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MEMORANDUM

TO: Dominick Pangallo, Chief of Staff
David Knowlton, P.E., City Engineer

FROM: Alan Cloutier, P.E., PTOE – FST
Advisor: Gary Hebert, P.E. PTOE – FST

DATE: February 5, 2015

SUBJECT: Task Order No. 20 of MSA O-37 (B) – Traffic Peer Review of Salem State University North Campus Access Study and the intersection of Lafayette Street/ Loring Avenue

1.0 Introduction

FST was retained by the City of Salem to conduct a traffic peer review of the Salem State University *North Campus Access Study*. In addition, FST was also tasked with reviewing the intersection of Loring Avenue/ Lafayette Street to determine what improvements could be made at this intersection to improve capacity and/or safety. Lastly, FST was also tasked with reviewing on-street parking operations along Loring Avenue and Lafayette Street to determine if bicycle improvements could be made on these two roadways and what the impact would be to the existing parking supplies and on-street loading areas.

This memorandum only addresses the Salem State University North Campus Access Study and potential improvements at Loring Avenue/ Lafayette Street. Bicycle accommodations on Loring Avenue and Lafayette Street with regard to on-street parking will be discussed in a follow-up memorandum.

2.0 Peer Review - Salem State University North Campus Access Study

The Salem State University *North Campus Access Study* consists of an analysis of the impacts of a proposed parking garage to be located within the north campus, and the access modifications associated with the proposed parking garage.

Although this review is limited to the proposed modifications and parking garage discussed in the North Campus Access Study, the previously submitted *Traffic Impact and Access Study* Salem State University Parking Garage was consulted for some of the additional information.

The following documents have been reviewed as part of this peer review.

- Salem State University North Campus Access Study, Tetra Tech, June 23, 2014 (referred to from here on as “the Study”)
- Traffic Impact and Access Study, Salem State University Parking Garage, Tetra Tech, April 22, 2014

A site visit was conducted by FST on September 22, 2014 to review existing conditions. In addition, FST attended a neighborhood meeting on August 20, 2014 to listen to neighbor concerns. We also contacted Tetra Tech on October 1, 2014 to discuss issues related to this peer review.

Our comments are as follows.

OVERALL

Generally, the Study was conducted using methodologies consistent with standard traffic engineering policies and procedures.

One of our key findings is that the Study did not include campus-wide summary of parking/traffic changes concurrent with the Garage impacts and was therefore it was difficult for us to determine the true impacts of the new Garage. A large amount of the information such as traffic volume figures were only included in the previously submitted Traffic Impact and Access Study for selecting the garage site. For instance, the North Campus Access Study does not provide a clear description of the size of the proposed garage, instead only stating that the North Campus parking spaces would be increased from 565 spaces to 1,110 spaces. Based on the previously submitted Traffic Impact and Access Study, the proposed North Campus garage appears to be 800 spaces and will replace 255 surface spaces for a net increase of 545 parking spaces.

Additionally, on-street parking currently used by students/faculty/staff was not addressed in the study to obtain a true estimate of all typical existing SSU peak parking/traffic demands. **We recommend that the Applicant provide a summary description of existing North Campus parking demands, accounting for both on- and off-street parking supplies used by the campus population. The actual net increase in parking associated with the proposed garage after accounting for all campus-wide losses in surface parking and assumed on-street parking diversions should be summarized. A prospective time line for when surface parking supply reductions will occur over the next six years and when programmed new academic buildings will come on line would be very helpful in reviewing the validity of the Study’s traffic projections.**

EXISTING SITE OBSERVATION ISSUES

There are a number of existing issues with the current configuration that FST noted during our field review. Many of these are not addressed in either study. These issues should be addressed as part of on-going campus maintenance regardless of the proposed parking garage and are not considered project related mitigation.

