WELLS + ASSOCIATES

MEMORANDUM

TO: Dave Avitabile, Goulston & Storrs
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COPY: Dan VanPelt, P.E., Gorove/Slade
Robert Schiesel, P.E., Gorove/Slade

FROM: Jami L. Milanovich, P.E.
Amber N. Mikec, P.E.

RE: Peer Review of Comprehensive Final Transportation Report for Georgetown University 2011-2021 Campus Plan by Gorove/Slade

DATE: October 17, 2011

INTRODUCTION

In July 2011, Wells + Associates was asked by Georgetown University (GU) to perform an independent peer review of the transportation report for their 2011-2021 Campus Plan, which was to be completed by Gorove/Slade. At that time, Gorove/Slade was in the process of scoping a revised transportation study in preparation for the Zoning Commission hearing scheduled for November 17, 2011. Wells + Associates' role in this process was to: (1) provide input on the proposed scope of work and methodology based on our experience with other similar projects, (2) provide ongoing input and comments on Gorove/Slade's technical analyses ultimately contained in the transportation study, and (3) conduct a peer review of the final revised transportation study submitted to the District Department of Transportation (DDOT).

This memorandum summarizes our input during the scoping process and our comments on the technical analyses performed by Gorove/Slade while preparing the transportation report. We also have reviewed the final transportation study submitted to DDOT on October 7, 2011 and have provided our comments specifically related to the technical analyses section of that report.

SCOPE OF TECHINCAL ANALYSIS

Study Area

The study intersections selected during the scoping process and ultimately analyzed in the transportation report, included 19 intersections along Reservoir Road, Foxhall Road, Canal Road, Wisconsin Avenue, and Prospect Street, as prescribed by DDOT. These intersections include the major signalized intersections near the GU Campus as well as less significant intersections that would be

impacted directly by the Campus Plan. During the scoping process, we expressed our concurrence with this selected study area as it would allow for an adequate assessment of the impact of the Campus Plan on the surrounding roadways.

Analysis Scenarios

As part of the scoping process, it was determined that the following analysis scenarios would be evaluated in the transportation report:

- Existing Conditions,
- 2021 Background Conditions without the Campus Plan,
- 2021 Total Future Conditions with the Campus Plan, and
- 2031 Horizon Year Conditions with the Campus Plan.

These scenarios are consistent with other transportation studies we have performed in the District. The evaluation of existing conditions provides insight into the operation of the surrounding roadway network as it is today and, most importantly, allows for calibration of the analyses model. This calibration is necessary so that the analyst can ensure that the inputs in the modeling software (i.e., Synchro 7 and SimTraffic 7) produce results that are similar to the observed existing conditions.

Analysis of the future (2021) background conditions is required so that a baseline condition for the build-out study year is established. This baseline condition then can be compared to the future (2021) condition with the proposed development (in this case, the changes associated with the Campus Plan) to determine what, if any, impact the Campus Plan would have on the roadway network.

The horizon year (2031) is not intended to identify specific impacts related to the Campus Plan. Rather, it is intended to be used a planning tool to assist DDOT in identifying long-term transportation needs. As such, the horizon year (2031) analysis does not provide a comparison between conditions with and without the Campus Plan.

As was expressed during the scoping process, we feel that analysis of these scenarios provides adequate information to calibrate the model for future conditions and to determine the potential impact of the Campus Plan.

EXISTING CONDITIONS

Traffic Counts

As outlined during the scoping process and documented in Gorove/Slade's transportation report, turning movement counts were performed at each of the study intersections on Tuesday, September 20, 2011 or Wednesday, September 21, 2011. We agree that each of these days would be considered "typical" days because (1) they are middle-of-the-week days, (2) no holidays occurred during the week of the count, (3) no significant or out of the ordinary event took place at GU on these days, (4) both

nearby neighborhood schools and GU were in session, and (5) Congress was in session on those days.

According to our correspondence with Gorove/Slade, due to an issue with the count data at the Foxhall Road/MacArthur Boulevard intersection, this intersection was recounted on Tuesday, September 27, 2011. We consider this day to be a "typical" day for the same reasons stated above except that Congress was not in session on this particular day. However, as discussed in the subsequent section, traffic volumes at this intersection were adjusted to appropriately balance with adjacent intersections and, therefore, we consider this count to be valid.

