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MEMORANDUM

TO: Eugene Zakhareyev
FROM: Bill Popp, P.E.
DATE: August 27, 2018
SUBJECT: **Review of traffic related documents re AEB Redmond project**

This memorandum provides a limited review summary of the traffic studies and various other documents related to assessment of the transportation and parking impacts for projected development of Anjuman E-Burhani mosque and community center.

Background

William Popp Associates (WPA) was retained by the neighbors of the proposed AEB development to review traffic studies by Jake Traffic Engineering (JTE) in early 2017, and then later in 2017 to review memos prepared by TSI (Traffic Solutions, Inc.) and submitted in response to WSDOT comments. These earlier review documents will be referenced herein as required.

The relevant documents used in scope of the review:

1. AEB Traffic And Parking Letter by JTE, dated June 5, 2012
2. AEB Traffic And Parking Letter by JTE, dated April 19, 2013
3. AEB Traffic And Parking Letter by JTE, dated May 28, 2013
4. AEB Traffic And Parking Letter by JTE, dated March 15, 2014
5. AEB Traffic And Parking Letter by JTE, dated December 20, 2016
6. AEB response to WSDOT comments by TSI, dated 24 July, 2017
7. AEB follow up to WSDOT comments by TSI, dated November 16, 2017
8. TENW comments on JTE Traffic and Parking Letter, dated April 1, 2014
9. William Popp Assoc. critique of JTE Traffic and Parking Letter, dated March 23, 2017
10. WSDOT email comments dated April 26, 2017 on AEB traffic study
11. Memo from William Popp Assoc. to WSDOT on subject of TSI responses to WSDOT comments, dated September 14, 2017
12. WSDOT email follow up comments dated October 12, 2017 on AEB traffic studies
13. AEB Transportation Management Plan, dated January 2, 2014

Based on the review of the available documents authored by the applicant's engineers (JTE and TSI), it is apparent that both JTE and now TSI significantly understate the project's potential traffic impacts and parking demand.
There are multiple points of contention present in the applicant's traffic documents some of which are discussed below.

Project site limitations

The only access to the site is via a driveway to NE 51st Street, a minor arterial. This access has been limited to right-in, right out per directions from WSDOT.

While the right of the way is owned by the City of Redmond, the driveway is located in the limited access intersecting roadway portion of the fully controlled access highway SR-520.

From a traffic operations overview perspective, this AEB project driveway access location is very undesirable for both the driveway users and the jurisdictions responsible for the arterial roadway (City/WSDOT). The right turn only aspect is necessary to protect the SR 520 ramp terminals from impacts of the commercial levels of left turning traffic demand from the project. This in turn forces significant out of direction travel and/or U-turns for the majority of the mosque attendees. And with this particular land use the very likely surge peaks in entering and exiting traffic will exacerbate the level of service impacts on street and driveway traffic operations far beyond the normal expectations for the amounts of traffic involved (see operational discussion under Traffic Volume below).

Professional standard of care

The applicant presented multiple versions of the project traffic study by JTE (references 1 to 7, dated from 2012 to 2016); those documents are based on different building sizes and parking allocations, yet arrive at the same conclusions.

JTE's traffic studies were reviewed by three independent professional engineering organizations (TENW, WPA, WSDOT - references 8 to 12) all of which cited multiple issues. Yet even today some of the most significant issues are not adequately addressed. The applicant's new traffic engineers (TSI) have produced two memo responses to WSDOT's comments, and while those responses invalidate some and update data in other portions of the last JTE study, the JTE study itself (the official project Traffic Impact Analysis) has not been updated.

It is not apparent what level of engineering review was conducted by the City staff and/or what documents were actually reviewed and commented upon for the project approval.

We believe that the sheer number of inconsistencies in the analyses and deviations from ITE guidelines and standard TIA practice merits a formal response from the city's professional engineering staff. And since many of the independent engineering organization comments on JTE documents were found relevant (TSI responses to WSDOT comments suggest as much), an updated final traffic study needs to be prepared and available for engineering review.

