

Intersection Improvements to Gorham Street at the Lowell Connector Lowell, MA MassDOT Project No. 604694		
	Existing Conditions, Roundabout Basics, and Project Info	Response to Comments
1	How do trucks, busses, and other oversized vehicles navigate through the radius of the roundabout?	The roundabout will be designed to accommodate large and oversized vehicles. A mountable concrete apron will be included along the inside lane of the roundabout. Since the apron is mountable, an oversized vehicle will be able to drive over it to navigate the roundabout. Other vehicles (trucks and buses) will be able to navigate the roundabout in the same manner as a passenger car.
2	What is curb-to-curb width of Gorham?	Gorham Street varies in width from 32' to 35' curb-to-curb.
3	Is there precedent for vehicles not understanding a roundabout and jamming traffic this way?	Public education and outreach will be important leading up to the project's completion. Providing guidance to the public via multiple sources will reduce the instances of operator error.
4	Is there any way to mitigate roundabout confusion through education, signage, etc?	Public education and outreach will be part of this project's scope. Multiple media sources will be utilized to disseminate information.
5	What is diameter of roundabout?	The roundabout diameter is 130 feet.
6	Is the Fire Department OK with a roundabout?	Yes. All emergency services will be consulted throughout the design phase.
7	Can the police department enforce rules at rotaries/roundabouts? A resident believes they can only enforce at traditional intersections.	All traffic laws apply to roundabouts.
8	Will there be a change in width of sidewalk? How much? Residents are concerned the sidewalks are already as narrow as they would like them, even if they could legally be more narrow.	Existing sidewalk widths will generally be matched. Sidewalks will be designed in accordance with MassDOT standards. Minimum sidewalk width including the curb is 5.5 feet. Any changes to the existing sidewalk width will be minor.
9	Does the plan require right-of-way takings, and do either alternative have different takings requirements?	Neither alternative will require right-of-way takings. All permanent features will be located within the State and City layout lines. Temporary construction easements will be required.
10	Please provide an overlay graphic of the existing condition (or satellite) and proposed alternatives	Graphics are attached to this response document.

11	Will the work happen at day or night?	It is anticipated that this project will be constructed during normal working hours, however, the possibility of night work cannot be ruled out at this time. The project's close proximity to residential neighborhoods will be considered.
12	Please briefly explain the process for developing and selecting the initial alternatives.	All feasible improvement alternatives, including variations of alternatives, were considered as part of the Alternatives Analysis Report. The alternatives analysis used a weighted rating system developed specifically for this project to compare the alternatives. The primary considerations in evaluating the alternatives were vehicular, pedestrian, and bicycle safety, as well as improvements to intersection capacity. Also considered were accommodation of trucks and transit buses, abutters' accessibility and property, consistency with community circulation and planning goals, environmental effects, and probable costs. This process identified the final two alternatives that were presented.
13	Please briefly explain the funding for this project.	This project is not currently on the MassDOT TIP. Funding is to be determined but will likely include Federal funds.
14	Please briefly explain the timeline for this project, including final approval of alternative and 25% design hearing, and approximate start and duration of construction.	This project is in the pre-25% design stage, following additional time for public comment, 25% design will begin. It is anticipated that construction of this project will take two construction seasons.
Traffic Modeling and Understanding Impacts		
15	<p>Many residents and City staff are concerned either alternative would add additional queue length onto Gorham, where it would block cross-street traffic, rather than leaving the queues on the Connector, where it makes less of an impact on other traffic patterns. One resident is concerned that larger queues in the City would have greater asthma impacts than queues on the Connector.</p> <p>Please develop and show an easy-to-understand model (potentially animated and/or with peak queue lengths indicated with shading) for both alternatives that includes both the junction and the Highland/Elm/Gorham intersection. This model should show that queues at Highland/Elm would not back into the roundabout, creating gridlock, especially at peak traffic events. Please also include summary level of service information.</p>	<p>Animated simulations of both alternatives are attached to these responses. The signalized "T" intersection alternative has a LOS of C during AM peak hour and a LOS of B during PM peak hour. The roundabout alternative has a LOS of A during AM and PM peak hour.</p>
16	<p>Many residents and City staff are concerned that because of the disparate levels of traffic and design of roundabout, southbound Gorham traffic will have difficulty navigating through the roundabout.</p> <p>Please show how traffic exiting the connector will not block southbound Gorham traffic using a model at peak traffic events or example with comparable volume disparities. Many respondents are afraid southbound traffic will have a hard time "battling" traffic coming off the connector, whether it is moving too fast/too steady a stream to let cars in or gridlock prevents cars from moving through the roundabout.</p>	<p>Vehicles exiting the connector will be required to yield to southbound vehicles that entered the roundabout from Gorham Street. Animated simulations of both alternatives are attached to these responses.</p>

