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October 2, 2018

Ref. T0812

Re: Cate Street Extension Traffic Study – Mixed Use Proposal
Transportation Peer Review – Response to Comments Review

Dear Ms. Walker:

On behalf of the City of Portsmouth, TEC, Inc. (TEC) has reviewed additional documents as part of the transportation engineering peer review of a proposed mixed used development located on the east side of US1 Bypass at the site of the Frank Jones Center in Portsmouth.

The following documents were received as part of our review:

- Response to Comments Memorandum, prepared by Stephen G. Pernaw & Co., Inc, dated September 25, 2018
- *Draft Traffic Impact and Site Access Study – Proposed Mixed-Use Site*, prepared for Torrington Properties by Stephen G. Pernaw & Co., Inc. – July 18, 2018
- *Cate Street Development Conceptual Site Plan* – prepared by PCA, undated
- *Road Layout Exhibit* - prepared by Fuss & O'Neil, revision dated June 28, 2018

Comments 1 thru 16 have been retained from the most recent TEC review letter dated September 7, 2018, originally issued as part of the project review. The Applicants response to comments is shown as **bold**; TEC responses are shown as *italic*:

Transportation Impact Evaluation

1. Study Area – The Traffic Impact and Site Access Study (TISAS) evaluates a reasonable study area for the purposes of evaluating the potential traffic impacts to the surrounding street system with the construction of the proposed development and the realignment/extension of Cate Street. TEC concurs that the scope of the study is in general accordance with NHDOT guidelines; and was previously approved by NHDOT and the City.

   SGP & Company, Inc. Response: Comment acknowledged; no response necessary.

   TEC: No response required.

2. Traffic Counts - Traffic counts used within the TISAS were conducted in May 2018 during a period in which area schools were in session. The May counts were seasonally adjusted upward by 7% during the weekday evening peak hour and 8% during the Saturday midday peak hour to reflect peak month conditions, consistent with NHDOT standards. This is generally reflective of summertime volumes in the seacoast area. TEC concurs with the use of these traffic volumes and adjustment factors based on NHDOT guidelines.

   The weekday evening peak commuter hour and Saturday midday peak commercial hour were studied with the TISAS to determine the project's overall effect on the roadway system. While TEC concurs that these selected time periods are generally appropriate for a mixed-use development, Stephen G. Pernaw and Company, Inc. (SGP) should provide justification for not including the weekday morning peak hour within the study as the morning peak hour of the residential dwelling units and office space within the development will typically overlap with the morning peak hours of the adjacent street system.

   SGP & Company, Inc. Response: The analysis periods were discussed with the NHDOT and City representatives at the scope meeting conducted on April 27, 2018, and it was determined and agreed upon that the Weekday PM and Saturday Midday peak periods would suffice. The NHDOT automatic traffic recorder counts for the US1 Bypass and Bartlett Street that are included in Appendix B show that the AM peak hour volumes are considerably lower than the PM peak hour volumes on weekdays.

   TEC: TEC concurs with the assessment that the weekday evening peak commuter hour and Saturday midday peak hour are conservative for analyzing the impact of the project on the adjacent street system.

3. Background Growth - The TISAS uses an annual traffic volume growth adjustment factor of 1.0 percent per year based on standard rates approved by NHDOT. SGP concurrently overlaid projected traffic volumes associated with five pending development projects within the study area. TEC concurs with the use of these adjacent development projects and adjustment factors based on NHDOT guidelines. The future conditions in 2020 (opening year) and 2030 (10-year horizon) were studied in conformance with NHDOT requirements.

   SGP & Company, Inc. Response: Comment acknowledged; no response necessary.

   TEC: No response required.

4. Crash Data – No motor vehicle crash data was provided within the TISAS. SGP should obtain and review crash data at the study area intersections to determine

whether any specific crash trends exist. This is primarily of concern at the two ends of the proposed Cate Street realignment. The crash data typically indicates the number, type, and severity of crashes at the study area intersections for the most recent three years on record. SGP should further provide documentation of other traffic safety related issues/deficiencies at the intersections and subject roadways, such as sight distances, if applicable.

