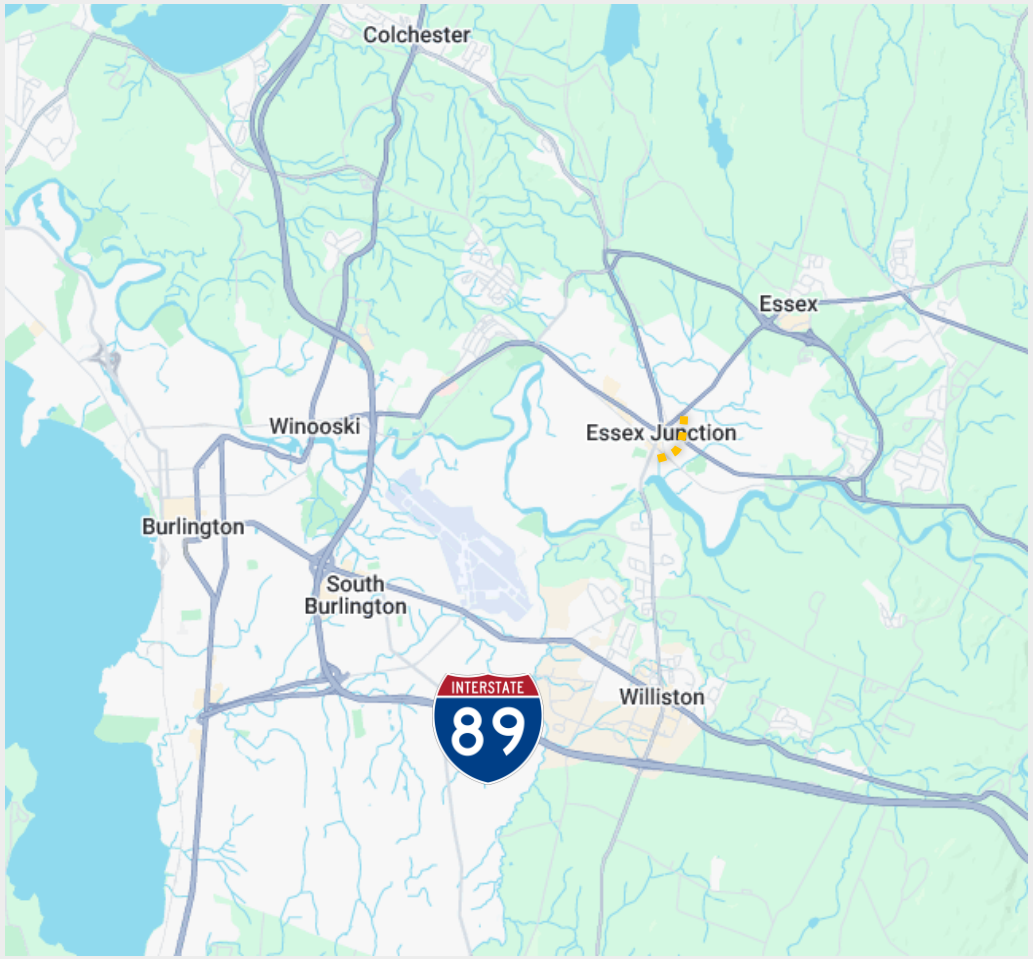
CRESCENT CONNECTOR SIGNAL DESIGN ESSEX JUNCTION, VT

Corey Mack, PE, PTOE
METHODS Consulting

CCRPC TAC
May 5, 2026

METHODS
CONSULTING

CRESCENT CONNECTOR PROJECT BACKGROUND



- Project located east of Five Corners in Essex Junction, VT
- Five Corners is the center of Essex Junction
- Circ Highway officially designated in mid-80s
- Middle section of Circ opened in 1993
- Traffic volume continued to grow in Five Corners
  - 2010 peak hour volume ~2,400 vph
- Essex Junction moved forward with planning the Crescent Connector project in mid-00's
- Circ Highway discontinued in 2011
- Crescent Connector funded as a "Circ Alternative" in 2012

METHODS CONSULTING

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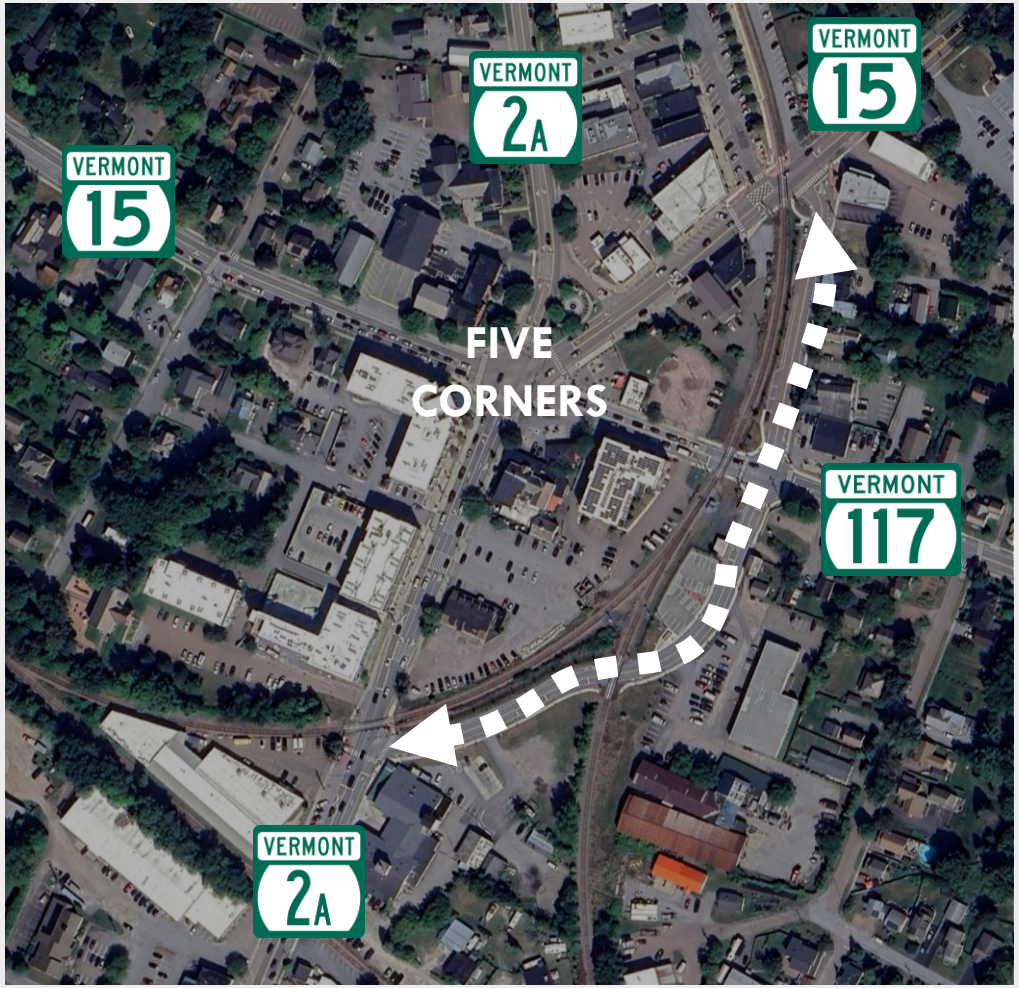

Crescent Connector (officially Railroad Street) is essentially a bypass of Five Corners

Purpose:

- Traffic: Relieve congestion at Five Corners
- Economic: Access and utilities to underutilized parcels
- Multimodal: Improve bicycle and pedestrian routes

Consultant Team:

Project Manager:
Donald L Hamlin
Consulting Engineers, Inc.