17	Please show or explain whether the additional throughput at either alternative would not create additional backup at Highland/Elm or other downtown intersections	An additional lane will not generate additional traffic demand along Gorham. Animated simulations of both alternatives are attached to these responses.
18	Please show in a model or comparable example that merging in the roundabout will not create slowdown or safety concerns	Animated simulations of both alternatives are attached to these responses.
19	A very large number of residents and City staff are generally concerned that the roundabout would create gridlock based on previous experience with similar rotaries/roundabouts or specific thoughts related to the set-up of this roundabout. Please show or explain why this roundabout wouldn't "clog" like many of the high-volume rotaries in Greater Lowell.	The designer was not able to locate many local roundabouts that resemble the proposed alternative. Similar intersections were reviewed but the designer found that they included signals and four (4) or five (5) intersecting roads. The proposed roundabout has three (3) legs which will provide longer decision making time for entering and existing of vehicles. This alternative will function far differently than other local roundabouts. An animated simulation of the roundabout is attached to these responses.
20	What is the capacity of the T and the roundabout, and will either alternative still work if there is 5-10% growth?	Growth rates and capacity were considered when analyzing the alternatives. Based on a regional traffic volume report from 2014, it was determined that the City of Lowell had only grown 0.09% in the previous 12 years. The designer took a conservative approach to design and assumed a 0.5% growth rate every year from 2014 to 2026 (the design year). The alternatives were designed based on the increased demand. Traffic volume figures have been attached to these responses.
21	The cross street intersections are very often blocked by traffic exiting the Connector. Can this be mitigated by an alternative?	These alternatives provide additional northbound queuing space at the intersection of Gorham and Elm by adding a second through lane. This will reduce the likelihood that side streets will be blocked by queued traffic.
22	Eliminating the "buffer" space with a third lane will make it harder for cars to navigate around left-turning cars onto side streets without traffic signals. Will this create an issue for traffic flow?	This concern was considered when analyzing the alternatives. Traffic counts indicate that very few vehicles will attempt left turns onto side streets compared to through traffic. The alternative analysis determined that reducing the southbound lane width is worth providing additional northbound queuing space.
23	If the tee alternative is used, would traffic signals at Highland and at the Connector be coordinated? Does this offer any advantages over the roundabout option?	As part of the T intersection alternative analysis, it was assumed that new traffic signals within the project limits would be coordinated.
24	Some residents believe traffic would be improved if the three-lane configuration is extended to Veterans' Way, while others are afraid that it would help during rush hour but create speeding situations at other times and not allow for any pedestrian/bicycle improvements for the ROW. What are the advantages and disadvantages to extending the 3-lane configuration to Veterans' Way?	This concept is outside of the project limits and therefore, is not something that can be evaluated.
25	Roundabout traffic (including pedestrians and bicyclists) should have the right-of-way, but with fast moving traffic approaching the rotary that may create the potential for accidents. What can be done to eliminate that risk?	A roundabout is a proven safer alternative.
26	Are any changes anticipated to impact emergency vehicles? Why or why not?	Traffic patterns will remain the same, however, an improved level of service will provide better access for emergency vehicles.

27	There is resident concern that a roundabout would alter the character of largely-residential Gorham from neighborhood/pedestrian to highway/auto-dominated. Are there any counter-examples of 2-lane roundabouts of this type having an urban/neighborhood character? How would a roundabout not be treated as an extension of the highway, cutting off bicycle access or pedestrian crossing because of the necessity of two crossings to access the multiuse path?	Bike and pedestrian traffic will not be cut-off. Bike traffic will follow vehicle traffic. Roundabouts are present in many settings and are often found in similar locations as the proposed alternative. An example from Hudson, MA is attached to these responses. Additional pedestrian accommodations (shared use path) will be considered if the roundabout alternative is selected. Also, roundabouts are a traffic "calming" measure. They help reduce speeds and minimize crash severity.
28	Can synchronized traffic signals and better signage reduce the number of people who block the box at Highland/Elm or other signalized intersections?	Synchronized traffic signals and increased queuing capacity would likely reduce the potential of blocked intersections. However, the scope of this project does not extend to intersections north of Highland/Elm. Further investigation would be required.
Pedestrian and Bicycle Improvements		
29	Many respondents indicated neighborhood residents, including school children, cross at the currently-unmarked crossing at Walnut to access the Rogers School and South Common. Is this crossing safe? If so, can a crosswalk be installed, and if not, could additional measures be installed to make it safe?	A crosswalk at that location would be considered unsafe. The conceptual crosswalk drawn on South Street should be moved north to the intersection of Highland Street and South Street. Pedestrians should use crosswalks along Highland Street and Elm Street to access Walnut Street.
30	Can specialized roadside-activated bike signals be accommodated and/or bicycle boxes (see Sean Long's email)?	Bicycle accommodations can be installed if the signal is the chosen option.
31	Residents cross at multiple locations between Bishop Markham and downtown. Can this be mitigated by an improved crosswalk or any other methods?	The location in question is outside of the project limits and therefore, is not something that can be evaluated as part of this project. However, the Department of Planning and Development have added it to their project list and will discuss the possibility of evaluating improved pedestrian accommodations with a consultant.
32	What signage will be installed for the shared use path? How will it be clearly marked?	MassDOT standard signing and markings for shared use paths will be used. During design development, this will be shared with the public and adjusted as needed.
33	Can the shared use path be widened to be wide enough for bicycles and pedestrians?	Yes, the shared use path would be designed for both.
34	Can pedestrian-activated flashing beacons be used at the crossings near the roundabout?	Beacons will be considered to improve safety.
35	Could you please illustrate how pedestrians safely travel through the roundabout or Tee intersection?	Figures that illustrate pedestrian traffic paths are attached to these comment responses.

