



August 6, 2009

Mr. Scott Brillhart
Director of Community Development
Township of Upper St. Clair
1820 McLaughlin Run Road
Upper St. Clair, PA 15241

Subject: Traffic Study of Zoning Regulations
Boyce Road & Washington Road (Route 19)

Dear Mr. Brillhart:

Trans Associates (TA) has completed a traffic study to assist with the development of zoning regulations along the north side of Boyce Road between Boyce Middle School and Washington Road. This area is currently zoned residential; however, rezoning the area to permit a mixture of office and/or retail may be sustainable in this area. Any rezoning could have a potential impact on traffic flow along Boyce Road, specifically at its intersection with Washington Road. The following sections of this report summarize the project data collection, the traffic analysis, and conclusions.

Data Collection

Manual turning movement counts were performed on April 29, 2009 between the hours of 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM at the following intersections:

- Washington Road (S.R. 0019) & Boyce Road (S.R. 3006)
- Boyce Road & Old Washington Road
- Boyce Road (S.R. 3006) & Thorntree Road
- Boyce Road (S.R. 3006) & Morton Road

As determined by the traffic counts, the weekday peak traffic periods occur at the following times:

- A.M. peak hour: 7:30 AM to 8:30 AM
- P.M. peak hour: 4:30 PM to 5:30 PM

Summaries of the data collected during the manual turning movement counts at each of the study intersections are included with this correspondence.

Traffic Analysis

The purpose of the analysis was to determine various land use combinations that could be absorbed into the existing traffic flows along Boyce Road without requiring significant roadway improvements on Washington Road (e.g. widening for additional thru lanes or dual turn lanes).

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Five land use scenarios were analyzed for the northwest corner property at Boyce Road & Washington Road:

- Scenario 1 – 100% residential use
- Scenario 2 – 100% office use
- Scenario 3 – 100% strip retail use
- Scenario 4 – approximately equal office/strip retail use
- Scenario 5 – 85% office use/15% retail accessory use

A sensitivity analysis was prepared for the study area. A sensitivity analysis studies how the results of an analysis vary by changing the inputs over a specific range. In this case, the sensitivity analysis studies various sizes of development (the input) and reviews the results of the traffic analysis in terms of LOS (the output). The recommended sustainable development sizes were based upon the upper limit of the development size (the input) that would not exceed the LOS requirements at the study intersections (the output).

Vehicular trip generation for the anticipated rezoning was projected based upon data published by Institute of Transportation Engineers (ITE) in the *Trip Generation* report, Eighth Edition, 2008. ITE trip generation land use code 210 (Single Family Residential); land use code 820 (Shopping Center); and land use code 710 (General Office) were utilized for this analysis.

Projected Traffic Volumes – 2015 No-Build and 2015 Build Conditions

Forecasted 2015 no-build traffic volumes for the weekday A.M. and weekday P.M. peak hours were determined by applying a background traffic growth rate of 1.15% per year, linear, to the existing 2009 traffic volumes. This background traffic growth rate was obtained from the Southwestern Pennsylvania Commission (SPC). In addition to the applied growth rate, an additional 50 single family homes were added to the background traffic to account for potential residential development on adjacent properties within the study area.

Forecasted 2015 build traffic volumes for the weekday A.M. and weekday P.M. were determined by applying the 2015 no-build peak hour traffic volumes with the corresponding future scenario.

Capacity Analysis

Capacity calculations were performed using the methodologies published in the Highway Capacity Manual 2000, by the Transportation Research Board, 2000. This methodology determines how well an intersection operates using both quantitative (average delay per vehicle in seconds) and qualitative (LOS – letter grade ranking) outputs. The quantitative measure of capacity is the overall average delay per vehicle at the intersection. The qualitative measure of capacity is Level of Service (LOS) A through F, with A representing the best operating conditions and LOS F the worst. Capacity analyses were completed utilizing the SYNCHRO 7 software, which reports both average delay and LOS.

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Using a sensitivity analysis, it was determined that the following development scenarios could be constructed without triggering major roadway improvements at Washington Road (e.g. widening for additional thru lanes or dual turn lanes):

- Scenario 1 - 450 residential dwelling units
- Scenario 2 - 125,000 square feet of office
- Scenario 3 - 80,000 square feet of retail
- Scenario 4 - 50,000 square feet of office & 60,000 square feet of retail
- Scenario 5 - 100,000 square feet of office & 20,000 square feet of retail

For all scenarios, additional turn lanes and existing turn lane lengthening is required at Washington Road & Boyce Road. In addition, all scenarios require turn lanes and traffic signal control at a site driveway on Boyce Road. Detailed trip generation calculations for the scenarios listed above are summarized in **Table 1**.

