THIS PRINT COVERS CALENDAR ITEM NO. : 10.5

SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY

DIVISION: Sustainable Streets

BRIEF DESCRIPTION:

Approving permanent parking and traffic modifications on Powell Street between Ellis and Geary streets, as well as on Ellis, Geary and O'Farrell streets near their intersections with Powell Street as part of the Powell Street Safety Project, a Vision Zero supporting project.

SUMMARY:

- In November 2015, the SFMTA implemented a pilot project on Powell Street between Ellis and Geary streets to improve safety and reduce cable wear caused by traffic congestion.
- The pilot project improved safety. There have been no reported injury collisions in the project area since the pilot project began, down from an average of three per year in the previous five years.
- The pilot project reduced cable wear. Following a 15-year trend of decreasing time between cable replacements, the average time between cable replacements rose by 23 percent in 2016.
- The pilot project reduced traffic volumes on Powell Street by an average of 60 percent without contributing to traffic congestion on nearby streets.
- The proposed action is the Approval Action as defined by the S. F. Administrative Code Chapter 31.

ENCLOSURES:

1. SFMTAB Resolution
2. Existing (Pilot Project) Conditions
3. Proposed Conditions
4. Pilot Project Evaluation Report

APPROVALS: **DATE**

DIRECTOR _____ 7/11/2017

SECRETARY _____ 7/11/2017

ASSIGNED SFMTAB CALENDAR DATE: July 18, 2017

PURPOSE

Approving permanent parking and traffic modifications on Powell Street between Ellis and Geary streets, as well as on Ellis, Geary and O'Farrell streets near their intersections with Powell Street as part of the Powell Street Safety Project, a Vision Zero supporting project.

STRATEGIC PLAN GOALS AND TRANSIT FIRST POLICY PRINCIPLES

This action supports the Vision Zero Policy goal to eliminate traffic fatalities and the following SFMTA Strategic Plan Goals and Objectives:

Goal 1: Create a safer transportation experience for everyone
Objective 1.3: Improve the safety of the transportation system.

Goal 2: Make transit, walking, bicycling, taxi, ridesharing and carsharing the preferred means of travel
Objective 2.2: Improve transit performance.
Objective 2.3: Increase use of all non-private auto modes.

Goal 3: Improve the environment and quality of life in San Francisco
Objective 3.4: Deliver services efficiently.

This action also supports the following sections of the Transit-First Policy:

1. To ensure quality of life and economic health in San Francisco, the primary objective of the transportation system must be the safe and efficient movement of people and goods.
2. Public transit, including taxis and vanpools, is an economically and environmentally sound alternative to transportation by individual automobiles. Within San Francisco, travel by public transit, by bicycle and on foot must be an attractive alternative to travel by private automobile.
3. Decisions regarding the use of limited public street and sidewalk space shall encourage the use of public rights of way by pedestrians, bicyclists, and public transit, and shall strive to reduce traffic and improve public health and safety.

DESCRIPTION

Background

On November 3rd, 2015, the SFMTA Board of Directors approved a pilot project restricting vehicle access on Powell Street between Ellis and Geary streets, as depicted in Enclosure 2, until June 4, 2017. The purpose of the pilot project was to evaluate the impacts of vehicle restrictions on cable car operations and pedestrian safety. The pilot project vehicle restrictions include exceptions for vehicles performing commercial or passenger loading. A detailed evaluation of the pilot project is attached as Enclosure 4. The pilot project has been effective in improving traffic and pedestrian safety, reducing wear on the cable car's machinery, and minimizing impacts on nearby streets. Staff recommends approval of the Powell Street Safety Project to make permanent the pilot project vehicle restrictions with some minor modifications based on feedback received from the community.

Pilot Project Results – Collisions

During a five-year period prior to the pilot project, there were 25 reported collisions in the project area, including 15 injury collisions. Turning vehicles were primarily responsible for the injury collisions. Since implementation of the pilot project, there have been no reported injury collisions in the project area. Staff attributes the reduction in collisions to turn restrictions, which reduced turn volumes on average by 75 percent, and painted safety zones, which slowed the remaining turns by increasing the intersection corner radii, forcing vehicles to make wider turns.

Pilot Project Results – Cable Wear

Between 2000 and 2014, the time between cable repairs or replacements on Powell Street decreased 40 percent, from an average of 108 days to 65 days. Staff attribute this in part to increased traffic congestion, which resulted in stop-and-go cable car operations that increased cable wear. Since implementation of the pilot project, the time between cable repairs or replacements has increased 23 percent to an average of 80 days. The increase in cable life corresponds with a reduction in vehicle volumes on Powell Street by about 60 percent following implementation of the pilot project.

Pilot Project Results - Passenger Loading

During the pilot project, hotels located on the northern block of Powell Street between Geary and O'Farrell streets expressed concern about guest access to passenger loading zones. The hotels and businesses on the two project area blocks of Powell Street generally do not have rear or side entrances. The pilot project analyzed two variations for vehicle restrictions on Powell Street: on the southern block between Ellis and O'Farrell streets, red treatments were applied to the roadway and signage restricted access to all non-commercial vehicles; on the northern block between Geary and O'Farrell streets, no red treatments were applied to the roadway and signage allowed vehicular access for the purpose of commercial or passenger loading.

