

FUNCTIONAL DESIGN REPORT

BRUCE FREEMAN RAIL TRAIL PHASE 2B ACTON & CONCORD, MA

Prepared for:

**The Towns of Acton & Concord for submittal to the
Massachusetts Department of Transportation**

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1.0 INTRODUCTION/ BACKGROUND

The Concord Rotary project is not currently on the Transportation Improvement Plan (TIP) Long Range Plan. As a result of this, the Bruce Freeman Rail Trail Phase 2 has been programmed on the State Long Range TIP.

MassDOT is committed to providing the 25% design for the BFRT Phase 2B up to and including the presentation of the project at a BFRT Phase 2B Design Public Hearing. At that point the design will be advanced by the Towns, for construction by MassDOT through the TIP process. The BFRT Phase 2B includes the rail trail multi-use path crossing over Route 2, the wildlife crossing under Route 2, and the rail trail from the Acton Sports Center in Acton to and including the crossing of Commonwealth Avenue in Concord.

Conceptual design of the rail trail and Route 2 crossing was included in the Route 2 Concord Rotary project as part of the environmental impact analysis. However, it was not included as a separate project with a separate schedule, public participation, 25% submission, review process and Design Public Hearing.

AECOM has now been directed by MassDOT to advance the BFRT Phase 2B forward as a separate project including a 25% design and a Design Public Hearing. This will require additional coordination meetings with MassDOT, the Towns of Acton and Concord and the save holders of the Bruce Freeman Rail Trail. This will also require the preparation of a revised 25% design and preliminary ROW plan sets for the rail trail. In addition, a bridge type study, geotechnical report and bridge sketch plans will be prepared for the proposed bridge crossings, and retaining walls associated with the rail trail approaches to the proposed bridges.

The inclusion of the Nashoba Brook wildlife crossing as well as additional subsurface investigations for foundation designs will require additional coordination with the environmental permitting agencies including the Concord Natural Resources Department representatives, U.S. Fish and Wildlife Service, Mass Natural Heritage and MassDOT as part of the Early Environmental Coordination.

A functional design report (FDR) has been prepared for this project to determine appropriate operations at crossings and to maintain safety. The report includes an assessment of existing roadway and traffic conditions, review of collected traffic volume and accident data, traffic signal warrant analysis, traffic accident analysis, and roadway crossing evaluation. The report also presents a traffic management plan for construction. The project area is shown in Figure 1.

