

7. OPERATIONAL ISSUES

Impact of Central Mass. Extension on Other Commuter Rail Services

Impact on Fitchburg Line Service as Currently Operated

Trains from a Central Mass. extension would have to use the tracks of the Fitchburg Line between North Station and either Clematis Brook in Waltham or a new Stony Brook Junction. The Fitchburg Line is mostly double-tracked in this area, but there is a single-track segment 0.6 miles long in Waltham, from just west of Waltham station to just east of Newton Street. This would have a direct effect on scheduling of Central Mass. trains using a Stony Brook connection, and could indirectly affect schedules of trains using a Clematis Brook connection.

The current weekday schedule of passenger trains on the Fitchburg Line has 16 trips in each direction on the segments that would be shared by Central Mass. trains. The closest scheduled spacing of inbound trains at Waltham Station is 28 minutes. The closest scheduled spacing outbound is 12 minutes. Without the constraint of the single-track segment, there would be little difficulty in finding time slots for Central Mass. trains at any likely service frequency. The single track would reduce the flexibility in selecting times for Central Mass. trains, but would not present an insurmountable obstacle.

Of the 16 inbound trains on weekdays, seven are scheduled to pass Waltham Station within 10 minutes or less of outbound trains. For reliability, no attempt should be made to schedule additional trains between the inbounds and outbounds in such cases. Most of the close meets at Waltham Station are results of the same trains having to meet others at ends of single-track sections further west, so they cannot easily be changed.

At one time, the single-track segment in Waltham was double-tracked, but the only platform at Waltham Station was on the outbound side. Inbound passengers had to walk across the outbound track to board or alight through left-side train doors. This made it necessary to schedule service so that inbounds and outbounds would not be in the station at the same time, so the effect was similar to that of single track. The present Waltham Station has separate inbound and outbound platforms on opposite sides of Moody Street, but both of these are on the north side of the track. Elimination of the bottleneck would require not only restoration of a second track but also a major reconfiguration of the station. Any such reconfiguration should be made consistent with the city of Waltham's long-range goal of eliminating the grade crossings of Moody and Elm Streets.⁸

⁸For a more detailed discussion of this issue see Central Transportation Planning Staff *Evaluation of the Moody and Elm Street Railroad Grade Crossings in Waltham, Final Report*. November 1979.

Impact on Future Fitchburg Line Express Service

At present, inbound A.M. peak service on the Fitchburg Line consists of four trips originating at Fitchburg and one originating at South Acton. The South Acton train and three of the Fitchburg trains stop at every station between their starting points and North Station.⁹ The other Fitchburg train makes all stops from Fitchburg to Lincoln, then omits all stops from there to Porter Square except Waltham. Outbound P.M. peak service provides similar coverage.

For the 1994 Program for Mass Transportation, new peak-period express service for the Fitchburg Line was analyzed. In the morning, five trains would originate at Fitchburg, make all stops from there to Concord, then run non-stop to Porter Square. Five other trains would originate at Littleton/495 and serve all stops from there to North Station. Stations from Littleton/495 to Concord would be served by both local and express trains. Outbound P.M. peak service would have a similar pattern.

The analysis found that this express service, combined with faster speed limits, would attract 570 additional inbound riders per weekday to the Fitchburg Line in the year 2020, including 480 new transit users. The capital cost per new transit user was found to be \$76,262.

Under this express service alternative, the number of peak-direction trains using the Fitchburg Line tracks through Waltham, Belmont, and Cambridge in peak hours would increase by five. This would be the same as the maximum number of Central Mass. trains that would be added to the same portion of the line under the alternatives examined in the present study. More detailed analysis would be needed to determine whether the line could accommodate Central Mass. trains in addition to both local and express Fitchburg Line trains.

