Emergency & Rail Preemption

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Emergency Vehicle Preemption

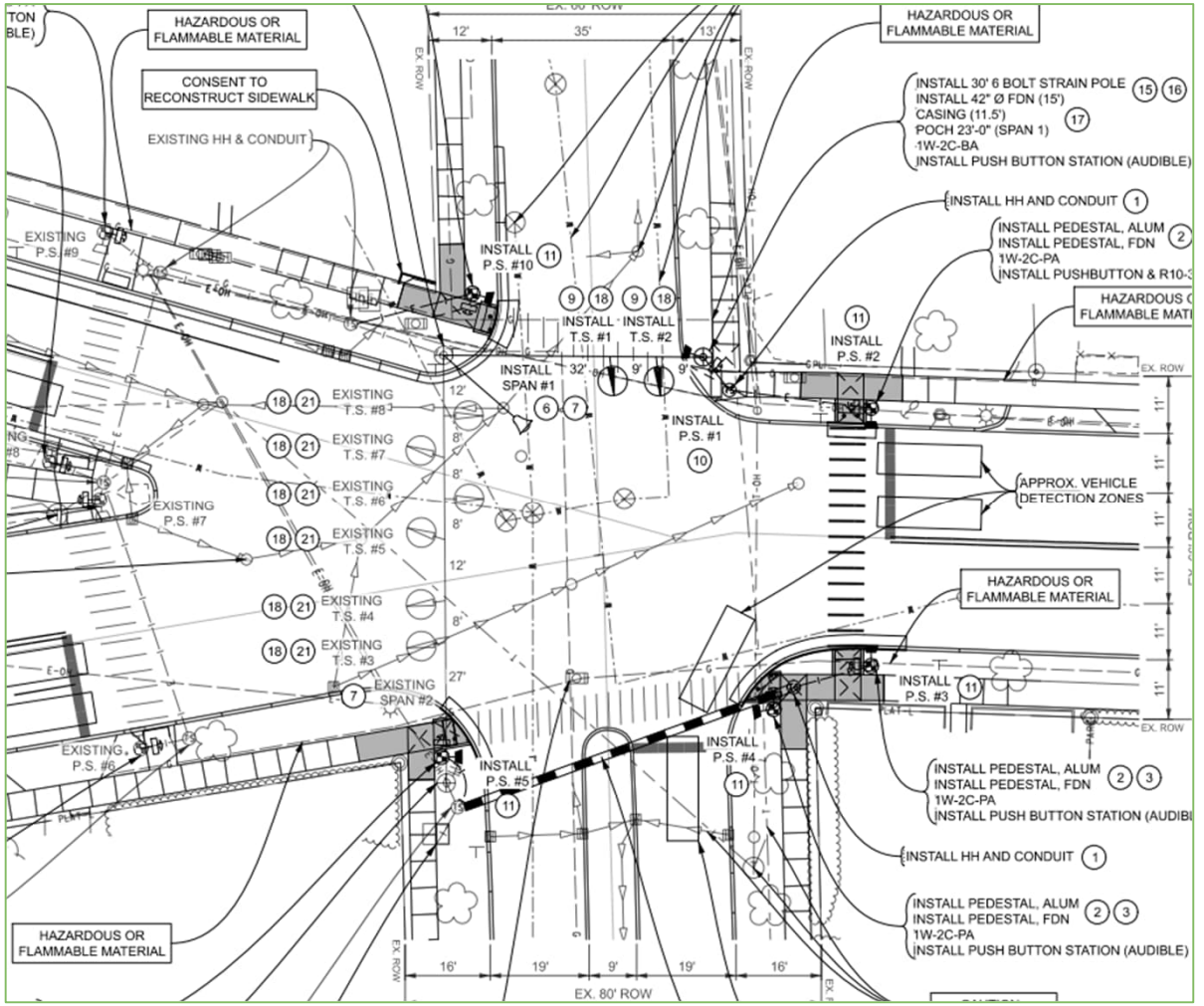
- Fire Stations 1 – Fifth Avenue, Huron Street
- Fire Station 4 – Huron Parkway & Platt Road