- The existing brick crosswalks at the “oval” portion of College Road and at the

intersection with Loring Avenue are not delineated with white pavement markings. Therefore, these are not MUTCD compliant crosswalks. White pavement markings need to be added to delineate the crosswalks.

- Yellow pavement marking are used on College Drive to separate the left and right turning traffic. Yellow pavement markings should only be used to separate direction of travel. These markings should be changed to white.

TRIP GENERATION

An updated trip distribution figure was not included in the North Campus Access Study. **A trip distribution figure with the proposed garage and a two-way College Road needs to be provided to clearly show the change in volumes due to the proposed project.**

Trip Generation for the project was calculated based on the increase in parking spaces using the existing traffic generation rate. The number of parking spaces, in and of itself, is typically not a reliable indicator of traffic generation demands. However, increasing the parking supply can increase the parking demand, and hence, proportionally increase traffic demands. Therefore, the method for calculating increased traffic demands pertaining to the garage is reasonable.

In the Study, “Trip Generation” for the proposed project was estimated by re-distribution of traffic from other areas of the campus to the garage plus a 1.5% six year growth in the campus population. However it did not include an assessment of how many trips associated with the campus use the nearby on-street parking supplies on Lafayette and Loring Avenues, which the Study expects will decline. Without any policy changes on on-street parking, we question why any on-street parkers will use the garage if on-street spaces are available.

The key to trip generation for the campus is not only whether the campus population increases within the assumed 1.5% six-year projected growth in the student population, but in the amount of commuting population assumed to occur on any given year, as well as how the campus-wide re-distribution of parking is to occur. The earlier Garage Study explains the redistribution estimates, but does not explain whether what will happen with the overall campus parking supply. Even if the campus population remains stable, if the proportion of student (and faculty/staff) commuters increase after the garage is available, thereby creating a higher parking supply throughout the campus, campus traffic impacts will increase, with most of the increases being absorbed by the North Campus, especially if the on-street parking supplies on Lafayette Street and Loring Avenue are retained.

Based on the information included in the earlier Traffic Impact and Access Study and a Sasaki SSU Master Plan presentation, the proposed North Garage is fundamentally needed to relieve a severe parking shortage that spills onto nearby on-street parking supplies, causing extra trips for students looking for parking spaces.

The Study redistributes 148 trips (125 in/ 23 out) to the North Campus during the morning peak hour and 174 trips (74 in/ 100 out) during the evening peak hour. With an increased parking

supply, traffic may not be students or faculty new to the campus, but rather could be the result of a mode shift from walking, biking, transit, carpooling, or simply due to the more plentiful North Campus parking supply projected to increase by 545 parking spaces. And, again, the total North Campus parking supply should rightly include any on-street parking spaces that will continue to be used by the campus population. This situation would not change unless City on-street policies change to *concurrently reduce or eliminate the on-street parking supply available to the campus population after the garage is open for use.*

A year by year accounting for campus wide lost/gained spaces, whether on- or off-street, with academic building construction assumed is needed for the next six years (the Study horizon year).

The earlier Traffic Impact and Access/Garage Location Study assumed a reduction in traffic associated with the construction of a 355 student residence hall, which would eliminate 157 existing surface parking spaces. The earlier Traffic Impact and Access Study for alternate garage locations assumed that the construction of the residence hall would reduce traffic by 98 trips during the morning peak hour and 103 trips during the evening peak hour. This reduction is not presented as a redistribution of trips, but rather as a total reduction in traffic. We believe this reduction may be overestimated for the following reasons.