SGP & Company, Inc. Response: Crash data from the State of New Hampshire Department of Transportation for the most recent three-year period (2013 to 2015) was researched to identify accident rates and patterns in the study area. Over the three-year period, the Location Data Reports indicate that 2,407 crashes were recorded on a city-wide basis. It should be noted that this database is considered to be a subset of the total collisions as not all incidents are required to be reported to the State. Of these, forty-one crashes contained sufficient detail to locate them in the study area. These reports, along with a summary table, are attached (see Attachments 1-3).

Sixteen crashes occurred in the vicinity of the US1 Bypass/Coakley Road/Cottage Street intersection. There were eight collisions that resulted in injuries to eleven persons. The majority (81%) of the crashes involved two or more vehicles. Two collisions were the result of a collision with a fixed object and two crashes were rear-end collisions. Inclement weather or unfavorable surface conditions may have been a contributing factor in four of these sixteen crashes.

Twelve crashes occurred in the vicinity of the US1 Bypass/Borthwick Avenue intersection. These crashes resulted in injuries to six persons. The majority (92%) of the collisions involved two or more vehicles. Inclement weather or unfavorable surface conditions may have been a contributing factor in two of these twelve crashes.

Five crashes occurred in the vicinity of the Bartlett Street/Cate street intersection. There was one collision that resulted in injury to one person and the majority (80%) of the crashes involved two or more vehicles. Inclement weather or unfavorable surface conditions may have been a contributing factor in four of the five collisions.

Eight collisions occurred in the vicinity of the Bartlett Street/Islington Street intersection. There was one crash that resulted in injury to one person. All of the crashes involved two vehicles. Inclement weather or unfavorable surface conditions were not a contributing factor in any of these eight collisions.

No fatalities were reported in this study group. There were no discernible trends in terms of crash frequency as 11 crashes occurred

in 2013, 16 occurred in 2014, and 14 occurred in 2015. In terms of monthly variations, August and February were the highest months (8 crashes each) and the lowest months included March, April, September and November (1 crash each). In terms of daily variations, nine crashes over the three-year period occurred on Wednesdays and Fridays, and the lowest day was Saturday with two crashes. The sight distance looking left and right from the Cate Street approach is applicable and is adequate. Although the crash rate at the Bartlett Street/Cate Street intersection is nominal, we share TEC's concern with sight distance on the Bartlett Street northbound approach to the intersection. Providing a left-turn pocket would be helpful, if it is feasible. Alternative configurations for this intersection could eliminate this concern.

TEC: Upon review of the data provided, TEC concurs that an identifiable crash issue and/or trend does not exist at the study area intersections. No further response necessary.

5. Site Trip Generation – The TISAS uses data published in the industry standard Institute of Transportation Engineers (ITE) publication, *Trip Generation, 10th Edition* to estimate the traffic generated by the proposed development. The TISAS uses data found under Land Use Code (LUC) 220 – Multi-Family Housing (Low-Rise) for the townhouse units, LUC 221 – Multi-Family Housing (High Rise) for the apartment units, LUC 710 – General Office Building for the office areas, and LUC 932 – High Turnover (Sit-Down) Restaurant, LUC 930 – Fast Casual Restaurant, and LUC 820 – Shopping Center for the retail areas of the site. TEC concurs with these land uses and general traffic generation methodology.
   The TISAS indicates that a portion of the traffic generated by the commercial areas of the site will be "pass-by" trips, or vehicles generated by the site that are existing on the immediately adjacent roadway system, specifically the US Route 1 Bypass. This is appropriate for the retail and restaurant areas of the site. It appears that some pass-by credit was taken for the office areas of the site within the study. Office land uses are primary trip generators and are not known to attract pass-by trips. While the removal of the pass-by credit will not materially impact the results of the overall analyses due to the relatively small size of the office area proposed, the trip generation calculations should be revised to remove any pass-by trips associated with the office land use.

   The ITE publication, *Trip Generation Handbook, 3rd Edition*, indicates that retail land uses have an average of 34% pass-by trips during the weekday evening peak hour and 26% during the Saturday midday peak hour and high-turnover sit-down restaurants have an average pass-by rate of 43% during the weekday evening peak hour. The TISAS applies a 36.5% pass-by rate during the weekday evening peak hour and 39.8% during the Saturday midday peak hour, which is appropriate for the proposed retail/restaurants on the site.

