



To: Adam Shulman, AICP
Cambridge Traffic, Parking, and
Transportation Department
344 Broadway
Cambridge, MA 02139

Date: December 6, 2023

Memorandum

Project #: 14968.03

From: Sean Manning, PE, PTOE
Matt Burmeister

Re: Alewife Station Access Road Bus Lane Feasibility Study

On behalf of IQHQ REIT (the "Proponent"), VHB has prepared this memorandum to document transportation mitigation commitments made to the City of Cambridge in support of the proposed development of 36-64 Whittemore Avenue (i.e., Alewife Park). This memorandum focuses specifically on the commitment outlined in the Planning Board's Special Permit 387 Decision, Condition 11(a)i., which states that the Proponent will commence a feasibility study for the construction of a bus-only lane along the Alewife Access Road (Loop Road) after vehicles exit the arched tunnel under Alewife Brook Parkway.¹

This memorandum presents an evaluation of the feasibility of this potential improvement action, as it was documented in a presentation shared by VHB during a meeting with the City of Cambridge and other transportation stakeholders on September 21, 2023 (**Attachment A**). Note that it does not present an in-depth analysis of alternatives, impacts to signals, environmental permitting implications, traffic, or MBTA bus service. If the bus-only lane is determined to be feasible by the City of Cambridge, MassDOT, MBTA, DCR, and the Cambridge Conservation Commission, the Proponent will be responsible to develop 100% design plans for review by these delineated agencies, and then construct those improvements within five years (or sooner) of receipt of the Project's first Certificate of Occupancy.

The findings of this feasibility study indicate that implementation of a bus-only lane is feasible on the Access Road after (east of) the arched tunnel Alewife Brook Parkway overpass, with some modest roadway widening required. The construction of this facility will also necessitate modification to the signalized intersection of Route 2 at Alewife Brook Parkway / Alewife Access Road and require environmental permitting and related mitigation to allow for work within the adjacent wetland zone buffer.

Background and Previous Boston MPO Study

In 2018, the Boston Region MPO conducted a high-level study to begin to assess the feasibility of providing a priority bus lane along the Alewife Access Road "jug handle".² The study suggested that this lane could be implemented with only lane striping changes, very limited roadway widening, and curb alterations to accomplish this reconfiguration. The study also determined that approximately 2,000 SF of new pavement would be necessary for implementation, and estimated a travel time savings of 11.7 seconds per bus trip (or 1.14 passenger-hours) during the weekday evening peak hour (**Attachment A, page 3**).

¹ Condition 11(a)i. *Special Permit Decision 387*, City of Cambridge Planning Board. 08/16/2022. Available online at: https://www.cambridgema.gov/-/media/Files/CDD/ZoningDevel/SpecialPermits/sp387/sp387_decision_20220816.pdf

² Bus Priority Feasibility at Alewife Station, Boston Region MPO. 12/27/2017. Available online at: https://www.cambridgema.gov/-/media/Files/CDD/Transportation/Transit/Studies_and_Reports/ctpsalewife42018/20171227buspriorityfeasibilityatalewifememarfinal.pdf

Alewife Park TIS

In the Transportation Impact Study (TIS) conducted in June 2021 supporting the Alewife Park Project³, VHB evaluated the findings of the 2018 Boston MPO study and documented the challenges of the defined configuration as it was previously presented. The TIS included a turning movement analysis depicting swept paths of a passenger vehicle and a 40-foot bus; the diagram indicated that the lane configuration from the MPO study would not allow for buses to make the required turns during the weekday afternoon peak period with vehicle queues in the adjacent lane (**Attachment A, page 4**). The TIS identified several additional concerns with the MPO's study – including concerns that the suggested widening may impede existing sidewalk space, concerns about wetland proximity, and concerns about intersection impacts – and determined a need for a more in-depth evaluation.

Feasibility Determination

In the Summer of 2023, VHB commenced the feasibility assessment for the bus-only lane. Using engineering survey plans obtained in April 2023, VHB developed a conceptual design plan depicting a recommended configuration for the bus lane along the Access Road. The plan illustrates the roadway and lane widths required for side-by-side bus and passenger vehicle movements, the anticipated limits of widening required, and the existing constraints and challenges associated with the potential roadway widening. See **Attachment A, Page 5**, which provides an illustration of the concept plan.

The concept plan incorporates several notable differences from previously studied configurations in the MPO concept, as summarized below:

- › **Lane Starting Point:** While previous studies initiated the bus-only lane before the access driveway to the Alewife Park Development, this concept plan shifted the lane starting point to the segment after the access driveway. Several advantages were identified with this change, including maximizing the ability to utilize existing roadway cross-section between the access driveway and the overpass for potential pedestrian and bicycle improvements (which were evaluated in a separate feasibility study). Other advantages include minimizing roadway widening in the low-elevation area of the access road, and not extending the bus lane through the sharpest turn of the access road. Based on the traffic analysis for the 2021 TIS, weekday evening peak hour queue lengths at the downstream intersection would not extend into or block the beginning of the bus lane.
- › **Lane Placement:** While the previous study placed the bus-only lane on the outer (east) edge of the jughandle road, this concept plan depicts the lane on the inside (west) edge of the roadway. This is primarily due to the challenges of providing a bus connection through the downstream intersection from an outer lane, which feeds into a signal-controlled, separated right-turn pocket lane.
- › **Lane Widths:** The concept plan depicts a 24.5-foot cross-section, which provides space for a 14-foot (maximum) bus-only lane and a 10.5-foot lane for general traffic. This cross-section was chosen based on the turning radius needs of the bus and passenger vehicle, side-by-side.
- › **Roadway Widening:** The concept plan presents a widening of the roadway on the inside (west) edge of the roadway. This is primarily to avoid the challenges of widening the roadway on the outside (east) edge, including a

³ *Alewife Park Project Review Special Permit*, submitted by IQHQ-Alewife, LLC. 12/27/2021. Available online at: https://www.cambridgema.gov/-/media/Files/CDD/ZoningDevel/SpecialPermits/sp387/sp387_appnarrative_20211227.pdf

generally steeper grade, large-caliper trees and vegetation, a light pole, an electrical handhold, and an existing pedestrian path (as identified in the survey and confirmed via a Site visit). The concept plan would require approximately 558 square feet of new asphalt. Note that this does not include any additional shoulder material between the edge of pavement and the relocated guardrail.

