

VISION ZERO SUCCESS STORY — INFRASTRUCTURE

Improved Nighttime Lighting — Fremont, California

Key Successes

Fremont's Vision Zero improvements, which included street light LED conversion, yielded the following results:

Fatal and Serious Injury Crashes

Before (2013-2015) = 140

After (2016-2018) = 79

Vehicular Crashes

Before (2013-2015) = 57

After (2016-2018) = 39

Pedestrian/ Bicycle Crashes

Before (2013-2015) = 47

After (2016-2018) = 29

*The reduction in crashes is due to various safety countermeasures; better lighting is just one component. Other countermeasures included pedestrian countdown signals, neighborhood speed lumps, lowered speed limits on several streets, increased enforcement, lane narrowing and buffered bike lanes, and community engagement programs.

Background

The City of Fremont Vision Zero 2020 Status Report and Action Plan¹, published in March 2016, identified that approximately 50 percent of the City's fatal and serious injury collisions occurred in the early or late evening, with the higher percentage of crashes occurring in the early evening period between 6:00 p.m. and 10:00 p.m. In response to this data, the City accelerated an environmental sustainability initiative to upgrade streetlighting to achieve more immediate safety benefits. Under this new initiative, the City replaced and retrofitted every existing streetlight with energy efficient light-emitting diode (LED) light fixtures. The LED fixtures, compared to previous high-pressure sodium lighting, improved nighttime visibility through better color rendering, provided more uniform lighting distributions, allowed for much greater flexibility regarding overall lighting output and control, and eliminated many dark areas between poles. Since nighttime driving inherently involves a low-light vision environment, the improved color contrast by LED lighting will provide better detection of pedestrians and roadside fixed objects.

Implementation

The City converted approximately 16,000 streetlights from the standard "yellow" sodium vapor lights to brighter "white" LED lights. The new streetlight fixtures are typically half the wattage of the old fixtures, and more than double the rated lumen output (the measure of the total amount of visible light to the human eye).

¹ <https://fremont.gov/2594/Fremont-Vision-Zero-2020>





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Figure 1. Graphic. Overhead view of intersection in Fremont with previously installed sodium vapor lights.

Figure 2. Graphic. Aerial view of intersection in Fremont with brighter LED lighting.

The new fixtures provide better color rendering compared to the old fixtures. LED lights also require less maintenance with lights lasting up to 5 times longer (10 years vs. 2 years). In residential areas, to avoid disturbing residents, the City installed a slightly warmer tone of white light with a color temperature of 3000K, consistent with the American Medical Association’s recommendation of a low-intensity lamp that minimizes short-wave blue light². This compares to the 4000K neutral-white color temperature for fixtures on higher-traffic arterial roadways and in other high traffic areas.

The City previously converted streetlights through energy efficiency block grants. The public responded positively to the conversions and expressed a greater sense of safety from the increased illumination.

Given the high percentage of crashes in the early evening period, the City’s Public Works department decided to rapidly convert the rest of the streetlights over several months in 2016 rather than multiple phases over several years by issuing bonds.

² <https://www.ama-assn.org/press-center/press-releases/ama-adopts-guidance-reduce-harm-high-intensity-street-lights>

Outcomes

The City assessed the impact of the upgraded facilities by comparing crash data three years prior to implementation (2013-2015) and three years directly following the completion of the upgrades (2016-2018). The City determined that fatal and serious injury crashes in dark conditions declined by approximately 23 percent.

Funding

The streetlight upgrades were part of a larger project that also included other energy and water efficiency improvements. The total project cost \$9.1 million, and the streetlight portion of the project cost approximately \$6.5 million. Prior to the lighting upgrades, the City spent \$1.2 million annually on the streetlight utility bill. Following the lighting upgrades, the City’s streetlight utility bill was nearly cut in half.

The City financed the project using bond issuance, and with the utility and maintenance cost savings, the City anticipates paying off the bonds within 10 years.

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