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Changing Vehicular Transportation to Alleviate School Zone Congestion in Fremont

ABSTRACT

School drop-off zones in Fremont face significant traffic gridlock during peak hours due to the rush of parents dropping off or picking up their students and people entering or exiting the school at the same time. Meanwhile, AC Transit's supplementary school services consistently operate at or near capacity and typically are not able to board additional passengers. According to the Alameda County Transportation Commission's Safe Routes to School program, 66% of high schoolers rely on family vehicles for their daily commute, illustrating a majority demographic that uses driving for convenience. This paper uses original community survey data from non-users and data from resources from previous years to diagnose the specific barriers that may prevent students from using public transit. Typically, the findings showed an "informational wall" and inconvenience regarding route schedules, as well as safety concerns reported by over 50% of responders, leading to more dependency on personal commuting. To bridge this gap and alleviate neighborhood congestion around schools, this study highlights a framework that proposes new station infrastructure with better information, a "transit buddy" mobile system, and an FUSD carpool community to assist with remaining commute demand.

INTRODUCTION

Every morning and afternoon, schools in Fremont and around Alameda County are bustling with students heading in and out, parents dropping off or picking up. Since the Fremont Unified School District eliminated home-to-school transportation services (school buses) for general education students in 2019, some students and families have been left inconvenienced and dependent on personal transportation. While there are students who use other means of getting to and from school, the majority are driven by a parent or guardian because it remains the most convenient option. This causes traffic gridlock in the neighborhoods that surround schools. This major dependence on vehicles is also driven by Fremont's suburban sprawl. The city of Fremont spans nearly 90 square miles but is divided into only five high school attendance zones, making each zone span around 10 to 15 square miles. For the students who live less than 2 miles from school, an active commute such as biking or walking can be a feasible option for them. However, for the many students who live further from school, an active commute to and from school is likely too far and long, making it an unreasonable option for students who are typically already exhausted, stressed, busy, and sleep-deprived. For these students, vehicular transport is a necessity, instead of just a choice. Students who depend on vehicles can use other means of vehicular transportation to get to and from school, one of them being the public bus service, primarily AC Transit's supplementary school service on its 600 bus series. However, the service consistently operates at or near capacity and cannot absorb more riders or add new buses due to expenses. If a student using public transportation is unable to board a supplementary bus, they can still board a standard local bus, but the AC Transit system itself has an "informational wall", and the local buses in Fremont have longer wait times, making it difficult to navigate for some

newer passengers. This introduces a need for low-cost, yet efficient solutions that can optimize resources, balance passenger loads, increase informativeness, and manage congestion, while ensuring that every student has a safe way to get home. This paper utilizes information and data from original and community surveys to diagnose the barriers when it comes to public transportation and other routes to school. To bridge the gap between automobiles and public transportation to school while also addressing school zone congestion, this paper outlines a framework that proposes three designs: new transit infrastructure, the transit-buddy system, and the carpool community. These solutions aim to provide a simple, convenient, and accessible transit system for all, while also increasing safety and peace of mind for families that use transit, and reducing traffic gridlock in school neighborhoods.

LITERATURE REVIEW

Currently, according to Alameda County's Safe Routes to School Year-End Report for 2024 - 2025, 66% of high schoolers drove themselves to school or were driven to school by a parent or guardian, more than both elementary and middle schoolers. Meanwhile, only 8% of high schoolers used shared modes of transportation like carpooling or public transit. Moreover, the South and East planning areas of Alameda County, which include District 1 cities like Fremont, have the first and second highest percentage of students who drive themselves or are driven to school by a family or household member, at 66% and 59%, respectively. At the same time, only 9% of students in the South planning area (Fremont) take shared transportation to school (bus, carpool, etc.), the lowest percentage of all the areas; likely due to the suburban sprawl in cities like Fremont. In suburban cities where sprawling neighborhoods are common,