Design Engineer:
Dubois & King, Inc

Traffic Signal Engineer
WCG / METHODS

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CONSULTING

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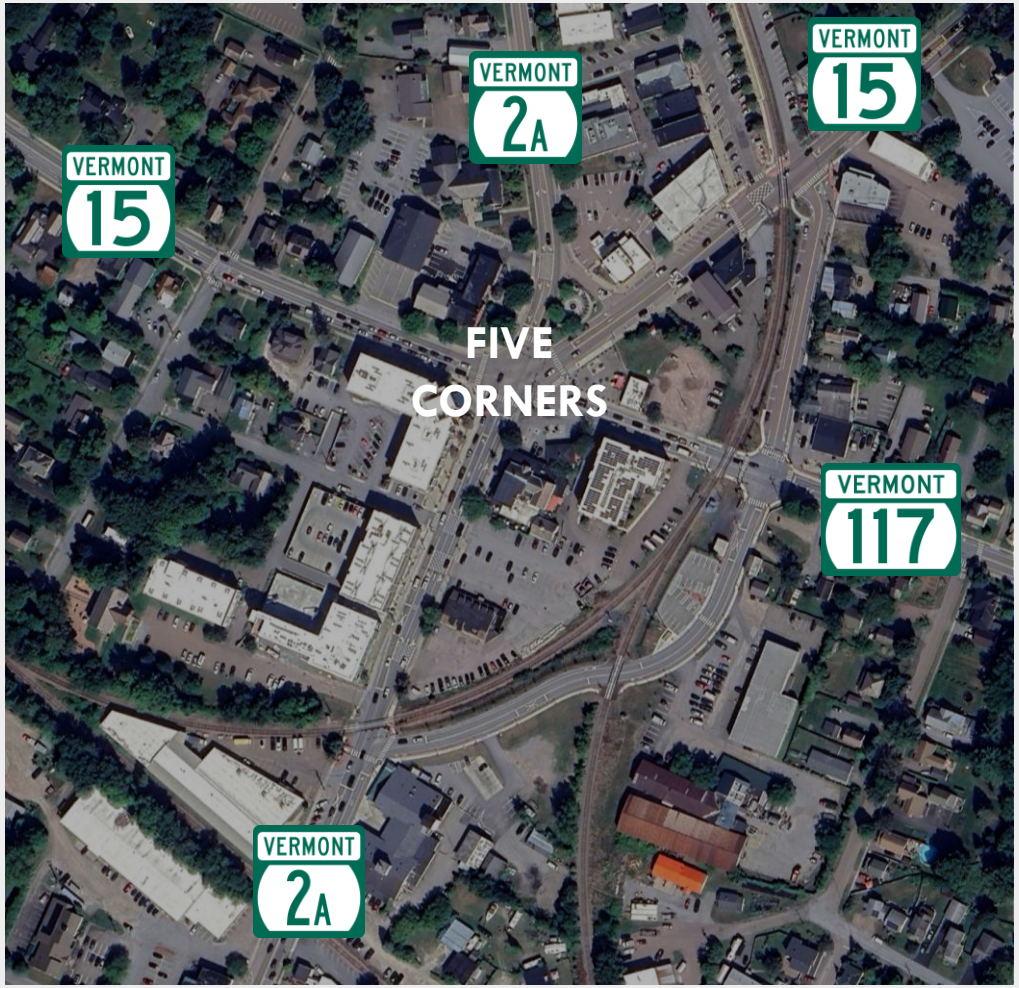

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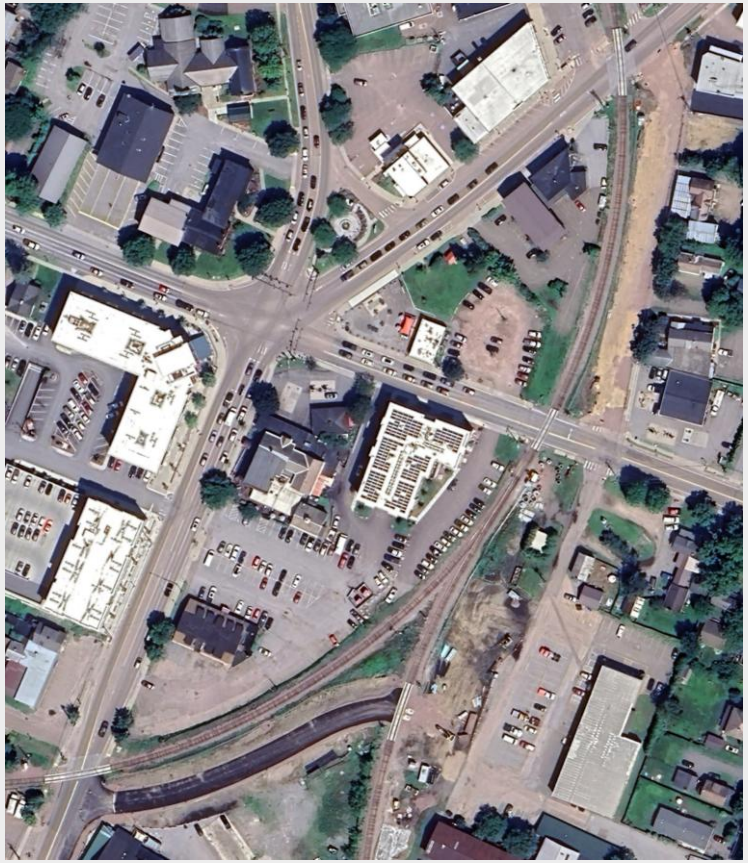
- Purpose:
  - Traffic: Relieve congestion at Five Corners
  - Economic: Access and utilities to underutilized parcels
  - Multimodal: Improve bicycle and pedestrian routes
- Complicating factors:
  - Existing Five Corners signal and intersection spacing
  - Two active railroad lines (and one inactive)
  - New railroad crossing
  - Challenges of an urban project: ROW, utilities, contaminated soils, stormwater, etc.

METHODS
CONSULTING

RAILROAD STREET CONSTRUCTION

Multiphase construction, beginning in 2022

Phase 1: Railroad Crossings: 2022
(image date October 2022)
Contractor: RJ Corman RR Services



Phase 2: Road & Signals 2023-2025
(image date July 2023)
Contractor: Engineers Construction, Inc.

Phase 2 (Continued)
(image date October 2024)
Contractor: Engineers Construction, Inc.

RAILROAD STREET RESULTS

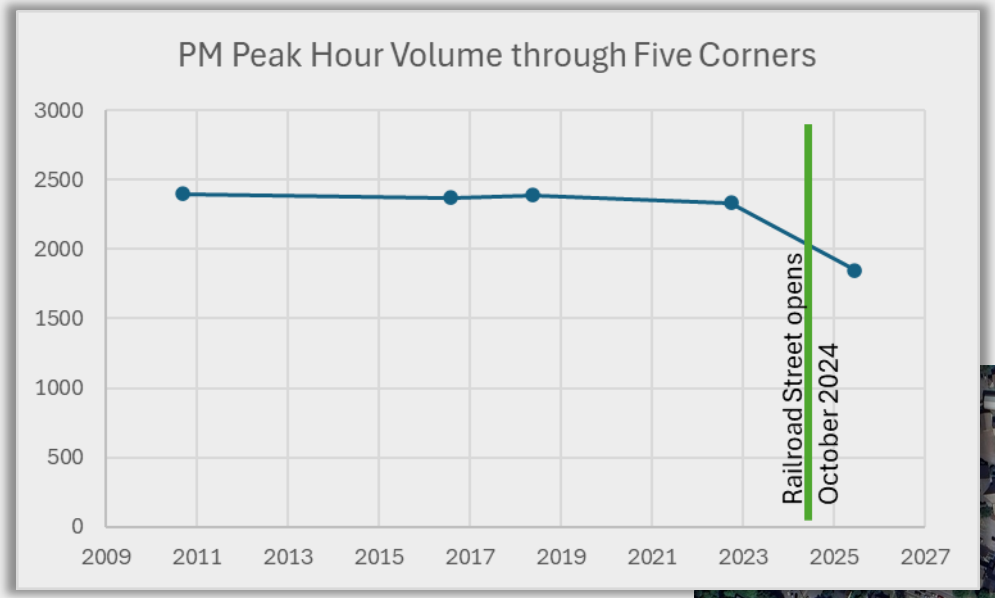
- Two new signalized intersections
  - Park Street (VT-2A) & Railroad Street
  - Maple Street (VT-117) & Railroad Street
- Three improved signalized intersections
  - Five Corners
  - Park Street & Iroquois Avenue / Franklin Street
  - Park Street & South Street / River Street
- Improved access and utilities to developable properties in city center
- New bike lanes, sidewalks, and crossing opportunities

