

# **Courthouse Traffic Committee**

## **Cut-Through Traffic Evaluation**

**J. Michael Ruane Judicial Center/Salem Trial Courts**

**Salem, Massachusetts**

Prepared for

Department Planning and Community Development

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Prepared by



## **INTRODUCTION**

The City of Salem, Massachusetts has retained BETA Group, Inc. to develop measures to prevent potential cut-through traffic and related impacts of traffic diversions associated with the construction of the J. Michael Ruane Judicial Center/Salem Trial Courts. The Department of Capital Asset Management (DCAM) will be constructing the Trial Court building in an area bounded by North Street (Route 114), Bridge Street (Route 107), Federal Street, and Washington Street. The ramps in the southeast quadrant of the North Street/Bridge Street interchange will be removed and replaced with traffic signals to accommodate the Trial Court building.

DCAM has conducted a traffic study and developed measures to mitigate the impact of the Trial Court construction on the roadway network. There are, however, concerns that the proposed project will induce cut-through traffic on Federal Street. The City formed a *Courthouse Traffic Committee*, consisting of residents, elected officials, and City staff to develop concepts that would prevent an increase in cut-through traffic on Federal Street. The concepts to be considered by the committee were based on the assumption that the Trial Court and its mitigation would be constructed.

BETA was hired to provide engineering assistance and was directed to conduct an initial screening of ten alternatives developed by the committee (see Descriptions and Initial Screening in the Appendix), to be followed up with a qualitative assessment of the more practicable alternatives. This memorandum summarizes BETA's findings and the evaluation process.

## **CONCEPT DEVELOPMENT**

BETA met with the City to conduct an initial screening of the committee's concepts. Six alternatives (illustrated in Sheets 1-6 of the Appendix) were selected for the development of concept sketches and a qualitative evaluation. In addition to those produced by the committee one scheme would be developed by BETA.

DCAM's traffic study and design plans were reviewed to gain an understanding of the existing and future traffic operation, traffic control, and road geometry. Field observations, described in the Appendix, were conducted to note the physical characteristics of the area streets and to monitor morning and afternoon peak hour traffic conditions. BETA then met with the committee to identify their issues and concerns with the Trial Court facility.

The conceptual plans (Sheets 1-6) and a table identifying the advantages and disadvantages of the alternatives are included in the Appendix, in addition to an alternative developed by BETA (BETA 1). This alternative consists of reversing the current westbound one-way flow on Federal Street between Monroe Street and Beckford Street. The interruption in one-way westbound flow would likely diminish the potential for cut-through traffic. Drivers destined towards Boston Street would lose the current direct connection and would be more likely to use the Essex Street or Bridge Street

arterials, both of which are major streets intended for this traffic. The disadvantages of this concept are that access to the River Street Neighborhood would become somewhat circuitous, and some feel that it may increase traffic volume on River Street from motorists destined for Bridge Street.

## **COMMITTEE INPUT**

BETA's assessment of the six concepts developed by the Committee and the BETA 1 Concept were presented to the committee for their comments and suggestions. Some members of the committee felt the BETA 1 alternative would result in increased traffic volume on River Street (a low speed, residential area) and asked BETA to consider other options. In response, BETA revised the concept to include a prohibition of right turns from Federal Street to River Street, which negated the possibility of cut-throughs to Bridge Street. This revised concept is labeled BETA 1-REV.

BETA 1-REV was presented at a subsequent meeting. The reaction was mixed. Some felt that BETA 1-REV satisfied the objective of eliminating cut-through traffic on Federal Street. Others, however, were still concerned about additional traffic on River Street.

Some meeting attendees were still interested in further study of Option N, which would reverse the current Lynde Street one-way flow from westbound to eastbound. BETA recommended against this option due to the expected impacts on Washington Street.

The committee then agreed to delay action on the Option N and BETA 1-REV alternatives until the roadway construction is complete to monitor traffic changes and understand if, in fact, any of these measures will be necessary.

The committee asked that the following three additional measures be considered:

1. Prohibit right turns from North Street southbound to Federal Street during the AM peak hours.
2. Prohibit left turns from Essex Street eastbound to Monroe Street.
3. Reverse Flint Street between Essex Street and Federal Street.

A telephone interview with LT. Robert Preczewski of the Salem Police Department indicated initial support for these three measures.

## RECOMMENDATIONS

BETA supports the committee recommendation to delay alternatives directly related to the Trial Court project until roadway/traffic signal construction is complete. Roadway traffic should then be monitored to determine if an increase of cut-through traffic on Federal Street actually occurs.

If a significant increase in cut-through traffic is verified, BETA recommends Alternative **BETA 1-REV** as a mitigation measure. This alternative will discourage the use Federal Street by cut-through traffic and will minimize the potential negative impact to other streets and neighborhoods.

While the three measures suggested by the Committee are generally supported, a planning level assessment (manual traffic assignments, field measurements of roadway widths, and traffic analysis) should be conducted to provide additional validation.

Finally, each of these measures should be fully discussed with City officials and the public to measure community support.

## **APPENDIX**

## **FIELD OBSERVATIONS**

## **FIELD OBSERVATIONS**

Location: Downtown Salem, MA; North Street @ Federal Street + surrounding area.

Observer: Mike Wasielewski & Ken Petraglia

Date: Thursday, March 27, 2008

Time: 7:00 AM to 9:00 AM

### **North Street @ Federal Street/Lynde Street**

- Very few vehicles were observed to make a right turn from Lynde Street and then turn left on to Federal St.
- Southbound queues from the Essex Street @ North Street/Summer Street intersection were observed to extend north through the West Ramp @ North Street intersection.

