

# Working Group **Meeting #11**

September 29<sup>th</sup>, 2025



# Agenda

- Traffic Analysis
- Design Updates based on Feedback Received
- Matrix Updates based on Feedback Received



# Traffic Analysis



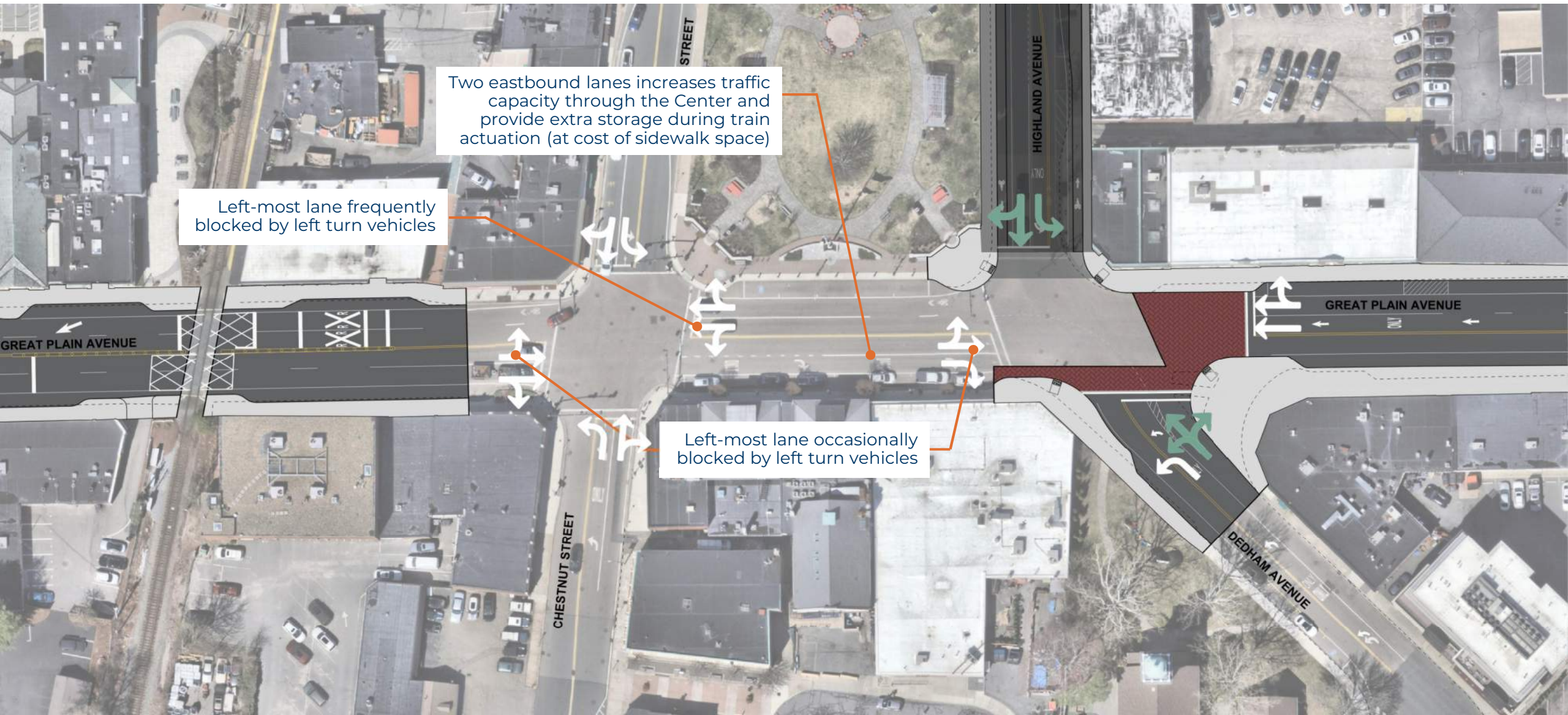
# Purpose

- To compare traffic operations for three alternatives relative to:
  - Travel time and queuing
  - Efficient circulation



