Alex J. Moore

From: Penelope Karagounis
Sent: Wednesday, June 10, 2015 9:40 AM
To: Alex J. Moore
Subject: FW: Avondale TIS Review
Attachments: Avondale Development TIS Comments.pdf

Alex,

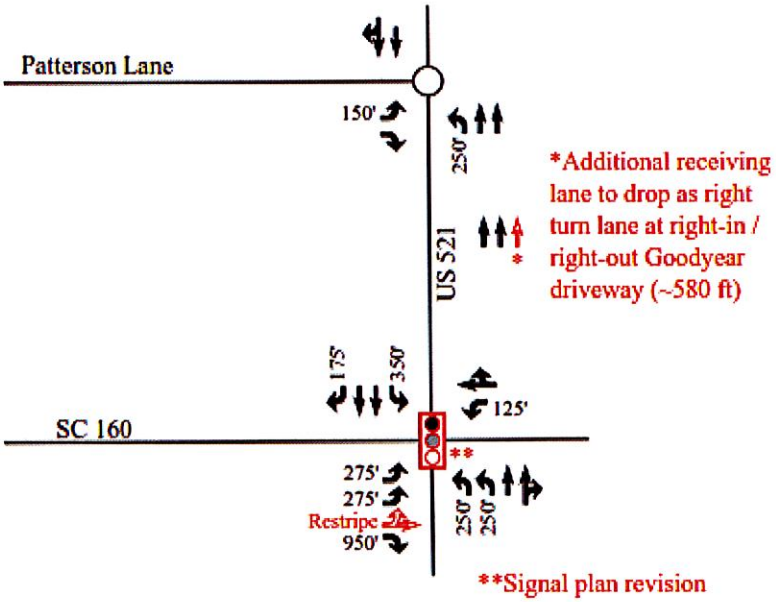
We should probably include this as a separate item to Judy's packet.

Penelope

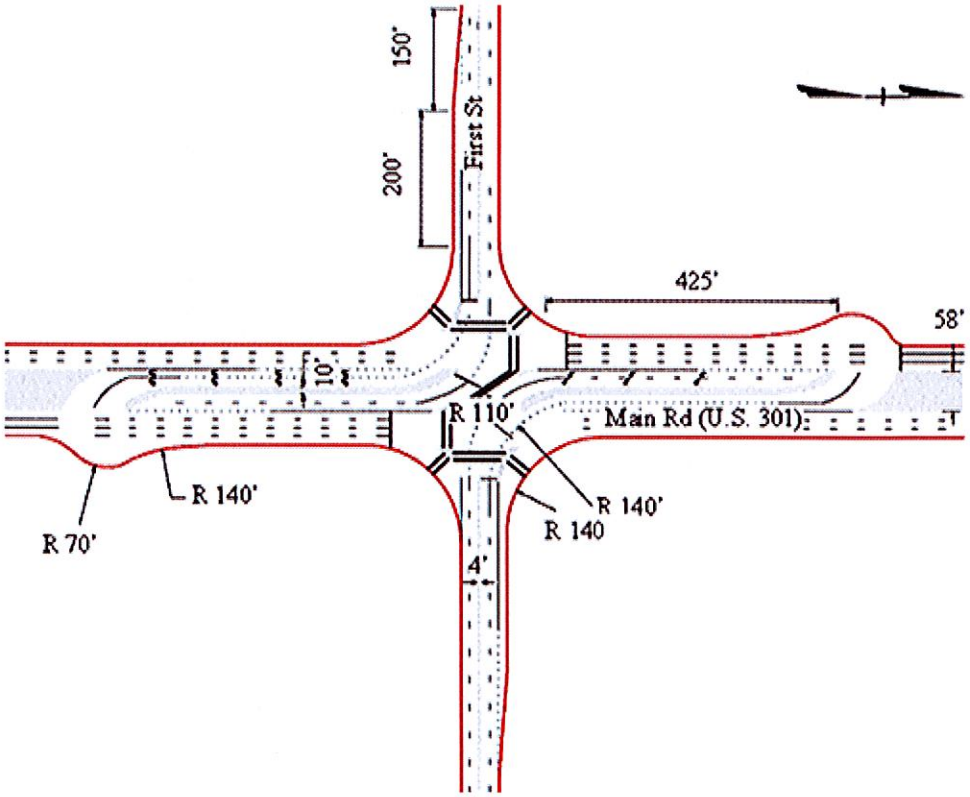
From: Gorrie, Jason R. [mailto:gorriejr@pbworld.com]
Sent: Tuesday, June 09, 2015 10:56 PM
To: Penelope Karagounis
Subject: Avondale TIS Review