### **Federal Street (Washington Street to North Street)**

- Traffic was light on Federal Street.
- Eastbound traffic should not be allowed on Federal Street because of the close proximity of the Federal Street @ Washington Street intersection to the Washington Street @ Bridge Street intersection.

### **Essex Street @ North Street/Summer Street**

- The northbound queue was observed to extend around the corner onto Norman Street.
- The northbound left turn from Summer Street is currently prohibited. If it were allowed:
  - It does not seem like heavy vehicles could make the turn,
  - Parking would need to be removed on the northbound approach,
  - Queue length and vehicles delay would be increased on both the northbound and southbound approaches.

### **Lynde Street (Washington Street to North Street)**

- Observations were made at the Lynde Street Washington Street intersection. Traffic along Washington Street seemed to be light. It seemed that there were gaps present in the Washington Street traffic stream for vehicles to turn off of Lynde Street if the direction of Lynde Street were reversed. It is worth conducting a capacity analysis to see what the numbers look like.

## **FIELD OBSERVATIONS**

Location: Downtown Salem, MA; North Street @ Federal Street + surrounding area.

Observer: Mike Wasielewski

Date: Thursday, March 20, 2008

Time: 3:15 PM to 6:00 PM

### **North Street @ Federal Street/Lynde Street**

- The intersections are very closely spaced.
- An existing narrow center median is present at the end of Federal Street to prevent vehicles from passing straight through the intersection. All traffic must turn right.
- A large volume of right turning traffic from Lynde Street was observed to turn left on to Federal St.
- A small number of vehicles were observed to turn left onto the West Ramp from Bridge Street, turn right onto North Street, and then turn right onto Federal St.
- Most vehicles turning right onto Federal Street from the north come off of the North Street Bridge not the West Ramp.
- Very few vehicles traveling northbound on North Street (arriving from the Essex Street intersection) make a left turn onto Federal Street.
- The pedestrian signal was called frequently for crossings of North Street @ Lynde Street/Federal Street.
- Southbound queues from the Essex Street @ North Street/Summer Street intersection were observed to extend north through the West Ramp @ North Street intersection.

### **Bridge Street @ Washington Street**

- The signalized rotary intersection shown in current aerial images has been removed and a new signalized intersection has been constructed in its place. The date on the Bridge indicates the project was recently completed (2008).
- The westbound approach is given a 15 - 20 second advance, during which time the northbound right turn is allowed to move in an overlap. The westbound left turn is then stopped and the east and west moves then move together. The pedestrian phase follows, if called, and that is followed by the northbound approach. When there is no pedestrian call, the time seems to be reallocated to the Bridge Street approaches.
- A guide sign on the Bridge Street westbound approach guides vehicles destined for 114 to make a left turn onto Washington Street.



### **Bridge Street @ Flint Street**

- Shortly after the 5:02 commuter rail train arrived at the Salem train station, a queue formed on the westbound approach which extended back to North Street. Pictures are included in the file. The queue dissipated very quickly (less than 5 minutes). A queue of this length was not observed again during the visit.
- The signal may be semi-actuated. The mainline timing is consistent, but the side streets seem to fluctuate. The side street maintains green for a long period of time before it gaps out.
- The signal operates in two phase operation and the cycle length is approximately 50 seconds when the exclusive pedestrian phase is not called. Approximately 60% of the green time is allocated to Bridge Street (the major approach). The remaining time is allocated to Flint Street (the minor approach).

### **Federal Street (Washington Street to North Street)**

- The roadway is very wide at the Washington Street end and narrows at the North Street end.
- Vehicle parking is allowed on both sides of the roadway. Parking meters are located along the north side of the street, while a mix of metered parking and residential sticker parking is provided along the south side of the street.
- It does not seem that 2 lanes of traffic could be accommodated with the on-street parking that is currently allowed on both sides of the street.
- A center island is present on Washington Street which prevents vehicles on Federal Street from passing straight through the intersection. All vehicles must turn right, though a few vehicles do make left turns. No signs are present that indicate right turn only.

### **Lynde Street (Washington Street to North Street)**

- The roadway is very narrow along its entire length.
- Vehicle parking is allowed along both sides of the street. Parking meters are located along the south side of the street, while a mix of metered parking and residential sticker parking is provided along the north side of the street.
- Vehicle parking on Washington Street is allowed very close to the intersection with Lynde Street.
- A large parking area is provided for the condominium/apartment building located on the south side of the street.

## **INITIAL SCREENING OF ALTERNATIVES**

**Option “N” - Reverse the current direction of Lynde Street.**

<b><u>Advantage</u></b>	<b><u>Disadvantage</u></b>
Traffic destined for Route 107 Eastbound/Bridge Street could be diverted from North Street onto Lynde Street and Washington Street. This reduction could reduce the level of delay incurred by vehicles making a left turn onto the West Ramp.	Existing Lynde Street traffic would be rerouted.
Could reduce the number of vehicles and level of delay incurred by vehicles making a right turn onto Bridge Street.	A difficult eastbound left turn movement would be created at the intersection of Lynde Street and Washington Street. The same movement currently exists at the intersection of Essex Street and Washington Street. Few vehicles make the move.
North Street traffic volume would be reduced, between Lynde Street and Federal Street.	Could generate cut-through traffic to Bridge Street on Church Street and St. Peter Street in an attempt to avoid the Bridge Street @ Washington Street intersection.