# Proposed Lane Configurations

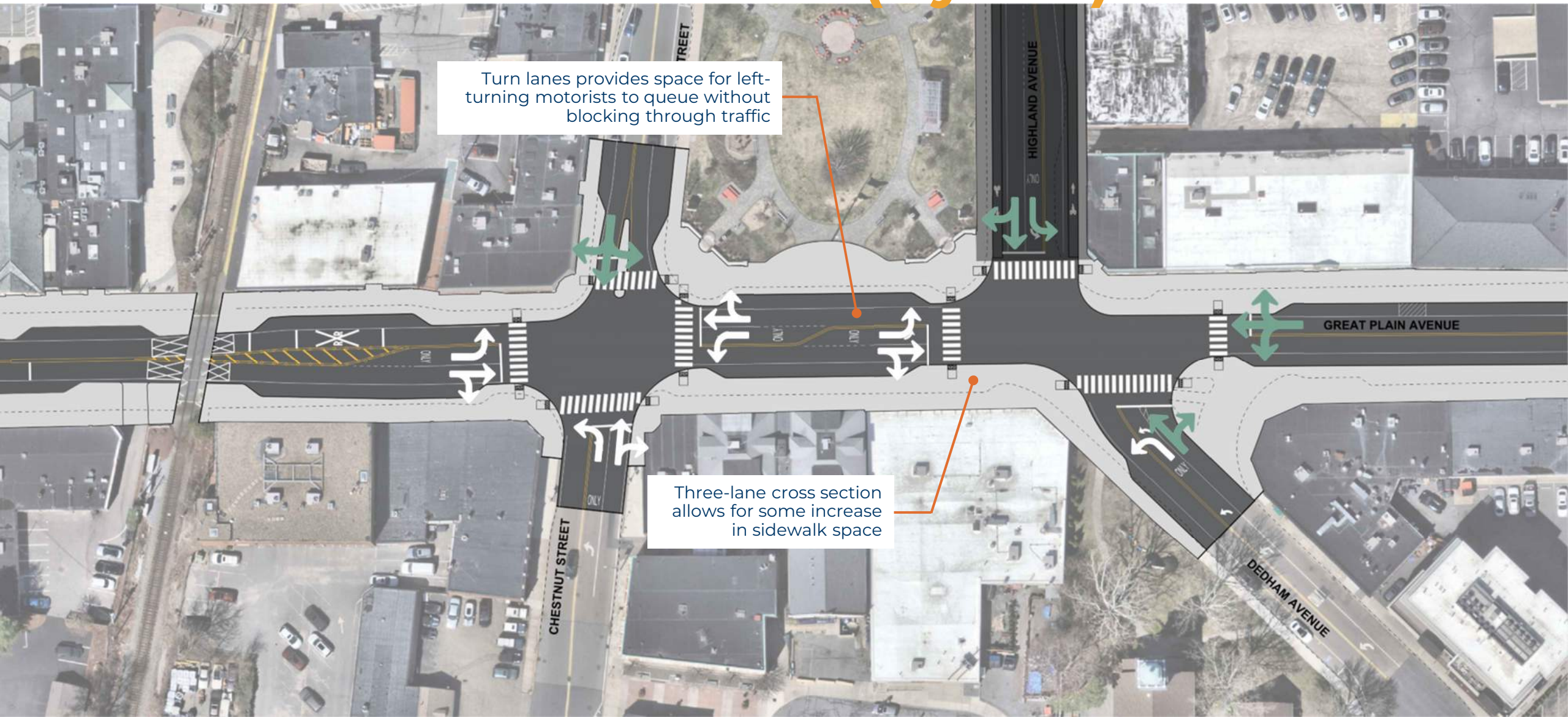
## Four Lanes





## Proposed Lane Configurations

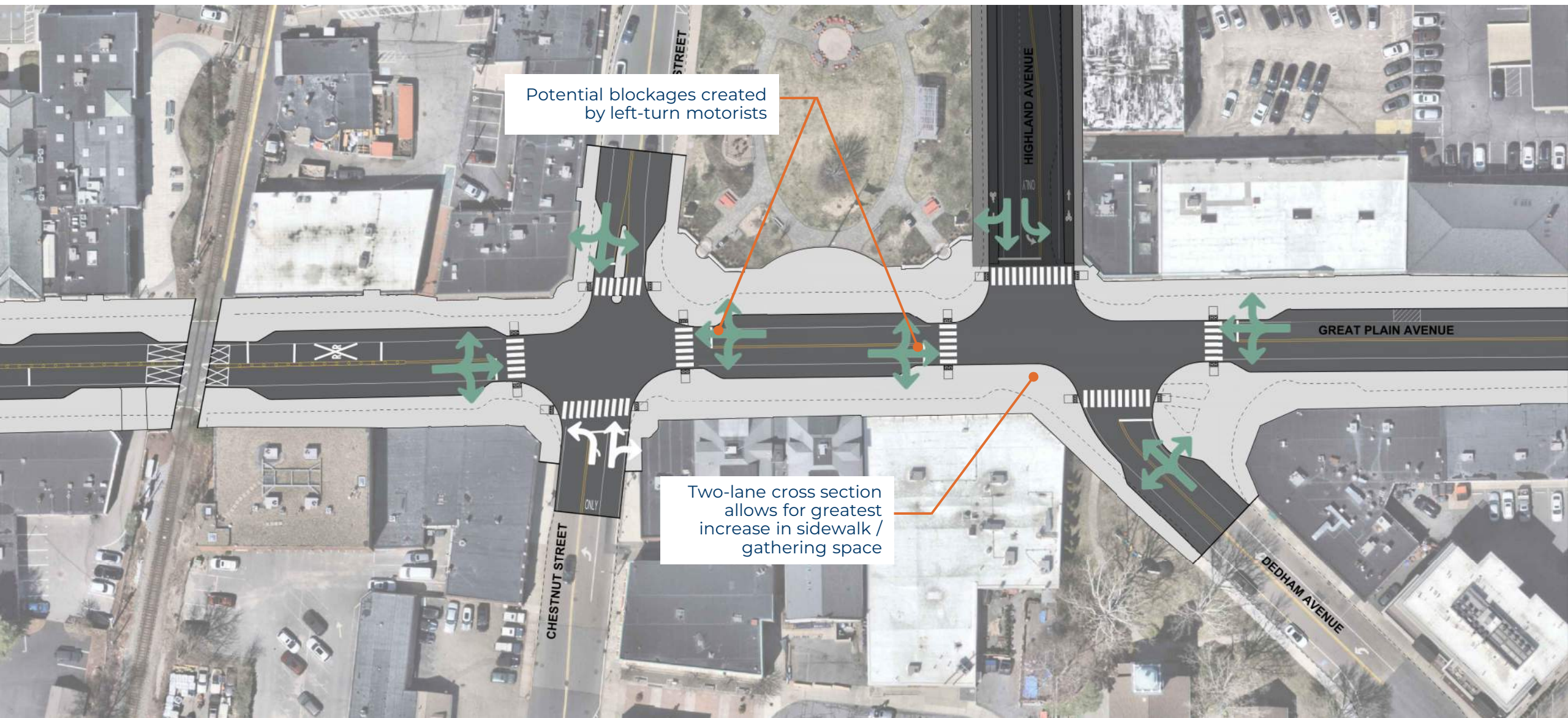
# Two Lanes + Turn Lanes (Hybrid)





# Proposed Lane Configurations

## Two Lanes



# Assumptions

| Assumption                                                            | Alternative 1<br>Four Lanes | Alternative 2<br>Two Lanes + Turn Lanes | Alternative 3<br>Two Lanes |
|-----------------------------------------------------------------------|-----------------------------|-----------------------------------------|----------------------------|
| Number of lanes on Great Plain Ave<br>in Center core                  | 4                           | 3                                       | 2                          |
| Number of lanes on Dedham Ave<br>approach                             | 2                           | 2                                       | 1                          |
| Number of lanes on Chapel St<br>Approach                              | 2                           | 1                                       | 1                          |
| Retain number of approach lanes<br>along Highland Ave and Chestnut St | ✓                           | ✓                                       | ✓                          |
| Retain exclusive pedestrian phasing                                   | ✓                           | ✓                                       | ✓                          |
| Coordinated traffic signals<br>(not clustered)                        | ✓                           | ✓                                       | ✓                          |

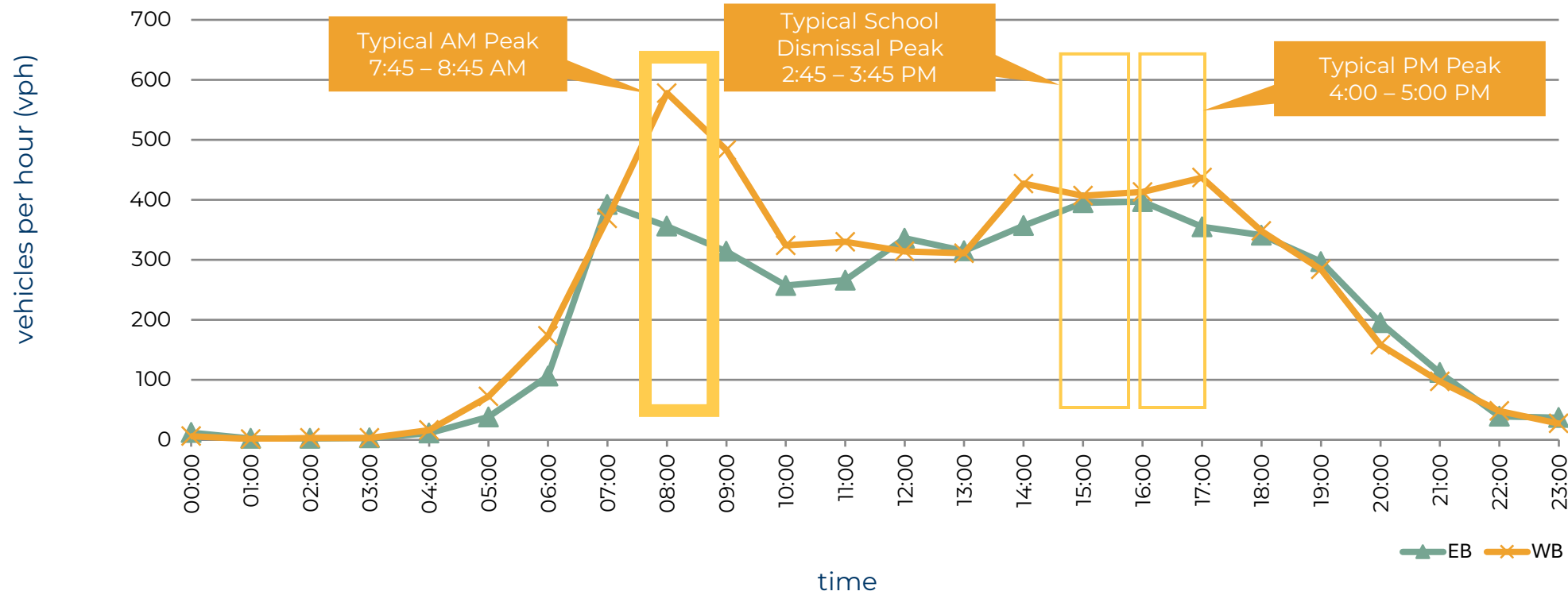


# Analysis Approach

- Updated traffic data (collected September 9, 2025) used for analysis
- VISSIM Traffic Modeling: stochastic model that simulates individual vehicles with more complex analysis of behavior and system-wide results determining:
  - Travel time
  - Queue distances



