

# INTERSECTION OF RTE. 133 & MAIN STREET



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Presented to: Select Board

Date: November 8th, 2021

# TIME LINE OF MILESTONE EVENTS TO DATE:

- ▶ May 2011: Town enters contract with Bayside Engineering to provide design services to the Town for TIP project from N. Andover to Main St.
- ▶ Sept 2017: Bayside receives 25% Design submittal comments from MA-DOT. A public hearing was targeted for later that fall.
- ▶ January 2018: Bayside provides technical memorandum for a “Roundabout” design alternative at the Main/133 Intersection due to an increase in traffic counts that warranted an intersection re-design.
- ▶ February 2019: Residents and/or Board Members at a Select Board meeting discuss a “Signalized Intersection” as a second design alternative to be evaluated and a proposal for those design services to be provided.
- ▶ Fall 2019: “Signalized Intersection” design alternative is placed on hold due to concerns of funding the task and MA-DOT 25% Design re-submission.

# DECIDING ON WHICH DESIGN ALTERNATIVE ROUNDBOUT VS. SIGNALIZED INTERSECTION:

A detailed intersection analysis was completed by Bayside Engineering in 2017/18 and came to the following conclusions:

- ▶ *"As an Unsignalized intersection with 2-way STOP control data shows that the Main St. approaches experiences long delays and queue lengths during both AM and PM peak hours and operations deteriorate further with future increases in traffic volumes."*
- ▶ *"As a signalized intersection with fully actuated (stop and go) traffic signals data shows that the intersection will operate at an acceptable or better than acceptable level of service during both the AM and PM peak hours under existing and future (2037) peak hour traffic volumes."*
- ▶ *"As a one-lane roundabout data shows that the roundabout design will operate at an acceptable or better than acceptable level of service during both the AM and PM peak hours under existing and future (2037) peak hour traffic volumes. The Level of Service (LOS) operation of the roundabout concept is comparable, and at times, better than the traffic signal control."*

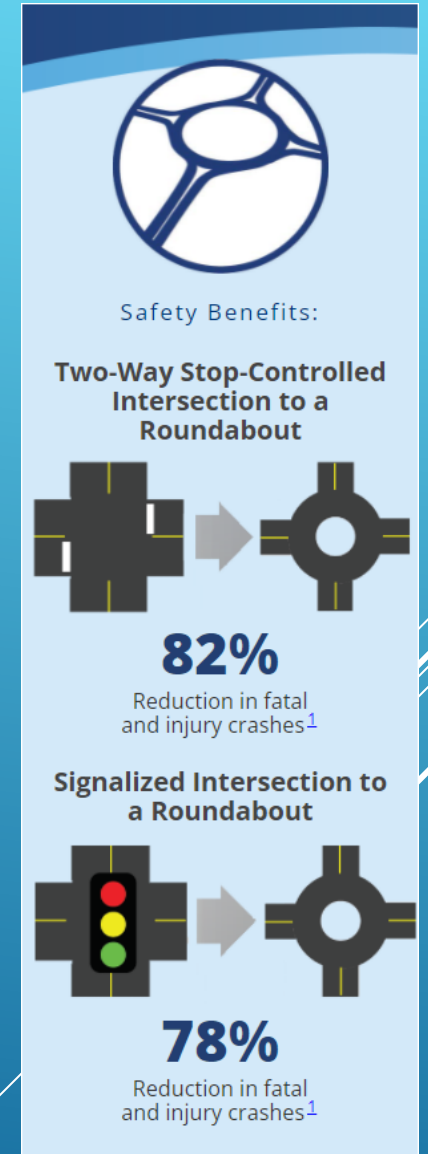
# DECIDING ON WHICH DESIGN ALTERNATIVE ROUNDBOUT VS. SIGNALIZED INTERSECTION:

A “better” design alternative is certainly subjective. However, for the purposes of an engineering objective approach three criteria should be evaluated:

1. Safety
  2. Level of Service and Traffic Flow/Maneuverability
  3. Cost (Initial and operating)
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# 1. SAFETY:

The Federal Highway Administration (FHA) now lists roundabouts as one of its 7 “Proven Safety Countermeasures” (PSC). This is the only countermeasure listed by the FHA that provides a comprehensive design alternative. Other intersection PSC are designed to improve the existing signal features, which try to mitigate the statistic that 1/3 of all intersection fatalities occur at ones with signals.