- The “new” traffic associated with the residence hall appears to be low, especially during the weekday evening peak hour when college students are active. Unless student residents are prohibited from having a car on campus (which is not addressed in the Study), we would expect the new SSU North Campus trip generation to be higher than projected during the weekday evening peak hour.
- The study justifies the reduction in traffic is based on the assumption that 355 on-campus students will replace 355 commuter students. This only makes sense if the campus is actually controlling the amount of commuter students *and reducing, not increasing* the parking supply on the full campus. It would seem that if the campus wide peak parking supply is increasing, the amount of anticipated commuter students is increasing, not decreasing. It would seem a better choice to ultimately reduce the campus wide parking supply to compensate for new on-campus student residences or academic buildings, if the notion is to reduce the commuting student population, as stated in the draft Master Plan, from 28% on campus to 50% on campus. The addition of campus housing has pedestrian impacts that also require mitigation at the Raymond Road intersection with Loring Avenue or at any location where crossing demands will increase across Loring Avenue itself.
- Essentially, there would be a disconnect if the *campus wide parking supply increases* while student commuter population *will decrease*, even if the enrollment does not increase beyond the 1.5% six year growth the Study assumes. Although the City of Salem has input into the construction of new buildings, the

City of Salem does not have the ability to regulate growth in the student commuting population, given the projected 545 increase in *the North Campus off-street* parking supply cited in the Study. If other words, *if there is not an overall net decrease in the campus-wide parking supply exceeding the 545 space increase*, campus wide traffic could increase with the construction of the new garage more than the assumed 1.5% growth in the campus population, thereby affecting the volumes reported in the Study.

Accordingly, we pose the following questions:

Is SSU committed to 1) A relatively stable campus wide population; 2) Reducing its commuting student population? If so, by how much and is there a target date?

A summary table of campus wide actions should be presented in the Study, which would show year by year changes in parking supplies campus-wide? This is perhaps best to illustrate on a graphic or a table.

Will there be a future campus parking policy that requires parking permits for *all* commuting/overnight students and faculty/staff, regardless of whether they park off-street or on-street?

How will the garage be managed? Will it be ‘free’ for students/faculty/staff or will parking rates be set to encourage on-campus housing and encourage commuting students to carpool/use the T/bike/walk?

Currently, enhancements to other modes of transportation, such as bicycling, walking, or transit are not addressed the Study. Will the campus provide concurrent on-campus facilities and be supportive of on-street actions (e.g., new bus stops, bike lanes or cycle tracks that could encourage other modes of transportation mitigate and minimize North Campus Garage traffic impacts?

Answers to these questions will help us determine whether future traffic impacts of the SSU North Campus Garage as described in the Study are reasonable.

ALTERNATIVE MODES OF TRANSPORTATION

The Study did not discuss any proposed improvements for other modes of transportation, such as bicycling, walking, or transit. Encouraging other modes of transportation is a crucial element to minimize traffic impacts of the campus. **Will any improvements be made to other modes of transportation (e.g., increased bike storage/shared bike system improvements to reduce pedestrian/vehicle conflicts on Loring Avenue at Raymond Road)? Does SSU desire to increase the on-street accommodations of bicycles on Loring Avenue that may require a loss of on-street parking controlled by the City but used by the campus population?**

LAFAYETTE STREET/COLLEGE ROAD ACCESS

The Study indicates the increase in traffic at the College Drive at Lafayette Street intersection

due to the proposed garage as well as the proposed change in access will add 57 additional vehicles during the morning peak hour and 23 additional vehicles during the weekday evening peak hour. Since College Road is one-way AWAY from the Lafayette Street, this intersection will operate acceptably with minimal change from existing conditions. Traffic from all directions, except from Marblehead, should be making right turns in to enter the campus garage from this intersection.

LORING AVENUE /COLLEGE ROAD ACCESS

As part of the proposed project, the College Road driveway at Loring Avenue will be changed from its existing one-way toward Loring Avenue operation to two-way operation. According to the Study, the increase in College Road traffic approaching Loring Avenue will account for 23 additional vehicles during the morning peak hour and 100 additional vehicles during the weekday evening peak hour.

This will result in poor operations for the traffic exiting College Road onto Loring Avenue during both the morning and evening peak hours. During the morning peak hour, the delay will increase from 31 seconds (LOS D) without the garage to 129 seconds (LOS F) with the garage. During the evening peak hour, the delay will increase from 55 seconds (LOS F) without the garage to 338 seconds (LOS F) with the garage.