The turning movement counts at each study intersection were performed from 6:30 AM to 9:30 AM and from 4:00 PM to 7:00 PM. From these counts, the common peak hours were determined to be from 7:45 AM to 8:45 AM and from 5:00 PM to 6:00 PM. Therefore, the common peak hours definitively were contained within the count periods.

Existing Traffic Volumes

According to Gorove/Slade's report, the existing peak hour vehicular traffic volumes resulting from the turning movement counts were shown on Figures 22 and 23. Wells + Associates reviewed the existing traffic volumes prior to the submission of the report. During our initial review, we provided several comments regarding the existing volumes, which showed three locations where the raw counts did not balance between adjacent intersections. Our comments indicated that it is appropriate to allow for some imbalance between adjacent intersections due to on-street parking, mid-block driveways/streets, slight human error, and clocks that are slightly out of sync during the counts. However, we felt that at these three locations, the raw counts should be adjusted. After a thorough internal discussion, Gorove/Slade made adjustments at the three locations by generally increasing the volumes to more appropriately balance with adjacent intersections.

Therefore, the existing peak hour vehicular traffic volumes presented in the final transportation report reflect these adjustments and we agree that they accurately portray the existing traffic conditions in the study area.

Existing Conditions Capacity Analysis

Prior to submission of Gorove/Slade's transportation report, Wells + Associates thoroughly reviewed the existing conditions capacity analyses (i.e., the Synchro files). The following list summarizes our initial comments on the existing conditions Synchro files and Gorove/Slade's subsequent response to these issues:

1. Wells + Associates commented that default lane widths (12 feet) were used in Synchro. It is our experience that the actual lane widths should be used in the District since they tend to be less than the default value of 12 feet. Therefore, it is more conservative to change the lane widths to the actual values. Based on our comment and subsequent discussions, Gorove/Slade updated the Synchro to include actual, field-measured lane widths.

2. Wells + Associates commented that default heavy vehicle percentages (two percent) were used in many locations. We felt that actual heavy vehicle percentages may be higher and should be used. Gorove/Slade's response indicated that actual, field-measured heavy vehicle percentages were used when they were higher than two percent. Where heavy vehicle percentages were lower than two percent, two percent was conservatively used. Upon learning this information, we indicated that we agreed with this approach.

3. Wells + Associates observed that default peak hour factors were used. Peak hour factors, which range from 0.25 to 1.00, are a measure of how uniform the traffic flow is over the hour. Lower peak hour factors indicate that traffic is more concentrated over short periods of time. Higher peak hour factors indicate that traffic is more uniformly distributed over the hour.

   Based on our experience, actual peak hour factors by approach should be used. On low volume approaches, peak hour factors can vary substantially from day-to-day; therefore, peak hour factors less than 0.75 generally should not be used.

   In the final transportation study, Gorove/Slade used actual peak hour factors calculated by movement. However, in several cases, they used actual peak hour factors less than 0.75. Consequently, the Synchro results yielded overly conservative delay estimates for several low volume approaches.

4. Wells + Associates indicated that, based on our discussions with District operations engineers, pre-timed signals should have a reference style of "TS2-1st Green" and actuated signals should have a reference style of "170 style" when modeling in Synchro. Additionally, the offsets for pre-timed signals should be referenced to the first phase that appears in the DDOT signal timing sheets, whereas the offsets for actuated signals should be referenced to the Flashing Don't Walk time on the mainline. Gorove/Slade agreed with this assessment and made the necessary adjustments to the signalized intersection timings in the Synchro files.

5. Wells + Associates observed that bus stops were not coded in Synchro at any of the study intersections. Gorove/Slade agreed that bus stops should be modeled in Synchro since they do impact the capacity of certain lane groups at the study intersections. Gorove/Slade subsequently updated the Synchro files to include bus stops at the applicable intersections.