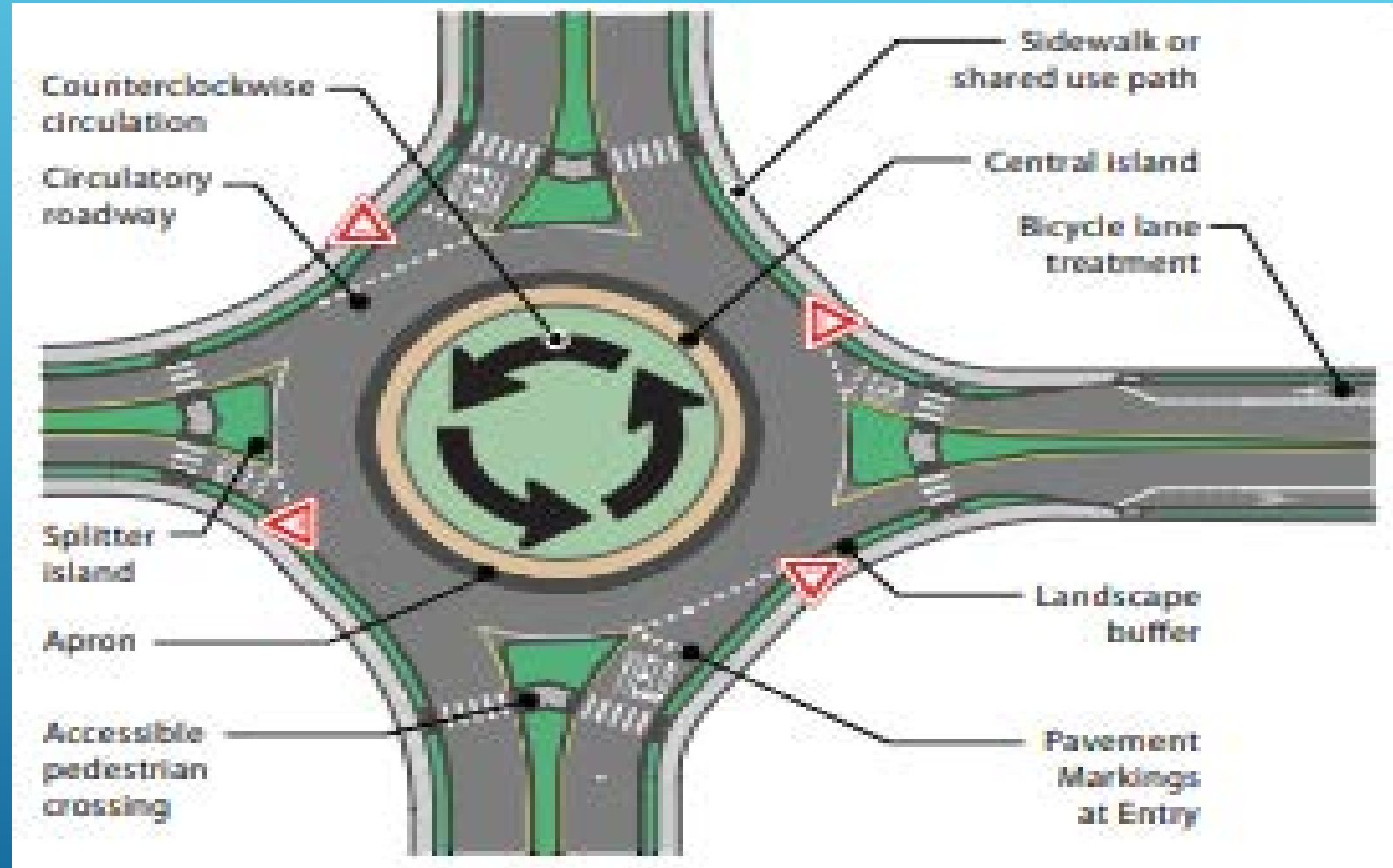




# 1. SAFETY:

## Safety Considerations:

- Conflict points: Roundabouts reduce vehicular conflict points by 75% and pedestrian conflict points by 66%.
- Entry and exit geometry avoids angle and left turn accidents. Roundabout accidents are “sideswipes” or single vehicle accidents.
- Speeds are significantly reduced by traffic calming measures such as:
  - signage,
  - pavement markings,
  - raised aprons/island,
  - and splitter islands.



## 2. LEVEL OF SERVICE (LOS) - DELAY TIME:

Level of Service quantifies traffic flow on roadway segments and through intersections. The LOS is related to the AVG. STOPPED TIME that the motorists experience through the intersection. The classifications are generally A, B, C, D, E or F.

**LOS A** = 10s or less (free flow traffic)

**LOS B** = 10 to 20 s

**LOS C** = 20 to 35 s

**LOS D** = 35 to 55 s

**LOS E,F** = 55+ s (considered unacceptable)

### CALCULATED LOS (DELAYS) FOR ENTIRE INTERSECTION

	SIGNALIZED INTERSECTION		ROUNDBOUT	
	LOS AM PEAK	LOS PM PEAK	LOS AM PEAK	LOS PM PEAK
2017 Volumes	B (19.4s)	C (30.5s)	B (14.4s)	B (15.9s)*
2037 Volumes	B (19.0s)	D (53.0s)	B (18.6s)	C (21.3s)**