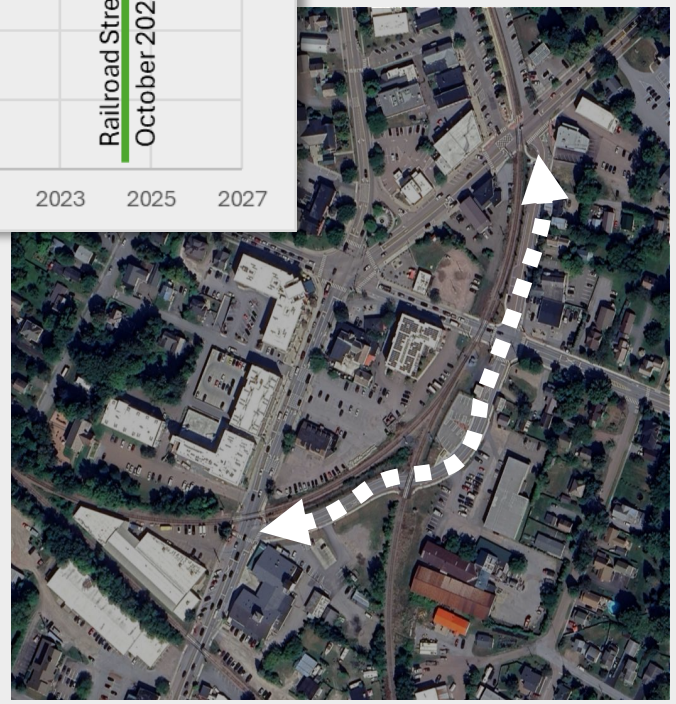
Source: DuBois & King

RAILROAD STREET RESULTS: REDUCED CONGESTION

Railroad Street reduces congestion three ways:

1. Railroad Street forms a grid
   - Traffic able to bypass Five Corners
   - Less traffic through the Five Corners intersection



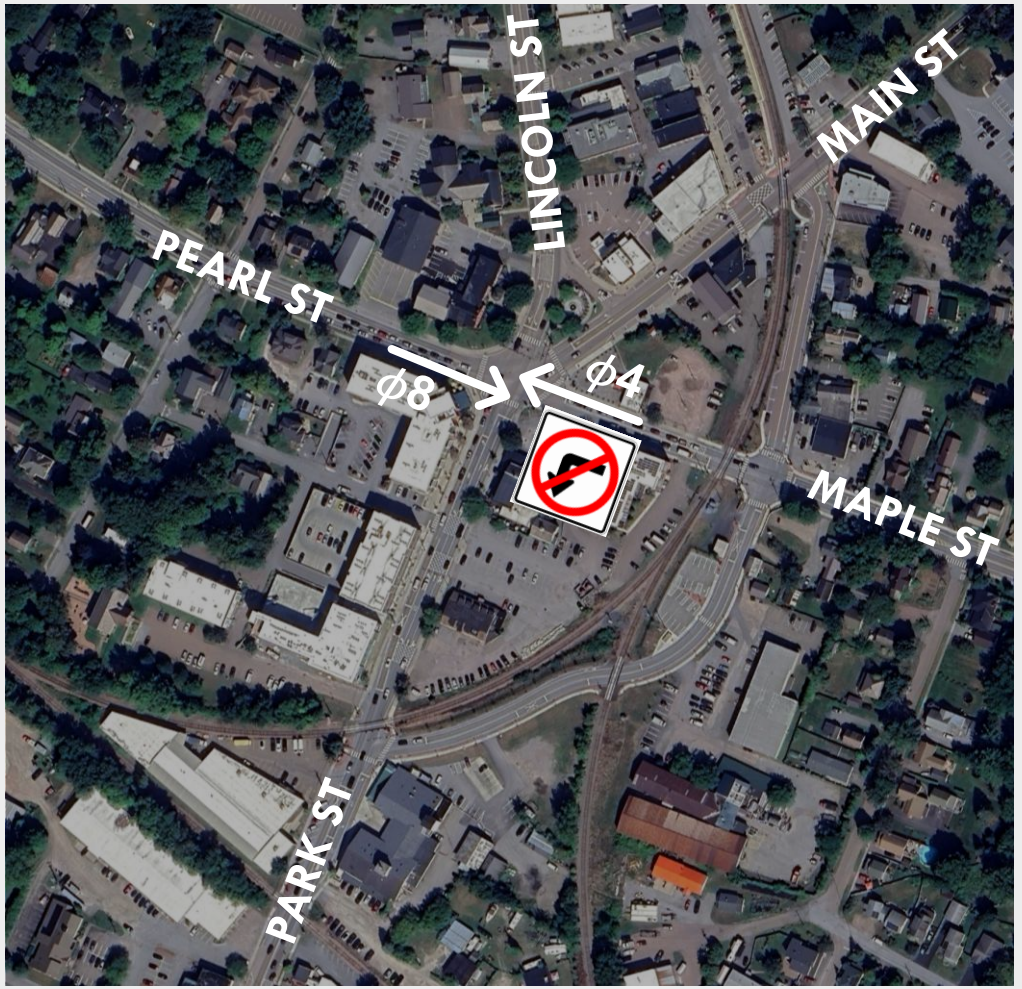


RAILROAD STREET RESULTS: REDUCED CONGESTION

Railroad Street reduces congestion three ways:

1. Railroad Street forms a grid

2. Efficiency improvements at Five Corners
   - Maple Street (VT-117) westbound lefts restricted
   - Railroad Street acts as a displaced left intersection for Five Corners
   - Pearl Street through and Maple Street through allowed concurrently ($\phi 8$ and $\phi 4$)
   - Earlier signal phasing was split along Pearl, Maple, and Main; eliminated a phase



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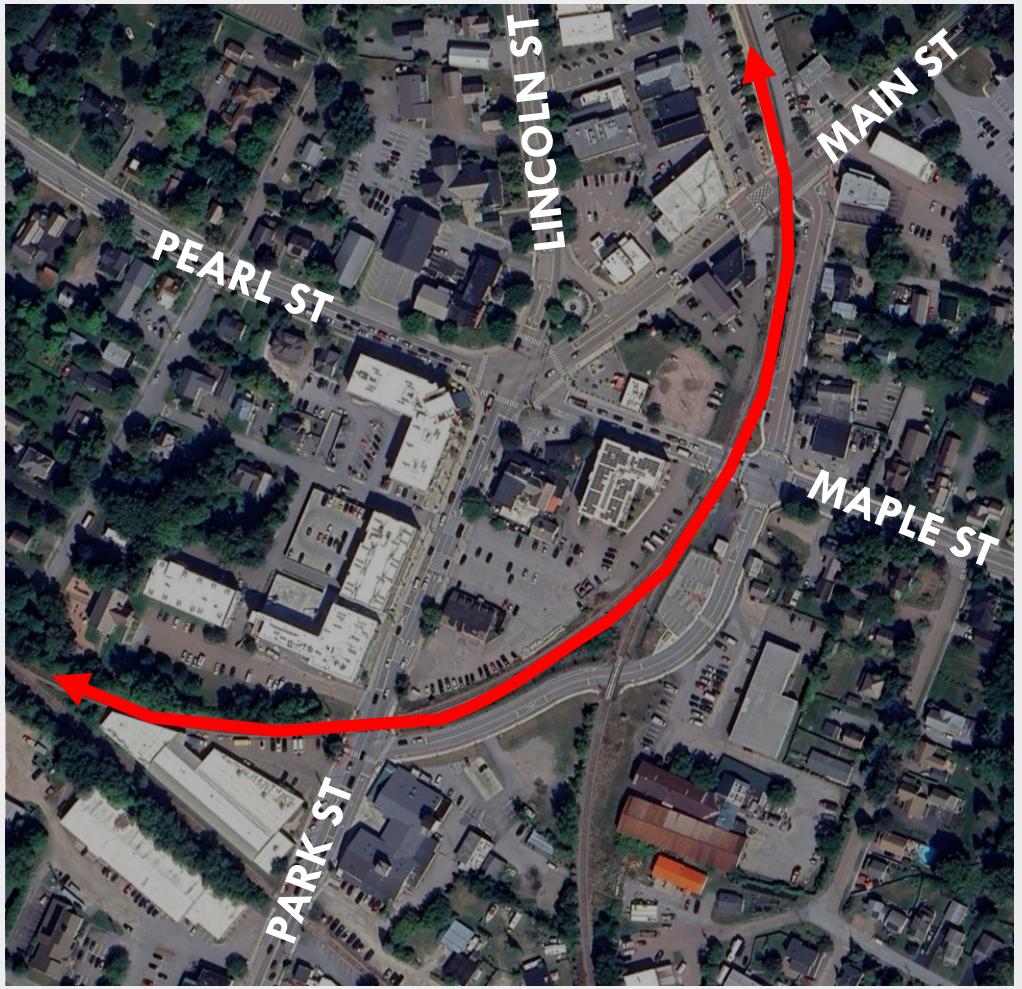
2. Efficiency improvements at Five Corners