Considerations for Future Study & Design

This section outlines several considerations for the design and configuration of a future bus-only facility to be explored in the next phase of work.

Earthwork, Tree, and Street Furniture Impacts

In the April 2023 survey and during a Site visit conducted by VHB staff in May 2023, VHB identified several challenges with performing any roadway widening activities on the outside (east) edge of the jughandle road:

- › The grade differential beyond the edge of pavement is steeper than on the inside (west) edge, and would potentially require more earthwork.
- › The east side of the roadway has more potential vegetation impacts, including up to seven large-caliper trees (i.e., greater than 8 inches in diameter).
- › The east side of the roadway has a light pole and an electrical handhold which may be impacted.
- › The existing pedestrian path, which connects to the jughandle road at the Alewife Park access driveway, may be impacted.

Due to these obstructions, performing roadway widening on the inside (west) edge of the jughandle may be more effective from a constructability standpoint. Refer to **Attachment A, page 6** for more detail.

Environmental Permitting Impacts

Any roadway widening along the jughandle road will require an environmental permitting effort, as most of the roadway is located within a 100-foot wetland zone buffer.

Signal & Intersection Impacts at Route 16/Route 2 Intersection

The final bus lane design should provide an effective solution for both westbound (thru) and northbound (right-turning) buses to navigate the intersection where the Access Road intersects with Route 2 and Alewife Brook Parkway. Based on the concept plan, VHB identified the following treatments at or approaching the intersection:

- › “Do Not Block the Box” signage and striping in the general traffic lane where it transitions into a right-turning pocket lane, to provide a gap for buses turning right from the bus-only lane.
- › Resetting curbs on both the median island directly east of the Access Road approach, and the island directly west of the intersection, to accommodate a side-by-side bus and passenger vehicle continuing towards Route 2.
- › Providing a bus-only signal head with a queue jump phase or alternative signal treatment, to allow buses to enter the intersection before general traffic.

Refer to **Attachment A, Page 7** for more detail.

Vehicle Operations

During the feasibility evaluation, VHB used the traffic operations evaluation presented in the 2021 Alewife Park TIS to compare the length of the westbound queues at the intersection with the length of a potential bus-only lane, with the intent of providing enough length such that a bus would be able to access the lane even during the weekday evening peak hour, when queues are the longest. Based on the 2021 TIS (which used 2018 data that was adjusted using a yearly growth rate), average westbound queues at the intersection were 18-19 cars, which would extend approximately 380 feet from the intersection (**Attachment A, pages 8-10**). The access point of the bus-only lane would be approximately 400 feet from the intersection.

For future design, the travel patterns and traffic operations along the jughandle road should be re-evaluated with current count data, which would be required by both MassDOT and the DCR as part of a Functional Design Report (FDR) in connection with their required design review processes. Specifically, the westbound queues approaching the existing intersection should be studied and compared against the length of the future bus-only lane. The travel time savings for MBTA buses should also be studied.

MBTA Bus Service

Currently, four MBTA bus routes terminate at Alewife Station and utilize the Alewife Station Access Road: the 62, 67, 76 (including the combined 62/76), and 350. Three routes make a westbound thru movement at the intersection with Alewife Brook Parkway, while the 350 makes a westbound right-turn to continue north on Alewife Brook Parkway. Between the four bus routes, existing bus service (as of August 2023) provides 84 daily trips, with 34 occurring during peak periods and 8 trips during the weekday evening peak hour. The future Bus Network Redesign (approved by the MBTA Board in November 2022)⁴ proposes the elimination of Route 350 service and a consolidation of the 62/76, resulting in even more limited service utilizing the access road. A review of the Bus Network Redesign indicated that updated bus service would provide 61 trips during the service day, with 33 during peak periods and 7 trips during the evening peak hour (see **Attachment A, page 11**). Based on the limited existing and projected frequency of MBTA service within the study area, the passenger travel time savings should be further evaluated.

⁴ The final report, maps, and project updates for the BNRD Project are provided on the MBTA's website: <https://www.mbta.com/projects/bus-network-redesign/update/bus-network-redesign-approval-and-final-report>