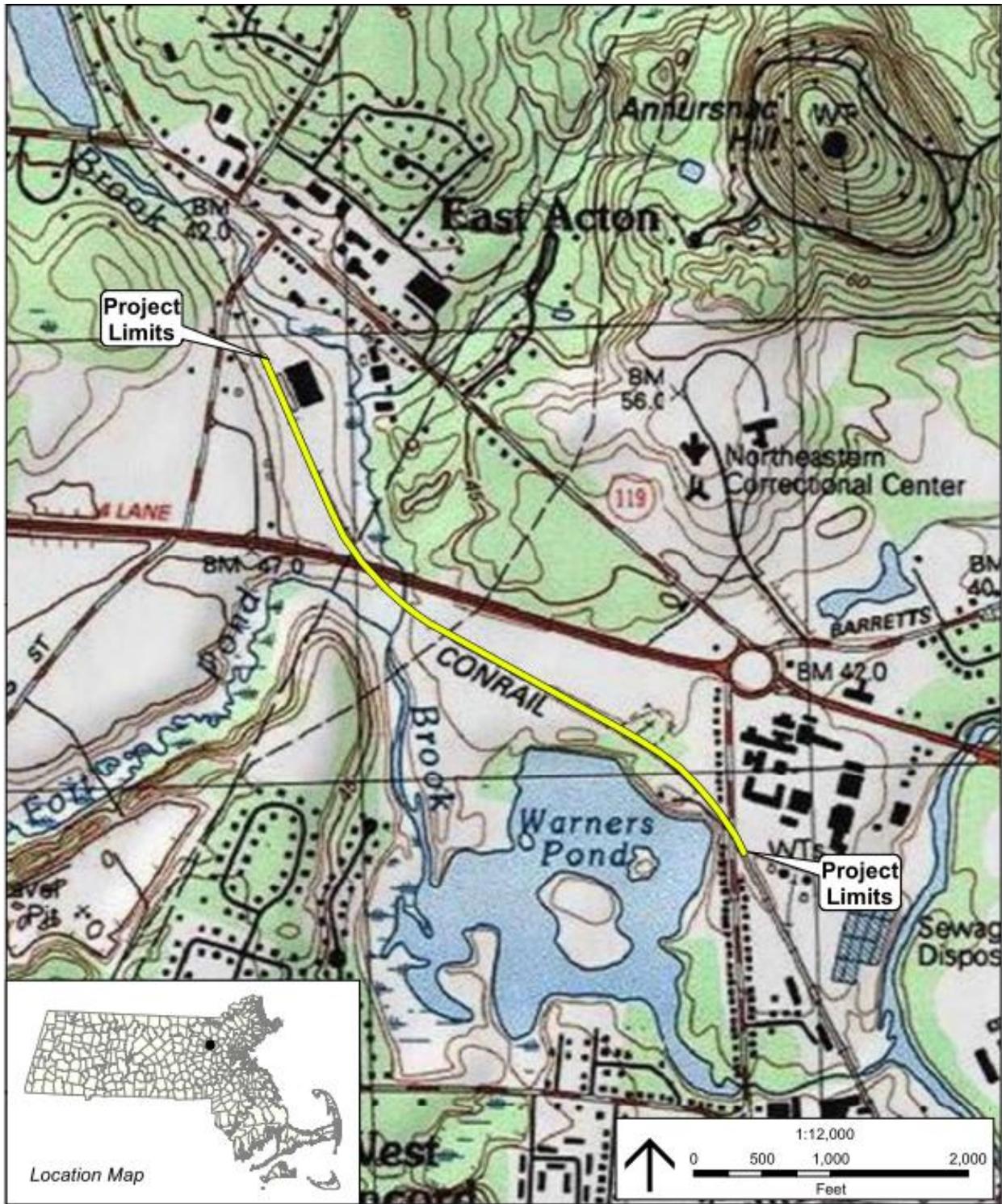


Figure 1: Locus Map – Project Area

2.0 EXISTING CONDITIONS

2.1 Rail Trail Route Description

The proposed rail trail will run in a north-south alignment in an abandoned rail right of way starting near the Teamworks Action Sports Facility after the rail right of way crossing at Wetherbee Road in Acton, over Route 2 and Nashoba Brook, and end after crossing Commonwealth Avenue in Concord. From the sports facility near the Acton/Concord town line the rail trail will run in the former rail right of way and cross Route 2 within the former rail right of way. After the Route 2 crossing, the rail trail will continue over Nashoba Brook via an existing rail bridge and proceed along the rail right of way through Concord through Commonwealth Avenue. In addition, nearby roadway descriptions have been provided based on the project study area and traffic data collected as part of the original Concord Rotary project.

2.2 Geometric Conditions at Rail Trail Roadway Crossings

Each rail trail crossing and adjacent roads are described below traveling through the project study area.

Route 2

Route 2 is a rural arterial roadway that generally runs in an east-west direction. Route 2 generally provides two travel lanes in each direction, and exclusive turning lanes at major intersections. Typically, the major intersections are controlled with traffic signals. At minor intersections, side street traffic is typically controlled with STOP signs, and only right-turning movements are permitted. The posted speed limit on Route 2 is generally 45 MPH, though in the immediate vicinity of the Concord Rotary, the posted speed limit on the approaches to the Rotary is reduced to 25 MPH. There are no pedestrian sidewalks along Route 2 in the location preceding or following the proposed rail trail crossing. The rail trail crossing at Route 2 Eastbound will be east of the School Street intersection and Route 2 Westbound will be east of the Wetherbee Street intersection. Both School Street and Wetherbee Street approaches have stop control. The rail crossing will be within the rail right of way along Nashoba Brook and will cross the 33 foot wide Route 2 Westbound, a 30 foot median, and 33 foot wide Route 2 Eastbound.

Nashoba Brook Wildlife Crossing

Currently, there is no existing bridge or culvert structure crossing Route 2 at the proposed wildlife crossing. Route 2 is a rural arterial roadway that generally runs in

an east-west direction. Route 2 generally provides two travel lanes in each direction, and exclusive turning lanes at major intersections.

