



Meeting with neighbors at the Forest Knolls block party. See story on page 2.

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Neighbors Welcome New Sutro Driveway

This is wonderful, it's beautiful," said Lisa Gautier of St. Germain Avenue as she walked her dog Tykhe, up Sutro Tower's new driveway. "It was so full of potholes and gravelly before."

The new driveway is 340 feet long, with 613 feet of curb, from Sutro Tower's security gate to the property line at Palo Alto Avenue – the portion used both as an access road to Sutro Tower and as a walkway for hikers, bicyclists and dog owners heading to and from Summit Reservoir. The contractor, Tim Wadleigh of the Wadleigh Group, also laid 142 feet of new concrete and gutter within the fenced area. In all, crews laid 750 tons of base rock and asphalt over three weeks.

Permits for the driveway improvements were granted by the San Francisco Planning Department and approved by the



Preparing the driveway for new pavement; Lisa Gautier enjoying the results

Avanzada Street. Repairs would be done by the Department of Public Works, which is responsible for city streets, or the Recreation and Parks Department, which owns the land on both sides of the street. "Maybe people are going to start paving it themselves," Gautier said.



Shane Best unclaps the lens cover and changes a light bulb 560 feet up

Changing the Light Bulbs on Sutro Tower

So, how many workers does it take to change a light bulb on Sutro Tower? The answer is 1, but he's not just screwing a new bulb into a socket.

The tower has 27 red lights, per Federal Aviation Administration safety regulations, to ensure it is visible to pilots. The light bulbs aren't really red -- a red plastic lens, usually 18 inches high and 15 inches in diameter, goes over a bulb and the wires, resistors, and other electronics needed so the lights turn on and off automatically.

"Actually, it's usually not the bulb itself that needs changing, it's the wiring or other things that fail," said Shane Best, Sutro Tower's safety and maintenance manager. "The constant vibration from the wind wears and frays even the best materials." Best should know – he and safety engineer Dave Gaddy are the ones who literally keep Sutro's lights on.

"We climb on the outside of the tower to reach the light bulbs," Best explained. "We wear a safety harness, with lifelines, carabiners, lanyards, rope grabs, and tool belts. It weighs about 40 pounds, plus your tools. Pre-planning, education, inspecting your equipment, and keeping your first and second connections – that's how we stay safe while we're working up there." Sutro Tower work practices follow the standards of OSHA, Cal-OSHA, the National Association of Tower Erectors and the American National Standards Institute.

"The toughest lights to change are the ones at the very top, because you're tied in at your feet instead of from above," said Best, who has worked on towers around the world for 20 years.

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Helping the Community and S.F. Schools

Whether it's handing out souvenirs at a community party or teaching young people about antennas, Sutro Tower representatives are regular sponsors and participants at neighborhood events.

For example, this spring Burton High School teacher Amber Zertuche brought her class of physics and engineering seniors to Sutro Tower for a field trip, as the tower became a real-life science classroom demonstrating wave lengths and other principles of physics that the class was studying. A few weeks later, dozens of kindergarten through fifth grade students took turns trying on the safety harness used by workers who maintain Sutro Tower hundreds of feet in the air, at Clarendon School's annual Science Day.

And households throughout the area now have Sutro Tower flashlights, pens and pet dishes – souvenirs given away at the block parties of the Forest Knolls Neighborhood Organization and the Midtown Terrace Neighborhood Association, as well as at an informal potluck for dog owners at Sutro Reservoir. “We are proud to sponsor community events and to join our neighbors at these gatherings,” said Sutro Tower vice president Eric Dausman. “They're fun, it's great to meet our neighbors and answer any questions people may have, and the food is always good!”

Burton High School physics students on a field trip to Sutro Tower



Fog Experiments at Sutro Tower Expand

The fog collection research project at Sutro Tower expanded this spring, with new fog catchers and a variety of special meshes installed so researchers can compare their efficiencies. There are now four fog catchers from the nonprofit FogQuest, and a large fog-to-water system called CloudFisher, developed by the firm Aqualonis for the nonprofit German Water Foundation.



The German Water Foundation's CloudFisher fog collector and a new FogQuest fog catcher have different meshes

Both FogQuest and the German Water Foundation have installations capturing water from fog in arid yet cloudy regions of a dozen developing countries, including Chile, Colombia, Ethiopia, Morocco, Namibia, Nepal, and Yemen. For example, a system of 35 large fog collectors at the village of Tojquia in the mountains of western Guatemala produces an average of 200 liters of water a day during the winter dry season. Both nonprofits are seeking to capture more water from each milligram of fog by incorporating the findings of new research.