\* Delay is reduced by 48%

\*\* Delay is reduced by 60%

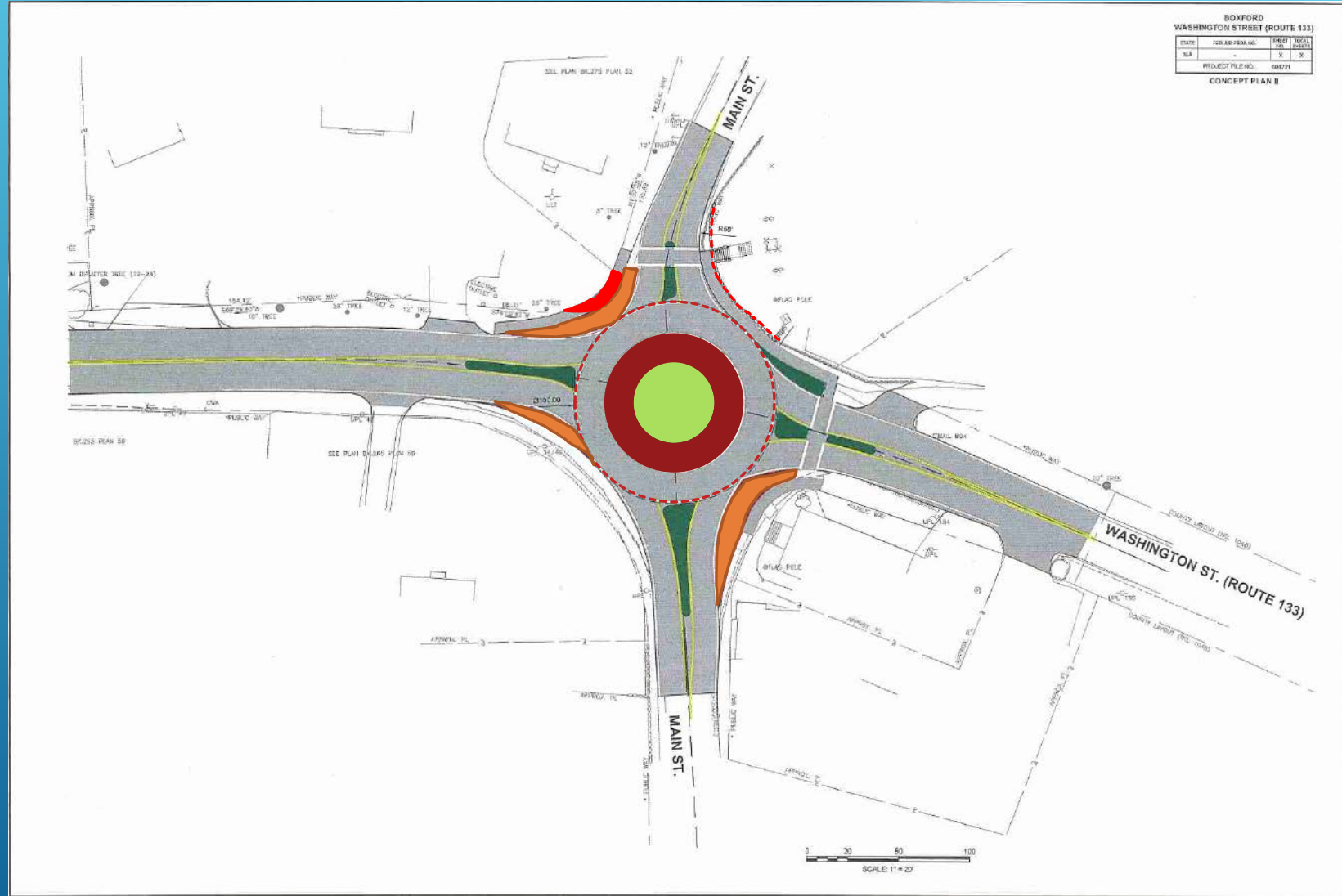
## 2. TRAFFIC FLOW & MANEUVERABILITY:

- ▶ Both the roundabout and signalized intersection will be scrutinized by another 25% Design submission to MA-DOT.
- ▶ MA-DOT will NOT approve a plan that does not accommodate large vehicle traffic.
- ▶ MA-DOT would not take on the liability of constructing a project with their funds that does not accommodate large vehicle traffic.
- ▶ FHWA's recommendation as follows : "In general, the inscribed circle diameter should be a minimum 100ft to accommodate a WB-50 design vehicle. Smaller roundabouts can be used for some local street or collector streets, where the design vehicle may be a bus or single-unit truck."