   No internal capture rate was applied between the land uses on the site. TEC concurs that this provides a conservative representation of the trips generated by the site.

SGP & Company, Inc. Response: Page 19 of the report states that *"Restaurants and retail trips are comprised of both primary trips and pass-by trips which are drawn from the existing traffic stream on US1 Bypass."* The 84 (PM) and 126 (SAT) pass-by trips shown on Table 1B (Page 19) are attributable to the restaurants and retail uses only. No pass-by credit was taken for the office space within the development. There is no need to revise the trip generation calculations in the study.

TEC: TEC concurs with this clarification. No further response necessary.

6. Trip Distribution – The traffic generated by the proposed project was distributed onto the adjacent roadway system based upon available Journey-to-Work data published by the US Census Bureau for persons residing in the City of Portsmouth for the residential portions of the development and for persons working in the City of Portsmouth for the office portion of the development. This form of trip distribution calculation is consistent with industry standards and TEC concurs with the methodology.

   The Site Generated Traffic Volume Figures within Appendix G include both the site generated traffic volumes and the diverted link volumes. TEC requests a figure detailing only the site generated traffic be provided to ensure consistency with the Journey-to-Work distribution and for clarity.

   SGP & Company, Inc. Response: The requested figures showing the distribution of the site generated traffic volumes are attached (see Attachments 4-11).

   TEC: The traffic generated by the proposed project was confirmed to be distributed appropriately onto the adjacent roadway system as clarified within Attachments 4-11 of the Response to Comments letter. No further response necessary.

7. Traffic Diversion – With the relocation and extension of Cate Street to intersect US Route 1 Bypass at Borthwick Avenue and close the connection with Cottage Street, traffic will be diverted to use the new roadway connection. The TISAS identifies five different traffic diversion patterns. TEC concurs with the existing patterns that will divert to the new Cate Street extension. The Diverted Traffic Volumes figures within the report are not consistent with the anticipated diversions. SGP should revise and reissue the figures. TEC recommends that SGP provide detailed tables or figures illustrating the volumes of traffic being diverted in each pattern scenario for review to ensure consistency and clarity.

SGP & Company, Inc. Response: Supplemental figures for each trip diversion pattern are attached. The diverted traffic volume figures in Appendix G have been updated as the draft report inadvertently included a superseded version of that Figure (see Attachments 12-23).

TEC: The traffic diversion patterns were confirmed to be distributed appropriately as clarified within Attachments 12-23 of the Response to Comments letter. No further response necessary.

8. Capacity and Queue Analysis - TEC generally concurs with the results of the capacity and queue analysis provided as part of the TISAS; utilizing *Highway Capacity Manual 2010* (HCM 2010) methodology as modeled by Synchro 10.

SGP & Company, Inc. Response: Comment acknowledged; no response necessary.

TEC: No response required.

9. At the intersection of US 1 Bypass / Cottage Street / Coakley Road, the capacity and queue analyses depict significant vehicle delay and queues on various approaches during the weekday evening peak hour in the 2030 No Build and Build condition. The addition of site generated traffic increases the delay and extends queue lengths on the northbound and westbound approaches. Suggested mitigation at this intersection includes the addition of a northbound right turn lane and shortening the northbound left turn lane queueing length to 50 feet. TEC notes that the addition of a northbound right turn lane may not be feasible within the existing US 1 Bypass right-of-way.

The report does attempt to document the influence of the Portsmouth Rotary on the operations at intersections along Route 1 Bypass to the south by using reduced lane utilization factors on the northbound approach movement during the peak hour studied. Observations of the operation of this roadway during the evening peak hour indicate that the queues from the rotary often extend beyond the Cottage Street / Coakley Road when the rotary is saturated with traffic. While TEC does not recommend incorporating rotary analysis as part of this application review, it is important to document the interconnected operations of other transportation facilities in this area.

SGP & Company, Inc. Response: Field survey is being conducted to determine the availability of right-of-way along the Bypass for the recommended right-turn lane. The two signalized study area intersections on the US1 Bypass have controllers that are vehicle-actuated and coordinated.