Alewife Park: Offsite Mitigation

Alewife Station Access Road
Bus Lane Feasibility Study

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August 14, 2023



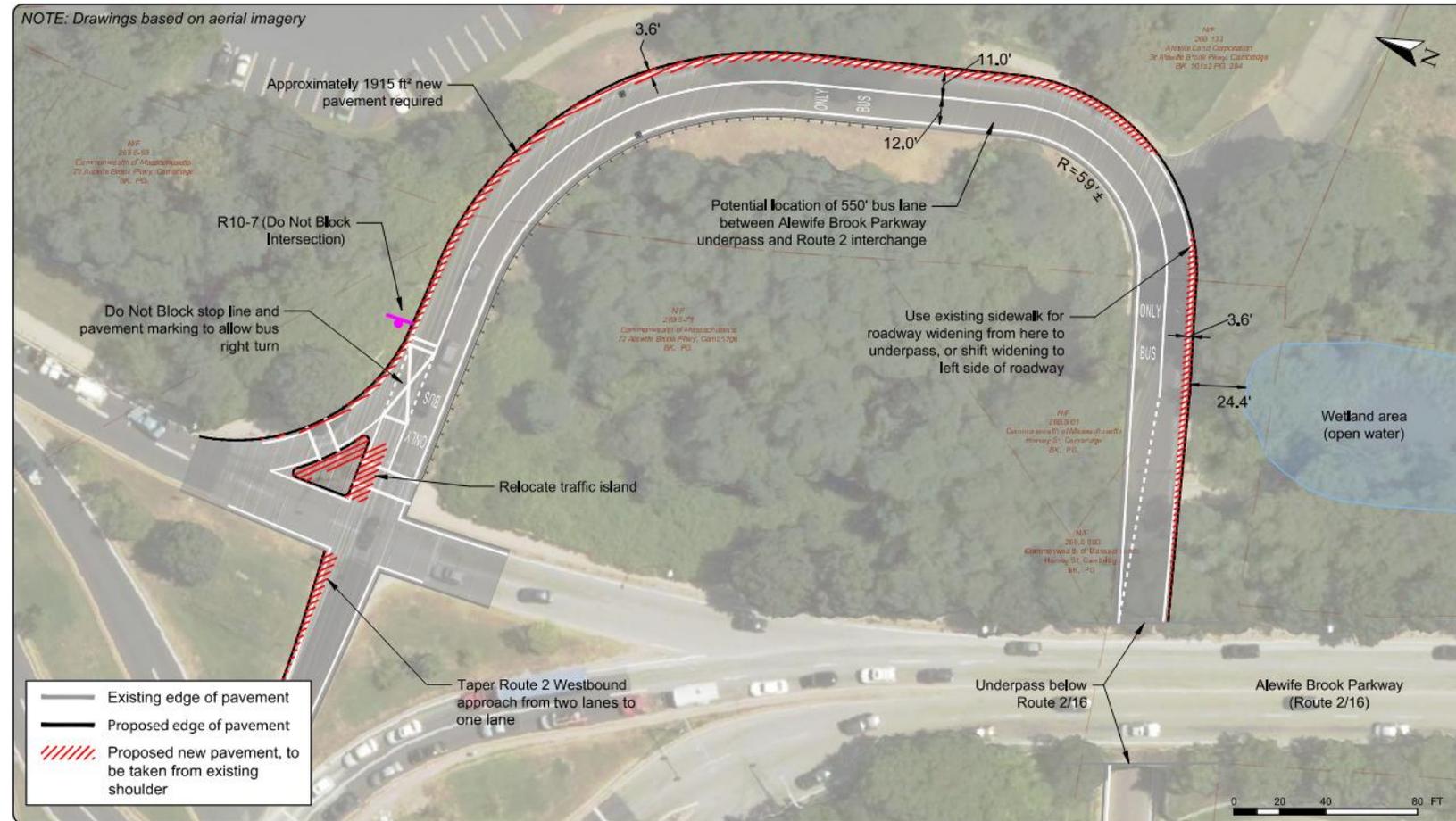
Introduction/Project Goals

- Cambridge SP 387, Condition 11a
- Feasibility Study for the construction of a bus-only lane along the Alewife Access Road (Loop Road) after vehicles exit the arched tunnel under Alewife Brook Parkway

MAPC (Metropolitan Area Planning Council) Study – 2017



- Determined roadway widening (approx. 2000' of new pavement) is necessary for Bus Lane implementation
- Existing 20' lane often permits two lanes to form approaching intersection
- May increase delay for general traffic, especially during PM peak
- Field observations showed that most bus drivers elect to exit Alewife via Cambridgepark Dr, rather than use the Jug Handle
- Estimated travel time savings of 11.7s per trip / 1.14 passenger-hours (during PM peak)