As discussed in chapter 4, one possible operating strategy for Central Mass. trains would be to have them provide most of the service at Waltham, Waverley and Belmont on the Fitchburg Line. Trains from Fitchburg and South Acton would still need to stop at Brandeis/Roberts for the benefit of passengers destined there, or requiring transfers to reach stations no longer served directly. (Fall 1994 counts showed 48 A.M. peak inbound alightings at the four stops in Waltham and Belmont, of which 24 were at Brandeis/Roberts.) This pattern would allow Fitchburg Line trains to run faster than at present, but would represent a much smaller service improvement than the express service examined in the PMT.

As discussed in Chapter 4 and Appendix E, omitting stops at Waltham, Waverley, and Belmont alone would reduce running times to Porter Square and

⁹The lightly patronized Silver Hill Station in Weston is not served by the South Acton train nor by the first of the three Fitchburg locals.

Belmont by about 4.5 minutes. Based on travel time elasticity formulas, this would attract only about 50 additional A.M. peak inbound riders from stations west of Brandeis/Roberts assuming unlimited parking. Most of these would be diverted from other transit services. The increased service frequency at Brandeis/Roberts and Porter Square would add another 30 riders, but only 10 would be new transit users. Therefore, operation of Central Mass. trains should not be regarded as a substitute for the PMT express service option for the Fitchburg Line.

Impacts on Intercity Passenger Service

No intercity passenger service is operated on the Fitchburg Line at present, and none is under consideration. The only location where Central Mass. trains would share facilities with intercity trains would be at North Station. Impacts there are discussed in a separate sub-section of this chapter.

Impacts on Freight Service

There is no through freight train service on the sections of the Fitchburg Line that would be used by Central Mass. trains. Local freight service is operated by the Springfield Terminal Railway Company, but generally does not exceed one train per day in each direction. Therefore, no significant conflicts between scheduling requirements of Central Mass. trains and Fitchburg Line freight trains would be expected.

It is unlikely that freight service would be operated on the Central Mass. line itself. Most of the businesses that used freight service on the line in the past have closed or re-located. Future industrial development potential in the Central Mass. corridor appears insufficient to sustain a viable rail freight operation. If freight service were to be provided on the line, the MBTA, as owner, would have the right to restrict times of freight trains to prevent conflicts with passenger service.

Between the Stony Brook Junction and Berlin, the only other active rail line intersected by the Central Mass. would be the Conrail Lowell Secondary Track. This line crosses the Central Mass. at grade at South Sudbury. Freight trains are run as needed on the Lowell Secondary to deliver building supplies to the Saxonville Lumber Company's warehouses near the South Sudbury Station site. The track layout requires that these freight trains pass over the crossing of the Central Mass. in the course of switching cars in and out of the lumberyard sidings. It would be necessary to impose a schedule on the freight operation to prevent conflicts with Central Mass. service. Interlocked signals would also be needed to alert train crews on each line of approaching trains on the other line.

Impacts at North Station

At present, North Station has 10 tracks served by five island platforms. All of these were recently extended by about three carlengths in conjunction with the construction of the new Fleet Center sports arena which is located above the extensions. The platforms are not all the same length, but most of them have capacities of at least nine cars. This would greatly exceed the maximum train length required on the Central Mass. At present, the ten tracks are used by trains from four lines, three of which have multiple outer turnback points. Amtrak intercity service to Portland, Maine expected to start in late 1997, will also use North Station, but only three to five round trips per day are anticipated initially.¹⁰ Portland service would be provided mostly for non-work travel so most of the trains would be in North Station during off-peak hours.

The design of the Fleet Center provides for one additional platform serving two additional tracks, but completion of these would require taking of part of the Mass. General Hospital employee's parking lot which now borders on Track 10. Unless the frequency of service on the existing lines increases greatly, the addition of Central Mass. service should not result in any capacity problems at North Station itself even without the two extra tracks.

