



HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

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To: Ms. Pooja Nagrath, David J. Powers & Associates, Inc.

From: Ollie Zhou
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Subject: Supplemental Analysis for the Proposed Avenues School in San Jose, California

Hexagon Transportation Consultants, Inc. has completed a supplemental analysis for the proposed Avenues School in San Jose, California. We understand the Avenues School will be built in phases. Phase 1A would accommodate approximately 150 students and 60 staff. This analysis studies the proposed vehicle operations of Phase 1A of the Avenues School development.

Site Access

Site access to the project would be provided via a right-in-right-out driveway on Parkmoor Avenue and a right-out only driveway on Meridian Avenue. Parents and staff would all access the project site via the Parkmoor Avenue driveway. Staff or parents who park in the parking lot would exit the site via the driveway on Parkmoor Avenue. The majority of parents who access the drop-off/pick-up area would exit the site via the Meridian Avenue driveway. There would be no collapsible bollards within the public right-of-way. To ensure that vehicles do not turn left into the project site from eastbound Parkmoor Avenue, Hexagon recommends that the school clearly communicates the expectation with parents and enforces it by having a staff member present at the driveway. The fire access lane would be coned off during drop-off/pick-up periods and would be open for the rest of the day. A security gate would be located at the driveway exit on Meridian Avenue. The gate would remain open during peak hours of operation. The circulation/operation plan is shown on Figure 1.

Phase 1A Trip Estimates

Trip Generation

Hexagon assumed that all 150 students are enrolled in Grades 6-8, which has the highest trip generation rates, representing a conservative analysis. Trips generated by students during the AM peak hour were estimated using rates published in the ITE *Trip Generation, 10th Edition* for Land Use Code 534, Private School (K-8). During the PM peak hour, students in grades 6-8 are all expected to leave between 4:00 PM and 5:30 PM. Therefore, the AM rate was divided by 1.5 hours to estimate the rate for the peak PM hour.

Trips generated by staff were assumed as one trip per staff member and that 60% of all staff will arrive within the AM peak hour and 30% of all staff will leave during the PM peak hour.

The project would generate 195 trips (124 in and 72 out) during the AM peak period and 125 trips (49 in and 76 out) during the PM peak period (see Table 1).



Figure 1
Phase 1A Circulation/Operation Plan

Trip Distribution and Assignment

The trip distribution patterns used for the *Avenues the World School Draft Traffic Analysis* were used for the supplemental analysis. Three separate trip distribution patterns were used for the project: (1) school trips by non-working parents and staff (same for AM and PM), (2) AM school trips by working parents, and (3) PM school trips by working parents. It was assumed that 80% of all student trips are made by working parents and 20% are made by non-working parents.

The peak-hour trips generated by the project were assigned to the two project driveways and the left-turn pocket on Meridian Avenue north of the exit driveway in accordance with the project trip distribution patterns. The project trip assignment was based on driveway assumptions and are discussed below:

- It was assumed that all student and staff trips will enter the site by turning right from westbound Parkmoor Avenue.
- It was assumed that all student trips will exit the site by turning right onto northbound Meridian Avenue.
- It was assumed that all staff trips will exit the site by turning right onto westbound Parkmoor Avenue.

Table 1
Phase 1A Trip Generation Estimates

Phase 1A Trip Generation Estimates										
Land Use	Size	Unit	AM Peak Hour				PM Peak Hour			
			Rate	Trips			Rate	Trips		
				In	Out	Total		In	Out	Total
<u>Phase 1A Attendance</u>										
Grade 6-8 Program ¹	150	students	1.06	88	72	159	0.71	49	58	107
Staff ²	60	staff	0.60	36	0	36	0.30	0	18	18
Gross Phase 1A Trip Generation				124	72	195		49	76	125
<u>Notes:</u>										
1. Grade 6-8 program AM peak hour trip generation referenced rates published in the ITE <i>Trip Generation, 10th Edition</i> for Land Use Code 534, Private School (K-8), average rates expressed in trips per student. Rates for the PM peak hour for Grade 6-8 were based on the AM rate, divided by 1.5 hours of dismissal period.										
2. It is assumed that 60% of all staff will arrive within the AM peak hour and 30% of all staff will leave during the PM peak hour.										

Vehicle Queuing

It is assumed that 75% of students would be dropped off within the last 15 minutes before school starts. Therefore, 18 vehicles would be expected to exit the site during the AM peak five minutes of drop-off operations. With the relatively low conflicting volume on northbound Meridian Avenue, there is estimated to be sufficient capacity during the peak 5-minute period for all 18 vehicles to exit. Assuming 25 feet per vehicle queued, the estimated maximum queue length on site would be 450 feet. The project proposes more than 1,000 feet of vehicle storage on site. Queues on-site are not expected to extend back onto the public right of way.

During the PM peak hour, it is estimated that 58 parent trips would be exiting the site onto Meridian Avenue. There would be fewer conflicting vehicles on northbound Meridian Avenue, and with a lower exit demand than during the AM peak hour, PM on-site queues are also not expected to extend back onto the public right of way. It is estimated that 18 staff trips would be exiting the driveway on Parkmoor Avenue, which equates to approximately one trip every three minutes. Therefore, no queuing issues would be anticipated during the PM peak hour.