6. Wells + Associates observed that adjacent parking lanes and the number of parking maneuvers per hour were not coded in Synchro. Gorove/Slade agreed that on-street parking should be modeled in Synchro since it does impact the capacity of certain lane groups at the study intersections. Gorove/Slade subsequently updated the Synchro files to include adjacent parking lanes and an estimate as to the number of parking maneuvers per hour that impact travel lanes.

7. Wells + Associates noted that though hourly pedestrian volumes were entered into Synchro, the number of pedestrian calls per hour at the actuated signals was not inputted.

Gorove/Slade agreed that the number of pedestrian calls per hour (for actuated signals only) could impact the results of the analysis and, therefore, appropriate updates were made to the Synchro files.

A few other miscellaneous comments regarding lane configuration and signal timings were made by Wells + Associates upon our initial review of the existing conditions capacity analyses. Gorove/Slade adequately addressed these minor issues and the inputs into the Synchro files for existing conditions are accurate.

Since completing our initial review, the final transportation report was submitted and Wells + Associates performed a second evaluation of the Synchro files for existing conditions. Upon a review of our initial comments and the final Synchro files, Wells + Associates identified three minor issues that were not addressed per our original comments. They are as follows:

1. At the Foxhall Road/MacArthur Boulevard/44th Street intersections in the AM and PM peak hour files, the offset reference phase should have been set to Phase 2+6 so that the Synchro signal timings correspond to those provided by DDOT. We do not anticipate that this oversight would have a significant impact on the analyses.

2. At the Foxhall Road/Canal Road intersection in the AM peak hour files, the offset reference phase should have been set to Phase 1+6 so that the Synchro signal timings correspond to those provided by DDOT. We do not anticipate that this oversight would have a significant impact on the analyses.

3. At the Reservoir Road/35th Street intersection in the AM peak hour files, an adjacent parking lane (and the estimated number of parking maneuvers per hour) should have been coded for the eastbound left/through lane and the eastbound right turn lane. We do not anticipate that this oversight would have a significant impact on the analyses.

In addition and as previously discussed, peak hour factors below 0.75 were used for some low volume movements at certain intersections. Consequently, the Synchro results yielded overly conservative delay estimates for several low volume approaches.

Simulation Results

As a result of ongoing discussions within the project team, Gorove/Slade expanded the traffic simulation model that was included in the submission of the final transportation report. The motivation to expand these simulations came from the realization that, although inputs into Synchro were customized to the extent possible to accurately represent existing conditions, Synchro 7 (and the Highway Capacity Manual 2000 methodology used by Synchro) has inherent limitations for analyzing unsignalized intersections and urban conditions. Specifically, it was apparent that Synchro was underestimating the gaps for unsignalized minor street movements, which would be created by adjacent signalized intersections.

The simulation results for existing conditions provided by Gorove/Slade subsequent to the submission of the transportation study were shown to better represent observed conditions in the field. Specifically, Gorove/Slade observed that the minor street approaches at the unsignalized intersections on Reservoir

Road operate with acceptable delays; however, the Synchro results indicated failing levels of service for the northbound left turn movements at these intersections. Therefore, we agree that the simulations better represent existing conditions and produce results that are more accurate at unsignalized locations.

2021 BACKGROUND CONDITIONS WITHOUT CAMPUS PLAN

Background Traffic Volumes

As discussed during the scoping process, no other approved projects (pipeline developments) in the study area were identified. Therefore, the 2021 background conditions were developed solely based on an annual growth rate that was applied to the existing traffic volumes. During the scoping process, Wells + Associates reviewed the data Gorove/Slade used to determine an appropriate growth rate. Additionally, we performed some additional research to determine if the chosen growth rate was applicable.

As documented in the final transportation report, the calculated growth rate using historical DDOT average annual daily traffic (AADT) maps was 0.29 percent per year using data older than 2007 and was 0.87 percent per year without data earlier than 2007. Our own calculations also showed that historical traffic data supports a growth rate less than one percent per year.

Ultimately, as agreed upon with DDOT and in the interest of conservatism, a one percent per year growth rate was used to develop the 2021 background traffic volumes. We concur with this assumption, though we do consider it to be a very conservative assumption since it is improbable that level of growth would be sustained over a 20-year period.

