

Variable Number of Left Turn Lanes (VNLTL) treatment - FAQs

What is the VNLTL treatment?

The VNLTL treatment is a method of varying the number of left turn lanes available for a given approach at a signalized intersection – and the associated left turn signal phasing for that approach and/or the opposing approach – by time-of-day.

How does the VNLTL treatment work for each approach that has a variable number of left turn lanes?

- **Under normal, off-peak operation**, only the left-most left turn lane would be available to serve left turns, operating under protected-permitted or permitted phasing using a flashing yellow arrow
- **Under peak period operation**, both left turn lanes are available, operating under protected-only phasing

What is the benefit of having only a single left turn lane during normal, off-peak operation?

Having all left turns from a given approach executed from the left-most left turn lane improves sight distance for those vehicles. In addition, closing the right-most left turn lane improves sight distance for the *opposing* approach. This can enable protected-permitted or permitted phasing for one or both of these opposing left turn approaches.

Which approaches or travel movements could benefit from implementation of VNLTL at a single approach?

The addition of *any* permitted left turn time – even for one approach – will reduce delay for *all* intersection users.

How does the ability of VNLTL to enable one or more “permitted” phases by time-of-day reduce delay?

A “permitted” left turn phase enables vehicles from an approach to execute a left turn whenever opposing through traffic has a green indication. This is in addition to any “protected” left-turn green arrow time for those left turns.

“Permitted” time for left turns always reduces delay at any intersection in three different, complementary ways:

- Each left turning vehicle has a much larger portion of the cycle available to potentially execute a left turn
- Serving left turns throughout the cycle lessens left turn queue lengths and reduces left turn signal phases
- Other approaches do not have to wait while a dedicated left turn phase is served to as few as one vehicle

How does VNLTL operation compare with the dual left flashing yellow arrow treatment?

Several intersections in North Carolina have dual left flashing yellow arrow operation at approaches where both left turn lanes have sufficient sight distance. The VNLTL treatment increases the potential number of intersections with permitted phasing by enabling improved sight distance for some approaches for at least part of the day.

Note that dual left flashing yellow arrow can be operated via VNLTL lane use signs and signals if desired.

What does “normal, off-peak” and “peak” operation mean?

The “normal, off-peak” and “peak” conditions generally refer to the periodic variation of left turning and opposing through volumes by time of day. However, there are not specific time periods associated with those conditions.

Can there be more than two “peak” periods for a given approach or intersection?

Yes. In fact, while the number of open left turn lanes for an approach will *not* vary dynamically (i.e., cycle-by-cycle), it is possible to have more (or less) than two peak periods for an approach as cross product volumes vary. As well, different approaches could have different numbers of peak periods and/or durations of peak period times.

Could VNLTL apply if protected dual lefts were opposed by a single, not positive-offset, protected-only left turn?

Yes. One or both approaches could become protected-permitted if closing the right-most left turn lane for the dual left approach sufficiently improves sight distance for one or both left turning movements. It would also be possible for either of the two approaches to remain protected-only, either all-day due to geometry, or under certain volumes.

Reference figures on reverse side

