

The notes below summarize the review of the recommendations identified in the Henry Chapel TIA Review Comments TTM (DRG, July 7, 2020 - referred to as TTM) compared to the identified mitigation included in the Henry Chapel TIA (Kimley-Horn, February 22, 2018 - referred to as TIA).

NOTE: This analysis does not include the Belmont Middle School traffic and intersection improvements, since the Henry Chapel TIA was performed prior to the Belmont Middle School TIA. Adding Belmont MS traffic would increase the congestion along the corridor beyond the results discussed below, further increasing the need for appropriate improvements to accommodate the proposed Henry Chapel traffic.

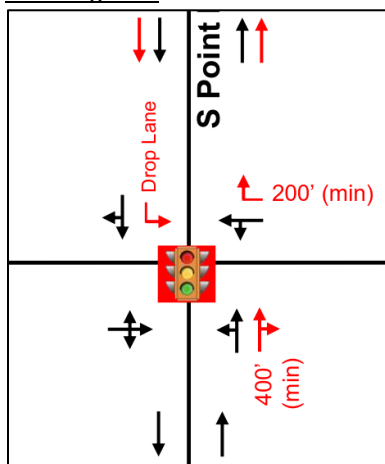
S POINT ROAD (NC 273) CORRIDOR

TIA Mitigation	TTM Mitigation
4-LN cross-section from Henry Chapel to RL Stowe	2-LN cross-section from Henry Chapel to Stowe 3-LN cross-section (1 NB, 2 SB) from Stowe to RL Stowe

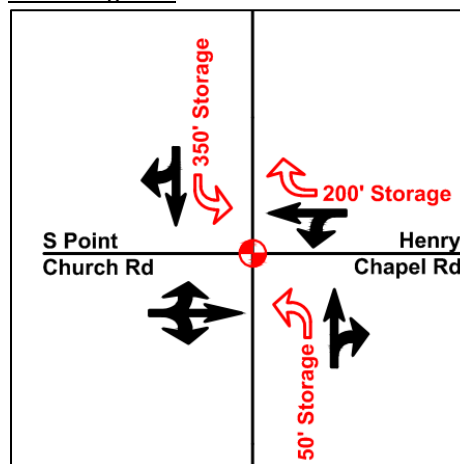
- Dropping the 2nd SB through lane at Stowe Rd (as identified in the TTM) appears to provide enough distance for traffic in the 2nd WB left-turn lane at RL Stowe Rd to merge without causing significant queuing issues.
- Not including a 2nd NB through lane along S Point Rd results in significant queuing throughout the corridor.
 - The following approximate travel times are expected along S Point Rd between Armstrong Rd and RL Stowe Rd for each scenario:
 - Background (w/o the site): NB in AM: 12 min, SB in PM: 5 min
 - Build-out (w/ the site):
 - w/ TTM Improvements: NB in AM: 25 min, SB in PM: 5 min
 - w/ TIA Improvements: NB in AM: 7 min, SB in PM: 5 min
- **SUMMARY: SB direction is expected to perform similar to Background with 2 SBT lanes between R L Stowe & McKee Farm/Stowe; However, NB direction is significantly impacted without appropriate mitigation recommended in TTM. If TTM improvements were installed, travel times NB in AM would double when the site is built; If the TIA improvements were installed, travel times NB in AM would be nearly cut in half when the site is built.**

S POINT ROAD (NC 273) AND HENRY CHAPEL ROAD

TIA Mitigation



TTM Mitigation

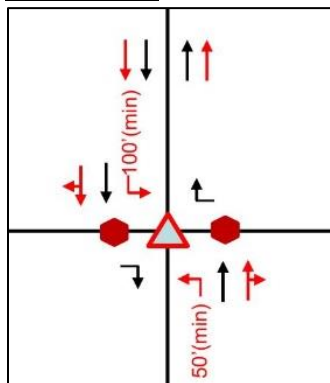


- TTM improvements match the TIA improvements with the exception of the 2nd NBT.
- **The TTM improvements were evaluated as Option 2 in the TIA (see p. 38 in TIA for discussion), but ultimately not recommended due to:**
 - NB approach being at or near capacity with just a single lane
 - NB approach queues extending nearly 1,700' (just past Boat Club Rd)
 - Significant impact to high volume (1,200+ veh) of traffic along S Point Road (particularly NB approach which experiences little to no delay under background conditions)

