Final Report

SLO Transit Innovations Study

Prepared for SLO Transit
by Arcadis IBI Group

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Executive Summary

The Transit Innovations Study presents the City of San Luis Obispo with a unique opportunity to reimagine SLO Transit. In 2020, the City set an ambitious mode-split objective target for 12% of trips to occur on transit by 2035, while it simultaneously experienced a dramatic decline in transit ridership due to the COVID-19 pandemic. To reach its mode split objective and ridership goals, SLO Transit needs to provide the community with approximately 500,000 additional trips every year between 2023 and 2035. This bold and ambitious commitment to increasing transit ridership necessitates moving beyond incremental change and investing in transformative solutions.

Transportation is the largest source of the City's climate emissions, and transit is a key lever to reduce emissions. The City also recognizes that public transit is more than a climate solution – it is equally a housing, parking, equity, and inclusivity solution. As the construction of new subdivisions comes to a close, the City will increasingly rely on infill development to keep pace with housing demand. As new housing increases the density of existing neighborhoods, SLO Transit can alleviate parking concerns while providing an affordable mobility option for a growing community of people that work, live, and play in San Luis Obispo.

This opportunity to bolster and improve SLO Transit is strengthened by the City's recent staffing and organizational changes. San Luis Obispo's new Mobility Services Division brings together Transit, Active Transportation, and Parking Services to allow greater coordination between all forms of mobility the City oversees including pedestrian, bike, car, and transit. SLO Transit's future depends on complementary first-last mile connections and innovative mobility services that give SLO community members the confidence to leave their cars at home or become single-car households.

The City has also recently affirmed that operating an independent transit service provides unique benefits and tangible value to the community. The Transit Program Analysis findings supplied evidence in support of maintaining an independent SLO Transit, alongside recommendations to partner with San Luis Obispo Regional Transportation Authority to implement certain solutions at a regional scale. As the majority of transportation trips in San Luis Obispo start or end outside of the City, pursuing thoughtful regional solutions that make it easy to transfer between transit providers is key.

This Transit Innovations Study builds on these findings and recommends and prioritizes innovations including critical technology upgrades for ongoing operations; technologies that improve riders' user experience; fare program updates for low-income, senior, and youth populations; enhanced fixed-route service and complementary alternative mobility services, and bus shelter and street improvements for rider safety and comfort. The City has never been more ready to offer community members integrated multi-modal transportation options, new ideas, and transformative solutions as it works steadfast to reach its 12% transit mode split target over the next twelve years.

SLO Transit Innovations Study

This SLO Transit Innovations Study evaluates opportunities for innovative technology and new mobility services to support the City's current transit network and help the City achieve its established mode shift goals of 12% transit trips, 20% bicycle trips, and 18% of trips via walking, carpools, and other forms by 2035.

The study aims to put forth actionable recommendations to improve fixed-route transit service, explore alternative service modes, and broadly enhance transit as a viable alternative to private automobile travel. By further investigating and implementing the new technologies and mobility strategies, the SLO Transit Innovations Study strives to improve current transit operations and restore ridership while also taking steps to enhance transit's potential to achieve diversity, equity, and inclusion goals through affordable and dependable mobility options.

The SLO Transit Innovations Study, led by the external consultant IBI Group, provides actionable recommendations that relate to transit and other innovative mobility concepts. These recommendations were developed in response to needs identified by internal and external transit staff and key stakeholders and were subsequently vetted and prioritized in a stakeholder workshop. Ultimately, the study's recommendations will be pursued through the 2024-25 Supplemental Budget, upcoming Short-Range Transit Plan update, and future updates to the Climate Action Plan, Active Transportation Plan, and other applicable plans.

Innovations Evaluated by the Transit Innovation Study

In total, the study recommends 19 transit innovations for SLO Transit's consideration, which are categorized into the five themes below.

On-Board Technology Upgrades for Ongoing Operations

The first category "Critical Technology" includes upgrades that support ongoing operations such as replacing computer-aided dispatch and automated vehicle locater systems (CAD/AVL), upgrading automatic passenger counters, and replacing and improving camera systems on fixed-route vehicles. Key stakeholders agreed these upgrades are necessary for successful ongoing transit operations.