**Option “J” - Make Federal Street two-way between Washington Street and North Street**

<b><u>Advantage</u></b>	<b><u>Disadvantage</u></b>
Traffic destined for Route 107 East/Bridge Street could be diverted from North Street onto Federal Street and Washington Street. This reduction could reduce the level of delay incurred by vehicles making a left turn onto the West Ramp.	The west end of Federal Street is very narrow. On street parking is currently permitted on both sides of the street and would need to be removed on the western half of the roadway.
The proposed curb line change in the southeast corner of the North Street/Federal Street intersection would not be required.	A median island currently divides Washington Street. If left turns from Federal Street were permitted to allow vehicles to access Bridge Street a new congested intersection would be created very close to the Bridge Street @ Washington Street intersection.
Could reduce the number of vehicles and level of delay incurred by vehicles making a right turn onto Bridge Street.	If the existing median island is maintained on Washington Street, then only right turns would be permitted from Federal Street. This would not benefit vehicles currently traveling on North Street.
	The southbound left turn movement from North Street and the through movement from the West Ramps would need to be added to the intersection or rerouted to Washington Street via Essex Street or via Bridge Street.
	Existing Washington Street traffic queue extends from Bridge Street to Federal Street (with the new traffic signal in place).

**Option “1” - Allow a left turn from Summer Street northbound onto Essex Street.**

<b><u>Advantage</u></b>	<b><u>Disadvantage</u></b>
Traffic destined for Route 107 West/Bridge Street could be diverted from Summer Street/North Street onto Essex Street. This reduction could reduce the number of vehicles turning left on to the West Ramp, and also reduce the delay incurred by these vehicles.	This move was permitted at one time, but was prohibited because of the crash history at the intersection. Allowing this movement could increase crashes at this intersection.
Could reduce the number of vehicles and level of delay incurred by vehicles making a right turn onto Bridge Street.	Delay at this intersection would be increased.
	Summer Street has one northbound lane and a parking lane at Essex Street. Some of the parking spaces would be removed to create a left turn lane. If the left turns were made from the single lane, delay would be increased further.

**Option “K” - Make Federal Street two-way between Washington Street and North Street, and allow a left turn from Summer Street northbound onto Essex Street.**

<b><u>Advantage</u></b>	<b><u>Disadvantage</u></b>
Traffic destined for Route 107 East/Bridge Street could be diverted from Summer Street/North Street onto Federal Street and Washington Street. This reduction could reduce the level of delay incurred by vehicles making a left turn onto the West Ramp.	The west end of Federal Street is very narrow. On street parking is currently permitted on both sides of the street and would need to be removed on the western half of the roadway.
The proposed curb line change in the southeast corner of the North Street/Federal Street intersection would not be required.	A median island currently divides Washington Street. If left turns from Federal Street were permitted to allow vehicles to access Bridge Street a new congested intersection would be created very close to the Bridge Street/Washington Street intersection.
Could reduce the number of vehicles and level of delay incurred by vehicles making a right turn onto Bridge Street.	If the existing median island is maintained on Washington Street, then only right turns would be permitted from Federal Street. This would not benefit vehicles currently traveling on North Street.
	The southbound left turn movement from North Street and the through movement from the West Ramps would need to be added to the intersection or rerouted to Washington Street via Essex Street or via Bridge Street.
	Existing Washington Street traffic queue extends from Bridge Street to Federal Street (with the new traffic signal in place).
	The Summer Street left turn was permitted at one time, but was prohibited because of the crash history at the intersection. Delay at this intersection would also be increased.
	Summer Street has one northbound lane and a parking lane at Essex Street. Some of the parking spaces would be removed to create a left turn lane. If the left turns were made from the single lane, delay would be increased further.

**Option “5” - Reverse the direction of Federal Street between Washington Street and North Street.**

<b><u>Advantage</u></b>	<b><u>Disadvantage</u></b>
Traffic destined for Route 107 East/Bridge Street could be diverted from North Street to Federal and Washington Streets. This reduction could reduce the level of delay incurred by vehicles making a left turn onto the West Ramp.	A median island currently divides Washington Street. If left turns from Federal were permitted to allow vehicles to access Bridge Street from Federal Street, then a new congested intersection with a difficult left turn would be created very close to the Bridge Street @ Washington Street intersection.
The proposed curb line change in the southeast corner of the North Street/Federal Street intersection would not be required.	Existing Washington Street traffic queue extends from Bridge Street to Federal Street (with the new traffic signal in place).
Could reduce the number of vehicles and level of delay incurred by vehicles making a right turn onto Bridge Street.	If the existing median island is maintained on Washington Street, then only right turns would be permitted. This would not benefit vehicles currently traveling on North Street.