Commonwealth Ave

Commonwealth Avenue is a collector roadway that connects West Concord and Route 2. Commonwealth Avenue generally runs in a north-south direction, and provides one lane of travel in each direction. The posted speed limit on Commonwealth Avenue is 30 MPH. A sidewalk is provided on both sides of Commonwealth Avenue at location of crossing. The proposed rail trail will approach and cross Commonwealth Avenue south of the Concord Rotary near a secondary prison driveway.

Minor Streets

School Street in Acton is a collector roadway that generally runs in a north-south direction between Route 2 and Lawsbrook Road. The northern terminus of School Street is Route 2. Land use along School Street is primarily residential.

Wetherbee Street in Acton is a collector roadway that generally runs in a north-south direction. Wetherbee Street connects Route 2 with Great Road (Route 2A/119) in Acton.

2.3 Existing Traffic Volume Data

Traffic volume data were collected to assess the operational characteristics within the study area as part of the Concord Rotary project. The existing daily two-way traffic volumes on several of the study roadways were obtained through the placement of Automatic Traffic Recorder (ATR) machines. The majority of the ATR counts were conducted over a 72-hour period from Tuesday April 1 – Thursday April 3, 2008. An additional ATR count on Route 2 was conducted over the 72-hour period from Tuesday October 28 – Thursday October 30, 2008. In addition to recording traffic volumes, the ATR count in October also recorded the classification of each vehicle on the roadway.

Automatic Traffic Recorder (ATR) counts were conducted for 24 hours in April 2008 and October 2008 at the following locations in Concord:

- Route 2 Eastbound and Westbound west of the rotary , and
- Commonwealth Avenue.

The summary of the existing Average Daily Traffic (ADT) information is shown in Table 1. The complete ATR data are contained in Appendix A.

Table 1: Existing (2008) Traffic Volumes

Roadway	ADT	AM Peak Hour Volume (two-way)	K-factor¹	Directional Distribution of AM Peak Hour Traffic	PM Peak Hour Volume (two-way)	K-factor¹	Directional Distribution of PM Peak Hour Traffic
Route 2	39,718	3,110	9.8%	63% EB 37% WB	3,323	9.2%	41% EB 59% WB
Commonwealth Avenue	8,403	553	9.0%	58% NB 42% SB	877	9.0%	61% NB 39% SB

¹ Percent of daily traffic that occurs during the peak hour

The traffic counts show that Route 2 Westbound and Eastbound experience the highest volumes in the study area with an ADT of 39,718 and peak hour volumes between 3,110 and 3,323. The peak direction for Route 2 is eastbound in the morning and reversing to westbound in the afternoon. The peak direction for Commonwealth Avenue is northbound for the morning and afternoon.

Manual turning movement counts (TMCs) were conducted from 6:00 AM to 10:00 AM and 3:00 PM to 7:00 PM in April 2008 and October 2008 at the following study areas:

- Route 2/ School Street (Eastbound Side),
- Route 2/ Wetherbee Street (Westbound Side), and
- Commonwealth Avenue.

The majority of the TMCs were conducted on Tuesday April 1, 2008 and Wednesday April 2, 2008. Additional TMCs were performed on Thursday October 30, 2008. Based on these TMCs, the morning and afternoon peak hours of the roadway network were determined to occur from 7:30-8:30 AM and 5:15-6:15 PM.

The data collected included passenger cars, trucks, bicycles and pedestrians. The average weekday percentage of heavy vehicles (trucks) during the AM and PM peak hours within the study area was 2.3%. Generally, the percentage of trucks was higher during the AM peak hour.

In order to determine if any of the traffic volume data needed to be adjusted to account for seasonal fluctuation within the area, the most recent MassDOT seasonal data were researched. The MassDOT seasonal data revealed that traffic volume data collected during the months of November are higher than average month conditions. Based on this, the observed volumes did not need to be adjusted. This provides a conservative (or above average) analysis condition.

Tables 2 and 3 summarize the peak hour counts at each intersection and the average weekday vehicular classification.

