



**Congestion Levels at intersections along the US-7 Corridor
from Milton to Georgia: 2015 and 2035**

An analysis was composed at the various intersections along US-7 from Milton to Georgia for 2015 volumes as well as volume growth over the next 20 years to 2035 . The analysis was done over this time frame to match the existing timeframes that were analyzed in the 2016 CCRPC Milton Corridor Study. The purpose of this analysis was not only to find which intersections are at a congested level at present and identify what if any mitigation has been proposed but to also analyze intersection volumes along the corridor 20 years into the future to see if any new congestion hot spots occur. The intersection analysis included warrants for left and right turn lanes as well as using traffic simulation software evaluating intersection congestion using a value known as Level of Service.

Intersection Level of Service is a measure of the operational conditions within a traffic stream as well as the perception of delay by motorists and passengers. Level of Service is influenced by a variety of factors, including intersection controls, intersection geometry, traffic levels, and incidents that impede traffic flow. There are six levels of service, characterized by letter designations A through F with A symbolizing the lowest level of congestion with minimal traffic delay and F symbolizing the highest level of congestion with potentially long traffic delays.

For Vermont state roads, VTTrans has adopted a Level of Service Policy for the state highway system. Level of Service (LOS) C is designated as the desired design target for signalized intersections and LOS D is designated as acceptable for side street approaches on stop-controlled intersections. Reduced LOS may be acceptable on a case-by-case basis, particularly within densely settled areas where further intersection improvements that are required to achieve LOS C would create negative cultural and environmental impacts. In cases where the existing LOS is less than desired and where the necessary intersections improvements are not feasible, a lower LOS may be acceptable, provided that the impact of future traffic can be effectively mitigated by implementing other congestion management strategies.

Table 1 - Signalized Intersection Level of Service Criteria

LOS	Avg. Delay (sec/veh)	Quality of Service
A	≤10	Free flow with little or no queuing
B	≤20	Low delays with short queues – reasonably unimpeded operation
C	≤35	Moderate delays and queues with occasional cycle failures*
D	≤55	Moderate delays and queues with noticeable cycle failures
E	≤80	Long delays and queues with frequent cycle failures
F	>80	Very long delays and queues with continued cycle failures

* a cycle failure occurs when a vehicle has to wait more than one traffic signal cycle to pass through the intersection

Table 2 – Stop Controlled Intersection Level of Service Criteria

LOS	Avg. Delay (sec/veh)	Quality of Service
A	≤10	Free flow with little or no queuing
B	≤15	Low delays with short queues – reasonably unimpeded operation
C	≤25	Moderate delays and queues but stable operation
D	≤35	Less stable condition -delays and queues are noticeable
E	≤50	Longer traffic queues and delay is more significant
F	>50	Very long delays and extensive queuing

Should an individual lane group or approach experience LOS F or a volume/capacity ratio greater than 1.0, the intersection is considered to have failed. In cases where an intersection fails, mitigation may be required, if reasonably possible, in order to mitigate a future traffic impact. Mitigation could include but is not limited to improvements such as extra left turn lanes, right turn lanes, through lanes, new traffic signals, existing traffic signal improvements, or roundabouts.

It should also be noted the for unsignalized or stop control intersections, the Level of Service D or better is utilized for side streets with volumes exceeding 100 vehicles per hour for a single lane approach and 150 vehicles per hour for a two lane approach. *No LOS criteria are in effect for volumes less than these.*

In reviewing the 20-year volume projections based on the annual average daily traffic volume trend from the previous 20 years, the corridor volumes would actually decrease over the next 20 years. However, to remain conservative, a 20-year growth factor of 7 percent was used from the VTrans Continuous Counter Report.

US-7 corridor: Intersection Congestion Hot Spots 2015 and 2035 – Milton to Georgia

US-7 at Catamount Drive (South):

- This was a road that was not measured in the CCRPC corridor management study. The Catamount Drive stop-controlled approach to US-7 has a Level of Service value of C for both 2015 and 2035 in the AM peak hour. During the PM peak hour, the intersection has a Level of Service value of B for 2015 and a Level of Service value of C for 2035. This is an acceptable Level of Service for a stop-controlled intersection. A northbound left turn lane exists for this intersection and right turn lane is not warranted. It should be noted that the Catamount drive (side street) volumes were less than 100 vehicles in the peak hours, so this falls below the minimum threshold for the VTrans Level of Service evaluation.

US-7 at Forbes Road:

- This was a road that was not measured in the CCRPC corridor management study. The Forbes Road stop-controlled approach to US-7 has a Level of Service value of C for both 2015 and 2035 in both the AM and PM peak hours. This is an acceptable Level of Service for a stop-controlled intersection. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, neither a left turn lane nor right turn lane was warranted. It should be noted that the Forbes Road (side street) volumes were less than 100 vehicles in the peak hours, so this falls below the minimum threshold for the VTrans Level of Service evaluation.