Motorist compliance with the two variations of vehicle restrictions is very similar and staff recommend allowing vehicle access for both commercial and passenger loading on both blocks of Powell Street within the project area. About two-thirds of observed vehicles complied with the pilot project restrictions. This compliance rate is lower than desired and will be addressed through design modifications as part of the Powell Streetscape Project, a longer-term effort currently in the outreach phase which includes more capital-intensive streetscape enhancements and traffic signal upgrades.

Pilot Project Results - Traffic Congestion

Traffic congestion within Union Square and the larger Downtown area were evaluated with traffic speed data gathered by INRIX[1]. There was no substantial change in traffic speeds during weekday evening peak periods within the Union Square area following implementation of the pilot project.

1 INRIX compiles GPS-based data including vehicle speeds from smartphones, vehicle navigation systems, and fleet management systems: http://inrix.com/.

Proposed Powell Street Safety Project

Following the success of the pilot project, SFMTA staff recommends that the SFMTA Board of Directors permanently adopt the pilot project's parking and traffic regulations with the following minor modification: permitting passenger loading on both blocks of Powell Street within the project area, rather than prohibiting passenger loading on the southern block.

Specifically the SFMTA proposes the following parking and traffic modifications:

A. ESTABLISH – NO RIGHT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 120 OR 230 POWELL STREET ONLY - Ellis Street, westbound, at Powell Street
B. ESTABLISH – NO LEFT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 120 OR 230 POWELL STREET ONLY - Ellis Street, eastbound, at Powell Street; and O'Farrell Street, eastbound, at Powell Street
C. ESTABLISH – NO LEFT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 111 OR 225 POWELL STREET ONLY - Geary Street, westbound, at Powell Street
D. ESTABLISH – RIGHT TURN ONLY EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 111 OR 225 POWELL STREET ONLY - Powell Street, southbound, at Geary Street
E. ESTABLISH – NO RIGHT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 111 OR 225 POWELL STREET ONLY - O'Farrell Street, eastbound, at Powell Street
F. RESCIND – NO LEFT TURN EXCEPT MUNI - Powell Street, southbound, at O'Farrell Street
G. ESTABLISH – TOW-AWAY NO STOPPING ANY TIME - Powell Street, east side, from Ellis Street to 92 feet north of Ellis Street; Powell Street, east side, from 152 feet north of Ellis Street to O'Farrell Street; Powell Street, east side, from O'Farrell Street to 97 feet north of O'Farrell Street; Powell Street, east side, from 177 feet north of O'Farrell Street to Geary Street; Powell Street, west side, from Ellis Street to 84 feet north of Ellis Street; Powell Street, west side, from 174 feet north of Ellis Street to O'Farrell Street; Powell Street, west side, from O'Farrell Street to 89 feet north of O'Farrell Street; and Powell Street, west side, from 149 feet north of O'Farrell Street to Geary Street
H. RESCIND – NO PARKING ANY TIME EXCEPT ACTIVE LOADING - Powell Street, east side, from 92 feet to 152 feet north of Ellis Street (60 foot zone); Powell Street, east side, from 97 feet to 177 feet north of O'Farrell Street (80 foot zone); Powell Street, west side, from 84 to 174 feet north of Ellis Street (90 foot zone); and Powell Street, west side, from 89 feet to 149 feet north of O'Farrell Street (60 foot zone)
I. RESCIND – NO PARKING ANY TIME - Ellis Street, north side, from 121 feet to 139 feet west of Powell Street; Ellis Street, north side, from 25 feet to 100 feet east of Powell Street; O'Farrell Street, north side, from 17 feet to 120 feet west of Powell Street; and O'Farrell Street, south side, from 7 feet to 67 feet east of Powell Street

STAKEHOLDER ENGAGEMENT

The SFMTA began outreach for the pilot project in early 2015 and has communicated with

stakeholders throughout the pilot, which was implemented beginning in November 2015. The pilot project has enabled both stakeholders and staff to observe effects and make modifications as needed.

Prior to the Pilot Project

The SFMTA surveyed the 34 businesses located in the project area in April 2015 to better understand their passenger and commercial loading needs. Of those surveyed, 11 indicated that they conduct passenger and/or commercial loading on Powell Street, and would be affected by potential access restrictions. SFMTA staff worked closely with the Union Square Business Improvement District (Union Square BID) and the Hotel Council to better understand the needs of property owners, hotel managers, and businesses in the project area. The Union Square BID assisted the SFMTA in collecting information, providing outreach to property owners and businesses, and articulating the District's goals for the project.

The SFMTA and Union Square BID staff conducted door-to-door outreach to every business in the project area in July 2015. Of the 28 business owners or managers contacted, five expressed concerns about the project, primarily focused on maintaining commercial and passenger loading access on Powell Street. With assistance from the Union Square BID, SFMTA staff continued to discuss these concerns through a series of seven in-person meetings between July and October 2015. This targeted outreach resulted in changes to the original proposals, including exemptions from access and turn restrictions for taxis and commercial vehicles.

A public open house was held on October 8, 2015 to gather additional feedback. This meeting was publicized through the Union Square BID, the Hotel Council, advocacy groups, and local media. The SFMTA project team also reviewed the proposals with the Cable Car Division, who strongly supported the project. Leading up to the SFMTA Board of Directors approval of the pilot project on November 3, 2015, the SFMTA project team provided regular updates to other key stakeholders, including WalkSF, the Bicycle Coalition, and the Board of Supervisors.

During the Pilot Project

Soon after implementation of the pilot project, hotels in the project area requested modifications to permit private vehicular access to the impacted blocks of Powell Street for passenger loading, and the SFMTA Board of Directors approved this modification on January 19, 2016. SFMTA staff also modified the signal timing at the intersection of Ellis and Powell streets to in the spring of 2016 in response to stakeholder requests.