A greater capacity constraint at North Station is imposed by the Charles River crossing just beyond the outer ends of the platforms. There, the ten station tracks are reduced to four to cross two double-track drawbridges. In the past there were two additional bridges, but these have been removed and the Spaulding Rehabilitation Hospital now occupies the former site of their southern approach. Therefore, present and future schedules must allow for moving all trains on all routes through this four-track section.

The Charles River is a navigable waterway at the North Station drawbridges, but is now used almost exclusively by excursion boats and small pleasure craft. Notices on the bridges state that they will not open for water traffic during weekday peak hours, so any boats that will not clear the closed bridges must wait. (The bridges are upstream of the Charles River Dam, which maintains constant clearance of about seven feet beneath them.) Operation of Central Mass. trains would result in no additional conflicts with water traffic during peak hours. Off-peak trains could be subjected to some delays, when the bridges are opened for boats, and conversely, boats could experience additional delays waiting for the bridges to re-open after Central Mass. trains pass.

¹⁰Source: Stone & Webster Engineering Corp. Statewide Rail Passenger Service Study Technical Appendix. Report on Passenger Needs: Boston-Portland-Brunswick Corridor Prepared for State of Maine Department of Transportation October 1990.

8. ENVIRONMENTAL AND COMMUNITY IMPACTS

Impacts on Air Quality

Air quality impacts of transit projects are typically calculated on the basis of expected changes in vehicle miles of travel (VMT) resulting from the project. For the Boston region, the automobile-generated pollutants of greatest concern are carbon monoxide (CO), nitrous oxides (NO_x), and volatile organic compounds (VOC). Based on the present travel modes of the expected users of Central Mass. rail service, an I-495 extension would reduce automobile vehicle miles of travel by about 32,650 per weekday. An extension only to Kane Drive in Hudson would reduce VMT by about 30,750 per weekday. An extension only to South Sudbury with reduced frequency would reduce VMT by about 21,050 per weekday. The associated improvements in air quality would be as shown in Table 8-1.

Table 8-1
Central Mass. Extension
Reduction in Average Weekday Auto Emissions

| | I-495/Berlin <u>Terminal</u> | Hudson <u>Terminal</u> | So. Sudbury <u>Terminal</u> |
|---------------------------|---------------------------------|---------------------------|--------------------------------|
| VMT Reduction | 32,650 | 30,750 | 21,050 |
| CO Reduction | 327.7 kg | 308.5 kg | 211.2 kg |
| NO _x Reduction | 55.4 kg | 52.1 kg | 35.7 kg |
| VOC Reduction | 30.6 kg | 28.8 kg | 19.7 kg |

At the same time, however, the diesel locomotives used on trains would add emissions to the air. In addition to CO, NO_x and VOC, particulate matter (PM) is of concern for diesel vehicles. For extensions to I-495 or Hudson with 16 round trips per day or an extension only to South Sudbury with eight round trips per day, locomotive emission increases would be as shown in Table 8-2.

Table 8-2
Central Mass. Extension
Increase in Average Weekday Train Emissions

| | I-495/Berlin <u>Terminal</u> | Hudson <u>Terminal</u> | So. Sudbury <u>Terminal</u> |
|--------------------------|---------------------------------|---------------------------|--------------------------------|
| CO Increase | 44.9 kg | 37.4 kg | 16.1 kg |
| NO _x Increase | 491.9 kg | 406.2 kg | 170.2 kg |
| VOC Increase | 15.8 kg | 13.2 kg | 5.7 kg |
| PM Increase | 6.5 kg | 5.3 kg | 2.2 kg |

The net impact of the reduction in auto emissions and increase in locomotive emissions would be as shown in Table 8-3. As can be seen from the table, extensions to any of the three terminals analyzed would result in overall reductions in CO levels and VOC levels but increases in NOx and particulate matter levels.

