

Transportation

Existing and 2030 No-Build analysis for the Peak Season, Non-Peak season, and Special Event traffic conditions

Capacity Analysis

The eight identified key intersections in the study area were analyzed using methods outlined in the *Highway Capacity Manual* and Synchro Version 6.0 software. The Highway Capacity Manual defines capacity as “the maximum rate of flow at which the persons or vehicles can be reasonably expected to traverse a point or uniform section of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions, usually expressed as vehicles per hour”.

Level of Service

Level of Service (LOS) is a term used to represent different traffic conditions, and is defined as a “qualitative measure describing operational conditions within a traffic stream, and their perception by motorist/or passengers”. Level of Service varies from LOS A, representing free flow, to LOS F, where traffic breakdown conditions are evident. LOS B represents good progression with minimal congestion. At LOS C, the number of vehicles stopping is significant, although many still pass through the intersection without stopping. LOS D represents more congestion, but the overall operations are acceptable. At LOS E, freedom to maneuver within the traffic stream is getting more difficult with corresponding increase in driver frustration.

For signalized intersections, service levels pertain to each approach as well as an overall value. For unsignalized intersections service levels pertain to each movement that yields the right-of-way. This movement is generally the secondary movement from a minor street. At an unsignalized intersection, the primary traffic on the main roadway is virtually uninterrupted. Therefore, the overall level of service is usually much greater than what is represented by the results of the minor street movements. Generally, Level of Service D is acceptable for signalized intersections in suburban areas during peak periods. Table 1 on the next page presents the criteria of each level of service as indicated in the *Highway Capacity Manual*.

Table 1: Level of Service Criteria

Signalized Intersections	
<u>Level of Service</u>	<u>Stopped Delay per Vehicle (Sec)</u>
A	<=10.0
B	>10.0 and <=20.0
C	>20.0 and <=35.0
D	>35.0 and <=55.0
E	>55.0 and <=80.0
F	>80.0

Unsignalized Intersections	
<u>Level of Service</u>	<u>Average Total Delay (Sec/Veh)</u>
A	<=10.0
B	>10.0 and <=15.0
C	>15.0 and <=25.0
D	>25.0 and <=35.0
E	>35.0 and <=50.0
F	>50.0

Source: *Highway Capacity Manual*, Special Report 209, Transportation Research Board, National Research Council, Washington, D.C., 1998

Existing Peak Hour Traffic Conditions

The computer software Synchro 6.0 was used to calculate the AM and PM peak hour level of service, and delay for each intersection for the peak and non-peak season using methods outlined in the *Highway Capacity Manual*. Existing intersection turning movement counts were taken in August (peak season).

A factor was applied for non-peak season to reflect fewer vehicles than there were in August.

Special event turning movement counts at two intersections were taken in August for the James Taylor concert at Tanglewood.

Capacity analyses were performed for existing and 2030 no-build conditions for the following intersections:

- Main Street and Center Street
- Main Street and Price Chopper Driveway
- Main Street and Park Street
- Park Street and High Street
- Park Street and Housatonic Street
- Route 20 and I-90 On/ Off Ramp
- Route 20, Route 102 and I-90 On Ramp
- Route 20 and Prime Outlets

Table 2 on page 4 presents the existing morning and afternoon peak hour traffic conditions at the key intersections for the peak and non-peak season traffic. The analysis is based on the turning movement counts observed and the signal timings and phasing plans provided by MassHighway, District 1 for the signalized intersections.

Five of the eight analyzed intersections were STOP sign controlled intersections, which are highlighted in Table 2. The intersection of Route 20 @ Prime Outlets Dr was not analyzed for the existing AM peak hour traffic condition. The existing intersection capacity analysis shows:

