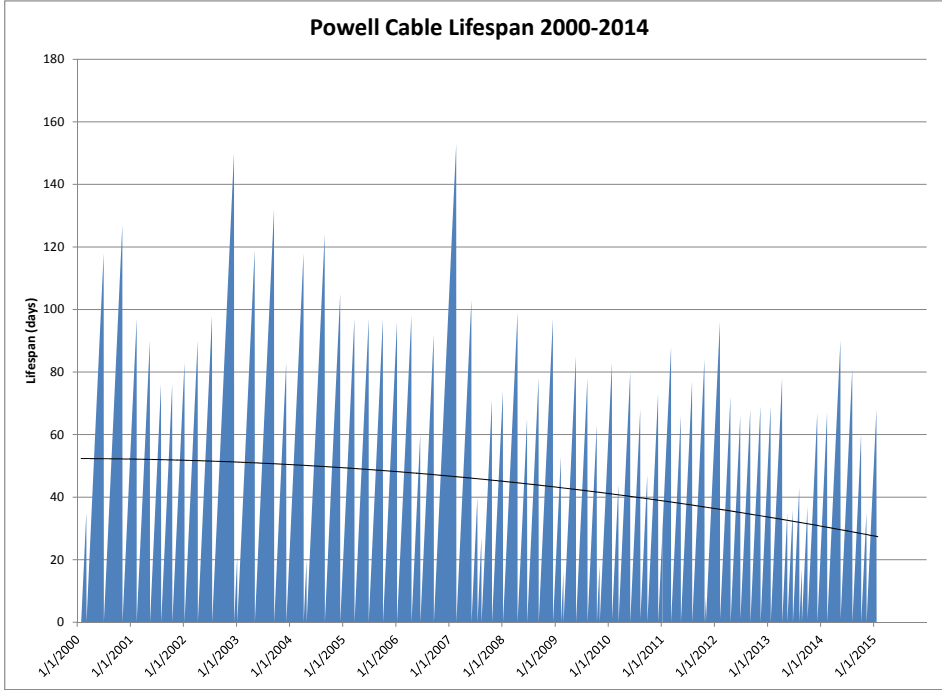


Powell Safety Pilot: Detailed Results



Cable Car Safety

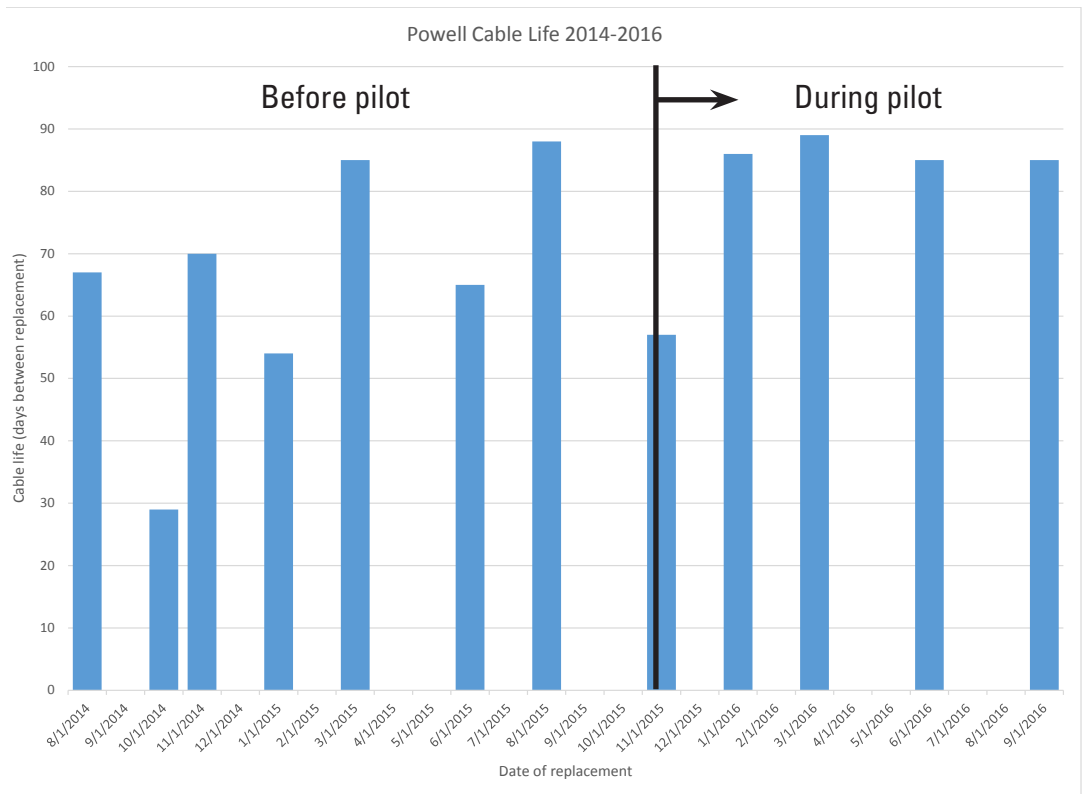
The main focus of the safety pilot was to reverse the trend of increasing wear and tear on the Powell cable caused by the cable car having to stop and start in traffic. As congestion has increased in the Union Square area, damage to the cable occurred more frequently and required the cable to be replaced more often. In addition to the increased downtime and maintenance costs, the increased cable wear raised the likelihood of a serious cable car collision.