The SFMTA hosted a stakeholder meeting on May 18, 2017, to share results from the pilot project and begin outreach for the longer-term Powell Streetscape Project. A total of 34 people attended, including property owners, merchants, community and advocacy group representatives, and district supervisor staff. There were no objections voiced at the meeting to continuing the pilot project on a permanent basis. Of 15 comments submitted following the meeting, all were supportive of the pilot project continuing, with two comments requesting additional modifications as follows: one request was to reduce vehicle queuing on the southbound approach of Powell Street at Geary Street, which staff plan to address with a forthcoming traffic signal modification; one request was for different materials to designate the transit-only area, which will be considered through the longer-term Powell Streetscape Project. Nearly all of the attendees indicated concerns with the quality of the streetscape

and the desire for improvements as part of the longer-term Powell Streetscape Project.

The SFMTA held a public hearing on June 16, 2017, to gather additional feedback. Notices were posted on the project website and in the project area two weeks prior to the hearing, and shared with the Union Square BID and other community groups and via email to the project's contact list. No input was received during or after the hearing.

The SFMTA has maintained a project website at https://www.sfmta.com/powell.

ALTERNATIVES CONSIDERED

The project team explored more expansive vehicle restrictions, including closing Powell Street to all vehicles other than transit and emergency vehicles for the four blocks between Ellis and Sutter streets. These alternatives were not pursued due to stakeholder concerns about maintaining vehicle access for passenger and commercial loading.

FUNDING IMPACT

The total cost of this project is $50,000. Capital funds for this project are included in the SFMTA FY18 budget and are provided by State Public Transit Modernization & Improvement (PTMISEA) funds.

ENVIRONMENTAL REVIEW

The proposed parking and traffic modifications are subject to the California Environmental Quality Act (CEQA). CEQA provides a categorical exemption from environmental review for operation, repair, maintenance, or minor alteration of existing highways and streets, sidewalks, gutters, bicycle and pedestrian trails, and similar facilities as defined in Title 14 of the California Code of Regulations Section 15301.

On June 9, 2017, the San Francisco Planning Department determined (Case Number 2017-006650ENV) that the proposed parking and traffic modifications are categorically exempt from CEQA as defined in Title 14 of the California Code of Regulations Section 15301. A copy of the CEQA determination is on file with the Secretary to the SFMTA Board of Directors, and may be found in the records of the Planning Department at 1650 Mission Street in San Francisco, and is incorporated herein by reference.

The proposed action is the Approval Action as defined by the S. F. Administrative Code Chapter 31.

OTHER APPROVALS RECEIVED OR STILL REQUIRED

The City Attorney's Office has reviewed this calendar item.

RECOMMENDATION

SFMTA staff recommends that the SFMTA Board of Directors approve permanent parking and traffic modifications on Powell Street between Ellis and Geary streets, as well as on Ellis, Geary and O'Farrell streets near their intersections with Powell Street as part of the Powell Street Safety Project,

a Vision Zero supporting project.

SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY
BOARD OF DIRECTORS

RESOLUTION No. _____

WHEREAS, The City adopted the Vision Zero Policy in February 2014 which aims to eliminate all traffic fatalities by 2024; and,

WHEREAS, The San Francisco Municipal Transportation Agency have developed the Powell Street Safety Project to support the City's Vision Zero Policy; and,

WHEREAS, SFMTA staff have proposed parking and traffic modifications as part of the Powell Street Safety Project, a Vision Zero supporting project, as follows:

A. ESTABLISH – NO RIGHT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 120 OR 230 POWELL STREET ONLY - Ellis Street, westbound, at Powell Street
B. ESTABLISH – NO LEFT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 120 OR 230 POWELL STREET ONLY - Ellis Street, eastbound, at Powell Street; and O'Farrell Street, eastbound, at Powell Street
C. ESTABLISH – NO LEFT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 111 OR 225 POWELL STREET ONLY - Geary Street, westbound, at Powell Street
D. ESTABLISH – RIGHT TURN ONLY EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 111 OR 225 POWELL STREET ONLY - Powell Street, southbound, at Geary Street
E. ESTABLISH – NO RIGHT TURN EXCEPT MUNI, TAXIS, AND VEHICLES ACCESSING THE LOADING ZONES IN FRONT OF 111 OR 225 POWELL STREET ONLY - O'Farrell Street, eastbound, at Powell Street
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H. RESCIND – NO PARKING ANY TIME EXCEPT ACTIVE LOADING - Powell Street, east side, from 92 feet to 152 feet north of Ellis Street; Powell Street, east side, from 97 feet to 177 feet north of O'Farrell Street; Powell Street, west side, from 84 to 174 feet north of Ellis Street; and Powell Street, west side, from 89 feet to 149 feet north of O'Farrell Street

I. RESCIND – NO PARKING ANY TIME - Ellis Street, north side, from 121 feet to 139 feet west of Powell Street; Ellis Street, north side, from 25 feet to 100 feet east of Powell Street; O'Farrell Street, north side, from 17 feet to 120 feet west of Powell Street; and O'Farrell Street, south side, from 7 feet to 67 feet east of Powell Street; and

