SCARSDALE VILLAGE CENTER MOBILITY PLAN DRAFT

AN ELEMENT OF THE SCARSDALE STRATEGIC MOBILITY + PLACEMAKING PLAN

09/20/22

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the Village of Scarsdale

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Strategic Mobility Plan Overview

The Scarsdale Strategic Mobility + Placemaking Plan is a community-driven transportation planning effort to identify and address challenges and opportunities in the Village Center roadways. The plan's goals are to increase pedestrian and cyclist safety, provide access for all users, improve traffic flow and circulation, activate public spaces, and incorporate sustainability. This document outlines recommendations for Popham Road, Fox Meadow Road, and Crane Road. These plans were developed in coordination with the Placemaking Plan, a separate report that includes recommended concepts for Spencer Place and Boniface Circle.

The concepts developed for this Strategic Mobility Plan were developed based off findings from community and stakeholder feedback, planning documents, traffic studies, drone data collection from March 2022, and an analysis of crash data. The project team collected community and stakeholder feedback through a walk audit in March 2022, through comments on the project website (www.scarsdalemobility.com), via email, and at Village Board working group meetings, a design workshop, and a virtual public workshop. Additional detail and analysis can be found in the Data Analysis Memo and the Data Analysis Memo Appendix. The conclusions of this report are advisory and intended for general planning purposes to help identify transportation safety needs that encourage walking and bicycling and improve roadway safety. The contents of this report are not intended to be legally binding but rather offer recommendations to improve safety in the study area.

Popham Road

Popham Road offers many opportunities for a redesign that includes improved bicycle and pedestrian infrastructure. Signal changes and improved pedestrian crossings can further improve safety and promote non-motorized access to the Village Center. This section documents the background, findings from the data analysis, alternatives considered, and the recommended approach.

Background

Popham Road is an east-west corridor running from the Bronx River Parkway to Route 22 Post Road. It serves as a critical gateway to the Village Center, and many use the road to access the Metro-North station via East Parkway or Depot Place. Popham Road is a two-lane road from Lockwood Road to Route 22 Post Road. Approaching the Village Center, the road widens to have a westbound right turn lane at Chase Road. Between Chase Road and East Parkway, Popham Road widens to have a left and right turn lane in the westbound direction and a left turn lane in the eastbound direction. This location has narrow lanes, nine-foot widths or less. Between East Parkway and Depot Place the road widens further as it crosses over the Metro-North railroad tracks. In addition to through lanes in each direction, the westbound direction has right and left turn lanes at Depot Place, and the eastbound direction has right and left turn lanes at East Parkway. The lanes are also wider at this location. According to the New York State Department of Transportation (NYSDOT) Traffic Data Viewer (2019), Popham Road has an estimated Annual Average Daily Traffic (AADT) of 12,224 vehicles.

Popham Road has been studied extensively, particularly at the Chase Road and East Parkway intersections. At Chase Road, recent report recommendations included pedestrian visibility improvements, new lighting, a leading pedestrian interval (LPI) to give pedestrians a head start in crossing, and "No Turn on Red" signage. Previous studies of the East Parkway intersection found a variety of challenges pertaining to pedestrian crossing, left turning movements, and poor visibility. Many of these observations were noted by participants in the March 2022 walk audit.

Between 2015 and 2019, 28 crashes occurred at the Chase Road intersection, and 60 crashes occurred at the East Parkway intersection; the East Parkway intersection has the highest number of crashes of any intersection in the study area. For additional information on the crashes and previous traffic studies, see the Data Analysis Appendix.

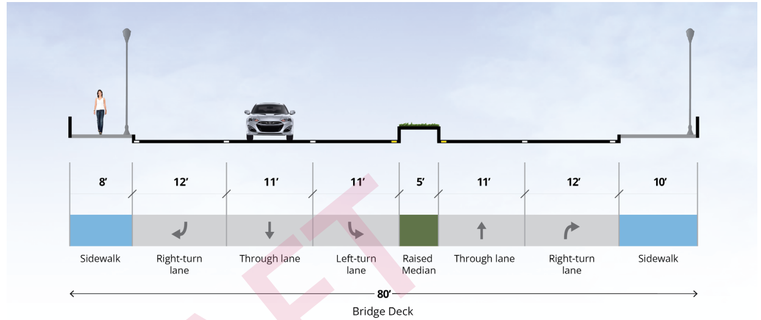
Findings

To provide additional data, a drone video of the Village Center was collected on Thursday, March 10th, 2022 to assist in the understanding of traffic patterns in the Village Center. Drone video spanned from the intersection of Crane Road and Chase Road to the intersection of Popham Road and Garth Road. This extent covered the entirety of the study area including all intersections on East Parkway and the intersection of Popham Road at Chase Road, East Parkway, and Garth Road. Drone video was recorded for approximately a one-hour period between 3:49 PM and 4:49 PM. This period was selected based on qualitative conversations indicating it is one of the busier time periods in the Village Center. Drone collection was conducted without the presence of the Dine the 'Dale tent that is temporarily set up on Spencer Place during warmer months. The drone video was subsequently processed to obtain individual tracks for vehicles and pedestrians. The data was utilized to understand travel patterns of these users through the study area.

Findings from this analysis pertaining to Popham Road included the following:

- Only about one third of traffic on Popham Road consists of through traffic both entering and exiting on Popham Road. Approximately 50% of traffic on Popham Road enters Popham Road from Garth Road, Depot Place, East Parkway, Scarsdale Avenue, Overhill Road, or Chase Road.
- Westbound traffic on Popham Road represents the heaviest traffic flow in the study area. This queue storage of westbound traffic on Popham Road at East Parkway is regularly filled with turning traffic from Chase Road.
- Westbound right-turn lanes on Popham Road are lightly used at the intersection of Chase Road, East Parkway, and Depot Place. Each of these movements serve fewer than 40 vehicles per hour in the afternoon peak hour observed. This finding suggests that this space can potentially be reallocated for pedestrian, bicycle, or landscaping use.
- Speeds exceeding 40 mph were recorded. The posted speed limit is 30 mph. (State law was recently updated to allow villages to post speeds of 25 mph.)

Figure 1. Popham Road over Metro-North Railroad | Looking West | Existing Cross Section



Feedback from the public, businesses, stakeholders, and the Village Board included the following:

- High vehicle speeds contribute to an environment that feels unsafe for pedestrians.
- Popham Road lacks bike infrastructure. The westbound right turn lane acts as a bike lane because it is infrequently used by cars. A bike lane is needed in the eastbound direction.
- Pedestrians face long wait times crossing Popham Road, and many participants said they feel unsafe crossing the roadway. Leading pedestrian intervals (LPIs) could help with crossing times and perceptions of safety.
- Improving the pedestrian environment could help encourage people to park at the Freightway site and walk to the Village Center core.
- When the flexible bollards are damaged by vehicles, the holders become tripping hazards at night.

- The roadway is in poor condition.
- Eastbound drivers between East Parkway and Chase Road frequently change lanes or take up both lanes because the lane widths are too narrow.
- The intersections at Depot Place and East Parkway have signals that are confusing to left turning drivers who are unfamiliar with the area. (The signal condition is called a "Yellow Trap." Drivers making left turns after the light has turned red assume oncoming drivers also have a red light when they continue to have a green light.)
- The overhead right turn only signage is not visible to westbound traffic in the right lane on the bridge.
- There is no signage prohibiting U-turns.
- The asymmetrical intersection creates sightline issues.

Alternatives Considered

With fewer than 40 right-turning vehicles in the westbound direction per hour, the most promising solution for improved bicycle and pedestrian access is to repurpose the right turn lanes. The project team developed three alternatives.

Alternative 1: Cycle Track to Bronx River Pathway

This alternative does not change any of the configuration in the eastbound direction. The westbound right turn lane is converted to a two-way cycle track that would tie into the Bronx River Pathway; the sidewalk width is reduced

Figure 2. Popham Road over Metro-North Railroad | Looking West | Alternative 1

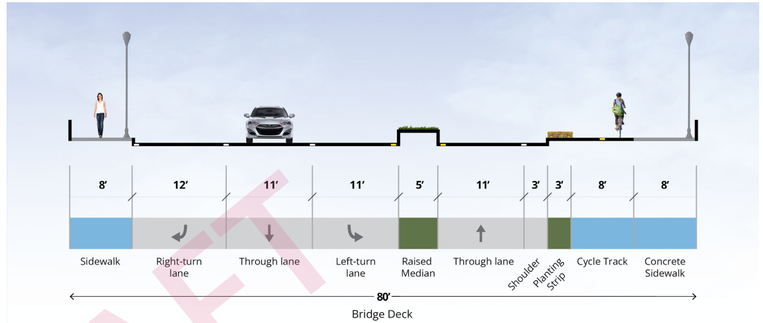
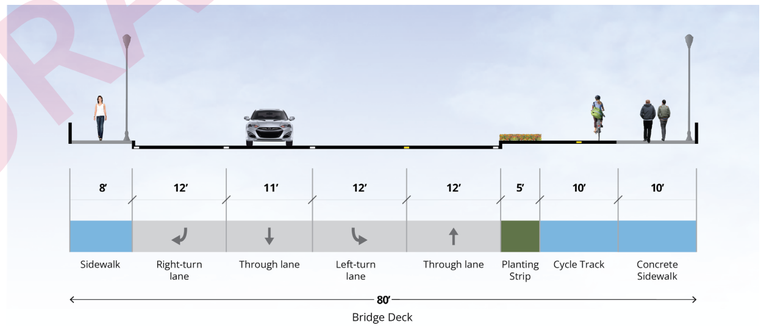


Figure 3. Popham Road over Metro-North Railroad | Looking West | Alternative 2



to eight feet to accommodate a planted buffer. This alternative would allow users of the Bronx River Pathway to access the Village Center more seamlessly. The protected bike infrastructure is designed to make biking comfortable and safe for all cyclists, regardless of age or ability. Moreover, cyclists commuting to the train station from neighborhoods to the east could use this path to access bike parking on the west side of the station, which is underutilized.

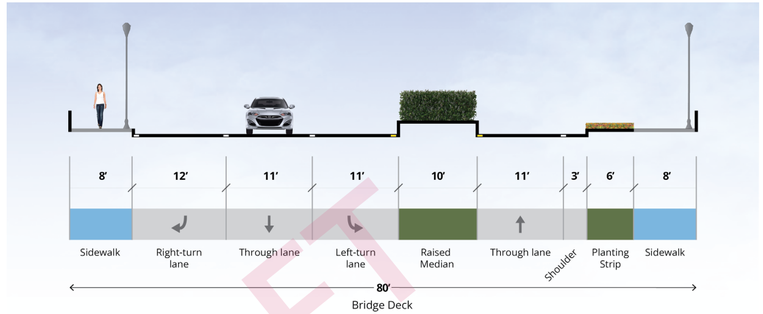
Alternative 2: Eliminate Raised Median

Alternative 2 further modifies the roadway. In addition to converting the westbound right turn lane into a cycle track, this alternative eliminates the raised median in favor of a wider planting strip and cycle track. Although center medians can have safety benefits by preventing head-on collisions, siting them in roadways with 30 mph speed limits is more of an aesthetic choice. Relocating the planter strip to the sidewalk could help add a level of comfort to the cycle track and sidewalk. The space may even be wide enough for restaurants to offer café seating on Popham Road.

Alternative 3: Widen Raised Median

For Alternative 3, the median is widened. Feedback about the existing median is that it is not attractive. A wider median may allow for more plantings and would create a roadway that felt

Figure 4. Popham Road over Metro-North Railroad | Looking West | Alternative 3



more like a boulevard. Gateway features could also be added. This alternative does not include a cycle track, so cyclists would either need to share the 8-foot sidewalk with pedestrians or ride in the lane with vehicles.

Alternative Selection

Following the presentation of alternatives at the virtual public meeting, members of the public emphasized a strong need for improved bicycle and pedestrian access to the Village Center. For this reason, Alternative 3 was eliminated for its lack of protected bike infrastructure. The difference between Alternative 1 and Alternative 2 is more of an aesthetic choice: offer the plantings in the center or along the cycle track/sidewalk. The project team believes the bicycle and pedestrian spaces offered in Alternative 1 meet the needs of active transportation users. This alternative is preferred because of the limited impact it has on the majority of the roadway. Moreover, it will be easier to pilot through a temporary lane closure.

The concept plan on page 10 outlines the new lane configurations as well as crossing, signage, and lane alignment recommendations.

The Vision for Popham Road

A redesigned Popham Road will be safer for all users. This includes important safety improvements for pedestrians, bicyclists, and drivers alike. The plan will enhance inadequate pedestrian connections with safer, more convenient crosswalks. The plan will establish new connections for bicyclists and other wheeled users between the Bronx River Pathway and the Village Center. The plan will make driving on Popham Road less stressful by establishing clearer travel patterns along the roadway, while reducing the number of potential conflicts between all users. The plan accomplishes these goals with the following components:

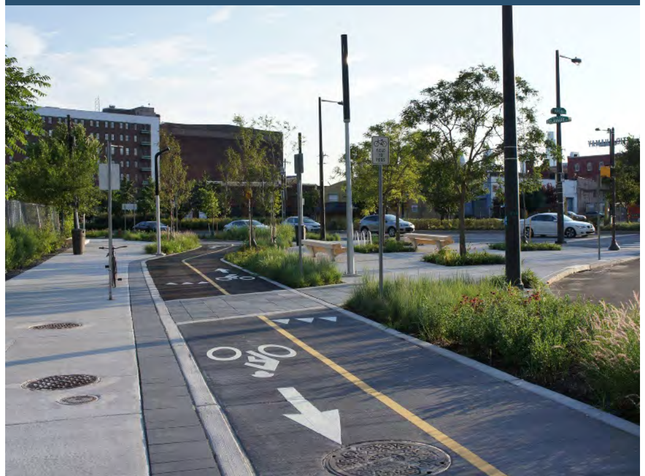
- A new cycle track provides a direct off-street bicycle connection between the Village Center to the Bronx River Pathway. The cycle track eliminates the need to bike in the street across the bridge, or to navigate a narrow ramp on the sidewalk to the north of the bridge.
- Shorter and improved crosswalks are made possible with bumpouts, a pedestrian refuge island at Depot Place, and an intersection realignment at Chase Road. Signalization will be improved to include leading pedestrian intervals (LPIs) at all intersections and left-turns will be prohibited when pedestrians are crossing East Parkway or Scarsdale Avenue.
- New gateway signage at East Parkway in an expanded sidewalk area will serve as a gateway to the village. This gateway location can also offer bike parking and informational signage for pathway users looking to explore the village.
- Channelization of through-traffic with mountable and landscaped median islands and bumpouts prevents the need for stressful lane changes through the study area.
- Eliminating the lightly-used westbound right-turn lane will allow travel lanes to be widened between East Parkway and Chase Road. Eastbound vehicles often change lanes or occupy both lanes where the lane widths narrow.
- Eliminating the westbound right-turn lane approaching Depot Place will provide room for the cycletrack. Drivers today use the right-turn lane to bypass properly queue traffic at Depot Place.

