SUBJECT:	Route 28 at Chickatawbut Road Intersection Improvements	DATE:	July 23, 2019
PREPARED BY:	Howard Stein Hudson	PROJECT NO.:	607342

Frequently Asked Questions

Q: What is the difference between a roundabout and a rotary?

A: The Federal Highway Administration (FHWA) encourages agencies to consider roundabouts for existing intersections such as Randolph Avenue (Route 28) at Chickatawbut that have been identified as needing safety or operational improvements as roundabouts are a FWHA Proven Safety Countermeasure to reduce serious injuries and fatalities. Modern roundabouts feature channelized approaches and a raised center island that results in lower speeds (15-25 MPH) and fewer conflict points. Roundabouts are an effective option for managing speed and transitioning traffic from high-speed to low-speed environments. Roundabouts reduce the types of crashes where people are seriously hurt or killed by 78-82% when compared to conventional stop-controlled and signalized intersections, per the AASHTO Highway Safety Manual. [1] In addition to the central island, roundabouts also feature triangular splitter islands design to slow and direct traffic. The islands also act as refuge for pedestrians and cyclists. This means pedestrians can choose to cross one direction of traffic at a time and have a safe place to wait before crossing another direction traffic. Roundabouts are designed to improve safety for all users, including pedestrians and bicycles.[2] Roundabouts are different from rotaries and other traffic circles.

Roundabouts are typically smaller than the large, high-speed rotaries. Rotaries are significantly larger than roundabouts and therefore process a great deal of traffic and can promote high speeds of 40 mph or above. The entry points to rotaries provide significantly less deflection which allows for significantly higher speed than roundabouts. It is typical for vehicles to enter a rotary alongside traffic that is circulating in the inside lanes, similar to freeway entrances. Rotaries perform very poorly safety wise due to high speeds and lack of lane demarcation. The lack of pavement markings and lane guidance through rotaries causes unnecessary weaving and can create opportunities for conflict and congestion. In a roundabout, guidance will be clearly marked by pavement markings and signs, so vehicles know which lane to be in prior to entering the roundabout. Once in the roundabout, vehicles will not need to change lanes.

Q: Why is the project only addressing the Randolph Avenue (Route 28)/ Chickatawbut intersection when there are speeding and congestion problems along the Route 28 corridor?

A: The goal of this project is to provide improvements at Randolph Avenue (Route 28)/ Chickatawbut Road to enhance safety. The intersection is identified as a high crash location and ranked #7 on the Statewide Top 200 Crash Locations. Funding for the intersection improvements is from the Safety Improvement Program and thereby limits the project scope to just the intersection. Congestion and speeds along the Route 28 will be addressed in a future corridor study. The Town and the State have already committed to initiating the study in the near future.

Q: Where else are there roundabouts like this with similar levels of traffic?

Roundabouts are becoming a more popular option for state DOT's and municipalities looking to address safety. A roundabout that is similar to the proposed is in Barnstable at Route 6 Ramps and Route 149 (Exit 5).

Rhode Island DOT has built several roundabouts in recent years which can be view in the links below.

https://www.google.com/maps/place/Apponaug,+RI+02886/@41.6978259,-71.4645418,385m/data=!3m1!1e3!4m13!1m7!3m6!1s0x89e44c65d2948ba7:0x7b3508a6c4be82f5!2sApponaug,+RI+02886!3b1!8m2!3d41.70028!4d-71.46028!3m4!1s0x89e44c65d2948ba7:0x7b3508a6c4be82f5!8m2!3d41.70028!4d-71.46028!5m1!1e1

https://ridot.maps.arcgis.com/apps/MapTour/index.html?appid=56619cb7ab2c437083d07e89cdcc6d86#map

In the Northeast, Connecticut DOT and Maine DOT have many roundabouts as well.

In 2013, the Boston Regional Metropolitan Planning Organization developed a roundabout installation screening tool to be used by MassDOT and municipalities. MassDOT's Project Development process requests that every intersection reconstruction project evaluate if a roundabout would be a suitable alternative.

Q: Why Rectangular Rapid Flashing Beacons (RRFB) rather than a High-Intensity Activated crosswalk beacon (HAWK)?