# Traffic Variation



**Great Plain Avenue, between Dedham Avenue/Highland Avenue and Chestnut Street/Chapel Street**  
*Automatic Traffic Recorder Data Collected September 9, 2025*



# Travel Time Comparison

| Movement                        | Existing<br>Four Lanes |           |     | Alternative 1<br>Four Lanes |           |     | Alternative 2<br>Two Lanes + Turn Lanes |           |     | Alternative 3<br>Two Lanes |           |      |
|---------------------------------|------------------------|-----------|-----|-----------------------------|-----------|-----|-----------------------------------------|-----------|-----|----------------------------|-----------|------|
|                                 | AM                     | Dismissal | PM  | AM                          | Dismissal | PM  | AM                                      | Dismissal | PM  | AM                         | Dismissal | PM   |
| Dedham Ave onto Westbound GPA   | 161                    |           | 135 | 117                         |           | 114 | 241                                     |           | 604 | 275                        |           | 388  |
| Westbound GPA                   | 99                     |           | 98  | 90                          |           | 99  | 101                                     |           | 120 | 116                        |           | 175  |
| Eastbound GPA                   | 137                    |           | 178 | 125                         |           | 157 | 120                                     |           | 284 | 266                        |           | 394  |
| Highland Ave onto Westbound GPA | 96                     |           | 97  | 139                         |           | 123 | 270                                     |           | 163 | 1198                       |           | 181  |
| Chapel St onto Eastbound GPA    | 148                    |           | 159 | 124                         |           | 145 | 315                                     |           | 342 | 1047                       |           | 1504 |
| Chestnut St onto Eastbound GPA  | 138                    |           | 134 | 118                         |           | 151 | 210                                     |           | 184 | 609                        |           | 858  |

Note: Travel times measured from approximately 1,800 feet upstream of stop line at respective approach





# Average Travel Times (AM Peak Hour)

## Existing Conditions





# Average Queue Lengths (AM Peak Hour)

## Existing Conditions



57' avg. queue

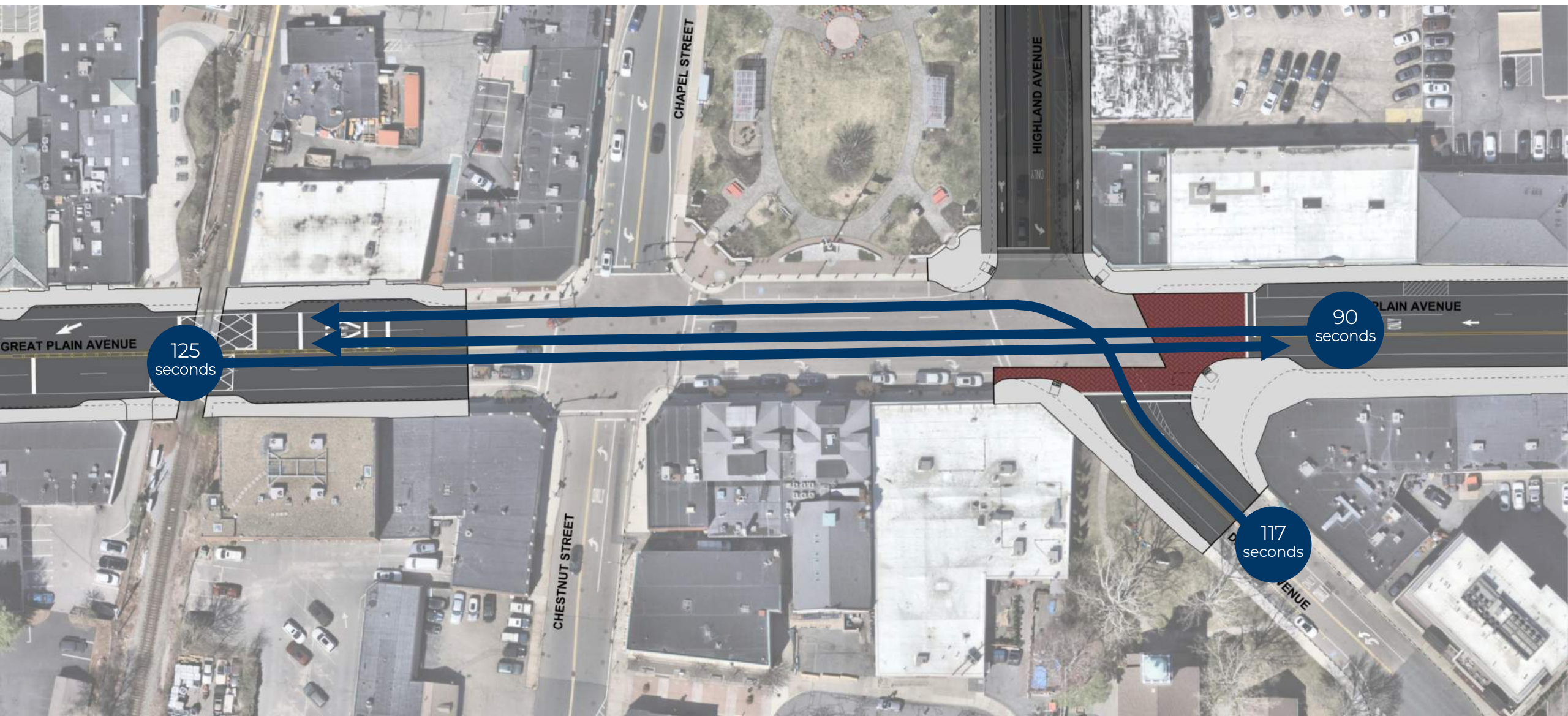
40' avg.  
queue

125' avg. queue



Average Travel Times (AM Peak Hour)