**Option “2” - Reverse the direction of Flint Street between Essex and Federal Streets. Reverse the direction of Beckford Street between Essex and Federal Streets. Reverse Federal Street between Beckford and North Streets.**

<b><u>Advantage</u></b>	<b><u>Disadvantage</u></b>
<b>Federal Street/Beckford Street:</b> Cut-through traffic would be eliminated on Federal Street.	<b>Federal Street/Beckford Street:</b> Right turns from Federal Street would be allowed on to North Street. This additional traffic volume would increase delay at the intersection.
<b>Federal Street/Beckford Street:</b> Traffic volume on Lynde Street, which is primarily cut-through traffic between Washington Street and Federal Street, would be reduced.	<b>Federal Street/Beckford Street:</b> Residents living on the effected section of Federal Street would be required to loop around the block to access Federal Street via Beckford Street or Lynn Street/Andover Street.
<b>Federal Street/Beckford Street:</b> Westbound left turns from Bridge Street on to the West Ramp would be reduced.	<b>Federal Street/Beckford Street:</b> Traffic currently using Lynde Street to access Federal Street would be redirected to the Washington Street/Bridge Street intersection or to the northbound left turn from North Street on to the West Ramp and the left turn from the West Ramp to Bridge Street.
<b>Flint Street:</b> Reversing this segment would prevent vehicles from using Flint Street as a cut-through from Bridge Street and Flint Street (north of Bridge Street) to Essex Street.	<b>Flint Street:</b> Would allow vehicles to use Flint Street as a cut-through from Essex Street to Bridge Street and Flint Street (north of Bridge Street).



**Option “3” (Not shown in graphics) - Direct Route 114 Traffic from Riley Plaza directly to Bridge Street via Washington Street.**

<u><b>Advantage</b></u>	<u><b>Disadvantage</b></u>
Could reduce northbound traffic on North Street.	Increases traffic along Washington Street.
Could reduce the number of northbound left turn vehicles on Washington Street at the Norman Street Intersection.	Could create confusion for drivers following guide signs for Route 114.

**Option “BETA 1” - Reverse the direction of Federal Street between Monroe and Beckford Streets**

<u><b>Advantage</b></u>	<u><b>Disadvantage</b></u>
Would force drivers back to Essex Street or Bridge Street via Beckford Street or River Street.	Forces vehicles onto narrow local streets (Beckford and River Streets)
Would eliminate cut-through trips on Federal Street.	Makes local access more circuitous.
	Could increase the number of vehicles and delay incurred by vehicles making a left turn onto the West Ramp.
	Could increase the number of vehicles and delay incurred by vehicles making a left turn onto Bridge Street.
	Could increase the number of vehicles and delay incurred by vehicles making a left turn from Washington Street to onto Bridge Street.

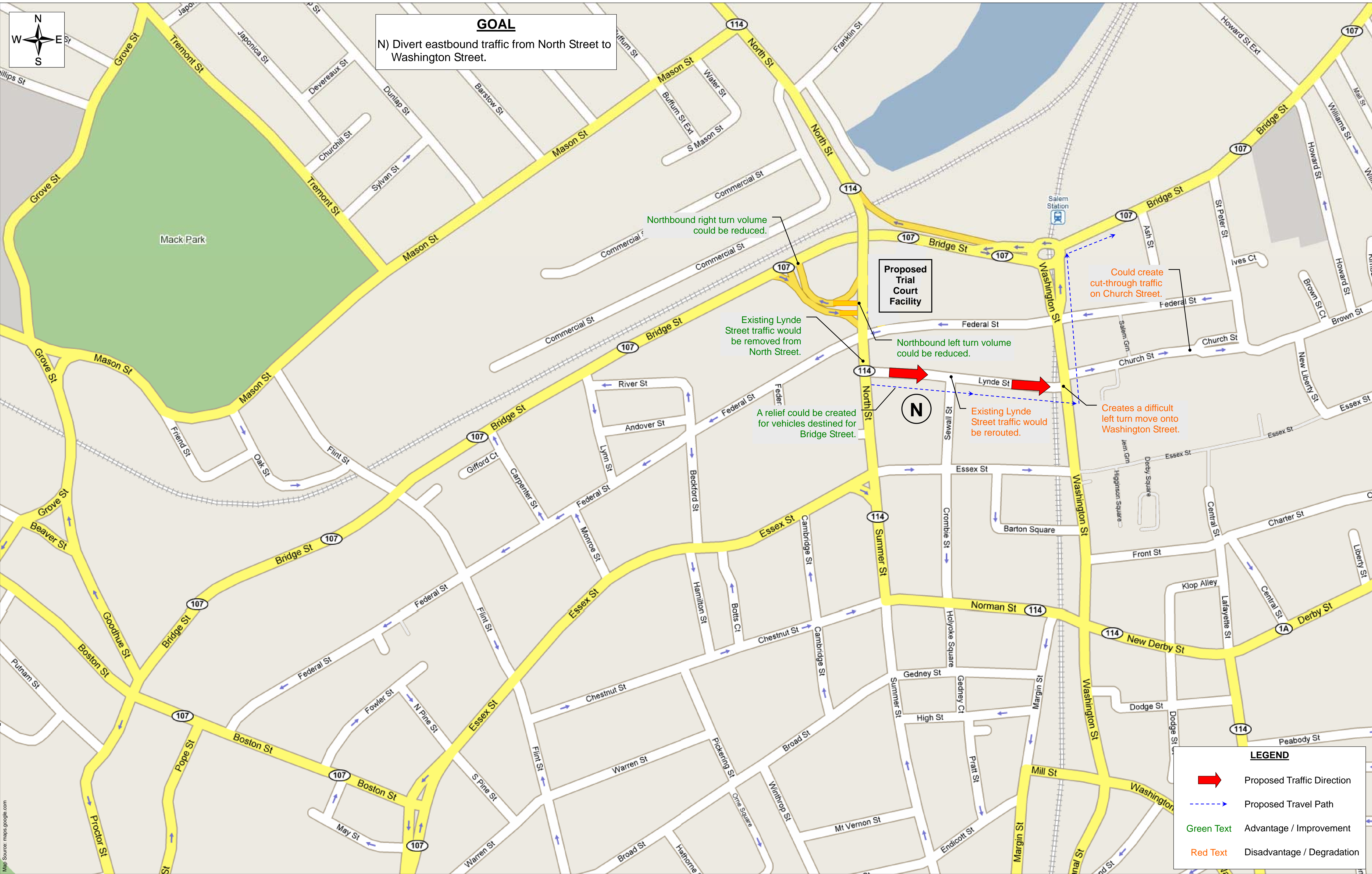
**Option “BETA 1-REV” - Reverse the direction of Federal Street between Monroe and Beckford Streets and prohibit right turns from Federal Street to River Street.**