the closest bus stops can still be a 15 to 30 minute walk from a student's house. This barrier, along with isolated stops in suburban areas, can increase safety concerns among parents, leading many families to default to driving to school. Moreover, AC Transit's supplementary school lines typically run once in the morning and once in the afternoon, specifically aligned with bell times. If a student has to get to school early or stay after school for extracurriculars, the supplementary bus is no longer an option, forcing them to find alternative options. Even when students do use these special supplementary routes, according to AC Transit director Diane Shaw, they typically operate at capacity. When the supplementary bus reaches capacity, the driver will display a "Drop-Off Only" sign and bypass waiting passengers, leaving some students stranded, making students who live further from the school wait for a standard local bus or a guardian to pick them up. However, it is difficult for AC Transit to expand this fleet to increase accommodation due to budget constraints. If a student misses or is unable to board a supplementary bus, they can board a local standard bus, but it can offer little relief in suburban areas due to low headways, especially if the student misses the standard bus as well. For instance, in more dense urban centers like Oakland in the North planning area of Alameda County, a student who misses a bus can simply hop on a regular local bus within a 15 to 20 minute wait. In suburban areas like Fremont, accidentally missing a bus can mean waiting 30 minutes to an hour for a standard local route, a wait too long and inconvenient for a busy student. This is demonstrated, for example, on AC Transit local line 51A in Oakland, which stops at Oakland Technical High School; that bus typically runs every 12 to 15 minutes. Meanwhile, AC Transit local line 216 in Fremont, which stops near John F. Kennedy High School, runs only every hour, resulting in a much longer wait time if that crucial first bus is missed.

Another reason for this statistical difference in means of transportation among areas in the county could be household income. The city of Fremont is one of the higher-income cities in Alameda County, with a median household income of \$175,816, higher than the county median of \$129,130. This higher income can lead to more car ownership, ultimately contributing to a higher rate of private transportation to school. Overall, in a sprawling suburban area, low-density housing, isolated stations, and distances from schools increase car dependency and decrease public transit ridership, making it financially unviable to operate frequent service or extend services. This lack of frequent public transportation service further increases car dependency, creating a downward cycle of mutually reinforcing problems.

Additionally, parents needing to pick up their children from school daily may pose somewhat of an inconvenience for them as well. Today, many parents are consistently busy. According to Pew Research Center, as of 2025, 52% of different-sex couples with children under 18 consist of two parents with full-time jobs; and in 2026, 52% of full-time working parents say their job makes it more difficult to be a good parent, and 45% say being a parent makes it difficult to advance at work. Especially in a city like Fremont, located in Silicon Valley, it is common for parents to work at offices and tech companies and remain working until the evening, leaving around 5:00 p.m. to 8:00 p.m. Because of this, it may be an obstacle for a parent to have to leave to pick up their student from school in the afternoon to drive them home or to another activity. Now, this problem can continue to grow as some AI startup companies, common in Silicon Valley, are adopting the Chinese “9-9-6 work schedule”, in which employees work 12-hour shifts from 9:00 a.m. to 9:00 p.m. six days a week from Monday to Saturday. This trend can place even more pressure on parents, as many already struggle to balance home

responsibilities with work, including needing to drive their students or other family members back and forth.

This trend of car dependency puts more pressure on the roads, clogging up the streets in school zones, especially if the school is surrounded by residential areas and smaller roads (e.g., American High School). Meanwhile, this congestion can put more pressure on parents, who may already be stressed or in a rush to get to work. According to a parent of a student from Mission San Jose High School, in the mornings, when dropping off her student, the area is flooded with cars, and it is common for parents to honk and lose their patience. Parents may stop or drop off their students far from the designated drop-off area, blocking the cars behind them, leading to congestion continuing to develop further from the school. Meanwhile, the residents who live around the school have trouble leaving their homes because of the congestion. All of these factors create a chaotic, unsafe environment that is unfit for a school zone, and create noise and air pollution that can disturb surrounding neighborhoods.

METHODOLOGY

To diagnose the barriers that prevent people from using public transportation and evaluate potential ways to alleviate congestion in Fremont, this study uses mixed methods of research, including primary survey data from the community and secondary data from regional transit commissions.