The delay exiting College Drive will be significant and there is a concern that excessive delay could result in frustrated drivers taking insufficient gaps, potentially creating safety issues for pedestrian/vehicle conflicts. **SSU should consider additional measures to mitigate traffic operations during the critical PM peak hour and encourage carpooling, biking, or walking.**

Westbound Loring Avenue left turns into College Drive during the morning peak hour will affect the westbound Loring Avenue through traffic. The Study projected 152 Loring Avenue left turns during the morning peak hour and 83 left turns during the evening peak hour. We are concerned that queuing of westbound Loring Avenue traffic behind stopped traffic that does not exist today will occasionally block through traffic on Loring Avenue. **The proponent should either prepare a traffic simulation showing that the Loring Avenue westbound left turns will not cause problems, or the Loring Avenue westbound left turns should be prohibited.**

To improve sight distance, on street parking should be removed on Loring Avenue west of College Road for a distance of approximately 150 feet. This was discussed in the April Traffic Impact and Access Study but was not reiterated in the June North Campus Access Study.

PEDESTRIAN CROSSINGS

The North Campus Access Study states that conflicts between vehicles and pedestrians at the Peabody Hall Crosswalk are an existing concern. This conflict may not be improved. Currently 310 pedestrians cross this crosswalk during the morning where they conflict with 220 vehicles. During the weekday evening peak hour, 410 pedestrians cross this crosswalk where they conflict with 190 vehicles.

The study stated that an additional 100 pedestrians are projected at this crossing during both the

AM and PM peak hour.

Based on information in the study, with the proposed garage and a two way College Road which allows left turns in from Loring Avenue, the study projects 410 pedestrians crossing this crosswalk during the morning where they conflict with 114 vehicles. During the weekday evening peak hour, 510 pedestrians were projected to cross this crosswalk where they conflict with 129 vehicles.

However, if left turns are not allowed from Loring Avenue into College Road, the projected conflicts at this crosswalk are estimated to be 410 pedestrians crossing this crosswalk during the morning where they conflict with 266 vehicles. During the weekday evening peak hour, 510 pedestrians will be expected to cross this crosswalk where they will conflict with 212 vehicles.

Therefore, if left turns are not allowed from Loring Avenue into College Road, the pedestrian/vehicle conflict volumes at the Peabody crossing will be higher than existing conditions. **Please consider additional measures to be implemented to improve this pedestrian crossing.**

PROPOSED DESIGN

The North Campus Access Study recommends two-way traffic on College Road from Loring Avenue to the proposed garage. The following design modifications should be addressed.

- For two way travel, the proposed width of 20 feet is inadequate for College Road. A minimum width of 24 feet is required along College Road to accommodate emergency fire access and winter plowing requirements.
- The drawing does not show a sidewalk along College Road. A sidewalk should be provided for the entire length of College Road.
- We agree with the use of the W11-2 (Pedestrian) and W16-7 (Arrow) signs proposed at the two midblock College Road crosswalks. W11-2 signs are not needed at the Stop controlled intersection. We recommend the signs at the two-way section should be double sided. It's unclear from the graphic if these are double sided or not.
- A marked crosswalk should be provided across College Drive at Loring Avenue.
- Stop lines are shown across all three legs of the internal College Road/Connector Road intersection. If this will be an all-way stop, stop signs and "all-way" plaques should be installed on all approaches.
- The extended brick sidewalk should have 12 inch wide white lines or continental style lines to distinguish the limits of the crosswalk.
- A stop line is not needed in front of the easternmost crosswalk.
- To improve sight distance, on-street parking on the north side of Loring Avenue should be removed west of College Road for a distance of 150 feet.