3. Allows traffic to flow during train movements

- Chip train is long, slow, frequent (~2x day) and irregular
- Railroad Street allows many movements to continue while Five Corners is effectively cut off

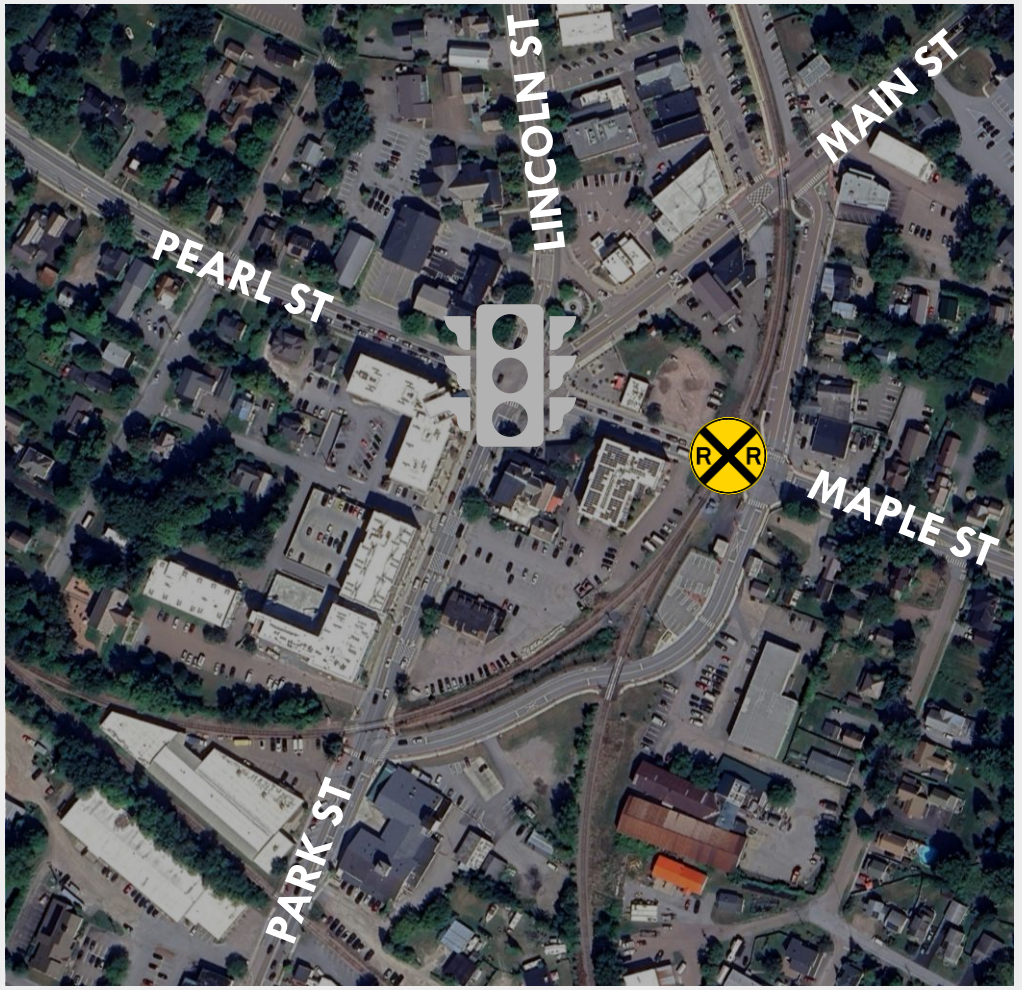
(Amtrak is shorter, faster, and off-peak)



RAILROAD STREET COMPLEXITY: RAIL PREEMPTION

Before Crescent Connector Project

- Five Corners received ~30s constant warning time (advanced warning) prior to train at Maple Street



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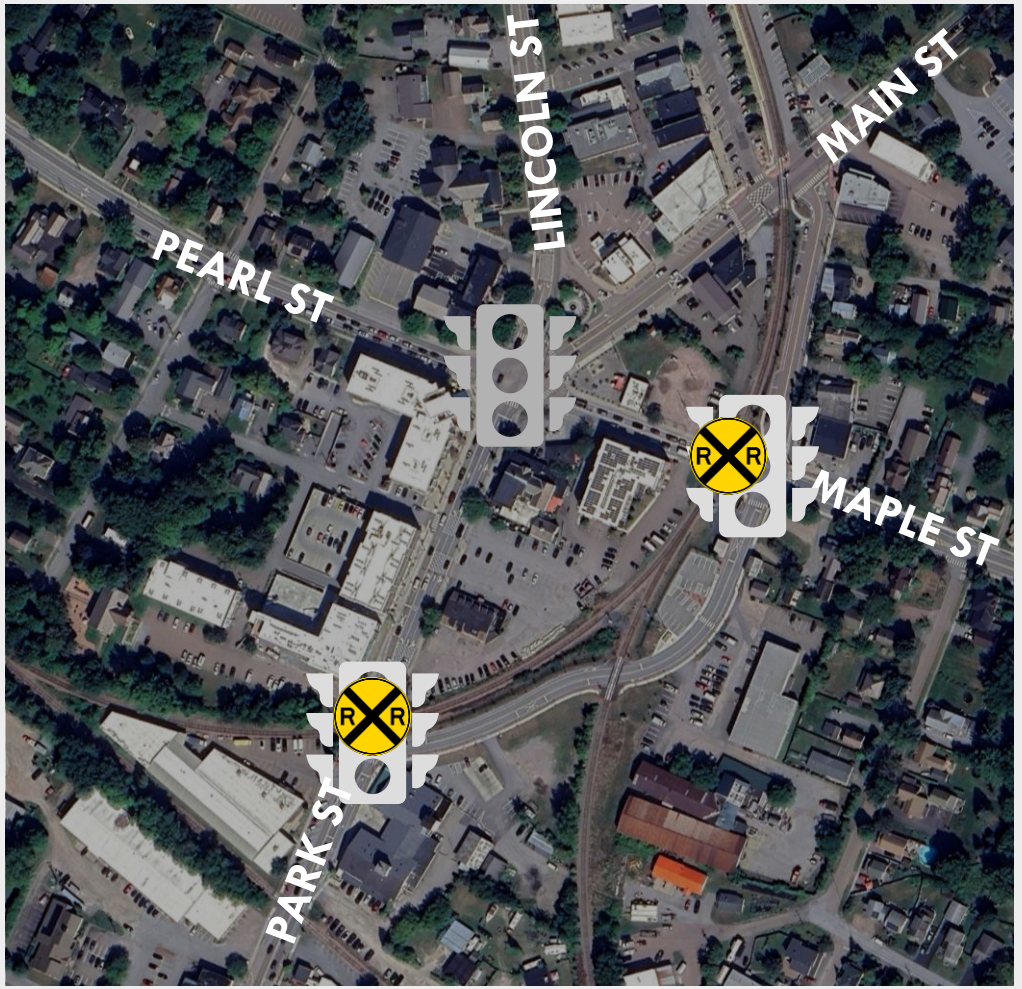
After Crescent Connector Project

- Two new signals directly adjacent to railroad
- Need new information: constant warning at Park Street Crossing

Required new infrastructure from the railroad

Trains with vastly different operating characteristics (passenger vs freight)