36	Can lane widths be adjusted to 10.5' or 10' per NACTO guidelines for urban streets without heavy bus traffic? Will this allow a bicycle lane or 2-lane bicycle track on the east side of Gorham?	The proposed additional lane would have to be eliminated to accommodate a bicycle track on Gorham. Minor lane width changes will not provide enough space. A standard bike lane in one direction is 3 ft with a 2 ft buffer (5 ft wide). The City will work with MassDOT and a consultant during the 25% design stage to determine the best way to accommodate bicycles in this important corridor.
37	There is a concern that the proposed crosswalk at Keene Street would be unsafe to cross. Does this crossing warrant any additional measures, such as pedestrian-activated flashing beacon?	Additional investigation is needed. The location of this crosswalk is a valid concern and all safety features will be considered.
Highland/Elm Specific Questions		
38	Can there be a roundabout at Highland/Elm and would this be desirable?	There are two initial concerns with this concept. The orientation and location of the South Street/Highland Street is problematic. That concern and the potential of right-of-way impacts would likely preclude this concept.
39	Can the Elm Street traffic signal be re-timed now (to give more priority to Gorham)?	This signal has been adjusted several times over the past few years. The intersection will be re-timed as part of this project.
40	What will be the phasing at the Elm Street light? I.e., will there be a green left arrow?	The Gorham/Highland/Elm signal will be phased based on traffic analysis and demand. Exclusive left turn lanes will be investigated as part of the design process.
Comparing Alternatives		
41	Please provide a fact sheet summary of pros/cons for alternatives to highlight why roundabout is preferred alternative.	A document containing a summary of pros/cons for the two alternatives has been attached to these responses.
42	Please explain on a high level whether one or the other alternative is anticipated to be built faster or more/less costly	A document containing a summary of pros/cons for the two alternatives has been attached to these responses.
Lowell Connector Changes		

43	<p>Multiple residents suggested a merge, T, or roundabout at Thorndike.</p> <p>Has MassDOT or the City considered any more major changes, such as making the junction with Thorndike a T or roundabout, and eliminating or reducing the connection to a 2-lane road between Thorndike and Gorham?</p>	<p>The City is exploring the feasibility of different junction types at Thorndike and the Lowell Connector with a consultant. There are significant design challenges, including the large grade change. A roundabout at the Lowell Connector and Thorndike would significantly impact the design of this project, as well as the design of the Lowell Connector On-ramps, which is the last segment of the Thorndike corridor project that included a widening and the Lord Overpass project.</p>
44	<p>Has an alternative involving a long one lane exit (divided by some kind of median) onto Gorham Street been considered, to divert more traffic onto Thorndike? What would be advantages and disadvantages?</p>	<p>This is not an alternative that the City has considered. Traffic volumes on Thorndike are already very significant and diverting additional traffic might not be a good solution. All alternatives will be explored as part of the analysis of the junction of Thorndike and the Lowell Connector.</p>
45	<p>Can the Connector after Plain Street be turned into a low-speed parkway (i.e., 4 lanes)?</p>	<p>The City has considered converting the Connector into a boulevard-style roadway as a good way to slow traffic. That project would require MassDOT concurrence. This possibility will be explored as part of the analysis of the junction of Thorndike and the Lowell Connector.</p>
46	<p>What signage or other notice will there be on the Connector before the junction to slow traffic?</p>	<p>Large warning signs possibly with flashing yellow lights may be installed. MUTCD guidance will be followed.</p>
47	<p>Is it possible to add signs with flashing lights or in-road flashing lights to the Connector after plain street to warn of the junction?</p>	<p>Large warning signs possibly with flashing yellow lights may be installed. MUTCD guidance will be followed.</p>
48	<p>Is it possible to add street trees or other passive traffic calming measures to the Connector somewhere after Plain Street to suggest a change from the high-speed Connector to an urban street grid?</p>	<p>MassDOT and the City are working together to determine what types of passive traffic calming measures could be (1) installed now, prior to the reconstruction project, (2) installed as part of the reconstruction project, and (3) installed as part of a project improving the junction of Thorndike and the Lowell Connector. The public will be updated as part of the 25% design process.</p>
49	<p>Is it possible to narrow lanes by 1' or narrow shoulder by 1' in the same area to suggest a change to an urban street grid?</p>	<p>Roads are designed to specific criteria based on roadway classification. Existing lanes are 12 ft wide. The City is exploring what MassDOT would allow and the public will be updated as part of the 25% design phase.</p>
<p>Parking</p>		
50	<p>Can parking spaces be added to the green space in the Roundabout? Would this be safe?</p>	<p>Parking within the green space will be considered and explored during the 25% design phase.</p>
51	<p>How many on-street parking spaces will be made or eliminated with each alternative?</p>	<p>Legal parking is only available along the southbound lane of Gorham Street, south of the Connector. The exact number of parking spaces is unknown since spaces are not marked. It is anticipated that the roundabout alternative will eliminate approximately 265 linear feet of parking spaces which is approximately 50 feet more than the tee intersection alternative.</p>