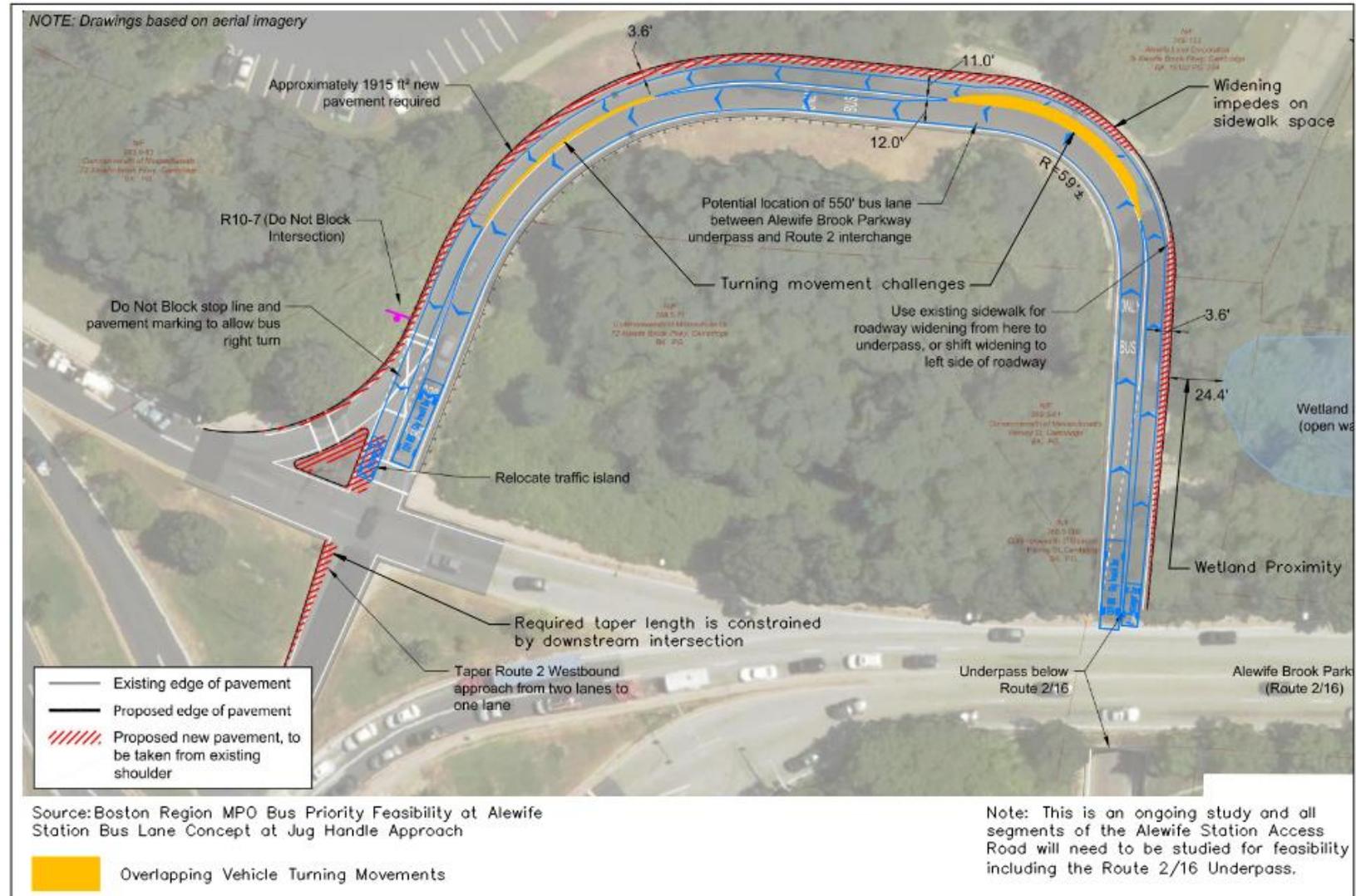


BOSTON REGION MPO **Figure 2** **Bus Lane Concept at Jug Handle Approach** *Bus Priority Feasibility at Alewife Station*

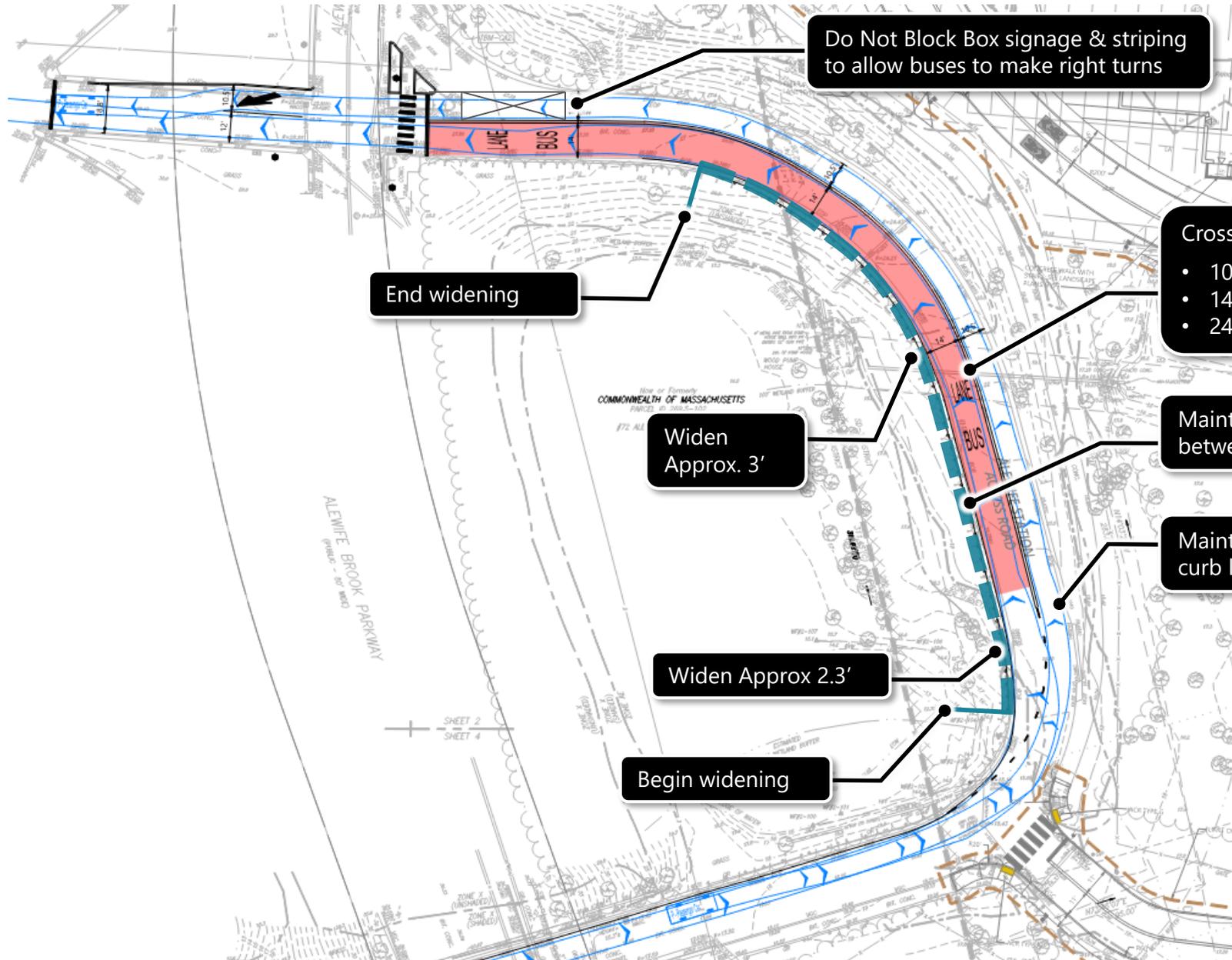
Alewife Park TIS – 2021



- Identified several concerns with MAPC Study and determined a need for further study
- Turning movements of bus & adjacent passenger vehicle will overlap in this configuration
- Widening may impede on existing sidewalk space
- Concerns about wetland proximity
- Concerns about intersection impact/required taper length