<u><b>Advantage</b></u>	<u><b>Disadvantage</b></u>
Would force drivers back to Essex Street or Bridge Street via Beckford Street or River Street.	Forces vehicles onto Beckford Street.
Would eliminate cut-through trips on Federal Street.	Makes local access more circuitous.
Would eliminate cut-through traffic on River Street	Could increase the number of vehicles and delay incurred by vehicles making a left turn onto the West Ramp.
	Could increase the number of vehicles and delay incurred by vehicles making a left turn onto Bridge Street.
	Could increase the number of vehicles and delay incurred by vehicles making a left turn from Washington Street to onto Bridge Street.

## **QUALITATIVE ASSESSMENTS**

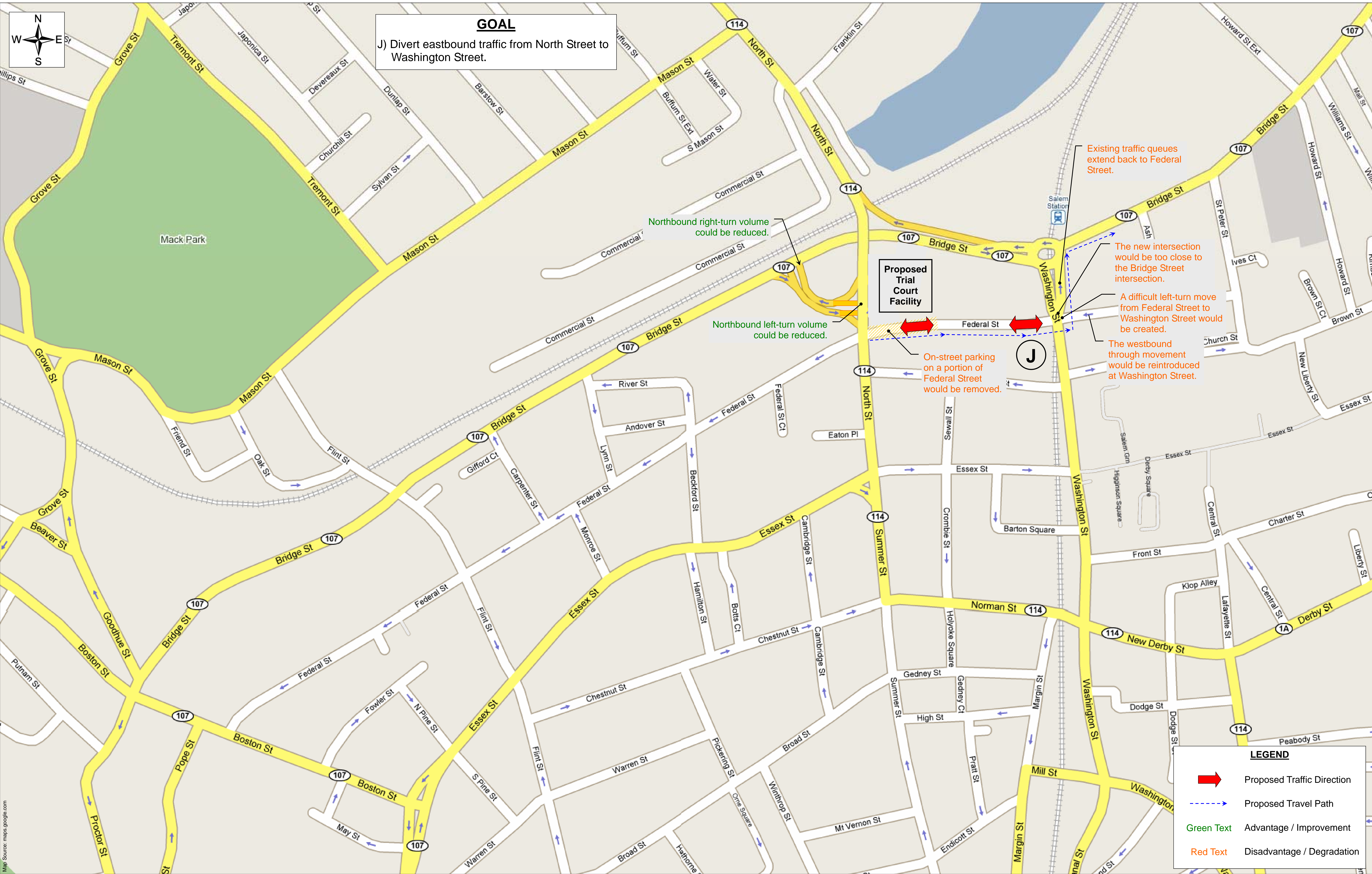
**Sheets 1-8**

Option “N” - Reverse the direction of Lynde Street between North Street and Washington Street