# Four Lanes





# Average Queue Lengths (AM Peak Hour)

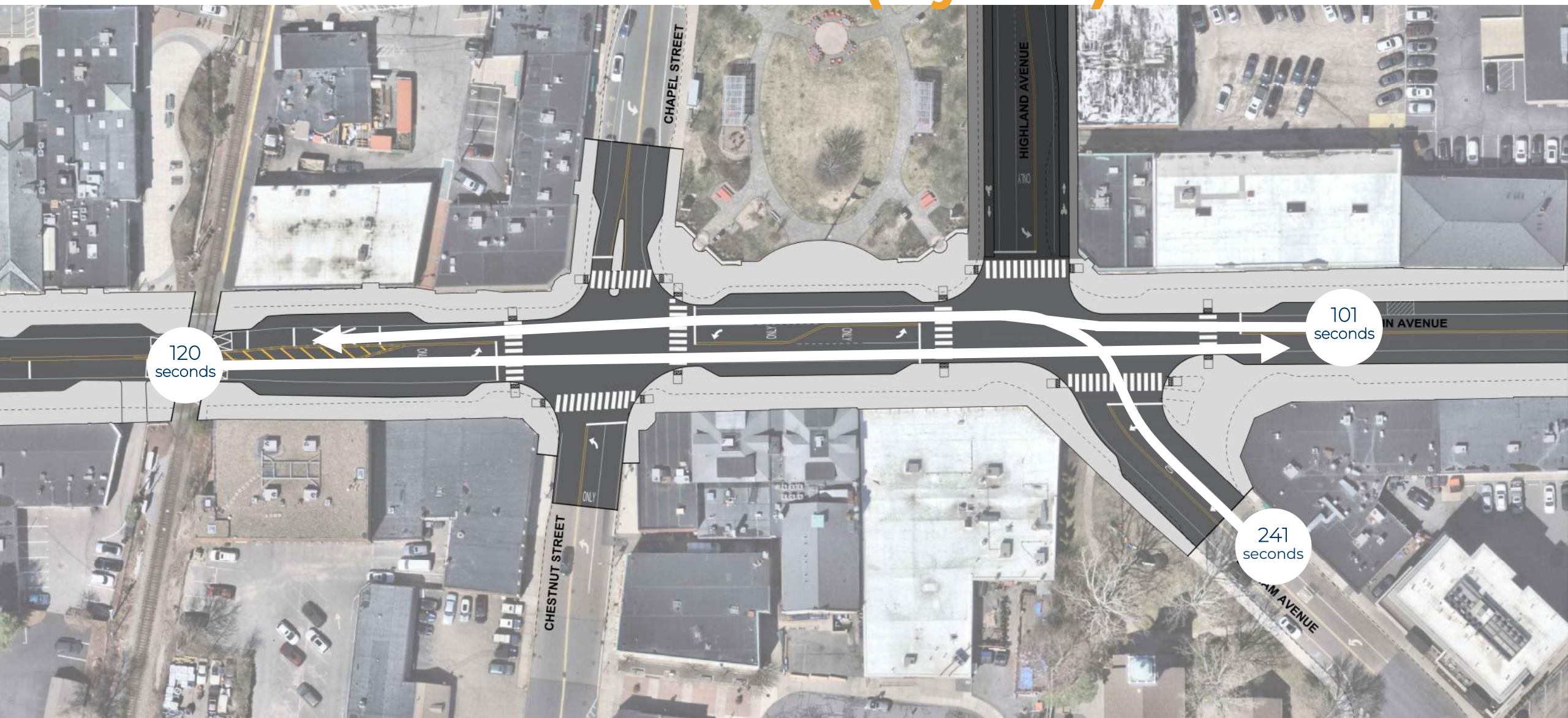
## Four Lanes





Average Travel Times (AM Peak Hour)

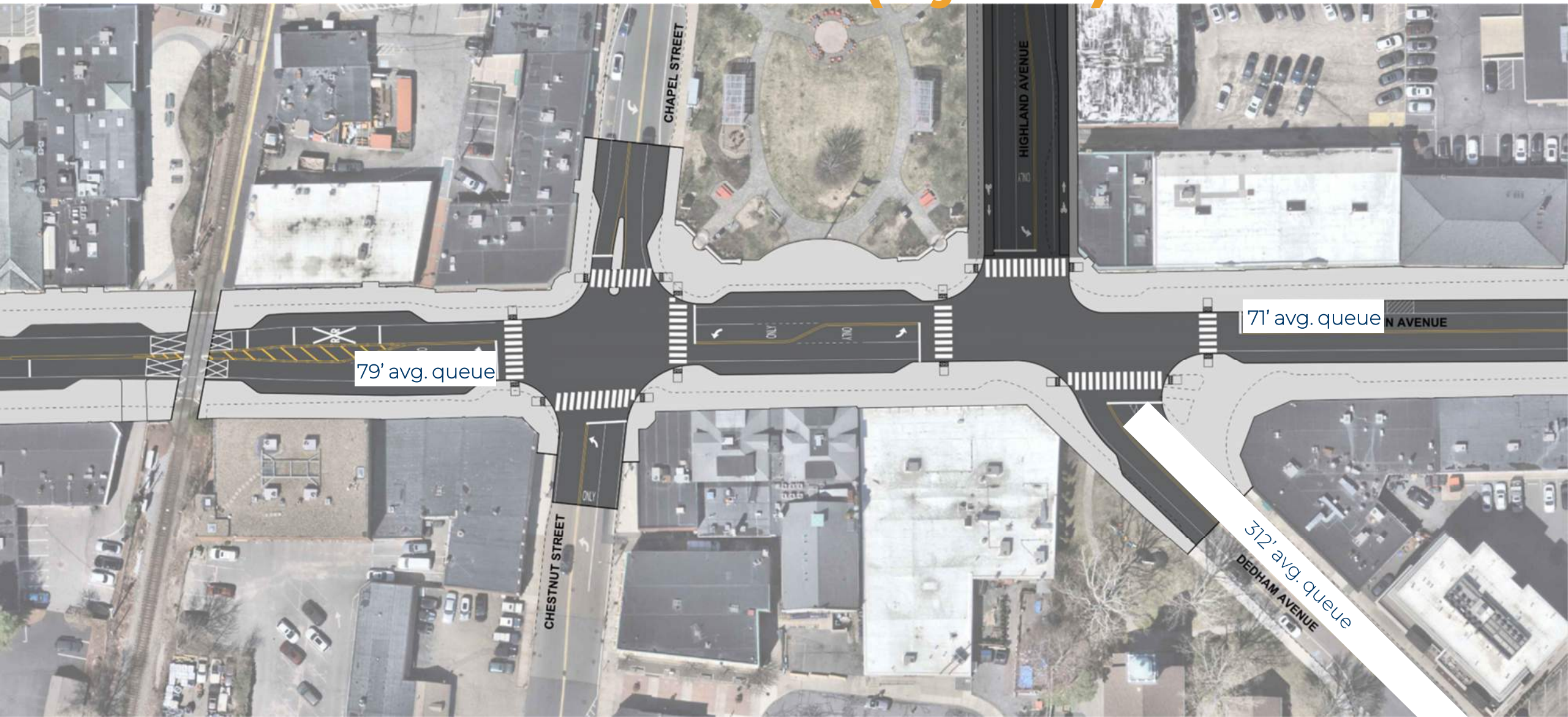
## Two Lanes + Turn Lanes (Hybrid)





Average Queue Lengths (AM Peak Hour)