A: A HAWK is a new style of pedestrian crosswalk beacon. HAWKs are considered beacons rather than signals because it only aluminates when it is activated by a pedestrian pushing the crosswalk button. HAWKs feature two red lights next to each other above one yellow light. When the pedestrian presses the pushbutton, approaching drivers would see the beacon flashing yellow for a few seconds, indicating they should reduce speed and be prepared to stop for a pedestrian in the crosswalk. The beacon would then change from a flashing yellow light to a solid yellow light. Following the solid yellow light, the two red lights would turn solid red, indicating that vehicle

drivers must stop. The signals facing the pedestrians at the crossing would show a walk symbol and emit an audible tone for the sight-impaired pedestrian. The signal would then change to flashing red and the pedestrian indications would show a flashing do not walk symbol with a countdown timer. During this stage, drivers would be allowed to proceed during the flashing red signal after first coming to a complete stop and making sure the crosswalk is clear. While HAWKs have been shown to be effective, particularly at midblock crossings, they are rare in Massachusetts and can require a learning curve for local drivers who may not be familiar with the different indication design. HAWKs would also create a full stop-condition when activated for vehicles exiting the roundabout which may be unexpected and could potentially lead to rear-end collisions.

Rectangular Rapid Flashing Beacon (RRFBs) are pedestrian-actuated conspicuity enhancements used in combination with pedestrian warning signs to improve safety at uncontrolled, marked crosswalks. The device includes two rectangular-shaped yellow indications, each with an LED-array-based light source, that flash with high frequency when activated. The RRFB design differs from the standard flashing beacon by utilizing a different shape, a much faster rapid-pulsing flash rate, and a bright light intensity. RRFBs would be placed on both sides of the roundabout crosswalk, one curbside and one in the splitter island, below the pedestrian crossing sign and above the arrow indication pointing at the crossing. The flashing pattern can be activated with pushbuttons and should be unlit when not activated. RRFBs have been shown to increase driver yielding behavior at crosswalks. The RRFBs can also emit a tone to help address accessibility concerns that traditional uncontrolled crosswalks may experience.

Q: What are the right of way impacts of the project? Will there be any permanent easements or takings?

A: The signalized intersection and roundabout alternative both have property impacts. MassDOT is required to go through an appraisal process and compensate property owners for any takings or easements. To reach the project's safety goals, the roundabout alternative necessitates the taking of one private property. Both alternatives (signalized and roundabout) require property owned by the Massachusetts Department of Conservation within Recreation Blue Hills Reservation. This would require an act of the state legislature as Article 97 of the Massachusetts Constitution protects all open space. MassDOT would be required to mitigate those impacts to Blue Hills.

Q: What would the level of service be at the roundabout?

A: The level of service (LOS) predicted for the roundabout based on future 2027 traffic volumes is based off on average delay. The LOS for the roundabout is found to be a LOS F during the a.m. peak hour, LOS E during the p.m. peak hour, and LOS A during the Saturday peak hour. The overall intersection delay under No Build Conditions (if the intersection were to remain as-is today with future traffic volumes) the LOS is predicted to be LOS F during the a.m. and p.m. peak hours, and LOS B during the Saturday peak hour.

However, LOS thresholds for delay are different for signalized and unsignalized intersections (see table below). Therefore, an unsignalized intersection could be considered a LOS F but experience less delay than a signalized LOS E.

Level of Service Criteria:

Level of Service	Average Stopped Delay (sec.)	
	Signalized Intersection	Unsignalized Intersection
A	0.0–10.0	0.0-10.0
B	10.1–20.0	10.1-15.0
C	20.1–35.0	15.1-25.0
D	35.1–55.0	25.1-35.0
E	55.1–80.0	35.1-50.0
F	>80.0	>50.0

The overall intersection delay for the roundabout is predicted to be 55 seconds during the a.m. peak hour, 36 seconds during the p.m. peak hour, and 8 seconds during the Saturday peak hour.

The No Build overall intersection delay is 107 seconds during the a.m. peak hour, 221 seconds during the p.m. peak hour, and 17 seconds during the Saturday peak hour.

Q: What are the traffic volumes like through the intersection?

