

Challenges in Constructing Safe Routes to School in a Dense Urban Environment – The San Francisco Chinatown Safe Routes To School Project

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Presentation for the ITE Western District Annual Meeting, July 2016, in
Albuquerque, New Mexico

The Chinatown Safe Routes to School project in San Francisco provided some unique challenges to the transportation engineers and planners who were involved. Some lessons learned were unique to San Francisco (such as cable cars), while other lessons could help other cities develop good and/or better relations with residents to help push transportation safety projects forward.

School Area Characteristics and Traffic Challenges

Gordon Lau Elementary School is located in the Chinatown District of San Francisco and is bounded by Washington Street to the north, Clay Street to the south, Powell Street to the west and Stockton Street to the east. This area is one of the densest locations in the City surrounded by narrow streets filled with pedestrians, private vehicles and various forms of public transit. This makes walking convenient for most kids and parents even though the hills are quite steep.

On the south side of campus is Clay Street which is a one way street going eastbound. Washington Street is a one-way street going eastbound west of Powell Street. East of Powell Street, Washington Street is a one way street going westbound, but it becomes a two-way street during school pick-up/drop-off hours. This allows school buses to load from the school side of the street instead of forcing students to cross the street first to board the bus.

The school has an annex across Washington Street at Stone Alley. In addition, a popular after school program is located on Joice Alley which intersects into Clay Street right in the middle of the block about 200 feet from each adjacent intersection. The easiest and quickest way for children and their guardians to access the annex and the after school program building was to cross mid-block on Washington and Clay Streets respectively. This was usually discouraged, but pedestrians ended up crossing mid-block anyway. Many times, both adult and child crossing guards would help pedestrians cross mid-block because forcing pedestrians to walk about 200 feet to the closest intersection to cross a 30 foot wide street was unrealistic. The school and community were aware of the not-so-ideal

mid-block crossing situation around the campus and have asked the SFMTA several times over the years to look into it.

Powell / Washington Intersection

Another concern they had was the intersection of Powell and Washington Streets, which was an all-way STOP controlled intersection that many of the students cross everyday. The intersection is unique in that two cable car lines run through the intersection but due to the cable cars' unique design, they could not stop at the intersection. They stop about 100 feet back from the intersection to pick-up and drop off passengers and then proceed through the STOP sign. They must do this or else they will not have enough momentum to climb back up the hill on the other side of the intersection. The City has been fortunate not to have many collisions related to this, but even with two adult crossing guards at the corner, residents and school officials were still concerned that this was a collision waiting to happen.

A traffic signal with transit priority was the ideal solution at this intersection, but it was very expensive with no funding source identified. An average signal at the time cost about \$150,000, but estimates were that this complex signal would at least double in cost due to the specialized cable car priority equipment needed. The signal did not meet warrants either. The data showed many warrants fell just under the threshold of being warranted. However, the reasons stated earlier made us realize that a traffic signal would still be the best solution in this case.

Community Support

The Chinatown community is fortunate to have a number of community support groups for residents of the area. The Chinatown Community Development Center (CCDC), Chinatown Transportation Research Improvement Program and the Stockton Street Commercial Corridor Task Force all have been pushing the SFMTA to help improve safety around Gordon Lau Elementary School. The CCDC had one person who was the "school champion" and had a particularly close relationship to the school. She was also a transportation planner which meant she understood the challenges that the SFMTA had in implementing traffic safety improvements here. This helped better communicate project details during the few times we couldn't get hold of school officials or when they had questions about the project. She also served as our translator and helped translate many of our safety flyers into Chinese which made up about 71% of the student population at the school.

The SFMTA also had great support from other city departments such as the Department of Public Health who helped create education and encouragement materials. They helped create safety flyers and supported efforts to start a walking school bus on Walk to School Day which the school participated in every year. The Police Department helped with enforcement issues. The SFMTA also had support from outside agencies such as the California State Automobile Association who helped create and distribute education materials and provided crossing guard training to the older children who were interested. As a result of this collaboration, the SFMTA was awarded an \$836,000 federal Safe Routes to School (SRTS) grant in 2007 to construct various improvements including mid-block sidewalk extensions (also known as a bulb-out), a mid-block crosswalk with flashing beacons, and a traffic signal.

Design Challenges

Design work started where we met with the school principal and the community organizations over the details of the project. The plan was to install one sidewalk bulb-out on Washington Street between the annex door and the upper playground gate. Another bulb-out was planned on Clay Street on the other side of campus to connect with Joice Alley where the after school program was located. In addition, flashing beacons would accompany the bulb-outs and a new traffic signal at Powell/Washington was to be constructed.