Technologies that Improve Riders' User Experience

The second category "User Experience" houses technology advancements that improve riders' user experience. These technologies consist of the enhancement of real-time passenger information, pursuing open loop payments through Cal-ITP, and establishing a Mobility-as-a-Service platform. An open-loop payment system—an on-board technology that enables riders to pay for the bus via credit card or a transit card—would reduce friction in the payment process, increase access for low-income riders, and ensure that SLO Transit is accessible to the next generation of younger transit users. Internal and external stakeholders agree that an open loop payment system is best pursued at a regional level in coordination with RTA, and that it should make it easy for low-income verified transit users to access reduced fares.

Fare Program Updates to Increase Transit Opportunities

The "Fare Programs" category incorporates fare program updates that increase transit accessibility. Ideas such as expanding the downtown access program, implementing fare changes for students, seniors, and low-income riders, and exploring institutional partnerships were grouped into this bucket. These fare program updates would enable SLO Transit to become more convenient and affordable to key rider markets while also better connecting the City's suburbs to the downtown core. Key partnerships with RTA, Cal Poly, school districts, hospitality businesses, and developers are crucial to getting more riders on regional transit. In all cases, fare program updates must be paired with robust communications and marketing efforts to ensure that residents and commuters are aware of the program/s and how to participate.

Bus Shelter and Street Improvements for Rider Safety and Comfort

The final category "Shelters and Streets" covers physical improvements to the bus stops themselves such as improved lighting, improved shelters, Real-Time Passenger Information, and sufficient bike parking. It also touches on constructing mobility hubs to promote bus rider transfers to different mobility options at strategic stops, and constructing bus bulb-outs at downtown stops to increase safety and reduce bus travel time. Contributors to the workshop agreed that creating a safe, comfortable, and secure environment was important to increasing ridership. Stakeholders emphasized the importance of using a standardized design language and creating an ongoing maintenance plan for this solution category.

Enhanced Service and Alternate Transit Options

The "Enhanced Service" category focused on improvements to SLO Transit's fixed route service as well as the addition of new alternative mobility options that could be operated by SLO Transit or third-parties. This category includes service enhancements that decrease headways, launching car and bike share programs, and offering micro-transit services. Stakeholders who participated in the Transit Innovation Study process overwhelmingly agreed that enhanced service (i.e., running buses more often on popular fixed routes) is vital to increasing ridership. As enhanced service often comes with a high price tag and staffing burdens, there are typically trade-offs between a transit program's fixed route geographic coverage and its headways. To overcome this challenge, the study recommends implementing enhanced service on certain routes with reduced coverage in other areas, as long as alternative mobility services (i.e., on-demand micro-transit) are introduced provide a feasible alternative for existing SLO Transit riders.

Transit Innovation Study Recommendations

The study's recommendations summarized in the table below aim to address SLO Transit needs and further its goals of enhancing mobility, restoring ridership, and improving technology. Each of the columns and the values displayed are described in more detail throughout the report.

Relevance to SLO

While each of these recommendations is generally relevant (other potential solutions have already been eliminated over the course of this project) this column evaluates the degree to which the respective solution maps to the needs of SLO Transit and the City. Through extensive conversations with SLO Transit staff, City staff, and stakeholders this categorization was developed and updated throughout the project to characterize the interests of the community and of the organization relating to a given solution. 'High' relevance reflects a solution that directly maps to a need identified through the needs assessment and that received high interest throughout the project. 'Medium' directly maps to a lower priority need or high need and received moderate interest. 'Low' relevance solutions generally reflect emerging trends that may address some needs for SLO Transit but received lesser interest.

Impact to Ridership

Some recommendations will help directly restore ridership or aim to improve transit reliability so as to expand ridership. These are coded as high impact. Medium impact recommendations should help improve ridership but are expected to be less impactful than high-ridership impact solutions. Other recommendations are internal planning efforts or operational improvements that will help SLO Transit maintain service levels and efficient operations but may not directly impact ridership. These are coded as low impact.

Timeframe

Recommendations are sorted into projects that can likely be completed in the short-term (1-2 years), medium term (2-3 years), or long-term (3+ years).

Cost

In line with purchasing policies from the City of San Luis Obispo, recommendations may be considered low, medium, or high cost. Low-cost recommendations are Tier 1 purchases (<$10,000 for professional services or <$15,000 for capital projects). Medium-cost recommendations are Tier 2 or 3 purchases ($10,000-$70,000 for professional services or $15,000-$200,000 for capital projects). High-cost recommendations are Tier 4 and above purchases (<$70,000 for professional services or >$200,000 for capital projects).