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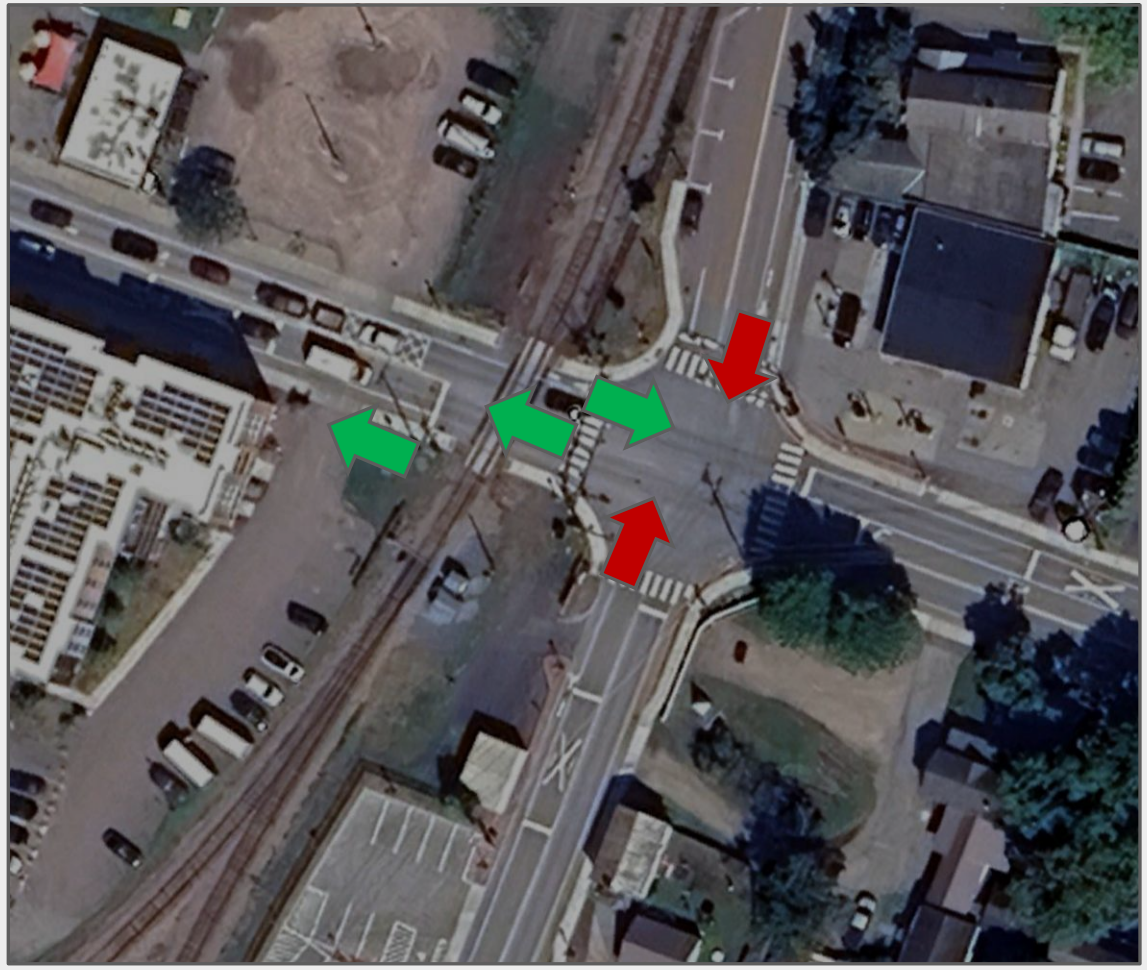
At new signals, limited constant warning time is provided (~12s)



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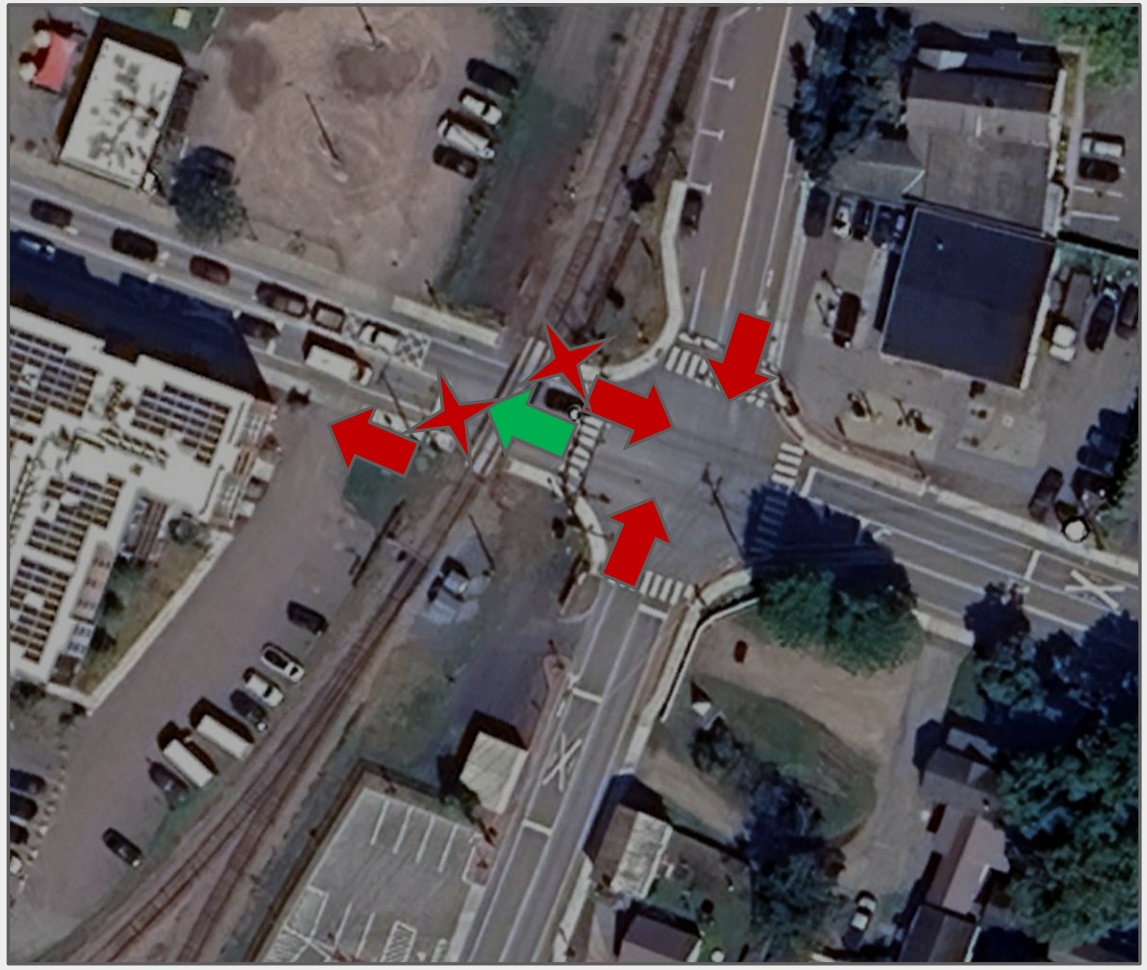

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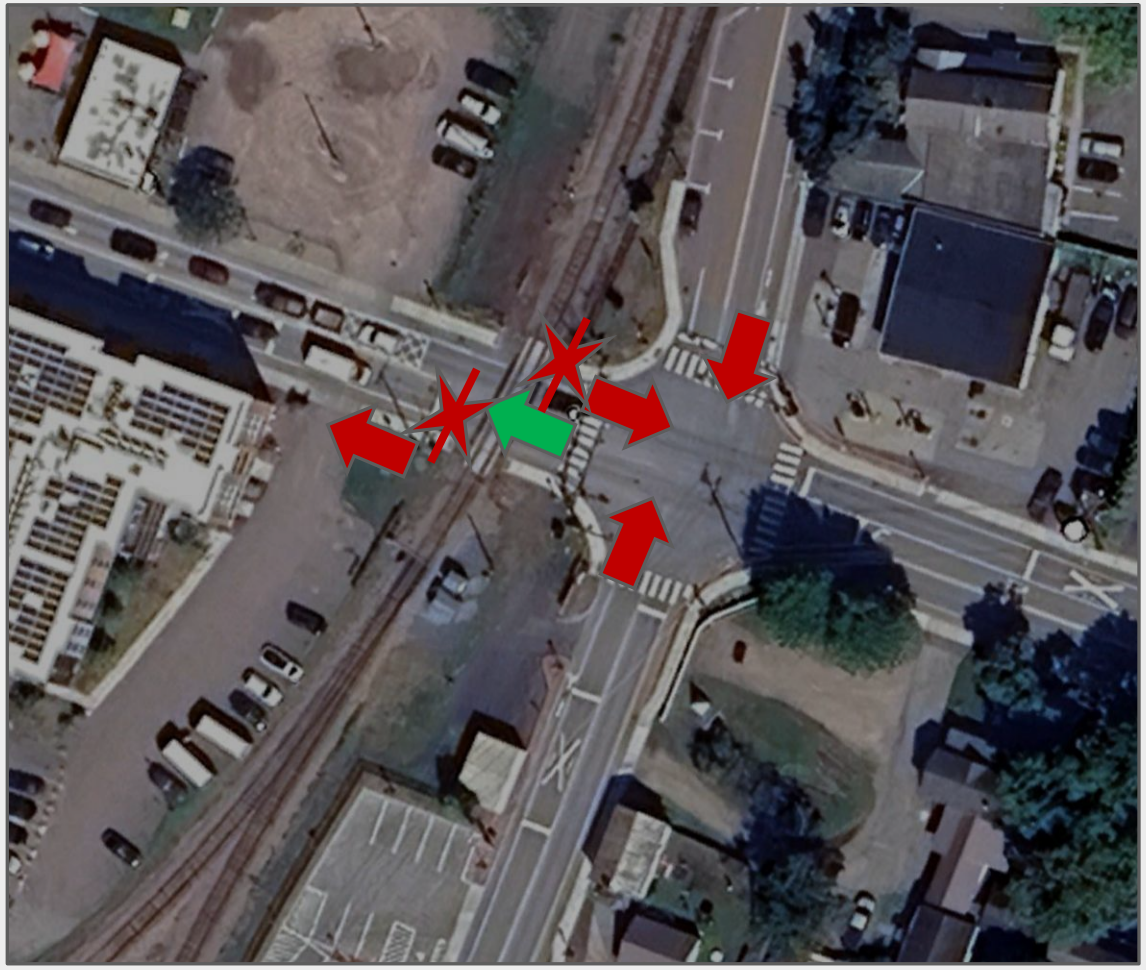