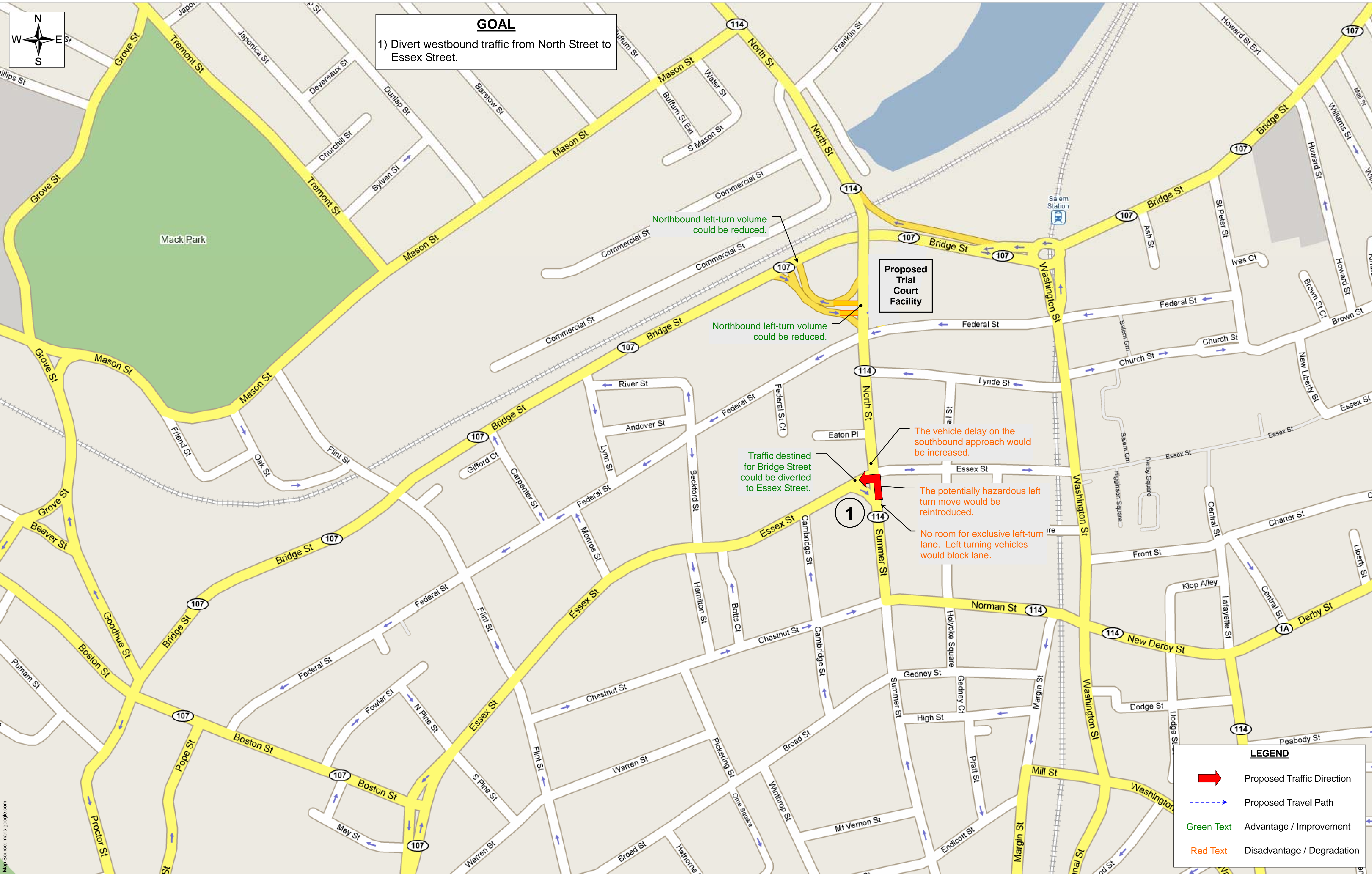


Option “J” - Make Federal Street two-way between North Street and Washington Street