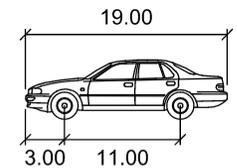


Bus-Only Lane: Concept Plan



Cross section:

- 10.5' Travel Lane
- 14' Bus Lane
- 24.5' total



Maintain 2' shoulder between EOP and guardrail

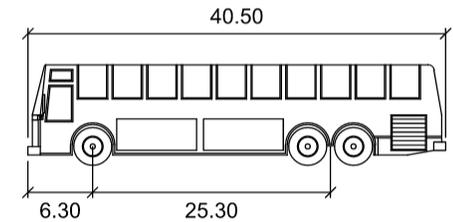
Maintain existing east/north curb line and guardrail

P	feet
Width	: 7.00
Track	: 6.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.6

Widen Approx. 3'

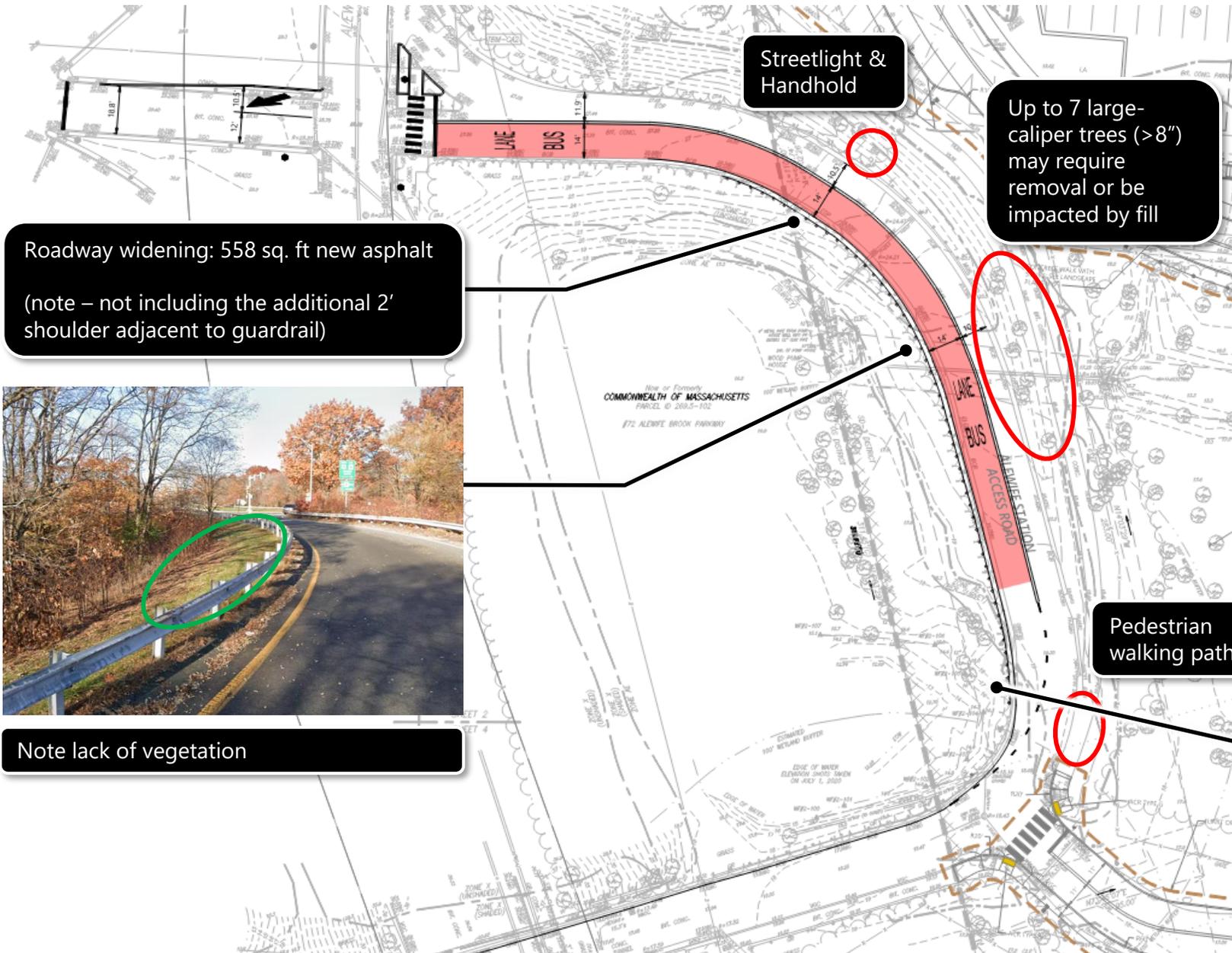
Widen Approx 2.3'

Begin widening



BUS-40	feet
Width	: 8.50
Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 41.9

Bus-Only Lane: Earthwork & Tree Impacts



Roadway widening selected on the west/south side due to:

- Less dramatic slope / less fill required
- Limited tree/vegetation removal required
- Limited signage/utility impacts
- No impact on pedestrian facility (to the east)