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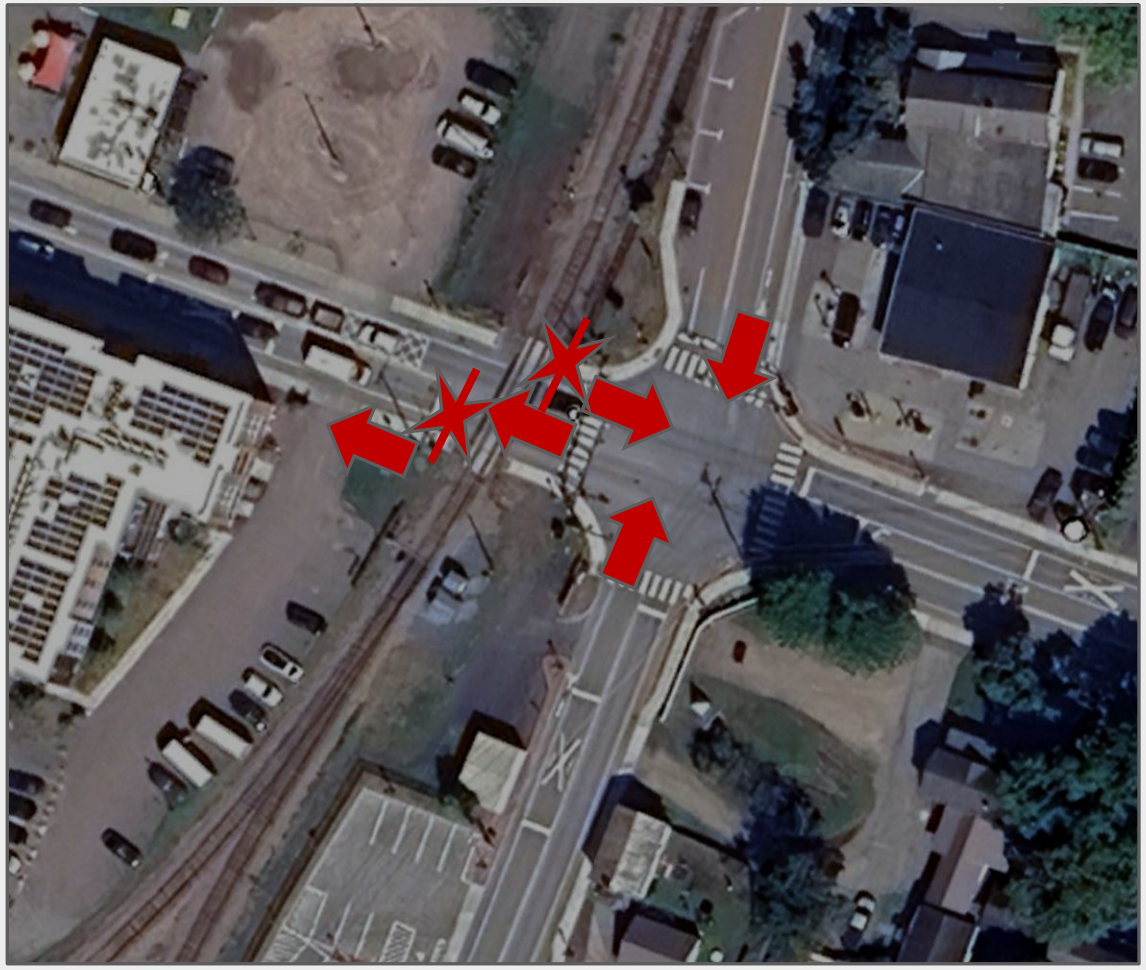

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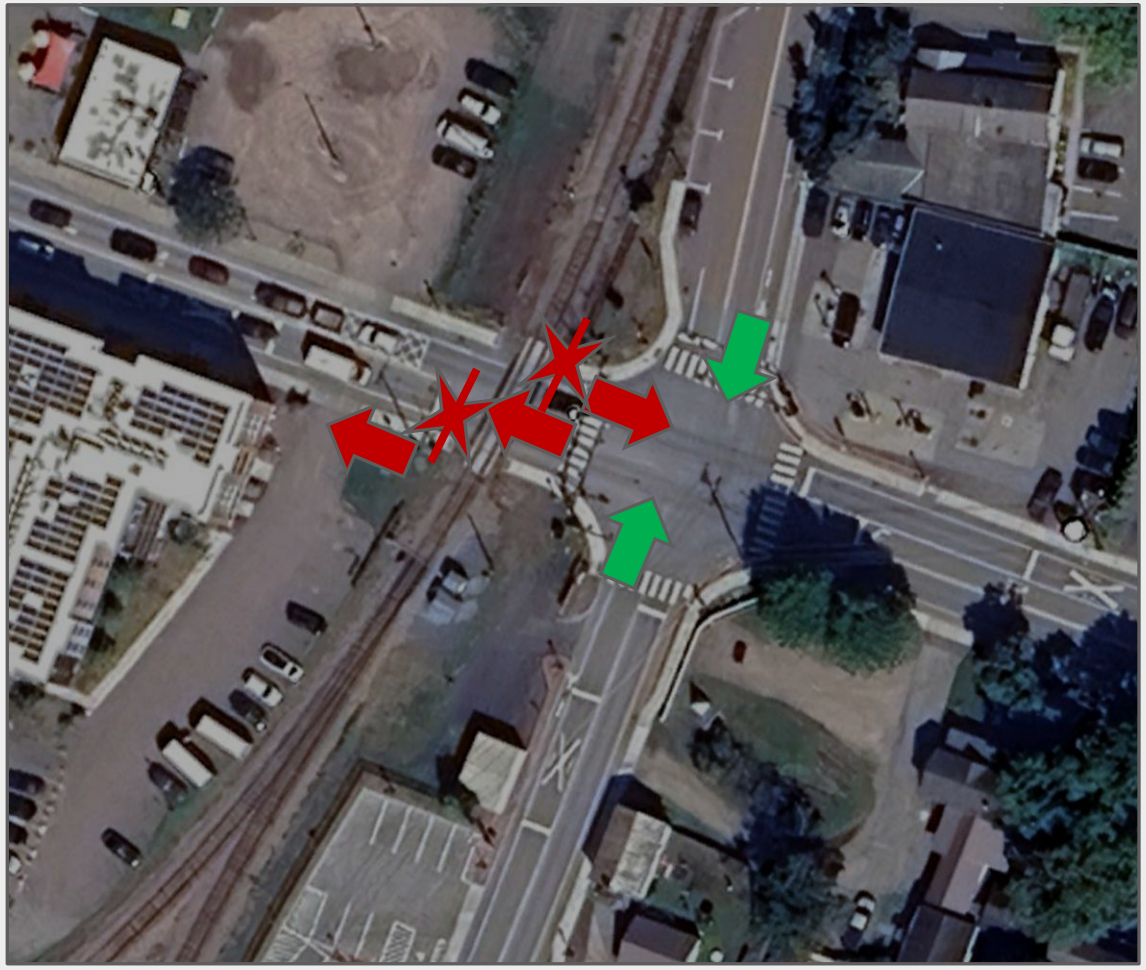
- Preemption cycle begins



