

## **APPENDIX E**

### **Evaluation of Improvement Alternatives**

Table E-1 Preliminary Comparison of Concord Rotary Design Alternatives, Concord

Table E-2 Preliminary Comparison of Route 2 Improvement Packages, Acton and  
Concord

**TABLE E-1  
Preliminary Comparison of Concord Rotary Design Alternatives  
CONCORD**

Alternative #	Concept Elements	Purpose	Benefits		Impacts					
			Improve Traffic Operations	Improve Safety	Historic Impacts	Wetland Impacts	Agricultural Impacts	Right of Way Impacts	Visual Impacts	Construction Cost and Traffic Disruption
<b>No Build</b>	Existing		<b>NO IMPACT</b> Long delays at Rotary and at Route 2A. High delays encourage cut-throughs south of Route 2.	<b>NO IMPACT</b> Second high crash location along Route 2. Unfriendly pedestrian environment.	<b>NO IMPACT</b>	<b>NO IMPACT</b>	<b>NO IMPACT</b>	<b>NO IMPACT</b>	<b>NO IMPACT</b>	<b>NO IMPACT</b>
<b>1</b>	Convert Rotary to an at-grade intersection with traffic signal and appropriate lane configuration at Concord Rotary. Install another signal at Route 2A/Barrett's Mill Road, including coordination with Route 2 signal.	Provide for protected traffic flows at Route 2/Route 2A/Commonwealth Avenue.	<b>LOW</b> Traffic operations will improve in the AM peak hour with the appropriate cross section at Route 2 and Route 2A. However, PM peak hour delays will persist. Favorable State Police and Prison access.	<b>LOW</b> Provides for a safer driving environment; eliminates the feeling of "uncertainty" for Rotary drivers.	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b> <b>Rough Cost Estimate:</b> App. \$4 million. <b>LOW</b> <b>Traffic Disruption:</b> Some impacts from construction detours and lane-shifting.
<b>2</b>	Reconstruct the Rotary with Route 2 passing under an elevated Rotary. Barrett's Mill Road and Commonwealth Avenue will continue to be connected to it and four slip ramps will be constructed for Route 2 on/off traffic. The structure would be built somewhat to the west of the existing Rotary and it would include two bridges and retaining walls for the ramps to the east. It also requires depressing Route 2.	Provide for grade-separated operation while maintaining existing unsignalized Rotary operation.	<b>MEDIUM</b> Significant improvements for traffic operations along Route 2. Route 2A, Commonwealth Avenue, and Barrett's Mill Road queues and delays will improve significantly. Speeds around the Rotary will increase. Somewhat increased travel for State Police. Prison Access from Commonwealth Avenue.	<b>LOW</b> Significant safety improvements for Route 2 traffic. Reduced safety for Route 2A, Route 2 ramp traffic and minor road traffic around the Rotary. Improved pedestrian safety around Prison parking lot due to the relocation of Commonwealth Avenue.	<b>LOW</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b> <b>Rough Cost Estimate:</b> Between \$20 and \$25 million. <b>HIGH</b> <b>Traffic Disruption:</b> Construction staging will be required.