All future traffic distribution was based on the existing traffic patterns at the intersection of Washington Road and Boyce Road. The following scenarios were analyzed:

- 2009 Existing Conditions
- 2009 Existing Conditions – Optimized
- 2015 No-build Conditions
- 2015 Build Conditions – 450 Residential Dwelling Units (Scenario 1)
- 2015 Build Conditions – 125,000 SF Office Development (Scenario 2)
- 2015 Build Conditions – 80,000 SF Retail Development (Scenario 3)
- 2015 Build Conditions – 50,000 SF Office & 60,000 SF Retail Development (Scenario 4)
- 2015 Build Conditions – 100,000 SF Office & 20,000 SF Retail Development (Scenario 5)

The intersection of Washington Road & Boyce Road currently operates at LOS E during both the A.M. and P.M. peak hour; however if existing traffic signal timings are optimized, the intersection is anticipated operate at LOS D during both A.M. and P.M. peak hour.

The 2015 no-build conditions capacity analysis indicate the intersection will operate at LOS D (53.3 seconds) during the A.M. peak hour and LOS E (57.6 seconds) during the P.M. peak hour. Delays are reported in terms of overall average delay per vehicle.

The 2015 build condition analysis for Scenario 1 through Scenario 5 indicate that the overall intersection delay will be within the PennDOT permitted 10-second overall delay variance during the A.M. peak hour and will be maintained at an overall LOS E during the P.M. peak hour. Results of the capacity analysis are summarized in **Table 2**.

Queuing Issues

Additional traffic on Boyce Road not only needs to meet the PennDOT LOS requirements but also queuing requirements along Boyce Road. There is only a finite amount of storage space and distance between intersections along Boyce Road. With increased traffic on Boyce Road, the traffic queues will also increase. Currently, queuing is an issue on Boyce Road at Thorntree Drive during the AM and PM peak hour. Traffic on Boyce Road blocks this roadway and will continue to do so in the future. Any significant development of the northwest corner property will cause peak hour queues to increase. Also, with additional traffic turning onto Boyce Road to access the site, longer left turn lanes will be required on Washington Road.

For each of the above scenarios, the queuing analysis indicates that an additional turn lane will be required in each direction on Boyce Road at Washington Road. Therefore, each approach of Boyce Road at Washington Road would require two left turn lanes, one through lane, and one right turn lane. Also, the existing left turn lanes on Boyce Road will need to be longer to accommodate the additional traffic.

Traffic Signal and Turn Lane Warrants

Traffic signal warrants were reviewed at the unsignalized intersections along Boyce Road. For the 2015 no-build scenario, traffic signal warrants are not met at any unsignalized study intersections. For the 2015 build scenario, traffic signal warrants are met at the proposed site driveway for the peak hour under all scenarios and for the four hour warrant for all but the office only scenario (scenario 2). A new traffic signal would operate at LOS D or better during both the AM peak and the PM peak hour. A new traffic signal would require at least 1,000' of spacing between the site driveway and Washington Road. **In addition to a traffic signal, the analysis reveals that left and right turn lanes would be warranted on Boyce Road at the site access.**

Site Access

Given the level of traffic generated by the potential development scenarios along Boyce Road, it is reasonable to expect that one access point would generate the need for a traffic signal and right/left turn lanes on Boyce Road. With a traffic signal, at least 1000' of distance is required between the site access and Washington Road.

Additional traffic benefit could be realized if the site driveway were aligned opposite Fairgreen Drive along with a connection to Boyce School Road and Boyce Middle School. This intersection would be signalized with turn lanes on Boyce Road.

Conclusions

The results of the traffic analysis indicate that the following development component can be absorbed into the traffic patterns on Boyce Road:

- Scenario 1 - 450 residential dwelling units
- Scenario 2 - 125,000 square feet of office

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- Scenario 3 - 80,000 square feet of retail
- Scenario 4 - 50,000 square feet of office & 60,000 square feet of retail
- Scenario 5 - 100,000 square feet of office & 20,000 square feet of retail


Note that there is some margin within the analysis that can be adjusted as the focus of the rezoning proceeds.

These assumptions are conditioned upon the following roadway improvements:

- Widen Boyce Road at Washington Road provide an additional turn lane in each direction on Boyce Road. Therefore, each approach of Boyce Road at Washington Road would require two left turn lanes, one through lane, and one right turn lane. The eastbound approach would require 250' left turn lanes and a 175' right turn lane. The westbound approach would require a full length lane addition back to Old Washington Road. The northbound left turn lane would need to be approximately 350' long and the southbound left turn lane would need to be about 225' long.
- Construct a site access point at least 1000' from Washington Road with a traffic signal and right/left turn lanes on Boyce Road. With a traffic signal, additional traffic benefit could be realized if the site driveway were aligned opposite Fairgreen Drive along with a connection to Boyce School Road and Boyce Middle School. The left turn and right turn lanes on Boyce Road would need to be approximately 100' long

If you have any questions or required further information, please contact our office.

Respectfully submitted,


Michael J. Muery, P.E., PTOE
Engineering Manager

MUD:pah

Enclosures

cc: File – upper00/09037/Washington Boyce Traffic Study