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November 1, 2006

Mr. Glenn Rowe, P.E.
Pennsylvania Department of Transportation
Bureau of Highway Safety and Traffic Engineering
Commonwealth Keystone Building
400 North Street, 6th Floor
Harrisburg, PA 17064

RE: Pennsylvania Gaming Control Board
Sugarhouse Casino TIS Review
PennDOT Agreement E00229, Work Order 14
EK Project No. 040015.038

Dear Mr. Rowe:

In accordance with Agreement E00229, Work Order 14, Edwards and Kelcey has completed its detailed review of the Sugarhouse Traffic Impact Studies (TIS), prepared by Gannett Fleming dated December 2005 and October 13, 2006. Our review considered the applicant's completeness in meeting the standards set forth by PennDOT and the Institute of Transportation Engineers (ITE), as well as the completeness and reasonableness of their assumptions, calculations, findings, and conclusions.

Following are our comments and findings based on the site visit and the review of the above-referenced documents:

Introduction

1. The site development staging includes an Interim Casino to be constructed in 2008, with 1,500 slot machines and limited auxiliary uses. The Phase I Casino is scheduled for 2009, with an additional 1,500 slots for a total of 3,000 plus restaurants, lounges, a ballroom, and a performance venue. The Phase II Casino will include an additional 2,000 slots for a total of 5,000 gaming positions, additional restaurants and shops, a 500-room hotel and a special event center.
2. The primary casino access points are on Delaware Avenue at Frankford Avenue and Shackamaxon Street. A secondary access point is located on Penn Street.

Trip Generation

3. Future off-site developments in the study area include approximately 4,000 proposed housing units. Of those, the Waterfront Square site is approved and under construction. That site, with between 780 and 966 condominiums, is included in the future no-build scenarios. The other developments are in

the conceptual phase and are not included. Figure 1 shows a photo of the Waterfront Square development.



Figure 1: High-rise Condominiums Under Construction on Penn Street

4. The preliminary study showed all entering traffic from westbound Delaware Avenue using the Shackamaxon Street entrance, and most traffic from eastbound Delaware Avenue using the Frankford Avenue entrance. The revised study shows a more even distribution between the two drives for entering traffic. The distribution of trips between the two primary site access points (at Frankford Avenue and at Shackamaxon Street) should be discussed in further detail.

Future Conditions Analysis & Mitigation

5. The planned Girard Avenue interchange improvement is scheduled for construction between 2009 and 2012. The Phase I Casino would open during the interchange construction. The Phase II Casino is planned assuming that the interchange project is complete. Given the scale of the casino development and associated traffic impacts, it is recommended that the Phase II Casino expansion be restricted to an opening after the completion of the Girard Avenue interchange project.

During the interchange construction, SugarHouse and their traffic engineering consultant should work closely with PennDOT regarding maintenance of traffic, temporary wayfinding signage, keeping casino patrons aware of official detours, and minimizing the opportunities for casino traffic to utilize “unofficial” detours through residential areas.

6. Due to the planned Girard Avenue interchange improvements, different intersections are impacted by casino traffic in different years. At a minimum, all signalized intersections between the site and the nearest interstate access should be analyzed, since most casino traffic is expected to use the interstate. For the Interim Casino, that includes Girard Avenue, Delaware Avenue, Richmond Street, and all signalized intersections along the circuitous path that must be traveled by casino patrons under existing and 2008 conditions. For the 2012 Phase II Casino, the study area of interest is much smaller since interstate traffic will have more direct access.

In the report, nine intersections were analyzed. Five additional intersections are recommended for analysis for existing conditions and Interim Casino conditions:

- a. Delaware Avenue and Spring Garden Street, a primary route for Center City traffic
- b. Delaware Avenue and Columbus Street, a signalized intersection between the site and the interchange access
- c. Delaware Avenue and Richmond Street/Aramingo Avenue, a signalized intersection between the site and interchange access
- d. Cumberland Street and Aramingo Avenue, a signalized intersection between the site and I-95 SB access.
- e. Aramingo Avenue and Moyer Avenue/York St., a signalized intersection between the site and I-95 SB access

Under Phase I conditions, the study area is dependent on PennDOT's plans for maintenance of traffic during the interchange construction project.