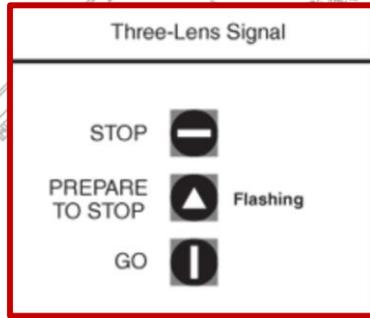


Note relatively minor grade change

Bus-Only Lane: Signal & Intersection Impacts



Precedent: Congress St at Sudbury St



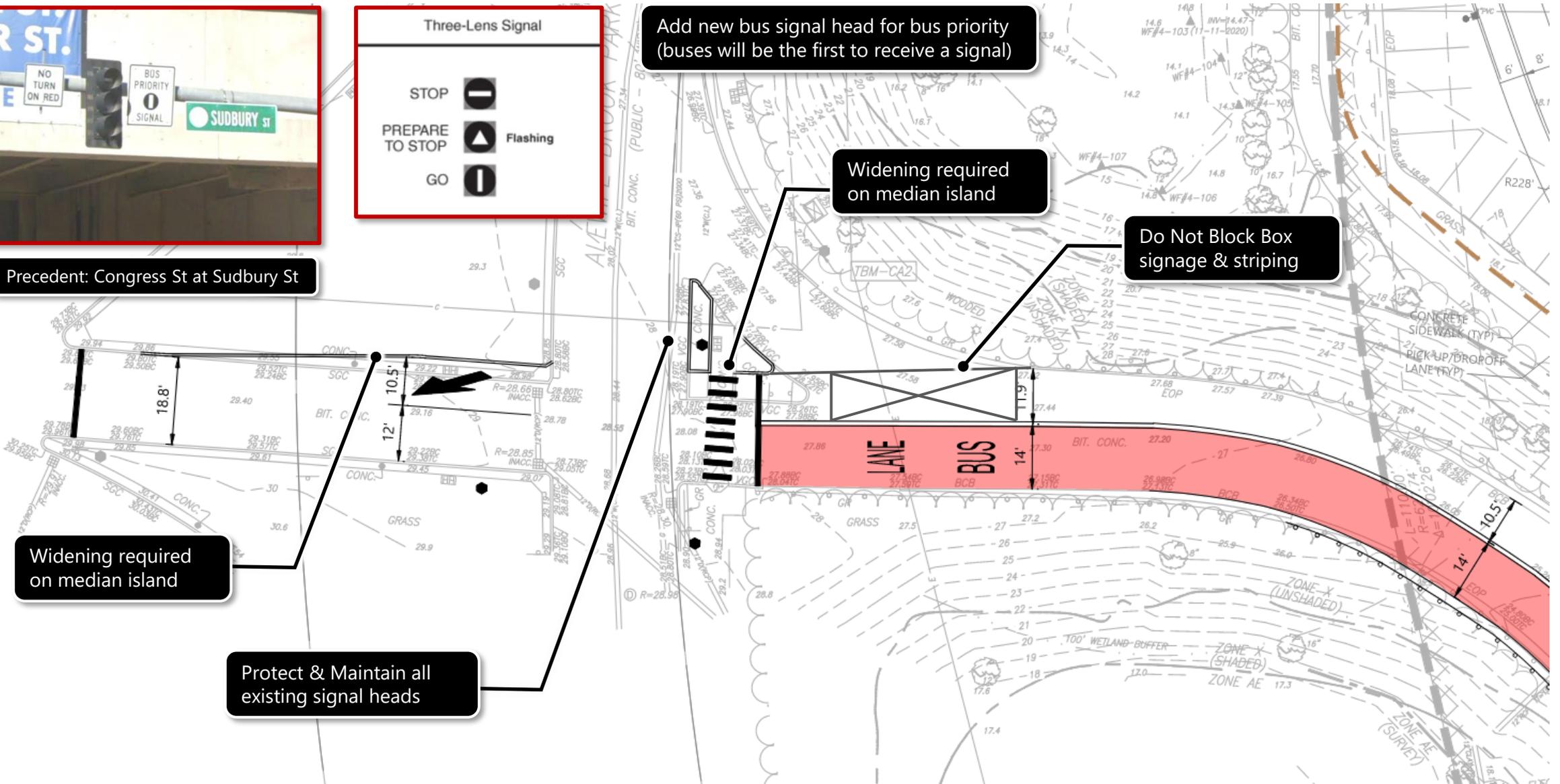
Add new bus signal head for bus priority (buses will be the first to receive a signal)