Cable damage, and the probability of a serious collision occurring, can be measured by tracking the cable life, which is the number of days between cable replacements. The graph to the left shows the trend of decreasing cable life prior to the pilot. Since 2000, the average time between cable replacements has decreased by 40%. In the year immediately preceding the pilot the Cable Car Division replaced the cable every 65 days on average; one new cable lasted only 29 days.

Within two months of the pilot's implementation, average cable life increased 23% to about 80 days. The graph at right shows the life of each cable replaced since 2014. Cable life also became more consistent after the pilot, which demonstrates the effect of the pilot in not only halting the trend shown above, but beginning to reverse it.

With the understanding that the pilot both reduced vehicular traffic volumes and increased cable life, this finding confirms that a major cause of cable damage is cable cars operating on congested streets.

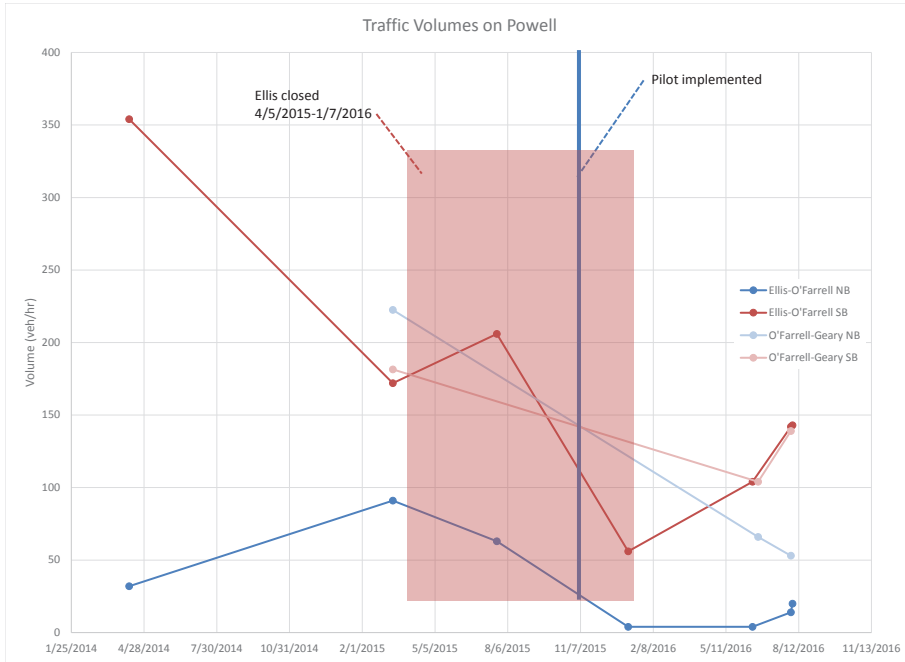


Powell Safety Pilot: Detailed Results



Traffic Volumes

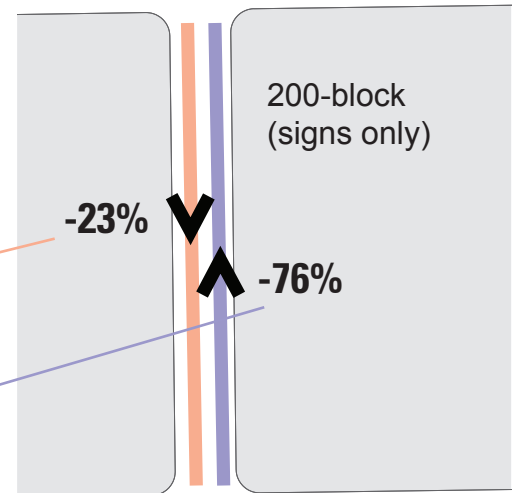
All traffic volumes decreased during the pilot, however southbound volumes did not decrease as much as northbound volumes. The least effective portion of the pilot was the southbound lane between Geary and O'Farrell. As the graph below shows, the pilot was also influenced by the closure of Ellis Street at Market due to Central Subway. Prior to the closure of Ellis, traffic volumes on southbound Powell were high. The combination of the pilot and the Ellis closure dramatically reduced these volumes, and now that Ellis is open again, demand for travel on Powell has increased but is kept low by the pilot.



on southbound Powell were high. The combination of the pilot and the Ellis closure dramatically reduced these volumes, and now that Ellis is open again, demand for travel on Powell has increased but is kept low by the pilot.

