

NOVEMBER 4, 2019

PROJECT DESCRIPTION

City of Palo Alto

New Public Safety Building Communications Tower

Prepared for

City of Palo Alto Architectural Review Board (ARB)

Prepared by

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RossDrulisCusenbery Architecture, Inc.



Palo Alto Public Safety Building, Palo Alto, CA

Communications Tower Description

OVERVIEW

The City of Palo Alto is constructing a new Public Safety Building (PSB) located on the current City-owned parking lot C-6 at 250 Sherman Avenue, in the California Avenue business district of Palo Alto. The new approximately 48,917 SF, multi-story facility constructed over two levels of secure basement parking, will house the City of Palo Alto Police Department, Fire Administration, Office of Emergency Services, 911 Dispatch Center and the City's Emergency Operations Center (EOC). The facility will be designed as an essential facility capable to operate on a standalone, 24/7 basis in the event of a major earthquake or disaster. The Construction Document phase will be completed and issued for Building Permit in December of 2019. Start of construction is scheduled for Fall of 2020. The project is currently scheduled for completion before the end of 2022. RossDrulisCusenbery Architecture, Inc. (RDC) is the project architect. Winbourne Consulting LLC, a specialist in the design of emergency communications systems was engaged by RDC to provide emergency radio system engineering services for the project. Winbourne Consulting LLC with RDC prepared the following communications tower description.

The new facility will include a 135' communications tower when measured from the ground plane to top of tower. The following provides a general description of the communications tower and its functionality.

FACILITY COMMUNICATION SYSTEM REQUIREMENTS

The new PSB will incorporate a variety of sophisticated emergency communication and data systems. The communications requirements of the facility will be supported by a variety of antennas mounted on an 80' unguided, monopole type tower attached to a surface mounted steel armature on the building's exterior wall (See Figures 1 & 2 and attached ARB Submittal Drawings). The antennas provide mission-critical voice and data communications to the city's first responders and emergency management personnel as well as meeting the city's need to integrate with other public safety agencies in the Silicon Valley Regional Interoperability Authority (SVRIA) area.

The SVRIA microwave network is the primary backhaul for radio communications and provides connectivity to the city's computer aided dispatch system (CAD) that is shared with Mountain View and Los Altos. The tower equipment also supports the 9-1-1 system and redundant radio communications.

The following description represents the currently estimated antenna loading scenario; it is possible that some of these antennas will not be required when the building is completed. It is also possible that additional antennas or equipment could be added in the future. The tower manufacturer

associated with the winning bidder may also propose minor deviations from the initial design based on their preferences, for example, proposing a round design vs. a polygonal one. The current conceptual design diagrams depict a round tower section.

TOWER HEIGHT & LOCATION

The communications tower's base is attached to a building mounted steel armature exterior to the building at 55' above ground, which results in the top of the monopole tower being at 135' (Figure 3) above the ground plane. This height is required to ensure the signal path of the microwave antennas are not attenuated to foliage, buildings, or other obstructions, and was determined by an engineering analysis.

Originally the building's monopole mounting armature was planned to be internal to the brick vertical tower chase on the building. Following additional study, it became apparent the amount of deflection estimated to be experienced from wind or seismic movements at the tower roof plane would be excessive and require a custom seismic expansion joint which would be problematic to design, waterproof and warranty. Consequently, the monopole mounting structure was shifted from the interior of the vertical brick tower to the exterior of the building similar to early images of the tower design presented to the City of Palo Alto. In so doing, the elevation of the brick tower structure facing Park Blvd was reduced in width by approximately 50% from that depicted in the prior ARB submittals. The overall brick tower height remains unchanged. The exterior surface mounted location avoids the expansion and deflection issues at the roof/monopole interface.

MATERIAL & FINISH

The tower design is based on either a round section or an 18-sided polygonal, slightly tapered pole constructed of galvanized, grade A585-55 steel. The diameter of the round tower at the mounting flange is approximately 27". The diameter of the mounting flange will be approximately 4' allowing for bolted connections between the monopole base the building armature. According to the City, similar communication towers in Los Altos and Mountain View have larger diameter towers. Another rooftop communication tower array exists on the neighboring County courthouse.

Rungs will be installed on the side to provide access for maintenance. The 80' tower above the roof line will have a galvanized metal finish to provide the best lifespan and minimize maintenance requirements. Below the roof line connection flange, the supporting pole and its attachments to the building will match the galvanized tower finish. Alternately the entire tower assembly could be painted to match the dark steel trim color of the Sherman Street canopy steel if a long-term durable finish was specified. The color of the communications tower will be discussed with the ARB. Dishes and antennae at the top of the tower will have typical manufacturer finishes that range from bare aluminum to protective coatings with colors that range from gray to white.