Table 2: Summary of Peak Hour Counts at Each Intersection

Intersection Location	Total Intersection Volume (vehicle trips per hour)	
	AM Peak Hour	PM Peak Hour
Route 2 / School Street (EB side)	2,141	1,380
Route 2 / Wetherbee Street (WB side)	1,237	2,048
Commonwealth Avenue	1,134	1,336

Table 3: Average Weekday Vehicular Classification Summary

Route 2, east of Baker Avenue Extension	Number	Percent
Passenger Vehicles	33,054	85.5%
Light Trucks	4,723	12.2%
Heavy Trucks	889	2.3%
Total	38,666	100.0%

2.4 Accident Data

Accident reports were obtained from MassHighway for each of the study intersections for the five most recent years on record (2003-2007). These data are summarized in Table 3. Crash rates averages were calculated per MassHighway methodology at each study intersection, based on the entire five-year period and also for the three most recent years. The crash rate worksheets are contained in Appendix B. The most recent statewide and district averages published by MassHighway indicate the statewide average crash rate is 0.60 for unsignalized intersections and 0.80 for signalized intersections. The District 4 (which includes the Town of Concord) average crash rate is 0.58 for unsignalized intersections and 0.78 for signalized intersections. The District 3 (which includes the Town of Acton) average crash rate is 0.69 for unsignalized intersections and 0.87 for signalized intersections.

As indicated in Table 4, below, the following intersections have all experienced a crash rate greater than the MHD District average for signalized intersections in the latest 3 years:

- Route 2 / School Street/Wetherbee Street
- Route 2 / Concord Rotary
- Commonwealth Avenue / Lawsbrook Road

At the locations along Route 2, the most prevalent crash type was rear end accidents. The high number of rear end accidents is likely due to the high travel speeds on Route 2 in combination with unexpected stops at the signalized intersections. When comparing the 5-year average crash rate to the latest 3-year crash rate, the number of crashes appears to be increasing in more recent years at the following intersection:

- Commonwealth Avenue / Lawsbrook Road

The average crash rate at each of these intersections during the past 5 years is below the MHD District average, while the average crash rate during for the most recent 3 years exceed the MHD District average. Further study may be required to determine the cause of this apparent increase in the number of accidents.

Table 4: Accident Data Summary (2003 – 2007)

	Route 2 at Reformatory Circle					Route 2 at School St / Wetherbee St					Commonwealth Ave at Lawsbrook Road				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
<i>Severity</i>															
Property Damage	29	38	42	53	31	2		2	1		1		1	4	3
Injury	6	5	9	8	15		1	1			1			1	1
Hit and Run															
Fatality															
Unknown	1	7	4	2	5			1							
<i>Crash Type</i>															
Rear End	18	23	25	22	25	1	1	3	1		1	1		1	
Angle	12	11	11	22	4			1						3	3
Head-On				1											1
Sideswipe	3	8	10	11	7	1							1	1	
Other/Unknown	3	8	9	7	15										
<i>Time of Day</i>															
6 AM – 10 AM	11	9	15	17	15		1							2	3
10 AM – 4 PM	10	23	17	15	9	1		1			1	1		2	1
4 PM – 7 PM	7	9	12	12	11	1		2					1		
7 PM – 6 AM	8	9	11	19	16			1	1					1	
<i>Roadway Condition</i>															
Dry	31	43	47	47	45	2	1	3	1			1		2	4
Wet	4	5	8	15	5			1					1	3	
Snow/Ice		1			1						1				
Other/Unknown	1	1		1											
<i>Season</i>															
Dec – Feb	7	11	12	23	11	1					1	1		2	1
Mar – May	8	16	8	12	6				1				1	2	2
Jun – Aug	11	11	17	18	15	1	1	2							
Sep – Nov	10	12	18	10	19			2						1	1
<i>Light Conditions</i>															
Daylight	28	42	43	42	40	2	1	3	1		1	1		5	4
Dawn/Dusk	2		2	6	3										
Dark (unlit)	1	3	2	3	5			1					1		
Dark (lit)	4	4	6	11	2										
Unknown	1	1	2	1	1										
Total	36	50	55	63	51	2	1	4	1	0	1	1	1	5	4
3-Year Average						1.67					3.33				
3-Year MHD Crash Rate						0.11					0.65				
5-Year Average						1.60					2.40				
5-Year MHD Crash Rate						0.11					0.47				

Source: MassDOT

2.5 Existing Conditions Capacity Analysis

Capacity analyses were conducted to assess the quality of traffic flow at the study intersections. This was performed for the 2008 Existing conditions, the 2015 and 2030 No-Build Conditions, and each of the three Build Alternatives in the year 2030.