Volume Count Results (taken at intersections)

Geary St



Geary-O'Farrell SB

Before: 182 veh/hr After: 139 veh/hr
Change: -43 veh/hr (23% change)

Geary-O'Farrell NB

Before: 223 veh/hr After: 53 veh/hr
Change: -170 veh/hr (76% change)

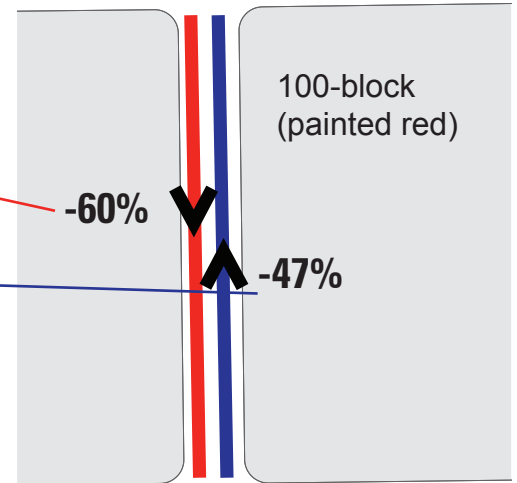
O'Farrell-Ellis SB

Before: 354 veh/hr After: 143 veh/hr
Change: -211 veh/hr (60% change)

O'Farrell-Ellis NB

Before: 32 veh/hr After: 17 veh/hr
Change: -15 veh/hr (47% change)

O'Farrell St



Ellis St

While the pilot regulations were effective in reducing traffic volumes to some degree, these results suggest that different techniques should be used at Powell and Geary to further reduce southbound traffic. It is difficult to divert through southbound traffic at this intersection because of the heavily congested southbound right turn.

Powell Safety Pilot: Detailed Results



Turn Volumes

The pilot was successful in reducing turning volumes, and on average reduced turns onto or off of Powell by 70 to 80%. On Powell as at most intersections in Union Square, turning vehicles pose a hazard to people crossing the street because a turning vehicle gets a green light at the same time as the crosswalk. The high number of people walking in the area ensures there are always people in the crosswalk when a vehicle is trying to turn, and this leads to both a hazard for the people walking and traffic congestion in the area. This issue manifests itself in the collision history; conflicts with turning vehicles are the top intersection-related collision pattern.

Geary & Powell

Volumes on Geary increased 33% over the course of the pilot. Even during this increased traffic, the pilot reduced turns onto and off of Powell by around 80%. The northern part of the intersection was not part of the pilot; westbound right turns increased 242% from 36 to 123, and southbound right turns changed little before and after the pilot, from 222 to 209. Future intersection treatments should attempt to better accommodate or reduce these turning volumes.