**NOTE**

**Benefits: HIGH** (best rating) **to LOW** (worst rating)

**Impacts: LOW** (best rating) **to HIGH** (worst rating)

**TABLE E-1 (continued)**  
**Preliminary Comparison of Concord Rotary Design Alternatives**  
**CONCORD**

Alternative #	Concept Elements	Purpose	Benefits		Impacts					
			Improve Traffic Operations	Improve Safety	Historic Impacts	Wetland Impacts	Agricultural Impacts	Right of Way Impacts	Visual Impacts	Construction Costs and Traffic Disruption
3	A diamond interchange at Concord rotary with two coordinated traffic signals at the ends of the bridge. Relocated Commonwealth Avenue.	Provide grade-separation for improved traffic operations and safety.	<b>MEDIUM</b> Grade separation and traffic control is expected to have significant improvement on traffic operations. Extra lanes and exclusive signal phases will be required for left turns at traffic signals.	<b>MEDIUM</b> Significant improvement in safety is expected from grade separation and protected left turns at signals.	<b>LOW</b>	<b>LOW</b>	<b>LOW</b> Minor agricultural and commercial impacts.	<b>MEDIUM</b>	<b>HIGH</b>	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$15 million <b>MEDIUM</b> <b>Traffic Disruption:</b> Impacts from construction staging
4	A half cloverleaf interchange at Concord Rotary on the western side of Commonwealth Avenue/Route 2A with two coordinated traffic signals at the ends of the bridge. Route 2 will be depressed.	Provides for grade-separated operation and fewer left turns at the traffic signals on the bridge.	<b>MEDIUM</b> The loop ramps allow for significantly improved traffic operations, especially for the Route 2A eastbound traffic in the morning. Somewhat more circuitous access for State Police vehicles.	<b>MEDIUM</b> Further improves safety, however it leaves parking lot inside southern loop ramp. Pedestrians are required to cross Commonwealth Avenue at signal.	<b>LOW</b>	<b>MEDIUM</b>	<b>HIGH</b> Agricultural and commercial impacts from the construction of the loop ramps.	<b>MEDIUM</b>	<b>HIGH</b>	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$20 million <b>HIGH</b> <b>Traffic Disruption:</b> Impacts from construction detours and lane-shifting
5	Half diamond interchange at the north side of Route 2 and a quarter cloverleaf at the southwestern quadrangle of the interchange. Relocate Commonwealth Avenue.	Provides for grade-separation and turns major movements into right turns.	<b>HIGH</b> This design appears to be superior to all others because the two highest traffic movements, the eastbound traffic from Route 2A in the morning and the westbound traffic from Route 2 to Route 2A in the evening peak are right turns.	<b>HIGH</b> The heaviest of all traffic movements on the bridge over Route 2 are right turns.	<b>MEDIUM</b> The loop ramp may have to be designed around the cemetery.	<b>LOW</b>	<b>HIGH</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$15 million <b>MEDIUM</b> <b>Traffic Disruption:</b> Medium disruption of traffic
6	Half diamond interchange at the south side of Route 2 and a quarter cloverleaf at the northwestern quadrangle of the interchange. Route 2 will be depressed.	Provides for grade separation.	<b>LOW</b> The high Route 2A traffic volume from/to Route 2 is required to turn left at both signals.	<b>MEDIUM</b> Safe pedestrian crossing from Prison Parking lot may be compromised.	<b>LOW</b>	<b>LOW</b>	<b>HIGH</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$20 million <b>HIGH</b> <b>Traffic Disruption:</b> Impacts from construction staging and lane shifting
7	Ramps on the north side of Route 2 are located to the west of the Concord Municipal light Plant. Ramps on south side are partial cloverleaf. Relocated Commonwealth Ave.	Provides for grade separation. Ensures a higher standard design for ramps at north side of Route 2.	<b>MEDIUM</b> The loop ramps allow for significantly improved traffic operations, especially for the Route 2A eastbound traffic in the morning. Somewhat more circuitous access for State Police vehicles. Unprotected Barrett's Mill Road lefts.	<b>MEDIUM</b>	<b>LOW</b>	<b>MEDIUM</b>	<b>HIGH</b> Agricultural and wooded land impacts.	<b>MEDIUM</b>	<b>LOW</b>	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$15 million <b>MEDIUM</b> <b>Traffic Disruption:</b> Medium traffic disruption