Figure 24 and 25 in the transportation report document the 2021 background peak hour vehicular traffic volumes without the Campus Plan. Wells + Associates has verified that these volumes include a one percent growth rate applied to the existing traffic volumes, except on movements solely attributable to GU, which should not be grown at this rate.

Background Conditions Capacity Analysis

As previously mentioned, no other approved projects were identified in the study area and, additionally, no other improvement projects are planned on the study roadways. Therefore, we agree with Gorove/Slade's assumption that no signal timing or infrastructure changes should be included in the 2021 background conditions capacity analysis.

Wells + Associates' examination of the Synchro files for the 2021 background conditions without the Campus Plan indicates that the files are consistent with the Synchro files for the existing conditions.

2021 TOTAL FUTURE CONDITIONS WITH CAMPUS PLAN

Trip Generation

During the scoping process and preparation of the final transportation study, Wells + Associates was thoroughly involved in the development of the trip generation methodology for the Campus Plan. During the scoping process, DDOT indicated that their preferred method for determining the baseline trip generation was the Institute of Transportation Engineers' (ITE) Trip Generation, 8th Edition. Because data contained in ITE's Trip Generation is based largely on suburban, auto-oriented sites, it was agreed that the baseline trip generation then would be adjusted to account for GU's urban location and less auto-oriented campus. This methodology was to be applied to the existing conditions (existing student and faculty/staff populations and existing size of hospital) and then compared to the traffic counts at the various gates throughout campus to determine the appropriateness of the methodology in estimating the number of vehicle trips generated by the University.

The adjustment to account for GU's urban location was based on results of a transportation survey conducted by Gorove/Slade and information contained within the Transportation Management Plan for Georgetown University Hospital (by OR George Associates). The mode split assumptions are documented in Table 10 of Gorove/Slade's transportation report. Based on our input, Gorove/Slade used composite mode splits for both the University and Hospital, which take into account the different mode splits for students versus faculty/staff for the University and for patients/visitors versus employees for the Hospital. Per our ongoing discussions with Gorove/Slade and per our review of the composite mode split calculations, we concur with the mode splits assumed in the study.

Gorove/Slade also undertook an analysis to determine which independent variables should be used for the University (students or employees) and Hospital (beds, employees, or square feet). As documented by Gorove/Slade, the six combinations of independent variables were analyzed and the combination of students for the University and square feet for the Hospital ultimately was chosen. We agree that these selected independent variables yielded the most conservative analysis. Specifically, the Hospital plans include no increase in number of beds, a 10 percent increase in number of employees, and a 43 percent increase in square footage. Therefore, the use of square footage as the independent variable for the Hospital is a very conservative assumption. In fact, utilizing square footage for the Hospital trip generation yielded twice as many net new trips added to the roadway network with Campus Plan than would have utilizing the number of employees.

Based on our experience, square footage is no longer an appropriate predictor of trip generation for hospitals. By today's standards, many hospitals are outdated and require modernization, which typically includes the conversion of shared rooms to single-occupancy rooms. This conversion would include an increase in square footage and would result in a proportionally smaller increase in staff (i.e., additional staff to maintain/clean the additional space) but would not result in an increase in number of beds. Additionally, upgrading a hospital can include providing additional space for the latest medical equipment but may not include additional employees for that equipment. For all of these reasons and based on the trip generation calculated for GU, we feel that the assumption to use square footage for the Hospital trip generation is very conservative and may have resulted in higher volumes than will be realized with the Hospital's plans for expansion.

Table 11 in Gorove/Slade's report documents the trip generation for the existing conditions based on ITE trip generation rates/equations and the GU specific mode splits. Wells + Associates has verified these calculations and we agree with the information presented in Table 11. Additionally, we agree that the calculated trip generation for existing conditions compares very well with the traffic counts performed at the various gates on Campus.

Table 12 in the report documents the same trip generation calculations for the future conditions. Again, Wells + Associates has verified these calculations and we agree with the information presented in Table 12.

Trip Distribution and Assignment

Figures 19 and 20 of Gorove/Slade's report document the assumed distribution and routing of new trips generated by the Hospital and University, respectively. Based on our knowledge of the study area and an examination of existing traffic volumes, we generally agree with the distribution and assignment of new trips used in the study.

