

## MEMORANDUM

**TO:** Mr. Corey York, PLS, Town Engineer/Director of Public Works

**FROM:** John Michalak, PE, ENV SP  
Jane Davis, PE, ENV SP

**DATE:** September 21, 2018

**RE:** Conceptual Design Options for Main Street (Route 27) at Prospect Street

## PURPOSE

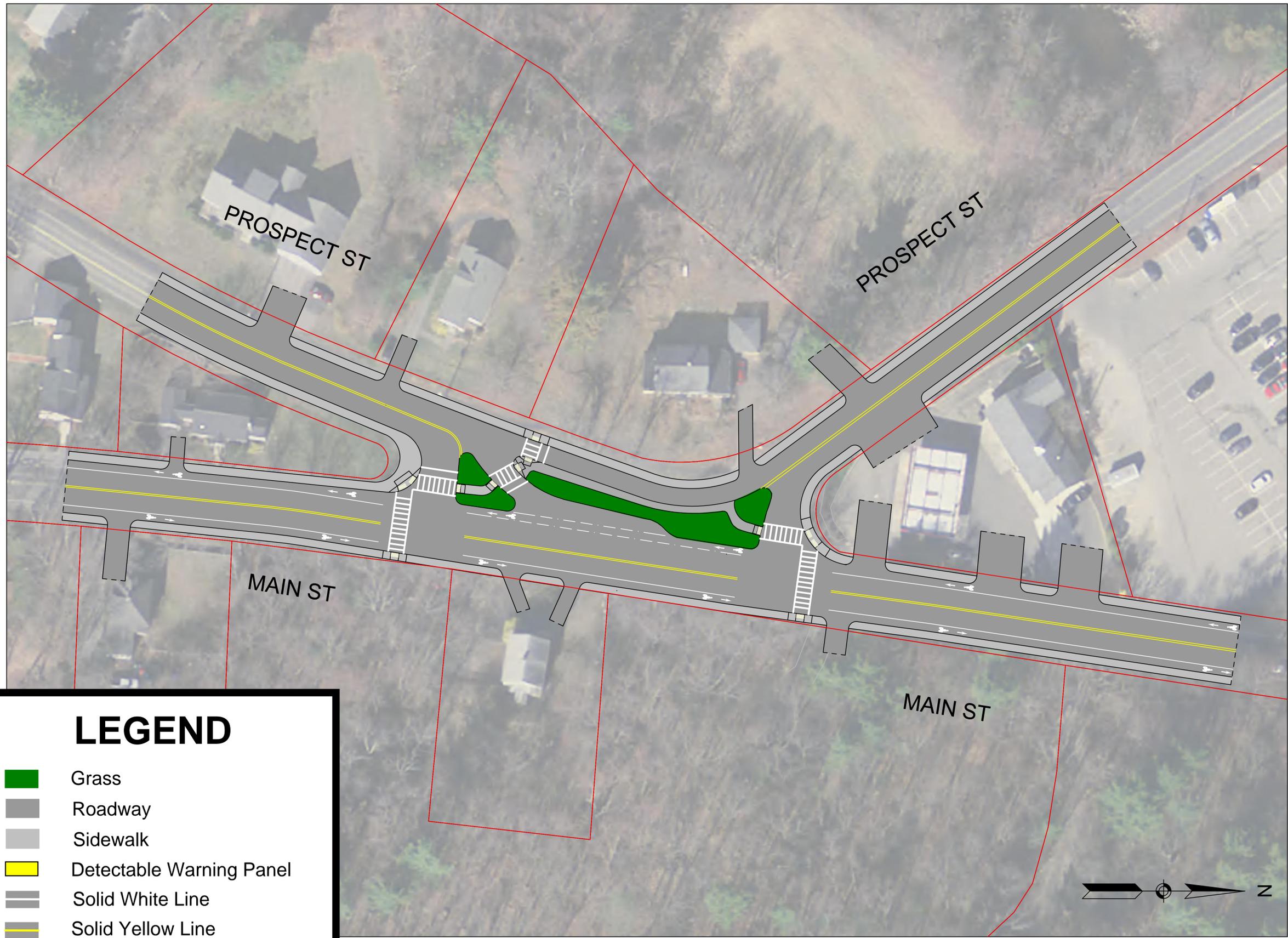
The Town of Acton retained Nitsch Engineering to provide a Public Infrastructure Improvement Plan for the intersection of Main Street (Route 27) at Prospect Street. As part of this effort, we have developed four conceptual design options: two unsignalized concepts, one signalized concept, and one roundabout concept. The concepts are shown in the following four figures and Table 1 summarizes the differences between each of the concepts.