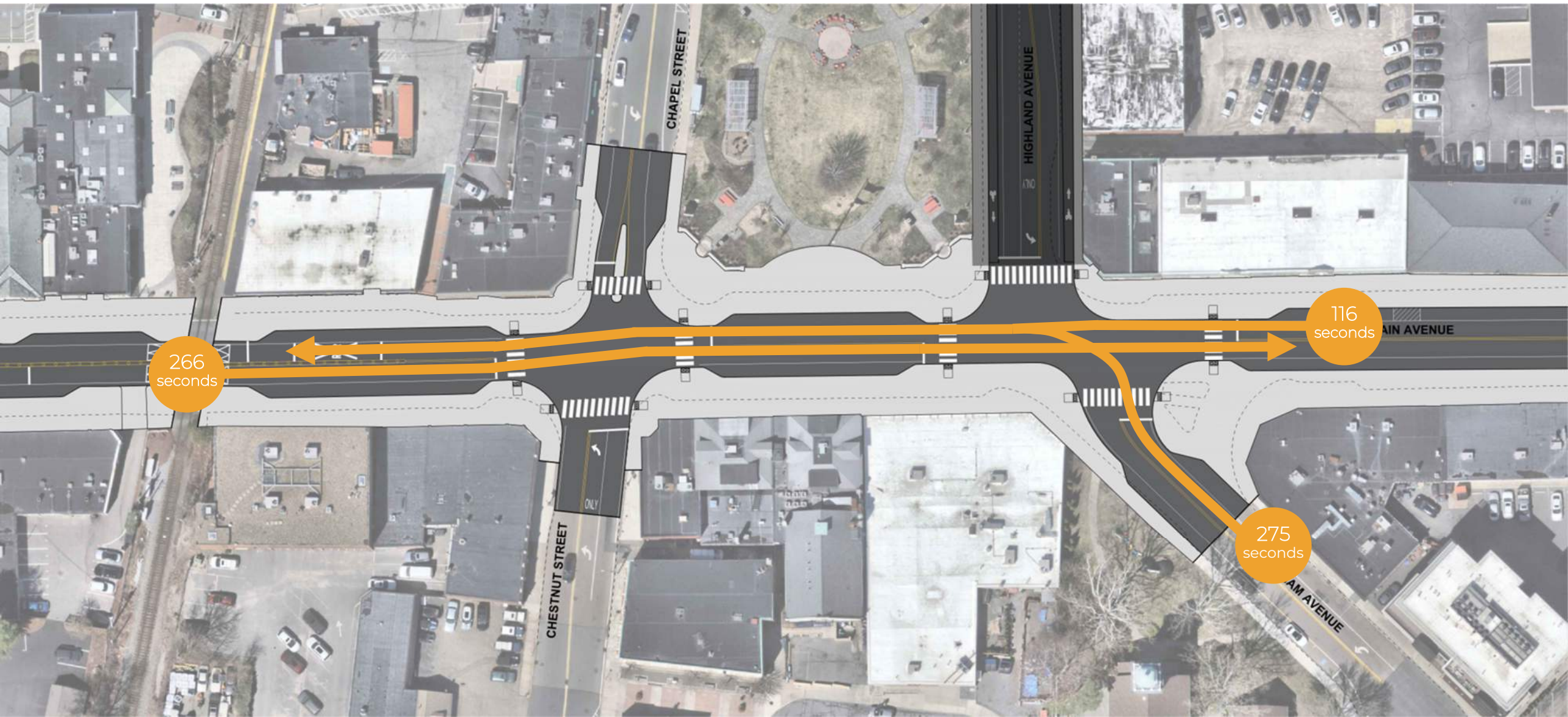
## Two Lanes + Turn Lanes (Hybrid)





Average Travel Times (AM Peak Hour)

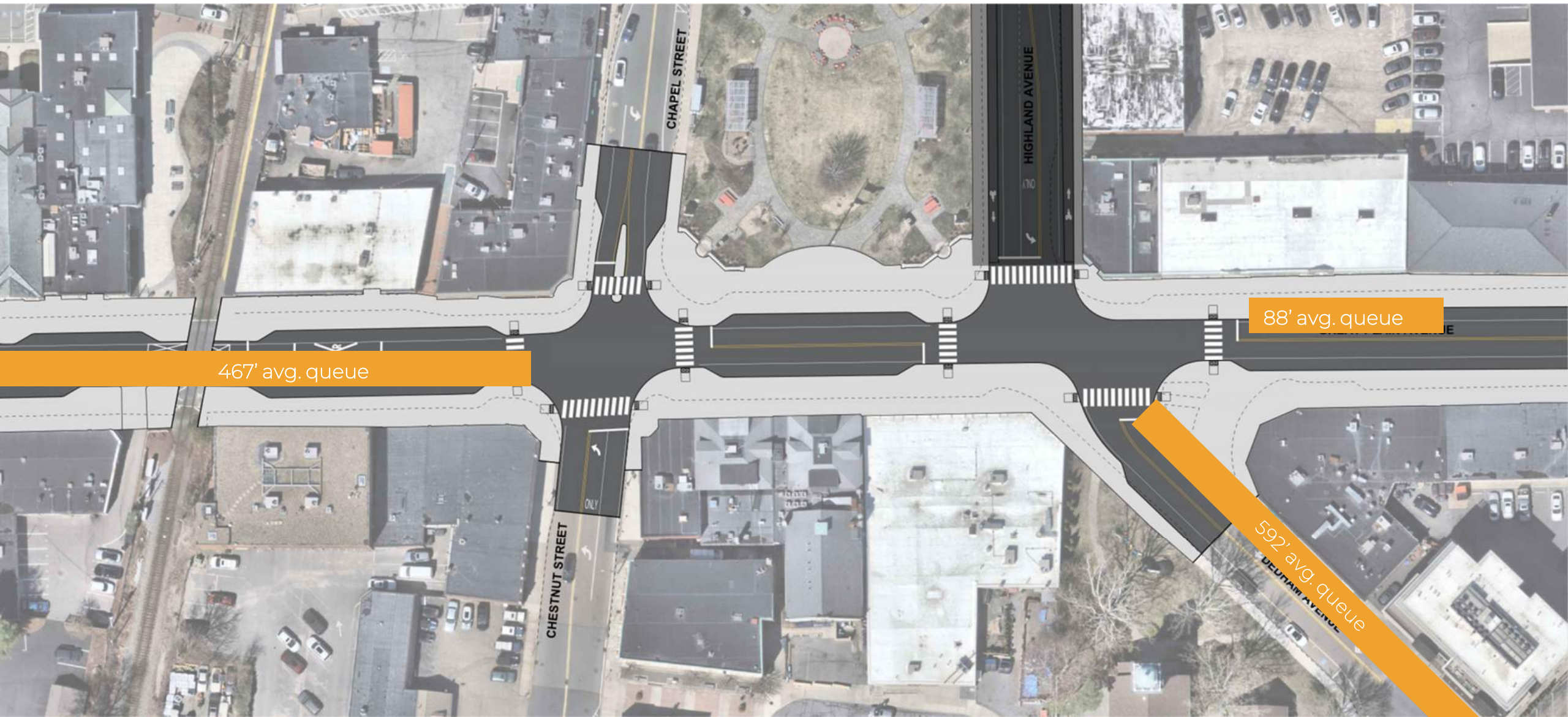
## Two Lanes





# Average Queue Lengths (AM Peak Hour)

## Two Lanes

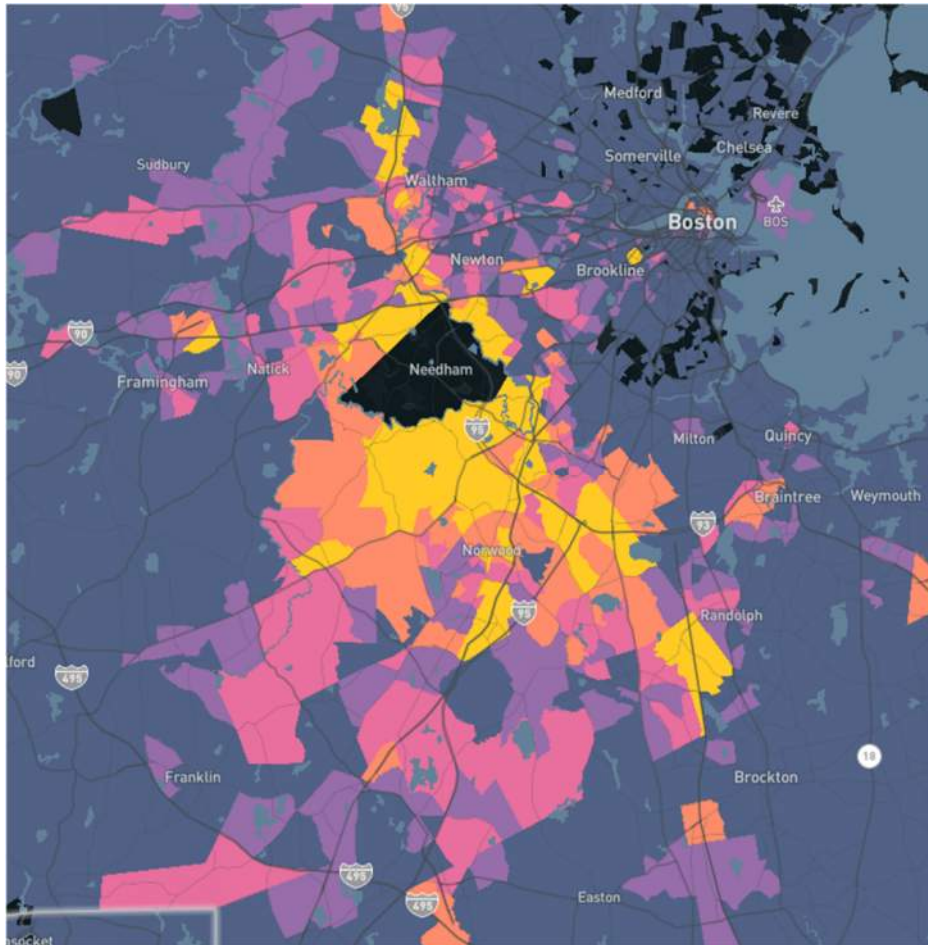


# Diverted Traffic

What kind of traffic is currently driving through Needham Center?