During our review of Figures 26 and 27, which show the trips generated by the Campus Plan, we noted the following discrepancies when comparing them to the trip generation presented in Table 12 and trip distributions presented in Figures 19 and 20:

1. Figure 19 shows that all new Hospital trips were routed to Gate #1 at the Reservoir Road/33th Street intersection. However, the outbound trips shown on Figure 26 are 11 trips lower in the AM peak hour and 10 trips lower in the PM peak hour than what is shown in Table 12 for the Hospital. Similarly, the inbound trips shown on Figure 26 are 11 trips lower in the AM peak hour and 10 trips lower in the PM peak hour. Our review indicates that the northbound right turn volume (outbound) and westbound left turn volume (inbound) seem to be the cause. Since the number of missing trips in any one direction is not extremely high, we do not anticipate that this oversight would have a significant impact on the analyses. This is especially true since we feel the trip generation for the Hospital was conservative.

2. On Figure 27, the eastbound through volume shown at the M Street/Wisconsin Avenue intersection for the AM peak hour seems to be incorrect. Based on the trip generation presented in Table 12 and the trip distributions shown on Figures 19 and 20, we calculate that this volume should have been zero. We trace this error back through the M Street/33rd Street intersection and the M Street/34th Street intersection as well. Since the volume actually should have been lower, we do not anticipate that this oversight would have a significant impact on the analyses.

Based on our assessment of the trip distribution and assignment, we feel that the additional trips associated with the Campus Plan have been adequately accounted for in the transportation report. The minor errors noted above are not anticipated to have a substantial impact on the results of the analyses.

Total Future Conditions Capacity Analysis

As documented by Gorove/Slade on Figures 28 and 29, the additional trips generated by the Campus Plan were added to the 2021 background traffic volumes. These volumes then were evaluated assuming no infrastructure or signal timing improvements.

Wells + Associates' examination of the Synchro files for the 2021 total future conditions with the Campus Plan indicates that the files are consistent with the Synchro files for the background conditions.

The results of the capacity analyses are included in Table 14 of Gorove/Slade's report. Gorove/Slade indicates that a level of service (LOS) "E" typically is used as the acceptable LOS threshold in the District, although LOS "F" is sometimes accepted in urbanized areas. In our experience and in accordance with DDOT's Design and Engineering Manual, we typically consider LOS "D" to be the acceptable threshold in the District for **overall** intersection level of service and degradation to a LOS "E" or "F" typically is considered unacceptable. We acknowledge that in urban conditions the amount of delay considered acceptable to drivers may be higher than in typical suburban or rural conditions and, therefore, agree with Gorove/Slade's assumption that LOS "E" may be considered acceptable in the District when looking at **approach** levels of service.

With an acceptable LOS "E" threshold for approaches, Table 14 shows that the following intersections would be impacted by the Campus Plan (i.e., drop from a LOS "E" or better to a LOS "F"):

1. At the Reservoir Road/Foxhall Road intersection, the westbound approach during the PM peak hour,

2. At the Reservoir Road/Gate #3 intersection, the northbound approach during the AM peak hour, and

3. At the Canal Road/M Street/Whitehurst Freeway/36th Street intersection, the northbound approach during the PM peak hour.

With an acceptable LOS "D" threshold for the overall intersection, Table 14 shows that the following intersections would be impacted by the Campus Plan (i.e., drop from a LOS "D" or better to a LOS "E" or "F"):

1. At the Reservoir Road/38th Street/Gate #1 intersection, the overall intersection level of service would drop from a LOS "C" without the Campus Plan to a LOS "E" with the Campus Plan during the PM peak hour,

2. At the Canal Road/Canal Road Gate intersection, the overall intersection level of service would drop from a LOS "D" without the Campus Plan to a LOS "E" with the Campus Plan during the PM peak hour,

3. At the Canal Road/M Street/Whitehurst Freeway/36th Street intersection, overall intersection level of service would drop from a LOS "D" without the Campus Plan to a LOS

"E" with the Campus Plan during the AM peak hour,

Additionally, there are approaches at various study intersections that would be failing under background conditions and would continue to fail under the total future conditions with the Campus Plan but with increased delay.