A Quick Look

What is a Cycle Track?

A cycle track is an exclusive bike facility that allows people to ride along a roadway completely separated from traffic. A cycle track provides a similar experience for bicyclists as a shared-use path or a rail trail and can be used by the most fearless or most timid of bicycle riders. Cycle tracks can be at street level or sidewalk level, but must feature vertical protection such as curbing, parked vehicles, or other vertical elements such as planters and flex posts

Below is a cycle track that was built along Delaware Avenue in Philadelphia. Although this stretches for a much longer distance it serves a very similar purpose. Delaware Avenue is a high-volume street with lots of fast-moving traffic. A bike lane in the street would not likely feel like a safe place to ride with a young child or if you were not an experienced urban rider. The Delaware Avenue cycle track, however, routinely attracts riders of all ages and abilities.



Connecting the village to the Bronx River Pathway is an important recommendation for the new vision for Popham Road. By repurposing an underutilized and misused turning lane, the Popham Road bridge over Metro-North will feature a new connection that will enhance safety, increase economic development potential with trail-oriented tourism, and expand recreational access for village residents.

The Bronx River Pathway is a 13-mile pathway extending from Valhalla to the north to Yonkers to the south. In Yonkers, the Bronx River Pathway provides a direct connection to the Bronx River Greenway which extends an additional 8-miles through New York City. The Bronx River Pathway is one of two important off-road multi-use pathways in lower Westchester County providing critical north-south connections between Westchester County and New York City.

With the Village Center situated directly off the Bronx River Pathway, there is untapped potential to turn Scarsdale into a bike tourism hub for the trail system. The proposed improvement to bicycle facilities should be paired with wayfinding improvements between the trail and the Village Center. This would allow trail users to navigate directly to the Village Center and potentially eliminate the need for some visitors to drive.

Not only would the cycle track connect to the Bronx River Pathway, it would provide cyclists access to the west side of the Metro-North station as well. Space on this side of the station is generally more available than the east side, and there exists potential to provide secure bicycle parking at this location. This would serve as a critical asset for Metro-North users who may wish to bicycle to the train but without the worry of bicycle theft during their trip. This could open new "last-mile" connections to this train station, especially for e-bike users who may be reluctant to lock their bike to an open bike rack.

Figure 5 illustrates improvements that would be required to establish this connection, while Figure 6 shows example elements proposed for a welcome sign. Signage aesthetics and content would need to be determined by the Village at a later date.

Figure 5. Proposed Pathway Connection

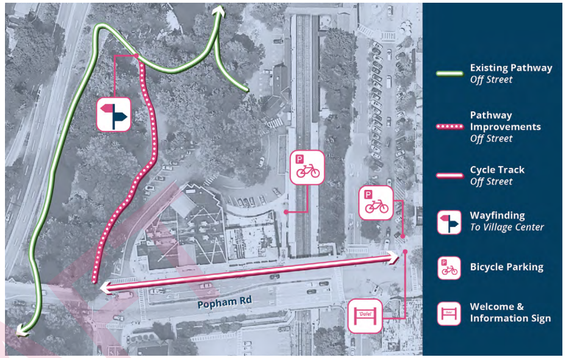


Figure 6. Proposed Welcome Signage Example Concept

The proposed welcome sign example concept depicted here is only illustrative of proposed elements, and not final design. It is proposed that this signage includes a) welcome signage gateway for all users, b) bicycle parking for trail users, and c) informational signage about the Village Center and the Bronx River Pathway.

Implementing the Vision

Garth Road is among the most difficult crossings for pedestrians. Installing a wider median island to include a pedestrian refuge will reduce the maximum unprotected crossing distance from 65 feet to 25feet.

Pedestrian Refuge Island

Current phasing of the left-turns at this intersection includes a confusing "yellow trap" scenario. Eliminated this scenario with the introduction of a fully protected left-turn phase for Popham Road. See Page 13 for further information.

Protected Left-Turn Phase

Change layouts on East Parkway to provide safer turning movements to East Parkway. See additional discussion on page 13.

East Parkway Changes

Eastbound drivers frequently occupy both lanes in this location due to narrow lane widths. With the removal of the westbound right turn lane, these lanes can be slightly widened to encourage vehicles to stay in a single lane.

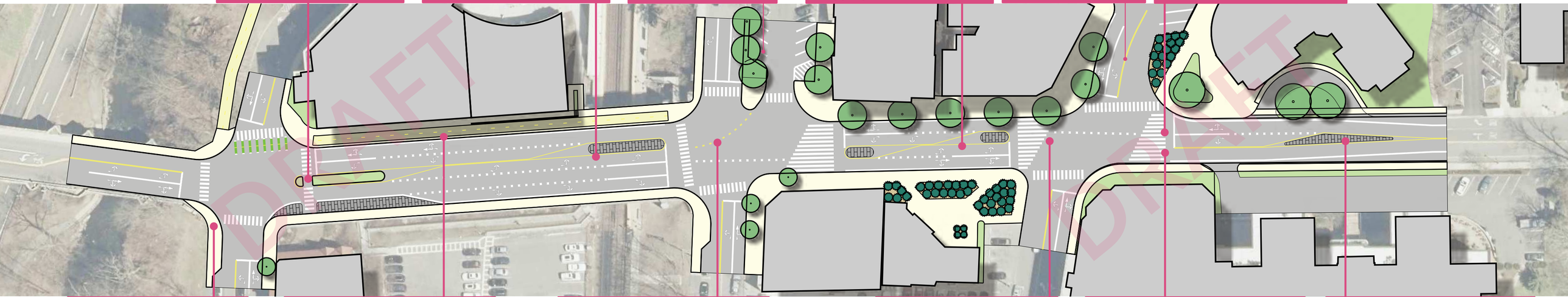
Appropriate Lane Widths

In response to proposed placemaking changes for the Village Center, Chase Road has several different alternatives each with its own benefits. See page 15.

Chase Road

Crosswalks at three locations are recommended to be striped wider. This enhances visibility to motorists and provides a more direct crossing route for pedestrians. The wider crosswalks also increase the visibility of the crossing for turning vehicles, which may not see current crosswalks until after a turn is complete.

Wider Crosswalks



Bumpouts

Bumpouts are proposed at all feasible locations in the study area for Popham Road. Bumpouts hardscape already prohibited no-parking zones and reduce pedestrian crossing distances. This bumpout reduces the crossing distance from 45-feet to 40-feet.

Bronx River Pathway Connection

The right-turn lane from Popham Road westbound to Depot Place could be eliminated with little impact due to light traffic demand. This space is reallocated as dedicated bicycle facility, allowing direct connection between the Bronx River Pathway and the Village Center. For more information page 12.

Additional Intersection Markings

Additional intersection markings or "cat tracks" are proposed for key movements in the study area. The cat tracks assist motorists navigating through an intersection. Cat tracks are recommended particularly on the eastbound left turn to East Parkway to prevent wrong-way driving on that divided roadway.

Intersection Realignment

The intersection of Popham Road and Chase Road has long been identified as a critical safety concern. The recommendations include realignment of Chase Road and a removal of the right-turn lane from Popham Road westbound to Chase Road. See page 15 for more information.

Leading Pedestrian Intervals (LPIs)

Leading pedestrian intervals, or LPIs, give pedestrians an opportunity to enter the crosswalk 3-7 seconds before vehicles are given a green signal. LPIs allow pedestrians to establish crossing prior to vehicle turning movements and are found to reduce pedestrian-vehicle crashes. LPIs are recommended at all three signalized intersections. For more information on LPIs see page 13.

Mountable Surfaces

The recommendations include plans for mountable surfaces. This surface could be flush or slightly raised cobblestone or a similar material. These mountable surfaces are located in areas to enhance channelization of motorists and in locations where raised medians and bumpouts are not feasible due to truck turning movements.

Making It Work

This section provides more detail on the safety infrastructure identified above. Potential alternatives are also considered.

Popham Road Cycle Track

According to drone data, 24 vehicles per PM peak hour use the westbound right-turn from Popham Road to Depot Place. Approximately ten vehicles per hour use this lane to bypass westbound through traffic queued for the signal at Popham Road and Depot Place by proceeding straight from the right-turn lane despite clear lane markings.

The plan recommends removing the westbound right-turn lane from Popham Road to Depot Place. A planning-level traffic analysis conducted in Synchro showed minimal impacts to traffic operations at this intersection.

This space is repurposed with an 8-foot cycle track (with 2-foot buffer from the curb), seamlessly creating a safe off-road bicycle connection between the Village Center and the Bronx River Pathway. This cycle track provides an off-road connection for more cautious cyclists by providing an alternative to an existing staircase and a tight ramp on the northern sidewalk.

Bronx River Pathway wayfinding signage is recommended at the intersection of Popham Road and East Parkway. Furthermore, the existing pathway from the intersection of Popham Road and Depot Place to the Bronx River Pathway should be upgraded to a minimum of 10-feet in width to accommodate bicycle traffic.

Mountable Surfaces

This plan recommends mountable treatments in five locations. Four of these locations are in a center median, while a fifth is provided at a bumpout at the intersection of Popham Road and Garth Road. These mountable surfaces will facilitate large vehicle turning movements at intersections and can easily be traversed when needed. Mountable surfaces should include a rough surface to discourage smaller vehicles from traversing.

Mountable surfaces can be of varying design. A Belgian block material may be desirable to match the aesthetic of other elements in the Village Center.

Figure 8. A raised two-way cycle track in Portland, OR

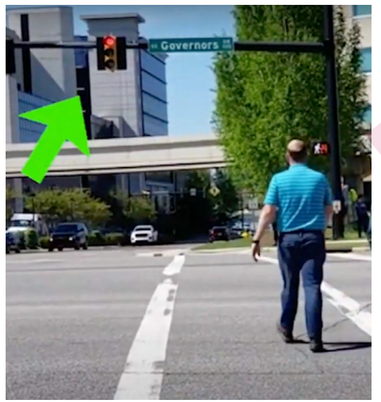
(Source: NACTO)

Figure 9. A mountable cobblestone median in West Hartford, CT

Leading Pedestrian Intervals (LPIs)

A leading pedestrian interval (LPI) is an advance 3-7 second period where pedestrians cross prior to vehicles given a green light. It is recommended that a 5-second LPI be introduced at all three signalized intersections in the Village Center with the LPI activated by default. LPIs are a Proven Safety Countermeasure identified by the Federal Highway Administration (FHWA) and are associated with a 13% reduction in pedestrian-vehicle crashes at intersections.

Figure 10. LPI Signal



A signal with an LPI shows a walk indication prior to green light (Source: Federal Highway Administration)

Protected Left-Turn Phase at Popham Road and East Parkway

The plan recommends changes to the existing signal phasing at this intersection as an immediate-term action. Currently, the signal phasing introduces a "Yellow Trap" condition, which is confusing to drivers and prohibited except under rare circumstances by the Manual on Uniform Traffic Control Devices (MUTCD), the FHWA standards used by transportation engineers nationwide on all public streets. The Yellow Trap condition occurs at this intersection due to the westbound left-turn arrow to Scarsdale Avenue being served following the Popham Road through movements. Eastbound left-turning traffic from Popham Road to East Parkway are permitted to turn left with through traffic, and upon seeing indication of a yellow signal may be inclined to complete their turn in front of oncoming traffic, which they may assume has a yellow indication as well. This assumption is incorrect and can lead to serious safety concerns, for which the project team observed via drone analysis and received public comment.

To eliminate the Yellow Trap condition, this plan proposes to fully protect the left-turn phases on Popham Road. This change would prohibit left-turns in the Popham Road through phase and would instead show these left-turns with a red left-arrow during this period. A change to a fully protected left-turn could increase queuing length, which is mitigated in this plan with a longer left-turn lane as shown. It is recommended that the left-turns be served in the same order as the existing case, with the eastbound left-turn

Figure 11. A red left-turn arrow prohibits left-turns during the through movement phase

preceding the through phase, and the westbound left-turn following.

East Parkway Changes

The block of East Parkway northbound just north of Popham Road is an area of concern due to the conflict between turning vehicles entering East Parkway and vehicles pulling out from angled parking. Currently, parked vehicles closest to the intersection must search for oncoming vehicles from three different directions. Vehicles turning onto East Parkway must yield to on-coming traffic and crossing pedestrians and then contend with vehicles parking on this block. Frequently, turning vehicles were observed in the drone data queuing onto Popham Road while waiting for vehicles to back out of parking spaces.