Option “1” - Allow the northbound left-turn onto Essex Street



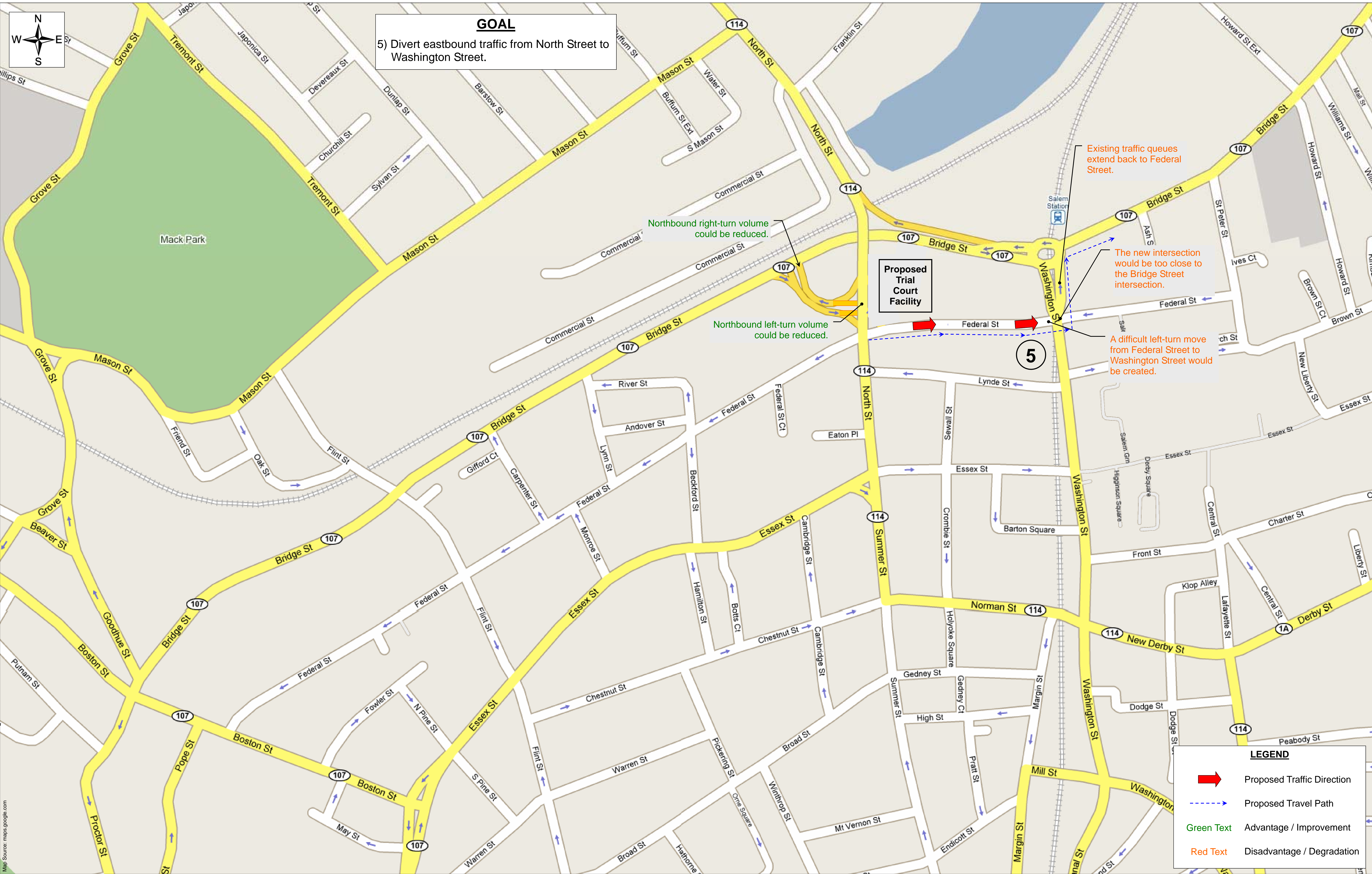


Option “K” - Make Federal Street two-way between North Street and Washington Street (J) and allow the northbound left turn onto Essex Street (1)