WHEREAS, The proposed parking and traffic modifications are subject to the California Environmental Quality Act (CEQA); CEQA provides a categorical exemption from environmental review for operation, repair, maintenance, or minor alteration of existing highways and streets, sidewalks, gutters, bicycle and pedestrian trails, and similar facilities as defined in Title 14 of the California Code of Regulations Section 15301; and

WHEREAS, On June 9, 2017, the Planning Department determined that the proposed parking and traffic modifications are categorically exempt from CEQA as defined in Title 14 of the California Code of Regulations Section 15301; and

WHEREAS, The proposed action is the Approval Action as defined by the S. F. Administrative Code Chapter 31, and a copy of the CEQA determination is on file with the Secretary to the SFMTA Board of Directors, and may be found in the records of the Planning Department at 1650 Mission Street in San Francisco, and is incorporated herein by reference; and,

WHEREAS, The public has been notified about the proposed modifications and has been given the opportunity to comment through the public hearing process; now, therefore, be it

RESOLVED, That the San Francisco Municipal Transportation Agency Board of Directors approves these parking and traffic modifications as set forth in items A-I above to implement the Powell Street Safety Project.

I certify that the foregoing resolution was adopted by the San Francisco Municipal Transportation Agency Board of Directors at its meeting of July 18, 2017.

_____

Secretary to the Board of Directors
San Francisco Municipal Transportation Agency

Powell Street Safety Improvement Pilot

MUNI FORWARD

Geary Turn Restrictions

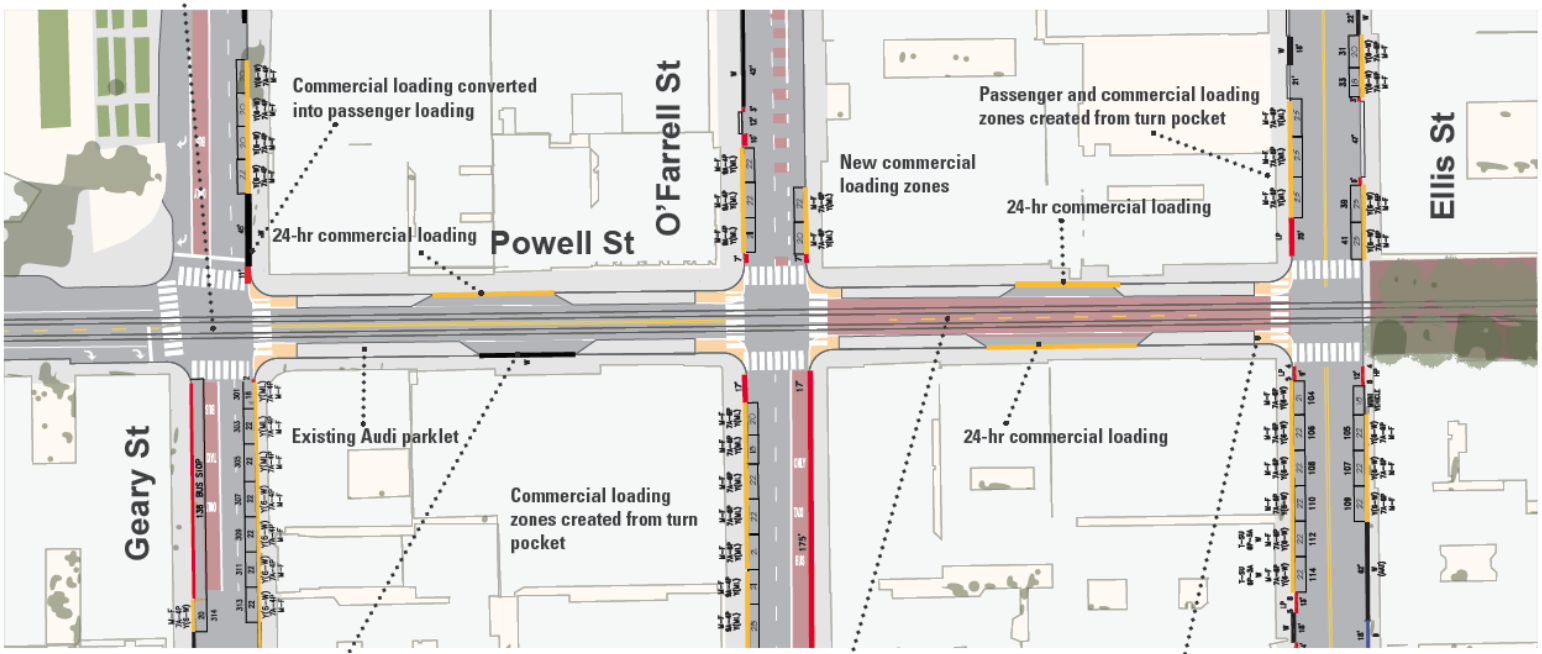
No left turn from westbound Geary to southbound Powell and right turn only from southbound Powell onto Geary, except Muni, taxis, commercial vehicles, and vehicles accesssing southbound Powell between Geary and O'Farrell for passenger loading.

O'Farrell Turn Restrictions

No turns from O'Farrell onto Powell are permitted, except Muni, taxis, commercial vehicles, and vehicles accesssing northbound Powell between Geary and O'Farrell for passenger loading.

Ellis Turn Restrictions

All vehicles except Muni, paratransit, taxis, and vehicles with commercial license plates are prohibited from turning onto Powell.



Local Access Only

Permits passenger loading to local businesses. Only vehicles picking up or dropping off passengers at the loading zones may drive onto Powell.