Trip generation

JTE studies (references 1 to 5) allege that the ITE Trip Generation Manual does not contain a land use that is comparable to AEB mosque and community center. And while the ITE Manual Users Guide states local studies should be performed in cases where land use is unique, the JTE documents fully ignore the guidance and use ITE trip numbers for land use category "Church".

And this occurs despite the fact that a year's worth of parking count data (excellent basis for trip generation) exists for the existing AEB Kirkland mosque location. WPA has discussed the issue at length in reference 9, pp. 2-3.

In two technical memos authored by TSI (references 6 & 7) and provided to WSDOT (but not officially directed to the City of Redmond), there was an attempt made to address the criticism related to trip generation. TSI conducted three days of counts (per ITE guidance) and then made several different trip generation estimates based on community size and building area from that limited data set. TSI engineers also compared ITE Manual trip numbers for mosque as well as estimates from two traffic studies for planned mosque developments. However, even this seemingly comprehensive attempt to bracket a trip generation rate leaves serious questions:

1. TSI used local counts of the existing Kirkland site performed on three days but ignored one full year of available count data (per applicant's TMP, reference 13) that would have substantially improved the level of confidence in trip rate derivations for this very complex trip generator. Making projections based on three days of counts, TSI ends up with results that are at odds with the actual counts in the full year data set.

2. TSI references trip generation estimates from two traffic studies for the planned mosques (one in WA and one in CA). The mosques used do not relate to Dawoodi Bohra and are not yet constructed. Rather than use projections for planned developments TSI could use existing mosque of comparable size in Redmond. Additionally, there are multiple Dawoodi Bohra mosques in the US that could be used as points of comparison (building size, family/member size, parking size). That would have addressed earlier assertions of the JTE that the Dawoodi Bohra is a unique land use type and hence ITE rates for "Mosque" do not apply. And once again, there exists one full year of event vehicle count data for the AEB mosque that would have greatly simplified TSI's complex trip generation machinations.

By using different methodologies TSI arrived at a wide range of trips during peak hours. While TSI picked the community size variable for its projections, there is no justification provided for the choice when a much less subjective approach was available. Indeed, comparing the proposed mosque size with publicly available data for Dawoodi Bohra mosques in the US, this mosque will be one of the largest, yet **the assumed member size is 1/3 of what it should be vis-à-vis other Dawoodi Bohra mosques** (reference 9, p. 2).

Both JTE and TSI studies allege that the regular services at the mosque will generate less than 20 weekday PM peak hour trips and will not occur during peak hours for majority of the days of the year. At the same time, there are multiple events outside the daily prayer services. Only one of such events is partially addressed and that is Ramadan. The full list of events as listed in JTE study (reference 1):

- Daily prayer services (every day three times a day)
- Friday afternoon prayer service
- Ramadan (30 days a year)
- Ashara Mubaraka\Start of Muslim New Year (10 day period). These important very highly attended events, equaling and even exceeding Ramadan, were omitted from the

JTE and TSI narratives and analyses. In 2012 most of the events impacted the street PM Peak hour as the period occurred in mid-November when sundown occurs very early.

- Special congregation gatherings
- School (every Saturday apart from the summer months)
- Community events – birthdays, weddings, etc. (once a month)
- Community gathering (once or twice a month)

Note that many of these events may occur during or on the shoulders of the street PM peak hour depending on the lunar calendar. When discussing only evening prayers, 26% of the weekdays in 2018 will overlap with PM peak hours: "In general, on about 25% (or 26% in 2018) of the days of a typical sunset falls between 4 and 6 PM, for the rest of the year evening prayer and events do not overlap with the PM peak hour" (reference 6, p. 7). And that does not include all additional events listed above. Weekend events and possible rentals of the facilities to the outside parties are also not included.