**Locus Map – Main Street (Route 27) at Prospect Street, Acton, MA (Source: Google)**

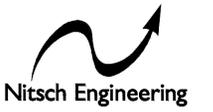
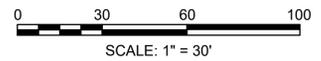
Table 1 - Concepts Comparison Summary

	UNSIGNALIZED CONCEPT 1	UNSIGNALIZED CONCEPT 2	SIGNALIZED CONCEPT	ROUNDBABOUT CONCEPT
<b>GEOMETRIC MODIFICATIONS</b>	Fewer conflict points compared to existing - all turning movements from Prospect Street to Main Street are condensed into the south intersection (north intersection is entering Prospect Street only)	Fewer conflict points compared to existing, more conflict points compared to Unsignalized Concept 1. The two Prospect Street approaches will be realigned closer to a typical "T"-type and will no longer be connected; vehicles will access Main Street or the other portion of Prospect Street via two separate intersections	All existing approaches will remain with minor geometric modifications. A by-pass will be constructed to permit the Prospect Street southeastbound right-turn movement to access Prospect Street southwestbound without passing through the intersection with Main Street.	Significant geometric modifications will connect two partial roundabouts and will operate continuously in the same way as a single roundabout. The roundabout layout will provide the least amount of conflict points of all concepts as there are no left-turns; however, the unconventional layout may require acceptance and buy-in from the community and abutters
<b>VEHICLE SPEEDS</b>	Potential lower vehicle speeds from Main Street southbound to Prospect Street southwestbound due to "STOP" control	Potential lower vehicle speeds due to improved geometric modifications	Potential lower vehicle speeds due to signal control and geometric modifications	By nature of the roundabout design, vehicle speeds will be lower approaching the roundabout and through the intersection
<b>TRAFFIC OPERATIONS</b>	All movements at both intersections are expected to operate at a LOS C or better except for the left-turn movement from Prospect Street to Main Street, which is expected to operate with excessive delay at a LOS F	All movements at both intersections are expected to operate at a LOS C or better except for the left-turn movements from each Prospect Street approach to Main Street, which are both expected to operate with excessive delay at a LOS F	Vehicle phasing will include a protected-permitted phase for Main Street northbound left-turns, followed by a Main Street northbound/southbound phase and split phasing for each of the Prospect Street approaches. Due to the signal control, Prospect Street to Main Street access will improve; however, long vehicle queues may result for Main Street northbound/southbound. The intersection is expected to operate at an overall LOS C. All movements are expected to operate at a LOS D or better, except for the left-turn movement from Prospect Street southeastbound to Main Street, which is expected to operate at a LOS E	All movements are expected to operate at a LOS C or better. The delay will increase slightly on Main Street northbound/southbound with minor queues approaching the roundabout, when compared to existing or the unsignalized options. However, this concept is expected to operate with the best overall level of service (LOS B) and the least amount of overall delay compared to the other concepts. Trucks from Prospect Street northeastbound to Main Street southbound may not be able to execute the movement due to the small angle between approaches and would likely have to circulate the roundabout to do so.