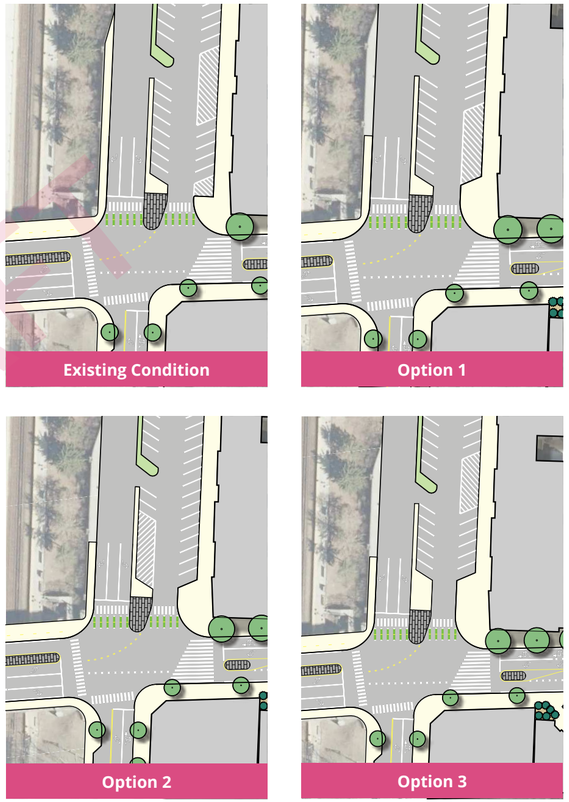
The recommendations included in this report present several options to improve the existing condition. In all options, sightlines between Popham Road and East Parkway parking should be evaluated. This includes potential sightline obstructions due to low-laying thick brush on the East Parkway median south of the on-street

parking. Furthermore, all options include raising an existing no-parking area near the northeast corner of this intersection to sidewalk level. The other options feature moving the existing loading zone to various locations. These options are as follows:

- Option 1: Move loading zone south along east side of East Parkway. This option pushes the existing loading zone to the south and maintains the same number of parking spaces in this area. With fewer vehicles using the loading zone relative to the angled parking, this option would reduce the number of potential conflict points.
- Option 2: Move loading zone to west side of roadway and place parking along entirety of east side of roadway. This option has the advantage of adding parking to the building frontage while serving the loading zone in the most problematic area of parking on East Parkway. This option maintains the same number of parking spaces in this area, but requires that two spaces be stripped just north of the loading zone.
- Option 3: Reduce the loading zone size and move the loading zone slightly to the north. Eliminate some of the parking closest to the intersection and curb this area to create a transition area between the intersection and the parking. This option would reduce the size of the loading zone to provide for one standard box truck and eliminate three parking spaces in this area.

Option 3 is recommended. The MUTCD discourages parking within 20 feet of crosswalks, and some states prohibit parking within 25 feet of crosswalks. This is due to the visibility challenges and potential conflict points that parking creates. Given the history of crashes and the numerous public comments received about safety at this intersection, an intersection with clearer sightlines and fewer conflict points is a higher priority than the existing parking configuration.

Figure 12. Various configurations for parking and loading zones on East Parkway.



Intersection Realignment at Popham Road and Chase Road

The intersection of Popham Road and Chase Road has been the focus of many studies dating back to at least 1995. Safety of pedestrians crossing both streets has been a key concern. Prior work as well as the public comments received as part of this plan have identified the east crossing of Popham Road as a key concern. Drivers fail to yield from westbound right-turn traffic to Chase Road and left-turning traffic from Chase Road.

The recommendations include a realignment of the Chase Road approach and a reallocation of lane assignments for the Popham Road westbound approach. The realignment of the Chase Road approach is recommended to shorten the crossing distance across Chase Road and to "T-up" this approach with the intersection. The realignment of Chase Road would require that "split" phasing be introduced at this intersection, first serving northbound traffic from Overhill Road and then serving southbound traffic from Chase Road. This change would impact traffic operations at this intersection but would result in limited increases in travel time along Popham Road as discussed in further detail in the following sections. A pedestrian phase to cross Popham Road could be phased to cross concurrently with the northbound approach from Overhill Road so that pedestrians would not cross Popham Road with a busier Chase Road phase.

The proposed realignment of this intersection would shorten the crosswalk across Chase Road from an existing 85 feet to approximately 65 feet. This reduced crosswalk length increases pedestrian safety by decreasing pedestrian exposure within a busy intersection. Additionally, the crosswalk on the east side of the intersection is proposed to be relocated closer to the intersection to the west. While this marginally increases crosswalk length, relocating this crosswalk increases visibility to the northbound approach.

Additional changes at this intersection include a reallocation of the westbound approach lanes. An exclusive right-turn lane is replaced with an exclusive left-turn lane for this approach.

Planning-level traffic analysis conducted in further sections show acceptable operation for these proposed changes at this intersection.

Harwood Court and Chase Road

Members of the public identified the intersection of Harwood Court and Chase Road as a potential challenge due to the relatively close spacing between this stop-controlled intersection and the signalized intersection at Popham Road and Chase Road. Currently, this intersection is approximately 65-feet from the Chase Road stop bar. The close distance between these intersections means the stop-controlled intersection at Harwood Court is frequently blocked with vehicles queuing for the signal at Popham Road.

Options in the placemaking plan include recommendations to permanently close Spencer Place to through traffic and to convert Boniface Circle, Spencer Place, and Harwood Court to local traffic, parking, and pick-up/drop-off activity with all exiting traffic from this area being directed to the intersection of Harwood Court and Chase Road. While this pattern is similar to that of summer traffic with the temporary Dine the 'Dale tent, this plan proposes three options to mitigate

Figure 13. Options for the intersection of Chase Road and Harwood Court.

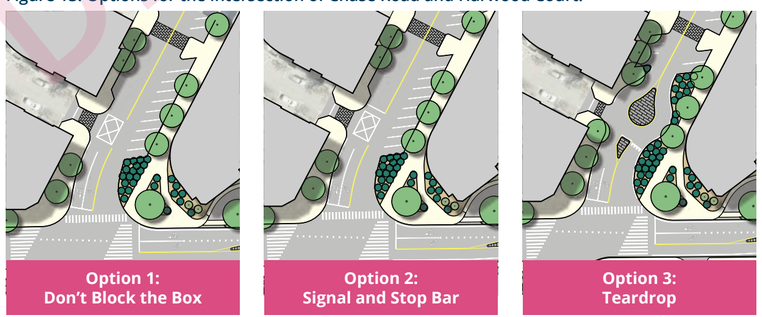


Figure 14. Advance Stop Bar

Advance stop bar in Bronxville, NY on Midland Avenue makes it easier for the stop-controlled Palumbo Place approach to enter Midland Avenue. (Source: Google Maps)

concerns for exiting traffic encountering a queue on Chase Road at Harwood Court.

The first option keeps operation at this stop-controlled intersection the same as the existing condition with the addition of a "Do Not Block the Box" pavement markings to encourage Chase Road traffic to keep clear of the intersection with Harwood Court. This recommendation would help traffic exiting Harwood Court to turn left to Chase Road northbound, however, turning right towards Popham Road could still face queuing as Chase Road traffic may have filled the available queuing space in this area.

The second option introduces an advance stop bar for Chase Road traffic southbound with the addition of a "Stop Here on Red" signage. To increase visibility of this advance stop-bar, a supplemental near-side signal at this location can also be introduced at the curb. The Harwood Court approach remains as a stop-controlled approach in this option, but the advance stop-bar keeps the approach to Popham Road clear so that Harwood Court traffic can queue at that signal. An example of a similar treatment can be found at the intersection of Midland Avenue and Palumbo Place in Bronxville, NY (Figure 14).

A third option introduces a mini-roundabout with mountable materials at this intersection. The mini-roundabout would feature a stop sign on the Harwood Court approach, and a yield on the Chase Road northbound approach. The mini-roundabout makes it easier for left-turning vehicles from Harwood Court by giving these vehicles right-of-way over traffic from Chase Road. Queuing from this yielding movement is not expected to impact the signalized intersection at Chase Road and Popham Road due to low volume of exiting vehicles from Harwood Court. The mini-roundabout would have several advantages to the existing configuration and Option 1 and Option 2: 1) the mini-roundabout serves as a gateway and traffic-calming device for northbound Chase Road traffic, and 2) the mini-roundabout allows passenger vehicles to U-turn from Chase Road southbound to Chase Road northbound. Both elements support the placemaking vision established as part of this plan. Traffic speeds would be reduced towards the raised crosswalk between Spencer Place and Chase Park. The allowance of a U-turn would further increase the flexibility of the placemaking plan by allowing motorists to U-turn at this location when Boniface Circle is closed for events. This movement makes it easier for motorists looking for parking, without being directed back to Popham Road.

Vehicular Detection

Vehicular detection should be considered on all side street and Popham Road left-turn phases. This change could improve travel time performance along Popham Road and increase efficiencies for the signal system in the Village Center. This change would also require the addition of pedestrian push buttons.

A planning-level traffic analysis in Synchro was conducted to understand the potential benefit detection may have on travel times on Popham Road. With the addition of detection being the only change, travel times on Popham Road were projected to improve from 62 seconds to 50 seconds in the eastbound direction and from 86 sections to 67 seconds in the westbound direction. This is an average of a 20% decrease in travel time on Popham Road due to the implementation of vehicular detection alone.

Due to the improved efficiencies vehicular detection adds to the system, vehicular detection can help mitigate some of the operational impacts of the safety improvements recommended in the study area.

Signalization Changes at Popham Road and Depot Place

Similar to the intersection of Popham Road and East Parkway, the signal at this intersection introduces a "Yellow Trap" condition due to the sequencing of the left-turn phases for eastbound and westbound left-turn arrows from Popham Road. Currently, eastbound left-turns are served prior to the Popham Road through movement phase and westbound left-turns are served after Popham Road through movements. This creates a confusing condition for drivers and is prohibited by the MUTCD except under rare circumstances. As the geometry of this intersection allows for both eastbound and westbound left-turn movements to be served together, it is recommended that these left-turns be served together, in advance of the Popham Road through movement phase. This eliminates the Yellow Trap condition and does not lead to any operational impacts.

Pedestrian Safety Signage

Additional pedestrian safety signage is recommended for all three signalized intersections on Popham Road. LED blank-out signs with variable messages indicating "No Turn on Red" during the leading pedestrian interval and "Yield to Peds" during the green interval with concurrent pedestrian crossing shall be installed on the following approaches to these intersections:

- Popham Road westbound approach to the intersection with Chase Road
- Overhill Road northbound approach to the intersection with Popham Road
- All approaches to the intersection of Popham Road and East Parkway
- Garth Road northbound approach to the intersection with Popham Road.

All other approaches shall receive a standardized "Turning Vehicles Yield to Pedestrian" sign for all right-turn movements. Consideration for a span pole mounted sign adjacent to the left-signal head for the left-turn movement from Popham Road eastbound to Chase Road should also be considered.

Figure 15. LED Blank-out Signs

LED Blank-out Signs with variable messages indicate No Turn on Red restriction during leading pedestrian interval and clearly indicates "Yield to Peds" during green interval. (Source: Google Maps Street View)

Close Staircase to Bronx River Pathway

The staircase on the southern side of the bridge over the Bronx River Pathway provides a cut off for pedestrians wishing to access the Bronx River Pathway from Popham Road above. While the staircase is not directly connected to the Bronx River Pathway below, it is clearly visible for passing pedestrians. However, this staircase exits at the top without sidewalk access on the Popham Road bridge and places pedestrians directly in the eastbound through lane on Popham Road.

It is recommended that this staircase be closed due to the safety concerns. Safe access between Popham Road and the Bronx River Pathway is maintained via the Waterfall Bridge just 500-feet to the north, and with a pathway along Depot Place, proposed to be upgraded as part of this plan.

Figure 16. A "Turning Vehicles Yield to Pedestrian" sign.

(Source: FHWA)

Traffic Signal Modifications

Public comment reveals some concerns with visibility of traffic signals and pedestrian signals due to location and issues with sun glare. It is recommended that all traffic signals be reviewed for proper placement and adjusted when

necessary. Furthermore, the following upgrades should be considered at some or all traffic signal locations:

- Upgrading the existing 8-inch signal heads to standard 12-inch signal heads
- Installing backplates to traffic signals
- Installing Accessible Pedestrian Signal (APS) equipment with an audible tone indicating the walk interval

Traffic Impacts

The recommendations included in this plan, such as the removal of turn lanes, addition of LPIs, left-turn phasing changes, and split phasing, have the potential to impact traffic in the study area. Although safety is the top priority of this planning effort, impacts to traffic should be understood. A planning-level traffic analysis was conducted in Synchro to review potential impacts. A traffic model for the afternoon peak period was developed based on values obtained from the 2016 traffic report and other estimated signal settings based on observations and best practices. To ensure conservative results, the highest hourly traffic volumes between the 2016 traffic report and the 2022 drone data collection were used.

Recommendations here are evaluated based on two criteria. First, level of service (LOS) is utilized to assess vehicular delay at each intersection. LOS values range from A (very limited vehicle delay) to F (significant vehicular delay). Typical practice finds LOS D or better acceptable in peak hours. Second, vehicular travel time on Popham

Figure 17. Level of Service (LOS), Existing v. Recommendations (PM Peak Hour)

Intersection	Existing Overall LOS / Delay [s]	Recommendations Overall LOS / Delay [s]
Popham at Depot	B / 13.2	B / 14.1
Popham at East Parkway	B / 15.1	C /26.0
Popham at Chase / Overhill	B / 15.7	C / 24.4

Figure 18. Popham Road Travel Time Results between Chase Road and Garth Road (PM Peak Hour)

Direction	Existing Travel Time [s]	Proposed Travel Time [s]	Difference [s]
Eastbound	61.6	61.9	+0.3
Westbound	86.0	79.5	-6.5

Road through the study area was evaluated utilizing SimTraffic, a component of Synchro. The original worksheets are included in the Appendix

Figure 17 presents overall LOS results for the three intersections in the study area for the PM peak hour. While delay increases at each of the three intersections evaluated, LOS remains at LOS C or better in the afternoon period.

With respect to travel times, the recommendations are estimated to have minimal impact on travel times along Popham Road (Figure 18).