LIGHTNING PROTECTION

The tower includes a lightning protection system. A 3/4" diameter, approximately 5' lightning rod extends beyond the top of the tower and is attached to the side of the tower.

MICROWAVE ANTENNAS

Below the lightning rod and the top of tower are two microwave dish antennas. These antennas provide line-of-sight, point-to-point, communications supporting CAD among the Emergency Communication Centers in the area as well as radio backhaul for the regional radio system. The microwave network is also a critical backup communications path to fiber optic links that are used for the 9-1-1 system.

Each of the dish antennas are approximately 3' in diameter. These appear at different heights on the tower diagram and are pointed in different directions to make the point-to-point connections to other facilities and to maintain the integrity of the regional microwave ring. The tower diagram indicates a third future micro wave dish antenna that may be added in the future. The exact requirements or need for this future dish is not known at this time. The microwave antennas included on the monopole tower are:

- PAPSB to Mountain View 9-1-1 Center, 134' above ground, azimuth = 123 degrees
- PAPSB to the Palo Alto Civic Center, 126' above ground, azimuth = 321 degrees
- Future Microwave dish antenna, height and azimuth T.B.D.

The dish antennas will be spaced apart to allow a future third dish (should it be required) to target a new station in the foothills that is still in the planning stages.

WHIP ANTENNAS

Below the microwave dishes, mounted on a tower crossarm are two whip antennas. These provide voice communications to first responders on both UHF and VHR radio systems. Each antenna is approximately 20' in height with a 2-3/4 "diameter. The top of these whip antennas must be lower than the top of the lightning rod. Approximately 10 - 12 other additional whip antennas will be roof mounted in the center of the PSB roof. It is unlikely these additional roof mounted whip antennas will be visible from the street.

PANEL ANTENNAS

Just below the top two microwave dishes are approximately six small panel antennas, arrayed to provide 360 degrees of coverage. These antennas provide communications to the City's mobile emergency operations center (MEOC) vehicle. This ensures that the MEOC has access to the necessary data communications when it is deployed in response to disasters or other major emergencies. Each panel measures approximately 14" w x 9"h x 4" d.

CABLING

All cabling to the antennas will be run internal to the monopole, exiting through the open center of the ground plate, and will home run to equipment rooms inside the PSB.