## Trips by Destination

Number of trips ending in each area

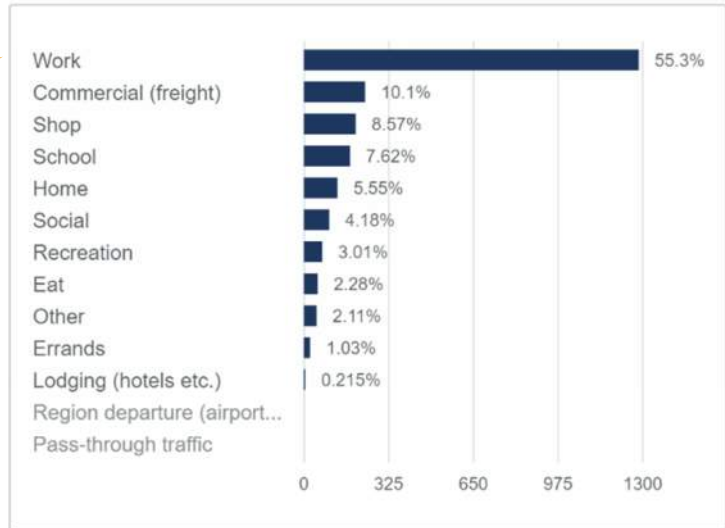


55% of trips are commute trips during AM peak

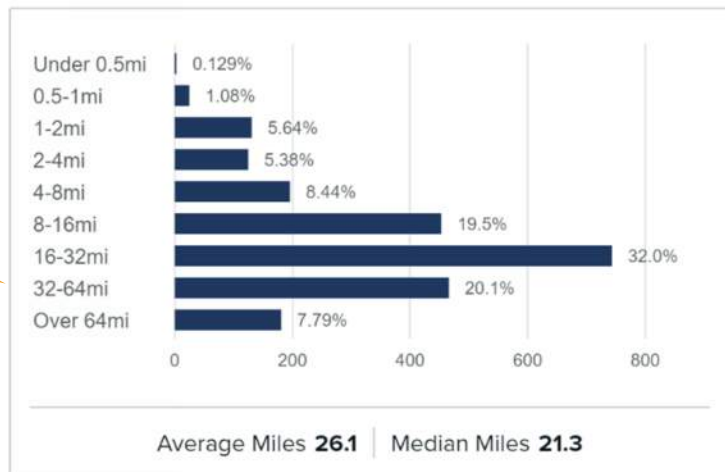
28% of trips are longer than 32 miles

## Replica Data – AM Peak Hour

### Trip Purpose

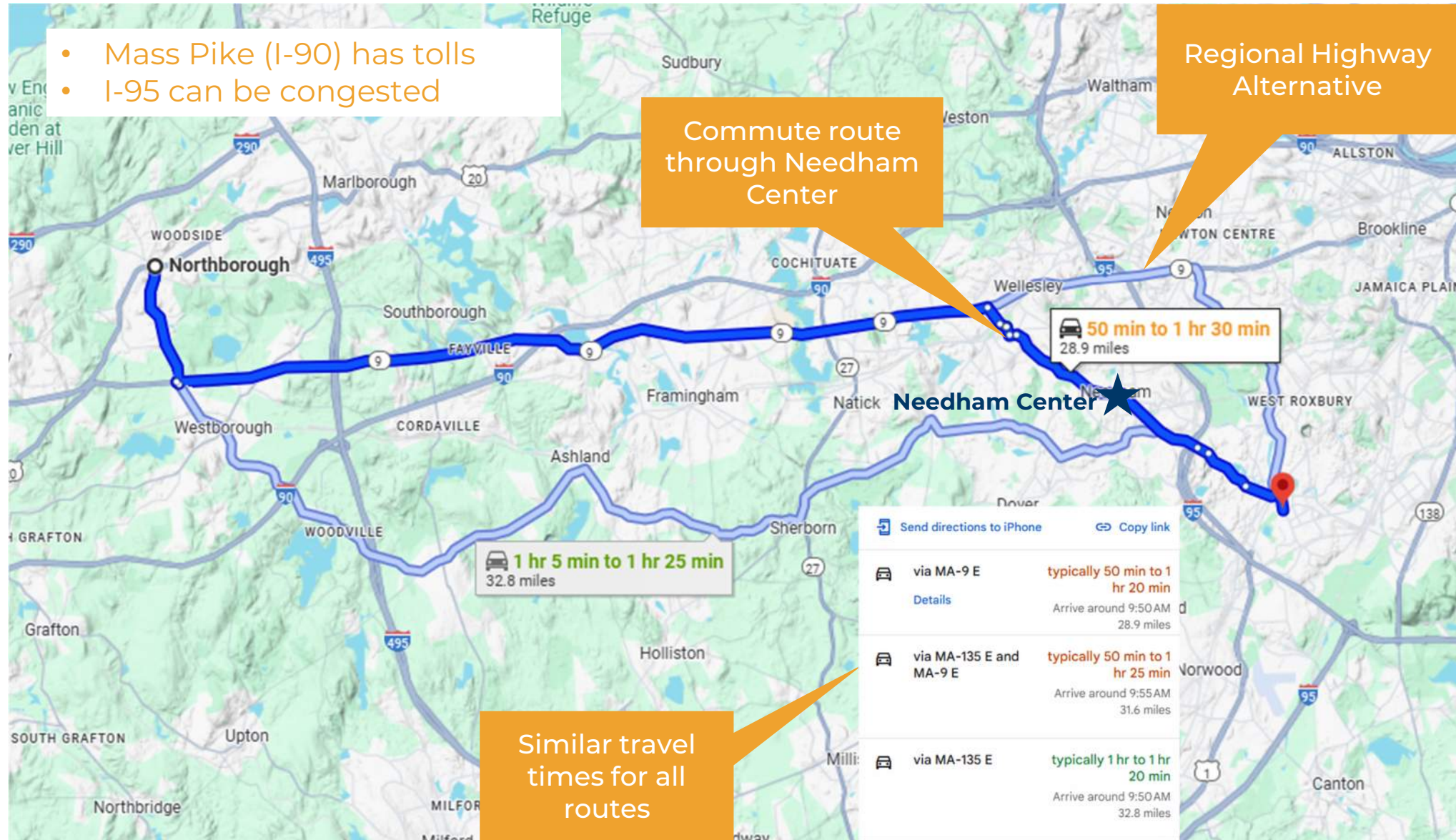


### Trip Distance (Miles)

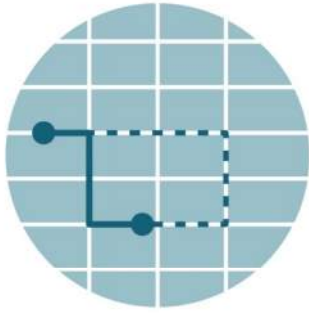




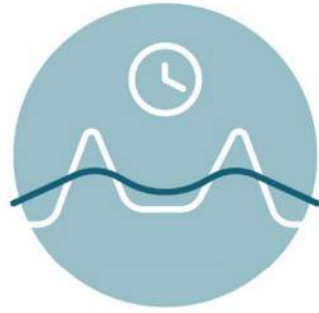
# Why do people cut through Needham?