Penelope,
Attached are our review comments for the Avondale Development TIS dated May 2015. Please let me know if you have any questions. I have to wait until next week to submit an invoice for this work since we are in the middle of a billing cycle.

There is one item that I would like to discuss that I did not include in the official comments. I am concerned about the recommended improvements the developer proposes at the US 521 & SC 160 intersection. Below is a snap shot of the improvements in question. Based on the SCDOT Roadway Design Manual, providing an acceleration length of 580' seems appropriate for the triple lefts that would come from SC 160; however, a 540' taper would also be included in a typical acceleration lane design. In this case, the lane would drop a the Goodyear driveway. Dropping a lane into a driveway instead of providing a taper creates a safety concern with regard to merging traffic.



The decision on whether this is acceptable ultimately resides with SCDOT; however, I would recommend the examination of a Median U-turn (Superstreet) intersection design at the US 521 & SC 160. This option would restrict the Overhill Dr (WB) approach to the US 521 & SC 160 intersection to right-in/right-out, which would allow more green time to be redistributed to other movements at the intersection. Additionally, U-turn bulb-outs would have to be constructed approximately 500'-700' from the US 521 & SC 160 intersection. Below is an example of the Median U-Turn design. PB is currently working with NCDOT and the Town of Cornelius on the application of this design along Catawba Ave. Our Regional Traffic Manager also authored a paper on the Median U-Turn design for FHWA. I would be more than happy to further discuss the operational and safety benefits of the Median U-Turn design if the County or SCDOT would like more information on the design.



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TO: Penelope Karagounis

FROM: Jason Gorrie, PE

DATE: June 10, 2015

RE: Avondale Development Traffic Impact Study Comments

Anticipated/Approved Future Development

- Page 7: The report indicates that no approved adjacent developments were included in future traffic growth. A supermarket site is proposed north of the US 521 and Red Venture Drive intersection and the planned completion date for the project is before 2017. The TIS for this development was submitted in December 2014. We recommend the trip generation for this site be included in the No-Build traffic volumes.

Trip Generation

- Page 8: The trip generation table is provided in the report showing the number of trips for each land use but there is no documentation of whether a trip generation rate or equation was used. According to the SCDOT Access and Roadside Management Standards (ARMS), the reason for using the rate or equation should be documented.
- Page 8: The site plan has changed since the TIS was completed. We recommend that the applicant update the trip generation based on the revised site plan. There was an increase in single family homes by 130 units and a decrease in town homes by 50 units, which would cause a net increase in trip generation.

Trip Distribution and Assignment

- Page 8: Were the pass-by and internal capture trips for the PM peak calculated using a percentage of the site trips? According to the ARMS, any reductions due to internal trip capture and pass-by trips should be justified and documented. In addition, all trip generation and trip reduction calculations and supporting documentation shall be included in the report appendix.

