November 23, 2020

Mr. Joshua Perry, AICP
Senior Planner, City of Cranston
869 Park Avenue
Cranston, RI 02910

Re: Development Application Submission for COSTCO
Responses to Peer Review Comments by Fuss & O'Neill

Dear Mr. Perry:

BETA Group, Inc. (BETA) is pleased to submit the following responses to peer review comments received from Fuss & O'Neill for the above referenced development project. We offer the following responses to address the comments:

Traffic Impact Study (TIS)

General

1. Throughout the study, we have assumed that the Access Road is the internal roadway that traverses the site parallel to New London Avenue (Route 2) and the Service Road is the perpendicular connector road between the Access Road and New London Avenue (Route 2). This naming convention seems to be inconsistent through the study, appendices, and figures. Please review and revise for clarity.

   Response: The Service Road is the road that runs parallel to New London Avenue (Route 2) and the Site Access Road is the east/west road connector road that links New London Avenue (Route 2) to the Service Road. The report including the appendices and figures have been updated for clarity.

Existing Conditions

2. The capacity analysis is based on data available from RIDOT and from previous traffic studies in the vicinity of the project from 2007 and supplemented with data from 2019. The methodology should be clarified to explain how these two data sets were compiled into the turning movement counts used at each of the study area intersections.

   Response: The 2007 data was reviewed as a basis for this project and was supplemented with the more current 2019 RIDOT data to obtain a comparison of traffic conditions in the project area. It was determined that traffic volumes between 2007 and 2019 have declined along this section of New London Avenue when comparing both sets of data as the current 2019

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volumes were found to be lower. Therefore, to be conservative, instead of obtaining new data in the Covid environment and making adjusts, the higher 2007 data was utilized for analysis purposes. The report has been updated for clarity.

3. The turning movement count data specifies that New London Avenue (Route 2), south of Howard Avenue, services 1900 vehicles during the morning peak hour, and 2,600 during the afternoon peak hour. Please specify the number of vehicles serviced for the Saturday peak hour.

   Response: New London Avenue (Route 2) services approximately 2,500 vehicles during the Saturday MD peak hour between 1:00 PM and 2:00 PM. The report has been updated to include this information.

4. The Saturday midday peak hour is identified as 12:00 pm to 1:00 pm where 2,455 vehicles travel along New London Avenue (Route 2). However, the study states that during this peak hour 1,260 vehicles travel northbound and 1,155 vehicles travel southbound, which sums to 2,415 vehicles.

   Response: The Saturday MD peak hour volume of 2,455 vehicles is correct including the 1,260 northbound vehicles, however, the southbound volume was a typo and has been updated accordingly.

Safety Analysis

5. The study remarks on sight distance throughout the study area but does not clearly specify which intersection is being assessed, nor whether intersection sight distance (ISD) or stopping sight distance (SSD) is being evaluated. ISD and SSD should be assessed at each of the site driveways and included in this study.

   Response: The stopping sight distance was evaluated at the unsignalized intersection of the Mulligan's Island service road with Howard Avenue and at the proposed signalized intersection of the New London Avenue (Route 2) with the Site Access Road to address right turn exiting vehicles. The report has been updated for clarity.

   In reference to providing information on the intersection sight distance (ISD), it should be noted that the most important sight distance measurement is the stopping sight distance (SSD), a requirement for safety, where vehicles can perceive, react and stop to avoid a collision with an object (vehicle) in their path. This value, which is conservative, is also the minimum ISD according to AASHTO and is the minimum value to be satisfied for the ISD when evaluating intersection safety.

   At all times it is beneficial to provide sight distances at an intersection greater than the SSD and preferably closer to the ISD to limit any interaction of conflicting vehicles. An ISD requirement according to AASHTO is a *goal* to allow drivers on the main roadway an additional distance so as not to have to make any adjustment in their travel speed if a vehicle is turning from a side street or driveway, allowing the turning vehicle to make the maneuver and accelerate to the roadway speed, and is not a specific measure of intersection safety, but rather operation.

This ISD factor is also *highly* subjective, where the distance from an intersection a minor approach driver chooses to enter the main roadway is a function of their gap acceptance behavior (passive/aggressive) and not available sight distance. A driver typically enters the traffic stream, irrespective of the sufficient sight distances available, where it is more a function of their perception of a gap in traffic and ability to safely turn onto the main roadway.

For example, an intersection could have an available unrestricted sight distance of 1,000 feet with a calculated 280/155 feet ISD/SSD requirement based upon the roadway travel speeds. A typical operating condition at the intersection would be for a driver to pull out of the side street when the approaching driver is between 175 and 250 feet away from the intersection, or a value consistent with their individual gap acceptance characteristics (passive/aggressive) for the roadway travel conditions. Both are short of the ISD but greater than the 155 feet to provide a safe maneuver. The result of this occurrence where the side street driver turns in the shorter gap, *may* cause the driver on the main road to make a small adjustment in their travel speed for a brief moment, while the turning vehicle accelerates up to the roadway speed, and would not result in an unsafe condition. Note, the desire in design is to have the greatest available sight distance at a particular location, with the minimum SSD available to provide a safe operating condition at the junction in accordance with AASHTO guidelines, but driver behavior controls the interaction of vehicles at an intersection regardless of the availability of unrestricted sight distances.