52	What, if any, off-street parking areas will be eliminated (regardless of whether they have a legal curb-cut)?	Prior to the 25% design, the City will develop a figure which highlights the location of existing off-street parking and labels where there are legal curb-cuts to determine what parking is to be eliminated and what mitigation is possible.
Misc.		
53	What input can the community have for vegetation in the center of the roundabout, and what is allowed or prohibited?	Vegetation can be installed within the roundabout, however, it must be low profile (< 2.5 ft high).
54	Can the landscaping in the existing cloverleaf be improved (Inside the Connector off-ramp to Thorndike northbound)?	The location in question is outside of the project limits and therefore, is not something that can be evaluated as part of this project. However, the City of Lowell will explore this as part of the analysis of the junction of Thorndike and the Lowell Connector.
55	Would there or can there be a longer right turn lane in the new "T" concept if this alternative is pursued?	The right turn lane would be designed to accommodate traffic demand.
56	Please note the boyhood home of Paul Tsongas at the intersection of Gorham and Highland. Would this be protected?	No impacts to this property are anticipated
57	Please replace the "no left turn" sign from the gas station onto Elm.	All signs within the project limits will be replaced. That particular sign was previously replaced.
58	How will signals be coordinated with downtown?	Locations outside of the project limits cannot be coordinated with signalized intersections within the project limits based on the scope of this project.
59	Where specifically are crash clusters in the area? What proportion are at the junction with the connector and what proportion are on the side streets?	Crash data was obtained for a three year period. In that time period there were 29 crashes at the intersection of Gorham Street and Highland Street/Elm Street, 18 crashes between Elm Street and the Lowell Connector, and 26 crashes at the intersection of Gorham Street and the Lowell Connector. For all three of these locations, the crash rate is higher than the statewide average for similar facilities.
60	Is there a way to add more speed control to both Connector and Gorham?	MassDOT and the City are working together to determine what types of passive traffic calming measures could be (1) installed now, prior to the reconstruction project, (2) installed as part of the reconstruction project, and (3) installed as part of a project improving the junction of Thorndike and the Lowell Connector. The public will be updated as part of the 25% design process.
61	Who owns Hosford Square intersection? Can pedestrian crossing signs be replaced (Gorham/Central/Thorndike intersection)?	The City is working with MassDOT to determine the best way to keep this area in a high level of maintenance.

62	Are left turns allowed from South Highland? Can there be traffic control?	More analysis is required. This movement will analyzed as part of the design process.
63	Are any alternatives to reduce traffic or redirect it to roads that have capacity rather than "build more roads" considered to ease congestion?	The City, under our Complete Streets policy, continues to attempt to improve pedestrian and bicycle facilities in the City, with the express purpose of driving a mode shift to help reduce congestion. City ROW is very constrained and it is not feasible to "build more roads" in most places. The City is continuing to work with MassDOT to learn more about whether they have long-term plans to reduce or redirect traffic regionally.
64	There is a gas main that runs along Gorham Street that serves South Lowell. Will this be diverted or rerouted during construction?	Relocations are not anticipated, however, that will be part of the utility coordination effort.
65	The rotary at Industrial Avenue has fewer traffic accidents than the one at Lord Overpass. Is this true when controlling for traffic volume? If so, is this a function of number of access points or design?	The Lord Overpass includes signalized intersections which greatly increase the number of conflict points present (more possible turning movements). Therefore, the disparity in accident data is more likely a function of the difference in conflict points rather than a function of design. The Industrial Avenue rotary is more similar to this project's roundabout alternative.