RAILROAD STREET COMPLEXITY: RAIL PREEMPTION

In case of vehicle stopped on tracks in periods of queued congestion, added railroad escape areas on far side of crossing

RAILROAD STREET COMPLEXITY: RAIL PREEMPTION

Close calls are still possible…

RAILROAD STREET COMPLEXITY: CITY OWNERSHIP

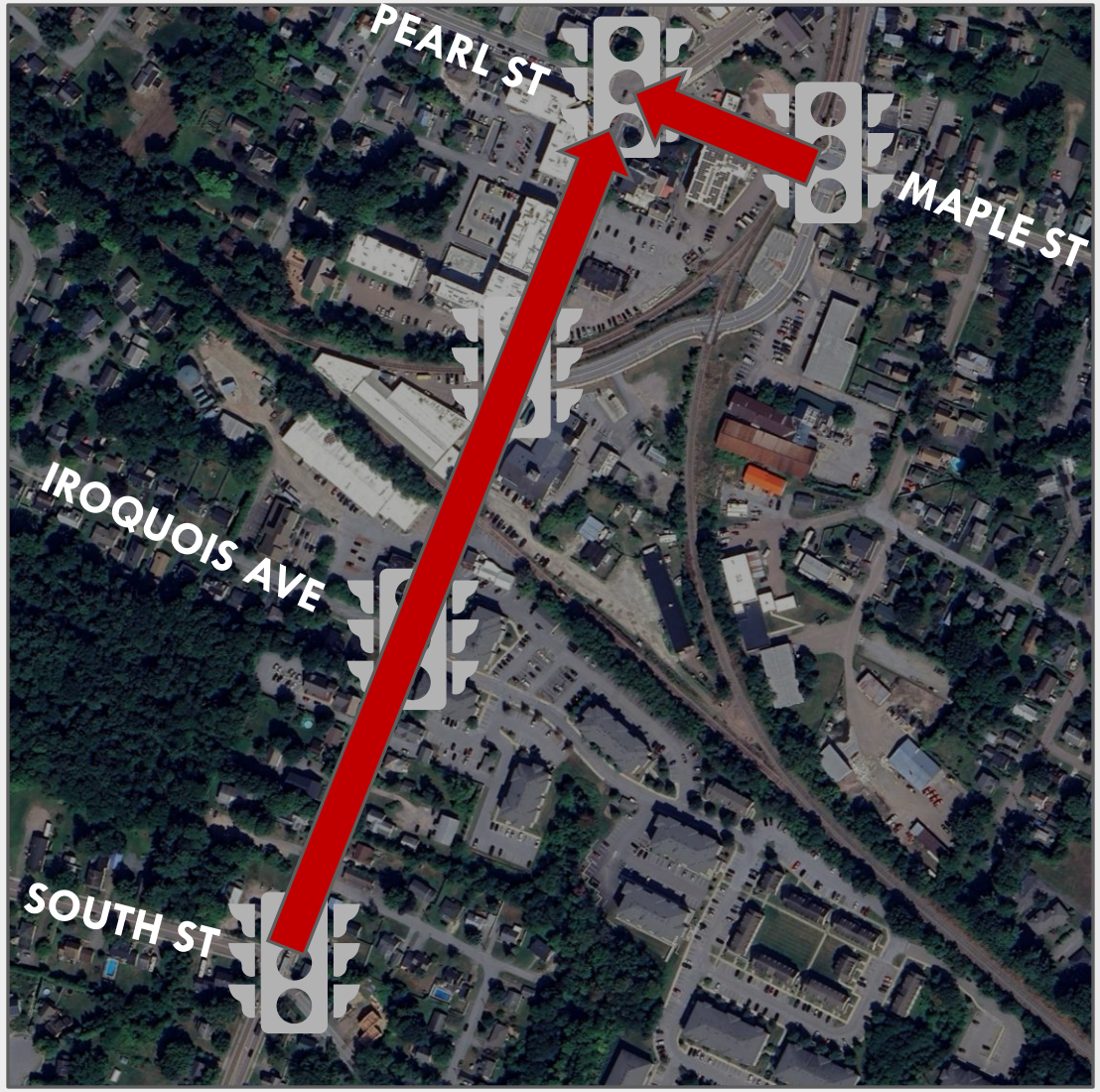
Railroad required the City to take ownership and maintenance responsibility of new railroad crossing (railroad signal and gates)

Installed a high-definition monitoring camera near new crossing to record traffic coming and going in the event of a crash

RAILROAD STREET COMPLEXITY: CITY OWNERSHIP

RAILROAD STREET COMPLEXITY: SOUTHBOUND FLUSH

Concern with queues from adjacent signals impacting Five Corners



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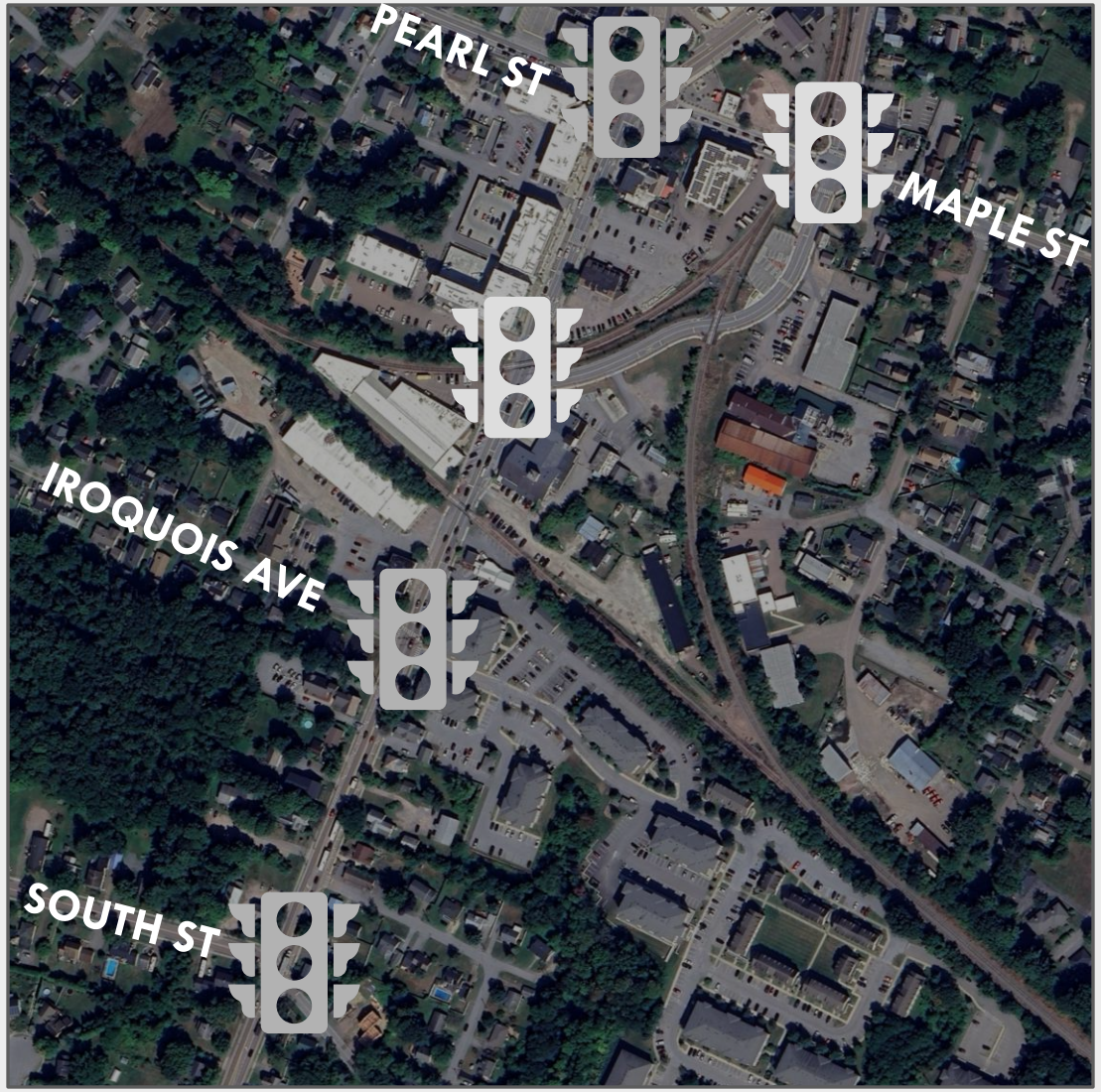
Near signals (Railroad Street) are designed with short cycle lengths, queues clear frequently