# How changes in vehicle capacity can change behavior



Route Change



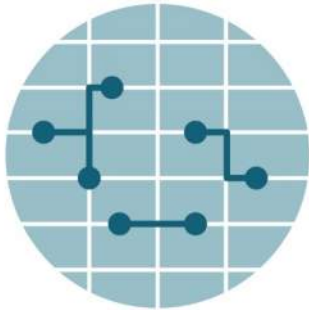
Time Shift



Proximity Shift



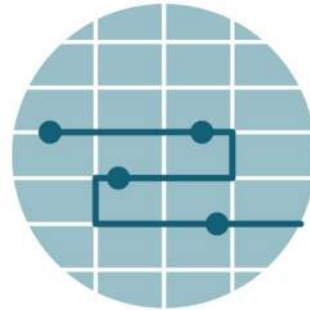
Mode Change



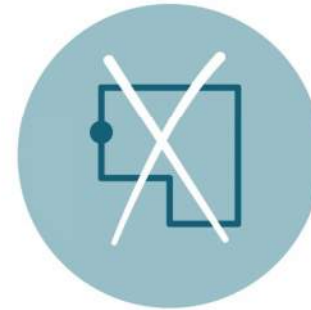
Trip Length Change



Trip Substitution



Trip Chaining



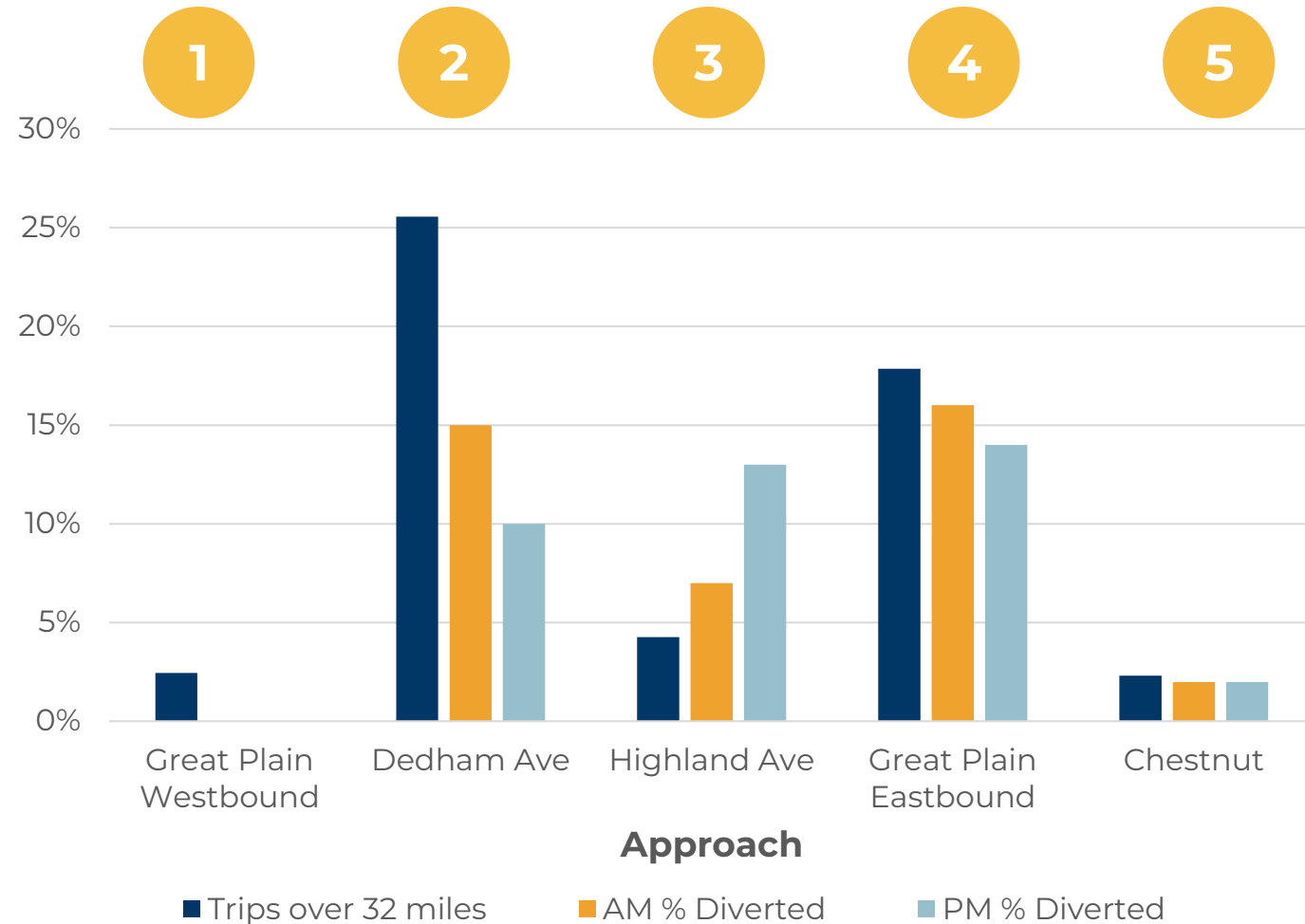
Trip Elimination



# Alt 3: Diversion of Long Trips

## Replica data platform

- For all approaches except for Highland Avenue, all diversion will be on regional highways, and none on local streets.
- On Highland Avenue, limited diversion onto parallel streets may occur.



# Diverted Trips

- Many trips passing through Needham Center at peak hours are regional commuting trips
  - **60%** of AM trips passing through the Center are **> 16 miles**
  - **28%** of AM trips passing through the Center are **> 32 miles**
  - **55%** of AM trips are **work related**
- Length of trips suggests that many viable alternative routes with similar travel times are available on regional highways
- Degree to which drivers change their behavior will influence which roadways are impacted by the project and by how much – not an exact science





# Design Updates



# Design Updates

- 5 parking spaces added in front of Town Common for hybrid and 2-lane alternatives
  - New parking totals:
    - Existing: 98
    - 4 Lane: 98
    - Hybrid: 102
    - 2 Lane: 110
- Bumpout at Pickering Ave extended in hybrid alternative to match other alternatives (-1 parking space)
- Highland Avenue TIP linework shown in all alternatives





# Matrix Updates



# Safety (no change)

| Metric                                     | Scoring Description                                                                                                                                                                                                                                        | Score by Alternative |                                                   |                    |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                                            |                                                                                                                                                                                                                                                            | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Incorporation of speed management features | -2 Speed anticipated to be higher than under existing conditions.<br>0 No major speed management features incorporated within project limits.<br>+2 Multi-pronged speed management strategy incorporated.                                                  | 0                    | +1                                                | +2                 |
| Conflict points                            | -2 Increases conflicts between modes.<br>0 Reduces some conflicts but leaves others unresolved.<br>+2 Significantly reduces conflict points across all modes.                                                                                              | 0                    | +1                                                | +1                 |
| Crossing distance                          | -2 Average crossing distances for non-motorists increase.<br>0 Crossing distances remain unchanged or decrease minimally compared to existing conditions.<br>+2 Crossing distances decrease considerably.                                                  | +1                   | +2                                                | +2                 |
| Crash reduction potential                  | -2 Crash risk increased compared to existing conditions.<br>0 Little/no reduction in crash risk compared to existing conditions.<br>+2 Substantial crash reduction with proven treatments (reduced speeds; crossing distances; multiple threat situations) | +1                   | +2                                                | +2                 |