Primary data was gathered with an original survey that was distributed to students and parents in the Fremont Unified School District. The survey targeted people who did not use public transit, which is a demographic that is typically overlooked in public transit ridership

surveys. It evaluated dimensions such as daily commute habits, public transit perception, and response to potential solutions. By capturing a fully non-user dataset, the survey identified the specific structural, psychological, and informational barriers that prevented public transit adoption and which solutions would be more effective.

To contextualize survey responses with broader trends, secondary data was received from sources like the Alameda County Transportation Commission's Safe Routes to School (SR2S) 2024-2025 end-of-year report, AC Transit official routes and schedules, and the U.S. Census Bureau. Regional commute data provided information on modes of transportation across Alameda County, while AC Transit schedules and metrics, and household income data from the U.S. Census Bureau helped identify and evaluate services that serve high schools and contextualize the Transportation Commission's commute data.

The survey findings and resources were mapped to provide a framework for proposals that optimize resources, address public perception, and alleviate community congestion.

FINDINGS AND ANALYSIS

To evaluate the underlying causes of vehicle dependency and barriers to public transportation in Fremont, a survey was posted and distributed to students from the Fremont Unified School District (N=11). Per the study's methodology, all respondents stated that they do not take public transit. By capturing an exclusive non-user student demographic, the survey pinpointed and helped diagnose the specific barriers to adopting public transportation. Before diagnosing transit barriers, the survey confirmed that traffic conditions around Fremont's school zones were an underaddressed issue. 45.5% (n=5) of respondents agreed or strongly

agreed that Fremont roads and school zones are unsafely congested during morning and afternoon drop-off/pick-up rush hours. This data confirms that current common commute habits create hazards and delays around school zones. It highlights the need for new solutions and different modes of transportation that can reduce the number of individual vehicles arriving at the school at the same time, creating a safer, less congested environment, and allowing for more students to arrive at school on time.

When it comes to the barriers to public transportation, personal safety concerns and perception are prominent ones. 54.5% (n=6), over half of the respondents cited safety concerns as a primary reason they do not take public transportation. However, this is largely due to perceived danger. While an incident can still happen, according to AC Transit Director Diane Shaw, the buses are generally very safe, and incidents are typically rare. Often, students and families may fear the environment of the bus stop, missing the bus, dangerous people on the bus, or an accident occurring. However, these anxieties are not an insurmountable barrier. Students responded positively to solutions such as peer-supported safety systems and real-time alert systems. When asked about different processes to address such fears, 81.9% (n=9) of respondents agreed that a “Transit Buddy” peer system would help or provide peace of mind in some way. Moreover, 63.6% (n=7) agreed that an emergency text-alert service would make them more inclined to use public transportation.

Additionally, physical timing and scheduling conflicts also presented a significant obstacle to bus adoption. 63.6% (n=7) of respondents reported that they frequently arrive at school early or stay after school for extracurricular activities and sports. This highlights the limitation of AC Transit’s supplementary school buses. Because these buses are specifically arranged around and

cater only to regular bell schedules, almost two-thirds of the student population are regularly left without public transportation as an option, making carpooling or driving the default, or walking or biking if the student lives close enough to the school.

In addition to these metrics, qualitative feedback from FUSD students revealed an “informational wall” or an inconvenience regarding public transit. Students have reported that trying to figure out the transit system can be confusing and frustrating, especially as a new rider or for routes involving transfers or complicated headways. One student noted: “main thing is to create a convenient, accessible, timely public transportation system for all.” Standard local routes in Fremont, like Line 216, run rather infrequently, and so the chances of making a navigation error or missing a transfer are high. Moreover, the system maps, line numbers, and bus headways can be hard to understand, navigate, or coordinate. This complex informational wall for new riders creates anxiety, leading people to opt out of public transit to avoid dealing with the system hassle.