Average daily traffic volumes along Randolph Avenue (Route 28) are approximately 26,000-29,000 vehicles during a typical weekday and approximately 24,000-25,000 during a typical weekend. Average daily traffic volumes along Chickatawbut Road are approximately 5,000-6,000 vehicles during a typical weekday and approximately 4,000-5,500 during a typical weekend.

During the peak hours, the traffic volumes along Randolph Avenue (Route 28) traveling northbound approaching the intersection are approximately 1,400 during the a.m. peak hour and 650 during the p.m. peak hour. During the peak hours, the traffic volumes along Randolph Avenue (Route 28) traveling southbound approaching the intersection are approximately 660 vehicles during the a.m. peak hour and 1,050 during the p.m. peak hour.

During the peak hours, the traffic volumes along Chickatawbut Road traveling eastbound approaching the intersection with Randolph Avenue (Route 28) are approximately 215 during the a.m. and 340 during the p.m. peak hour. The traffic volumes traveling westbound along Chickatawbut Road approaching the intersection with Randolph Avenue (Route 28) are approximately 360 during the a.m. peak hour and 370 during the p.m. peak hour.

Q: Can MassDOT post a lower speed limit to address speed concerns on Route 28? What is the speed reduction of the roundabout versus a signalized intersection?

A: Current Massachusetts state law requires a speed study to change the posted speed. The law dictates that speed limit be set based on the 85th percentile speed vehicles are driving today, which has the potential to result in increasing the speed. With the roundabout design, we would have advisory signs posted to the 25-mph roundabout design speed. The design speed for the signalized intersection is 40 MPH. Making geometric changes will help to reduce speeds at the intersection and

be more effective than changing speed limit signage as many people currently travel well above the current posted speeds.

Q: Can we get protected left-turn signals in the interim to prevent further serious crashes?

A: The current lane configuration does not allow for the restriction of left turns as there are shared left and through lanes. The lanes would have to be reconfigured as it is more than changing the signal equipment. Anything that changes to the intersection has to go through a process. MassDOT has expedited the approach. In the interim, MassDOT and the project team can look at extending the current timing on the left arrow and/or adjusting the current timing.

Q: How does someone from Chickatawbut Road turn left if it's a continuous line of traffic?

A: The roundabout has safety and operations benefits. Vehicles approaching the roundabout along Chickatawbut Road EB may have difficulty identifying gaps during the evening peak hour and WB traffic may experience some delay during the a.m. peak hour. However, the slower design speed through the roundabout will help vehicles to enter the roundabout. Traffic flowing in the opposing direction will also help provide gaps for vehicles to enter the roundabout.

When comparing the expected queue lengths at the roundabout to the No Build Condition, the Chickatawbut Road EB approach is expected to have on average 3 vehicles more during the p.m. peak hour but less queuing during all other times of day than under No Build. The Chickatawbut Road WB approach is expected to experience longer queue during the a.m. peak hour when compared to No Build however the queue is expected to be improved under the roundabout during all other hours of the day.

The remainder of the day at all hours will see safety and operational improvements for all traffic movements. Design speeds will limit the rate at which vehicles travel around the roundabout as well.

Q: What are the queue lengths for the roundabout versus current queue lengths?

A: The future traffic conditions account for traffic growth up to 2027. The posted presentation includes predicted 2027 a.m. peak hour, p.m. peak hour, and Saturday peak hour traffic conditions for the No build condition, the signalized alternative, and the proposed roundabout. The roundabout in three out of four approaches fares better in 95th percentile queue conditions than the current intersection design.

Q: When do you anticipate construction starting? How long will the project take to build?

A: The project is slated in the State highway safety program for $1.5 million in FY 2021 however given the complexity of the project it likely to move to 2023 for construction and the cost will likely increase from the current amount.

Q: What are some of the next steps the Project Team will take to respond to community concerns?

A: MassDOT will evaluate signage prohibiting through traffic on side streets. The project team can create a computer model to simulate the roundabout and post to the project website.

[1]"Roundabouts." *Safety,* safety.fhwa.dot.gov/provencountermeasures/roundabouts/.

[2] "Intersection Safety-Safety: Federal Highway Administration." *Safety,* safety.fhwa.dot.gov/intersections/innovation/roundabouts/.