The assertion that weekday PM trips will be under 20 is of particular importance (quoting JTE study, reference 1): "*The City of Redmond typical traffic effect threshold is 20 or more project generated trips PM peak hour one way trips through a signalized intersection.*" This may be the case on average for the existing facility but **the new facility will accommodate almost 3 times the existing number of members based on national Dawoodi Borah mosque site data** so that 20 number threshold will be handily crossed under any sort of rational development traffic forecasting approach (reference 9). Assuming arbitrary 5% membership growth (as TSI did in references 6 & 7) for a ten-fold increase in building size is not realistic.

Overall, both JTE and TSI documents fail to adequately take into account multiple events and their true range of trip rate values by not using the existing full year of available data. Most importantly, their trip generation approaches ignore the ten-fold difference in building size and/or the national relationship of members to building size for this sect of Islam. They opt to use existing community size as the trip generation basis which is an unverifiable claim of the applicant that is belied by the sheer magnitude of the project. TSI seemed to recognize the implications of the building size issue and rationalized cutting the size in half in their sensitivity analysis of trip rates (reference 7) using only 11,320 sf as the variable.

Traffic volume

Per the project site plan the proposed lot will accommodate 65 vehicles under their tandem/valet parking scenario. Thus 74 vehicles (assuming 9 passenger van, 9 round trips) entering and 9 vehicles exiting would approximate the generator peak hour volume at the site driveway as that is the capacity limit there. But this capacity would not cover the TMP's estimated maximum congregation events which would have up to 30 vehicles (75 people) diverted to an offsite lot. Therefore, the project maximum traffic demand as limited by parking capacity would suggest it is approximately 104 vehicles per hour.

The unconstrained potential maximum vehicular demand could be on the order of 135 vehicle trips using national Dawoodi Borah ratio of building size to membership and applying that to the existing maximum parking count data. Under this scenario, project vehicles would likely

disperse to the nearby neighborhood. Also this calculation generously assumes no vehicles arrive and leave because the lot was full. This condition would require some real time management of the lot and advance communication with arriving motorists all of which are difficult to do (reference 9, p. 4).

Operationally a significant oversight is the fact that the available LOS analyses do not address the project's likely traffic surge and its impacts on NE 51st Street traffic operations. This is a basic requirement for application of Highway Capacity Manual procedures and is addressed with what is termed the peak hour factor adjustment which is applied when conducting LOS and simulation analyses. The analyses reviewed show that the analysts applied a normal street factor which means the analyses are essentially incorrect as they do not account for the project's likely peaking characteristics:
A neglected, but very important traffic operational impact point is, all of the Special Events and perhaps future evening prayer events will have significant traffic surge impacts on NE 51st traffic with conditions exacerbated when the arrivals or discharges occur during or on the shoulders of the street peak. This statement assumes the arrival or discharge is likely to occur within a 15 or 20 minute period which means that if it's 15-minute volumes for instance, those would be multiplied by 4 for inclusion in the full hour LOS, queuing and simulation calculations. Assuming the 65 vehicle lot capacity as a weekday peak hour demand event, the equivalent hourly vehicle impact would be 260 equivalent hourly vehicles (4 X 65) or 32% more than that of Microsoft's equivalent exiting hourly traffic at 154th Ave NE10. This is not a minor traffic generator!
(reference 9, p.4)

Trip distribution

AEB asserts that the membership composition is well known. Thus it should be possible to come up with very accurate contemporary trip distribution figures. Yet trip distribution figures (numbers and/or percentages by corridor) are not provided (either in JTE or TSI documents). The July 24, 2017 TSI document only provides a generic travel routes diagram for accessing the site (reference 6, p.10) that is supposed to be communicated to the AEB members.

The trip routings presented for almost all quadrants are those necessary to overcome making U-turns at the 154th Ave NE intersection with NE 51st St. Some are significantly out of the way and would be unintuitive for most motorists. One improbable scenario accrues to the traffic arriving via SR 520 from the north wherein it must travel south to NE 40th St and then back north via 156th Ave NE and NE 51st St. The alternative probable routing for that trip would be via SR901 and then NE 51st Ave NE but the TSI figure doesn't suggest it.