Conclusions and Considerations for Implementation

The recommendations for Popham Road offer opportunities to:

- Connect the Village Center to the Bronx River Pathway with protected bike infrastructure and sidewalks
- Improve pedestrian safety and visibility at Popham Road crosswalks through implementing LPIs, shortening crosswalks, and including staged crossings
- Eliminate the Yellow Trap that is creating unsafe left-turn movements at two intersections
- Create a safer driving environment for motorists with clear lane assignments, appropriate lane widths, and improved pavement markings

The planning-level analysis shows these recommendations are possible without creating significant delays on Popham Road. Village Board Trustees expressed interest in additional data analysis, such as modeling with Vissim software or collecting data over a longer period. These approaches may be worthwhile to explore before implementation, but the Village may also choose to consider a temporary lane closure instead. Closing the westbound left turn lane at Depot Place (and possibly East Parkway) would allow new data to be collected on how the lane closure would impact delay. However, temporary measures without signal improvements as noted may increase vehicular delay beyond the levels noted here. Regardless of which approach to conducting more analysis, additional engineering design will be required.

The recommended planning-level concept in this report is one of the most promising opportunities to improve safety for all road users in the Village Center. Throughout this study and in previous planning processes, the community has highlighted Popham Road as a barrier to accessing the Village Center. The recommendations provide a context-sensitive solution to the access and safety concerns continually raised by the community while adding a critical link in the bicycle network.

Fox Meadow Road

Background

Fox Meadow Road is a residential north-south corridor with a significant role in multimodal Village Center access. The portion closest to the Village Center has a sidewalk on the west side of the roadway, and pedestrians and cyclists are frequently seen using the roadway itself. According to the NYSDOT Traffic Data Viewer, the Average Annual Average Daily Traffic (AADT) is 1,877 (2019). When the Bronx River Parkway is used for Bicycle Sundays, Fox Meadow Road is an alternative for vehicles.

The lanes on Fox Meadow Road are 15 feet in each direction, and the GIS property data available indicates that the public right of way extends at least seven feet beyond the existing roadway on either side of the street. Parking is permitted on the street, and landscaping and delivery vehicles can be seen using the parking. Fox Meadow Road is often used for private vehicle parking during Village Center Events.

Findings

Speeding is common on Fox Meadow Road. With a posted speed of 30 mph, the drone video captured speeds regularly exceeding 40 mph. Members of the public confirmed that speeds on the road are high, raising concerns of bicycle and pedestrian safety. Drivers associate wide lane widths with higher-speed roadways, so the 15-foot lanes may be encouraging drivers to speed. Members of the public requested traffic calming measures such as speed bumps. Repaving has also been requested.

One of the most common comments received was the need to improve the crossing at Crane Road. This location presents a significant challenge. Drone data indicates that pedestrians cross Crane Road at Fox Meadow Road rather than walking to the crosswalk at East Parkway. This could be because the pedestrians are headed toward Chase Road or because the crossing distance does not feel far enough to pose a safety concern. Comments from the public as well as project team observations noted the potential for near misses given limited visibility and high vehicle speeds at that location. Potential solutions for this intersection are discussed in the Crane Road section starting on page 24.

Drone footage recorded no pedestrians using the East Parkway crosswalk. The speeding on Crane Road and the lack of an all-way stop at East Parkway contribute the concerns about crossing at this location (discussed more in the Crane Road section). Reports from 2015 and 2016 indicate poor sightlines at this location. According to the 2016 report, the sight distance from Fox Meadow Road was found to be only 131 feet compared to the 335 feet necessary.

Alternatives Considered

With such a wide right of way, bicycle infrastructure is feasible on Fox Meadow Road. The project team developed three alternatives, two of which include dedicated space for cyclists.

Alternative 1: Bike Lane

This alternative uses the five feet currently used for street parking and adds a bike lane adjacent to the curb. Additionally, this alternative adds a sidewalk and planting strip on the east side of Fox Meadow Road in the public right of way. Any on-street parking in this concept would block the bike lane. Infrastructure such as this may create a perception of safety for some cyclists, but it is likely that the bike lane would be blocked frequently by parked vehicles.

Figure 19. Fox Meadow Road at Crane Road | Looking North | Existing Condition

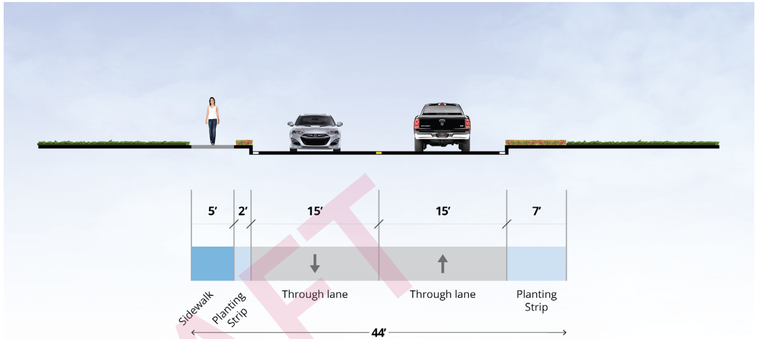
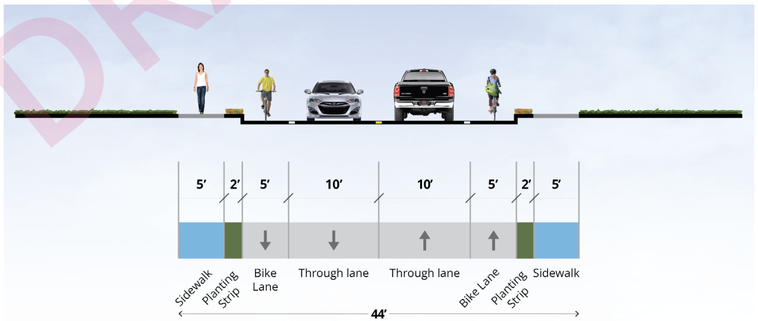


Figure 20. Fox Meadow Road at Crane Road | Looking North | Alternative 1



Alternative 2: Cycle Track

Alternative 2 also provides space for cyclists but with an enhanced buffer. The cycle track would be separated from vehicle traffic by a two-foot planter strip. A sidewalk and cycle track would be added on both sides of the street. A two-way cycle track on the west side of the road was considered, but the project team did not advance this option due to the number of driveways.

Alternative 2 assumes on-street parking would not be permitted, so delivery and landscaping vehicles would need to use the driveways; for Village Center events, private cars would need to park at the Freightway site or other roads in the Village Center.

Alternative 3: Neighborhood Greenway

The neighborhood greenway concept has been used on residential streets throughout the country. Neighborhood greenways use traffic calming infrastructure to create streets with low traffic and low speeds. The streets are designed to keep vehicles at speeds under 20 mph. Traffic calming infrastructure included on neighborhood greenways includes:

- Speed bumps
- Chicanes
- Chokers
- Neighborhood traffic circles
- Speed feedback signage

Figure 22. Fox Meadow Road at Crane Road | Looking North | Alternative 2

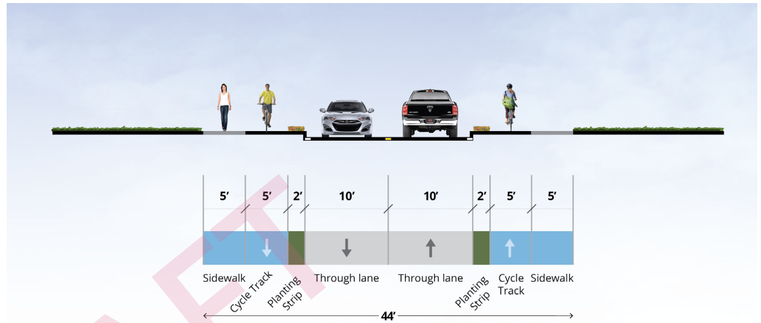
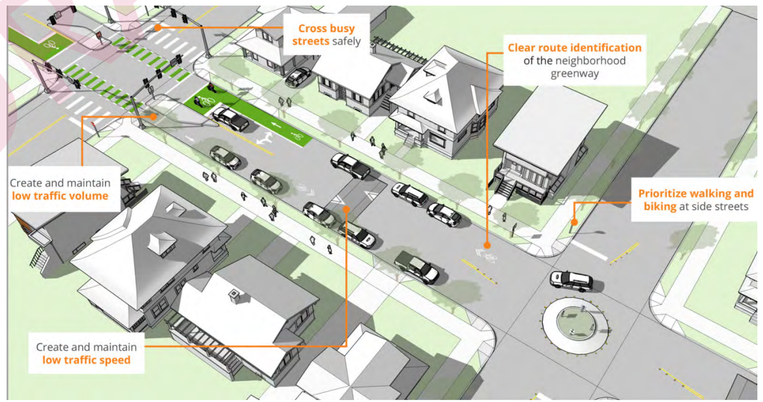


Figure 21. Neighborhood Greenway Concept



Source: Portland Bureau of Transportation

Bike sharrows, bike icons and chevrons painted on-street, offer wayfinding benefits for cyclists. "Bicyclists may use full lane" signage will emphasize the street is a street that prioritizes active transportation. Additionally, many neighborhood greenways paint intersections with colorful designs as a placemaking component. Because cyclists require smooth pavement to comfortably use roadways, many cities prioritize paving neighborhood greenways. Traffic diversion is a common design intervention but is not recommended in this alternative due to the lack of north-south alternatives for vehicles in the area.

Recommendations

The neighborhood greenway concept (Alternative 3) is recommended for Fox Meadow Road. With appropriate traffic calming infrastructure, Fox Meadow Road could be a road that is comfortable for all road users, including children. This alternative maintains the on-street parking, which is a critical need during events. Now that state law permits villages to post 25 mph speed limits, it is recommended that the speed limit on Fox Meadow Road be lowered.

Conclusions and Considerations for Implementation

The wide lanes on Fox Meadow Road encourage faster vehicle speeds, which contribute to an unsafe pedestrian and bicycle environment. At the same time, community members recognized the need for on-street parking space given the proximity to the Village Center. The neighborhood greenway concept would use traffic calming intersection to reduce the speeds of the vehicles while keeping most of the space available for parking.

Implementing neighborhood greenways is a coordinated effort. Traffic calming should be strategically placed to maximize the benefits. As an immediate-term action, the Village could implement painted chicanes and chokers to test locations. Outlined with flexible bollards, these would help narrow the roadway. Speeds could be monitored both before and after implementation to determine effectiveness. Speed humps, neighborhood traffic circles, and hardscaped chicanes/chokers could be added once the best locations are determined. The outcome will be a safer street more reflective of the residential urban form.

Neighborhood Greenways, such as these in Seattle, use sharrows (top photo) as wayfinding. Speed reduction measures, such as speed humps (bottom photo), prevent drivers from exceeding the 20 mph speed limit on these residential streets. (Source: Seattle Department of Transportation)

Crane Road

Background

Crane Road is a two-lane road running east-west from East Parkway to Route 22 Post Road. The lane widths are 10 feet. GIS parcel data indicates that in some locations private properties abut the roadbed, so there is no additional public right of way in these locations. There are large embankments, shrubbery, trees, and fences, some of which appear to be in the public right of way along certain segments.

There is a sidewalk that runs from Chase Road to East Parkway on the south side only; the sidewalk is elevated above the roadway. There are only two crosswalks in the Village Center section, one at East Parkway and the other at Woodland Place. The intersection at Woodland Place is a signalized intersection; the intersection at East Parkway requires a stop for vehicles turning onto East Parkway, but drivers turning onto Crane Road from East Parkway's northbound lane are not required to stop. Near the intersection of Chase Road is a path for pedestrians accessing the Village Center. According to the NYSDOT Traffic Data Viewer, the Average Annual Average Daily Traffic (AADT) is 7,627 (2019).

Findings

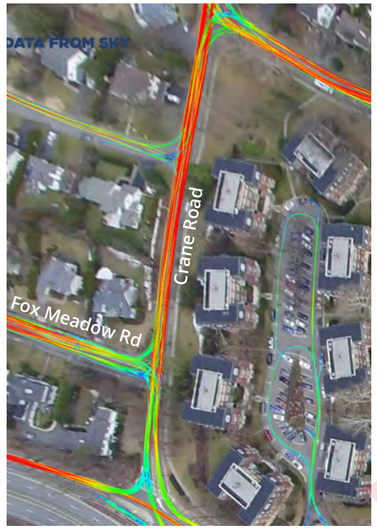
Previous studies found a number of challenges to safely walking and biking on Chase Road. Reports from 2015 and 2016 recommended:

- Additional crossings west of Woodland Place
- Reducing the speed limit to 25 mph. (Previously, state law did not allow village speed limits below 30 mph, except in rare circumstances. The state law has since changed to allow 25 mph speed limits.)
- Improving the sightlines for vehicles turning from Fox Meadow Road by removing vegetation on the north side of Crane Road between Fox Meadow Road and Stonehouse Road.
- Adding speed humps and stop signs

Members of the public raised safety concerns with Crane Road, many of which center around excessive speeding. The drone data documented many, if not most, vehicles speed on Crane Road. Without a stop sign between East Parkway and Woodland Place, vehicles are able to accelerate above 30 mph and maintain that speed for several blocks.

Members of the public shared a variety of different ideas for reducing speeds. They proposed roundabouts, all-way stops, and additional crosswalks. Sidewalks are also requested, particularly between Chase Road and

Figure 23. Speeding on Crane Road



Speeds of approximately 40 mph (shown in red) were captured by the drone footage. Crane Road has frequent speeding between Fox Meadow Road and Chase Road.

Woodland Place on the south side of the street. One participant also considered making Crane Road a one-way street to allow for sidewalk space and bicycle infrastructure.

Additionally, members of the public raised a key challenge for Crane Road: pedestrians and cyclists using Fox Meadow Road need to be able to cross Crane Road safely to access the Village Center. The crosswalk at East Parkway is not heavily used, likely because it is not in a convenient location for many of the pedestrians heading north-south on Fox Meadow Road. Drone data captured zero pedestrians using this crosswalk; instead pedestrians were captured crossing at Fox Meadow Road, where there is no crosswalk. As noted in the Fox Meadow Road Findings (page 20), this location has limited visibility, which poses a safety concern for a frequent pedestrian crossing location.