**TABLE E-2  
Preliminary Comparison of Route 2 Improvement Packages  
ACTON AND CONCORD**

Package #	Concept Elements	Purpose	Benefits				Impacts	
			Minimize Cut-Throughs	Reduce Delay	Improve Safety	Improve Local/Emergency Access	Right of Way Impacts	Construction Cost and Traffic Disruption
<b>No Build</b>	Existing		Long delays at Rotary encourage cut-throughs. Eastbound Route 2 traffic is diverted via Piper, Hosmer, and School streets in Acton to Laws Brook Road and Main Street in Concord.	Long delays for Route 2 and Route 2A traffic due to the yield-control operation of the Rotary.	High crash location. Unfriendly pedestrian environment.	Available access at Piper /Taylor and Concord Rotary is inadequate. Pedestrian crossing of Commonwealth Avenue difficult.	No takings involved	No costs involved
<b>5*</b>	Interchange at Concord Rotary; realignment of Commonwealth Avenue to the west so that parking becomes part of Prison Campus	Provide for safer traffic processing and pedestrian circulation. Reduce delays. Reduce cut-throughs.	<b>MEDIUM</b> Significantly improves cut-through problem by removing 400-600 vehicles from Law Brooks Road to Route 2. Southbound Cut-through traffic on Piper, Hosmer, and School streets is eliminated. Traffic increases northbound School Street to access Route 2.	<b>MEDIUM</b> Practically eliminates Route 2 traffic delays between Piper/Taylor streets and Commonwealth Avenue. Improves Route 2A and local traffic delay. Reduced congestion along Laws Brook Road.	<b>LOW</b> Significantly improves safety by eliminating conflicts between Route 2 traffic and Route 2A Commonwealth Avenue traffic and allowing for traffic signal control for remaining conflicts. Eliminates traffic pedestrian conflicts by relocating Commonwealth Avenue. Likely delays at northbound School Street as more traffic will attempt to access Route 2 eastbound at this point.	<b>LOW</b> Maintains present local access. Improves pedestrian circulation as prison parking is moved inside the prison campus.	<b>LOW</b> Impacts on agricultural land and commercial business.	<b>LOW</b> <b>Rough Cost Estimate:</b> App. \$15 million. <b>MEDIUM</b> <b>Traffic Disruption:</b> Major construction detours and lane-shifting
<b>5A</b>	Interchange at Concord Rotary; partial diamond/cloverleaf interchange at Hosmer Street; partial interchange at the east side of Piper/Taylor roads; one-way CD roads between the latter two interchanges	Provide, in addition to all benefits listed above at Concord Rotary, two grade-separated crossings of Route 2 in Acton, including on and off ramps for local access.	<b>MEDIUM</b> In addition to traffic diversions caused by concept 5 above, some of Route 2A traffic (south of Concord Road) is diverted to Route 2 via Hosmer Street. Increased northbound traffic along Hosmer and School streets.	<b>MEDIUM</b> Practically eliminates Route 2 delays between Piper/Taylor streets and Commonwealth Avenue, and along Laws Brook Road. Reduced southbound delays along Piper/ Taylor, Hosmer, and School streets; more congestion in the northbound direction as traffic is attracted to improved Route 2 access. Route 27 delay reductions.	<b>HIGH</b> Significantly improves safety at present Concord Rotary, and Piper/Taylor and Hosmer streets. Some safety concerns at School Street northbound right turns as additional northbound traffic attempts to enter Route 2 there.	<b>MEDIUM</b> Maintains local access and improves pedestrian circulation at Concord Rotary. Significantly improves local access, including emergency response at Piper /Taylor roads and Hosmer streets.	<b>HIGH</b> ROW impacts as in concept 5 above for Concord Rotary grade separation. In addition, land takings associated with the construction of ramps at Hosmer Street and Piper/Taylor roads, and C/D roads.	<b>HIGH</b> <b>Rough Cost Estimate:</b> App. \$50 million. <b>MEDIUM</b> <b>Traffic Disruption:</b> Construction staging; construction impacts at Piper /Taylor streets
<b>5B</b>	Concord Rotary Interchange; bridge only at Piper/ Taylor roads and School Street; interchange at Hosmer Street; two-way CD road north of Route 2 between Piper/Taylor roads and Hosmer Street	Provide, in addition to the interchange at Concord Rotary, three more crossings of Route 2 for additional local and emergency access in Acton. One of the crossings provides full movements.	<b>LOW</b> Hosmer Street bridge carries significantly higher traffic than School and Piper/ Taylor bridges. Laws Brook Road benefits are lower as a smaller amount of its traffic diverts to Route 2.	<b>MEDIUM</b> Lower delays along Route 27, Route 2A south of Concord Road, and Laws Brook Road.	<b>HIGH</b> Significantly improves safety and emergency response as it eliminates circuitous travel and allows for multiple, direct Route 2 crossings.	<b>HIGH</b> Significantly improves local access and emergency response across Route 2.	<b>MEDIUM</b> Same as in concept 5A in the area of Hosmer Street and Concord Rotary. Impacts within existing ROW at Piper/Taylor and School streets.	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$40 million <b>MEDIUM</b> <b>Traffic Disruption:</b> Construction staging

**NOTE**

**Benefits:** HIGH (best rating) to LOW (worst rating)

**Impacts:** LOW (best rating) to HIGH (worst rating)

\* This table compares the various alternative packages based on expected benefits and impacts in the context of the entire Route 2 corridor between Route 111 in Acton and Baker Avenue in Concord; while comparison in the previous table (Table E-1) focuses only on the rotary design alternatives and expected benefits and impacts of the area surrounding the rotary. Therefore, ratings of Alternative 5, although under the same column title, may be different in Table E-1 and Table E-2.