Priority

This column provides an overall summary priority level considering stakeholder feedback and all other factors presented in this table. High priority items are recommended to be integrated into near term policy, budgetary, and programmatic decisions, and thereby initiated within the next 6-12 months. Medium priority items are targeted to begin in 12-24 months. Low priority items, while still worth pursuing, have dependencies or other long range planning efforts that make those efforts more realistic to be pursued in 24+ months. Priority is distinct from 'Timeframe' which only provides guidance on how long each effort may take to complete.

Table 1: SLO Transit Innovations Study Recommendations

#	Recommendation	Category	Relevance to SLO	Impact to Ridership	Timeframe	Cost	Priority
1	Enhanced Service on Fixed Routes	Enhanced Service	High	High	Medium	High	**HIGH**
2	Pursue open loop payments through Cal-ITP, in coordination with RTA and SLOCOG	User Experience	High	High	Medium	Medium	**HIGH**
3	Fare Changes for Students, Seniors, Low-Income Riders	Fare Programs	High	High	Short	Low	**HIGH**
4	Replace CAD/AVL System on Fixed-Route Vehicles	Critical Tech	High	Low	Short	High	**HIGH**
5	Upgrade Automatic Passenger Counters on Fixed-Route Vehicles	Critical Tech	High	Low	Short	Medium	**HIGH**
6	Enhance Real-Time Passenger Information	User Experience	Medium	High	Short	Medium	**HIGH**
7	Replace and Improve Camera Systems	Critical Tech	High	Low	Short	Medium	**MEDIUM**
8	Explore Institutional Partnerships	Fare Programs	Medium	High	Medium	Low	**MEDIUM**
9	Install Lighting, Shelters, and Bike Parking at Applicable Bus Stops	Shelter and Streets	Medium	Medium	Short	Medium	**MEDIUM**
10	Expand Downtown Access Program	Fare Programs	High	Medium	Short	Low	**MEDIUM**
11	Pursue Micro-Transit Mobility Services	Enhanced Service	Medium	High	Long	Medium	**MEDIUM**
12	Launch a Bikeshare Program	Enhanced Service	Medium	Low	Short	Low	**MEDIUM**
13	Establish a Mobility-as-a-Service Platform	User Experience	Medium	Medium	Long	High	**LOW**
14	Investigate and Establish Mobility Hubs	Shelter and Streets	Medium	Medium	Medium	High	**LOW**
15	Launch a Carshare Program	Enhanced Service	Medium	Low	Medium	Medium	**LOW**
16	Implement a Transit Signal Priority Strategy	Enhanced Service	Low	Low	Medium	High	**LOW**
17	Add Bus Bulb-outs Downtown	Shelter and Streets	Medium	Low	Long	Medium	**LOW**

Introduction

The *Transit Innovation Study* evaluates opportunities for new technology and new delivery modes that will support the City's current transit network and help achieve its established mode shift goals of 12% transit trips, 20% bicycle trips, and 18% of trips via walking, carpools, and other forms by 2035. These goals emphasize the need to bolster transit and other active transportation modes as viable alternatives to the private automobile. Historically, SLO Transit has been largely focused on traditional fixed-route bus service. This study will lend insight into new technologies and innovations to improve fixed-route service as well as innovative transit concepts related to micro-transit, micro-mobility, fare structures, and more.

By further investigating and implementing the new technologies and mobility strategies discussed in this plan, SLO Transit strives to improve current transit operations and restore ridership while also taking steps to enhance transit's potential to achieve diversity, equity, and inclusion goals through affordable and dependable mobility options.

The Transit Innovation Study is informed by and helps support the City's many existing planning documents, including the:

- *Land Use Element of the General Plan* which represents a generalized blueprint for the future of the City of San Luis Obispo by setting forth a pattern for the development of land within the City's planning area.
- *Circulation Element of the General Plan* which aims to recognize implications of land use policy on all modes of movement and establishes mode shift goals, policies, standards, and implementation measures that work with the Land Use Element update and address both existing and potential circulation opportunities and deficiencies.
- *Active Transportation Plan* which sets forth goals for San Luis Obispo to become an active transportation friendly city where people of all ages, incomes, backgrounds and ability levels have access to sustainable transportation options that are healthy, comfortable, convenient and affordable.
- *Access and Parking Management Plan* which provides context on commuter transportation and identifies opportunities to improve parking policies and strategies in an effort to encourage more sustainable modes of transportation.
- *Climate Action Plan* which establishes a Council adopted community-wide goal of carbon neutrality by 2035 with an objective to achieve the mode split objective of 7% transit use by 2030 and 12% transit use by 2035.