The experimental fog catchers at Sutro Tower are sponsored by Hangar 1, the Alameda distillery, which also is making sizeable donations to both FogQuest and the German Water Foundation, and is supporting research by Professor Daniel Fernandez at Cal State Monterey Bay. His work, in conjunction with studies by the U.S. Geological Survey's Pacific Coast Fog Project, is making the Bay Area the hub of fog-to-water development, according to Chris Fogliatti, a

volunteer for both of the nonprofits. “We're uniquely situated: lots of fog and lots of researchers in one place,” he said.

Hangar 1 will use the water captured by the experimental fog catchers at Sutro Tower and elsewhere to make another batch of Fog Point vodka, which it created last year from the first 300 gallons of water obtained from FogQuest's fog catchers.

“We're thrilled to support fog-to-water experiments in the Bay Area, and then to be able to use the captured water right here to make a fun local product,” said Caley Shoemaker, Hangar 1's head distiller. “What the researchers learn here helps FogQuest and the German Water Foundation meet the water needs of peoples in arid areas throughout the world, and could help farmers in California. We are grateful for the cooperation of Sutro Tower that makes this project possible.”

The fog collectors at Sutro Tower produce up to 200 gallons of water a week under the typical San Francisco spring-summer conditions of morning fog and no rain. Precise equipment from the U.S. Geological Survey is micro-measuring the different sizes of moisture droplets from the different meshes on the various collectors at Sutro Tower. A software engineer, Anut Chaudhari, and a NASA researcher, are using data from the Sutro Tower fog collectors to develop a model for optimal placement of collectors in future installations.

FCC Auction Means Extensive Work at Sutro Tower

The Federal Communications Commission's complex auction of broadcast spectrum ended this spring with 10 Bay Area television stations selling their broadcast frequencies to wireless providers. The stations all have indicated that they will remain on the air by making agreements with other stations to broadcast on other frequencies or to share frequencies – which means a lot of federally-mandated work to replace antennas at Sutro Tower in coming years.

TV broadcasters, even those who did not participate in the auction, must “repack” their transmission frequencies into a smaller overall band of frequencies under the FCC's rules. No stations will be able to broadcast on a frequency above channel 37. This is possible because TV stations switched to all-digital signals in 2009, so

broadcasters need less spectrum than they did in pre-digital days. Thus some spectrum space previously allotted to broadcasters could now be used by wireless companies, which prompted Congress to authorize the auction.

Charles Meisch, spokesperson for the FCC in Washington, explained that “repacking” television signals with new channel assignments “preserves a robust broadcast TV industry and makes valuable low-band airwaves available for wireless mobile use, easing congestion on wireless networks and laying the groundwork

for fifth generation (5G) wireless services and applications” as mobile data use grows.

Repacking will be largely invisible to viewers. But the technical expenses involved in repacking Bay Area stations so they can broadcast on their new frequencies, in particular changing antennas on Sutro Tower, will be tens of millions of dollars. The changes at Sutro Tower, deemed “extremely complex” by the FCC, will occur at the end of the FCC's nationwide transition – probably in 2020.

“Broadcasters are informing the FCC what they need to do,” said Eric Dausman, chief operating officer for Sutro Tower Inc. “Once that is finalized, we'll work with the City Planning Department so repacking can be done within the FCC's mandated schedule.”

In all, 50 wireless companies spent \$19.8 billion for 70 megahertz of spectrum nationwide. T-Mobile bought 45 percent of the available spectrum, spending nearly \$8 billion. Dish Network spent \$6.2 billion, Comcast \$1.7 billion, and AT&T \$910 million, according to FCC data. Sprint and Verizon did not participate. Of the \$19.8 billion received, \$10 billion went to the 175 TV stations which gave up spectrum, \$1.8 billion was set aside to pay the costs of repacking in different markets, \$7.3 billion goes to the U.S. Treasury, and the rest covered the FCC's costs and certain credits.

Here are the Bay Area channels that sold their frequencies and will move their broadcasting to new frequencies. Four have antennas at Sutro Tower.

CALL SIGN	CHANNEL
KRON	4
KOFY	20
KRCB	22
KTSF	26
KEXT	27
KMTP	32
KTNC	42
KEMO	50
KQEH	54
KTLN	68