U-Turn Analysis on Meridian Avenue

All vehicles must exit the school by turning right onto northbound Meridian Avenue. Therefore, it is expected that some vehicles will perform a U-turn on Meridian Avenue after exiting the project driveway. To ensure vehicle queues do not extend into the roadway, Hexagon conducted a queuing analysis for the left-turn pocket on Meridian Avenue just north of the exit driveway (see Table 2). Vehicle queues were estimated using a Poisson probability distribution, which estimates the probability of “n” vehicles for a vehicle movement using the following formula:

$$P(x=n) = \frac{\lambda^n e^{-(\lambda)}}{n!}$$

Where:

$P(x=n)$ = probability of “n” vehicles in queue per lane

n = number of vehicles in the queue per lane

λ = average number of vehicles in the queue per lane (vehicles per hour per lane/signal cycles per hour)

The basis of the analysis is as follows: (1) the Poisson probability distribution is used to estimate the 95th percentile maximum number of queued vehicles per signal cycle for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement.

Vehicle queuing was studied for the peak 15 minutes. Based on the queuing analysis, the available storage at the left-turn pocket would be able to accommodate the expected vehicle queues during Phase 1A.

Table 2
Meridian Avenue U-Turn Queuing Analysis

Analysis Scenario	Meridian Avenue Turn Pocket	
	NBL	
	AM	PM
Phase 1A		
Delay (sec)	11.7	15.7
Volume ¹	81	67
Number of lanes	1	1
Volume (vphpl)	81	67
Avg. Queue (veh/ln)	2	2
Avg. Queue ² (ft/ln)	50	50
95th %. Queue (veh/ln)	5	5
95th %. Queue ² (ft/ln)	125	125
Storage (ft/ln)	190	190
Adequate (Y/N)	Y	Y
Notes: NBL = northbound left ¹ Volume for the peak 15 minute period ² Assumes 25 feet per vehicle queued.		

On-Site Circulation

The ingress driveway on Parkmoor Avenue would provide access to a parking lot with about 53 faculty/visitor parking spaces and about 30 student parking spaces. In addition, 5 ADA parking spaces would be provided near the school entrance. The one-way parking lot would provide a 24-foot drive aisle and 90-degree parking spaces.

Vehicles would travel in a one-way direction through the project site. The project proposes an 11-foot wide loading/unloading lane and a 10-foot wide travel lane along the building frontage. Vehicles would enter the drop-off location west of the parking lot.

Drop-off/Pick-up Operations

The project proposes two drop-off locations for students. The primary drop-off location would be at the entrance on the west side of the school just south of the exit driveway. The secondary drop-off location would be on the south side of the school. As proposed, parents would have a drop-off span of approximately 30 minutes and a pick-up time of 1.5 hours.

Hexagon recommends that one faculty member be assigned to each drop-off location to assist traffic flow and the transportation of students. The faculty member at the secondary drop-off location should keep traffic moving toward the primary drop-off location. When the primary loading zone becomes full, the faculty member would initiate drop-off operations at the secondary location.

Project Start Times

Since there would not be any anticipated queuing issues, staggered start times would not be necessary regarding circulation and vehicle storage.

Construction Operations

Construction traffic circulation/operation plans were not provided. It is assumed that trucks would enter and exit the project site via Harmon Avenue and the fire access lane on Parkmoor Avenue (outside of school drop-off and pick-up periods). Typical activities related to the construction of any development could include lane narrowing and/or lane closures, sidewalk and pedestrian crosswalk closures, and bike lane closures. In the event of any type of closure, clear signage (e.g., closure and detour signs) must be provided to ensure vehicles, pedestrians and bicyclists are able to adequately reach their intended destinations safely. Per City standard practice, the project would be required to submit a construction management plan for City approval that addresses the construction schedule, street closures and/or detours, construction staging areas and parking, and the planned truck routes.

VMT Analysis

The VMT analysis compared the existing VMT to the project generated VMT. The existing employee and proposed student daily trips referenced rates published in the ITE *Trip Generation, 10th Edition* for General Office Building (Land Use 710), Warehousing (Land Use 150), and Private School (K-8) (Land Use 534). The existing employee and proposed staff trip lengths referenced the City of San Jose's Area Employment VMT as discussed in the *Avenues the World School Draft Traffic Analysis*. The proposed student trip lengths referenced Hexagon's distribution model as discussed in the *Avenues School Proposed VMT Analysis Methodology Memo*. The proposed staff daily trips assumed two trips per staff member per day.

The existing per-employee VMT, based on 2,340 daily trips and an average trip length of 12.68 miles per day, is 29,671. The project generated per-student VMT, based on 617 daily trips and an average trip length of 10.46 miles per trip, would be 6,454. The project generated per-staff VMT, based on 120 daily trips and an average trip length of 12.68 miles per day, would be 1,522. Therefore, the total project generated VMT would be 7,976. The net VMT (project generated VMT – existing VMT) would be -21,695.

The project generated VMT would be considerably less than the existing VMT. Therefore, Phase 1A would not result in a significant transportation impact on VMT.

Conclusions

The circulation/operation plan for Phase 1A of the Avenues School development would have adequate site access and on-site circulation. Based on the assumed trip generation and driveway assumptions, queuing issues would not be expected. To ensure that vehicles do not turn left into the project site from eastbound Parkmoor Avenue, Hexagon recommends that the school clearly communicates the expectation with parents and enforces it by having a staff member present at the driveway. Hexagon also recommends that two faculty members assist traffic flow, with one faculty member stationed at each drop-off location. Phase 1A would not result in a significant transportation impact on VMT.