Traffic Analysis

- Page 10 (Existing): Lead/Lag optimization was allowed in Synchro. As a result, signal phasing is not consistent for the Existing scenario at the intersection of US 521 and Sandra Lane. The southbound left (phase 5) is a leading left in the AM peak and a lagging left in the PM peak. We recommend verifying that the existing traffic signal controller equipment can accommodate changing the phasing sequence based on the time of day by altering left-turn phasing from leading left to lagging left or changing the phasing to be consistent.
- Page 10 (No-Build): Signal phasing is not consistent for the No-Build scenario at the intersections of US 521 and Sandra Lane and US 521 and Red Ventures Drive. At US 521 and Sandra, the southbound left (phase 5) is a lagging left in the AM peak and a leading left in the PM peak. At US 521 and Red Ventures, the southbound left (phase 5) is a leading left in the AM peak and a lagging left in the PM peak. We recommend verifying that the signal controller equipment can accommodate this or changing the phasing to be consistent.
- Page 11 (Build): Signal phasing is not consistent for the Build scenario at the intersections of US 521 and Sandra Lane and US 521 and Red Ventures Drive. At US 521 and Sandra, the northbound left (phase 1) is a leading left in the AM peak and a lagging left in the PM peak and the southbound left (phase 5) is a lagging left in the AM peak and a leading left in the PM peak. At US 521 and Red Ventures, the southbound left (phase 5) is a leading left in the AM peak and a lagging left in the PM peak. We recommend verifying that the signal controller equipment can accommodate this or changing the phasing to be consistent.
- Page 11 (Build Improved): Signal phasing is not consistent for the Improved scenario at the intersections of US 521 and Sandra Lane and US 521 and Red Ventures Drive. At US 521 and Sandra, the southbound left (phase 5) is a lagging left in the AM peak and a leading left in the PM peak. At US 521 and Red Ventures, the southbound left (phase 5) is a leading left in the AM peak and a lagging left in the PM peak. We recommend verifying that the signal controller equipment can accommodate this or changing the phasing to be consistent.

Capacity and Level of Service at Study Intersections

- Page 15 (Table 6 – US 521 and Patterson Lane): According to the ARMS, intersection analysis shall include LOS determination for all approaches and movements. The table only includes approach delay/LOS instead of movement delay/LOS for the stop controlled approach. The eastbound stop controlled approach has two lanes so control delay is provided in Synchro for the left turn lane and the right turn lane. The eastbound left turn is experiencing the most delay at this intersection so we recommend including the delay/LOS for this movement in the table and in the capacity discussion.

- Page 19 (SC 160 and Calvin Hall Road): The report says "it should be noted that the capacity analysis results for the No-Build PM peak scenario are indicating improved delays when compared to existing PM peak conditions." However, the Synchro report for the 2018 No-Build PM peak included in the Appendix does not show improved delay/LOS. Also, the delay/LOS shown in the table for the 2018 No-Build PM Peak does not match this report from the Appendix. We recommend either revising the table or report to be consistent.
- Page 20 (Table 9 – SC 160 and Calvin Hall Road): For the Build Improved scenario, the southbound approach has two lanes so control delay is provided in Synchro for each lane. The southbound left turn is experiencing the most delay at this intersection so we recommend including the delay/LOS for this movement in the table and in the capacity discussion.
- Page 20 (Table 9 – SC 160 and Calvin Hall Road): The Synchro report for the 2018 Build Improved PM Peak included in the Appendix does not show delay and LOS.
- Page 20 (Table 9 – SC 160 and Calvin Hall Road SimTraffic): The 95th percentile queue length for the NBTR movement for the 2018 Build Improved PM peak does not match the SimTraffic report that is provided in the Appendix.
- Page 24 (Table 11 – Harrisburg Road and Calvin Hall Road): The intersection and approach delay/LOS that are shown in the table for the 2018 Build Improved (AM and PM) do not match the SIDRA Reports that are provided in the Appendix. We recommend either providing the correct SIDRA reports or updating the delay/LOS in the table to be consistent.
- Page 25 (Table 12 – Calvin Hall Road and Site Drive 3): The northbound and southbound approach delay that is shown in the table for the PM peak does not match the Synchro report that is provided in the Appendix. Additionally, the southbound and northbound stop controlled approaches at Site Drive 3 have two lanes so control delay is provided in Synchro for each lane. We recommend including the delay/LOS for the left turn movements in the table since they are experiencing the most delay at this intersection.
- Page 25 (Table 12 – Harrisburg Road and Site Drive 4): The eastbound approach delay that is shown in the table for the PM peak does not match the Synchro report that is provided in the Appendix. We recommend revising the table to be consistent.
- Page 25 (Table 12 – Harrisburg Road and Site Drive 5): The eastbound approach delay that is shown in the table for the PM peak does not match the Synchro report that is provided in the Appendix. We recommend revising the table to be consistent.
- Page 25 (Table 12 – Harrisburg Road and Site Drive 6): The eastbound approach delay that is shown in the table for the PM peak does not match the Synchro report that is provided in the Appendix. Additionally, the eastbound stop controlled approach at Site Drive 6 has two lanes so control delay is provided in Synchro for each lane. The eastbound left turn is