Widening required on median island

Do Not Block Box signage & striping

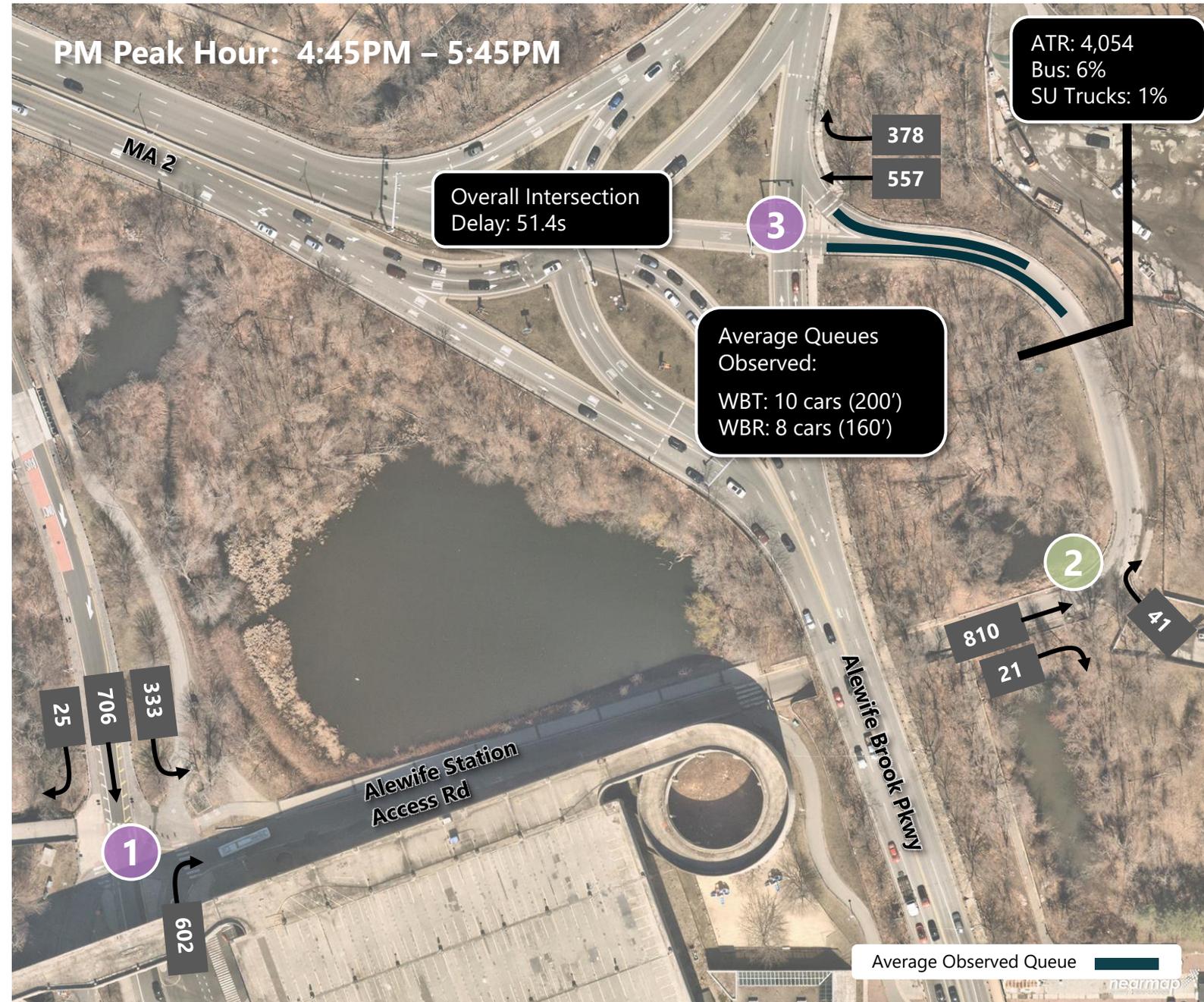
Widening required on median island

Protect & Maintain all existing signal heads



Existing (2021) Conditions Vehicle Operations

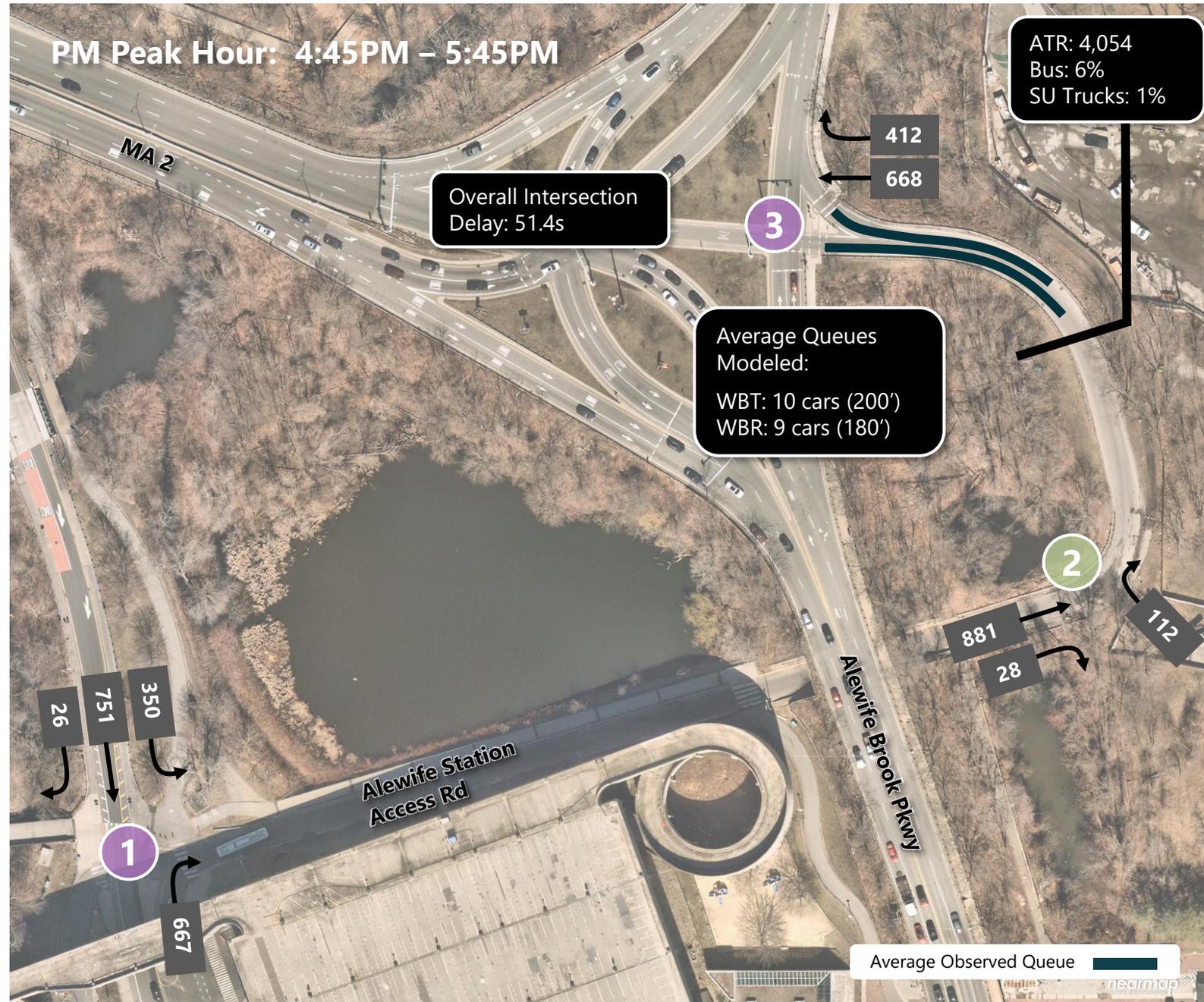
- Existing 20' lane permits two WB queuing lanes to form approaching intersection (3)
- Average Vehicle Delay:
 - WBT: 11.5 s (LOS B)
 - WBR: 8.4 s (LOS A)



■ *Counts taken from INRIX data, which is from Fall 2019
■ *Counts conducted December 2018; yearly growth rate applied.