Railroad Preemption

- State Street & Stimson Street
- Main Street & Madison Street
- Liberty Street & First Street
- Barton Drive & Plymouth Road

Design Impacts

- ADA Compliance
  - Without APS
    (accessible pedestrian signal)
  - With APS
- Right-of-Way (ROW) Impact
- Placement of Signal Poles and Cabinet
- Underground Utilities
  - Conduits & Handholes



Communications and Operations

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- Fiber Optic Data Communications Infrastructure
- Connection between Field Device to Central Server
  - TOC (Traffic Operations Center) Operations
  - Special Event Traffic Operations
- Timing Permits, Bench Testing
- Preventive Maintenance
  - Signal Equipment
  - MMU (Malfunction Management Unit) Testing and Certification

Communications and Operations

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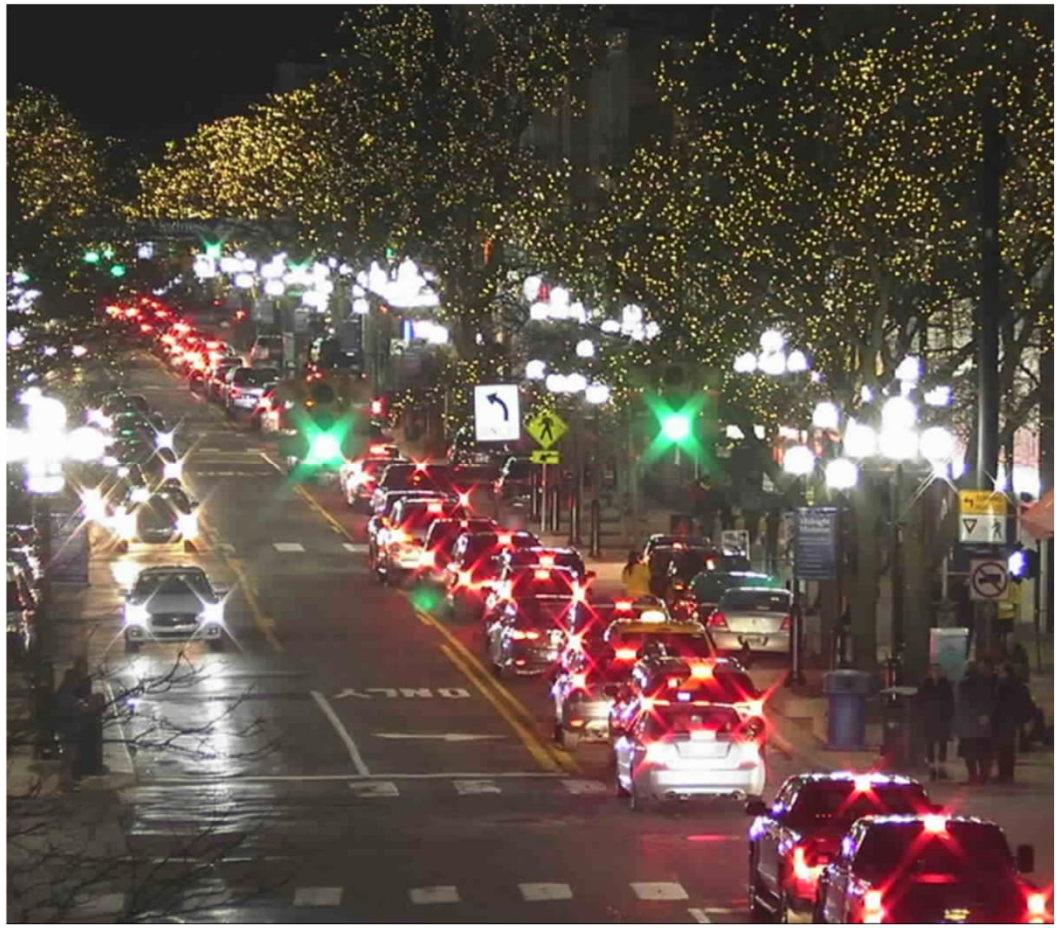