Figure 2 – Existing AM Peak Hour Volumes

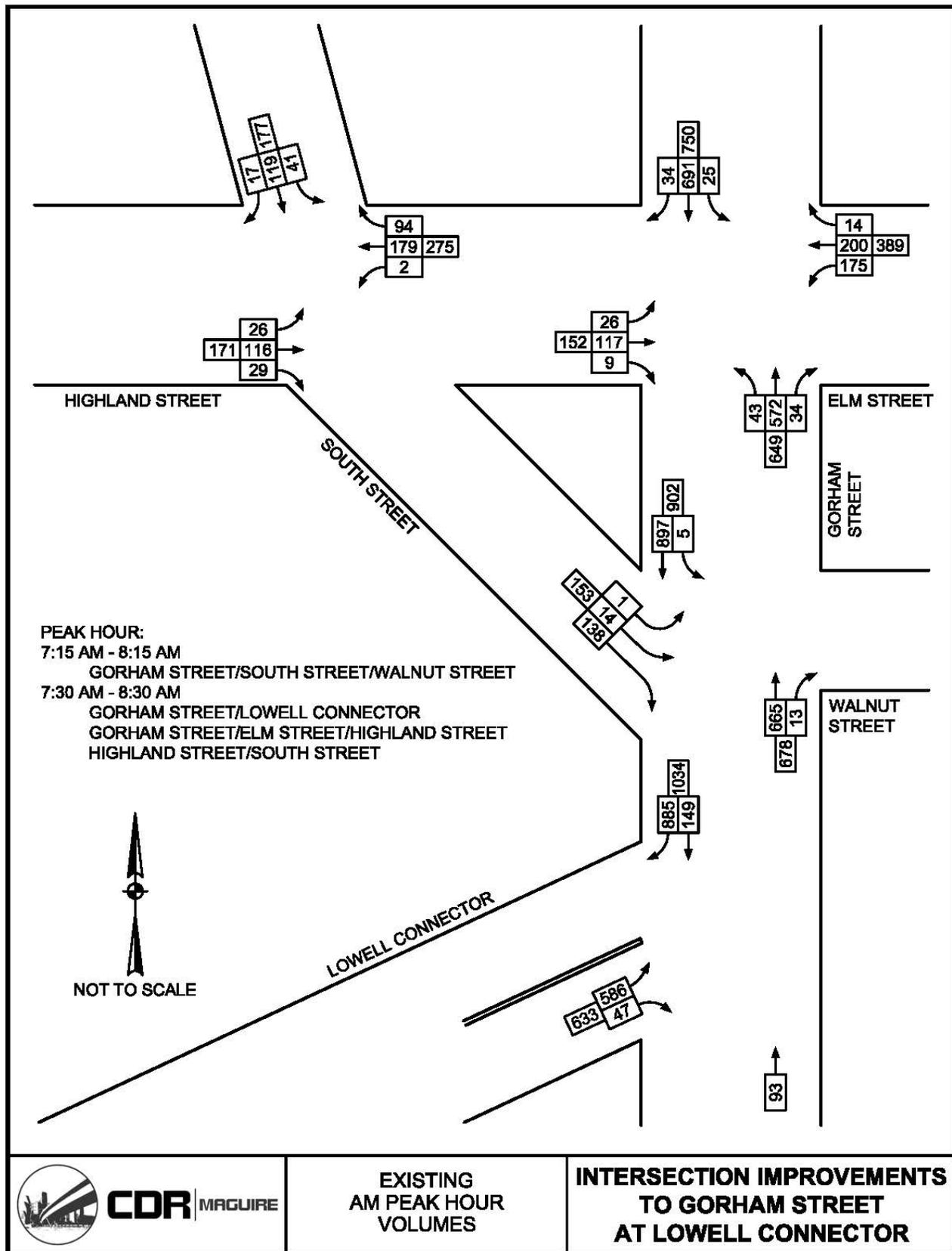


Figure 3 – Existing PM Peak Hour Volumes

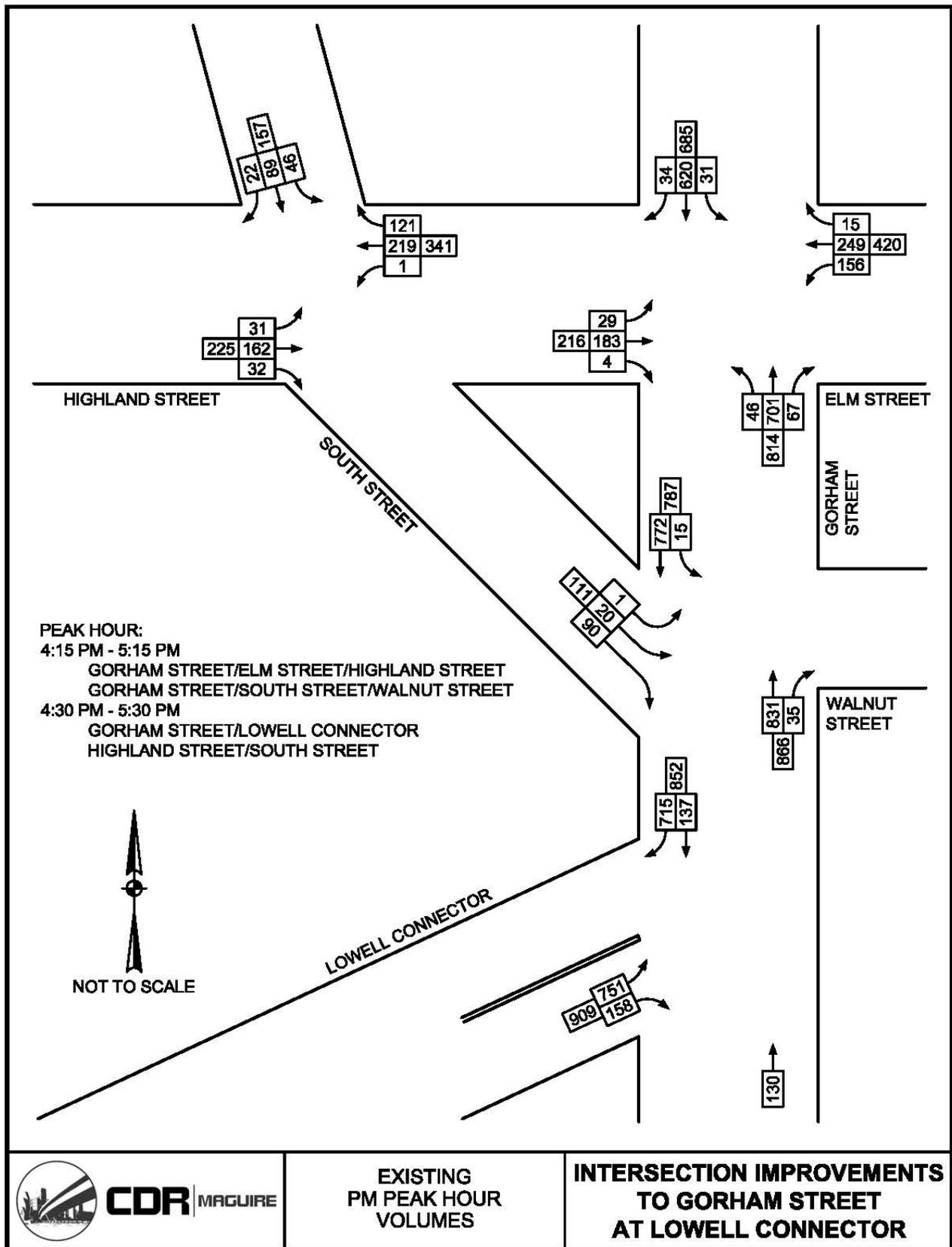