TEC: Adding a northbound right turn lane on the US 1 Bypass at Cottage Street / Coakley Road may encourage motorists to continue to use Cottage Street to cut through the neighborhood to Bartlett Street. The City has indicated that removing traffic from Cottage Street and the neighborhood is preferable. The Applicant should consider the addition of a northbound right turn lane at Cate Street during the site plan review process as an alternative to providing the northbound right turn lane at Cottage Street.

10. At the intersection of US 1 Bypass / Borthwick Avenue / Cate Street Extension, the capacity and queue analyses depict increased vehicle delay and queues along the eastbound Borthwick Avenue approach, westbound Cate Street Extension approach and northbound US 1 Bypass left turn movement during the weekday evening peak hour in the 2020 and 2030 Build conditions. The addition of site generated traffic increases the delay and extends the queues by one to two vehicles. Suggested mitigation at this intersection includes the modification of the westbound Cate Street Extension approach to provide a shared left/through/right turn lane and an exclusive right turn lane and extending the southbound left turn lane queueing length to approximately 200 feet. TEC notes that one of the proposed mitigation items for this intersection is increasing the signal cycle length to 120 seconds. During the weekday evening and Saturday midday peak hours, the existing cycle length is 120 seconds, rendering this mitigation item unnecessary. The improvements proposed will not fully mitigate the impact of the site generated traffic, but do reduce delays on the Borthwick Avenue approach and the Cate Street Extension approach during the weekday evening peak hour.

    SGP & Company, Inc. Response: The existing cycle length at these intersections is 120-seconds during the PM peak hour and 110-seconds during the Saturday peak hour. TEC is correct; the mitigation item concerning cycle length on Page 35 of the report is not applicable.

    TEC: Upon further review of the existing geometry of the intersection, simply restriping the westbound Cate Street Extension approach to provide the proposed mitigation may not be feasible due to the alignment of the existing westbound left turn lane opposite a center median island on the eastbound Borthwick Avenue approach. The mitigation as proposed may require reconstruction of either the Cate Street Extension or the Borthwick Avenue approach, or both. The feasibility of extending the southbound left turn lane and reconfiguring the westbound Cate Street Extension approach will require the review and approval of NHDOT through their Access Permit process. The Applicant should pursue the implementation of these improvements with NHDOT during the site plan review process.

11. The southbound left turn lane of US 1 Bypass at Borthwick Avenue / Cate Street is projected to have a 95% queue length (the generally accepted maximum queue length) of 11 vehicles, or 275 feet in the weekday evening peak hour and 13 vehicles, or 325 feet, in the Saturday midday peak hour. The left turn queue length may extend past the provided storage length during some signal cycles within peak periods, even with the proposed longer storage length. This increase in delay may encourage vehicles to divert to back to the intersection of US 1 Bypass / Cottage Street / Coakley Road to make a left turn.

    SGP & Company, Inc. Response: We concur, this is certainly a possibility.

    TEC: No response necessary.

12. Should NHDOT execute on their vision to remove the traffic signal and close the median opening at US 1 Bypass / Cottage Street / Coakley Road, the intersection of US 1 Bypass / Borthwick Avenue / Cate Street Extension will require a complete redesign to accommodate the relocated traffic. With the introduction of new development traffic, existing over capacity conditions are aggravated at both US 1 Bypass / Cottage Street / Coakley Road and US 1 Bypass / Borthwick Avenue / Cate Street Extension. TEC recommends that SGP perform an alternative analysis considering the removal of the traffic signal at US 1 Bypass / Cottage Street / Coakley Road and determine the desirable lane configuration at US 1 Bypass / Borthwick Avenue / Cate Street Extension to accommodate development traffic and diverted traffic.