- The three STOP sign controlled intersections; Main St @ Center St, Main St @ Park St, and Park St @ Housatonic St are not currently operating at acceptable LOS. These intersections operate at LOS D for the existing morning non-peak season traffic and at LOS F for all the other peak period traffic conditions analyzed. They will only get worse in future years if not mitigated.
- Among the eight analyzed intersections, Park St @ Housatonic St intersection shows the worst traffic condition for the PM peak hour. The average delay per vehicle for PM peak hour is 135.8 second for non-peak season and greater than 1000 seconds for peak season traffic condition.
- The three signalized intersections; Housatonic St @ I-90 Off Ramp, Housatonic St @ I-90 On Ramp, and Route 20 @ Prime Outlets Dr operate at acceptable LOS B during the AM and PM peak hours for the existing peak and non-peak season traffic. The average delay per vehicle at these intersections for the peak and non-peak season traffic varies from 10.2 to 19.1 seconds for AM and 11.1 to 19.2 seconds for PM peak hours.
- The two STOP sign controlled intersections Main St @ Price Chopper Dr and Park St @ High St operate within the acceptable LOS C or better during the AM and PM peak hours for the existing peak and non-peak season traffic.

NOTE: The Software cannot handle delay of greater than 1000 seconds (16.67 minutes)


Table 2: Existing Peak Hour Traffic Conditions at Key Intersections

Intersection	EXISTING AM PEAK HOUR				EXISTING PM PEAK HOUR			
	Non-Peak Season		Peak Season		Non-Peak Season		Peak Season	
	ADPV	LOS	ADPV	LOS	ADPV	LOS	ADPV	LOS
Main Street @ Center St*	31.6	D	491.9	F	59.6	F	>1000	F
Main St @ Price Chopper Dr*	10.6	B	12.0	B	11.1	B	13.0	B
Main St @ Park St*	33.5	D	405.6	F	73.6	F	>1000	F
Park St @ High St*	13.4	B	18.7	C	14.6	B	22.5	C
Park St @ Housatonic St*	28.4	D	209.4	F	135.8	F	>1000	F
Housatonic St @ I-90 Off Ramp	10.2	B	10.8	B	11.1	B	11.9	B
Housatonic St @ I-90 On Ramp & Route 102	18.1	B	19.1	B	17.9	B	19.2	B
Rout 20 @ Prime Outlets Dr					11.9	B	12.7	B

ADPV= Average Delay per Vehicle, in Seconds

LOS = Level of Service (A is excellent, E and F are undesirable)

* For STOP sign-controlled intersections, the conditions represent the left turn from the side street

 = STOP sign controlled intersections

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NOTE: PM Peak Hour controls; as such AM Peak Hour will not be carried to Table 3

2030 No-Build Peak Hour Traffic Conditions

Afternoon peak hour traffic conditions for all the eight identified key intersections were analyzed for 2030 no-build traffic conditions. Both the peak and non-peak season PM peak hour traffic conditions were analyzed for the 2030 no-build scenario. The Berkshire Regional Transportation Model “2030” was used to forecast the 2030 traffic at these intersections.


Table 3 on page 6 compares the existing and 2030 no-build PM peak hour traffic conditions for both the peak and non-peak season traffic. The 2030 no-build intersection capacity analysis indicates:

- All three signalized intersections which are operating at the acceptable LOS B for existing traffic condition will operate at the same LOS B for the 2030 peak and non-peak season traffic. The 2030 no-build analysis was done using the same signal timings and phasing plans as the existing, so the optimization of signal timings might improve the performance level of these intersections.
- The three STOP sign controlled intersections; Main St @ Center St, Main St @ Park St, and Park St @ Housatonic St which are identified as problem intersections for existing peak hour traffic conditions will operate at unacceptable LOS F for 2030 no-build traffic condition. These intersections are already operating at LOS D and F for all the existing peak periods analyzed.
- The two STOP sign controlled intersections Main St @ Price Chopper Dr and Park St @ High St will operate within the acceptable LOS D or better during the PM peak hours for the 2030 peak and non-peak season traffic.