experiencing the most delay at this intersection so we recommend including the delay/LOS for this movement in the table and in the capacity discussion.

Figures

- Figure 3 (2015 Existing Lane Configurations): The lane configuration on eastbound SC 160 between US 521 and Harrisburg Road does not match the aerial or what is modeled in Synchro. The eastbound left and right turn lanes develop west of Harrisburg Road so the storage should be shown at the intersection of Harrisburg Road instead of at the intersection of US 521.
- Figure 5 (Site Trip Distribution Percentages): We recommend changing the label for the Y percentage to "Exiting Trip Distribution" in the legend.
- Figure 5 (Site Trip Distribution Percentages): According to the report, some of the site trips are assumed to cut through to US 521 between Site Drive 5 and Patterson Lane and utilize the signal at Red Ventures Drive. The vehicles would need to cut through a business parking lot in order to make this maneuver. We do not recommend sending trips through a parking lot. Please justify this cut through and also document the cut through route in the Trip Distribution and Assignment section of the report. It is difficult to follow exactly where the vehicles will go using only the Site Trip Distribution Percentages Figure.
- Figure 5 (Site Trip Distribution Percentages): Should the exiting trip distribution for the eastbound right turn on Red Ventures Drive at US 521 be 10% instead of 5% to match the 10% that is assumed to cut through to southbound US 521 or does this missing 5% utilize a different driveway north of Patterson Lane? We recommend showing all distribution percentages in the figure and the cut through route needs to be documented in the report.
- Figure 6 (Primary Site Trip Assignment): We recommend showing the site trips that are assumed to cut through to US 521 instead of the distributions. For example, show "49/39" on southbound Harrisburg Road turning left south of Site Drive 5 instead of "10%". The distributions are already shown in Figure 5.
- Figure 6 (Primary Site Trip Assignment): Refer to the question for Figure 5 above. Adjust the site trips for the eastbound right turn on Red Ventures Drive at US 521 accordingly.
- Figure 7 (PM Peak Hour Pass-By Trip Distribution Percentages): We recommend changing the label for the Y percentage to "Exiting Trip Distribution" in the legend.
- Figure 9 (Total Site Trip Assignment): We recommend showing the site trips that are assumed to cut through to US 521 instead of the distributions.
- Figure 9 (Total Site Trip Assignment): Refer to the question for Figure 5 above. Adjust the site trips for the eastbound right turn on Red Ventures Drive at US 521 accordingly.

- Figure 11 (2018 Build Peak Hour Traffic Volumes): Refer to the question for Figure 5 above. Adjust the volume for the eastbound right turn on Red Ventures Drive at US 521 accordingly.
- Figure 12 (Recommended Lane Configurations): We recommend using red instead of black for the eastbound left turn lane storage on Site Drive 6 since it is a recommended improvement.