    SGP & Company, Inc. Response: The NHDOT public informational meeting conducted in October 2006 regarding the traffic circle and US1 Bypass for Project 13455 included two concept plans that showed the extension of the existing median island on the Bypass through the Cottage Street/Coakley Road intersection. This would eliminate the existing traffic signal and restrict the turning movements to/from the minor approaches to a right-in/right-out pattern only. This concept plan was discussed at the April 2018 scope meeting and it is no longer being considered by the NHDOT (not included in the NHDOT Ten-Year Plan). At the request of TEC, we have prepared hypothetical 2030 peak hour Design Hour Volumes for the Borthwick Avenue/Cate Street Extension intersection (see Attachment 24) assuming turn restrictions are in effect at Cottage Street and Coakley Road (due to the median extension). Analysis of these hypothetical projections is summarized in the table below. A more-detailed summary table is found on Attachment 25. The preliminary results indicate that the proposed median has the potential to increase the overall Build V/C ratio from 0.97 to 1.02 during the 2030 PM peak hour period (see Case B). Overall delay would increase by approximately +12 seconds. Recognizing that the southbound left-turn volume would exceed 300 vph with the hypothetical median in place, consideration was given to providing two left-turn lanes on the Bypass southbound approach (for turns onto Cate Street Extension). Case C indicates that future widening of the Bypass to provide an additional southbound lane has the potential to reasonably mitigate the impacts of the hypothetical median extension. It should be noted, Torrington Properties Inc. is not proposing to extend the median island on the Bypass (past Coakley Road and Cottage Street) nor widen US1 Bypass to construct the additional left-turn lane (see Attachment 26-31).

    TEC: TEC notes that within their hypothetical analysis, SGP redistributed all of the left turns from Cottage Street to perform a right turn movement, make a U-turn via the Portsmouth Rotary, and return as southbound through movements at the intersection of US 1 Bypass with Cottage Street / Coakley Road. TEC believes that some, if not all, of these left turn movements will relocate to the Cate Street

Extension, potentially necessitating a left turn lane on the westbound Cate Street approach. It is noted that maintaining the existing left turn lane on westbound Cate Street, striping a through/right turn lane and adding a right turn lane may be a preferable mitigation scenario considering the existing alignment of Cate Street opposite Borthwick Avenue as mentioned in Comment #10. Through discussions with the City, it is TEC's understanding that the City desires to eliminate as much of the cut-through traffic within the adjacent neighborhood as possible with the implementation of the Cate Street Extension. It is therefore desirable for the Applicant to continue to coordinate with the City and NHDOT to determine whether closing the median opening at US 1 Bypass / Cottage Street / Coakley Road is feasible and whether the resulting redistributed traffic can be accommodated at the US 1 Bypass / Borthwick Avenue / Cate Street Extension intersection. TEC recommends further analysis of this scenario through the site plan review process to ensure sufficient right-of-way width is maintained to accommodate any widening of westbound Cate Street if required in the future.

13. At the intersection of Islington Street / Bartlett Street / Pharmacy Driveway, the capacity and queue analyses depict increased vehicle delay and queues along the eastbound Bartlett Street approach during the weekday evening peak hour in the 2020 and 2030 Build conditions. The addition of site generated traffic increases the delay on this approach, but does not increase the projected queue lengths. Improvements at this intersection are under final design by the City for construction next year. No additional lanes will be provided. Suggested mitigation at this intersection includes increasing the signal cycle length to 120 seconds. The proposed timing change reduces the delays on the Bartlett Street approach; however, the queue lengths increase. The 95% queue length on the Bartlett Street approach is projected to be 17 vehicles, or 425 feet, during the weekday evening peak hour. TEC notes that the intersection of Bartlett Street / Cate Street is located approximately 250 feet to the west of this intersection. As a result, it is likely that the intersection of Bartlett Street / Cate Street will be blocked by queueing traffic during peak periods, causing conflicts between queuing vehicles and turning vehicles. TEC does not recommend implementation of this mitigation.

    SGP & Company, Inc. Response: The mitigation summary on Page 35 of the report for this intersection is incorrect. The analysis was based on increasing the signal traffic signal cycle length from 80-seconds to 90-seconds during the Saturday peak hour period only. This was offered as a mitigation possibility only, and the City and its consultants will choose whichever cycle lengths they deem appropriate.

    TEC: Agreed. No further response necessary.