Level of Service Criteria

The capacity analysis was conducted using the procedures of the 2000 Highway Capacity Manual (HCM) using the Synchro/SimTraffic (version 7) software package. The capacity analysis utilizes traffic volumes, geometrics, and traffic controls at an intersection to determine a Level of Service (LOS) rating from A through F indicating how the intersection is expected to operate, or the quality of the driving conditions. LOS A represents the best operating conditions or little to no delay, while LOS F represents the worst operating conditions or very high delay. LOS E represents an intersection operating at capacity or at the limit of acceptable delay.

Level of service for signalized intersections is based on the average control delay in seconds per vehicle approaching the intersection. The methodology takes into consideration the effects of signal type, timing and phasing, and geometrics when determining the delay for the intersection approaches and the intersection as a whole.

Level of service at an unsignalized intersection is defined as the delay experienced by each minor movement, since the major movements are considered to be uninterrupted. The LOS for unsignalized intersections is not defined for the intersection as a whole.

Table 5 provides the level of service and the delay threshold criteria for both signalized and unsignalized intersections.

Table 5: Level of Service Criteria – Intersections

<u>Category</u>	<u>Delay (second per vehicle)</u>	
	<u>Unsignalized Intersections</u>	<u>Signalized Intersections</u>
LOS A	0.0 – 10.0	0.0 – 10.0
LOS B	10.1 – 15.0	10.1 – 20.0
LOS C	15.1 – 25.0	20.1 – 35.0
LOS D	25.1 – 35.0	35.1 – 55.0
LOS E	35.1 – 50.0	55.1 – 80.0
LOS F	> 50	> 80

source: Highway Capacity Manual, Transportation Research Board, Washington DC; 2000

Operating Conditions

The traffic capacity results for the existing conditions are shown in Table 6 and the complete analyses are contained in the Appendix C. The results also provide the queue lengths for each approach movement; both the average queue and the 95th percentile queue are reported in the tables below.

As indicated in the following tables, the Concord Rotary currently experiences significant vehicular delays and queues during both the weekday morning and afternoon peak hours. Additionally, several of the signalized intersections along the Route 2 corridor are operating at or over capacity.

Table 6: Existing Conditions / Intersection Capacity Analysis Summary

Location	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
	LOS ¹	Delay ²	Queue Length		LOS ¹	Delay ²	Queue Length	
			Avg. ³	95th ⁴			Avg. ³	95th ⁴
Unsignalized Intersections								
Route 2/School Street/Wetherbee Street								
Right turns from School Street NB	C	23.6	-	4	C	17.3	-	17
Right turns from Wetherbee Street SB	C	15.6	-	17	D	32.3	-	45
Route 2 Rotary								
Right turns from Route 2 EB	F	116.4	>1500	587	F	>120	761	1267
Right turns from Commonwealth Ave NB	F	>120	111	935	D	27.2	238	408
Right turns from Route 2 WB	F	>120	878	>1500	F	>120	>1500	>1500
Right turns from Barrett's Mill Road SB	B	12.6	-	-	F	>120	436	692
Right turns from Route 2A/119 EB	F	>120	>1500	>1500	F	>120	407	612
Commonwealth Ave/Prison Parking Lot								
EB Left from Prison Parking Lot	B	13.1	-	3	C	20.9	-	57
NB on Commonwealth Avenue	A	0	-	1	B	12.1	-	21

¹ LOS – Level of Service
² Delay – average delay in seconds per vehicle
³ Avg. = Average Queue length (measured in feet)
⁴ 95th = 95th percentile Queue length (measured in feet)

3.0 FUTURE CONDITIONS-PROPOSED PROJECT

3.1 Design Criteria

The trail will have a design speed of 18 MPH. Design speeds are based on Chapter 11 - Shared Use Paths and Greenways of the 2006 MassDOT Project Development Guide and the 2012 AASHTO Guide for the Development of Bicycle Facilities (4th edition).

The trail surface will be hot mix asphalt (HMA) pavement that is 12 feet wide with 2-foot wide stone dust or paved shoulders. The maximum grade along the path will not exceed 4.5% and the path will have a 1.5% design typical cross slope to one side.

3.2 Alternatives Analysis

As part of the Route 2 Concord Rotary Project, AECOM advanced the conceptual design of the BFRT Phase 2B. This included the evaluation of four (4) different alternatives for the BFRT crossing of Route 2 including an alignment: 1) with a bridge over Rte 2; 2) a tunnel under Rte 2; 3) a proposed rail trail bridge over Nashoba Brook, then running along the proposed westbound Rte 2 on-ramp and over the proposed Commonwealth Avenue Grade Separation Overpass Bridge; and 4) along Wetherbee Street and along Route 2A and then over the proposed Commonwealth Avenue Grade Separation Overpass Bridge.