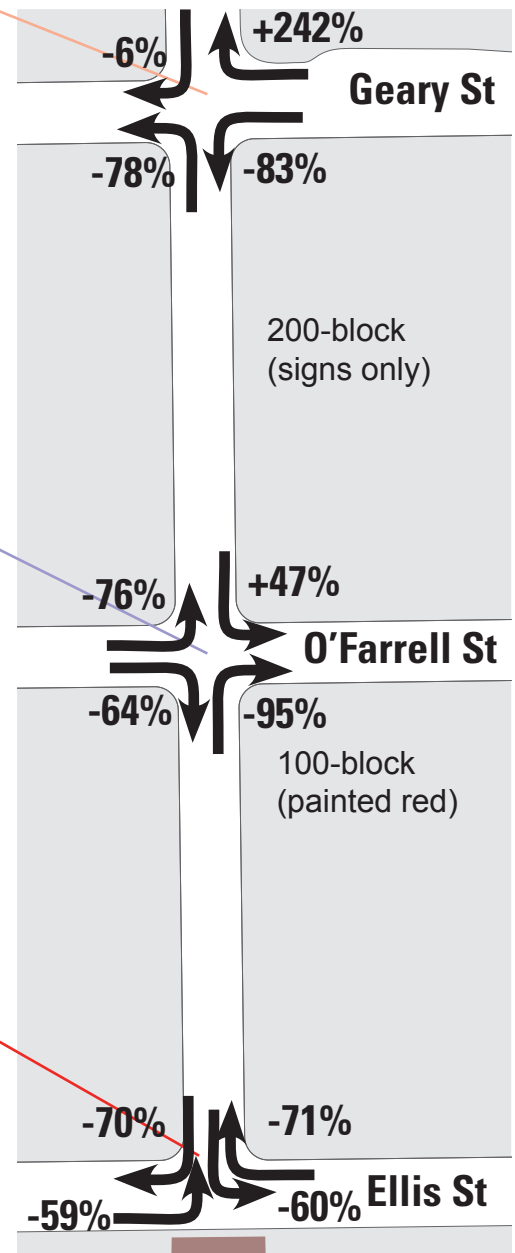
O'Farrell & Powell

Turning volumes decreased dramatically at this intersection, between 64% and 95%, with the exception of the southbound left turn which saw a nearly 50% increase, from 17 vehicles to 25 vehicles/hr. This increase can be explained by the previously mentioned failure to reduce southbound volumes at Geary. Improvements to the Geary intersection should positively affect this location.

Ellis & Powell

All turn volumes were decreased by 60-70%. This intersection hosts nearly 7,000 people crossing the streets per hour. The heaviest turn movement after the pilot is the southbound left, with about 112 veh/hr making the turn. Through traffic volumes on Ellis increased 150% in the eastbound direction (due to Ellis being closed at Market before the beginning of the pilot) during the same period.

Volume Count Results (taken at intersections)