Red lanes indicate restriction

All vehicles are prohibited from these areas except Munim taxis, paratransit and commercial vehicles.

Painted safety zones

These extensions reduce the turn radius, causing vehicles to turn more slowly onto Powell.

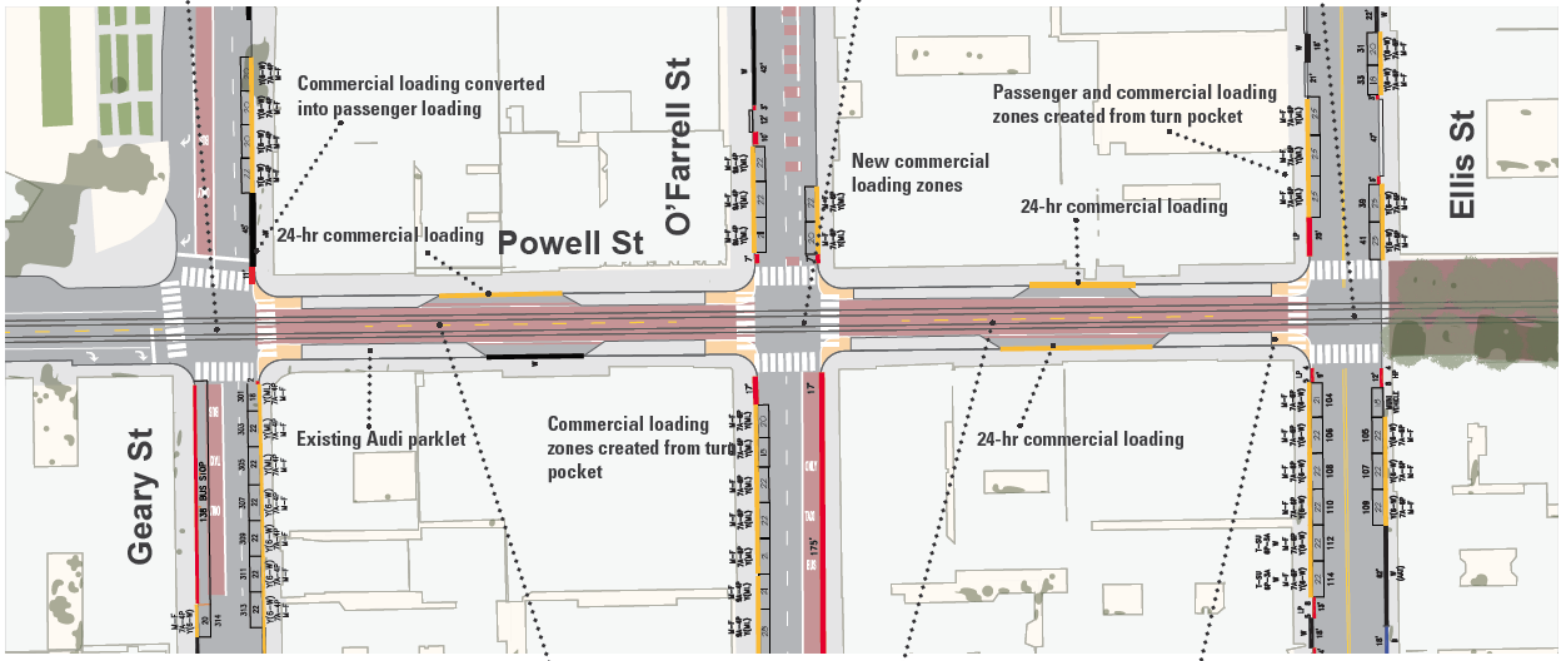
Powell Street Safety Project

Geary Turn Restrictions

No left turn from westbound Geary to southbound Powell and right turn only from southbound Powell onto Geary, except Muni, taxis, and vehicles accesssing southbound Powell between Geary and Ellis for passenger or commercial loading.

O'Farrell and Ellis Turn Restrictions

All vehicles except Muni, taxis, and vehicles accessing Powell between Geary and Ellis for passenger or commercial loading are prohibited from turning onto Powell.



Local Access Only

Permits loading to local businesses. Only vehicles using Powell to access the loading zones may drive onto Powell.

Painted safety zones

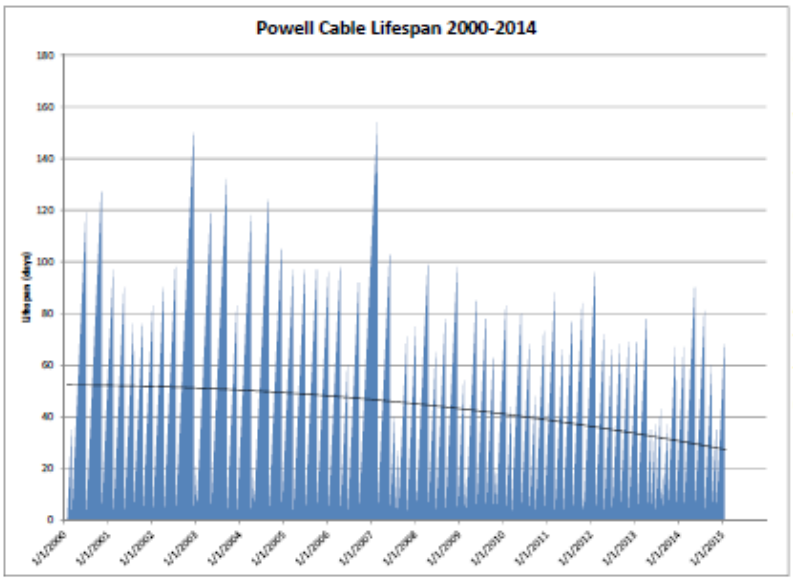
These extensions reduce the turn radius, causing vehicles to turn more slowly onto Powell.