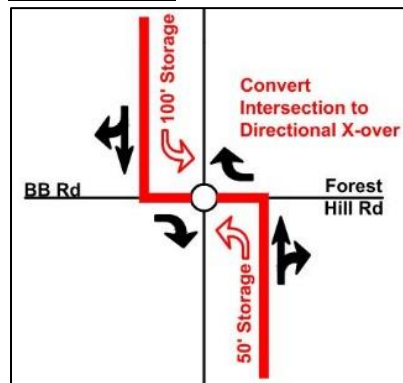
- TTM states that if queuing and delay on S Point Road is the major concern, an unsignalized directional crossover should be considered.
 - Under this scenario, adequate gaps are not provided on S Point Road for the high volume of WB traffic to turn right.
 - Similarly, SBL traffic entering the site would experience longer delays, longer queues, and increased safety concerns for both left-turn crashes (for the SBLs taking shorter gaps) and rear-end crashes (for SBL traffic spilling out of the turn lane into the SBT lane).
 - If an unsignalized directional crossover is provided at Henry Chapel Rd instead of a signal, more site traffic would likely use the northern access via Forest Hill Rd, promoting more traffic through the South Hill Estates neighborhood.
 - Under this scenario by not allowing WB traffic from Henry Chapel to turn left to travel south, it would likely promote illegal U-turns along S Point Road at locations like Belle Meade Cir, 2nd Avenue, or Gaither Road, where left-turn lanes are not provided, which would create more significant queuing issues NB along S Point Road which is already near capacity.
- **SUMMARY: The 2nd NB through lane is needed to limit the queuing and delay impacts to the heavy NB traffic that currently experiences no delay without the site. A signal is needed to allow site traffic to appropriately enter/exit to/from S Point Road, to limit safety concerns, to limit the amount of site traffic through the South Hill Estates neighborhood, and to avoid safety/operational concerns that illegal U-turns may create based on the TTM recommendation to consider an unsignalized directional crossover.**

S POINT ROAD (NC 273) AND FOREST HILL ROAD

TIA Mitigation



TTM Mitigation

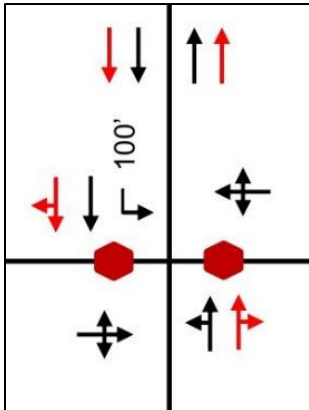


- TTM improvements match the TIA improvements with the exception of the 2nd NBT and 2nd SBT lanes.
- **The TTM improvements were evaluated as Option 2 in the TIA (see page 41 for discussion), but ultimately not recommended due to:**
 - WB approach operating at LOS F w/ 590 seconds of delay in AM peak – serving 124 veh
 - Significant impact to Forest Hill Rd (due to the site adding a significant amount of volume to NB, SB & WB approaches – which further limits gaps available to turn onto S Point Rd – while also increasing the side-street demand for those gaps along Forest Hill Rd)
 - NB and SB approaches being over capacity (1.21 for NB in AM and 1.09 for SB in PM) – meaning little to no gaps in the traffic to be able to turn onto S Point Rd
- TTM only discusses the EB approach of BB Drive being mitigated, and notes that the mitigation rationale used at Stowe/McKee Farm should be applied to this intersection.
 - The volume on BB Drive makes up less than 0.2% of the volume at this intersection.
 - At Stowe/McKee Farm, Synchro was not able to calculate the side street delay during either peak hour under background conditions. Therefore, the site's impact could not be measured.
 - The site clearly has a significant impact on operations at this intersection. This intersection serves as an extension of the proposed site's access (different from the Stowe/McKee Farm intersection).

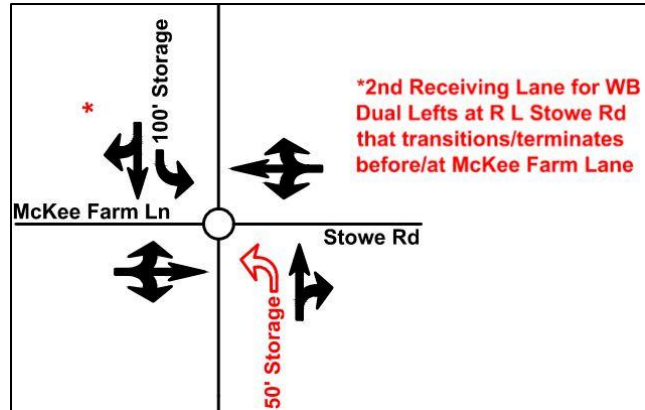
- **SUMMARY:** The analysis shows that existing South Hill Estates residents and the new Henry Chapel site traffic would have extreme difficulty turning onto S Point Rd with only a single lane on S Point Rd (leading to both safety and operational concerns). An additional NBT lane would significantly improve safety/operations.