3.0 Loring Avenue/ Lafayette Street Intersection

IMPACT

The intersection of Loring Avenue/ Lafayette Street will be affected by the proposed garage. The additional volume at this intersection due to the garage will be somewhat mitigated by the two way operation of College Drive, allowing Loring Avenue eastbound traffic to enter the North Campus without passing through the intersection of Lafayette Street/ Loring Avenue. With the new garage and a two-way College Drive, the traffic volume at the intersection will increase by 23 vehicles during the AM peak hour and 6 vehicles during the PM peak hour.

The Traffic Impact and Access Study calculated the overall increases to the delay at this intersection an average of 9 additional seconds per vehicle during the AM peak hour and 5 additional seconds per vehicle during the PM peak hour. This analysis has not been recalculated in the North Campus Access Study and does not reflect the volume reduction due to the two-way College Road.

This intersection is a high accident location and averages 6.7 accidents per year.

Because of the impacts at this location, mitigation should be proposed at this intersection to offset the impacts of the proposed SSU garage project.

EXISTING CONDITIONS/DEFICIENCIES

The intersection of Loring Avenue/ Lafayette Street/ West Avenue is a four legged signalized intersection. Lafayette Street is State numbered Route 114. Loring Avenue and Lafayette Street north of the intersection are State numbered Route 1A. The Loring Avenue eastbound approach consists of a shared left/through lane and an exclusive right turn lane. Lafayette Street northbound approach consists of an exclusive left turn lane and a shared through/ right turn lane. Lafayette Street southbound consists of a shared left/through lane and an exclusive right turn lane. West Street westbound consists of a single lane.

Crosswalks are located across all four legs of the intersection. There are bike lanes on Lafayette Street north and south of the intersection. The southbound bike lane ends at the intersection where the right turn lane is and begins again 30 feet south of the intersection. The northbound bike lane ends at Savoy Street and begins again on the north side of the intersection. The Salem Pilot Bike Route travels through the intersection utilizing the southern leg of Lafayette Street and West Street.

The traffic signal operates as a four phase signal. The phases consist of the Lafayette Street northbound protected left turn with northbound through, followed by the Lafayette Street northbound and southbound phase followed by the Loring Avenue/West Street Phase and an exclusive pedestrian phase. Traffic signal equipment is a mix of old and new post mounted signal heads. There are no backplates on any of the signals faces. The northbound left turn has a four section head while all of the other signal faces consist of three section heads. Countdown pedestrian signal heads are located on all crossings. Pedestrian pushbuttons are mostly the wide mushroom plunger type, except for the southeastern corner, which has an old small push button. The traffic signal detectors are wire loop. Replacements of the existing traffic signal detectors with overhead video detection was previously designed by FST, but has not yet been

implemented. The traffic signal control cabinet could not be opened to review the controller settings, but we have measured the timings and they are consistent with our prior investigations.

The wheelchair ramps on all four corners are not ADA compliant due to excessive cross slopes. In addition, these ramps do not contain tactile warning panels.

As stated previously, this intersection is a high accident location and averages 6.7 accidents per year. Two of these accidents involved pedestrians. It was observed during the field visit that Lafayette Street southbound right turning traffic is very aggressive turning right on red and frequently do not come to a full stop. This can be hazardous during the pedestrian phase. The lack of overhead signals and lack of backplates also limit the visibility of the signal indications.

RECOMMENDED IMPROVEMENTS

The following improvements are recommended at the intersection of Loring Avenue/ Lafayette Street.

Short Term

- Replace existing wheelchair ramps with new ADA compliant ramps.
- Replace the deficient push button on the southeastern corner.
- To improve pedestrian safety, we recommend installing fiber optic “No Turn on Red” signs on the southbound approach that would be illuminated only during the pedestrian phase.
- Overhead video detection is recommended to make the intersection operate more efficiently.

Long Term

- In order to improve the visibility of the traffic signal faces, consider installing new overhead mast arm signals with backplates.