Enclosure 4: Pilot Project Evaluation Report

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 occured 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.

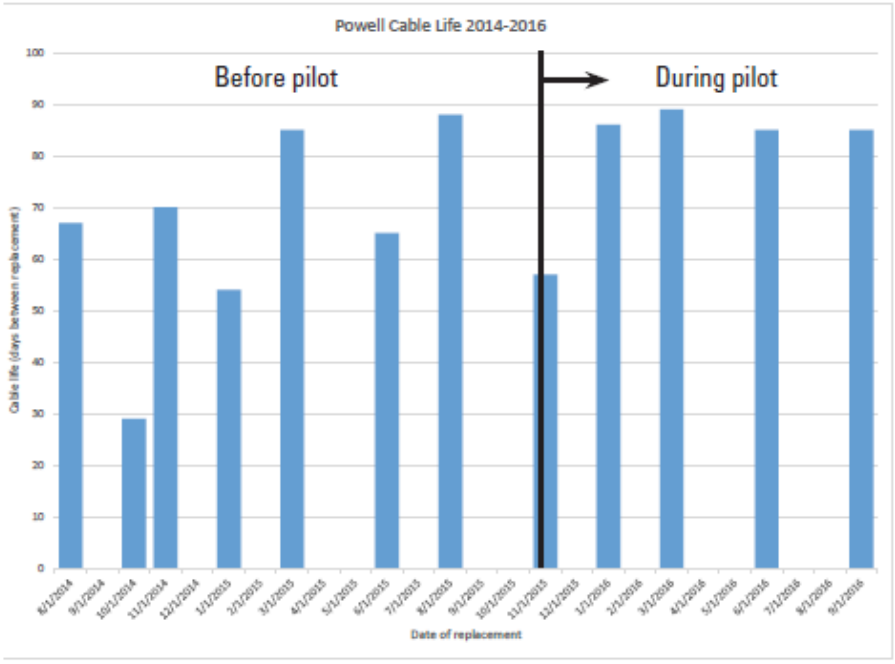


Cable damage, and the probability of a serious collision occurring, can be measured by tracking the cable life, which is the number of days between cable replacements.

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.

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)

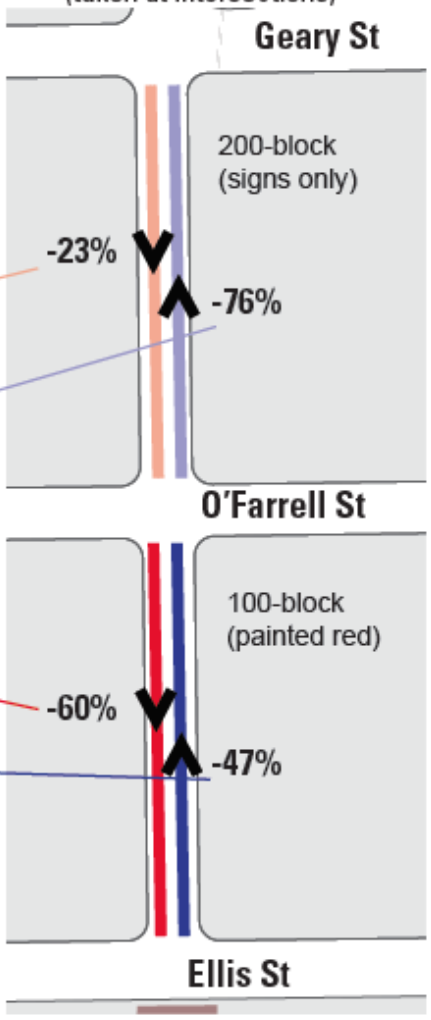
O'Farrell-Ellis NB

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

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.

Volume Count Results

(taken at intersections)



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

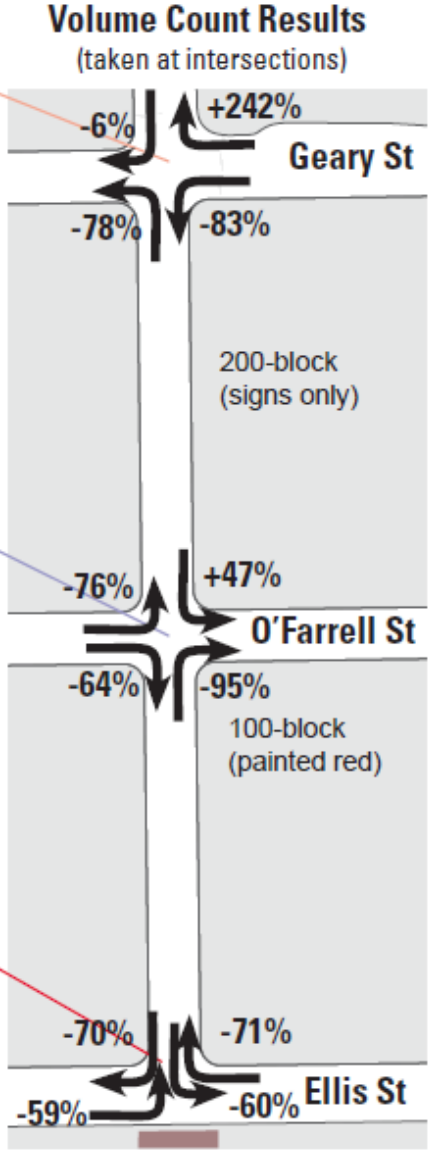
Volumes on Geary increased 33% over the course of the pilot. Even during this increased traffic, the pilot reduced turns onto and off of Powell by around 80%. The northern part of the intersection was not part of the pilot; westbound right turns increased 242% from 36 to 123, and southbound right turns 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.