As part of the conceptual design of the Route 2 Concord Rotary project, it was decided that the BFRT crossing of Route 2 should be Alternative 1, a bridge over Route 2 using a rail trail /bike path /pedestrian bridge in the vicinity of the previous at-grade railroad crossing of Route 2.

Various meetings took place and a technical memorandum summarizing the alternatives analysis and evaluation for the four (4) different alternatives was prepared.

No further work is anticipated to investigate the different alternatives.

A Nashoba Brook wildlife crossing under Route 2 has been included in the BFRT Phase 2 project. It is assumed that the wildlife crossing will consist of precast concrete box culvert segments or a precast culvert located on the west side of Nashoba Brook. A type study will has been prepared for the wildlife crossing.

3.3 Proposed Rail Trail

The Bruce Freeman Rail Trail is intended to be used by a variety of users. Bicyclists, roller bladers, joggers, and walkers have traditionally used rail trails. This area will also be attractive to wheelchairs and baby carriages, as it directly serves a populated

area. This portion of the BFRT will be used by people enjoying the physical recreation. Of equal importance is the ability to use this trail to commute to work. The BFRT provides a vital connection to the MBTA via the commuter rail at the West Concord rail stop and also connects some of the major employers and employment locations in the region with residential areas. The timing of commuter use will generally not conflict with primary times for recreational use.

The Acton portion of the BFRT begins between the Teamworks Action Sports Facility after the rail right of way crossing at Wetherbee Road. It continues along the rail right of way and the Acton portion of the BFRT ends at the Acton-Concord town line prior to the Route 2 crossing.

The BFRT continues at the Acton-Concord town line into Concord over Route 2 with a proposed bridge over the existing roadway within the rail right of way. The bridge will allow pedestrian and bicycle traffic to traverse Route 2 with no impact to the vehicular traffic crossing below. In addition to the proposed pedestrian bridge, a proposed box culvert will be constructed beneath Route 2 toward the southeast and the west of Nashoba Brook. During the construction of the culvert, traffic along Route 2 Eastbound and Westbound will be affected. However, traffic impacts during peak hours will be minimized as much as possible.

The trail then proceeds southeasterly after Route 2 toward Nashoba Brook. At this point, the BFRT alignment and construction types will be able to accommodate a future connection to the ballfields along School Street in Acton. There is an existing crossing at Nashoba Brook that will be utilized southeast the Route 2 crossing. The proposed box culvert for will end after crossing beneath Route 2 west of Nashoba Brook.

The trail will continue through the rail right of way through Concord toward Commonwealth Avenue. The trail will cross Commonwealth Avenue near the prison driveway and end in Concord after the roadway crossing. There will be some traffic impacts along Commonwealth Avenue approaching the proposed crossing. Traffic signs, pavement markings and a Rectangular Rapid Flash Beacon have been proposed to alert drivers when pedestrians and bicyclist will be crossing Commonwealth Avenue.

The portion of BFRT proposed will be approximately 5,199 feet along the RR ROW. Slope work within the rail right of way will be necessary for drainage and impacts to the environment will be minimized.

3.4 Future No-Build Conditions

Future No-Build Traffic Volumes

All of the future traffic volume forecasts for this project were conducted by the Central Transportation Planning Staff (CTPS) at the Boston Region Metropolitan Planning Organization (MPO). The CTPS used the most recent traffic data collected for this project to calibrate their regional forecast model with the most recent traffic data available. The CTPS forecast model (the most recent “MetroFuture Hybrid” scenario) incorporates local cities’ and towns’ master plans, and is consistent with regional “smart growth”, which encourages transit-oriented development projects and a higher use of public transportation in the future.

Future No-Build Capacity Analysis

The results of the year 2030 No-Build capacity analysis are summarized in Table 7. As indicated in these tables, the poor operating conditions found under the existing conditions would continue and be aggravated by the additional traffic volume demand expected in the future years.