Communications and Operations Support Near-Miss Analytics Safety Effort

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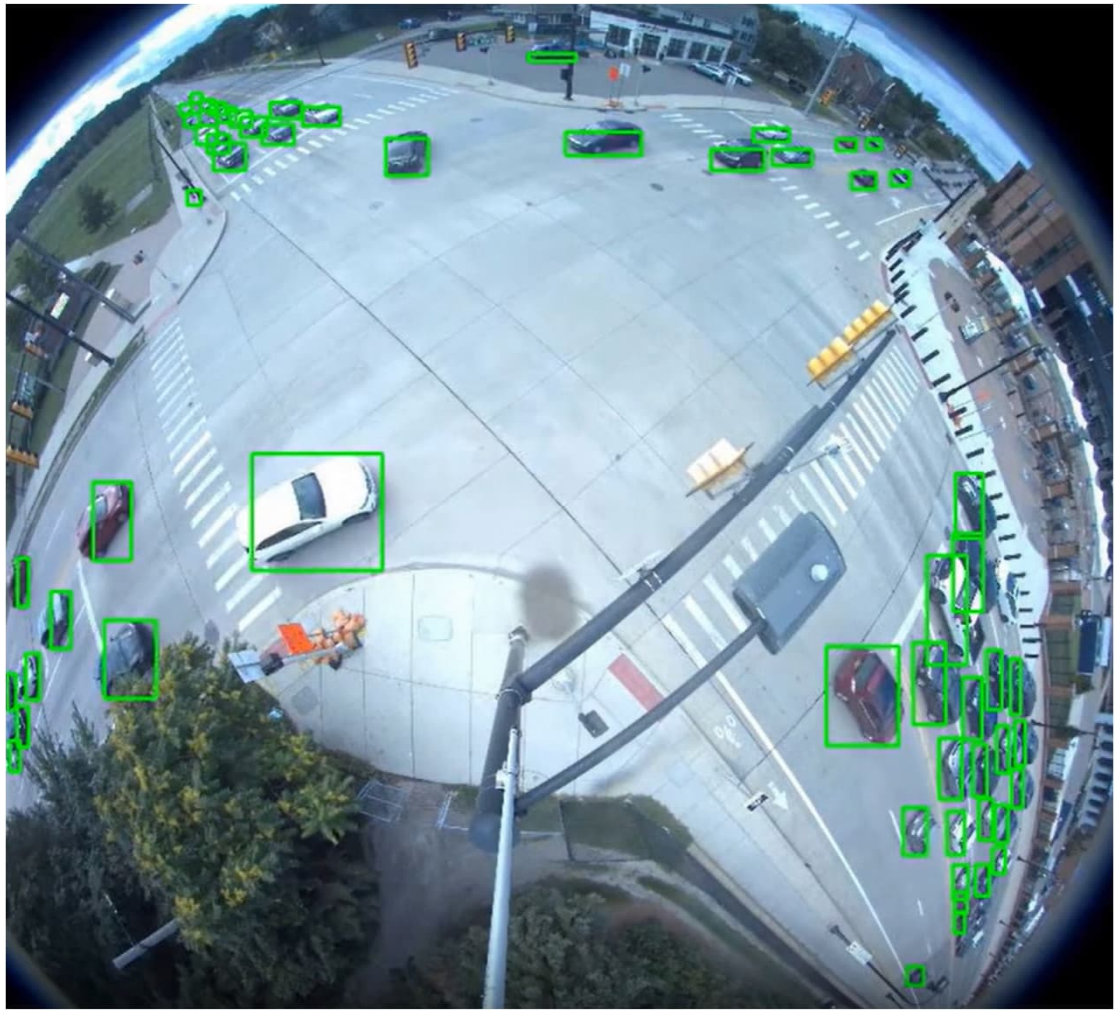