Figure 4 – Future (2026) AM Peak Hour Volumes

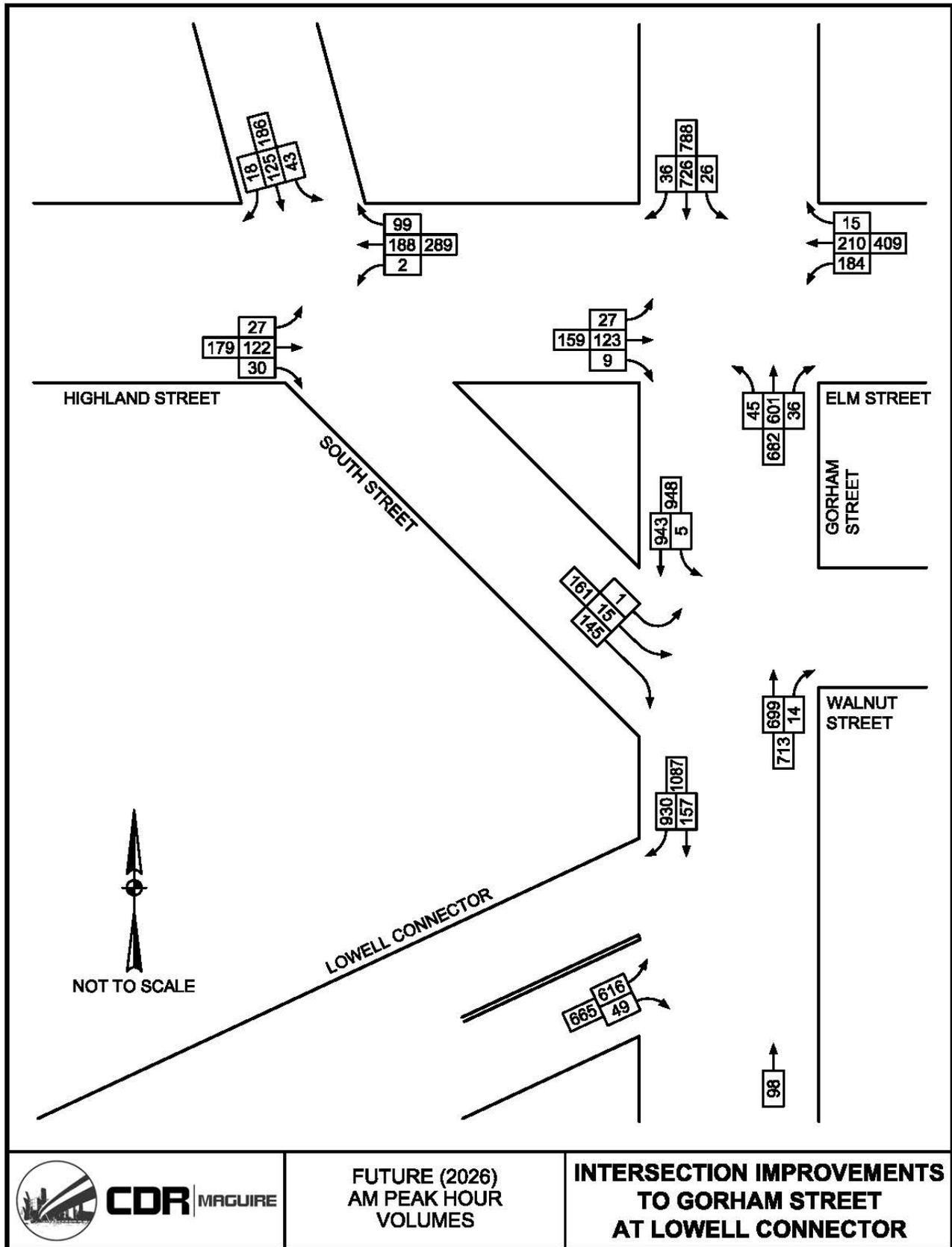
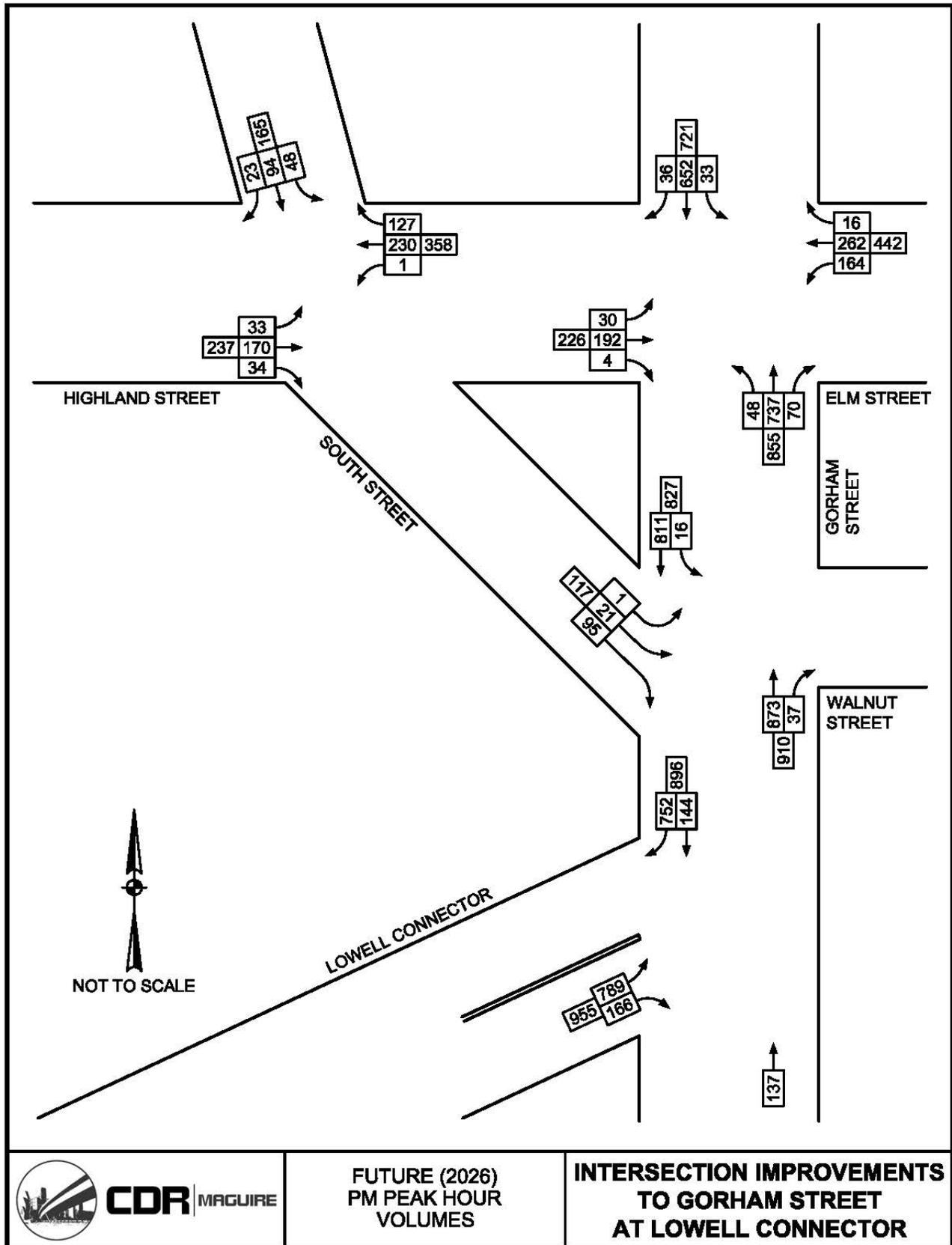