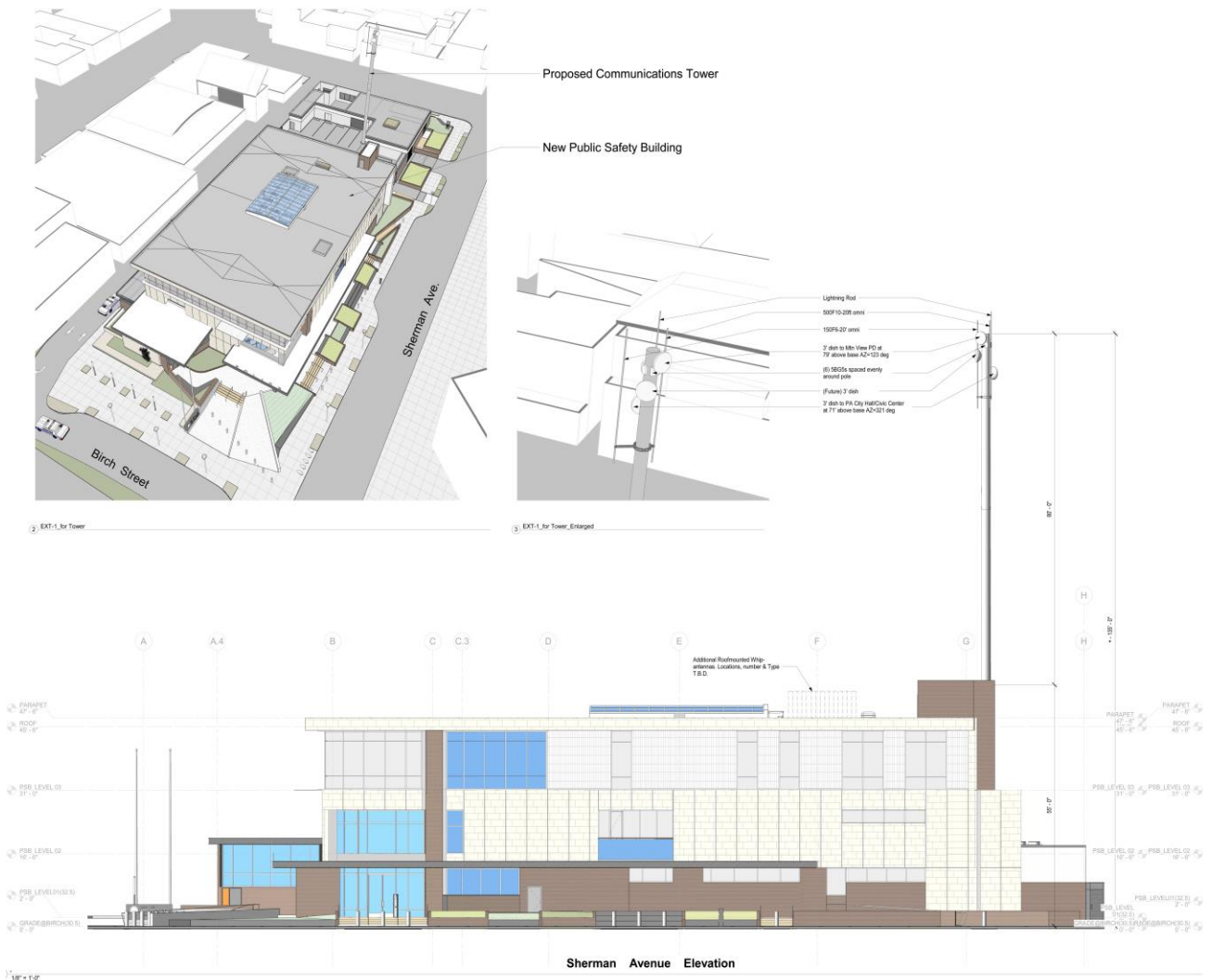


Figure 1. Sherman Avenue Elevation

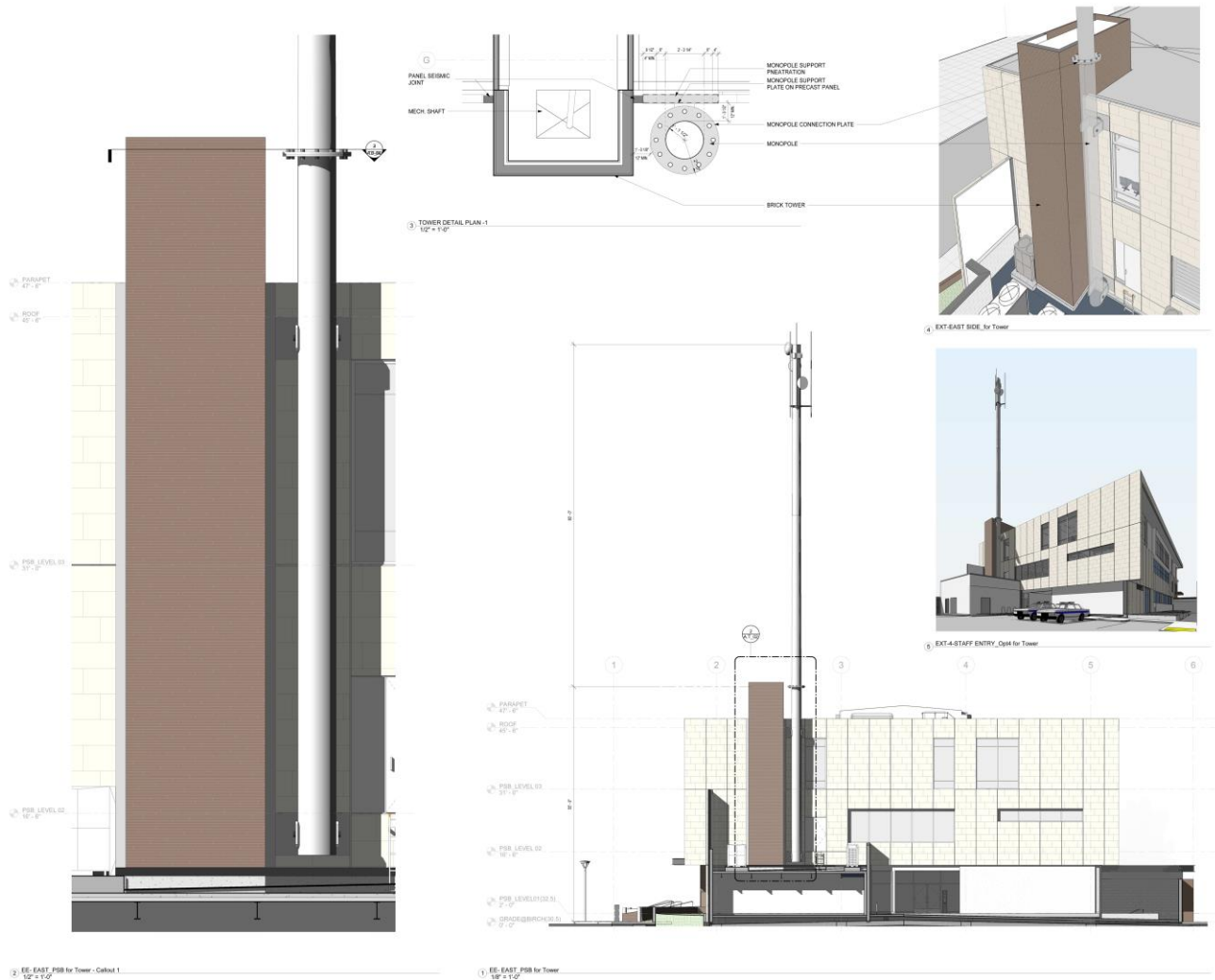


Figure 2. Additional Tower Views