Alternatives Considered

For Crane Road to become a safe bicycle and pedestrian corridor, vehicle speeds must be slowed. The project team considered a variety of elements to prevent speeding: signage, all-way stops, mini roundabouts, crosswalks, speed bumps, and raised crosswalks.

Chase Road Intersection Alternatives

The two alternatives for the Chase Road intersection emerged from previous planning studies and comments from the public. Additional traffic calming is discussed in the recommendations section.

Alternative 1: Mini Roundabout at Chase Road

Mini roundabouts are scaled-down versions of traffic circles. They work to reduce vehicle speeds and are often less expensive to implement relative to traffic lights. They are often used in locations where vehicle volumes do not justify traffic lights and can be mountable to allow larger vehicles to pass. They can be made from a variety of materials and provide a range of aesthetic options.

A mini roundabout in Manchester, Vermont. (Source: Google Streetview)

A preliminary analysis shows a mini roundabout would fit in this intersection, but additional study would be needed to determine feasibility.

Alternative 2: All-Way Stop at Chase Road

An all-way stop at Chase Road could reduce the speeding that occurs between Woodland Place and East Parkway. Whereas now drivers can continue to build speed uninterrupted, this stop would ideally prevent the acceleration that is now occurring. An all-way stop could also provide an opportunity for crosswalks, which are an identified need.

Fox Meadow Road Intersection Alternatives

The Fox Meadow Road intersection does not have enough space for a mini roundabout without cutting into the embankment, so a variety of stop signs and traffic calming combinations were considered.

Alternative 1: All-way Stop at East Parkway and Speed Bumps

This alternative would require the northbound East Parkway traffic to stop before turning onto Crane Road. Without stop signs at Fox Meadow Road, speed bumps would be installed in both directions approaching Fox Meadow Road. Signage would be installed encouraging pedestrians to use the East Parkway crosswalk but no crosswalk would be installed at Fox Meadow Road.

Alternative 2: All-way Stop at Fox Meadow Road with Crosswalks

This alternative would create an all-way stop at Fox Meadow Road. A crosswalk would be installed to connect the Fox Meadow Road sidewalk to the sidewalk on the south side of Crane Road. The stop sign at East Parkway would remain unchanged.

Alternative 3: All-way Stop at Fox Meadow Road with Raised Crosswalks

This alternative would offer the same all-way stop at Fox Meadow Road discussed in Alternative 2, but the crosswalks would be raised. The raised element would prevent drivers from driving fast or ignoring the all-way stop.

Raised crosswalks, such as this one in Silver Spring, MD, offer two benefits: a high-visibility crosswalk and a speed bump.

Recommendations

The graphic on page 28 illustrates the safety infrastructure measures recommended for Crane Road. Additional detail is discussed below.

Chase Road Intersection Recommendations

The project team recommends Alternative 2, the all-way stop with crosswalks at the Chase Road intersection. A flashing red stop sign could further emphasize the need for vehicles to stop at this location. The uninterrupted speeding that occurs at this intersection has created an environment that makes turning from side streets difficult. Moreover, the reduced speeds could help alleviate some of the concerns pertaining to pedestrian crossings. It is worth noting that members of the public had differing viewpoints; some advocated for the mini roundabout while others pushed for the all-way stop. Members of the public felt the mini roundabout would create confusion and would be complicated by adjacent driveways.

Fox Meadow Road Recommendations

The project team recommends Alternative 3 at the Fox Meadow Road Intersection. The all-way stop paired with raised crosswalks will force drivers to slow down at what is a critical crossing for pedestrians and cyclists. To further enhance the pedestrian and cyclist connectivity, an ADA-accessible ramp on the south side of the intersection should connect the crosswalk to the sidewalk and ultimately the East Parkway parking area. This will maximize convenience, comfort, and safety.

The visibility and speeding concerns at the intersection of Fox Meadow Road and Crane Road could be mitigated by an all-way stop and a raised crosswalk connecting to the existing sidewalk.

Add multi-use path to make access to East Parkway as convenient, safe, and comfortable as possible for pedestrians and cyclists.

Develop Fox Meadow Road as a neighborhood greenway using a variety of traffic calming infrastructure.

Add an all-way stop to slow traffic. High-visibility crosswalks will connect new sidewalks on each of the approaching segments.

The raised crosswalks and all-way stop will slow vehicles and improve pedestrian and cyclist visibility at an existing unmarked crossing location.

On south side of Crane Road, extend the sidewalk from Chase Road to Woodland Place in the immediate term. Consider connecting sidewalk to Route 22 Post Road in medium-term. On the north side of Crane Road, add sidewalk to connect Stonehouse Road, the new crosswalk at Chase Road, and the footpath.

Additional Safety Infrastructure

A sidewalk on the south side of Crane Road from Chase Road to Woodland Place should be implemented as soon as possible; extending the sidewalk beyond this study area should also be considered. This sidewalk would provide a critical link for neighborhood residents to access the Village Center on foot rather than driving. It could also help pedestrians access the trail near the Chase Road intersection. Ideally the sidewalk would be wide enough to accommodate both cyclists and pedestrians.

Speed feedback signage located between Chase Road and East Parkway may also help to remind drivers of the speed limit.

Conclusions and Considerations for Implementation

Through this study, Crane Road emerged as a critical east-west corridor to access the Village Center and Bronx River Parkway. Crane Road presents a significant challenge, however. The constrained right of way, topography, embankments, mature trees, utilities, and fencing that exists adjacent to the roadbed restrict the opportunities for traffic calming and improved pedestrian and bicycle infrastructure. This report assumes that the Village would not pursue easements or takings, but if this were an option, wide sidewalks that could accommodate both pedestrians and cyclists are recommended for the full length of Crane Road.

Funding

Signed in November 2021, the Infrastructure Investment and Jobs Act (IIJA) is the new federal infrastructure law that oversees federal investments in road, bridge, and mass transit infrastructure. Many of the concepts proposed in this report will qualify for federal funding, particularly infrastructure that will improve roadway safety for all users.

Although not all federal grants require coordination with regional and/or state agencies, the Village of Scarsdale should work with Westchester County and the New York Metropolitan Transportation Council (NYMTC) when pursuing federal grants. Westchester County is a member of NYMTC, the metropolitan planning organization that coordinates the regional vision and funding for transportation projects. Some projects or additional studies may qualify for grants through NYMTC.

The most common and relevant federal funding sources for bicycle/pedestrian projects are listed below. A comprehensive list of all federal funding sources may be found on the Federal Highway Administration (FHWA) website.[1]

- Safe Streets and Roads for All is a discretionary grant program aimed at preventing deaths and serious injuries on roadways. Metropolitan planning organizations, counties, towns, and other subdivisions of a state may pursue these grants. Many of the recommendations of this report are eligible including: planning, design, and development activities that support roadway safety; quick-build street design changes informed by outreach and user input; development of a bike network; and installing pedestrian safety enhancements. Fiscal Year 2022 applications are due September 15, 2022.[2]
- The Surface Transportation Block Grant program is a funding opportunity for States and localities to improve the conditions on any public roads. This funding source is typically programmed by the New York State DOT (NYSDOT) in cooperation with NYMTC. It is one of the most flexible federal funding categories. Use of these funds will require the support of both NYSDOT and NYMTC.

1 *Federal Highway Administration. Bicycle and Pedestrian Funding Opportunities.* https://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

2 *U.S. Department of Transportation. Safe Streets and Roads for All (SS4A) Grant Program.* https://www.transportation.gov/grants/SS4A

- The Transportation Alternatives Set-Aside program is housed within the Surface Transportation Block Grant program and is intended for smaller-scale transportation projects like bicycle and pedestrian projects. There is funding dedicated for areas with a population between 5,000 and 49,999. Municipalities are encouraged to adopt and implement Complete Streets policies/ordinances to support grant applications. Projects that make walking and biking to school safer are highlighted as an eligible activity, suggesting that the improvements recommended for Sprague Road and adjacent streets may be a good candidate.
- The Congestion Mitigation and Air Quality Improvement Program (CMAQ) can fund many of the same safety projects as the Transportation Alternatives Set-Aside program funds. CMAQ is generally more focused on reducing congestion and emissions from commuting trips, and only communities that do not meet National Ambient Air Quality Standards qualify (all of Westchester County qualifies). To be eligible for this funding, an air quality impact analysis performed by NYMTC will be required, so coordination with their modeling staff is important, particularly to be sure their work plan includes that analysis.
- Highway Safety Improvement Program (HSIP) funds may be used on all public roads, including local roads. The funding can be used for bicycle and pedestrian safety projects and must be included in the State Highway Safety Plan.[3] This program is data-driven and focused on reducing crashes, fatalities, and injuries. It uses federal funding but is run through the New York State Governor's Traffic Safety Committee (GTSC). Applications are typically due by May 1 of each year.
- RAISE (Rebuilding American Infrastructure with Sustainability and Equity) discretionary grants are intended to address projects of local or regional significance that address key safety, mobility, connectivity, and sustainability goals. These funds are highly competitive, but bicycle/pedestrian projects are often selected based on their merit.
- The Center for Disease Control has historically offered small grants for programming and small-scale infrastructure projects that promote physical activity. The latest program is called the State Physical Activity and Nutrition (SPAN) program. Though not offered on an annual basis, these programs can provide opportunities for demonstration projects, traffic safety campaigns, and Complete Streets workshops. The grants are administered through the New York State Department of Health.

State funding sources like the Downtown Revitalization Initiative and New York Main Street programs have helped New York communities fund streetscaping, façade improvements, and planning. Foundation or corporate grants are a less common funding source, though some communities in the region have had some success. Hartford and Jersey City were both awarded Blue Zones grants[4] to help fund bicycle and pedestrian infrastructure. Amityville receive funding for a walk audit grant from AARP. Pedestrian plazas and other placemaking initiatives are typically funded locally.

3 *New York Department of Transportation. New York State Strategic Highway Safety Plan.* https://www.dot.ny.gov/divisions/operating/osss/highway-repository/NYS_SHSP_TotalReport.pdf

4 *Blue Zones Made to Move Grant Winners.* https://www.bluezones.com/made-to-move-grant-winners/

Appendix A: Synchro Reports

Scarsdale Mobility Plan
2: Garth Road/Depot Place & Popham Road

Existing Condition
PM Peak Hour

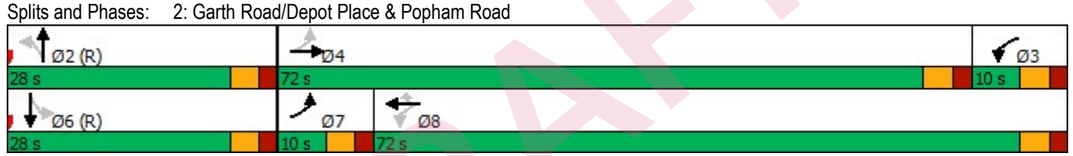
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	557	53	90	549	24	79	6	107	20	4	29
Future Volume (vph)	15	557	53	90	549	24	79	6	107	20	4	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	115		0	135		0	75		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987				0.850		0.859			0.867	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1839	0	1770	1863	1583	1770	1600	0	1770	1615	0
Flt Permitted	0.288			0.346			0.734			0.637		
Satd. Flow (perm)	536	1839	0	645	1863	1583	1367	1600	0	1187	1615	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				69		116			32	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		891			422			387			247	
Travel Time (s)		20.3			9.6			8.8			5.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	16	605	58	98	597	26	86	7	116	22	4	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	663	0	98	597	26	86	123	0	22	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0		0	0	0	0	0		0	0	
Detector Template												
Leading Detector (ft)	0	0		0	0	0	0	0		0	0	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		3	8	8	2	2		6	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	23.0		10.0	23.0	23.0	23.0	23.0		23.0	23.0	
Total Split (s)	10.0	72.0		10.0	72.0	72.0	28.0	28.0		28.0	28.0	
Total Split (%)	9.1%	65.5%		9.1%	65.5%	65.5%	25.5%	25.5%		25.5%	25.5%	
Maximum Green (s)	5.0	67.0		5.0	67.0	67.0	23.0	23.0		23.0	23.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	Max	Max		Max	Max	Max	Max	Max		Max	Max	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0	0	0	0		0	0	
Act Effct Green (s)	67.0	67.0		67.0	67.0	67.0	23.0	23.0		23.0	23.0	
Actuated g/C Ratio	0.61	0.61		0.61	0.61	0.61	0.21	0.21		0.21	0.21	
v/c Ratio	0.04	0.59		0.22	0.53	0.03	0.30	0.29		0.09	0.10	
Control Delay	8.7	15.6		7.1	7.9	0.1	40.2	9.6		36.4	14.4	
Queue Delay	0.0	0.0		0.0	0.2	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.7	15.7		7.1	8.1	0.1	40.2	9.6		36.4	14.4	
LOS	A	B		A	A	A	D	A		D	B	
Approach Delay		15.5			7.7			22.2			22.7	
Approach LOS		B			A			C			C	
90th %ile Green (s)	5.0	67.0		5.0	67.0	67.0	23.0	23.0		23.0	23.0	
90th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	
70th %ile Green (s)	5.0	67.0		5.0	67.0	67.0	23.0	23.0		23.0	23.0	
70th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	
50th %ile Green (s)	5.0	67.0		5.0	67.0	67.0	23.0	23.0		23.0	23.0	
50th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	
30th %ile Green (s)	5.0	67.0		5.0	67.0	67.0	23.0	23.0		23.0	23.0	
30th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	
10th %ile Green (s)	5.0	67.0		5.0	67.0	67.0	23.0	23.0		23.0	23.0	
10th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	
Stops (vph)	6	356		20	124	0	66	20		17	11	
Fuel Used(gal)	0	8		1	3	0	1	1		0	0	
CO Emissions (g/hr)	11	570		38	236	6	87	47		20	15	
NOx Emissions (g/hr)	2	111		7	46	1	17	9		4	3	
VOC Emissions (g/hr)	3	132		9	55	1	20	11		5	4	
Dilemma Vehicles (#)	0	0		0	0	0	0	0		0	0	
Queue Length 50th (ft)	4	263		14	93	0	52	4		13	2	
Queue Length 95th (ft)	13	372		m29	145	m0	99	52		35	30	
Internal Link Dist (ft)		811			342			307			167	
Turn Bay Length (ft)	100			115			135			75		
Base Capacity (vph)	382	1123		444	1134	991	285	426		248	362	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	116	0	0	0		0	0	
Spillback Cap Reductn	0	7		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.04	0.59		0.22	0.59	0.03	0.30	0.29		0.09	0.10	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 13.2		Intersection LOS: B	
Intersection Capacity Utilization 61.1%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: Garth Road/Depot Place & Popham Road



