

**Mitchell Park Library and
Community Center
Expansion**

Transportation Impact Analysis

Prepared for
City of Palo Alto

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Project Intersection Analysis

Intersection Level of Service Analysis

The intersection level of service results under project conditions are summarized in Table 7. Measured against the City of Palo Alto level of service standards, all of the signalized study intersections would operate at acceptable levels (LOS D or better). The level of service calculation sheets are included in Appendix C. None of the study intersections would be significantly impacted by the project based on the City's impact criteria.

The unsignalized project driveway intersection is also expected to operate at a good level of service (LOS B).

Table 7
Project Intersection Levels of Service

	Peak Hour	Background		Project			
		Ave. Delay	LOS	Ave. Delay	LOS	Increase	
						Delay	V/C
Signalized							
Middlefield Road and E. Meadow Drive	PM	35.2	D	35.9	D	0.3	0.0
Middlefield Road and Charleston Road	PM	46.4	D	49.0	D	4.8	0.0
Middlefield Road and Mayview Avenue/ Driveway	PM	9.1	A	13.3	B	4.3	0.1
Unsignalized							
Project Driveway and E. Meadow Drive	PM	13.0	B	13.8	B	0.1	0.0

¹ For signalized intersections average stopped delay for all movements is reported.

For unsignalized intersections average control delay for the worst lane group is reported.

Intersection Operations Analysis

In addition to the analysis of the project's conformance with the City's level of service standards, an operations analysis was conducted for the signalized project driveway on Middlefield Road. Currently, the project driveway is located approximately 100 feet south of the signalized intersection at Mayview Avenue. These two closely-spaced intersections operate in effect as a single intersection. The north and south approaches are served in a single phase with permitted left turns from a shared through/left-turn lane. Separate phases are required for the east and west legs due to the offset. The project site plan shows that the project access on Middlefield Road will be realigned to be directly opposite Mayview Avenue. It also shows that the realigned driveway would have the same number of lanes as the current driveway—one lane inbound and one lane outbound.

Due to the increase in traffic generated by the project, the need for exclusive left-turn lanes on Middlefield Road at the project driveway/Mayview Avenue was evaluated. Under project conditions, the northbound and southbound left-turn volumes are estimated to be 91 and 18 vehicles per hour during the PM peak hour, respectively. The projected traffic volumes correspond to an average of between 1 and 2 vehicles per signal cycle for the northbound left turn and less than 1 vehicle per signal cycle for the southbound left turn.

* The operation of the permitted left-turn movements and the effect on through traffic was analyzed using the methodology described in the *2000 Highway Capacity Manual (HCM)*. The analysis shows that both the northbound and southbound approaches would have an average control delay of less than 10 seconds per vehicle, which corresponds to level of service A. The average queue would be about 2.5 vehicles for the northbound approach and 0.5 vehicles for the southbound approach. At a 95 percent confidence level, the maximum back of queue would reach to 5 vehicles for the northbound approach and 2 vehicles for the southbound approach. The analysis results indicate that the current lane configuration on Middlefield Road with shared through/left-turn lane and permitted left turns would operate acceptably under project conditions with only short delays and reasonable queue lengths.

* In actual operation, many vehicles traveling through on Middlefield Road may change lanes, switching from the inner to the outer through lane in order to go around a vehicle that is waiting to turn left. However, even with one through lane blocked by left-turn traffic, the projected traffic volumes are within the capacity of the intersection. Thus, the potential lane changing by through traffic is not expected to cause an unusual safety hazard. Even if traffic volumes on Middlefield Road increase above the projected levels, reducing the number of acceptable gaps for left-turn movements, the projected left-turn volumes are low enough so that all left turns could be accomplished during the clearance intervals. Thus, separate left-turn pockets are not required on Middlefield Road.

The analysis indicates that the driveway would operate acceptably (at LOS C) with only a single lane in each direction. The driveway is estimated to have an average queue of about 4 vehicles and a maximum queue (95th percentile) of about 7 vehicles. While providing multiple outbound lanes would reduce the delay and queue lengths, it would increase the crossing distance for pedestrians. Because the project is expected to attract many children, it is recommended that the project driveway on Middlefield Road have only one lane in each direction. A driveway width of 26-30 feet is recommended.

Signal Warrant Analysis

The peak-hour volumes under project conditions at the unsignalized project driveway on E. Meadow Drive were evaluated to determine if the intersection would warrant signalization. The project volumes do not satisfy the peak-hour warrant. Therefore, the installation of a traffic signal at the unsignalized project driveway intersection is not justified under project conditions. The signal warrant sheet is contained in Appendix D.

Project Roadway Analysis

The TIRE analysis results for roadway segments under project conditions are summarized in Table 8. Measured against the City of Palo Alto impact criteria, none of the study roadway segments would be significantly impacted by the project. All of the study roadway segments would operate at the same TIRE Index at which they are operating under existing conditions. The estimated increase in roadway traffic volumes caused by the project will not be noticeable to the residents (change in TIRE Index of less than 0.1).