US-7 at Bartlett Road:

- This was a road that was not measured in the CCRPC corridor management study. The Bartlett Road stop-controlled approach to US-7 has a Level of Service value of C for both 2015 and 2035 in the AM peak hour. During the PM peak hour, the intersection has a Level of Service value of B for 2015 and a Level of Service value of C for 2035. This is an acceptable Level of Service for a stop-controlled intersection. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, a right turn lane was not warranted, however a left turn lane was found to meet warrants. However, the CCRPC corridor study suggested a possible geometric change that would eliminate Bartlett Road from intersecting US-7 (Milton Corridor Study Page 3-42). If this change took place, a left turn lane would not be needed. It should also be noted that the Bartlett Road (side street) volumes were less than 100 vehicles in the peak hours, so this falls below the minimum threshold for the VTrans Level of Service evaluation.

US-7 at West Milton Road:

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of F during the AM and PM peak hours. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, neither a left turn lane nor right turn lane was warranted, however the intersection does have issues with traffic delay nonetheless shown by the Level of Service value. The CCRPC corridor study suggested a possible geometric change that would eliminate the northbound left turn movement and make West Milton Road a one-way westbound route (Milton Corridor Study Page 3-42). This change would help decrease traffic delay and potential safety conflict points within the intersection.

US-7 at Chrisemily Lane:

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of E during the AM peak hours in 2015 and 2035. During the PM peak hour, the intersection has a Level of Service value of E for 2015 and a Level of Service value of F for 2035. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, a left turn lane was not warranted, however a right turn lane was just on the threshold of being warranted. Chrisemily Lane does have a reported Level of Service of E and F, however the side street volumes were less than 100 vehicles in the peak hours (in this case less than 50 vehicles in the peak hours). This falls below the minimum threshold for the VTrans Level of Service evaluation.

US-7 at Pecor Avenue:

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of F during the AM and PM peak hours in 2035. However, since the time of the CCRPC analysis, there has been traffic signal placed at the intersection with both independent left and right turn lanes along US-7. This change will help decrease traffic delay at this intersection. The signal was installed to help facilitate the construction of the future Milton East-West connector road that will help provide an alternate path for traffic in Milton other than US-7. The East-West connector will also form a good backing road to collect traffic and route them to signalized intersections for traffic control.

US-7 at Landfill Road:

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of E during the AM peak hours in 2015 and 2035. During the PM peak hour, the intersection has a Level of Service value of F for both 2015 and 2035. There are currently no left or right turns lanes along US-7 for this intersection however a development that is planned for the corner of US-7 and Landfill Road has received their VTrans permit to construct an eastbound left

turn lane on US-7. The intersection does not warrant a right turn lane on US-7. Landfill Road does have a reported Level of Service of E and F; however, the side street volumes were less than 100 vehicles in the peak hours (in this case less than 20 vehicles in the peak hours). This falls below the minimum threshold for the VTrans Level of Service evaluation.

US-7 at Southerberry Drive

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of E during the AM peak hours and a Level of Service rating of F for the PM peak hours. There are currently both left and right turns lanes along US-7 for this intersection. Southerberry Drive does have a reported Level of Service of E and F, however the construction of the future Milton East-West connector road that will help provide an alternate path for traffic in this area other than US-7. The East-West connector will also form a good backing road to collect Southerberry traffic and route them to a signalized intersection for traffic control. The first portion of the East-West connector from US-7 at Boysenberry to Southerberry was approved by Act 250 on 10-1-2021.

US-7 at Bombardier Road:

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of F during the AM and PM peak hours both for 205 and 2035. Left turns from US-7 are prohibited at this intersection and there are currently no right turns lanes along US-7 at this location, therefore the intersection was evaluated for warrants. Based on design hour volumes, a right turn lane was warranted for this intersection. The CCRPC corridor study had a diagram displaying the East-West connector or backing road could connect a Park Place next to Bombardier forming an alternate traffic connection (Milton Corridor Study Page 3-54).

US-7 at Haydenberry Drive:

- This was a road that was not measured in the CCRPC corridor management study. The Haydenberry stop-controlled approach to US-7 has a Level of Service value of C for both 2015 and 2035. During the PM peak hour, the intersection has a Level of Service value of C for 2015 and a Level of Service value of D for 2035. This is an acceptable Level of Service for a stop-controlled intersection. An eastbound left turn lane exists for this intersection and right turn lane is not warranted. There is VTrans capital project in place (The Milton Hourglass STP 5800(3)) that will improve both roadway geometrics and traffic delay in this section of the corridor. Construction is estimated to start for this project in 2025. The Milton Hourglass project will aid Haydenberry traffic in an indirect way. Currently the traffic signal head for the left turn lane turning on to Centre Drive (and into Hannaford) is a protected only turn arrow so vehicles have to wait for the green arrow in order to turn left. Drivers will instead turn left at the non-signalized Haydenberry Drive before the Centre Drive intersection to get to Hannafords instead. By doing this, they avoid having to wait for left turn protected arrow at Centre Drive. When the Milton Hourglass project is constructed, the left turn protected head at Centre Drive will be replaced with a flashing yellow arrow protected/permissive traffic signal head. In that instance, vehicles can make a left at any timing during the flashing yellow arrow once the opposing traffic produces gaps. The vehicles will not have to wait for the protected green arrow of the road is clear. This could help alleviate current left turn movements from US- on to Haydenberry Drive.

