



MARTHA'S VINEYARD COMMISSION

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**DRI 633 – Oak Bluffs Roundabout
Bus Stops and Associated Walkways**

January 28, 2012

This technical memo prepared by MVC staff addresses the proposed bus stops at the Oak Bluffs Roundabout, for use by the Commission in evaluating the location of stops, the use of pullouts, and other related issues it had conditioned related to bus stops as part of its DRI approval.

MassDOT has indicated that they would like official confirmation as to the location of the bus stops and the possibility of pullouts within the coming week in order to allow preparation of the final plans in time to advertise the project on April 7 (to allow construction to start this fall and be substantially completed next spring, thereby avoiding having a partially completed project during the summer season). They would like to receive any other recommendations as soon as possible.

The aim is to discuss this at LUPC on Monday, January 30 and have a decision by the Commission on Thursday, February 2, with respect to the location of stops and pullouts. MassDOT needs this information in order to prepare a detailed layout, which would be reviewed later by LUPC as part of the landscaping plan.

Background

When MassDOT builds a project using federal funds, it must meet certain federal requirements. Among these is that any improvements be compliant with the Architectural Access Board and the Americans with Disabilities Act. Among these is the requirement that if buses stop within the project area, ADA-compliant platforms be provided for loading and unloading, as well as ADA compliant walkways to the crosswalks.

Earlier in the roundabout design process, the VTA indicated that the current informal setup allows them to pull off onto all eight shoulders of the intersection. Since the roundabout plans would formalize the locations of bus stops, they requested six formal stops, each of which would have a pullout to allow buses to get out of the way of traffic. This was included in the first plans presented to the Martha's Vineyard Commission for DRI review.

When the MVC approved the roundabout, it was with the proviso that the infrastructure related to bus stops be scaled back as much as possible. The following are the conditions in the MVC decision related to bus stops.

Landscaping

Bus platforms, sidewalks, and walkways shall be as small as possible consistent with FHWA minimum requirements and shall be in materials that make them visually recede and harmonize with the rural character of the area.

Bus Stops

The infrastructure related to the bus stops (pull-offs, and related landing areas, sidewalks, walkways, etc.) shall be substantially reduced in area and impact with a revised plan to be submitted to and subject to the approval of the Commission.

The revision to the plan shall include, but is not limited to, the following changes:

- *Providing only the minimum required ADA standards, given the low pedestrian usage of the area.*
- *Reducing the number of stops to four.*
- *Locating stops immediately adjacent to the SUP as much as possible to minimize the need for additional infrastructure.*
- *Reducing landing areas for loading and off-loading passengers to the minimum required by ADA (10-foot long strips according to the latest information from MassDOT).*
- *Eliminating those walkways that are not needed to provide the basic required connections to the Shared Use Path and the basic required access for passengers transferring from one bus to another.*
- *Preserving as many mature trees and as much existing vegetation as possible.*
- *Having walkways set back from the roadway with a vegetated buffer and with sloping curbs, rather than concrete sidewalks with vertical curbs, wherever possible.*

MassDOT then prepared 75% design plans showing six bus stops with the understanding that – per the Commission’s DRI decision – two would be eliminated. At each of these locations, there is a 10-foot wide hard-surfaced area along the roadway edge leading to the adjacent pedestrian walkway or SUP. Buses would stop in the travel lane at the hard-surfaced areas, allowing passengers to load and unload.

In recent weeks, there have been discussions with MVC staff, VTA staff, representatives of the Town, and MassDOT as to the location of bus stops as well as whether pullouts are warranted.

Location of Bus Stops

The VTA has agreed with reducing the number of stops to four. After analyzing several options in conjunction with MVC staff, the VTA now recommends that the four stops be located at each of the approach lanes of the intersection.

These locations offer the following advantages.

- It is the typical location for bus stops at intersections, so people will understand where they are and how they work.
- If there is no pullout, a stopped bus would not potentially back up traffic into, and block, the roundabout.
- It avoids having one stop across the street from the other which, if there are pullouts, would result in a very wide expanse of pavement at such locations.
- If there are pullouts (as recommended by the VTA), this configuration of stops would have the least impact on vegetation.

- It avoids having a bus stop in the southwest corner of the intersection, which would have been the most problematic location for a stop, and especially for a pullout. A stop here would have required re-grading and the loss of about a 6 to 12 trees between the road and SUP, resulting in a significant impact on the character of Barnes Road.

Walkways

Irrespective of whether or not there are bus stops in this location, it could be argued that there should be a crosswalk at each splitter island to provide a safe way to cross each road. A crosswalk must be connected to an ADA compliant walkway at each end. This would suggest that, even in this area of relatively limited pedestrian traffic, providing crosswalks at each road and walkways around the intersection would provide greater pedestrian and bicyclist convenience and safety compared to an option where some crosswalks or sections of walkway are missing.