<b>PEDESTRIAN ACCOMMODATIONS</b>	Crosswalks and pedestrian ramps will be provided at all approaches to the two intersections. As the crosswalks will be unsignalized, pedestrians will have to rely on vehicles to yield at the crosswalks	Crosswalks and pedestrian ramps will be provided at all approaches to the two intersections. As the crosswalks will be unsignalized, pedestrians will have to rely on vehicles to yield at the crosswalks	An exclusive pedestrian phase with push-button actuation will provide additional protection of pedestrians	Crosswalks and pedestrian ramps will be provided at all approaches to the roundabout. As the crosswalks will be unsignalized, pedestrians will have to rely on vehicles to yield at the crosswalks; however, due to the roundabout design, vehicle speeds will be lower approaching the intersection
<b>BICYCLE ACCOMMODATIONS</b>	Consistent with existing conditions, exclusive bicycle lanes will be provided along both sides of Main Street	Consistent with existing conditions, exclusive bicycle lanes will be provided along both sides of Main Street	Exclusive bicycle lanes will be provided along both sides of the Main Street approaches to the intersection; the roadway will contain shared-lane "sharrow" markings through the intersection. To include bike lanes through the intersection, some land takings would likely be required	Exclusive bicycle lanes will be provided along both sides of the Main Street approaches to the roundabout; the roadway will contain shared-lane "sharrow" markings through the intersection
<b>ACCESS MODIFICATIONS</b>	The southernmost driveway at 60 Prospect Street will have to be right-in/right-out only due to geometric modifications	The southernmost driveway at 60 Prospect Street will have to be slightly realigned and will have to be right-in/right-out only due to geometric modifications	The southernmost driveway at 203 Main Street will have to be enter-only due to its location at the stop line for Main Street northbound; the northernmost driveway will have to be exit-only and will likely be part of the signal phasing	The driveway(s) at 60 Prospect Street will likely have to be realigned/reoriented to provide access to the existing garage entrance.
<b>GREEN SPACE</b>	Approximately 2x the existing area	Approximately 4x the existing area	Approximately the same as existing area	Approximately 2x the existing area
<b>EASEMENTS</b>	Based on approximate layout lines, we expect no/minor easements	Based on approximate layout lines, we expect no/minor easements	Based on approximate layout lines, we expect no/minor easements; if bike lanes are to be included through the intersection, however, some takings will likely be required	Based on approximate layout lines, we expect no/minor easements
<b>COST</b>	Relatively low cost	Relatively low cost	Relatively high cost for equipment and electrical power	Relatively high cost and disruption for construction
<b>MAINTENANCE</b>	Relatively low maintenance	Relatively low maintenance	Relatively high maintenance for equipment	Relatively low maintenance