Powell Safety Pilot: Detailed Results

Compliance

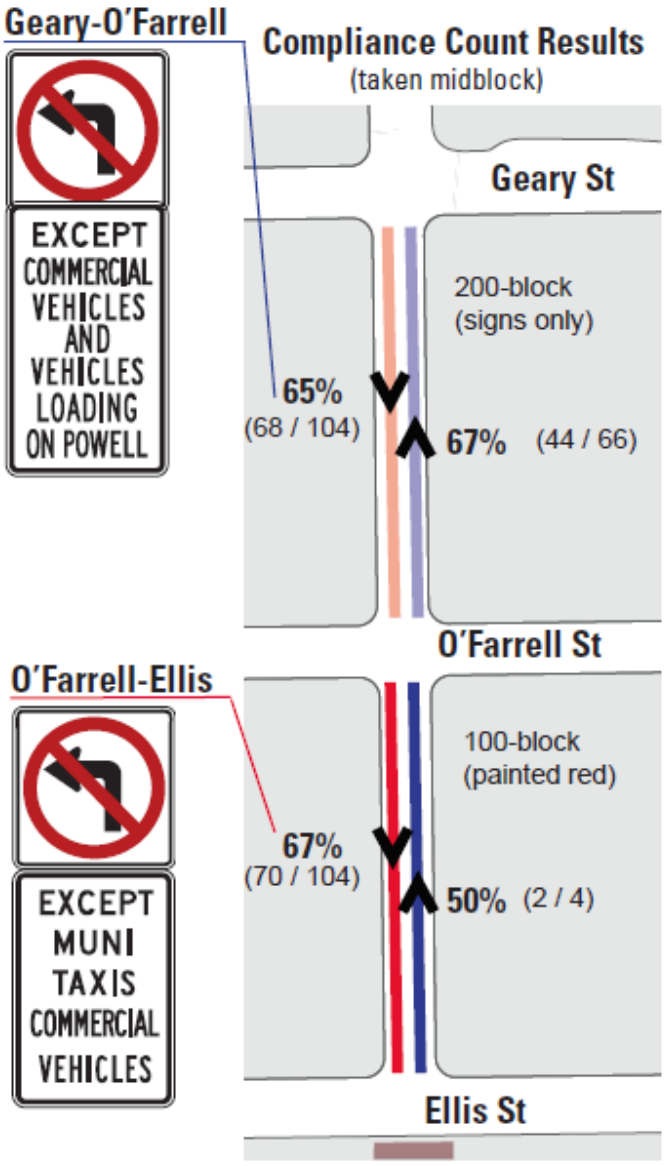
At the request of project stakeholders, the pilot also compared the effectiveness of two types of treatments. The 100-block from Ellis to O'Farrell was painted red and restricted to taxis, commercial vehicles, and transit. The 200-block from O'Farrell to Geary was not painted red and restricted to only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