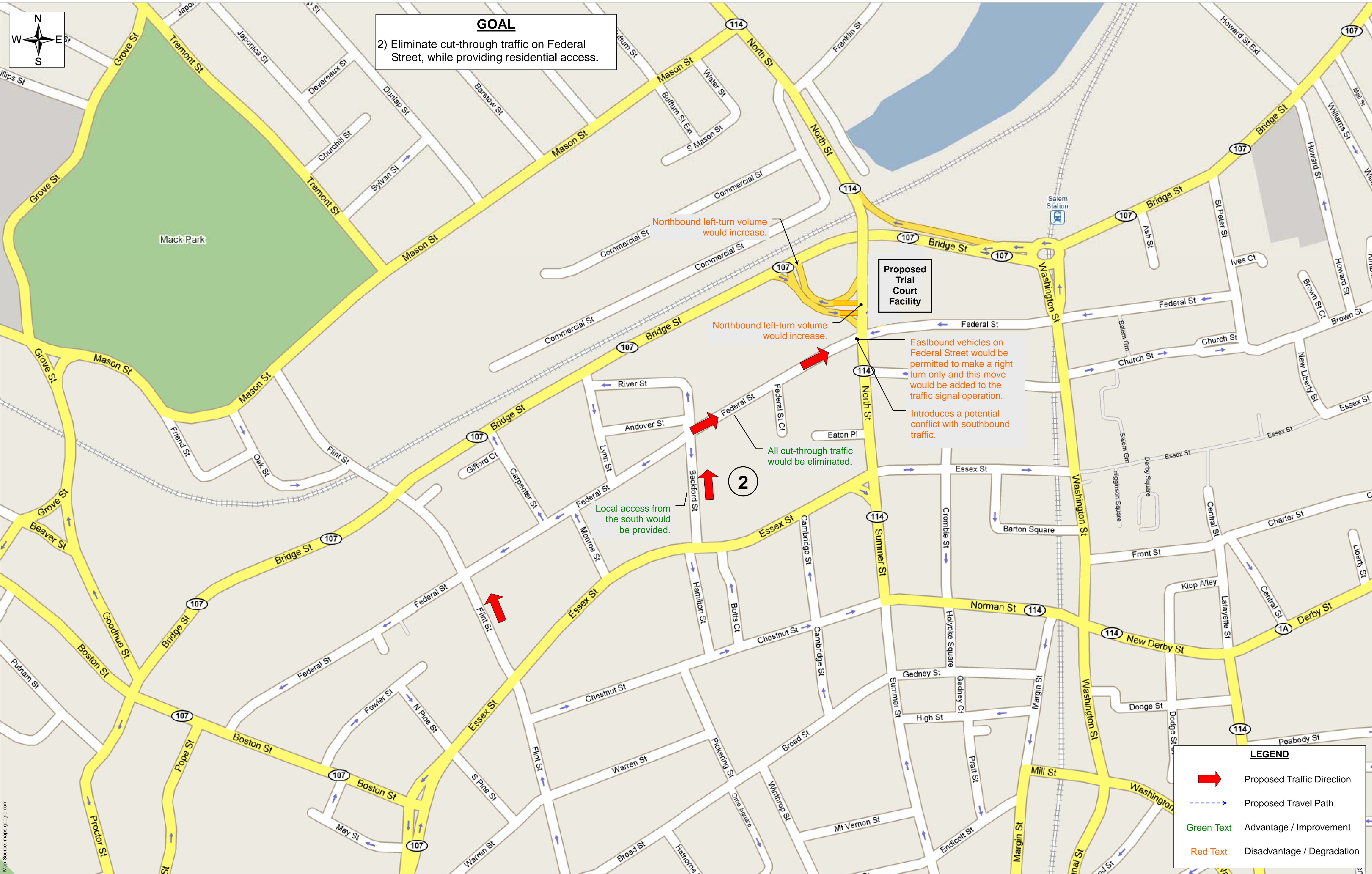


Option “5” - Reverse the direction of Federal Street between North Street and Washington Street



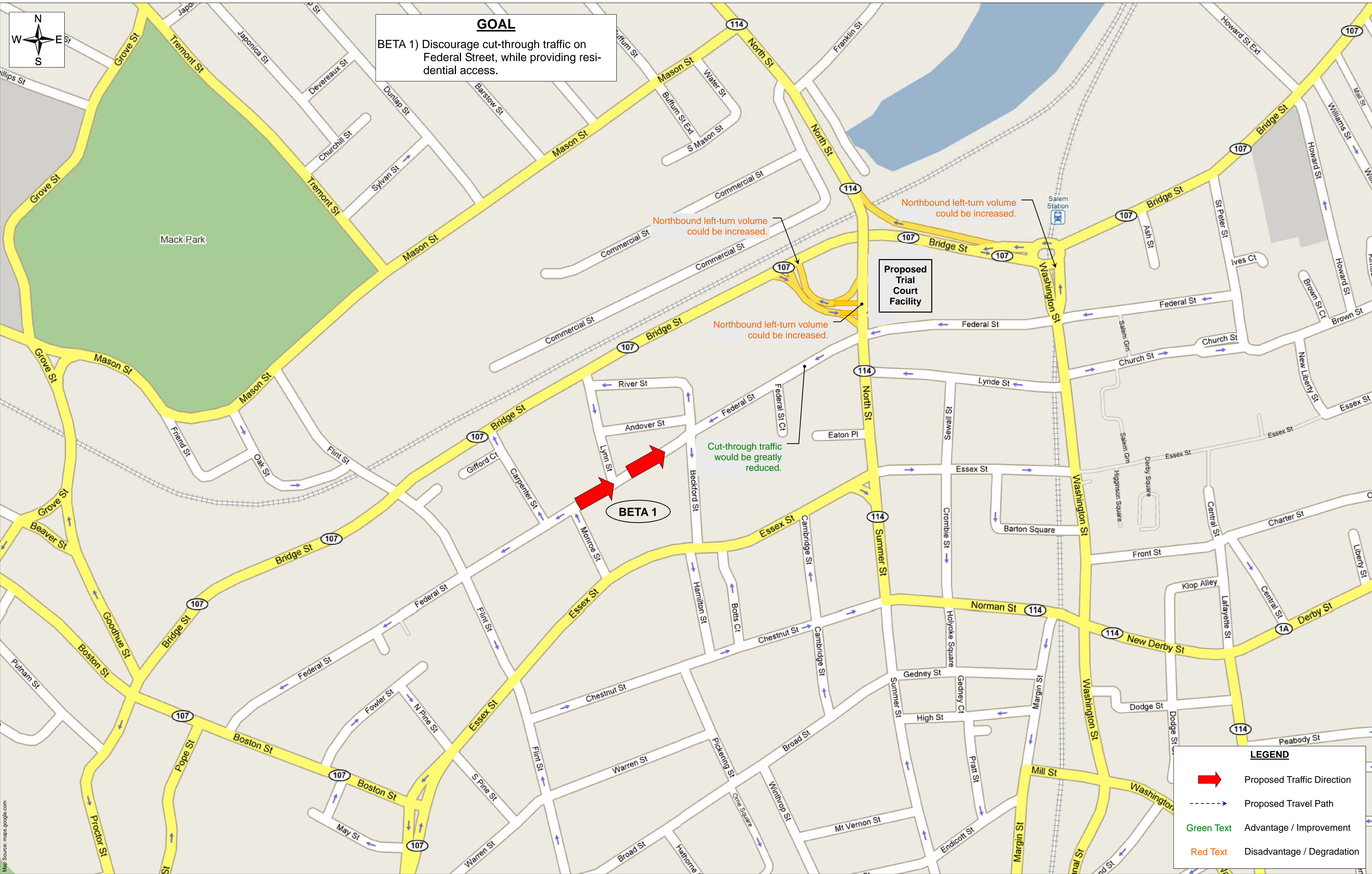


Option “2” - Reverse the direction of sections of Flint Street, Beckford Street and Federal Street





Option “BETA 1” - Reverse the direction of Federal Street between Monroe St and Beckford Street





Option “BETA 1-REV” - Reverse the direction of Federal Street between Monroe St and Beckford Street