## LEGEND

- Grass
- Roadway
- Sidewalk
- Detectable Warning Panel
- Solid White Line
- Solid Yellow Line
- Property Line



**Nitsch Engineering**  
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- ▶ Land Surveying
- ▶ Transportation Engineering
- ▶ Structural Engineering
- ▶ Green Infrastructure
- ▶ Planning
- ▶ GIS

**MAIN STREET AND PROSPECT STREET  
 UNSIGNALIZED CONCEPT I**

ACTON, MASSACHUSETTS

PREPARED FOR:  
 TOWN OF ACTON

REV.	COMMENTS REVISIONS	DATE

NITSCH PROJECT # \_\_\_\_\_  
 FILE: \_\_\_\_\_  
 SCALE: AS NOTED  
 DATE: 8/24/2018  
 PROJECT MANAGER: J. MICHALAK  
 SURVEYOR: \_\_\_\_\_  
 DRAFTED BY: T. PRESUME  
 CHECKED BY: J. MICHALAK



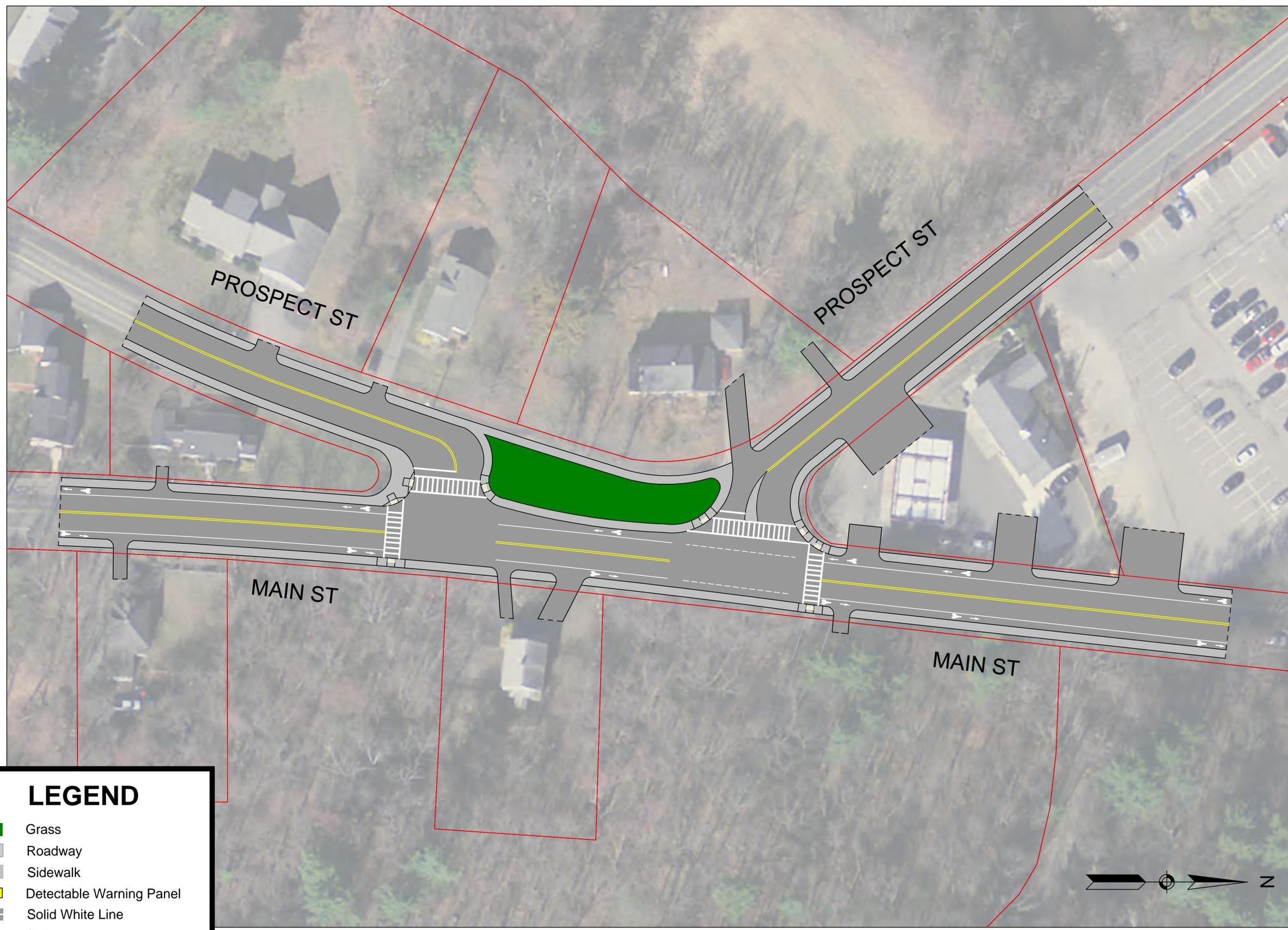
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**MAIN STREET AND PROSPECT STREET  
 UNSIGNALIZED CONCEPT 2**