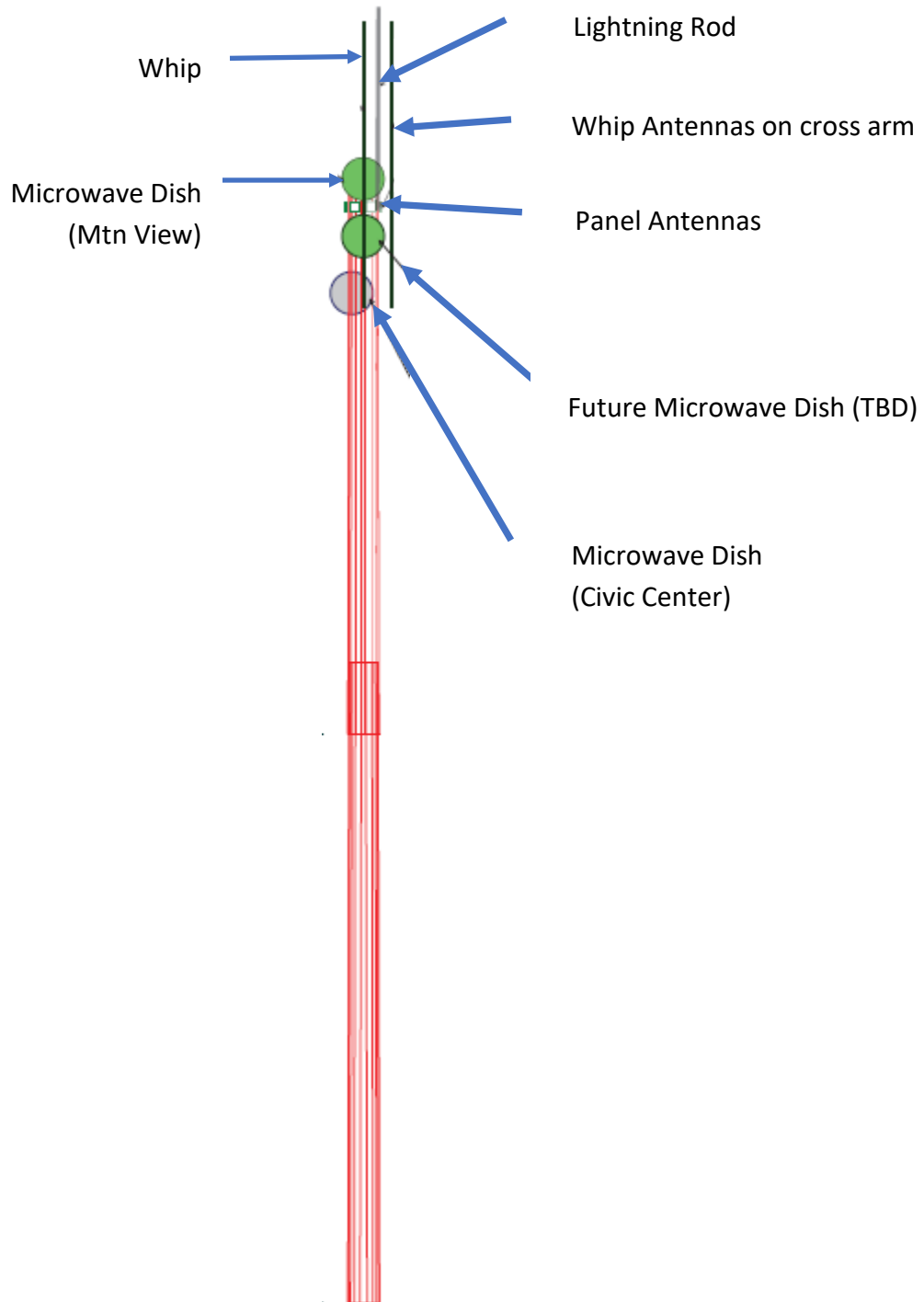


Figure 3. 80' PAPS B Monopole attached to new PSB at 55' above ground plane. Total height of building and monopole tower is 135'.