# Mobility & Access for Non-Motorists

| Metric                                              | Scoring Description                                                                                                                                                                                                                                                                | Score by Alternative |                                                   |                    |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                                                     |                                                                                                                                                                                                                                                                                    | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Level of Traffic Stress (LTS) for those on bicycles | -2 LTS for those on bicycles increased compared to existing conditions.<br>0 No change in bicycle accommodations compared to existing conditions.<br>+2 Ability to incorporate fully protected, connected bike network integrated with downtown.                                   | 0                    | +2                                                | +2                 |
| Sidewalk width                                      | -2 Reduction in sidewalk width compared to existing conditions.<br>0 Minimal widening of sidewalks compared to existing conditions.<br>+2 Increase in sidewalk width throughout corridor.                                                                                          | 0                    | +1                                                | +2                 |
| Curb management efficiency                          | <del>-2 Increased number of conflicts between loading operations and parking.</del><br><del>0 No change in curb management efficiency compared to existing conditions.</del><br><del>+2 Well managed curb zones supporting deliveries, pick up/drop off, and business needs.</del> | 0                    | 0                                                 | 0                  |



# Traffic Flow

| Metric                                  | Scoring Description                                                                                                                                                                                       | Score by Alternative |                                                   |                    |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                                         |                                                                                                                                                                                                           | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Traffic rerouting impact<br>(peak hour) | -2 Significant rerouting of traffic from the project limits anticipated.<br>0 No rerouting of traffic from the project limits anticipated.<br>+2 Increased traffic anticipated within the project limits. | 0                    | -1                                                | -2                 |
| Vehicle travel time<br>(peak hour)      | -2 Significantly increases congestion or delay anticipated.<br>0 Neutral or minor delay impacts anticipated.<br>+2 Vehicle travel efficiency anticipated to be improved.                                  | 0                    | -1                                                | -2                 |
| Queue lengths<br>(peak hour)            | -2 Significantly increased queue length anticipated.<br>0 Neutral or minor impacts to queue lengths anticipated.<br>+2 Queue lengths anticipated to be improved.                                          | 0                    | -1                                                | -2                 |



# Economic Development

| Metric                   | Scoring Description                                                                                                                                                                                                 | Score by Alternative |                                                   |                    |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                          |                                                                                                                                                                                                                     | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Parking supply           | -2 Significant net loss without mitigation.<br>0 Balanced loss and gain along corridor with modest impacts.<br>+2 Supports efficient turnover and complements demand.                                               | 0                    | +1                                                | +1                 |
| Business accessibility   | -2 Reduces or complicates access.<br>0 Maintains current access with minimal improvements.<br>+2 Improves deliveries, visibility, and customer access.                                                              | +1                   | 0                                                 | 0                  |
| Outdoor dining/gathering | -2 Fewer outdoor dining/gathering opportunities compared to existing condition.<br>0 No change in amount of outdoor dining/gathering opportunities.<br>+2 Major increase in amount of outdoor dining opportunities. | 0                    | +1                                                | +2                 |
| Foot traffic increase    | -2 Reduction in foot traffic anticipated.<br>0 No expected increase.<br>+1 Modest increase through improved walkability.<br>+2 Significant increase in pedestrian presence and time spent downtown.                 | 0                    | +1                                                | +2                 |





# Streetscape/Urban Design (no change)

| Metric                     | Scoring Description                                                                                                                                                                      | Score by Alternative |                                                   |                    |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                            |                                                                                                                                                                                          | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Public realm space         | -2 Reduced public realm space compared to existing condition.<br>0 No/limited added public realm space.<br>+2 Major addition of usable public spaces, plazas, and wider sidewalks.       | 0                    | +1                                                | +2                 |
| Tree canopy/greenery       | -2 Fewer street trees/greenery than in the existing condition.<br>0 Few/no new street trees/greenery compared to existing condition.<br>+2 Major expansion of tree canopy and greenery.  | 0                    | +2                                                | +2                 |
| Street furniture/amenities | -2 Fewer amenities than in the existing condition.<br>0 Few/no new amenities compared to existing condition.<br>+2 Comprehensive suite of street furniture enhancing comfort and safety. | 0                    | +1                                                | +2                 |



# Sustainability/Resilience

| Metric                | Scoring Description                                                                                                                                                                    | Score by Alternative |                                                   |                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                       |                                                                                                                                                                                        | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Stormwater BMPs       | -2 No new stormwater improvements.<br>0 No new stormwater BMPs included as part of project.<br>+2 Comprehensive green stormwater infrastructure integrated.                            | +1                   | +2                                                | +2                 |
| Vehicle emissions     | <del>-2 No reduction; may increase emissions.</del><br><del>0 Neutral to modest improvement.</del><br><del>+2 Significant emissions reduction through mode shift and efficiency.</del> | 0                    | +1                                                | +1                 |
| Heat island reduction | -2 Reduction in shade compared to existing conditions.<br>0 No shade/reflective improvements.<br>+2 Major reduction in urban heat islands through tree canopy and material selection.  | 0                    | +1                                                | +2                 |



# Cost/Implementation

| Metric                                | Scoring Description                                                                                                                                                    | Score by Alternative |                                                   |                    |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                                       |                                                                                                                                                                        | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Pilot recommended prior to full-build | -2 Pilot strongly recommended prior to full-build construction.<br>+2 Pilot not recommended prior to full-build construction.                                          | +2                   | -1                                                | -2                 |
| Construction cost                     | -2 Construction cost is higher when comparing all design alternatives<br>+2 Construction cost is lower when comparing all design alternatives                          | +2                   | -1                                                | -1                 |
| ROW / utility conflicts               | <del>-2 Few ROW/utility conflicts anticipated compared to alternatives.</del><br><del>+2 Significant ROW/utility conflicts anticipated compared to alternatives.</del> | +1                   | 0                                                 | 0                  |
| Constructability                      | -2 Alternative anticipated to have significant constructability issues.<br>+2 Alternative anticipated to have few constructability issues.                             | +2                   | 0                                                 | 0                  |





# Project/Policy Alignment (no change)

| Metric                          | Scoring Description                                                                                                                                                                                                       | Score by Alternative |                                                   |                    |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|--------------------|
|                                 |                                                                                                                                                                                                                           | 4-Lane Alternative   | 2-Lane Hybrid Alternative<br>2 Lanes + Turn Lanes | 2-Lane Alternative |
| Consistency with regional plans | -2 Not consistent with adopted plans.<br>0 Aligns with some but not all plans.<br>+2 Strong alignment with multiple adopted plans (e.g., Complete Streets Plan, Boston MPO Vision Zero Plan).                             | 0                    | +2                                                | +2                 |
| Coordination with projects      | -2 Missed opportunity; conflicts with other capital projects.<br>0 Some coordination possible.<br>+2 Strong coordination with scheduled projects (Highland Ave TIP project)                                               | -1                   | +1                                                | +1                 |
| Grant competitiveness           | -2 Not competitive or eligible for the majority of current programs through the state or federal government.<br>0 Not competitive for some limited funding streams.<br>+2 Highly competitive for multiple grant programs. | -1                   | +1                                                | +1                 |