MassDOT has indicated that if the community so desires, it would eliminate those walkways on the north side of the Edgartown – Vineyard Haven Road that are not needed to meet ADA requirements to serve bus stops, given that this is a remote rural area with relatively little pedestrian traffic and low likelihood of significant increases in the near future based on the adjacent and nearby land uses. If any walkways are eliminated, MVC staff recommends that the design of the area alongside the roadway ensure that the occasional pedestrian who walks there can do so safely and that the layout provide for the possible addition of the missing walkways and crosswalks in the future.

Locating bus stops at all four approaches would require walkways and crosswalks around the whole intersection.

MassDOT has agreed to set the walkways far enough from the road so that there is a vegetative buffer between the walkway and road where possible. This will allow curbs to be sloped curbs rather than the originally planned vertical granite curbs needed when a sidewalk is adjacent to the road. The one exception where the walkway will be right next to the road is a portion of the northeast corner between the crosswalks, where the narrow right-of-way there does not allow setting the walkway farther back.

Bus Platforms

If the buses stop in the travel lane, the platforms can be reduced to the minimum 10' required by ADA, since the bus can pull up so either the front or the rear door aligns with the platform. If a pullout is provided that is the length of a bus, the platform has to extend from the front of the front door to the back of the back door of the largest bus, namely about 30 feet. Note that in the original plans reviewed by the Commission, the platforms were 60 to 80 feet long.

Bus Pullouts¹

During recent discussions, the VTA maintains that pullouts at each of the bus stops are necessary for the following reasons.

¹ Also called "bus pulloffs", "bus bays", or "bus laybys"

- They would allow buses to stop out of the travel lane so they would not block traffic. The VTA has received complaints from drivers about having to wait behind a stopped bus and the police favor having buses stop out of the travel lane if possible. The duration is relatively short for passenger boarding, but could be longer for loading/unloading bikes, for handicapped passengers, and for bus layovers awaiting connecting buses.
- This is an important transfer point in the bus network, sometimes requiring buses to wait for a connecting bus. Most transfers between routes take place in locations where buses can wait without affecting traffic (e.g. Church Street in Edgartown, SSA bus loop in Vineyard Haven, Cronigs Up-Island).
- Taking advantage of the roundabout project to install pullouts now would provide for future growth in bus ridership and traffic.
- It is possible to install well-designed pullouts as part of the roundabout project at no cost to Vineyard taxpayers.
- If there are no pullouts, buses needing to wait for a long time (e.g. to allow for transfers) would presumably continue to pull onto the side of the road rutting the surface and making it impossible for the grass to grow, whereas if there are adequate pullouts, the roadside grass could grow properly.
- Installing formal bus stops with bus pullouts here could serve as a prototype for similar installations across the Island, allowing their impact to be assessed before considering them in more scenic locations.

The VTA has suggested that even if there had not been a roundabout proposal, it would have proposed installation of bus pullouts at this location, mainly to accommodate buses waiting for a few minutes to allow passengers to make connections to other routes. If one passenger on each of two routes that meet here to transfer to the other route, both buses have to wait wish

During the review of the roundabout, several Commissioners raised the following concerns about providing bus pullouts (referring to the plan being reviewed at that time).

- They would add to the paved area of the roundabout project and the project's overall visual impact.
- They would lead to the removal of a large number of mature trees and potentially eliminate the canopy of trees that now exists over the section of Barnes Road south of the intersection.
- This is and is likely to remain a rural area with little pedestrian traffic and few people boarding or alighting buses.²
- They add to the cost of the project.
- There has been no community consensus about the desirability of providing bus pullouts across the Island. To do so would have a negative impact on the character of the Island's rural roads. If they are to be provided, they should only be in locations of greatest need, and it is not clear that this area would qualify.

² *A one day survey carried out by the MVC on a typical peak summer day (August 3 2011, 8:30 a.m. to 4:30 p.m.) showed that of the 66 buses that passed through the intersection, 13 stopped; these involved 20 passengers, of whom only 4 transferred from one bus to another. The VTA noted that this survey did not include workers travelling earlier in the morning or later in the afternoon. The VTA has estimated that as many as a hundred people transfer there per day.*

MassDOT clarified that there was no requirement to include pullouts with bus stops, though they could be useful. It agreed to having the buses stop in the travel lane, though it would install pullouts if the community wished. It noted that the VTA could continue to respond to flagged requests in any location and that buses could still pull off onto shoulders. MassDOT subsequently prepared the 75% design plans for the roundabout, which do not include any bus pullouts and include 10-foot platforms at bus stops.