US-7 at Centre Drive, Railroad Street, and the Milton Square Shopping Center Driveway:

- These three intersections all report a Level of Service value of E during the PM peak hour. This is especially critical for the Centre Drive and Milton Square Shopping Center Driveway intersections since they are signalized. However, there is VTrans capital project in place (The Milton Hourglass STP 5800(3)) that will improve both roadway geometrics and traffic delay in this section of the corridor. Construction is estimated to start for this project in 2025.

US-7 and Rebecca Lander Drive

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of F during schooltime AM and PM peak hours in both 2015 and 2035. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, neither a left turn lane nor right turn lane was warranted. Rebecca Lander Drive does have a reported Level of Service of F, however the side street volumes were less than 100 vehicles in the peak hours (in this case less than 25 vehicles in the peak hours). This falls below the minimum threshold for the VTrans Level of Service evaluation. There could be more than this amount in the afternoon when school gets out, however the US-7 corridor has less traffic at that time compared to the standard PM peak hour. In this instance, the CCRPC corridor study focused on a safe way for children and other pedestrians to reach the school. The study recommended crosswalks with Rapid Rectangular Flashing Beacons (RRFBs) as well as splitter islands along US-7. (Milton Corridor Study Page 3-43)

US-7 at Lamoille Terrace

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of F during the AM and PM peak hours for both 2015 and 2035. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, neither a left turn lane nor right turn lane was warranted. While Lamoille Terrace does have a reported Level of Service F, the side street volumes were less than 100 vehicles in the peak hours (in this case less than 50 vehicles in the peak hours). This falls below the minimum threshold for the VTrans Level of Service evaluation. In this instance, the CCRPC corridor study focused on a safe way for children and other pedestrians to reach the school. The study recommended crosswalks with Rapid Rectangular Flashing Beacons (RRFBs) as well as splitter islands along US-7. (Milton Corridor Study Page 3-43)

US-7 at Barnum Street

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of F during the AM peak hours for both 2015 and 2035. The intersection was also found to have a Level of Service rating of E during the PM peak hours of both 2015 and 2035. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, neither a left turn lane nor right turn lane was warranted. Barnum Street does have a reported Level of Service of E and F, however the side street volumes were less than 100 vehicles in the peak hours (in this case less than 50 vehicles in the peak hours). This falls below the minimum threshold for the VTrans Level of Service evaluation. In this instance, the CCRPC corridor study focused on a safe way for children and other pedestrians to reach the school. The study recommended crosswalks with Rapid Rectangular Flashing Beacons (RRFBs) as well as splitter islands along US-7. (Milton Corridor Study Page 3-43) It was also mentioned in the CCRPC corridor study then Barnum Street and Lamoille Terrace be evenly aligned with one another, so the intersection does not contain a side street offset.

US-7 at Main Street

- This was a road that was measured in the CCRPC corridor management study and found to have Level of Service rating of E during the AM peak hours and a Level of Service rating of F for the PM peak hours. There are currently no left or right turns lanes along US-7 for this intersection, therefore the intersection was evaluated for warrants. Based on design hour volumes, this intersection meets the warrants for both a left turn lane and right turn lane. However, there is a large turn radius from US-7 onto Main St. which allows vehicles to turn at a faster speed. It may also not be prudent to put in a right turn lane because the crosswalk would have to be extended through another lane in this village setting. Main Street has a reported Level of Service of E and F,

with over 100 vehicles per hour egressing from the side street (turning movement count data shows approximately 200 vehicles egressing Main Street in the PM peak hour). The CCRPC corridor study recommended a scoping study that would include analysis of a possible single lane roundabout at that location. (Milton Corridor Study Page 3-46). The roundabout would represent a good solution for traffic control as well as enhancing the aesthetics in the village area. A roundabout would also negate the need for both a left and right turn lane.

US-7 at Lake Road:

- This was a road that was not measured in the CCRPC corridor management study. The Lake Road stop-controlled approach to US-7 has a Level of Service value of B for 2015 and a Level of Service value of C for 2035 during the AM peak hour. During the PM peak hour, the intersection has a Level of Service value of C for 2015 and a Level of Service value of D for 2035. This is an acceptable Level of Service for a stop-controlled intersection. A northbound left turn lane exists for this intersection and right turn lane is not warranted.

US-7 from Ballard Road through the I-89 Northbound and Southbound Ramps:

- The intersections of Ballard Road through the interstate ramps along US-7 in Georgia and analyzed and summarized in the Georgia Roadway Master Plan. However, it should be noted that the I-89 southbound ramp did meet warrants for a right turn lane.