Under Phase II, full build-out conditions, the following additional intersections should be considered.

- a. Delaware Avenue and Spring Garden Street
 - b. Delaware Avenue and Columbus Street
 - c. Any other signalized intersections that result from the new interchange configuration that are between the site and the interstate access points
7. A trolley line was observed on Richmond Street. Discussion should be presented detailing the frequency of trolley operation, and the potential for conflict between this trolley and casino patrons using Richmond Street to get from the casino to I-95 SB, or to get to the casino from I-95 NB.
 8. The intersection of Delaware Avenue and Penn Street was included in the analysis, because bus and truck traffic will use Penn Street to access the casino. It was planned for all bus and truck traffic to arrive outside of the peak hour, thereby minimizing the casino's impact on local traffic during the busiest time of day. This restriction of bus/truck traffic is a good idea from a planning perspective, however, with no truck/bus traffic during the design hour, there is no analysis of the impacts of trucks/buses at the intersection of Penn Street entrance and Delaware Avenue.

Parking is permitted on both sides of Penn Street, and the roadway appears somewhat narrow. The intersection geometry should be evaluated with respect to truck and bus turning movements.



The distribution figures show zero traffic using the Penn Street access. However, the Traffic Volume Diagrams show some volume on Penn Street attributed to the casino. Also, it is likely that some car-trips will use the Penn Street entrance, particularly employees or others familiar with the site and coming from the south. Some percentage of car traffic should be distributed to this entrance in addition to the truck/bus traffic. It is not clear whether the analysis included car trips and/or truck/bus trips at the Penn Street/Delaware Avenue intersection.

Under existing conditions, the intersection of Delaware Avenue and Penn Street was reported to experience LOS E during the PM Peak hour on the Penn Street approach. Using the same volumes but different signal timings, the LOS under existing conditions for that approach in the revised report is listed as LOS C. Discussion of this difference should be presented. Figure 2 shows a photo of the intersection.

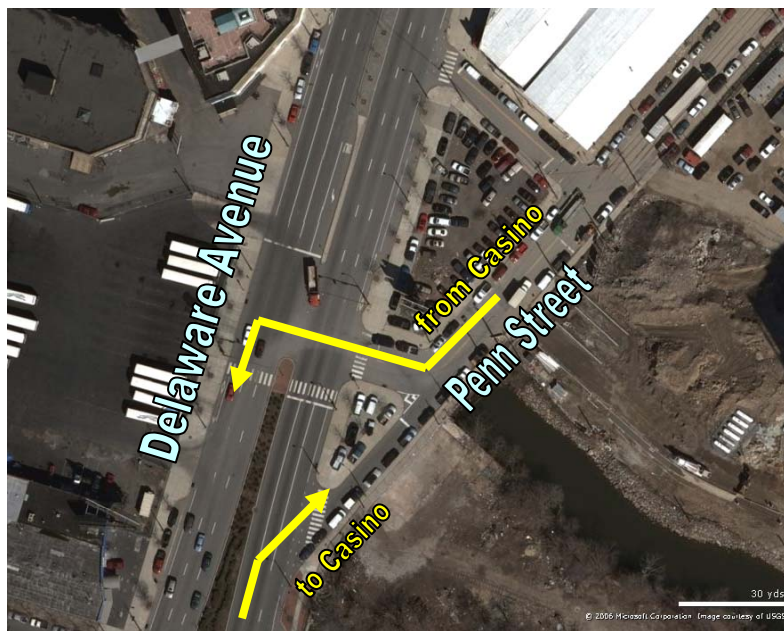


Figure 2: Penn Street and Delaware Avenue

9. The description of geometry at the intersection of Delaware Avenue and Shackamaxon Street is incorrect. The report lists left-turn lanes on Delaware Avenue in both directions. However, there is only a southwest-bound left-turn lane. There is no northeast-bound left turn lane because Shackamaxon Street is one-way toward Delaware Avenue. The intersection is shown in Figure 3.