In order to help resolve the issue, the MVC staff sought objective standards for when bus pullouts are warranted and how the issue is dealt with in other areas, and analyzed the pros and cons of pullouts at each bus stop (see Appendix). It would appear that from Nantucket to Boston, it is common practice that formal bus stops have buses stopping in the travel lane. The most useful guidance document to help determine whether or not a pullout is warranted in a given location is: *Transit Cooperative Research Program (TCRP) Report 19 Guidelines for the Location and Design of Bus Stops*. It includes criteria about the volume of traffic on the road, the number of buses, the typical duration of stops, the number of passengers boarding/alighting, and whether buses lay over at this location.

Several Town of Oak Bluffs officials and a selectman involved in the recent discussions have indicated that they are favorable to the installation of pullouts provided their locations and design minimize their impacts. No formal comment has been received from the Town.

If there are pullouts, the intention would be to treat the area between the shoulder of the paved roadway and bus platform in a way that contrasts with the roadway and blends visually into the natural areas, at least in color. Materials could be:

- compacted gravel, which would have the least impact from some points of view but would require more maintenance,
- macadam with a surface in small stones, either from the Island or to match the stones of the Island., or
- KBI Flexi-pave (<http://www.kbius.com/productinfo.htm>) which is highly porous and could be colored,
- cobble-stamped colored concrete as proposed for the apron of the central island.

It might be desirable choose a darker color, similar to earth or dried leaves, that would visually recede rather than the light beige color of Island stone or sand, which tends to stand out. These details can be resolved in the landscaping plan.

Enclosed are sketches of the layout without and with pullouts, prepared by MVC staff. They are roughly to scale, but need to be checked by MassDOT.

MVC staff recommends that at each of the four bus stops, MassDOT be asked to ensure that the walkways are set back 9 feet from the fog line. This is similar to what they now show or has already been suggested. This would allow for pullouts to be added now or sometime in the future without changing the overall design. It also provides for a good size vegetative buffer where there is no pullout.

<i>Analysis of the Possibility of Bus Pullouts (Based on TCRP Guidance) at Each Approach Lane</i>					
	<i>Minimum to warrant pullout</i>	<i>Barnes southbound³</i>	<i>Barnes northbound</i>	<i>Ed-VH Road eastbound</i>	<i>Ed-VH westbound</i>
<i>Traffic in the curb lane during the peak hour</i>	<i>exceeds 250 vehicles</i>	<i>a.m. - 252 p.m. - 402</i>	<i>a.m. - 342 p.m. - 426</i>	<i>a.m. - 480 p.m. - 495</i>	<i>a.m. - 428 p.m. - 399</i>
<i>Traffic speed</i>	<i>40 mph or more</i>	<i>20-30 mph</i>	<i>20-30 mph</i>	<i>20-30 mph</i>	<i>20-30 mph</i>
<i>Bus volumes per peak hour in the lane of the roadway</i>	<i>10 or more</i>	<i>1</i>	<i>2</i>	<i>2 to 5</i>	<i>2 to 6</i>
<i>Passenger boardings per hour at that stop</i>	<i>exceed 20 to 40</i>	<i>1 to 2⁴</i>	<i>1 to 4</i>	<i>1 to 6</i>	<i>1 to 8</i>
<i>Average peak-period dwell time</i>	<i>exceeds 30 seconds per bus</i>	<i>Buses often wait for 3-5 minutes to make connection</i>	<i>Typically 7-10 seconds. Could be greater if a many passengers (especially if paying cash) if loading a bike (typically 30 seconds) or if loading a wheelchair (typically 3 minutes). Any bus could have to wait a few minutes for another bus to make a timed transfer.</i>		

Note that the VTA peak hour is typically after 6 p.m., which is after the peak hour for traffic.

Based on the TCRP criteria for when installation of pullouts is warranted, it would appear that all four locations exceed the threshold traffic volumes at peak hour in the summertime, though they have lower bus volumes than the thresholds. Presumably, these volumes will increase in the future.

Barnes Road Southbound: The VTA has indicated that this is the highest priority for accommodating a pullout to accommodate buses waiting 3-5 minutes to make connections. Adding a pullout might require the removal of a few trees, however, this should not be very noticeable in that whole area is heavily wooded.

Barnes Road Northbound: It might be possible to accommodate a pullout with little or no impact on trees, but MassDOT has to verify whether there is room enough north of one large caliper tree; if not it would have to be removed.

Ed-VH Road Eastbound: The VTA has indicated that this is their second priority for operational reasons. It should be possible to accommodate this without affecting vegetation, although it might require shifting the SUP over a few feet (which may affect vegetation).

³ *This refers to the numbers in the lane heading southbound (i.e. towards the airport) in the lane approaching the intersection from downtown Oak Bluffs.*

⁴ *Estimated. The lower number is based on the MVC survey. The higher number is based on the VTA estimate of 100 passengers per day, assuming 20 at peak hour distributed proportionally by the number of buses at each stop.*

Ed-VH Road Westbound: It should be possible to accommodate s pullout without affecting vegetation. There might be construction issues related to the sloping ground and operational issues related to the presence of the Tilton Rental driveway.