Table 7: Future Year (2030) No-Build Conditions / Intersection Capacity Analysis Summary

Location	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
	LOS ¹	Delay ²	Queue Length		LOS ¹	Delay ²	Queue Length	
			Avg. ³	95th ⁴			Avg. ³	95th ⁴
Unsignalized Intersections								
Route 2/School Street/Wetherbee Street								
Right turns from School Street NB	E	37.5	-	23	C	19.2	-	19
Right turns from Wetherbee Street SB	C	19.7	-	29	F	68.3	-	84
Route 2 Rotary								
Right turns from Route 2 EB	F	>120	>1500	>1500	F	>120	1269	>1500
Right turns from Commonwealth Ave NB	B	12.0	98	172	D	33.4	280	394
Right turns from Route 2 WB	F	>120	1266	>1500	F	>120	>1500	>1500
Right turns from Barrett’s Mill Road SB	C	17.9	83	149	E	39.4	200	337
Right turns from Route 2A/119 EB	F	>120	>1500	>1500	F	>120	787	1164
Laws Brook Road/Commonwealth Ave								
EB Left from Laws Brook Road	C	16.2	-	84	D	29.5	-	94
WB Through/Right from Comm. Ave	A	0	-	0	A	0	-	0
SB Left from Commonwealth Avenue	D	30.7	-	65	E	39.1	-	119
SB Right from Commonwealth Avenue	A	9.4	-	10	B	12.5	-	26

¹ LOS – Level of Service
² Delay – average delay in seconds per vehicle
³ Avg. = Average Queue length (measured in feet)
⁴ 95th = 95th percentile Queue length (measured in feet)

Since the rail trail will not add traffic to Route 2 and have minimal impacts to Commonwealth Avenue, no significant roadway improvements have been proposed. New signs, pavement markings and a Rectangular Rapid Flash Beacon have been proposed at the Commonwealth Avenue crossing.

4.0 RIGHT-OF-WAY IMPACTS

4.1 Acton

For the Maynard portion of the BFRT, either Acton or MassDOT own the Right-of-Way (ROW).

The first section of the trail starts in Acton and ends at the Acton-Concord town line prior to Route 2, approximately 1,425-feet long. This entire section within Acton is within the Bruce Freeman Rail Trail right of way owned by the Commonwealth of Massachusetts. The Right of Way will be cleared of all vegetation along the path of the rail trail, and the alignment is straight and the profile level.

4.2 Concord

For the Acton portion of the BFRT, either Concord or MassDOT own the Right-of-Way (ROW).

The trail continues from the Acton/Concord line through Concord within the Bruce Freeman Rail Trail right of way owned by the Commonwealth of Massachusetts for approximately 3,725-feet. The trail continues through Concord over Route 2 via a proposed pedestrian bridge and a proposed wildlife will be placed beneath Route 2 via a proposed box culvert. The separation of pedestrians, bicyclists and wildlife will likely provide a reducing in vehicular traffic accident along this corridor of Route 2. The wildlife crossing will only require one temporary and one permanent easement on Commonwealth of Massachusetts and Department of Corrections property.

5.0 TRAFFIC MANAGEMENT DURING CONSTRUCTION

In general, this project does involve work in areas that have active vehicular traffic including Route 2 for the box culvert installation for the wildlife crossing and some impacts at the Commonwealth Avenue crossing. The following two sections briefly describe the expected traffic management that will be in these two areas.

5.1 Route 2 Traffic Management

In order to install the Nashoba Brook Wildlife Crossing beneath Route 2, temporary traffic control plans will be developed for vehicular traffic. Two alternatives were developed for the management of traffic during this construction.

The first alternative utilizes standard temporary traffic control detail provided by MassDOT which include lane and shoulder closures. It would be proposed that two left lane closures would occur simultaneously in Eastbound and Westbound directions in order to install the box culvert under those lanes and the existing median. The right lane and shoulder closures for both the Eastbound and Westbound traffic would also occur simultaneously if possible to complete culvert installation under Route 2. Impacts to abutters and lane closures will take place during the peak hours, but will be minimized at all times.

The second alternative also utilizes standard temporary traffic control details provided by MassDOT which includes median crossovers. Temporary pavement would be placed within the median between Route 2 Eastbound and Westbound as well as north of Route 2 Westbound and south of Route 2 Westbound in two stages. In stage 1, it was proposed that Route 2 Westbound be shifted southerly into the median and part of Route 2 Eastbound while shifting eastbound traffic south slightly. In stage two, Route 2 Westbound traffic would be shifted back slightly north of its original alignment and the eastbound traffic would be shifted north into the median area and part of existing Route 2 Westbound. Once the box culvert installation is complete, traffic will be diverted back to the original alignments for Route 2 Eastbound and Westbound. No lane closures will take place during the peak hours and impacts to abutters will be minimized at all times.