**TABLE E-2 (continued)**  
**Preliminary Comparison of Route 2 Improvement Packages**  
**ACTON AND CONCORD**

Package #	Concept Elements	Purpose	Benefits				Impacts	
			Minimize Cut-Throughs	Minimize Delay	Improve Safety	Improve Local/Emergency Access	Right of Way Impacts	Construction Costs and Traffic Disruption
<b>1</b>	Convert Rotary to an at-grade intersection with traffic signal; and appropriate lane configuration. Install another signal at Route 2A/Barrett's Mill Road, including coordination with Route 2 signal	Provide for protected traffic flows at Route 2/Route 2A/Commonwealth Avenue.	<b>LOW</b> Traffic operations will improve in the AM peak hour with appropriate cross section at Route 2 and Route 2A. However, PM peak hour delays will persist. Favorable State Police and Prison access.	<b>LOW</b> Provides for safer driving environment; eliminates the feeling of "uncertainty" for Rotary drivers.	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b> <b>Rough Cost Estimate:</b> App. \$4 million. <b>LOW</b> <b>Traffic Disruption:</b> Some impacts from construction detours and lane-shifting.
<b>1A</b>	Interchange at School/Wetherbee streets; cul de sac at Hosmer Street; bridge only at Piper /Taylor roads; traffic signal at Concord Rotary	Provides for earlier interception, collection and distribution of Route 2, Route 2A, and local traffic; a total of two crossings across Route 2 in Acton.	<b>HIGH</b> Significant amount of diversions from Laws Brook Road and Route 2A to Route 2 via School /Wetherbee streets interchange.	<b>HIGH</b> Reduced delays along Route 27, Route 2A (south of Concord Road), and Laws Brook Road.	<b>HIGH</b> Significantly improves safety and emergency response. It allows for two grade-separated crossings in Acton (one a full interchange) and one traffic signal-controlled crossing in Concord.	<b>MEDIUM</b> It provides two safe crossings of Route 2. It eliminates access from /to Hosmer Street and Piper/Taylor roads. It allows for all movements at School/Wetherbee streets and at Concord Rotary.	<b>LOW</b> Mostly agricultural impacts.	<b>LOW</b> <b>Rough Cost Estimate:</b> App. \$20 million <b>LOW</b> <b>Traffic Disruption:</b> Minor disruption of traffic at all construction sites
<b>1B</b>	Fly-over at Wetherbee Street; cul de sac at School Street; diamond interchange at Hosmer Street; cul de sac at Piper/Taylor roads; traffic signal at Concord Rotary	Provides for desegregation of traffic flow exchanges at two grade-separated facilities, Hosmer and Wetherbee streets.	<b>MEDIUM</b> Diversions to Route 2 from Route 2A, south of Concord Road, are very high; diversions from Laws Brook Road are low.	<b>MEDIUM</b> Reduced delays along Route 27 and Route 2A (south of Concord Road).	<b>HIGH</b> Significantly improves safety at present Concord Rotary location and provides one additional safe crossings.	<b>MEDIUM</b> Provides crossing at Hosmer and access to Route 2 from the north at Wetherbee Street.	<b>MEDIUM</b> Land takings for ramps at Hosmer Street and at Wetherbee Street near Route 2.	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$25 million <b>LOW</b> <b>Traffic Disruption:</b> Medium disruption of traffic
<b>1C</b>	Cul de sac at Wetherbee Street; new road west of Wetherbee Street that connects with Route 2A/Concord Road intersection; interchange at School Street/new road; bridge only at Hosmer Street; interchange to the west of Piper/Taylor roads; relocate Route 11/Route 2 ramps; traffic signal at Rotary.	Provides for three crossings over Route 2 in Acton, one of which is only a bridge. Relocates the terminus of Route 111 from Route 2 to Piper Road and the proposed interchange there. Includes new road parallel to Wetherbee Street and connected directly into Route 2A/Concord Road.	<b>HIGH</b> Traffic diversions from Laws Brook Road and Route 2A (south of Concord Road) to Route 2.	<b>HIGH</b> Reduced delays along Route 27, Route 2A (south of Concord Road), and Laws Brook Road.	<b>HIGH</b> Provides three safe crossings of Route 2 with full movements at two locations. Relocation of the Route 111 terminus to Piper Road will improve safety significantly at that location.	<b>HIGH</b> Major improvement to Route 2 access and emergency response.	<b>HIGH</b> Land takings for ramps at Wetherbee and School streets, Piper and Taylor roads, and new alignment of Route 111.	<b>MEDIUM</b> <b>Rough Cost Estimate:</b> App. \$35 million <b>MEDIUM</b> <b>Traffic Disruption:</b> Medium disruption during construction