Moreover, AC Transit has an official app available to download that can provide real-time trip information, predictions, schedules, service changes, and more. A usability audit was conducted on this app to evaluate the experience for new users along with an analysis of public user reviews. The audit showed that while the app does offer helpful tools, information, and trip planning, it lacks holistic system mapping. Bus stops are shown as unlabeled dots on a monotone map, and routes are not rendered on the map unless they are individually searched. This requires users to already know street names and stop locations, which can pose a significant barrier for newer or infrequent riders. These gaps correlate to public feedback on the iOS App Store, where the app currently holds a 2.9 out of 5-star rating. One 2-star reviewer emphasized that navigating

a new area across multiple bus lines was complicated and hard to follow because the app displays isolated, unlabeled stops instead of connected routes. For new users, the app does offer a tutorial feature that can be accessed at any time. However, it is hidden away in a menu rather than integrated into the initial download, leaving new users to navigate the app without guidance or knowledge that a tutorial is available for them. For unfamiliar users, users who require high-visibility tools, or users who have trouble navigating maps, a monotonous, unlabeled interface with a hidden tutorial creates confusion. When bus routes in Fremont run on long headways, busy students cannot afford to guess which route a bus will take or look through unlabeled stops. This friction deepens the “informational wall”, pushing people to choose the safe predictability of a personal drive over a transit app.

These findings collectively illustrate that while school-zone congestion creates a need to reduce private vehicle trips and increase other modes of transportation to school, getting students to actually switch modes requires specific mechanisms: lowering rider safety anxiety through peer connection networks, breaking down the informational wall with clear and concise tools, and organizing necessary car trips into connected carpool networks. Together, these mechanisms, if implemented correctly, can significantly reduce congestion in school zones and create a safer and more efficient school transportation environment.

PROPOSED SOLUTIONS

To address the barriers identified in the survey and the app audit, this paper proposes a three-part proposal that collectively targets safety perception, accessibility, and vehicle usage.

1. Digital “Transit Buddy” and Text-Alert Systems

To alleviate the safety anxiety that prevents over half of surveyed non-users from taking public transportation, AC Transit can launch a peer-pairing “transit buddy” initiative where vulnerable riders can choose to be paired with a guardian or peer through the AC Transit or Clipper app and allow tracking for specific guardians. When the rider boards a bus and scans their Clipper Card or arrives at their destination, the guardian gets a notification on their device. For example:

“[Student Name] boarded bus 1714 on Line 211 at Fremont Blvd & Alder Av (American Sr High School) toward Union City BART at 3:40 PM.”

When the boarding notification is received, the guardian can track the bus that the rider is on in real time through GPS until the rider arrives at their destination. Since riders do not have to tap their card upon exiting the bus, the system will provide arrival information based on estimates and will notify the guardian when the bus has arrived at the destination. Not only can this provide peace of mind for parents with students taking the bus to and from school, but it can also reassure many other families with vulnerable groups as well, such as seniors traveling alone or adults with spouses. This system can be available to anyone. Additionally, although AC Transit already operates an opt-in SMS/email subscription system for route service alerts, it can be better promoted to families with students who use public transportation. AC Transit can partner with FUSD to help streamline subscription to the service through existing platforms like

ParentSquare and StudentSquare (platforms that FUSD already uses for communication and school/District messages). Upon registration, parents and students can opt in to receive notifications from the app on school days about all AC Transit supplementary and local bus lines that serve their school and choose which stations they would like to receive alerts for. This school-specific service would operate like the existing AC Transit alert system, providing alerts for delays, cancellations, detours, stops, issues, and emergencies, just integrated into a school platform, increasing knowledge of the service and providing further reassurance for families. Family fear is often caused by a lack of context or visibility. By turning regular fare card taps into automated check-ins and allowing students *and* parents to receive information, it partially eliminates the necessity for students and parents to constantly text or call while giving guardians peace of mind.