Figure 5 – Future (2026) PM Peak Hour Volumes



CDR MAGUIRE

FUTURE (2026)
PM PEAK HOUR
VOLUMES

INTERSECTION IMPROVEMENTS
TO GORHAM STREET
AT LOWELL CONNECTOR

Hudson Fire Station 1

Hudson Public Library

Assabet Livery

Metro West Ballet

Iglesia Pentecostal Nosso Dios

Main St

Felton St

New City Microcreamery
Takeout · Delivery

Avidia Bank
Temporarily closed

Liberty Park

St Luke's
Episcopal Church

J & S Hair Co Etc

Victor's 50's Diner
Takeout

Main St

62

62

Washington St

H & L Automotive

SAGO EXPRESS

T's Tattoo
Tattoo shop

Rail Trail Flatbread Co
Takeout · Delivery

Café 641
Takeout · Delivery

Mullahy

Assabet River

Sully's Barbershop

TOWN OF HUDSON

Google

URBAN ENVIRONMENT ROUNDABOUT EXAMPLE



PROJECT SCOPE

ROUNDBABOUT

Pros:

- Improved safety (90% reduction in fatalities, 76% reduction of injuries, and 35% reduction of all crashes)
- Reduces the number of vehicle conflict points
- No signal equipment to maintain
- Slower speeds are safer for pedestrians
- Reduces vehicular delay (reduced fuel consumption and emissions)

Cons:

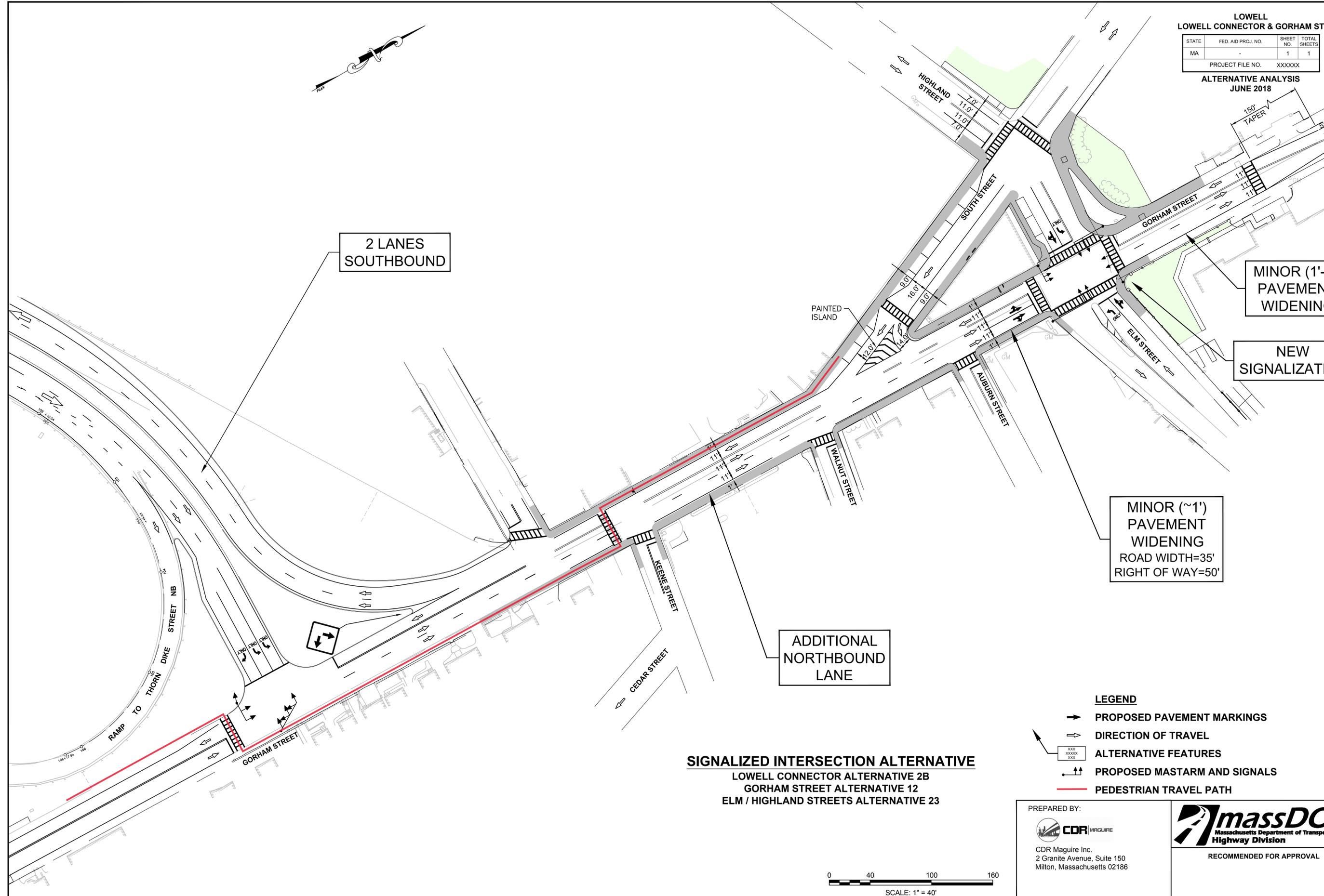
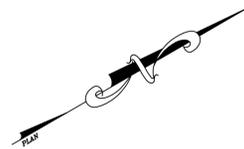
- Longer pedestrian paths
- Typically more expensive to construct
- Drainage costs could be more complicated and expensive

**LOWELL
LOWELL CONNECTOR & GORHAM ST**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	1

PROJECT FILE NO. XXXXXX

**ALTERNATIVE ANALYSIS
JUNE 2018**



**2 LANES
SOUTHBOUND**

**MINOR (1'-2')
PAVEMENT
WIDENING**

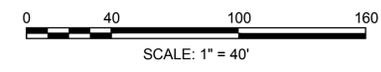
**NEW
SIGNALIZATION**

**MINOR (~1')
PAVEMENT
WIDENING
ROAD WIDTH=35'
RIGHT OF WAY=50'**

**ADDITIONAL
NORTHBOUND
LANE**

SIGNALIZED INTERSECTION ALTERNATIVE
 LOWELL CONNECTOR ALTERNATIVE 2B
 GORHAM STREET ALTERNATIVE 12
 ELM / HIGHLAND STREETS ALTERNATIVE 23

- LEGEND**
- PROPOSED PAVEMENT MARKINGS
 - DIRECTION OF TRAVEL
 - ALTERNATIVE FEATURES
 - PROPOSED MASTARM AND SIGNALS
 - PEDESTRIAN TRAVEL PATH



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RECOMMENDED FOR APPROVAL

PROJECT SCOPE

TRAFFIC SIGNAL

Pros:

- Moves intersection farther away from Highland/Elm intersection
- Eliminates existing driveway signal phase
- Would be coordinated with the signal at Highland/Elm to provide vehicle progression

Cons:

- Queues could block side streets
- Southbound queue could block channelized right turn lane onto the Lowell Connector
- Signal maintenance costs