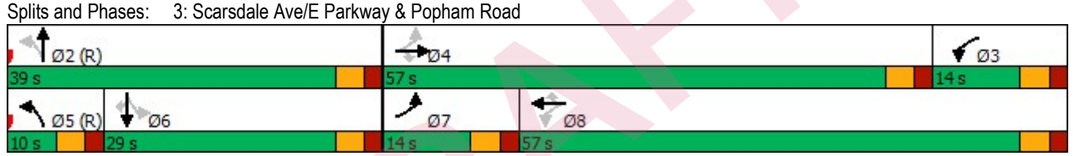
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	454	70	42	500	42	40	90	50	45	70	155
Future Volume (vph)	160	454	70	42	500	42	40	90	50	45	70	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	115		0	0		0	100		0	0		135
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1764	0	1770	1863	1583
Flt Permitted	0.193			0.451			0.586			0.660		
Satd. Flow (perm)	360	1863	1583	840	1863	1583	1092	1764	0	1229	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			119			119		26				169
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		422			256			479			463	
Travel Time (s)		9.6			5.8			10.9			10.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	174	493	76	46	543	46	43	98	54	49	76	168
Shared Lane Traffic (%)												
Lane Group Flow (vph)	174	493	76	46	543	46	43	152	0	49	76	168
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0	0	0	0	0	0	0		0	0	0
Detector Template												
Leading Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	3	8	8	5	2		6	6	6
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	9.0	18.0	18.0	5.0	18.0	18.0	5.0	18.0		18.0	18.0	18.0
Minimum Split (s)	14.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0		23.0	23.0	23.0
Total Split (s)	14.0	57.0	57.0	14.0	57.0	57.0	10.0	39.0		29.0	29.0	29.0
Total Split (%)	12.7%	51.8%	51.8%	12.7%	51.8%	51.8%	9.1%	35.5%		26.4%	26.4%	26.4%
Maximum Green (s)	9.0	52.0	52.0	9.0	52.0	52.0	5.0	34.0		24.0	24.0	24.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max		Max	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0		0	0	0
Act Effct Green (s)	52.0	52.0	52.0	52.0	52.0	52.0	34.0	34.0		24.0	24.0	24.0
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.47	0.47	0.31	0.31		0.22	0.22	0.22
v/c Ratio	0.61	0.56	0.09	0.10	0.62	0.06	0.12	0.27		0.18	0.19	0.35
Control Delay	20.0	13.8	0.4	8.0	10.5	0.2	27.9	25.1		37.2	36.5	7.6
Queue Delay	0.0	0.9	0.0	0.0	0.8	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	20.0	14.7	0.4	8.0	11.3	0.2	27.9	25.1		37.2	36.5	7.6
LOS	C	B	A	A	B	A	C	C		D	D	A
Approach Delay		14.5			10.2			25.7			20.1	
Approach LOS		B			B			C			C	
90th %ile Green (s)	9.0	52.0	52.0	9.0	52.0	52.0	5.0	34.0		24.0	24.0	24.0
90th %ile Term Code	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	Coord	Coord		MaxR	MaxR	MaxR
70th %ile Green (s)	9.0	52.0	52.0	9.0	52.0	52.0	5.0	34.0		24.0	24.0	24.0
70th %ile Term Code	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	Coord	Coord		MaxR	MaxR	MaxR
50th %ile Green (s)	9.0	52.0	52.0	9.0	52.0	52.0	5.0	34.0		24.0	24.0	24.0
50th %ile Term Code	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	Coord	Coord		MaxR	MaxR	MaxR
30th %ile Green (s)	9.0	52.0	52.0	9.0	52.0	52.0	5.0	34.0		24.0	24.0	24.0
30th %ile Term Code	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	Coord	Coord		MaxR	MaxR	MaxR
10th %ile Green (s)	9.0	52.0	52.0	9.0	52.0	52.0	5.0	34.0		24.0	24.0	24.0
10th %ile Term Code	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	Coord	Coord		MaxR	MaxR	MaxR
Stops (vph)	59	246	1	8	109	0	29	86		36	56	20
Fuel Used(gal)	2	4	0	0	3	0	1	2		1	1	1
CO Emissions (g/hr)	105	288	17	14	186	6	38	120		49	76	64
NOx Emissions (g/hr)	20	56	3	3	36	1	7	23		10	15	12
VOC Emissions (g/hr)	24	67	4	3	43	1	9	28		11	18	15
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	0
Queue Length 50th (ft)	29	125	1	6	68	0	21	66		28	44	0
Queue Length 95th (ft)	64	223	m0	m11	100	m0	49	120		63	85	54
Internal Link Dist (ft)		342			176			399			383	
Turn Bay Length (ft)	115						100					135
Base Capacity (vph)	285	880	811	473	880	811	368	563		268	406	477

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	170	0	0	126	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.61	0.69	0.09	0.10	0.72	0.06	0.12	0.27		0.18	0.19	0.35

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:NBTL and 5:NBL, Start of Green			
Natural Cycle: 75			
Control Type: Pretimed			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 81.8%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: Scarsdale Ave/E Parkway & Popham Road



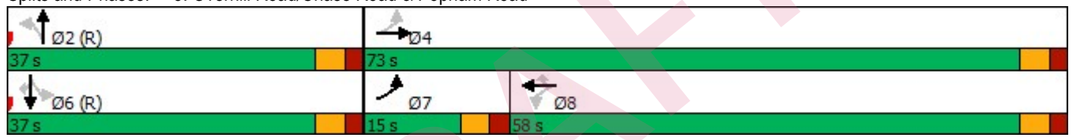
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	430	14	20	481	84	33	21	20	102	20	70
Future Volume (vph)	107	430	14	20	481	84	33	21	20	102	20	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		300	100		0	0		70
Storage Lanes	1		0	0		1	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00	0.94	0.98	0.98			0.98	0.96
Frt		0.995				0.850		0.927				0.850
Flt Protected	0.950				0.998		0.950				0.960	
Satd. Flow (prot)	1770	1849	0	0	1859	1583	1770	1687	0	0	1788	1583
Flt Permitted	0.264				0.972		0.646				0.730	
Satd. Flow (perm)	492	1849	0	0	1808	1481	1180	1687	0	0	1330	1527
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				91		22				76
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		256			1260			384			384	
Travel Time (s)		5.8			28.6			8.7			8.7	
Confl. Peds. (#/hr)	15		20	20		15	13		9	9		13
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	116	467	15	22	523	91	36	23	22	111	22	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	482	0	0	545	91	36	45	0	0	133	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0		1	0	0	0	0		1	0	0
Detector Template				Left						Left		
Leading Detector (ft)	0	0		20	0	0	0	0		20	0	0
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	18.0		18.0	18.0	18.0	18.0	18.0		18.0	18.0	18.0
Minimum Split (s)	10.0	23.0		23.0	23.0	23.0	23.0	23.0		23.0	23.0	23.0
Total Split (s)	15.0	73.0		58.0	58.0	58.0	37.0	37.0		37.0	37.0	37.0
Total Split (%)	13.6%	66.4%		52.7%	52.7%	52.7%	33.6%	33.6%		33.6%	33.6%	33.6%
Maximum Green (s)	10.0	68.0		53.0	53.0	53.0	32.0	32.0		32.0	32.0	32.0
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0			5.0	5.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	Max	Max		Max	Max	Max	Max	Max		Max	Max	Max
Walk Time (s)		7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	68.0	68.0			53.0	53.0	32.0	32.0			32.0	32.0
Actuated g/C Ratio	0.62	0.62			0.48	0.48	0.29	0.29			0.29	0.29
v/c Ratio	0.28	0.42			0.63	0.12	0.10	0.09			0.34	0.15
Control Delay	4.8	4.5			25.1	3.7	29.7	17.9			33.9	7.4
Queue Delay	0.0	0.4			0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	4.8	4.9			25.1	3.7	29.7	17.9			33.9	7.4
LOS	A	A			C	A	C	B			C	A
Approach Delay		4.9			22.1			23.2			24.3	
Approach LOS		A			C			C			C	
90th %ile Green (s)	10.0	68.0		53.0	53.0	53.0	32.0	32.0		32.0	32.0	32.0
90th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	Coord
70th %ile Green (s)	10.0	68.0		53.0	53.0	53.0	32.0	32.0		32.0	32.0	32.0
70th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	Coord
50th %ile Green (s)	10.0	68.0		53.0	53.0	53.0	32.0	32.0		32.0	32.0	32.0
50th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	Coord
30th %ile Green (s)	10.0	68.0		53.0	53.0	53.0	32.0	32.0		32.0	32.0	32.0
30th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	Coord
10th %ile Green (s)	10.0	68.0		53.0	53.0	53.0	32.0	32.0		32.0	32.0	32.0
10th %ile Term Code	MaxR	MaxR		MaxR	MaxR	MaxR	Coord	Coord		Coord	Coord	Coord
Stops (vph)	18	67			364	9	25	17			94	12
Fuel Used(gal)	0	2			9	1	0	0			2	0
CO Emissions (g/hr)	29	116			664	66	31	26			121	27
NOx Emissions (g/hr)	6	23			129	13	6	5			23	5
VOC Emissions (g/hr)	7	27			154	15	7	6			28	6
Dilemma Vehicles (#)	0	0			0	0	0	0			0	0
Queue Length 50th (ft)	14	57			276	0	19	12			74	0
Queue Length 95th (ft)	24	77			395	27	45	39			130	35
Internal Link Dist (ft)		176			1180			304			304	
Turn Bay Length (ft)						300	100					70
Base Capacity (vph)	420	1144			871	760	343	506			386	498

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	280			0	0	0	0			0	0
Spillback Cap Reductn	0	0			3	0	0	0			0	0
Storage Cap Reductn	0	0			0	0	0	0			0	0
Reduced v/c Ratio	0.28	0.56			0.63	0.12	0.10	0.09			0.34	0.15

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 77.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 8: Overhill Road/Chase Road & Popham Road



Arterial Level of Service: EB Popham Road

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Garth Road	2	14.3	34.4	0.2	18
Scarsdale Ave	3	10.6	20.1	0.1	14
Overhill Road	8	1.4	7.2	0.0	24
Total		26.3	61.6	0.3	18

Arterial Level of Service: WB Popham Road

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Chase Road	8	28.8	56.7	0.2	15
E Parkway	3	7.7	13.8	0.0	13
Depot Place	2	6.5	15.4	0.1	19
Total		43.0	86.0	0.4	15