Table 8-3
Central Mass. Extension
Net Changes in Average Weekday Emissions

| | I-495/Berlin <u>Extension</u> | Hudson <u>Terminal</u> | So. Sudbury <u>Extension</u> |
|------------|----------------------------------|---------------------------|---------------------------------|
| CO change | -282.7 kg | -271.1 kg | -195.1 kg |
| NOx change | +436.5 kg | +354.0 kg | +134.6 kg |
| VOC change | -14.8 kg | -15.6 kg | -14.0 kg |
| PM change | +6.5 kg | +5.3 kg | +2.2 kg |

Impacts on Water Resources

A Central Mass. extension would use an existing railroad right-of-way which has been inactive since at least 1980. Some changes in cuts and embankments have been made where bridges have been removed. Re-activation of service would return the grade to its pre-abandonment form at most locations.

The Central Mass. right-of-way is generally graded for only one track. There were formerly passing tracks at the old Weston, Wayland, and South Sudbury station sites. Optimal passing track locations for future service would depend on the desired schedule, and would require a more detailed operating analysis than was performed for this study. It appears, however, that passing tracks could be provided without adversely affecting any water resources.

The Central Mass. crossed five rivers, ponds, or other bodies of water on long open-deck wooden trestles. Because of the age and condition of these structures, the capital cost estimates in chapter 5 assume that all of them would be replaced. The costs are based on closed-deck bridges, which would be provided with drainage systems to prevent pollutants such as oil and brake dust from being dropped in the water by trains. Pollutants dropped on other sections of the railbed by trains would be in low concentrations, and would be unlikely to migrate to wetlands, waterways, or groundwater in significant volumes. Runoff of pollutants dropped in parking lots by autos is would be a more likely problem, which would have to be dealt with by use of appropriate drainage systems and lot maintenance strategies.

The Berlin/I-495 station site would be next to a swamp. Provision of adequate parking there would probably require some filling of these wetlands. At South

Sudbury, the only undeveloped land with large enough area for necessary parking is also wetlands. Most of the Saxonville Lumber site is already paved, so replacing it with a commuter parking lot with drainage improvements would not adversely affect water resources.

The Kane Drive, Linde Air, Sudbury Landfill, and Wayland Raytheon sites are all near wetlands. Construction of stations at any of these sites would provide an opportunity to improve wetlands impacts compared with past industrial uses, however.

Impacts on Community and Cultural Resources

This impact category covers changes that would occur to historic buildings, sites, and districts, to archeological sites, to parks and open spaces, and to buildings and resources that are important to the expression of cultural values, such as schools, churches, and monuments.

The Central Mass. right-of-way does not pass close to any sites that meet this definition in Weston, Sudbury¹¹, Bolton, or Berlin, but would impact some sites in Wayland and Hudson. Specifically, at Wayland Center the line passes through the town historic district. Buildings within this district include the Heard House, which serves as headquarters and museum of the town historical society, and the former railroad station which is owned by the town and used as a non-profit gift shop. The town library is also near the right-of-way. In Hudson, the Central Mass. runs past two churches, (including one with parking that currently encroaches on the right-of-way) and an elementary school. All of these are in the segment between Kane Drive and I-495.

Traffic Impacts on Major Arterial Routes

The reductions in vehicle miles of auto travel as a result of a Central Mass. extension would be distributed over many different routes. The greatest reduction at any individual location would occur on Route 20 at the Wayland/Weston town line. With a terminal at I-495 or in Hudson, the daily reduction at this point would be about 485 cars in each direction. The highest concentration of these would occur between 8:00 and 8:30 A.M., when about 135 cars would be removed. This would be about 17% of the eastbound traffic on the road in this interval. A South Sudbury terminal with reduced service would have a slightly lower impact in the peak half hour. The daily reduction would be about 400 vehicles in each direction.

¹¹Although there was formerly a Wayside Inn Station in Sudbury, the historic inn itself is over a mile from the nearest point on the rail line.