Powell Safety Pilot: Detailed Results

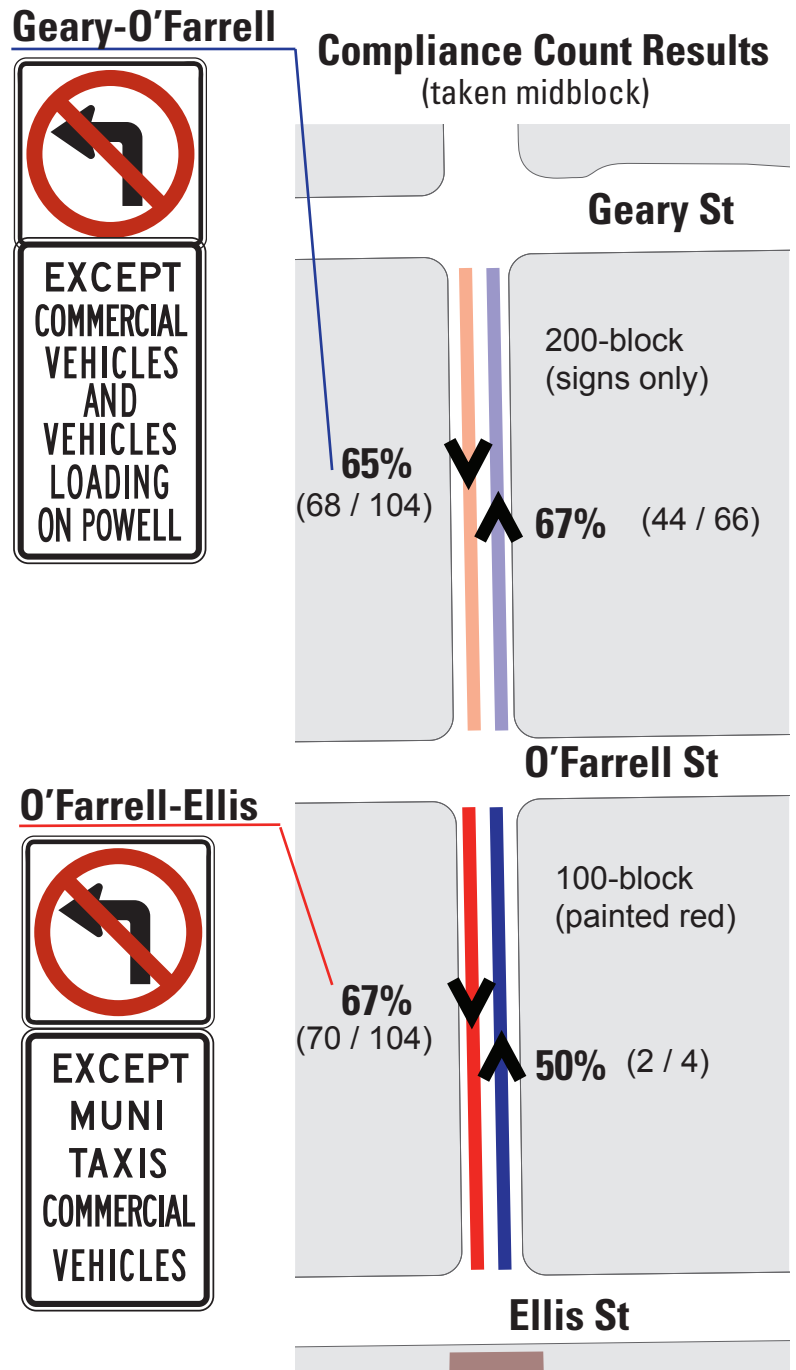
Compliance At the request of project stakeholders, the pilot also compared the effectiveness of two types of treatments. The 100-block from Ellis to O’Farrell was painted red and restricted to taxis, commercial vehicles, and transit. The 200-block from O’Farrell to Geary was not painted red and restricted to only vehicles loading and unloading on that block.

Compliance counts were taken at several times during the pilot. While compliance was high, around 80 to 90%, when the pilot first started, about 2/3 of the vehicles now on Powell are authorized to be there.

Generally there was no difference in compliance between the two treatments. The overall number of vehicles in compliance are also given as a fraction of the total vehicles on the street. From this we can see that the number of vehicles heading northbound between Ellis and O’Farrell are too small for compliance to be accurately measured.

We can conclude that while compliance with the regulations is about the same between the two treatments, the regulations on the 100-block are more restrictive as they do not permit regular passenger vehicles at any time, and therefore these regulations do reduce the overall volumes more than those on the 200-block. However, if as in this case, businesses need passenger vehicles to be able to access the street for loading, these modified regulations can be effective.

Lastly, the pilot shows that installing signage alone can reduce traffic and turning volumes significantly and calm a street, even in the midst of a heavily-congested area. Of the remaining third of vehicles that do violate the traffic rules, some people in this group likely disregard traffic laws in all cases, and only stepped-up enforcement would be able to preclude them from using the street. We estimate a larger percentage of this group may be confused by the regulations or tempted to violate the rules out of frustration. To influence these people’s behavior, we recommend making adjustments to the look and feel of the street itself to reinforce that this is not a part of the regular street network. If the street is to be repaved in a pattern designed to reduce violations, we recommend comparing compliance after that project with these results.