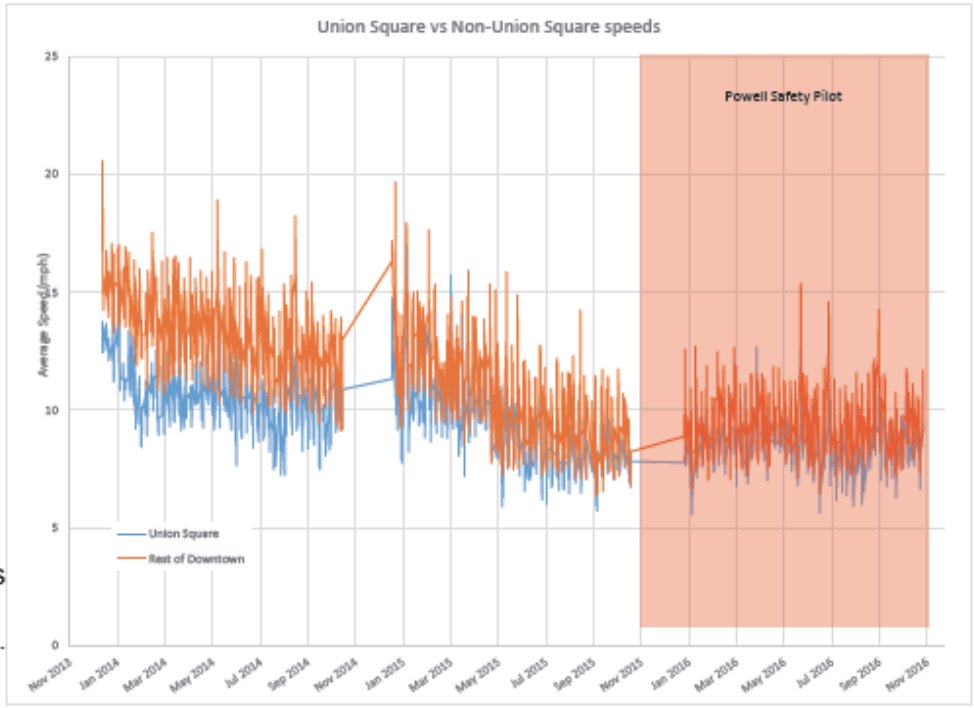


Powell Safety Pilot: Detailed Results

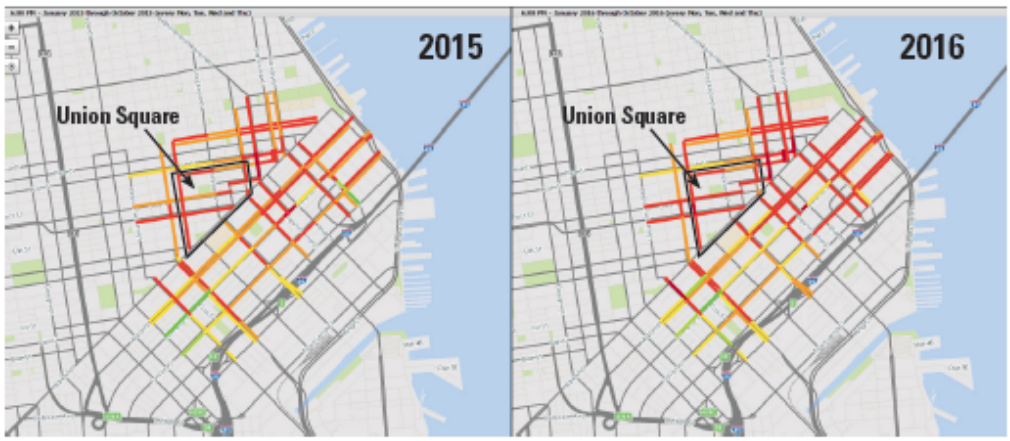
Congestion

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.



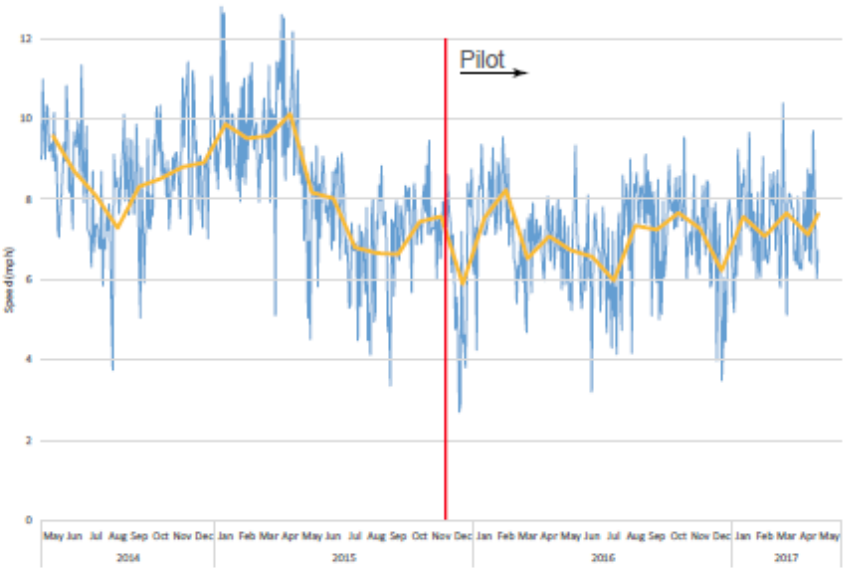
Speeds used in this study were calculated for a typical weekday afternoon peak period, between 5 PM and 7 PM when traffic is the greatest. The holiday season, where traffic speeds are not characteristic of the rest of the year, was excluded from this analysis.

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.

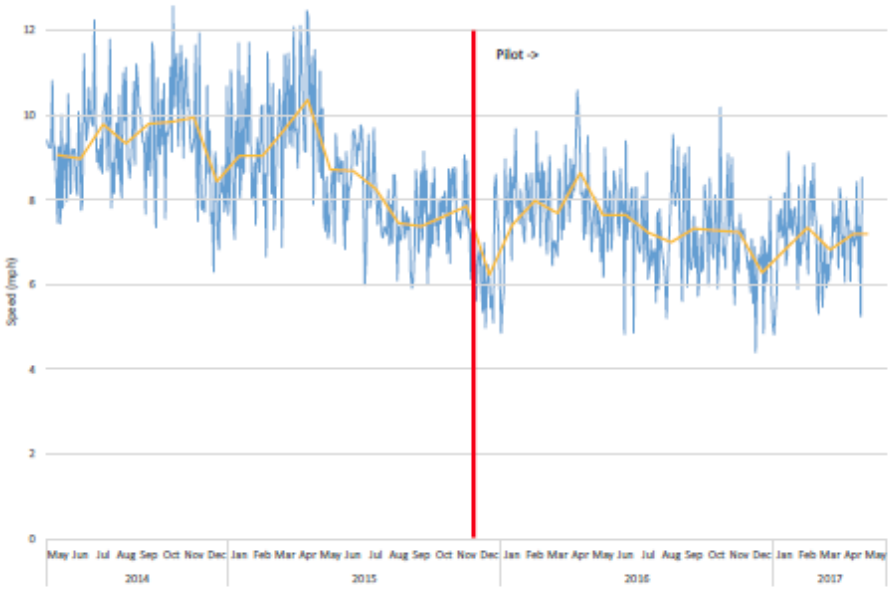
Speed on O'Farrell Street between Leavenworth and Stockton



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 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).