ACTON, MASSACHUSETTS

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 TOWN OF ACTON

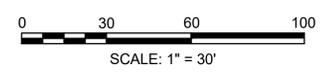


**LEGEND**

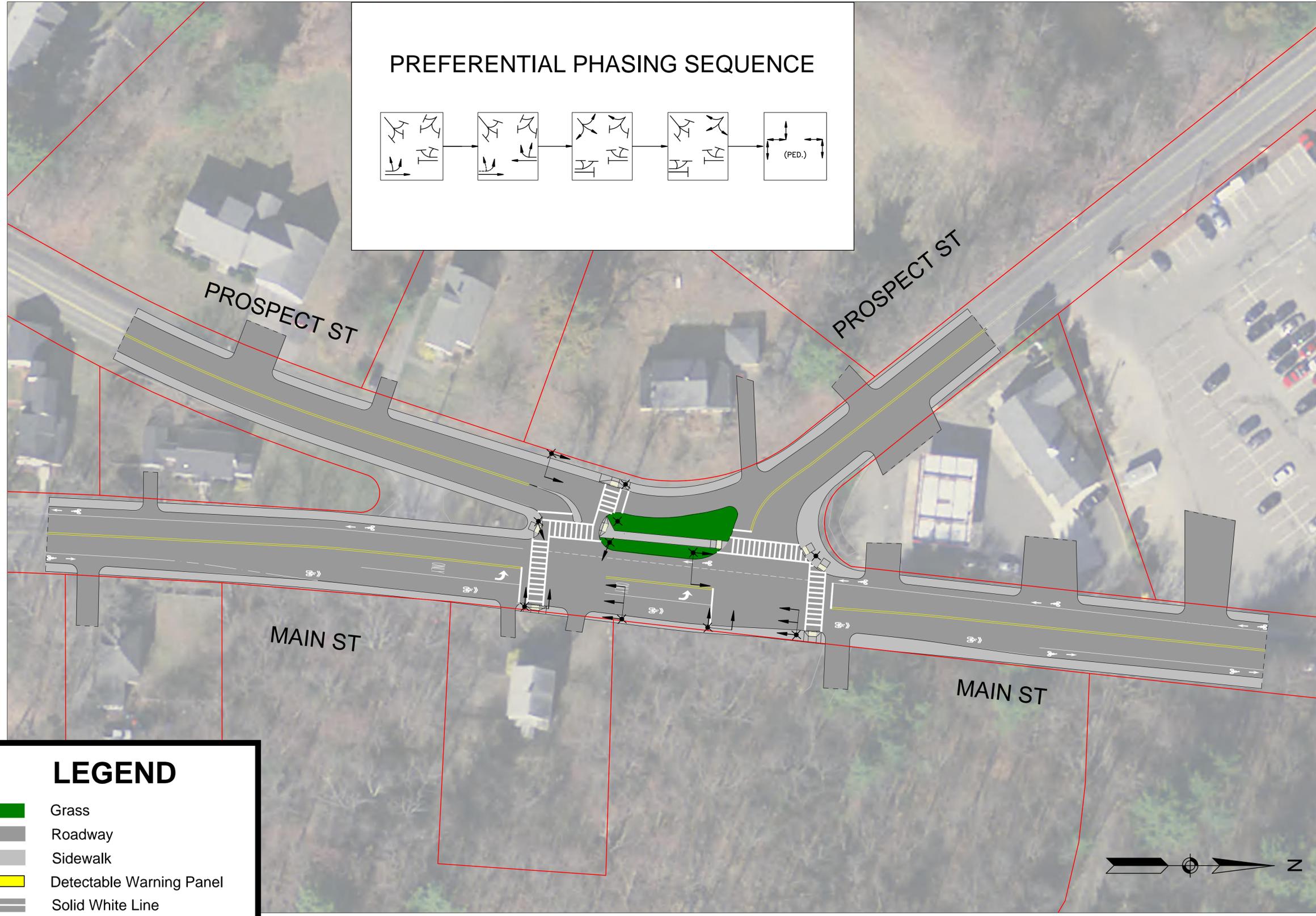
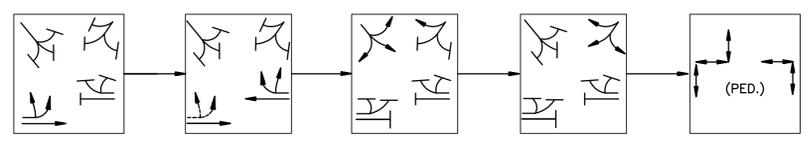
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REV.	COMMENTS	DATE

NITSCH PROJECT # \_\_\_\_\_  
 FILE: \_\_\_\_\_  
 SCALE: AS NOTED  
 DATE: 8/22/2018  
 PROJECT MANAGER: J.MICHALAK  
 SURVEYOR: \_\_\_\_\_  
 DRAFTED BY: T.PRESUME  
 CHECKED BY: J.MICHALAK



**PREFERENTIAL PHASING SEQUENCE**



**LEGEND**

- Grass
- Roadway
- Sidewalk
- Detectable Warning Panel
- Solid White Line
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**MAIN STREET AND PROSPECT STREET  
 SIGNALIZED CONCEPT**  
 ACTON, MASSACHUSETTS

PREPARED FOR:  
 TOWN OF ACTON

REV.	COMMENTS	DATE

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