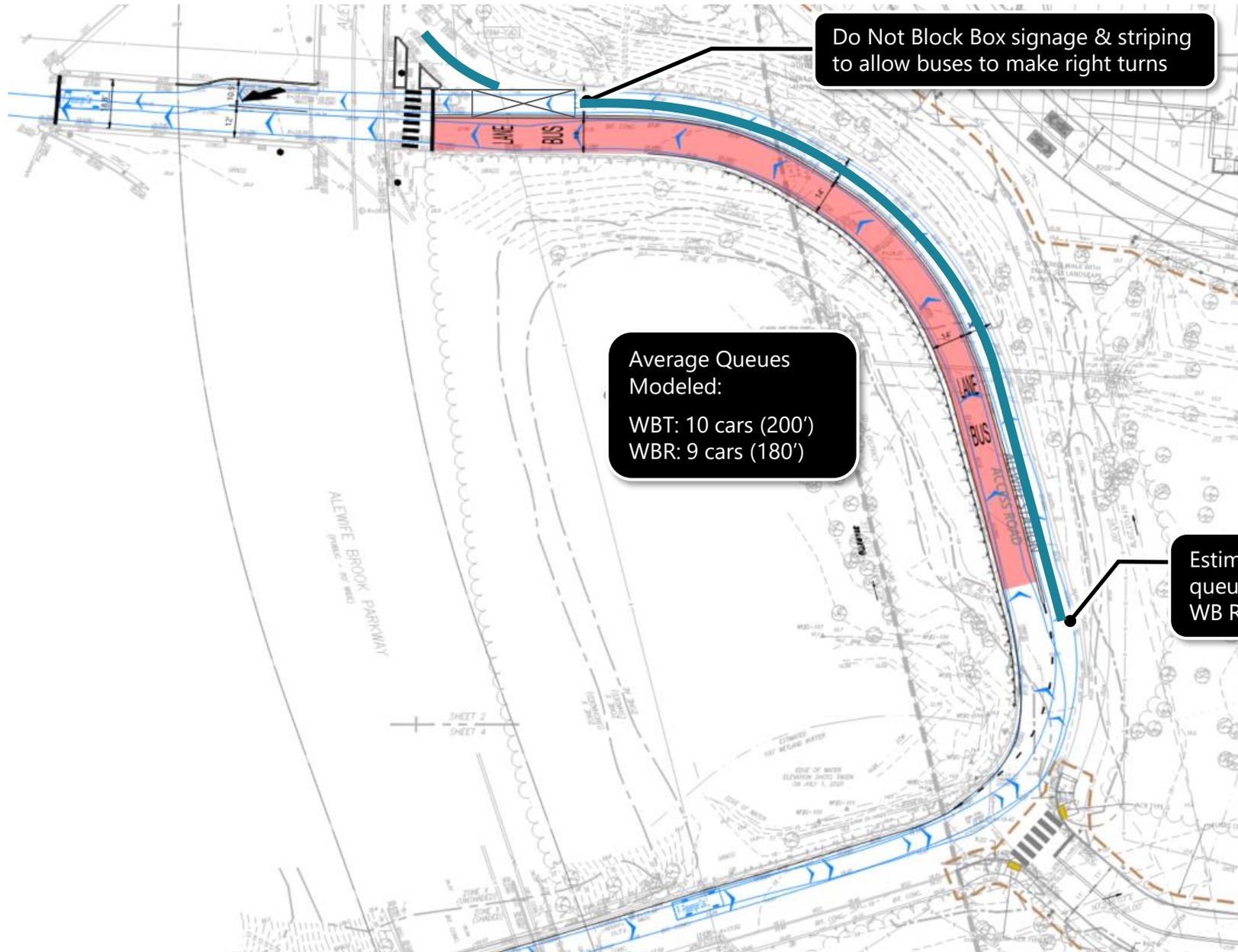
Future (2026) Conditions Vehicle Operations

- Average Vehicle Delay:
 - WBT: 13.8 s (LOS B)
 - WBR: 9.1 s (LOS A)



■ *Counts taken from INRIX data, which is from Fall 2019
■ *Counts conducted December 2018; yearly growth rate applied.

Future (2026) Conditions – Vehicle Operations



MBTA Bus Network Redesign



Route	Existing (2023) Conditions (Bus Trips)			Under BNRD (Bus Trips)		
	Weekday Total	Weekday Peak Hours	Hourly Frequency during PM Peak	Weekday Total	Weekday Peak Hours	Hourly Frequency during PM Peak
62/76	10	0	0	-	-	-
62	11	7	2	25	11	3
76	10	7	2	18	11	2
67	24	10	2	18	11	2
350	29	10	2	-	-	-
TOTAL	84	34	8	61	33	7

- Bus Network Redesign is approved as of Spring 2023
- Due to proposed route consolidation/elimination, estimated 20 fewer buses will use the Access Road in a service day
- Estimated 7 bus trips during the PM Peak Hour
- *Next step: Study the time-savings benefit of a Bus Only lane*