S POINT ROAD (NC 273) AND STOWE ROAD/MCKEE FARM LN

TIA Mitigation



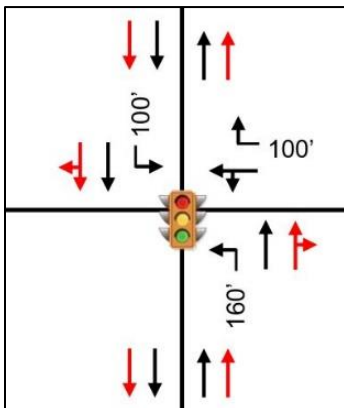
TTM Mitigation



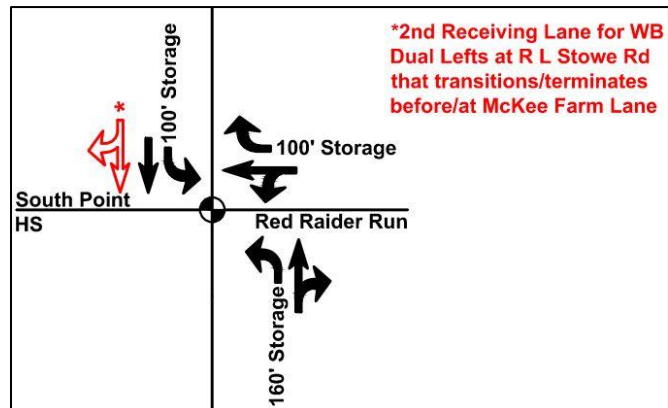
- TTM improvements include a NB left instead of 2nd NBT and 2nd SBT lanes.
- Evaluating this intersection in isolation, adding a NB left mitigates the NB approach delay at this intersection.
 - However, the through lanes needed at this intersection will be more of a function of the addition of through lanes (or lack thereof) at the upstream & downstream intersections – in order to extend the 2nd through lanes to a logical terminus where significant traffic is dispersed (i.e., R L Stowe Rd intersection).
 - Additionally, the NB approach would operate well-over capacity (1.38 in AM) without the 2nd NBT lane.
- **SUMMARY:** The 2nd NBT lane would significantly reduce queuing NB along S Point Rd and significantly increase the capacity along the NB approach. Particularly if a 2nd NBT lane is deemed necessary at the study intersections to the south, it would need to be carried through this intersection to R L Stowe Rd where traffic disperses. The simulation shows that dropping the 2nd SB lane as a left-turn lane at this intersection would not cause significant queuing issues SB along S Point Rd.

S POINT ROAD (NC 273) AND SOUTH POINT HS/RED RAIDER RUN

TIA Mitigation



TTM Mitigation



- TTM improvements match the TIA improvements with the exception of the 2nd NBT lane.
- **The TTM states that the applicant agrees with the TIA improvements; however, Exhibit 1 does not show the 2nd NBT lane.**
- Without the 2nd NBT lane:
 - Site's impact is not mitigated (results similar to build-out)

- The overall intersection is expected to operate at LOS F (with 170 seconds of delay) in AM and LOS E in PM compared to LOS B in AM and C in PM with 2nd NBT lane.
- NB queue is expected to be ~3,500' in AM and 2,000' in PM compared to 1,000' in AM and 500' in PM with 2nd NBT.
- **SUMMARY: The 2nd NBT lane is needed to mitigate the site's impact and to reduce queueing NB along S Point Rd.**

PERCENT IMPACT

- The TTM notes that background conditions are inadequate and therefore, the developer should contribute to only a portion of the widening.
- Based on review of the percent increase in intersection delay between background and build-out conditions, the site's impact along the S Point Road corridor is approximately (based on the percent impact in delay to each approach weighted against the approach volume):

Intersection	AM	PM
Henry Chapel Rd	Error	228%
Forest Hill Rd	Error	Error
Stowe/McKee Farm	Error	Error
South Point HS/Red Raider Run	64%	95%
RL Stowe/Nixon	35%	46%

- The 'Error' shown at each of the unsignalized intersections indicates that these intersections/approaches would operate well over the theoretical capacity and therefore cannot be calculated with the addition of proposed site traffic. Therefore, if the City/NCDOT determine that a 'fair proportionate share' (as proposed in the TTM) is an acceptable mitigation measure, an alternative method to calculating the percent impact would need to be considered.