If some or all four pullouts are installed, they would have less impact than the bus pullouts in the proposal originally submitted to the Commission:

- There would be four rather than six,
- They would be shorter – about 40' long rather than 60 to 80 feet long (plus angled entries/exits),
- They would be located where there would be relatively little impact on trees,
- They would be staggered with only one in each stretch of roadway.
- They would be treated with special materials to contrast with the roadway, rather than as an asphalt extension of the roadway.

Appended are the original proposal submitted at the beginning of the DRI process and schematic sketch plans prepared by MVC staff showing the intersection in its context indicating:

- the existing situation,
- bus stops at each approach without pullouts,
- bus stops at each approach with pullouts.

Appendix 1 - Bus Pullouts – Guidance and Experience in Other Areas

Massachusetts Guidance: The *MassDOT Design Guide* provides little written guidance about when to use pullouts. *Section 6.8.3 Intersection Design - Transit Stop Considerations* says: “*Bus pullouts, under some circumstances, may be appropriate at intersection areas. However, the drawback of pullouts—difficulty for the bus in reentering the traffic stream—can be problematic near intersections.*”

U.S. Guidance: The Federally (FTA) supported Transportation Research Board’s *Transit Cooperative Research Program Report 19 Guidelines for the Location and Design of Bus Stops* provides the following guidance about the use and design of bus stops.

Advantages of bus pullout

- *Allows patrons to board and alight outside the travel lane.*
- *Provides a protected area away from moving vehicles for both the stopped bus and the bus patrons.*
- *Minimizes delay to through traffic.*

Disadvantages of bus pullout

- *May present problems to [bus] drivers when attempting to re-enter traffic, especially during periods of high roadway volumes.*
- *Is expensive to install compared to curbside stops.*
- *Is difficult and expensive to relocate.*

Bus bays should be considered at a location when the following factors are present:

- *Traffic in the curb lane exceeds 250 vehicles during the peak hour,*
- *Traffic speed is greater than 40 mph,*
- *Bus volumes are 10 or more per peak hour on the roadway,*
- *Passenger volumes exceed 20 to 40 boardings an hour,*
- *Average peak-period dwell time exceeds 30 seconds per bus,*
- *Buses are expected to layover at the end of a trip,*
- *Potential for auto/bus conflicts warrants separation of transit and passenger vehicles,*
- *History of repeated traffic and/or pedestrian accidents at stop location,*
- *Right-of-way width is adequate to construct the bay without adversely affecting sidewalk pedestrian movement,*
- *Sight distances (i.e., hills, curves) prevent traffic from stopping safely behind a stopped bus,*
- *A right-turn lane is used by buses as a queue jumper lane,*
- *Appropriate bus signal priority treatment exists at an intersection,*
- *Bus parking in the curb lane is prohibited, and*
- *Improvements, such as widening, are planned for a major roadway. (This provides the opportunity to include the bus bay as part of the reconstruction, resulting in a better-designed and less-costly bus bay.)*

Note: It is not clear in the guidance whether a single criterion is enough to warrant introducing pullouts, or whether a combination of criteria would be needed.

New Jersey Guidance: The New Jersey DOT Highway Design Manual Section 6.10.02 notes that: *“Near side [i.e. before an intersection] bus turnouts create conflict with right turning traffic, obscure pedestrian view of oncoming traffic and may obscure a driver’s view of signs, traffic control devices and pedestrians.”*

Nantucket Experience: Nantucket does not use flagged stops, only formal bus stops. The Transportation Planner of the Nantucket Planning and Economic Development Commission estimates that fewer than 10% of these stops have pullouts. In the vast majority of cases, the buses stop in the travel lane. There are four bus stops at the Nantucket roundabout; one of the two heavily used stops has a pullout; at the three others, the buses stop in the travel lane.

Cape Cod Experience: The Cape Cod Regional Transit Authority also works mainly with flagged stops. It doesn’t have a lot of formal stops and few if any bus pullouts. Buses almost always pull off the roadway onto the shoulder. The RTA does not approve requests for new stops without the possibility of pulling off roadway.

Boston Experience: Boston has a much greater intensity of transit vehicles as well as traffic than the Vineyard does. There, buses and streetcars typically stop in the travel lane, requiring vehicles behind the bus to wait, even though there is a high frequency of buses/streetcars, a high number of people getting on and off at each stop, and there is much greater traffic to be impacted. Buses stop away from the curb, separated by parked cars, even where it would have been easy to provide a pullout by removing a few parking spaces.



Existing Situation



Bus Stops at each approach – without pullouts



Bus Stops at each approach – with pullouts