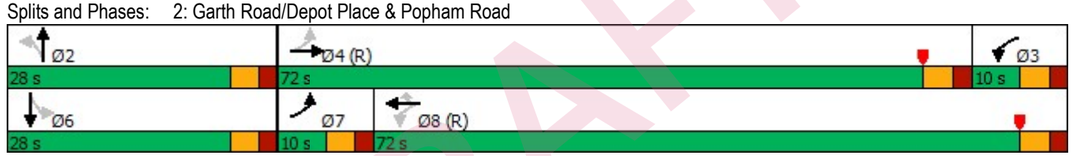
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	557	53	90	549	24	79	6	107	20	4	29
Future Volume (vph)	15	557	53	90	549	24	79	6	107	20	4	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	115		0	135		0	75		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987				0.850		0.859			0.867	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1839	0	1770	1863	1583	1770	1600	0	1770	1615	0
Flt Permitted	0.349			0.367			0.734			0.557		
Satd. Flow (perm)	650	1839	0	684	1863	1583	1367	1600	0	1038	1615	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				69		116			32	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		891			422			387			247	
Travel Time (s)		20.3			9.6			8.8			5.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	16	605	58	98	597	26	86	7	116	22	4	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	663	0	98	597	26	86	123	0	22	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0	0	1	1		1	1	
Detector Template												
Leading Detector (ft)	40	0		40	0	0	40	40		40	40	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		3	8	8	2	2		6	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	23.0		10.0	23.0	23.0	23.0	23.0		23.0	23.0	
Total Split (s)	10.0	72.0		10.0	72.0	72.0	28.0	28.0		28.0	28.0	
Total Split (%)	9.1%	65.5%		9.1%	65.5%	65.5%	25.5%	25.5%		25.5%	25.5%	
Maximum Green (s)	5.0	67.0		5.0	67.0	67.0	23.0	23.0		23.0	23.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0	0	0	0		0	0	
Act Effct Green (s)	77.8	77.8		83.3	83.3	83.3	12.2	12.2		12.2	12.2	
Actuated g/C Ratio	0.71	0.71		0.76	0.76	0.76	0.11	0.11		0.11	0.11	
v/c Ratio	0.03	0.51		0.17	0.42	0.02	0.57	0.44		0.19	0.17	
Control Delay	5.9	9.5		4.5	4.6	0.1	60.0	14.1		46.2	17.9	
Queue Delay	0.0	0.0		0.0	0.3	0.0	0.0	0.0		0.0	0.0	
Total Delay	5.9	9.5		4.5	4.9	0.1	60.0	14.1		46.2	17.9	
LOS	A	A		A	A	A	E	B		D	B	
Approach Delay		9.5			4.6			33.0			28.6	
Approach LOS		A			A			C			C	
90th %ile Green (s)	6.4	72.4		5.0	71.0	71.0	17.6	17.6		17.6	17.6	
90th %ile Term Code	Gap	Coord		Max	Coord	Coord	Gap	Gap		Hold	Hold	
70th %ile Green (s)	6.0	75.6		5.0	74.6	74.6	14.4	14.4		14.4	14.4	
70th %ile Term Code	Gap	Coord		Max	Coord	Coord	Gap	Gap		Hold	Hold	
50th %ile Green (s)	0.0	77.8		5.0	87.8	87.8	12.2	12.2		12.2	12.2	
50th %ile Term Code	Skip	Coord		Max	Coord	Coord	Gap	Gap		Hold	Hold	
30th %ile Green (s)	0.0	80.0		5.0	90.0	90.0	10.0	10.0		10.0	10.0	
30th %ile Term Code	Skip	Coord		Max	Coord	Coord	Gap	Gap		Hold	Hold	
10th %ile Green (s)	0.0	83.1		5.0	93.1	93.1	6.9	6.9		6.9	6.9	
10th %ile Term Code	Skip	Coord		Max	Coord	Coord	Gap	Gap		Hold	Hold	
Stops (vph)	6	270		17	105	0	73	22		19	12	
Fuel Used(gal)	0	7		0	3	0	2	1		0	0	
CO Emissions (g/hr)	11	483		33	202	6	112	55		23	17	
NOx Emissions (g/hr)	2	94		6	39	1	22	11		5	3	
VOC Emissions (g/hr)	3	112		8	47	1	26	13		5	4	
Dilemma Vehicles (#)	0	0		0	0	0	0	0		0	0	
Queue Length 50th (ft)	3	186		10	68	0	59	5		14	3	
Queue Length 95th (ft)	11	318		30	142	m0	106	56		38	32	
Internal Link Dist (ft)		811			342			307			167	
Turn Bay Length (ft)	100			115			135			75		
Base Capacity (vph)	518	1302		567	1410	1215	285	426		217	362	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	309	0	0	0		0	0	
Spillback Cap Reductn	0	4		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.03	0.51		0.17	0.54	0.02	0.30	0.29		0.10	0.10	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 95 (86%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 11.0		Intersection LOS: B	
Intersection Capacity Utilization 61.1%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: Garth Road/Depot Place & Popham Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	454	70	42	500	42	40	90	50	45	70	155
Future Volume (vph)	160	454	70	42	500	42	40	90	50	45	70	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	115		0	0		0	100		0	0		135
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1764	0	1770	1863	1583
Flt Permitted	0.255			0.483			0.554			0.660		
Satd. Flow (perm)	475	1863	1583	900	1863	1583	1032	1764	0	1229	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			119			119		26				169
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		422			256			479			463	
Travel Time (s)		9.6			5.8			10.9			10.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	174	493	76	46	543	46	43	98	54	49	76	168
Shared Lane Traffic (%)												
Lane Group Flow (vph)	174	493	76	46	543	46	43	152	0	49	76	168
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0	0	1	1		1	1	1
Detector Template												
Leading Detector (ft)	40	0	0	40	0	0	40	40		40	40	40
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	3	8	8	5	2		6	6	6
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	9.0	18.0	18.0	5.0	18.0	18.0	5.0	18.0		18.0	18.0	18.0
Minimum Split (s)	14.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0		23.0	23.0	23.0
Total Split (s)	14.0	57.0	57.0	14.0	57.0	57.0	10.0	39.0		29.0	29.0	29.0
Total Split (%)	12.7%	51.8%	51.8%	12.7%	51.8%	51.8%	9.1%	35.5%		26.4%	26.4%	26.4%
Maximum Green (s)	9.0	52.0	52.0	9.0	52.0	52.0	5.0	34.0		24.0	24.0	24.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0		0	0	0
Act Effct Green (s)	64.8	64.8	64.8	59.7	59.7	59.7	24.0	24.0		18.0	18.0	18.0
Actuated g/C Ratio	0.59	0.59	0.59	0.54	0.54	0.54	0.22	0.22		0.16	0.16	0.16
v/c Ratio	0.42	0.45	0.08	0.08	0.54	0.05	0.17	0.38		0.24	0.25	0.42
Control Delay	10.2	10.3	0.4	8.3	12.7	0.3	34.0	31.9		43.8	42.6	9.6
Queue Delay	0.0	0.3	0.0	0.0	0.4	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	10.2	10.7	0.4	8.3	13.1	0.3	34.0	31.9		43.8	42.6	9.6
LOS	B	B	A	A	B	A	C	C		D	D	A
Approach Delay		9.5			11.9			32.3			23.9	
Approach LOS		A			B			C			C	
90th %ile Green (s)	14.9	58.0	58.0	9.0	52.1	52.1	5.0	28.0		18.0	18.0	18.0
90th %ile Term Code	Gap	Coord	Coord	Hold	Coord	Coord	Max	Hold		Min	Min	Min
70th %ile Green (s)	12.6	58.0	58.0	9.0	54.4	54.4	5.0	28.0		18.0	18.0	18.0
70th %ile Term Code	Gap	Coord	Coord	Hold	Coord	Coord	Max	Hold		Min	Min	Min
50th %ile Green (s)	11.1	58.0	58.0	9.0	55.9	55.9	5.0	28.0		18.0	18.0	18.0
50th %ile Term Code	Gap	Coord	Coord	Hold	Coord	Coord	Max	Hold		Min	Min	Min
30th %ile Green (s)	9.0	68.0	68.0	9.0	68.0	68.0	0.0	18.0		18.0	18.0	18.0
30th %ile Term Code	Min	Coord	Coord	Hold	Coord	Coord	Skip	Min		Min	Min	Min
10th %ile Green (s)	9.0	82.0	82.0	0.0	68.0	68.0	0.0	18.0		18.0	18.0	18.0
10th %ile Term Code	Min	Coord	Coord	Skip	Coord	Coord	Skip	Min		Min	Min	Min
Stops (vph)	46	221	2	12	284	1	31	95		39	60	21
Fuel Used(gal)	1	4	0	0	4	0	1	2		1	1	1
CO Emissions (g/hr)	78	257	17	15	270	6	42	137		54	83	68
NOx Emissions (g/hr)	15	50	3	3	53	1	8	27		11	16	13
VOC Emissions (g/hr)	18	59	4	4	63	1	10	32		13	19	16
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	0
Queue Length 50th (ft)	37	216	0	8	269	1	23	72		31	47	0
Queue Length 95th (ft)	49	202	1	m14	386	m0	53	130		68	92	58
Internal Link Dist (ft)		342			176			399			383	
Turn Bay Length (ft)	115						100					135
Base Capacity (vph)	413	1097	981	559	1010	913	258	563		268	406	477

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	203	0	0	149	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.42	0.55	0.08	0.08	0.63	0.05	0.17	0.27		0.18	0.19	0.35

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 91 (83%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 15.0	Intersection LOS: B
Intersection Capacity Utilization 81.8%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 3: Scarsdale Ave/E Parkway & Popham Road

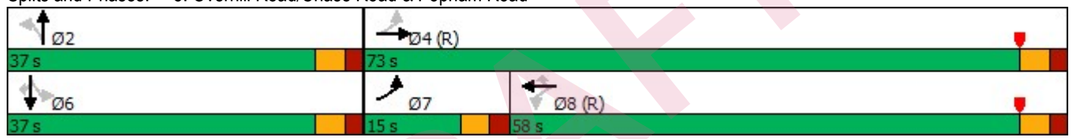
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	430	14	20	481	84	33	21	20	102	20	70
Future Volume (vph)	107	430	14	20	481	84	33	21	20	102	20	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		300	100		0	0		70
Storage Lanes	1		0	0		1	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00	0.94	0.98	0.98			0.98	0.96
Frt		0.995				0.850		0.927				0.850
Flt Protected	0.950				0.998		0.950				0.960	
Satd. Flow (prot)	1770	1849	0	0	1859	1583	1770	1687	0	0	1788	1583
Flt Permitted	0.346				0.973		0.594				0.730	
Satd. Flow (perm)	645	1849	0	0	1810	1481	1085	1687	0	0	1330	1527
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				91		22				76
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		256			1260			384			384	
Travel Time (s)		5.8			28.6			8.7			8.7	
Confl. Peds. (#/hr)	15		20	20		15	13		9	9		13
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	116	467	15	22	523	91	36	23	22	111	22	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	482	0	0	545	91	36	45	0	0	133	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0	0	1	1		1	1	1
Detector Template				Left						Left		
Leading Detector (ft)	40	0		20	0	0	40	40		20	40	40
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	18.0		18.0	18.0	18.0	18.0	18.0		18.0	18.0	18.0
Minimum Split (s)	10.0	23.0		23.0	23.0	23.0	23.0	23.0		23.0	23.0	23.0
Total Split (s)	15.0	73.0		58.0	58.0	58.0	37.0	37.0		37.0	37.0	37.0
Total Split (%)	13.6%	66.4%		52.7%	52.7%	52.7%	33.6%	33.6%		33.6%	33.6%	33.6%
Maximum Green (s)	10.0	68.0		53.0	53.0	53.0	32.0	32.0		32.0	32.0	32.0
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0			5.0	5.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	C-Max		C-Max	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	80.7	80.7			68.1	68.1	19.3	19.3			19.3	19.3
Actuated g/C Ratio	0.73	0.73			0.62	0.62	0.18	0.18			0.18	0.18
v/c Ratio	0.21	0.36			0.49	0.10	0.19	0.14			0.57	0.23
Control Delay	2.7	2.8			13.8	2.4	40.6	23.9			51.6	10.3
Queue Delay	0.0	0.3			0.1	0.0	0.0	0.0			0.0	0.0
Total Delay	2.7	3.0			13.9	2.4	40.6	23.9			51.6	10.3
LOS	A	A			B	A	D	C			D	B
Approach Delay		3.0			12.3			31.3			36.6	
Approach LOS		A			B			C			D	
90th %ile Green (s)	9.6	76.7		62.1	62.1	62.1	23.3	23.3		23.3	23.3	23.3
90th %ile Term Code	Gap	Coord		Coord	Coord	Coord	Hold	Hold		Gap	Gap	Gap
70th %ile Green (s)	8.1	80.9		67.8	67.8	67.8	19.1	19.1		19.1	19.1	19.1
70th %ile Term Code	Gap	Coord		Coord	Coord	Coord	Hold	Hold		Gap	Gap	Gap
50th %ile Green (s)	7.4	82.0		69.6	69.6	69.6	18.0	18.0		18.0	18.0	18.0
50th %ile Term Code	Gap	Coord		Coord	Coord	Coord	Min	Min		Min	Min	Min
30th %ile Green (s)	6.8	82.0		70.2	70.2	70.2	18.0	18.0		18.0	18.0	18.0
30th %ile Term Code	Gap	Coord		Coord	Coord	Coord	Min	Min		Min	Min	Min
10th %ile Green (s)	6.0	82.0		71.0	71.0	71.0	18.0	18.0		18.0	18.0	18.0
10th %ile Term Code	Gap	Coord		Coord	Coord	Coord	Hold	Hold		Min	Min	Min
Stops (vph)	16	66			268	7	28	21			111	13
Fuel Used(gal)	0	2			8	1	1	0			2	0
CO Emissions (g/hr)	25	105			546	63	37	31			158	30
NOx Emissions (g/hr)	5	20			106	12	7	6			31	6
VOC Emissions (g/hr)	6	24			127	15	9	7			37	7
Dilemma Vehicles (#)	0	0			0	0	0	0			0	0
Queue Length 50th (ft)	9	53			186	0	22	14			88	0
Queue Length 95th (ft)	23	74			324	22	50	44			146	39
Internal Link Dist (ft)		176			1180			304			304	
Turn Bay Length (ft)						300	100					70
Base Capacity (vph)	575	1357			1121	952	315	506			386	498

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	337			0	0	0	0			0	0
Spillback Cap Reductn	0	0			59	0	0	0			0	2
Storage Cap Reductn	0	0			0	0	0	0			0	0
Reduced v/c Ratio	0.20	0.47			0.51	0.10	0.11	0.09			0.34	0.15

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 105 (95%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 77.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 8: Overhill Road/Chase Road & Popham Road



Arterial Level of Service: EB Popham Road

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Garth Road	2	6.0	26.1	0.2	24
Scarsdale Ave	3	6.4	15.9	0.1	18
Overhill Road	8	2.5	8.2	0.0	21
Total		14.9	50.1	0.3	22

Arterial Level of Service: WB Popham Road

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Chase Road	8	13.3	41.4	0.2	21
E Parkway	3	7.7	13.9	0.0	13
Depot Place	2	3.1	12.1	0.1	24
Total		24.1	67.4	0.4	20