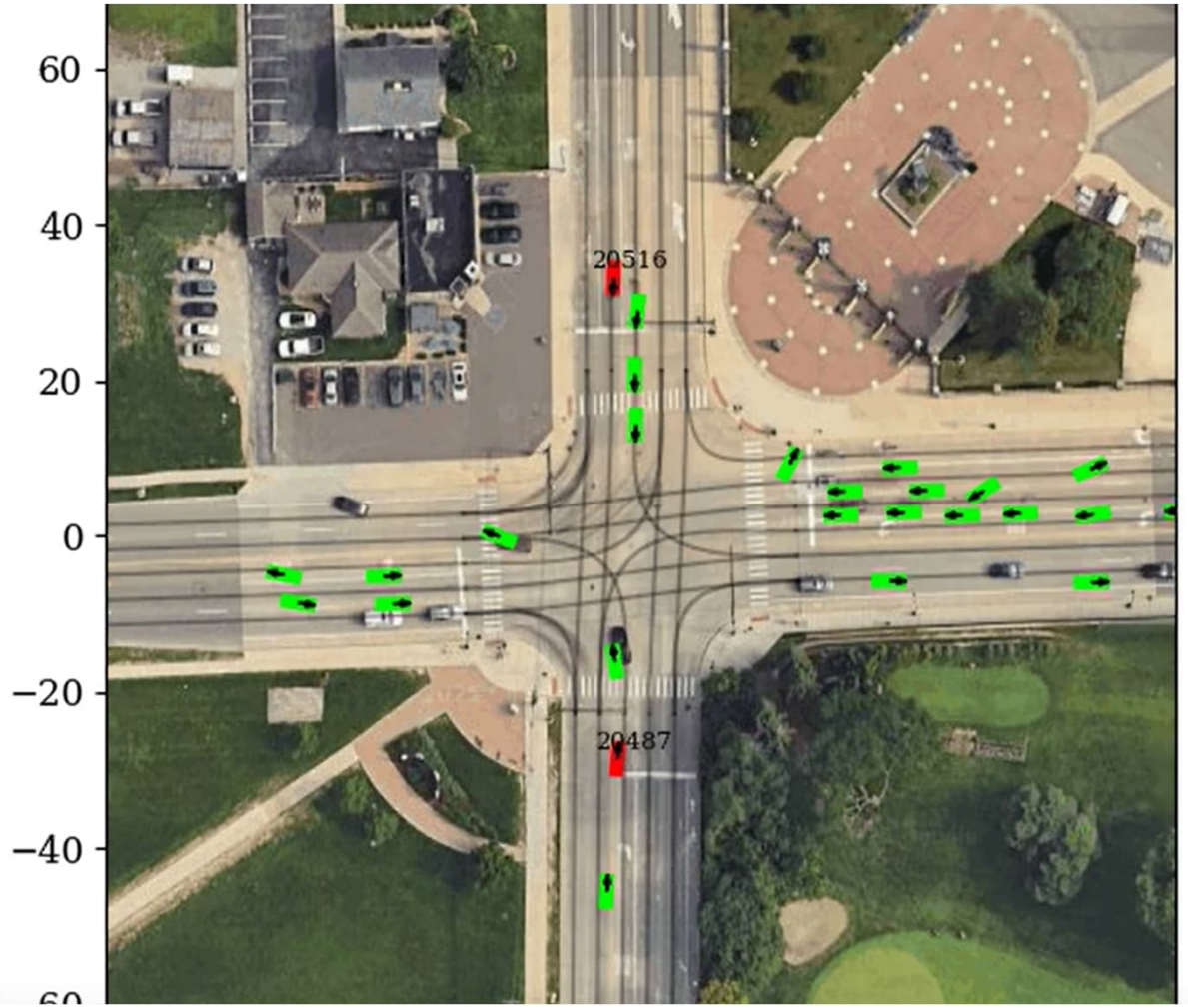

Questions and Answers

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