6. The study indicates that a total of 67 vehicle crashes occurred in the project area over the three-year study period, with eleven involving injuries. It is not clear whether any of these crashes involved injuries to pedestrians or fatalities of any involved parties. Please clarify.

   Response: In general, fatalities will only be cited in the report if there are any within the project area; however for clarity, the report has been updated to include language that no fatalities occurred within the project area/three-year study period. In addition, a detail discussion of each type of crash has been provided in the report, which concludes that there were no crashes that involved pedestrians. A full summary of each crash type and conditions is provided in the Appendix.

7. In paragraph two, please revise sentence two to read "…the available sight distance at the access road intersection is greater than 300 feet through the signalized junction with Route 2 to the west…"

   Response: The report has been updated accordingly.

8. In paragraph six, please correct the "rear-end" typo in the last sentence.

   Response: The report has been updated accordingly.

Impact Analysis

9. As mentioned throughout the study, trip generation rates for the Costco discount club and associated gas station have been taken from a study conducted by Kittelson & Associates (Kittelson), dated October 15, 2020.

a. The study conducted by Kittelson analyzes data gathered during the early weeks of March 2020. During this time, the effects of the COVID-19 global pandemic were taking shape in New England and throughout the country and, as mentioned in the study, customers at discount clubs like Costco were reaching record highs. It is mentioned in this study that the March 2020 data was compared to data gathered in March 2018 and March 2019 and several adjustment factors were applied to the 2020 data to account for the abnormality. Please elaborate on the decision to utilize the heavily adjusted 2020 data, rather than using the 2018 and/or 2019 data.

   Response: As stated in the Kittelson & Associates memo that was provided in the appendices (Appendix C), Kittelson & Associates has acknowledged that the March 2020 data was higher compared to the March 2018 and March 2019 data due to COVID-19 impacts and as a result, the trip estimates for the proposed Cranston Costco were adjusted accordingly based upon extensive review of transaction data and compared to the extensive traffic database obtained over the years working directly for Costco across the country. In addition, the adjustments in traffic were also based regional data, and year-to-year comparisons accounting for general growth in Costco's customer base. These values have been determined to be conservatively high to ensure adequate design of infrastructure improvements.

b. The trip generation rates for this development have been provided by the Kittelson study based on traffic counts taken at three similar Costco discount clubs in Connecticut. The trip generation rates were applied to the proposed 165,000 square feet of the proposed development; however, Kittelson also recommends that the trip generation should be reduced to account for pass-by and diverted trips, totaling a 64.8 percent and 50 percent reduction during the weekday afternoon peak hour and Saturday peak hour, respectively. However, these reduction factors are not included in the trip generation analyzed for this study, citing a conservative nature of the study. Please further clarify the methodology behind implementing only part of the data strategy used by Kittelson.

   Response: As stated in the report no reduction was taken for pass-by and internal-capture trips in order to be conservative on our operational analysis. In addition, the build out of the proposed improvements to the servicing roadways/intersections were designed to accommodate the conservative approach as indicated previously.

c. With the exception of the Costco discount club and associated gas station, the expected site generated traffic for the morning, afternoon, and Saturday peak hours were calculated using empirical data from the Institute of Transportation Engineers (ITE) publication Trip Generation, 10th edition, 2017. This publication is an industry accepted resource for determining trip generation. Please provide the expected trip generation for the Costco discount club and associated gas station according to the ITE Trip Generation Manual as a means of comparison to the trip generation calculated using the trip generation rates provided by Kittelson.

   Response: Refer to the table below for the trip generation estimate comparison of the proposed Cranston Costco based on factors from the ITE Trip Generation Manual and the data provided by Kittelson. The Independent Study (Kittelson) rates provided by Costco were utilized for analysis purposes and typically result in a conservative analysis of future operating conditions;

	ITE Land Use Code 857 Discount Club			Independent Study (Kittelson)		
	Enter	Exit	Total	Enter	Exit	Total
AM Peak Hour	149*	116*	265*	169	170	339
PM Peak Hour	345	345	690	374	387	761
Sat. MD Peak Hour	514	537	1,051	458	459	917

** Trip estimate includes gasoline station (93 enter / 92 exit) using ITE LUC 944 Gasoline/Service Station.*

d. The trip generation rates calculated by Kittelson for the afternoon and Saturday peak hours are verifiable based on the tabulated data provided in their study. The trip generation rate provided for the morning peak hour, accounting for only the gas station, is more ambiguous. Please provide the methodology used to determine this rate.

   Response: The proposed Cranston Costco includes a gas station with 18 vehicle fueling positions (VFP) similar to other Costco locations nationwide. As noted in the report, the proposed Cranston Costco warehouse does not open for members until 10 AM; however, the gas station is typically open during the weekday AM peak hour. Kittelson & Associates provided the trip estimate for this morning period based on their extensive data collection program at numerous Costco facilities, including over 35 different sites across the US. The trip estimate is based upon the average trip rate of these facilities utilizing fueling positions.