Figure 3: Delaware Avenue and Shackamaxon Street

10. The intersection of Frankford Avenue and Laurel Street is described as being located approximately 60 feet from Delaware Avenue. If a minimal number of vehicles on Frankford are queued at Delaware Avenue, then eastbound Laurel Street is blocked. If there are three or more vehicles on Frankford queued at Delaware Avenue, then both eastbound and westbound Laurel Street are blocked. The capacity of the Laurel Street approach is entirely dependent on queues on Frankford Avenue. The Synchro analysis should account for this potential blocking.
11. On Page 9-2, first full paragraph, the report states, “At the Girard Avenue – Frankford Avenue intersection westbound Girard Avenue left-turn movement, *although not impacted by casino patron travel...*” In fact, the westbound left-turn movement volume doubles from 21 vehicles in no-build 2008, to 43 vehicles in 2008 with Interim Casino. This increase is a result of casino traffic from SB I-95 traffic exiting at Girard Avenue and turning left on Frankford Avenue to access the site. The report text should be clarified.
12. Recommended Improvements, Interim Phase:
 - a. Southbound Shackamaxon Street through traffic to the casino will be restricted. No physical improvements are shown; therefore it is assumed that this restriction will be enforced via signage. A through movement restriction, in particular, is difficult to enforce when left- and right-turns are allowed. There are no traffic calming measures proposed for Shackamaxon Street between Girard Avenue and Delaware Avenue. Thus, it is possible that casino patrons or staff who are familiar with the area may use Girard Avenue to Shackamaxon Street, then violate the restricted through movement to access the casino. This movement is more direct than using Girard Avenue to Frankford Avenue. Discussion should be presented on the impacts to Shackamaxon Street and the Delaware Avenue intersection of permitted through movements. Alternatively, a concept plan could be prepared showing a physical restriction of the through vehicles, although this may not be feasible given the intersection geometry constraints.

- b. The proposed improvements are not shown to scale. Will the northbound and southbound through movements on Frankford Avenue/site drive be aligned properly?

13. Recommended Improvements, Phase I:

- a. This condition was not reviewed in detail, due to the uncertainty of PennDOT's maintenance of traffic plans and routing of non-casino traffic during the interchange construction project.

14. Recommended Improvements, Phase II:

- a. Timing optimization along Delaware Avenue should consider additional intersections, besides those adjacent to the casino. Additional benefits may be realized through further optimization.
- b. A second westbound left-turn lane is recommended on Delaware Avenue at Shackamaxon Street/site entrance. The study recommends removing on-street parking on the south side of Delaware Avenue to accommodate the additional lane. A scaled figure is desired to show the feasibility of this improvement, and whether the through traffic on Delaware Avenue can safely accommodate the required lane shift. The proximity to Beach Street east of Shackamaxon and the eastbound right-turn-only lane from Delaware to Beach Street is a concern. In addition, obstacles such as street lights, signal hardware, fire hydrants are present along the parking lane alignment, located in curb bump-out areas. These would require relocation if the parking lane were converted into a travel lane. A photo facing east at the intersection of Delaware Avenue and Shackamaxon Street is shown in Figure 4.



Figure 4: Utilities in the Parking Lane on Delaware Avenue at Shackamaxon Street

- c. Similarly, a second westbound left-turn lane is recommended on Delaware Avenue at Frankford Avenue/site entrance, along with removal of on-street parking on the south side of Delaware Avenue to accommodate the additional lane. Again, a scaled figure is desired to show the feasibility of this improvement. This intersection may be better suited to a lane-shift due to the existing horizontal curves on either side of Frankford Avenue. Realigning the intersection to make a "T" intersection by removing the stub to westbound Frankford Avenue might also be considered. Utilities are still an issue, as shown in Figure 5. The signal support structure, a street light, and fire hydrant are present in this bump-out.



