

## LATE MERGE ... the ZIPPER SYSTEM

### **“The Question”** ... *When are we suppose to merge when a lane is closed?*

Motorists ask this question because they get mixed messages in the “Real World” of traffic congested work zones. What is the “right” thing to do? The simple answer is “Do it when it is safe”. Beyond the simple answer, there is much more to explain about what you are “supposed” to do, and when to start doing it.

### **“The Conflict”**

We have conflict between what has been taught as the “proper” procedure based upon many years of driving etiquette & safety ... versus what is legally required ... versus what is a better & safer procedure in today’s times of high congestion.

Drivers are taught to obey the traffic signs and merge over when they are requested to do so. Therefore, most motorists start to merge as soon as they see warning signs and discover which lane is closed. Since they were taught this, it is their mindset that everyone else ‘Not Merging’ immediately is ‘wrong’. This may lead to many adverse conditions during high traffic volumes such as during rush hour.

Legally, you can continue in either lane until you are told to actually leave the lane. This command is given with the “MERGE (left or right)” sign. All signs before that are simply warning you of conditions ahead. Obviously, when traffic conditions are light and vehicles are traveling at highway speeds, it is best to make the merge maneuver as soon as safely possible rather than leaving that merge maneuver to the last moment at high speed.

When traffic is heavy and slow, it is actually much safer for motorists to remain in their current lane until the point where traffic can orderly take turns merging which is generally after the “MERGE” sign. Unfortunately, while the safer procedure is legal, it is not what has been taught.

### **“A New Procedure”**

For several years, Mn/DOT has been using an electronic detection system on selected larger construction projects which we call “Late Merge” and the media has called the “Zipper” system. The late merge system detects when traffic is slow or congested and several electronic changeable message signs placed along the route are activated to say “Use Both Lanes” and “Take Turns At Merge”. Motorists understand the messages and quickly form two lanes of traffic and take turns merging near the lane closure area. We have found that motorists appreciate being told they are “allowed” to use both lanes.

It has been shown that motorists may be able to easily identify the congestion situation without a computerized sign system in place. This was proven on I-35 in a rural setting (between Pine City and Hinckley) where we simply placed standard signs prior to the work zone which told motorists to “During Backups Use Both Lanes”. On that project, where congestion only happened on the weekends, we found that motorists could easily identify the backup situation, determine that ‘both lane’ usage would be prudent, and they implemented the late merge on their own. It was the signs posted prior to the backup area that told the motorists that it was “allowable” to use both lanes.

When it is more difficult for motorists to determine whether “both lane” usage is prudent, such as closer to the Metro area where volumes and speeds may fluctuate throughout the hour each day, it may be necessary for a computer to analyze speed trends and lane capacity to determine when “both lane” usage is the most prudent operation.

### **“Benefits”**

We have witnessed 3 primary safety and operational improvements whenever the Zipper System has been deployed. These improvements were found regardless of whether the system had computerized detection with automated warning signing or the motorist had to determine whether it was time to “use both lanes” because of a traffic backup.

- 1) By creating two full lanes of traffic, we reduce the difference in speeds between the two lanes. Therefore, vehicles generally do not have a reason to switch lanes, and if they do decide to switch, then the traffic is traveling approximately the same speed in both lanes making the maneuver is much easier and safer.

- 2) We reduce the overall length of the backup by up to 50% (40% is common). While this may not be important in rural areas, it is critical in the metro area where the backups affect other interchanges. Therefore, we reduce the congestion problem for the other interchanges.
- 3) When both lanes are moving slowly, then everyone is “equally” disadvantaged by the backup and while the driver may not be happy, they have no reason to be mad at a fellow driver in the backup. Therefore, “Road Rage” is reduced significantly.

### **“Misconceptions”**

Although motorists seem to believe that a single lane of traffic flowing into a work zone should flow through unrestricted and much faster without a slow down for merging traffic, this just does not happen in the real world of traffic hazards. Motorists slow down because of the uncertainty of the drivers’ actions ahead, poor visibility beyond, signs/drums/barricades and concrete barriers, unexpected temporary curves, construction equipment, and workers nearby. That slows down the rest of the line of traffic and the longer the queue (line of traffic) the more it slows down and a longer time before it regains speed. When traffic is heavy, a perfect line of drivers cruising through the work zone at safe highway speeds and spacing with no delay, is impossible to maintain.

During our previous experience with the late merge system, we have collected and processed data on whether the system improves (or not) the motorist’s travel time through the work zone. Our analysis has shown that the Zipper System has no effect on travel time through the work zone. Unfortunately, the motorist’s travel time through a work zone appears to remain approximately the same regardless of whether the zipper was used or not. However, the zipper system produces a much safer merge situation and the length of the queue is much less.

### **“When Will We Change?”**

We are changing slowly. The public has been taught one way to drive and changing their mindset will take time. As we move to change the mindset, we hope to get the motorists accustomed to the new procedure where it makes the most sense and they will see the greatest advantages.

Starting in the 2009 construction season, projects on I-35 between Faribault and Owatonna used standard signs prompting motorists to “Use Both Lanes During Backups” and “Take Turns Merging”. These projects will last for a couple of years and many motorists will be taught that is OK to stay in the lane until the merge area. Mn/DOT has already installed permanent signage in two locations within the Metro Area where a lane drop routinely caused backups and queuing. One location is on Highway 61 entering Hastings from the north, and the other is on the ramp from I-35E to westbound I-694. In the future, Mn/DOT will start using versions of the signs in temporary lane closures such as those for daily maintenance operations. We anticipate that the media will help with the education process as these signs appear on more projects in the future.

We will be continuing to use the “Late Merge” system to detect congestion and prompt motorist to “use both lanes” whenever a construction project justifies the use of the system through traffic volumes, duration of closures, and other factors which may be considered before investing in the system deployment.

The answer to “WHEN” is “NOW”, but do not expect everyone to follow you. We will be implementing signing on both construction and maintenance projects and working on ideas for educational pieces, but those things are moving slowly as we monitor public reaction and determine the “best” sign messages to convey the procedure. Meanwhile, “the guy in the car next to you” has not read this document and may not understand that you should “Merge When it is Safe”, it is legal to use both lanes, it is illegal to block lanes, and Taking Turns is just plain “Minnesota Nice”.

Hopefully this has answered the question regarding “When to Merge”, but if you have more questions, please contact Ken Johnson, State Work Zone Engineer at 651-234-7386 or email him at [ken.johnson@state.mn.us](mailto:ken.johnson@state.mn.us)