Traffic Impacts of Station Access

With stations at I-495, Kane Drive in Hudson, South Sudbury and Wayland, the most heavily used of the four, regardless of specific location, would be the one serving Wayland. At this station, with the maximum service level examined the most heavily used train would have about 180 boardings. About 150 of the passengers for this train would use some form of auto access. In the final minutes prior to train departure, auto arrivals would average about 16 per minute, but not all of these would approach from the same direction. A station at the Raytheon site in Wayland would be accessed both from Route 20 and from Route 27. This would divide approaching traffic there among four directions.

At South Sudbury, the maximum auto arrival rate would be around 10 per minute. At I-495 or Kane Drive, the maximum rate would be about three per minute.

Grade Crossings

The Central Mass. alignment from Stony Brook Junction to I-495 has 26 grade crossings of public roads in 18.4 miles, or an average spacing of 0.7 miles. The greatest concentration of these is between Kane Drive in Hudson and I-495, where there are 13 crossings in 5.6 miles (an average spacing of 0.43 miles).

Two of the busiest crossing locations are of Route 20, on the Wayland border and just east of South Sudbury. Elimination of the crossing on the Wayland border appears to be feasible by elevating the track in conjunction with replacement of the adjoining trestle over the Concord River. The cost of this has not been included in chapter 5, however. (Because of proximity to the river, depression of the track at Route 20 would not be feasible.)

Traffic at each grade crossing would be stopped for about 45 seconds for each train. With schedules similar to those on the Fitchburg Line, there would be three to four trains per hour in both directions combined during peak hours. The impact on traffic would be smaller than that of any of the signalized intersections along Route 20.

At Wayland Center, state Routes 27 and 126 are crossed at grade in close succession just east of the old Wayland Station site. Elimination of these crossings by elevating them would be more compatible with an elevated Route 20 crossing and a Raytheon site station than depressing them. Elevating the tracks at this location would have a negative visual impact on the Wayland historic district, however.

Routes 27 and 126 merge just south of their crossings of the railroad and cross Route 20 at a signalized intersection 600 feet further south. At times of heavy

traffic, queues of cars extending over the railroad crossings would be a safety issue.

In addition to the public crossings, there are at least five authorized private crossings between Stony Brook Junction and I-495. Some abutting property owners with land on both sides of the right-of-way have constructed unapproved crossings since service on the line ended, but the MBTA would have the right to close these if the line re-opened.¹²

In addition to the grade crossings on the Central Mass. route itself, Central Mass. trains entering the Fitchburg Line at a junction between Kendal Green and Brandeis/Roberts would pass through eight grade crossings on that line. This would include four crossings in Waltham, one each in Belmont and Cambridge, and two in Somerville. The most heavily traveled of these is the Moody Street crossing in Waltham, which is located between the existing inbound and outbound Waltham Station platforms. This crossing is viewed by the city of Waltham as a serious impediment to traffic flow even with existing rail service levels. Additional traffic studies would be needed to determine the impact of adding Central Mass. service.

Impacts on Abutters

Between Stony Brook Junction and I-495 there are about 150 houses within 200 feet of the Central Mass. right-of-way. Of these, about 50 are east of South Sudbury, 40 between South Sudbury and Kane Drive in Hudson, and 60 between Kane Drive and I-495. Therefore, a South Sudbury extension would impact a much smaller number of abutters than extensions to Hudson or I-495.

The Central Mass. line has carried no trains east of Hudson since 1980 and west of Hudson since 1975. Many of the houses close to the right-of-way were built before previous rail service ended, but after 1971 traffic consisted of at most one freight train per day in each direction. Because of normal occupancy turnover, it is likely that a substantial percentage of the residents of these houses moved in after 1980, and an even higher percentage after 1971.