Table 3: Existing and 2030 No-Build PM Peak Hour Traffic Conditions at Key Intersections

Intersection	PM PEAK HOUR							
	Non-Peak Season				Peak Season			
	Existing		2030 No-Build		Existing		2030 No-Build	
	ADPV	LOS	ADPV	LOS	ADPV	LOS	ADPV	LOS
Main Street @ Center St*	59.6	F	70.2	F	>1000	F	>1000	F
Main St @ Price Chopper Dr*	11.1	B	11.5	B	13.0	B	13.8	B
Main St @ Park St*	73.6	F	149.4	F	>1000	F	>1000	F
Park St @ High St*	14.6	B	16.3	C	22.5	C	28.3	D
Park St @ Housatonic St*	135.8	F	518.6	F	>1000	F	>1000	F
Housatonic St @ I-90 Off Ramp	11.1	B	11.4	B	11.9	B	12.3	B
Housatonic St @ I-90 On Ramp & Route 102	17.9	B	18.1	B	19.2	B	19.8	B
Rout 20 @ Prime Outlets Dr	11.9	B	12.0	B	12.7	B	13.0	B

ADPV= Average Delay per Vehicle, in Seconds
 LOS = Level of Service (A is excellent, E and F are undesirable)
 * For STOP sign-controlled intersections, the conditions represent the left turn from the side street

 = STOP sign controlled intersections

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Special Event Peak Hour Traffic Conditions

Special event turning movement counts at two intersections; Main St @ Center St and Main St @ Park St were taken in August for James Taylor concert at Tanglewood. Capacity analyses were performed for existing and 2030 no-build traffic conditions for these two intersections.

Table 4 compares the existing and 2030 no-build traffic conditions at two intersections for the special event day traffic.

- The two STOP sign controlled intersections Main St @ Center St and Main St @ Park St operate at unacceptable LOS F for both the existing and 2030 no-build special event traffic.

Table 4: Special Event Existing and 2030 No-Build PM Peak Hour Traffic Conditions at two Key Intersections

Intersection	SPECIAL EVENT PM PEAK HOUR			
	Existing		2030 No-Build	
	ADPV	LOS	ADPV	LOS
Main Street @ Center St*	>1000	F	>1000	F
Main St @ Park St*	>1000	F	>1000	F

ADPV= Average Delay per Vehicle, in Seconds
 LOS = Level of Service (A is excellent, E and F are undesirable)
 * For STOP sign-controlled intersections, the conditions represent the left turn from the side street

= STOP sign controlled intersections

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Summary of Existing and 2030 No-Build Traffic Condition

Based on the analyses performed for this study, the three STOP sign controlled intersections; Main St @ Center St, Main St @ Park St, and Park St @ Housatonic St are identified as problem intersections. These intersections operate at the unacceptable LOS F for all the existing and 2030 peak periods analyzed except for the existing AM peak hour non-peak season traffic during which they operate at LOS D.

The other five study area intersections; Main Street @ Price Chopper Driveway, Park Street @ High Street, Route 20 @ I-90 Off Ramp, Route 20 @ Route 102 and Route 20 @ Prime Outlets analyzed operate at acceptable LOS C or better for the existing traffic and at LOS D or better for 2030 no-build traffic condition.

The major technical findings are summarized below:

Existing Conditions

- The capacity and level of service analysis of the eight intersections studied shows that the following three signalized intersections; Route 20 @ I-90 Off Ramp, Route 20 @ Route 102 and Route 20 @ Prime Outlets and two STOP sign controlled intersections; Main Street @ Price Chopper Driveway, Park Street @ High Street, work within the acceptable LOS C or better during the AM and PM peak hours for the existing peak and non-peak season traffic.
- The three STOP sign controlled intersections; Main St @ Center St, Main St @ Park St, and Park St @ Housatonic St operate at LOS D for the existing morning non-peak season traffic and at LOS F for all the other peak period traffic analyzed. .

Projected 2030 No-Build Conditions

- The 2030 no-build analysis indicates that all three signalized intersections which were operating at the acceptable LOS B for existing traffic condition will operate at the same LOS B for the 2030 peak and non-peak season traffic. The 2030 no-build analysis was done using the same signal timings and phasing plans as the existing, so the optimization of signal timings might improve the performance level of these intersections.
- The 2030 no-build analysis indicates that the three STOP sign controlled intersections; Main St @ Center St, Main St @ Park St, and Park St @ Housatonic St which will operate at LOS F. These intersections are already operating at LOS F for all the existing PM peak periods analyzed.

Special Event Traffic

- The two STOP sign controlled intersections Main St @ Center St and Main St @ Park St operate at unacceptable LOS F for both the existing and 2030 no-build special event traffic.