Signal Warrant Analysis

10. Warrant 2 – Four-Hour Vehicle Volume and Warrant 3 – Peak Hour, are satisfied using the Kittelson volumes that do not take into account pass-by and internal capture rates. Please confirm that signal warrants would be met if those volume reduction factors were to be applied.

    Response: Both Signal Warrants 2 and 3 are satisfied taking into account these factors as the proposed site access roadway volume would not change for pass-by or diverted link reductions. The reduction in volume would be from the Route 2 traffic stream, which has sufficiently high volumes to satisfy main line volumes for the warrants reviewed when taking into account this estimated reduction.

Future Traffic Conditions

11. The trip distribution percentages applied in this study are provided as a narrative in the second paragraph of this section. Please provide a traffic volume figure with this information for each of the proposed land uses, including the distribution at the internal signalized intersection.

    Response: As discussed in the report, the directional distribution of the site traffic was estimated based upon traffic patterns in the project area, the type of land use proposed, and the location of higher order facilities such as Route 37 and Route 295. Please refer to the appendices for the directional trip distribution volumes for the proposed mixed-use project.

12. It seems unreasonable that no new left turns will be experienced at the intersection of New London Avenue and Garden Hills Parkway/Howard Avenue. Please clarify.

    Response: Assuming that the comment refers to left turning traffic from Howard Avenue to southbound New London Avenue, it is anticipated that all site traffic coming from the proposed restaurants on the north end of the Service Road that are bound to the south are going to take advantage of the proposed new signal to the south at Route 2 with the Site Access Road for convenience purposes; motorists typically prefer right turn than left turn movements due to less conflicting movements, and motorist tend to want to travel in the direction of their destination rather than the opposite direction.

Operational Analysis

13. The capacity analysis provided for the intersection of Howard Avenue and Slate Hill Drive using HCS7 does not appear to match the geometry and traffic volumes provided elsewhere in the study. Please clarify this methodology and/or revise the analysis, as needed.

    Response: Due to the limitation of the HCS7 analysis software and the unconventional nature of the unsignalized intersection where the southbound and westbound approaches are *Stop* controlled, the intersection was modeled as shown to better reflect these operating conditions.

14. Traffic volume figures are provided for each intersection for each of the Existing, No-Build, and Build conditions.

    a. The northbound left turn volume at the intersection of New London Avenue (Route 2) and Howard Avenue/Garden Hills Parkway did not grow at the specified one percent between the Existing and No Build conditions. Please revise.

       Response: The northbound left volumes at the intersection of New London Avenue (Route 2) with Howard Avenue/Garden Hills Parkway are very low where a 1% growth rate over 5 years is negligible, coupled with the fact that this movement services a densely populated fully developed residential neighborhood where no growth would be anticipated.

    b. The westbound left turn volume at the intersection of New London Avenue (Route 2) and Howard Avenue/Garden Hills Parkway is lower in the Saturday Build condition than it is in the Existing condition. Please revise.

       Response: The left turn traffic volume has been updated accordingly.

    c. Traffic volume balancing along Howard Avenue between the Existing, No-Build, and Build conditions appears to vary during the Saturday analysis period. Please clarify.

       Response: Traffic volumes under the Existing, No-Build, and Build conditions along Howard Avenue between the Mulligan's Island Service Road and Slate Hill Drive do not balance due to an existing driveway between these two points on Howard Avenue that services a parking lot for a state medical building, which generates minor traffic during these periods.

15. The trip distribution figure depicting the morning peak hour is incorrect along New London Avenue (Route 2). Please clarify.

    Response: The AM Peak Hour trip distribution figure in Appendix C depicts the correct trip estimate and directional distribution and is consistent with the trip generation summary and other references within the report.

16. On each of the trip distribution figures, the study intersection of Howard Avenue at Slate Hill Drive is not depicted. Please revise to include.

    Response: The intersection of Howard Avenue at Slate Hill Drive has been added to the trip distribution figures in the Appendix as requested.

17. The capacity analysis for the Build condition during the morning, afternoon, and Saturday peak hours indicate that the separation between the two proposed signalized intersections is 85 feet. In this case, the anticipated queue lengths exceed the available storage capacity and have the potential to queue onto New London Avenue (Route 2). Upon further review, the geometric layout provided in Appendix F does not match the site plans submitted for this development. Please update the capacity analysis as needed.

    Response: The comment appears to reference the site entry queue length on the Site Access Road (east/west connector road) eastbound approach to the intersection with the Service Road (running parallel to Route 2). If so, based on the Build condition analyses, the Site Access Road eastbound left turn is expected to have a 95th percentile queue length of one (1) vehicle during the weekday AM/PM and Saturday MD peak hours. In addition, queuing for the right turn to potentially spill back to New London Avenue is not a concern as the eastbound right turn at this internal intersection has a separate dedicated lane with no control, operating free to the Costco site over 1,100 feet to the south, and will not have any queueing.

Should you have any questions, or require additional information, please contact us at your earliest convenience.

Very truly yours,
BETA Group, Inc.

Paul J. Bannon
Associate

cc: file