In the past few years, several new residential subdivisions have been developed close to the right-of-way, and land has been cleared for additional houses. The largest new subdivisions are in the eastern half of Wayland and the western half of Sudbury. (The latter would be beyond the end of a route terminating at South Sudbury.) Restored passenger service, even at the lowest frequency considered in this study (eight round trips per day) would be far in excess of what most present occupants of houses near the Central Mass. right-of-way have ever

¹²Massachusetts law prohibits the establishment by adverse possession of new crossings over railroad rights of way.

experienced there. Negative impacts for these residents would consist of noise and vibration from trains and sounding of whistles approaching grade crossings.

Most of the houses close to the right-of-way would be too far from the most likely station sites to be impacted by station traffic. Traffic past houses along Route 20 east of South Sudbury would decrease slightly because of diversions to the rail line.

9. SUMMARY AND CONCLUSIONS

A Central Mass. commuter rail extension either to Route I-495 in Berlin, to Main Street at Kane Industrial Drive in Hudson, or to South Sudbury would be feasible from an operations standpoint, but would produce very limited benefits for the costs involved. At current travel levels, about 1,300 riders in each direction would ride trains on an I-495 extension on weekdays. Of these, about 580 (45%) would be former auto drivers or passengers. The remainder would be diverted from other transit services. The maximum highway traffic impact of the extension would be felt on Route 20 in Weston, where there would be a reduction of about 17% in the number of peak-direction vehicles during commuting hours. Future growth in travel would increase ridership on the extension by only about 5% over the 1996 level by the year 2020.

Line-haul rail travel times to Boston would, at best, be a few minutes faster than those for single-occupant auto trips from stations in Hudson, Sudbury and Wayland, but several minutes longer than auto times from I-495. Rail times would be significantly faster than current scheduled express bus times from the corridor, but few corridor residents now use the buses.

Incremental fare revenue from an I-495 extension would cover only about 12% of incremental operating cost, which would be far below acceptable levels. An extension only to Hudson would have a revenue-to-cost ratio of 14%. An extension only to South Sudbury with minimum acceptable service would have a revenue-to-cost ratio of 27%, which would still be relatively low.

Capital costs for necessary right-of-way improvements, station platforms and parking, and additional rolling stock would total \$103.2 million for an extension to I-495, \$72.2 million for an extension to Kane Drive in Hudson, or \$46.8 million for an extension to South Sudbury with reduced service frequency. The respective capital costs per new transit user on the extension itself would be \$177,931, \$131,318, or \$111,303. Any of the three alternatives would be among the most costly per new transit rider of any MBTA commuter rail extension analyzed recently.

Extensions to any of the three terminals analyzed would improve air quality slightly, but the capital cost per weekday kg of VOC elimination would range from \$3.3 million with a South Sudbury terminal to \$8.7 million. In this measure, it would be more costly than most of the commuter rail improvement or extension projects examined in the MBTA's 1994 Program for Mass Transportation.

These findings are summarized in Table 9-1

Table 9-1
Summary of Performance Measures for
Central Mass. Extension to I-495, Hudson, or South Sudbury

| <u>Item</u> | <u>To I-495</u> | <u>To Hudson</u> | <u>To South Sudbury</u> |
|---|-----------------|------------------|-----------------------------|
| Weekday Inbound riders | 1,295 | 1,245 | 950 |
| New Transit Riders Included Above | 580 | 550 | 420 |
| Annual Operating Cost | \$11,995,000 | \$9,830,000 | \$3,315,000 |
| Incremental Fare Revenue | \$1,445,000 | \$1,375,000 | \$910,000 |
| Incremental Revenue/Operating Cost | 0.121 | 0.140 | 0.274 |
| Capital Cost | \$103,200,000 | \$72,225,000 | \$46,785,000 |
| Capital Cost/New Transit Rider | \$177,931 | \$131,318 | \$111,393 |
| Capital Cost/kg of weekday VOC reduction | \$6,973,000 | \$4,630,000 | \$3,342,000 |

Note: South Sudbury figures are based on reduced service, on weekdays only