Powell Safety Pilot: Detailed Results



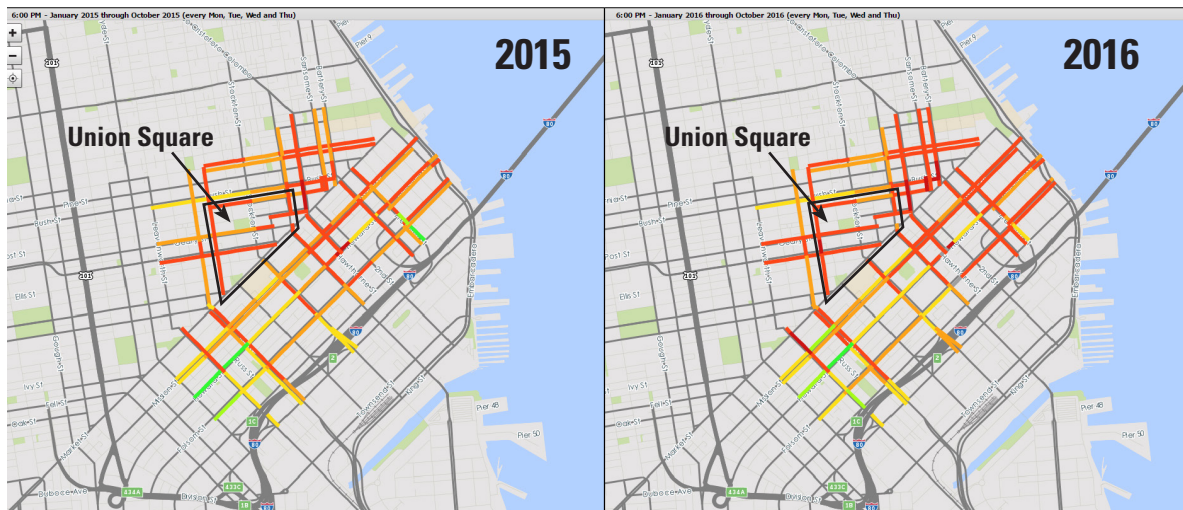
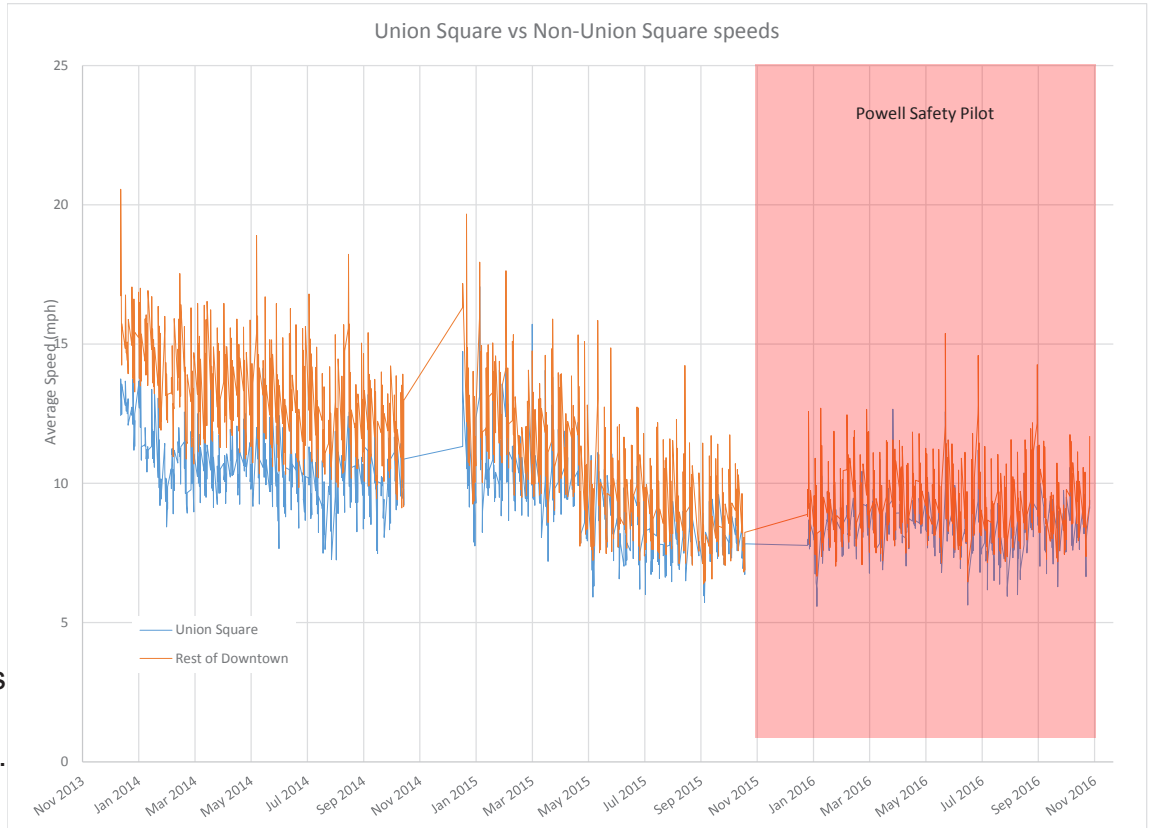
Congestion