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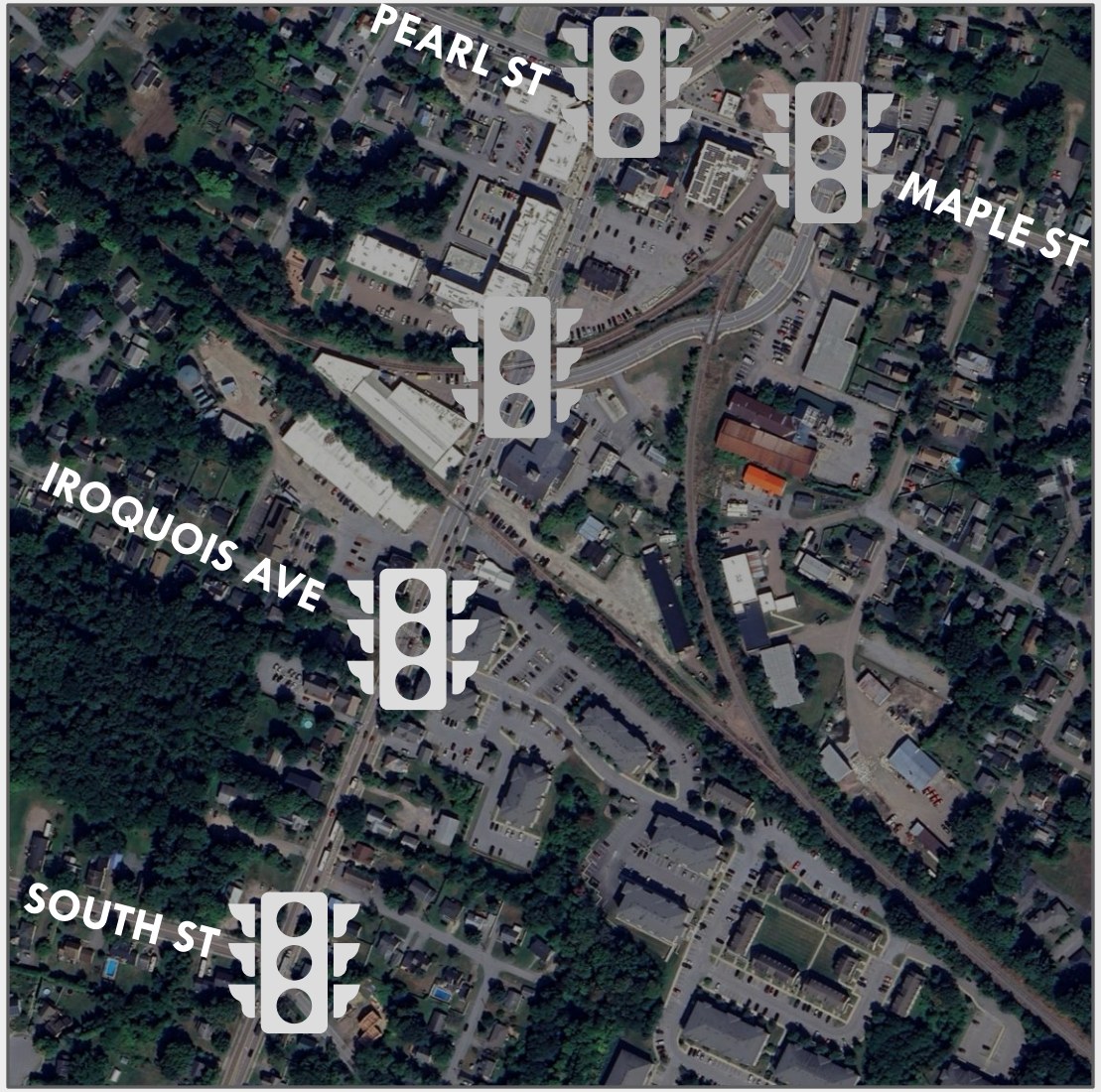

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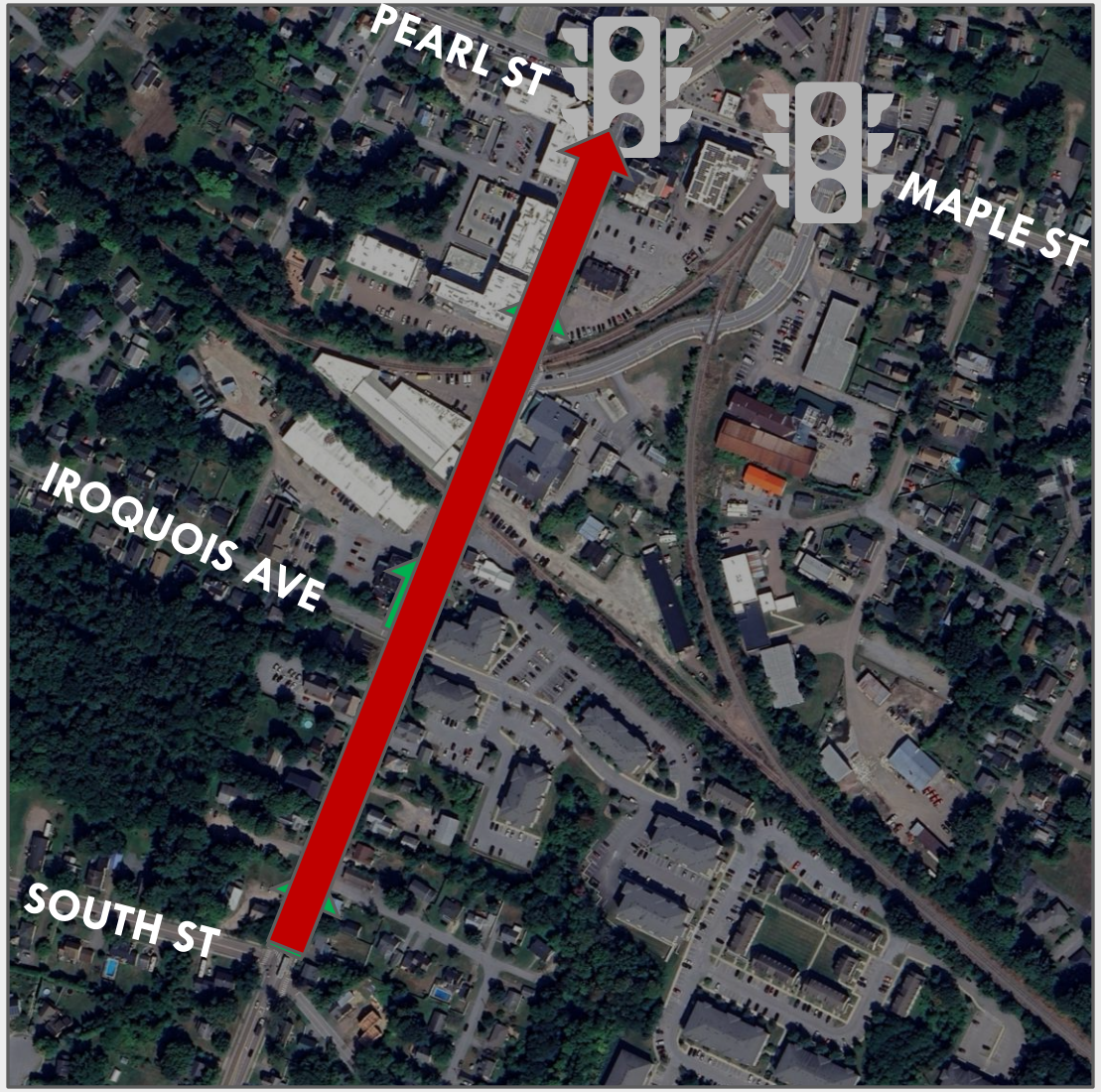
Queue detectors programmed to initiate a southbound flush when queue begins to approach Five Corners



RAILROAD STREET LESSONS LEARNED

Timeframe from conception to construction

- Staffing transitions
- Village to City
- Equipment obsolescence

The railroad world is different

- Language
- Expectations

CONTINUED REFINEMENTS EXPECTED

THANK YOU!

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