

October 22, 2019

Palo Alto Fire Department

XCAP Memo

The Palo Alto Fire Department (PAFD) was asked to identify potential impacts on operations as it relates to the Alma/Churchill street grade separation proposal. It is our goal to strategize so we can maintain our response standard of arriving at an emergency in eight minutes or less, ninety percent of the time. Road access is essential when it comes to responding to the scene of an emergency. Ideally, the preference is to have access to all roads to get emergency resources to the incident for the quickest possible mitigation of the incident. However, access to all streets is regularly not available due to temporary closures e.g., construction projects or special events. In these cases, emergency responders must navigate around the obstacles but ultimately get to the destination with some delay that may or may not meet our response time standard.

When PAFD is tasked with modifying the operational deployment model, we have worked with a company that uses a modeling tool that can model and test emergency dispatch rules, department configuration, and deployment, perform retrospective and prospective analysis, and statistical calculations.

For this exercise, the vendor performed an analysis of input data provided by PAFD with an assessment of any potential adverse impacts.

All models included station locations, unit roles, personnel qualifications, overlay polygons (mapping) incident classifications dispatch policies, and other attributes developed in prior studies. All models dispatched based on simulated Automatic Vehicle Location (AVL) analysis, sending the closest appropriate unit to every incident.

For historical modeling, roughly five years of incident history (March 18, 2014, through January 21, 2019) were simulated against the current "base" model using Alma/Churchill intersection opened and closed. 40,611 events were simulated in both cases. Of these events, 122 (0.35) were found to have response differences of 0.01 minutes (approximately 2/3 of a second).

Three models were used to test the effects of the intersection closure:

- If only the closest engine was available
- If only the 2nd closest engine was available
- If both the closest and 2nd closest engines were available

The impact of the potential closure is predicted to represent significant delays (30-90 seconds) within a narrow geographic area, for less than 0.5% of PAFD's responses. The number of incidents affected by the closure is predicted to be extremely low, as a proportion of overall incident volume.

Variability across methods was significant, but all suggested that the number of incidents affected would be minimal, though delays in individual cases might be moderately substantial.

Simulation Method	Predicted % of Incidents Affected
40,668 Historical incidents, 2015-2018	0.30%
29,278 Addresses of record, PAF3/PAF6 contingent availability	0.26%
29,278 Addresses of record, PAF3/PAF6 both available	0.05%

In the cases where incident responses are predicted to be affected by the closure, delay effects vary by scenario:

Response Scenario	Predicted Typical Range of Delays
PAF3 SW of Alma/Churchill	0:58-1:28
PAF6 NE of Alma/Churchill	0:30-0:47

Conclusion: The data available clearly indicate that only a very small number of incidents (probably fewer than 0.5%, city-wide) will be affected by the closure. Response time delays for these few incidents may be on the order of a minute or more.