Simulation

Similar to the existing conditions, simulations were used to evaluate an alternative methodology to the Synchro capacity analyses for the future conditions. Similar to the existing conditions analysis, the simulation results provided to us by Gorove/Slade clearly show that capacity under the future conditions is underestimated in Synchro. Therefore, we agree that the delays and levels of service calculated by Synchro should be considered conservative.

Mitigation Measures

The Gorove/Slade report identifies four locations for potential mitigation measures. The first is the Reservoir Road/Foxhall Road intersection where the westbound approach is anticipated to drop to a failing level of service with the Campus Plan during the PM peak hour. As a means of mitigating the impact of the Campus Plan, Gorove/Slade performed an optimization of signal timings (splits and offsets) using Synchro's optimization functions. Specifically, Gorove/Slade indicates that the overall LOS can be improved from LOS F to an acceptable level with the optimization. While we agree that the overall LOS can be improved, the northbound approach would drop from a LOS C without the Campus Plan to a LOS F with the Campus Plan. This drop in level of service for the northbound approach is the result of the signal optimization algorithm used by Synchro, which heavily favors mainline traffic, often at the expense of side street traffic. Upon our examination of this intersection in Synchro, we found that by manually adjusting the existing signal timings (rather than using Synchro's optimization function), the impact of the Campus Plan during the PM peak hour could be mitigated with very minor adjustments to the green times (i.e., shift two seconds of green time from the northbound phase to the eastbound/westbound phase and shift one second of green time from the northbound approach to the southbound phase). These minor timing adjustments confirm that the impact of the Campus Plan at the Reservoir Road/Foxhall Road intersection is minimal and geometric improvements are not required to accommodate the additional trips from the Campus Plan.

Second, Gorove/Slade examined the impact of the Campus Plan on the unsignalized gates (Gates #2, #3, and #4) along Reservoir Road. As previously stated, we agree with Gorove/Slade's opinion that the simulation results provide a much more realistic synopsis of what future conditions will be at these locations. Specifically, the excessive delays reported by Synchro would not be experienced, although the simulation does indicate that the northbound left turn movements would operate with failing levels of service. Considering the northbound approaches at these intersections are traffic generated by the Hospital and do not impact traffic on the public street, we do not consider these failing levels of service to be problematic.

The third location evaluated for mitigation measures is the westbound approach at the Reservoir Road/38th Street/Gate #1 intersection. As previously discussed, the westbound approach would operate

with a failing level of service with or without the Campus Plan; however, the additional traffic anticipated to be generated by the Hospital would cause the westbound approach to have an increase in delay. Gorove/Slade's optimization at this intersection improves the westbound approach delay somewhat but at the expense of the northbound approach. Therefore, Gorove/Slade performed an analysis of the future conditions with the Campus Plan assuming a westbound left turn lane could be constructed at this intersection. As shown, a westbound left turn lane at this intersection would provide an overall benefit to the intersection, thereby improving all approaches (except the northbound approach during the AM peak hour) to LOS D or better. We agree that this turn lane should be evaluated during further processing of the future development sites at the Hospital as it has the potential to provide the additional capacity needed at this intersection.

Finally, the Canal Road/M Street/Whitehurst Freeway/36th Street intersection was examined to determine if measures could be taken to mitigate the impact on the northbound approach during the PM peak hour. We agree with Gorove/Slade's statement that the amount of traffic related to the Campus Plan at this intersection is minimal. Additionally, although the northbound approach LOS would drop from a LOS "E" to a LOS "F" during the PM peak hour with the Campus Plan, the increase in delay is only 5.9 seconds per vehicle and should be considered insignificant. Finally, Gorove/Slade's optimization analysis showed that the level of service on northbound approach could be improved but at the expense of the southbound approach, which is minor approach serving a gas station. Upon our examination of this intersection in Synchro, we found that by manually adjusting the existing signal timings (rather than using Synchro's optimization function), the impact of the Campus Plan during the PM peak hour can be mitigated with slight adjustments to the green times (i.e., shift two seconds of green time from the southbound phase to the northbound phase). These minor timing adjustments confirm that the impact of the Campus Plan at the Canal Road/M Street/Whitehurst Freeway/36th Street intersection is minimal and geometric improvements are not required to accommodate the additional trips from the Campus Plan.