Higher priority projects delayed the project, so work was not restarted until a few years later. During this time, a new principal took charge, so we met to discuss the plans again. The new principal wanted to change the location of the bulb-outs. Luckily, detailed design did not start yet, but the new locations posed some new challenges in design. The Clay Street bulb-out was especially difficult because the bulb-out and crosswalk were originally on the west side of the Clay/Joice intersection. Now, the school wanted it on the east side of the intersection to avoid right turning cars from Clay Street onto Joice Alley. This put the crosswalk and bulb-out right next to the school's driveway. This resulted in an unorthodox design where we installed an additional curb and railing between the driveway and the crosswalk/curb ramp area. The Washington Street bulb-out was moved from directly in front of the annex entrance to about 50 feet east. New student policies now dictated that students use the main campus lower playground gate to start and end travel between the annex and main campus. They also wanted parents who drove their kids to school to pick up and drop off their children right at the front door.

Another aspect of the bulb-out design that was overlooked in the planning phase was that the mid-block location did not provide a flat landing at the top and bottom of the curb ramp. The Washington and Clay Street grades were about 13% which meant that it was nearly impossible to provide a flat landing at the top and bottom of the curb ramp at the new crosswalk. This was quite a challenge for the city's Americans with Disabilities Act (ADA) engineer who had to solve this difficult problem. One option was to delete the bulb-out, but the project team agreed that this crossing was crucial for the neighborhood. In the end, a waiver was granted for these curb ramp landings to be built at a 9% grade instead of the usual 2% grade. In the future, we will not recommend installing a mid-block crosswalk at locations with such a steep grade.

The flashing beacons posed another issue because the SFMTA policy is to use solar powered beacons instead of hardwired beacons because of funding and utility constraints. We had concerns about the multi-story buildings around the crosswalks casting shadows on the solar panels. After consulting with the manufacturer, they determined that the solar panels would not get enough sunlight to recharge. Combined with the narrow right-of-way, the 3-4 story buildings were just tall enough to create a building canyon effect that would not allow enough sunlight to hit the solar panels to recharge them. Fortunately, we had some surplus funds from savings in other parts of the project that allowed us to fund the installation of additional conduit from the adjacent signalized intersections to the mid-block flashing beacons. This is another lesson that we will keep in mind for future projects in high density areas.

The most unusual obstacle we encountered was when we were testing the traffic signals. The cable car operators complained that they could not see the cable car signals. What engineers did not realize was that the gripperson who controls the cable car is standing several feet back from the front of the cable car. The low ceiling of the cable car combined with the downhill grade of the approaches meant that the gripperson could not see the signal at the cable car stop. The signals were important because it showed when to stop and start and what was ahead around the corner. The cable car signals were attached to the poles higher than the vehicle signals to discourage the attention of car drivers. However, the high location of the cable car signal was also too high for the cable car operators. In the end, the cable car signals and the vehicle signals were installed side-by-side which is generally discouraged by most traffic signal design experts. However, we installed a CABLE CAR SIGNAL sign next to the cable car signal to inform drivers not to obey it. In addition, an operator bulletin was sent out to all the cable car operators stating that they must duck or squat as they approach this intersection to see their signals. This is one instance

where having specially trained professional drivers helps in distributing information.

Construction time to connect the traffic signal with the existing cable car equipment was also constrained. The cable cars needed to be in revenue service during construction because shutting down the lines and replacing them with shuttles was very expensive. It ended up being cheaper to have the contractor work at night from 1am-5am instead when the cable cars were not in service. Some of the work was loud and disruptive to the residents of this high density neighborhood, so the SFMTA and the Department of Public Works Public Relations officers had to keep an open line of communications with the residents to reassure them that the noise would be kept to a minimum and to complete this project as soon as possible.

Finally, the large \$1.6 billion Central Subway Project on the Washington Street side of campus started construction before the Washington Street bulb was constructed. This work closed off Washington Street to all through traffic to allow trucks which came every 5-10 minutes access to the construction site. We tried to coordinate the two projects, but were unsuccessful due to contractor's workload, and the interference it would cause with the near constant ingress and egress of large trucks. The booming local economy has resulted in a shortage of construction tradespeople such as electricians to meet the public's demand. Only two electrical contractors bided on the project because of the high demand for electricians in the area. The final bid was still below the engineer's estimate, but this shifted "control" of the project to the contractor. The contractor took several months longer than usual to start and finish the project because he was finishing up other city projects he was awarded. Ultimately, the Washington Street bulb was removed from the contract because the grant funding expired in 2018. The Central Subway is scheduled for completion in 2019.

Conclusion

Overall, the Chinatown SRTS project taught us much about the construction challenges that we faced in the most dense and hilly sections of San Francisco. Most importantly, having good relationships with the stakeholders was a key in easing the setbacks that were encountered during design and construction. While they were not happy when construction was delayed due to the challenges mentioned, they understood that the end product would be a big benefit for the community. If we did not have a good relationship, the hiccups could have caused more loss in patience and trust in the SFMTA.