Figure 5: Utilities in the Parking Lane on Delaware Avenue at Frankford Avenue

15. For all scenarios, the lane configuration for the northbound and southbound approaches of Frankford Avenue/site drive shown in TIS Appendix H does not match the Synchro analysis. In addition, the Synchro analysis for existing conditions does not match the existing lane configuration. The existing Frankford Avenue approach includes a left-turn-only lane and a shared through/right-turn lane. Appendix H shows that geometry, plus a shared left/through lane and a right-turn-only lane on the casino approach. The Synchro analysis for all scenarios shows a left-turn-only and a shared left/right for the Frankford Avenue approach, and a left/right shared and right-turn-only lane on the casino approach under build scenarios. No through movements are shown in the Synchro analysis. When analyzed correctly, this intersection may require additional mitigation measures.
16. The queue lengths are not shown on the Synchro output. Therefore, the turn lane lengths and queue storage could not be verified for any of the scenarios.
17. Wayfinding and traffic restriction signage: locations of signs are shown, but a plan for what each sign would say is not provided. More information is desired to review the appropriateness of these signs. Also, no signs are shown in the vicinity of Richmond Street/Cumberland Street, where casino patrons arriving from the south or departing to the south must make a circuitous path through local streets.

These signs may be temporary in nature due to the planned Girard Avenue interchange improvements, but they will be necessary for the Interim Casino opening.

Other Comments

18. There is no discussion of crash data or other safety analysis at the study intersections.
19. A business currently has access on Shackamaxon Street south of Delaware Avenue. That leg of Shackamaxon Street currently allows two-way traffic for full access to that business. Maintenance of access to the property should be considered with the Shackamaxon Street modifications. Figure 6 shows a photo of that existing business.



Figure 6: An Existing Business with Access to Shackamaxon Street South of Delaware Avenue

20. The impacts of the recommended traffic calming measures should be discussed with emergency responders to assess the impact on their vehicle access.

CONCLUSIONS

A detailed review of the Traffic Impact Study for the Sugarhouse Casino site at Delaware Avenue and Frankford Avenue - Shackamaxon Street was conducted. The latest report (dated October 13, 2006) is more complete than the previously submitted report, but additional information is required to show that traffic in the area will not be disrupted by the addition of the casino site.

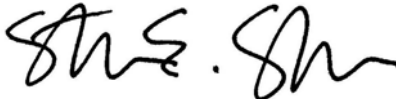
The primary concerns that remain include the scope of intersections included in the analysis (not all signalized intersections between the casino site and interstate access were included in the study) and the feasibility of the recommended improvements (dual-left-turn lanes accomplished by shifting through traffic in the opposite direction). An error in the capacity analysis of one of the primary intersections (Delaware Avenue and Frankford Avenue) may lead to unresolved traffic issues at that intersection. Wayfinding instructions are inadequate between the interstate and casino for certain movements under existing conditions.

Additionally, as the plans are further refined and developed, the designers should:

- Review recent traffic accident statistics to determine the need for any safety measures.
- Be prepared to making operational adjustments to adapt to changing conditions.
- Resolve geometric design details.
- Initiate early coordination with utility agencies and companies regarding relocation needs associated with street and intersection improvements.
- Integrate public bus operations and stops with the roadway and site design.
- Ensure that vehicles entering the parking garage will not backup into public streets due to internal congestion.
- Develop a comprehensive signage system in coordination with other nearby destinations.
- Ensure compliance with all ADA requirements throughout the improvement areas.

This summarizes our comments for the detailed review of the Sugarhouse Traffic Impact Study. We will be happy to further discuss any of these issues with you or you staff, or meet to clarify or elaborate on any of our findings. Please let me know if we can be of further assistance.

Very truly yours,



Stephen E. Cunningham, P.E.
Project Manager

SEC/jp

cc: Paul Resch, Acting Secretary, Pennsylvania Gaming Control Board
Devang Patel, P.E., Pennsylvania Department of Transportation
Richard Sesny, Pennsylvania Department of Transportation
EK Project Team