The pilot also considered the possibility that redirecting through traffic from Powell would overburden adjacent streets and contribute to downtown traffic congestion. Staff analysis of traffic data provided by INRIX suggests that the pilot regulations did not significantly impact traffic on other streets.

As the graph to the right shows, traffic speeds in Union Square were significantly lower than elsewhere in downtown in 2014. In 2015, traffic speeds dropped, with traffic speeds elsewhere in downtown falling faster than in Union Square. By the 2015 holiday season, traffic speeds downtown converged with those in Union Square.

Following the holiday season when the pilot was implemented, traffic speeds in Union Square did not differ from those downtown. This is an indication that the Powell pilot did not

contribute to congestion in the Union Square area. The maps below show the streets for which data were available for this study. The streets considered as part of Union Square are shown on the maps, and all streets outside the box were considered to be 'elsewhere in downtown'. The maps also show little difference between traffic speeds in 2015 and 2016 in the entire downtown area.



Speeds used in this study were calculated for a typical weekday afternoon peak period, between 5 PM and 7 PM when traffic is the greatest. The holiday season, where traffic speeds are not characteristic of the rest of the year, was excluded from this analysis.

Powell Safety Pilot: Detailed Results

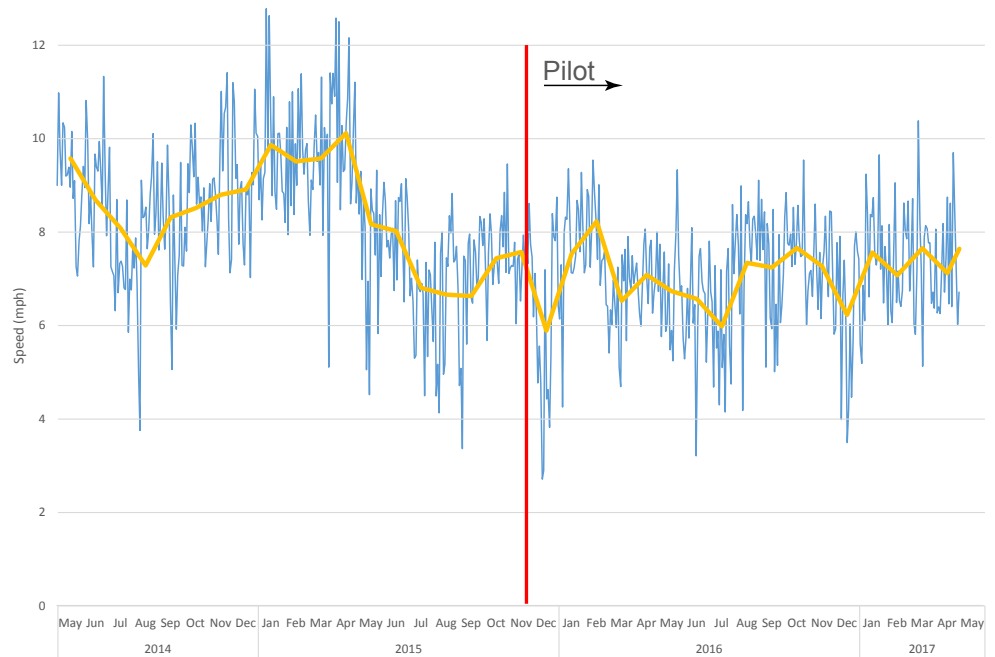
Traffic speeds were also tracked on Geary Street and O'Farrell Street as they pass through the project area and many of the piloted turn restrictions were onto or off of these streets.