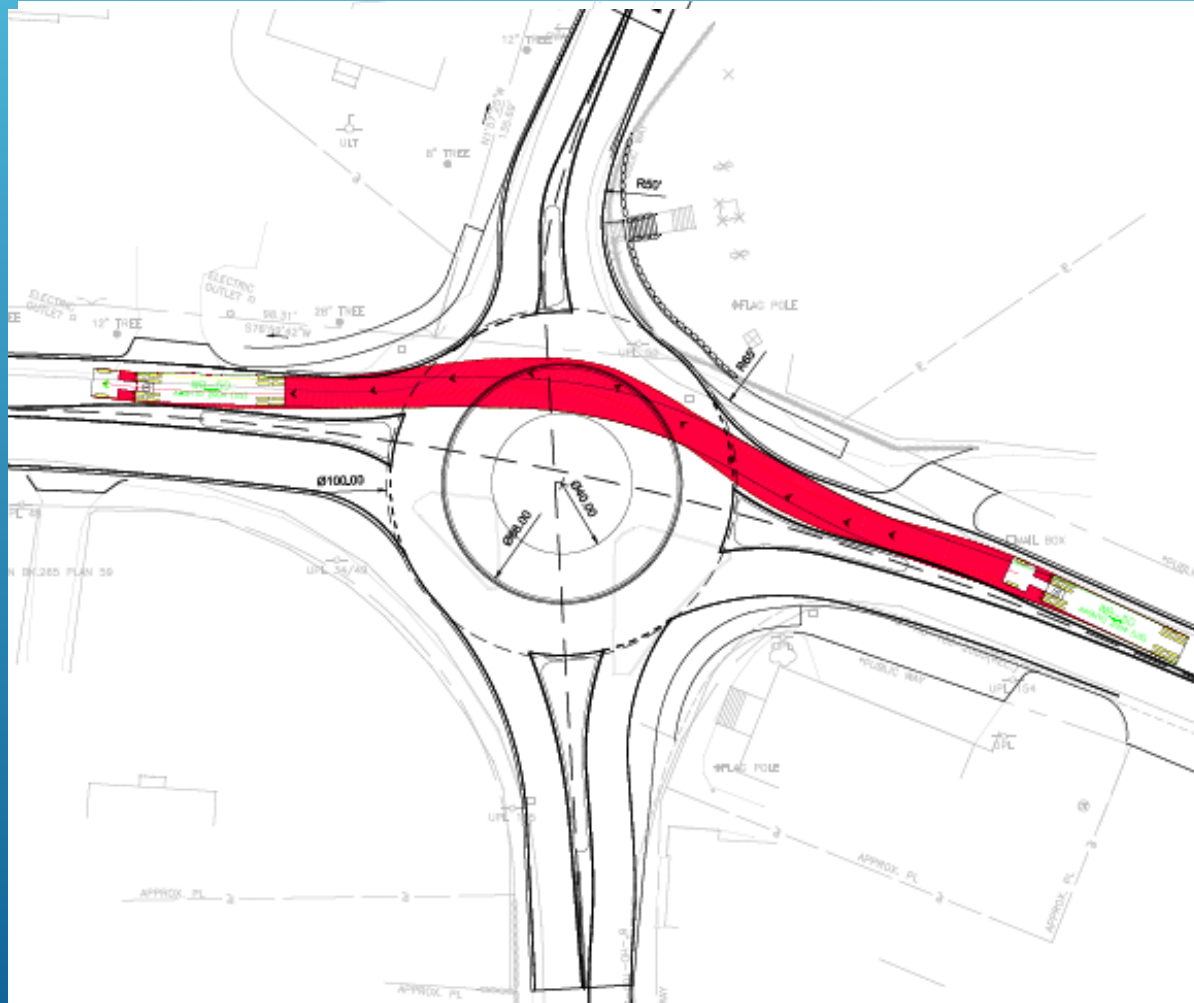


# BOXFORD'S PRELIMINARY DESIGN:

1. 40' Dia. Landscape Island
2. 66' Dia. Truck Apron (13' isle)
3. 100' Dia. Inscribed Cir. (17' lane)
4. 3-Turning Aprons at the tighter corners for larger vehicles.
5. No Land Takings Needed
6. Access Easement from Church is needed for sidewalk and to move the retaining wall at Veteran's Memorial.
7. This plan would need to be evaluated by MA-DOT, other concept plans show the ability to fit a larger inscribed circle as well.



## 2. TRAFFIC FLOW & MANEUVERABILITY:



MASSACHUSETTS STATE

### 3. COST:

1. Costs for construction of roundabout can be more or less costly than a signal based on many variables. Since this is a TIP project MA-DOT would incur the construction cost.
2. Based on literature from FHA, costs associated with long term care and operations and maintenance costs of a signalized intersection can be approximated at \$5,000-\$10,000 annually (\$3,000 of which is power alone).
3. The cost to design a signalized intersection, even for consideration, would need to be appropriated in the amount of approximately \$73,000.

# RECOMMENDATION:

	SIGNALIZED INTERSECTION	ONE LANE ROUNDBOUT
SAFETY		✖
LEVEL OF SERVICE		✖
COST		✖

# QUESTIONS/DISCUSSION?

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