14. SGP analyzed the intersection of Bartlett Street / Cate Street using several different geometric layouts for the unsignalized intersection. With the addition of site generated traffic, the Cate Street approach to the intersection increases in delay and degrades in levels of service (LOS) from LOS D to LOS F in the 2030 Build condition

in both the weekday evening and Saturday midday peak hours. TEC notes that the condominium development under construction at 30 Cate Street will be widening the Cate Street approach to the intersection to provide an exclusive right turn lane as a condition of their approval. The analyses within the TISAS should be revised to reflect the eastbound right turn lane as constructed within the No Build and Build analyses. Further, constructing this lane should be removed as a recommended mitigation for the subject development.

SGP & Company, Inc. Response: The No-Build and Build analyses have been updated as requested, and Table 9A has been updated accordingly (see Attachments 32-40).

TEC: The analyses have been updated as requested. The left turn movement from Cate Street will operate with delays and LOS F in the 2020 and 2030 Build conditions in both the weekday evening and Saturday midday peak hours. No further response necessary.

15. The TISAS recommends maintaining the intersection geometry generally as existing, with the addition of an approach lane on Cate Street to provide a shared through/left turn lane and a right turn lane and provision of a northbound left turn lane along Bartlett Street. Of concern with maintaining this geometry is the sight distance for vehicles traveling north/westbound on Bartlett Street away from Islington Street. The distance between Cate Street and the railroad bridge over Bartlett Street is less than 100 feet, increasing the potential for rear-end accidents at the intersection should 1-2 vehicles queue to turn left into Cate Street. The addition of a left turn lane along northbound Bartlett Street to provide a short queue storage area can aid in relieving this safety concern. Realigning northbound Bartlett Street to become the through movement onto Cate Street (Alternative Configuration B within the TISAS) relocates the delay onto the Bartlett Street southbound movement, but may allow for a safer intersection geometry and increased visibility for turning movements. This configuration would potentially have an added benefit of diverting more traffic from Bartlett Street north of Cate Street and removing additional through vehicles from the neighborhood. SGP should provide additional analyses and a recommendation based not only upon delay but considering safety issues and construction feasibility.

SGP & Company, Inc. Response: Maintaining the current configuration of this intersection with the additional approach lane on Cate Street (by others) results in the lowest overall intersection delay. To address the sight distance concern and the potential for rear-end crashes, we recommend that additional field survey be conducted to determine if constructing a northbound left-turn pocket on Bartlett Street is feasible. At this juncture, we are not comfortable recommending Alternative Configuration B or Configuration C due to the excessive delays and queuing that are expected to occur on the Bartlett Street southbound approach.

TEC: As previously stated, the City desires to remove as much of the cut-through traffic within the adjacent neighborhood as possible with the implementation of the Cate Street Extension. It is understood that realigning northbound Bartlett Street to become the through movement onto Cate Street (Alternative Configuration B within the original TISAS) relocates the delay onto the Bartlett Street southbound movement. However, this delay may encourage more motorists to divert and use the Cate Street Extension and US 1 Bypass rather than Bartlett Street through the neighborhood. It may also increase visibility for turning movements and provide a safer intersection geometry. The realignment would eliminate northbound left turn queuing vehicles by creating a free flow movement for motorists traveling from Islington Street onto Bartlett Street and then onto Cate Street. This free flow movement would be particularly efficient for emergency vehicles using the Cate Street Extension to access Portsmouth Regional Hospital. TEC recommends further analysis of this realignment as the project progresses through site plan review.

16. The remaining unsignalized intersections: US 1 Bypass / Site Driveway, Bartlett Street / Shared Driveway and Cate Street with the three site driveways will all operate with acceptable levels of service in the 2030 Build condition with the addition of site generated traffic.

    SGP & Company, Inc. Response: Comment acknowledged; no response necessary.

    TEC: No response required.

Upon the receipt of additional, revised, and/or new documentation for the project, TEC reserves the right to provide additional comments as needed. If you have any questions regarding the peer review, please do not hesitate to contact us at (978) 794-1792. Thank you for your consideration.

Sincerely,
TEC, Inc.
*"**T**he **E**ngineering **C**orporation"*

Elizabeth Oltman

Elizabeth Oltman, PE
Senior Traffic Engineer