Supposedly the AEB community will be advised and will follow these routes for Mosque arrivals. However, the most likely outcome is a significant amount of U-turning traffic will occur at the 154th Ave NE intersection as other routings can appear unnecessary and even bizarre to drivers when SR 520 provides such direct access.

Should the City decide to prohibit U-turns at the intersection, the likely result will be a significant amount of U-turns in the 154th Ave NE neighborhood on the north or in the Microsoft

campus on the south side of NE 51st Street.

Parking demand

As noted above, there are multiple events with increased parking demand.

Per discussion above tandem/valet parking is proposed to kick in when all 36 designated stalls are filled. At the Kirkland Prayer Center in the 2012-2013 data year there were 16 days with 37 to 50 parked vehicles. With the new very large facility there will undoubtedly be many more of these days when tandem/valet parking is needed -- as many as 43 days based simply on the previously cited 2.7 size related growth factor for this Mosque.

Based on the weighted average parking provided for five Dawoodi Bohra mosques in the US, the parking required would be almost twice that of the RZC. Combining the available national data where parking and building area information is complete (five of the national mosques), the weighted average parking supply is 6.12 stalls/000 sf which would translate to a parking supply of 139 stalls needed for the proposal.

Application of the ITE Parking Generation Manual rate for the category Mosque13 would require 390 parking spaces, or almost 4 times that of the RZC. The ITE rate is based on studies from three mosques. Consideration of use of this rate is not addressed in the JTE Letter and should have been at least discussed as mosques are clearly very unique generators of parking and traffic demand.
(reference 9, p.5)

Parking forecasts cannot use only religious assembly, but need to include events that would utilize full building capacity.

The JTE Letter parking analysis and recommendations are based on the section of the Redmond Zoning Code (RZC) that calls for one stall per 5 seats for religious assembly use. JTE applies that value to seats in the prayer area (147/5 = 30) and in the multipurpose area (210/5 = 42) for a total of 72 spaces. However, re the multipurpose area, the RZC 21.08.280.C.2 which speaks to assembly areas for religious facilities says "*The use shall comply with the parking regulations for assembly uses, except that in no event shall parking be in excess of one space per three seats in a residential zone.*" Under this provision the multipurpose area would require 70 spaces (210/3 = 70). And thus the total code required parking would be 100 spaces.

Based on ITE Parking Generation Manual, the AEB mosque would require some 390 spaces. However, based on data for US Dawoodi Borah mosques the project should have some 139 spaces. Those numbers are significantly different from the 36 parking stalls as approved for the project.

Transportation Management Plan

The applicant presented a Transportation Management Plan based on JTE studies and the current unpermitted location AEB lease in Kirkland (reference 13).

As noted above, the applicant's traffic studies do not incorporate growth other than 5% per TSI (reference 6 & 7) and they minimize the potential attendance for the numerous events based on a very limited sample of existing use. Simply viewed from the perspective of the mosque's size and thus its potential growth, there is a very high likelihood the overflow parking will be required on many more occasions than are presented in the TMP.

The mitigations presented in the TMP are grossly insufficient

1. Community Transportation Coordinator is an advisory figure that may or may not affect the community traffic patterns.

2. The management program does not account for traffic surge as the attendees arrive or leave events in a short time period nor does it address growth in attendance.

3. Valet Parking suggested typically requires hiring out the services and configuring the parking lot and ingress\egress geometry to provide for efficient operation. No evidence of either is provided in the TMP.

4. Offsite parking discusses the number of guests at 249 while the permitted number is 150. Should offsite parking be employed, the plan should regulate how the attendees would learn that the onsite lot is full, locations for boarding and drop off for the shuttle accompanied with the properly executed agreement for the offsite parking location lease.

In the event the mitigations fail, the TMP does not provide any realistic measures to address traffic and parking issues. Providing additional offsite parking and shuttle service is not realistic for daily operations, and using transit cannot be enforced on the congregation. Note that the neighborhood does not have any spillover parking lots or park and rides within walking distance, and parking for the AEB mosque on public streets cannot be prevented.