2. Improved Station Infrastructure and Digital Streamlining

To break down the “informational wall”, AC Transit should prioritize user-friendliness and implement approaches that improve physical station design and digital usability. While AC Transit is currently on a mission to improve stations across the district, they should prioritize high-visibility, adequate lighting, and standard, clear signage at each station. Currently, many AC Transit stations are just a small sign on the sidewalk, easily missable and only showing which routes stop there. At a minimum, every station sign should clearly feature route numbers, headways, maps, and schedules so that all people of all groups may understand it. This station sign design would be extremely beneficial, not just to students, but to all users, allowing them to easily check

and understand what bus to board, how to get to their destination, and approximately how long they need to wait without having to resort to their devices. It would be particularly useful in locations with spotty reception (as the AC Transit app requires an Internet connection), or if the rider does not have a device with them or has a low battery on their device. Moreover, adequate lighting would greatly help with visibility and safety at night, for the user and for the bus driver. Meanwhile, where spacing, budgeting, and regulations allow, AC Transit should also consider prioritizing the installation of benches and bus shelters in as many stations as possible. This would also increase safety and help passengers so that they may have a place to rest and protect themselves from the elements, especially at stations with longer wait times.

To resolve navigation issues with the official AC Transit app, the app should be updated with student- and beginner-friendly interfaces and tools. For new users opening the app for the first time, the app should automatically show an option to the user to go through an interactive tutorial and be guided through the app and shown how to use essential functions. The user can opt out or end the tutorial at any time, and it can be accessed in the menu at any time. Additionally, for specific tabs or pages that may need some clarification, such as “select line” and “select stop” on the app’s search page, the app should provide small help logos (like a question mark) so that the user can find context or information when they need it. Additionally, the app should also introduce a customizable map with map layer toggles on the main map interface, allowing users to independently display routes, stations, and labels based on their preference. Together, these new station and app designs can help ensure that all users feel safe and informed, physically and

digitally, regardless of where they are or their familiarity with the system, effectively dismantling the “informational wall” and developing transit confidence.

3. Carpool Community Program

Of course, not every student is able to take the bus, and not everyone prefers to take public transportation. To address this group of students, FUSD can create a designated “carpool community” or carpool matching program for each school. Also, since FUSD eliminated general education school bus services, it would be beneficial to help parents with an alternative. This program can have a specific group text on apps like ParentSquare. Each parent can opt in through the app at any time. Each school will have its own chat where parents can reach out and find other parents who may be available to help drive their student. Another way this program could work is that parents can fill out a form to submit to the school or the district with their student’s name, what school they attend, their contact information, their general location, and when they will need a carpool. Then, FUSD can have a person or use technology to look through their database and find a family who also lives in the same area and has a student who attends the same school. A notification can be sent to that family, asking them if they would be interested in a carpool. For example:

Dear Parent,

A family with a student who also goes to Irvington High School is looking for a carpool on Tuesdays and Fridays. Would you be interested? If you are interested, please click the link below to be connected. If you are not interested, you may ignore this message.

This program is a way to ensure that all students can safely get home or to school while also reducing pressure on roads and parents. While most students who carpool find carpools through friends, parent relations, and parent group chats on apps like WhatsApp or WeChat, not every student may feel comfortable or have the time to look for carpools, and not every parent may know other parents or be in a parent group chat. With a carpool matching system, it can ensure that every student is accounted for and is able to find a safe ride between school and home while also reducing the number of vehicles on the roads.

CONCLUSION

This study demonstrates that chaotic, congested roads are not an adequate environment for Fremont's schools. Alleviating congestion while still keeping vehicular transportation convenient in FUSD requires shifting vehicular transportation patterns to different modes besides individual vehicles. Public transit is an option, but usage is hindered by barriers like safety concerns, complicated information, and scheduling conflicts. As a result, standard local buses can remain rather empty even when supplementary school routes are full.

In order to effectively decrease traffic around schools, local leaders need to make alternative transportation options safe, simple, and practical. Implementing automatic Clipper

check-in alerts for parents, installing standard amenities across bus stops, streamlining the AC Transit app, and establishing a carpool network for students can all help address personal vehicle dependence. By making transit and carpooling safer, more reliable, and more reassuring, together, FUSD and AC Transit can reduce vehicular traffic and successfully ease rush-hour congestion in school zones while ensuring that every student has a safe way to travel between home and school, even when parents may not be able to drive them.

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