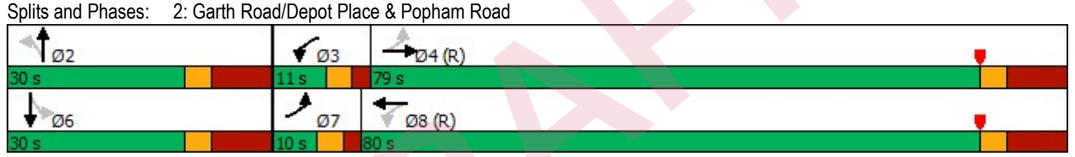
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	557	53	90	549	24	79	6	107	20	4	29
Future Volume (vph)	15	557	53	90	549	24	79	6	107	20	4	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	210		0	135		0	75		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987			0.994			0.859			0.867	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1839	0	1770	1852	0	1770	1600	0	1770	1615	0
Flt Permitted	0.390			0.306			0.734			0.678		
Satd. Flow (perm)	726	1839	0	570	1852	0	1367	1600	0	1263	1615	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			3			116			32	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		891			422			387			247	
Travel Time (s)		20.3			9.6			8.8			5.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	16	605	58	98	597	26	86	7	116	22	4	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	663	0	98	623	0	86	123	0	22	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template												
Leading Detector (ft)	40	0		40	0		40	40		40	40	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	28.0		10.0	28.0		28.0	28.0		28.0	28.0	
Total Split (s)	10.0	79.0		11.0	80.0		30.0	30.0		30.0	30.0	
Total Split (%)	8.3%	65.8%		9.2%	66.7%		25.0%	25.0%		25.0%	25.0%	
Maximum Green (s)	5.0	69.0		6.0	70.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	7.0		2.0	7.0		7.0	7.0		7.0	7.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	10.0		5.0	10.0		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	86.0	75.2		90.8	82.7		12.8	12.8		12.8	12.8	
Actuated g/C Ratio	0.72	0.63		0.76	0.69		0.11	0.11		0.11	0.11	
v/c Ratio	0.03	0.57		0.20	0.49		0.59	0.45		0.16	0.18	
Control Delay	4.4	16.3		2.7	4.5		66.4	15.1		49.2	19.2	
Queue Delay	0.0	0.0		0.0	0.4		0.0	0.0		0.0	0.0	
Total Delay	4.4	16.3		2.7	4.8		66.4	15.1		49.2	19.2	
LOS	A	B		A	A		E	B		D	B	
Approach Delay		16.0			4.5			36.2			30.6	
Approach LOS		B			A			D			C	
90th %ile Green (s)	6.3	69.0		7.6	70.3		18.4	18.4		18.4	18.4	
90th %ile Term Code	Gap	Coord		Max	Coord		Gap	Gap		Hold	Hold	
70th %ile Green (s)	5.9	72.0		7.8	73.9		15.2	15.2		15.2	15.2	
70th %ile Term Code	Gap	Coord		Gap	Coord		Gap	Gap		Hold	Hold	
50th %ile Green (s)	0.0	75.1		7.1	87.2		12.8	12.8		12.8	12.8	
50th %ile Term Code	Skip	Coord		Gap	Coord		Gap	Gap		Hold	Hold	
30th %ile Green (s)	0.0	78.0		6.5	89.5		10.5	10.5		10.5	10.5	
30th %ile Term Code	Skip	Coord		Gap	Coord		Gap	Gap		Hold	Hold	
10th %ile Green (s)	0.0	81.9		5.8	92.7		7.3	7.3		7.3	7.3	
10th %ile Term Code	Skip	Coord		Gap	Coord		Gap	Gap		Hold	Hold	
Stops (vph)	5	351		9	76		74	21		19	12	
Fuel Used(gal)	0	8		0	3		2	1		0	0	
CO Emissions (g/hr)	10	573		28	197		120	56		24	18	
NOx Emissions (g/hr)	2	112		5	38		23	11		5	4	
VOC Emissions (g/hr)	2	133		6	46		28	13		6	4	
Dilemma Vehicles (#)	0	0		0	0		0	0		0	0	
Queue Length 50th (ft)	2	277		8	59		65	5		16	3	
Queue Length 95th (ft)	9	444		m14	108		115	60		40	34	
Internal Link Dist (ft)		811			342			307			167	
Turn Bay Length (ft)	100			210			135			75		
Base Capacity (vph)	570	1155		501	1277		227	363		210	295	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	240		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.03	0.57		0.20	0.60		0.38	0.34		0.10	0.12	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 14 (12%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 14.1		Intersection LOS: B	
Intersection Capacity Utilization 69.4%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: Garth Road/Depot Place & Popham Road



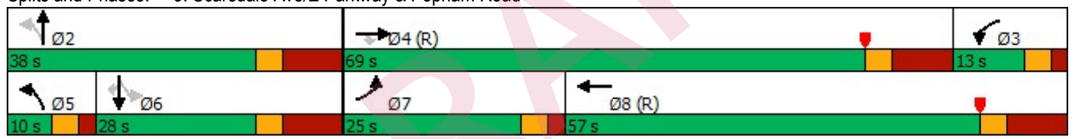
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	454	70	42	500	42	40	90	50	45	70	155
Future Volume (vph)	160	454	70	42	500	42	40	90	50	45	70	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		210	110		0	100		0	0		135
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850		0.988			0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1840	0	1770	1764	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.554			0.660		
Satd. Flow (perm)	1770	1863	1583	1770	1840	0	1032	1764	0	1229	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			200		4			22				245
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		422			256			479			463	
Travel Time (s)		9.6			5.8			10.9			10.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	174	493	76	46	543	46	43	98	54	49	76	168
Shared Lane Traffic (%)												
Lane Group Flow (vph)	174	493	76	46	589	0	43	152	0	49	76	168
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0		1	1		1	1	1
Detector Template												
Leading Detector (ft)	40	0	0	40	0		40	40		40	40	40
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4				2			6		6
Detector Phase	7	4	4	3	8		5	2		6	6	6
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	9.0	18.0	18.0	5.0	18.0		5.0	18.0		18.0	18.0	18.0
Minimum Split (s)	14.0	28.0	28.0	10.0	28.0		10.0	28.0		28.0	28.0	28.0
Total Split (s)	25.0	69.0	69.0	13.0	57.0		10.0	38.0		28.0	28.0	28.0
Total Split (%)	20.8%	57.5%	57.5%	10.8%	47.5%		8.3%	31.7%		23.3%	23.3%	23.3%
Maximum Green (s)	20.0	59.0	59.0	8.0	47.0		5.0	28.0		18.0	18.0	18.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	7.0	7.0	2.0	7.0		2.0	7.0		7.0	7.0	7.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	10.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0		0	0	0
Act Effct Green (s)	16.4	63.6	63.6	7.5	52.6		31.0	26.0		18.0	18.0	18.0
Actuated g/C Ratio	0.14	0.53	0.53	0.06	0.44		0.26	0.22		0.15	0.15	0.15
v/c Ratio	0.72	0.50	0.08	0.41	0.73		0.14	0.38		0.27	0.27	0.38
Control Delay	86.1	15.9	0.2	44.0	14.8		33.8	36.4		49.6	48.2	3.2
Queue Delay	0.0	0.6	0.0	0.0	1.8		0.0	0.0		0.0	0.0	0.0
Total Delay	86.1	16.5	0.2	44.0	16.6		33.8	36.4		49.6	48.2	3.2
LOS	F	B	A	D	B		C	D		D	D	A
Approach Delay		31.1			18.6			35.8			22.6	
Approach LOS		C			B			D			C	
90th %ile Green (s)	20.0	59.0	59.0	8.0	47.0		5.0	28.0		18.0	18.0	18.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord		Max	Hold		Max	Max	Max
70th %ile Green (s)	19.5	59.0	59.0	8.0	47.5		5.0	28.0		18.0	18.0	18.0
70th %ile Term Code	Gap	Coord	Coord	Max	Coord		Max	Hold		Max	Max	Max
50th %ile Green (s)	17.0	59.0	59.0	8.0	50.0		5.0	28.0		18.0	18.0	18.0
50th %ile Term Code	Gap	Coord	Coord	Max	Coord		Max	Hold		Max	Max	Max
30th %ile Green (s)	14.5	59.0	59.0	8.0	52.5		5.0	28.0		18.0	18.0	18.0
30th %ile Term Code	Gap	Coord	Coord	Hold	Coord		Max	Hold		Max	Max	Max
10th %ile Green (s)	10.8	82.0	82.0	0.0	66.2		0.0	18.0		18.0	18.0	18.0
10th %ile Term Code	Gap	Coord	Coord	Skip	Coord		Skip	Min		Min	Min	Min
Stops (vph)	157	157	1	41	306		29	99		39	62	2
Fuel Used(gal)	4	4	0	1	4		1	2		1	1	1
CO Emissions (g/hr)	293	268	17	48	308		41	147		58	90	47
NOx Emissions (g/hr)	57	52	3	9	60		8	29		11	17	9
VOC Emissions (g/hr)	68	62	4	11	71		9	34		13	21	11
Dilemma Vehicles (#)	0	0	0	0	0		0	0		0	0	0
Queue Length 50th (ft)	139	139	0	37	67		25	84		34	53	0
Queue Length 95th (ft)	219	213	m0	m53	#320		55	147		73	101	8
Internal Link Dist (ft)		342			176			399			383	
Turn Bay Length (ft)	250		210	110			100					135
Base Capacity (vph)	295	987	932	118	809		297	428		184	279	445

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	191	0	0	100		0	0		0	0	0
Spillback Cap Reductn	0	33	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.59	0.62	0.08	0.39	0.83		0.14	0.36		0.27	0.27	0.38

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 112 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 26.0		Intersection LOS: C	
Intersection Capacity Utilization 96.0%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: Scarsdale Ave/E Parkway & Popham Road



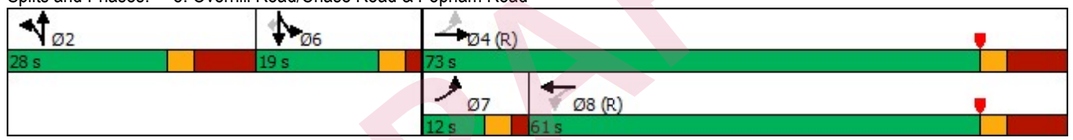
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	430	14	20	481	84	33	21	20	102	20	70
Future Volume (vph)	107	430	14	20	481	84	33	21	20	102	20	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	110		0	100		0	100		0	0		70
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.97	0.99		0.96	0.98			0.98	0.93
Frt		0.995			0.978			0.927				0.850
Flt Protected	0.950			0.950			0.950				0.960	
Satd. Flow (prot)	1770	1849	0	1770	1803	0	1770	1685	0	0	1788	1583
Flt Permitted	0.231			0.488			0.950				0.960	
Satd. Flow (perm)	430	1849	0	878	1803	0	1706	1685	0	0	1746	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			9			22				200
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		256			1260			384			384	
Travel Time (s)		5.8			28.6			8.7			8.7	
Confl. Peds. (#/hr)	15		20	20		15	13		9	9		13
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	116	467	15	22	523	91	36	23	22	111	22	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	482	0	22	614	0	36	45	0	0	133	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	1
Detector Template										Left		
Leading Detector (ft)	40	0		40	0		40	40		20	40	40
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Turn Type	pm+pt	NA		Perm	NA		Split	NA		Split	NA	Perm
Protected Phases	7	4			8		2	2		6	6	
Permitted Phases	4			8								6
Detector Phase	7	4		8	8		2	2		6	6	6
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	18.0		18.0	18.0		18.0	18.0		10.0	10.0	10.0
Minimum Split (s)	10.0	28.0		28.0	28.0		28.0	28.0		15.0	15.0	15.0
Total Split (s)	12.0	73.0		61.0	61.0		28.0	28.0		19.0	19.0	19.0
Total Split (%)	10.0%	60.8%		50.8%	50.8%		23.3%	23.3%		15.8%	15.8%	15.8%
Maximum Green (s)	7.0	63.0		51.0	51.0		18.0	18.0		14.0	14.0	14.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	7.0		7.0	7.0		7.0	7.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	5.0	10.0		10.0	10.0		10.0	10.0			5.0	5.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)		7.0		7.0	7.0		7.0	7.0				
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0				
Pedestrian Calls (#/hr)		0		0	0		0	0				
Act Effct Green (s)	74.8	69.8		57.8	57.8		18.0	18.0			12.8	12.8
Actuated g/C Ratio	0.62	0.58		0.48	0.48		0.15	0.15			0.11	0.11
v/c Ratio	0.34	0.45		0.05	0.70		0.14	0.17			0.70	0.23
Control Delay	6.6	6.3		20.9	32.3		45.8	28.7			71.0	1.6
Queue Delay	0.3	0.3		0.0	0.8		0.0	0.0			0.0	0.0
Total Delay	6.9	6.5		20.9	33.1		45.8	28.7			71.0	1.6
LOS	A	A		C	C		D	C			E	A
Approach Delay		6.6			32.7			36.3			45.8	
Approach LOS		A			C			D			D	
90th %ile Green (s)	7.0	63.0		51.0	51.0		18.0	18.0		14.0	14.0	14.0
90th %ile Term Code	Max	Coord		Coord	Coord		Max	Max		Max	Max	Max
70th %ile Green (s)	7.0	63.0		51.0	51.0		18.0	18.0		14.0	14.0	14.0
70th %ile Term Code	Max	Coord		Coord	Coord		Max	Max		Max	Max	Max
50th %ile Green (s)	7.0	63.0		51.0	51.0		18.0	18.0		14.0	14.0	14.0
50th %ile Term Code	Max	Coord		Coord	Coord		Max	Max		Max	Max	Max
30th %ile Green (s)	8.0	64.9		51.9	51.9		18.0	18.0		12.1	12.1	12.1
30th %ile Term Code	Gap	Coord		Coord	Coord		Max	Max		Gap	Gap	Gap
10th %ile Green (s)	5.9	95.0		84.1	84.1		0.0	0.0		10.0	10.0	10.0
10th %ile Term Code	Gap	Coord		Coord	Coord		Skip	Skip		Min	Min	Min
Stops (vph)	18	131		12	444		28	22			116	0
Fuel Used(gal)	0	2		0	12		1	0			3	0
CO Emissions (g/hr)	32	152		24	819		39	34			194	16
NOx Emissions (g/hr)	6	30		5	159		8	7			38	3
VOC Emissions (g/hr)	7	35		6	190		9	8			45	4
Dilemma Vehicles (#)	0	0		0	0		0	0			0	0
Queue Length 50th (ft)	16	67		10	401		25	16			100	0
Queue Length 95th (ft)	27	86		27	559		57	51			#175	0
Internal Link Dist (ft)		176			1180			304			304	
Turn Bay Length (ft)	110			100			100					70
Base Capacity (vph)	348	1075		423	873		265	271			208	347

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	43	167		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	79		0	0			0	8
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.38	0.53		0.05	0.77		0.14	0.17			0.64	0.22

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 24.4		Intersection LOS: C	
Intersection Capacity Utilization 78.5%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 8: Overhill Road/Chase Road & Popham Road



Arterial Level of Service: EB Popham Road

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Garth Road	2	10.9	31.0	0.2	20
Scarsdale Ave	3	12.0	21.5	0.1	13
Overhill Road	8	3.7	9.4	0.0	19
Total		26.6	61.9	0.3	17

Arterial Level of Service: WB Popham Road

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Chase Road	8	24.6	52.2	0.2	16
E Parkway	3	9.7	15.8	0.0	11
Depot Place	2	2.5	11.5	0.1	25
Total		36.8	79.5	0.4	17