It should be noted that the TMP makes no effort to shield the neighborhood from the spillover parking and has no provisions to that effect. The same can be said about attendees who may elect to make U-turns along 154th Ave NE (should the City prohibit U-turns at the intersection of 154th Ave NE with NE 51st Street).

Overall, the TMP does not list measures that can be traced to direct reduction of spillover parking in the neighborhood or cut through traffic through local streets. Valet parking on site requires significant expense in operation and specific site geometry, and those aspects together with the administration and enforcement of the mechanism are not listed in the TMP.

Most tellingly, the TMP goals are not measurable and thus cannot be enforced either via TMP or future contingency measures.

Project scope and growth

While traffic impact studies require assessment of impacts at full development, this is not the case with Anjuman E-Burhani project:

- All versions of JTE traffic studies (from 2012 to 2016, references 1 to 5) assert that there is zero growth in the size of the congregation and use 2011 numbers to substantiate the traffic study

- TSI documents (references 6 & 7) state the growth is flat however use arbitrary 5% growth for its projections

Currently AEB operates from an unpermitted location in an office park in the City of Kirkland with 2,300 sf of building area. Both JTE and TSI assume that the existing facility usage demand will be transferred to the new project, ignoring the following:

1. The proposed building area is ten times that of the existing space and will include sizeable "storage area", 12 classrooms, kitchen, dining and multipurpose gathering area, a parsonage and a guest quarters residence in addition to prayer assembly space.

2. The applicant indicated that a significant number of congregation members work at Microsoft (60% per JTE study) and the new location is across the road from the Microsoft main campus and close to other tech industries in the area.

The applicant states that the size of the congregation is 150 members (including children) or 60 families and contends that their present and future growth rate is flat. The permitted seating capacity is 150, allowing for zero growth.

But zero growth does not apply to community events like weddings and special assembly events. The traffic studies should still provide traffic and parking projections (including valet/overflow parking mechanics) for those occurrences, and using building occupancy rather than community size variable is the way to predict it.

As the applicant is unable or unwilling to provide realistic projections for growth, it is befitting then to use the overall building capacity to calculate projected traffic and parking impacts for the project.

TSI (reference 7) uses building area for trip generation and arrives at vastly different results (as compared with community size based generation) – typical evening prayer may generate up to 84 trips based on building area (vs 18 based on community size)! And that estimate assumes that only half of the building is available for assembly use. However, TSI continues using community size as a variable for traffic and parking impact calculations:
"*The community size variable was included with the past study. Community size, which can be related to maximum attendance, provides a more measurable relationship to trip generation than building area for a"mosque" use. There is space within the prayer facility that will not support people. A similar situation where building area does not equate to trip generation is an institution (or a school) where trip generation is a function of enrollment*."

The quote above underscores the fact that the study by JTE (on which the city presumably based the project approval) does not even attempt to include building size as a variable. According to JTE, the traffic impacts of existing 2,300 sf location in the office park in Kirkland and new 22,000+ sf location next to SR-520 and Microsoft are identical.

It has been indicated by AEB applicant that the facility will represent a community center, with activities not limited to religious assembly. The applicant has indicated there will be Saturday school, various community event and gatherings. Moreover, there is possibility of renting out space to the general public. These latter uses are not reflected in JTE or TSI traffic studies.

Traffic impact analysis guidelines require assessment of impacts at full development and while AEB may claim they do not expect any growth, their facility plan and facility size/membership relationships at other Dawoodi Borah mosques in the US suggest otherwise. Furthermore, artificial limitation to a three-year horizon cannot supplant a requirement for assessment of impacts at full development. This facility will undoubtedly be an architectural statement for what might be considered a state of the art US mosque. As such it is likely to attract membership and participation far beyond anything one can conjure when reflecting upon the present austere and inappropriate setting.