Generally, speeds after the pilot are comparable to traffic speeds immediately before the pilot, indicating that the pilot regulations had little effect on congestion on these cross streets.

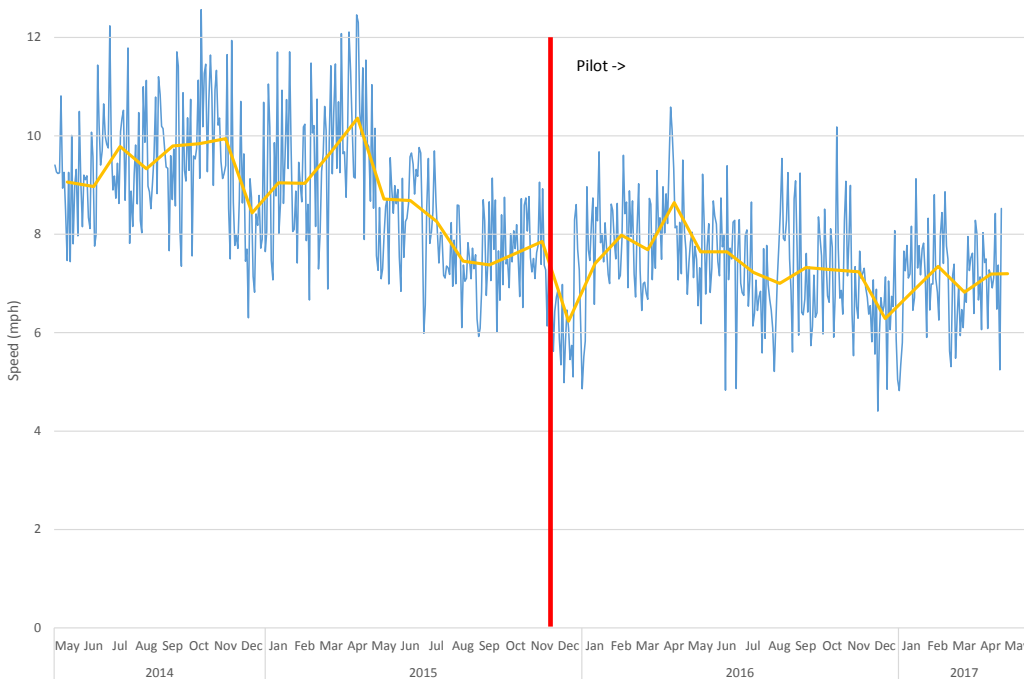
Both streets experienced a slowdown during 2015 that can be attributed both to the overall increase in congestion downtown and to the fact that construction on Central Subway began to affect the number of available lanes during this time.

Both streets also exhibit predictable drops in speed during the holiday shopping season, owing to the higher demand for travel at these times. This is remarkable considering that during this period, Central Subway vacated the travel lanes, increasing the available capacity temporarily during the holiday season, yet this increased capacity was still overwhelmed by the demand.

Speed on O'Farrell Street between Leavenworth and Stockton



Speed on Geary St between Stockton & Leavenworth



In these graphs, the blue line represents daily averages while the orange line represents monthly average speeds. As in the previous page, speeds are representative of the afternoon peak hour (between 5 PM and 7 PM), and the data is provided by INRIX. INRIX collects anonymized travel time data from in-car navigation systems, certain smartphone navigation apps, and fleet vehicles to produce traffic reports that are available to SFMTA through a grant from the Metropolitan Transportation Commission (MTC).