Currently, these two alternatives have been presented to MassDOT and further discussion will be needed to determine which alternative is the preferred construction method for the project as the design submissions progress.

All traffic management plans have been prepared in a manner to provide safe and efficient movements for all facility users (vehicles, bikes, pedestrians) through the construction areas in accordance with the latest Manual on Uniform Traffic Control Devices (MUTCD) and the MassDOT Standard Details for the Development of

Temporary Traffic Control Plans. Police details and flaggers will also be utilized to help facilitate all movements and access as needed, such as temporary lane closures. All necessary traffic control devices such as signs, drums, temporary pavement markings, changeable message signs, and barriers have also been detailed on the plans.

5.2 Commonwealth Avenue Traffic Management

Most of the work at the Commonwealth Avenue crossing will consist of wheelchair ramp installation, signs and pavement markings. No lane closures will take place during the peak hours and impacts to abutters will be minimized at all times. The plans have been prepared in a manner to provide safe and efficient movements for all facility users (vehicles, bikes, pedestrians) through the construction areas in accordance with the latest Manual on Uniform Traffic Control Devices (MUTCD) and the MassDOT Standard Details for the Development of Temporary Traffic Control Plans. Police details and flaggers will also be utilized to help facilitate all movements and access as needed, such as temporary lane closures. All necessary traffic control devices such as signs, drums, temporary pavement markings, changeable message signs, and barriers have also been detailed on the plans.

6.0 ENVIRONMENTAL & HAZARDOUS MATERIALS

The most prevalent risk associated with the proposed use would be potential contact with coal ash associated with the former railroad. Soils that must be excavated during construction will be re-used at or as near as possible to the location of original excavation. Areas along the finished trail where direct human exposure could occur to these soils will be paved or landscaped to prevent direct contact with the coal ash.

The existence of possible hazardous waste sites will be investigated and included as part of the preparation of the Environmental Notification Form (ENF).

7.0 DRAINAGE

In general, new storm drainage structures, such as leaching catch basins, will be installed at low points. Existing drainage patterns are being maintained. There are existing cross culverts along the project which will be maintained and may require modifications.

At proposed trailhead areas the stormwater runoff from the paved area will sheet-flow into a grass-lined swale adjacent to the trail.

8.0 PROPOSED PROJECT BENEFITS

8.1 Regional

The Bruce Freeman Rail Trail (BFRT) is a project of regional significance. The rail trail will connect the communities of Acton and Concord. The BFRT will provide a connection to the West Concord commuter rail stop south of the Commonwealth Avenue crossing for commuters traveling into Boston, relieving the roadways of additional vehicles. The BFRT will also provide regional access for these communities to the commercial and retail centers of each of these communities. The BFRT will also connect many areas of community interest such as athletic fields. The completion of the BFRT will encourage further recreational uses and provide an economic benefit to the communities.

8.2 Safety

The project will provide an off-road bicycle and pedestrian route through Acton and Concord taking cyclists and pedestrian off of the local roads and reducing the interaction of these users with the motoring public. On-street bicycle accommodations do not presently exist. The paved shoulders on many of the roadways are too narrow to provide bicycle or pedestrian accommodations and sidewalks do not exist in many areas. The facility will provide for safe off-street commuting/travel route for bicyclists and users of other non-motorized modes of transportation.

8.3 Economic

The project connects the commercial and retail centers of Acton and Concord. The trail will bring recreational users to retail centers and encourage the use of existing businesses in these communities.

8.4 Mobility

The project will connect the towns of Acton and Concord to the West Concord commuter rail stop providing a commuter path that can be accessed by both towns and the region as a whole. The need for alternative transportation modes and corridors, especially in Boston urban and suburban areas has been well documented. The project will also connect the commercial and retail centers of these communities encouraging alternative modes of travel between these Towns. The BFRT will also connect many recreational facilities within both communities providing much needed links to these services.

8.5 Environmental

The project will provide an alternate commuter route for the communities of Acton and Concord, reducing the number of vehicles on the roadways. The reduced number of vehicles and reduced congestion will provide an environmental benefit by reducing emissions from these vehicles.