CONDITIONS WITH GUTS BUS REROUTING

Per the scoping process, Gorove/Slade included an analysis of allowing the Georgetown University Transportation Shuttle (GUTS) buses to make the southbound left turns during the AM peak hour at the Canal Road/Canal Road Gate intersection. We generally agree with the methodology employed to analyze the impact of allowing this movement. In the review of the final transportation study, we do note that the heavy vehicle percentages were not adjusted to account for the gain/loss of buses on certain movements; however, our evaluation of the Synchro analyses indicates this adjustment would have minimal impact. Specifically, we increased the heavy vehicle percentage on the southbound left turn movement at the Canal Road/Canal Road Gate intersection to 100 percent during the AM peak hour and this approach still would operate with a LOS "D" with the Campus Plan and rerouted buses.

Gorove/Slade's capacity analyses indicate that allowing GUTS buses to make the southbound left turn movement at the Canal Road/Canal Road Gate intersection during the AM peak hour would not have a negative impact on the Canal Road corridor. In fact, Table 20 of the transportation report shows that that allowing this movement would have virtually no impact the levels of service on the eastbound and westbound Canal Road traffic flows.

Based on the previous discussions regarding the relevance of simulation for this project, Gorove/Slade also performed a simulation of conditions with and without the left turn restriction. As shown on Figure 21, the average queue lengths on the major eastbound approaches to the study area are very similar between the scenarios with and without the left turn restrictions. Where the queue lengths are anticipated to be slightly longer without the left turn restriction, the increase in queue is approximately six percent in both cases and would not cause spillback into adjacent intersections.

Based on the above, Wells + Associates believes that permitting the GUTS buses to make the southbound left turn at the Canal Road/Canal Road Gate intersection during the AM peak hour will not have a negative impact to the levels of service, delay, or queues on the Canal Road corridor.

2031 HORIZON CONDITIONS WITH CAMPUS PLAN

As documented in Gorove/Slade's report, the 2031 horizon conditions with the Campus Plan were developed in the same manner as the 2021 total future conditions with the Campus Plan. Namely, a one percent growth rate was applied over 20 years to the existing volumes and the site trips from the Campus Plan were added to these volumes. The 2031 horizon conditions were provided only for informational purposes since it was not a comparative analysis (i.e., no 2031 background condition without the Campus Plan was required). As discussed at the beginning of this report, the horizon year (2031) is not intended to identify specific impacts related to the Campus Plan. Rather, it is intended to be used as a planning tool to assist DDOT in identifying long-term transportation needs. As such, the horizon year (2031) analysis does not provide a comparison between conditions with and without the Campus Plan.

Wells + Associates agrees with the 2031 traffic volumes presented in Figures 30 and 31 as well as the 2031 capacity analyses contained within report. The 2031 horizon conditions again demonstrate the necessity of examining the simulation results since delays predicted by Synchro at certain study intersections should be considered unrealistic (e.g., the northbound approach delay at the Reservoir Road/Gate # 2 intersection during the AM peak hour).

SUMMARY OF ASSESSMENT

Based on our involvement during the scoping process, our continual review of the analyses performed by Gorove/Slade while preparing the transportation study, and our final review of the entire transportation study, Wells + Associates believes that the impact of the GU Campus Plan has been evaluated adequately and that proper mitigation strategies have been proposed to accommodate the projected increase in traffic volumes. In a number of areas, we feel that the analyses should be considered conservative. Specifically, the one percent growth rate, the trip generation for the Hospital, and Synchro's underestimation of available capacity at certain study intersections resulted in a conservative assessment of the Campus Plan impact.

We hope that this peer review of Gorove/Slade's Comprehensive Final Transportation Report for Georgetown University 2011-2021 Campus Plan adequately serves your needs. Please feel free to contact us at 724-933-9010, jlmilanovich@mjwells.com, or anmikec@mjwells.com with any questions you may have regarding this memorandum.