The Transit Innovation Study provides actionable recommendations that relate to transit and other innovative mobility concepts for possible inclusion in the 2024-25 Supplemental Budget, and future updates to the Climate Action Plan, Short-Range Transit Plan, Active Transportation Plan, and other future applicable plan updates. The Transit Innovation Study also strives to address diversity, equity, and inclusion goals through affordable and dependable mobility options.

1 Background

San Luis Obispo (SLO) Transit is a municipal system administered through the City's Public Works Department. SLO Transit plays a crucial role in providing safe transportation options for students at the California Polytechnic State University (Cal Poly), residents, local employees, and visitors. SLO Transit works with other departments within the City for ongoing planning and improvement of mobility services in the region.

In addition, SLO also works with the San Luis Obispo Council of Governments (SLOCOG) which serves as the Regional Transportation Planning Agency (RTPA) and Metropolitan Transportation Organization (MPO) for the County as well as San Luis Obispo Regional Transit Authority (RTA) which operates the regional fixed-route and paratransit[1] services. SLO Transit contracts its operations for the provision of drivers, dispatching, road supervision, and maintenance. Transdev (formerly First Transit) is the City's current contractor.

The program's services are provided via the City's Transit Fund, which is made up of federal funding, state funding, and local revenue. Like many agencies, ridership and farebox revenue for SLO Transit have decreased since the COVID-19 pandemic. Restoring ridership numbers to pre-pandemic levels remains a top priority for SLO Transit.

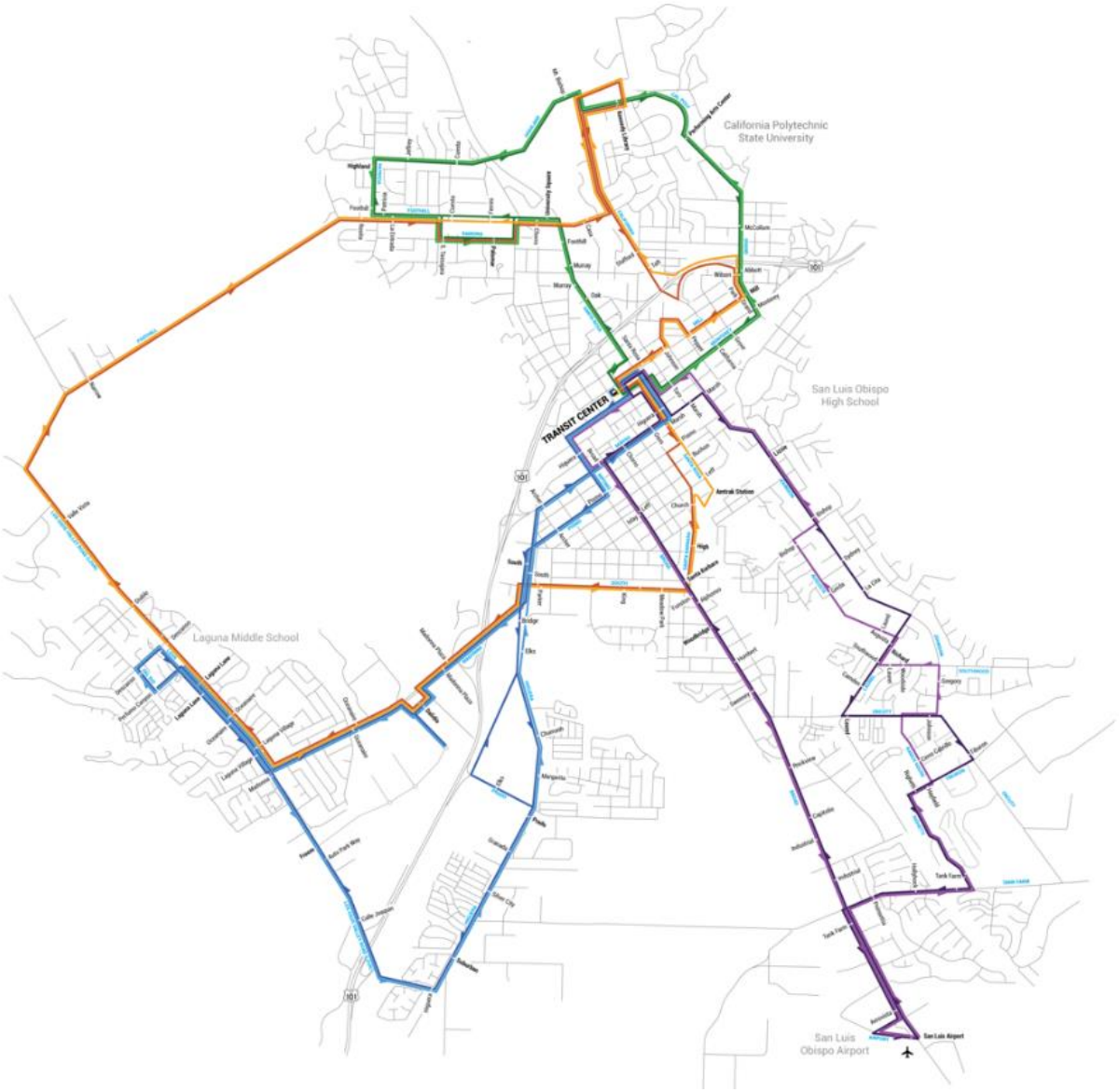
Currently, the transit program has eight fixed-routes operating throughout the downtown and surrounding area and maintains the following capital assets:

- 17 revenue vehicles and 2 support vehicles
- Operations and maintenance facility
- Bus wash system
- Transit center with sawtooth bays and four deluxe shelters
- 165 bus stops

In addition to SLO Transit, the City is serviced by the San Luis Obispo Regional Transit Authority (RTA). RTA provides intercommunity public transportation. RTA's service area includes all of San Luis Obispo County and extends into Santa Barbara County to the south. RTA provides regional fixed-route service and Americans with Disabilities Act (ADA) complementary paratransit service (Runabout) for RTA fixed-route as well as SLO Transit routes.

[1] Paratransit refers to Americans with Disability Act (ADA) complementary paratransit service

Figure 1. SLO Transit Service Map



2 Existing Conditions and Needs Assessment

This section outlines the current technologies utilized by SLO Transit for operations and administration as well as the technologies used by drivers and riders on-board. In addition, a needs assessment was conducted to analyze the current state of SLO Transit's fixed-route transit technology and the needs that stem from those systems and related systems. It is important to note that the list of needs developed for this plan, while critical to this effort, are not exhaustive. Other needs identified in previous planning documents were considered in creating recommendations. These included:

- Achieving mode split of 7% transit use by 2030 in pursuit of carbon neutrality, as outlined in the Climate Action Plan and Short-Range Transportation Plan
- Reducing emissions through improving active transportation offerings and amenities such as additional bike parking, as discussed in the Active Transportation Plan
- Easing the cost of transportation for low-income individuals, as described in the Access and Parking Management Plan
- Need to reduce headways and improve on-time performance as identified in the Short-Range Transportation Plan.

2.1 Stakeholders

To document existing systems and assemble a list of needs, virtual meetings were conducted in January and February 2023 with City of San Luis Obispo staff and contracted staff, who handle operations and maintenance on behalf of SLO Transit. These meetings included discussions with key personnel and departments including transit planning, operations, maintenance, administration, active transportation, sustainability, and finance.

Once the SLO Transit assembled the list of needs, it shared this list with relevant external stakeholders including Mass Transportation Committee (MTC) members, Downtown SLO, SLOCOG, the Chamber of Commerce, and RTA. These organizations continued to share feedback and were involved throughout the remainder of the project as well.

2.2 Existing Systems

The technologies relevant to SLO Transit operations can be grouped into the following categories:

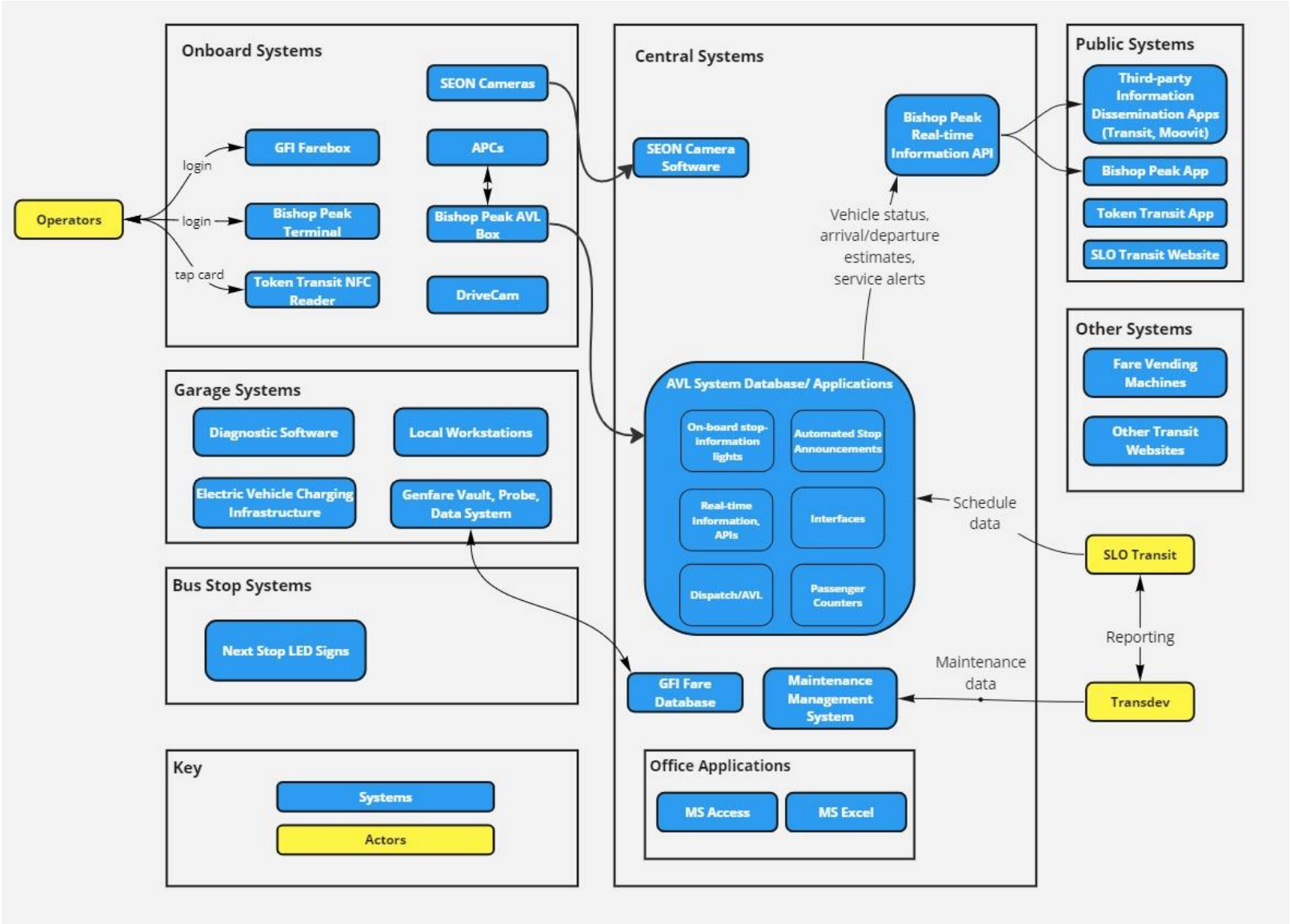
- **Onboard:** Refers to technology systems installed onboard SLO's bus fleet. These systems often interface with the central systems through cellular data communications, radio communications, or satellite.
- **Central:** Refers to systems that are installed for SLO operations, maintenance, and planning. This includes central automatic vehicle location (AVL) components as well as farebox software, camera software and maintenance management systems.
- **Bus Yard:** Refers to systems that are installed at SLO Transit's Bus Yard. These systems are often interfaced with the central systems through a direct wired network connection, and with onboard systems through wireless data communications access

points. This includes diagnostic software and electric charging components for battery electric buses (BEBs).

- **Public Systems:** Public-facing systems are closely integrated with central systems but disseminate information to the public via the Internet using an external customer interface (e.g., SLO Transit website or third-party applications). These systems are accessible outside the firewall to protect the central systems from external network threats.

A high-level system interconnect diagram is provided in **Error! Reference source not found.** to show relationship between various systems and technologies. Appendix A provides an inventory of these existing systems and more details as to their function in the current transit environment.

Figure 2: SLO Transit Existing Systems



3 On-Board Technology Upgrades for Ongoing Operations

Technologies impact every aspect of fixed-route services including planning, schedule development, operations, maintenance, revenue management, providing timely information to customers, and many others. In conjunction with the SLO Transit needs found in Section 2, an industry scan of relevant transit technologies was prepared to help inform the possibilities SLO Transit could pursue to improve operations.

Of the twelve technologies discussed in the industry scan, three solutions were identified as particularly relevant to SLO Transit needs and priorities. These on-board technology improvements are critical for maintaining ongoing fixed-route services and are notable pain points for SLO Transit; unreliable vehicle location data, inconsistent passenger counts, and aging camera systems place the agency at a disadvantage when it comes to maintaining operations. This section provides a summary of three on-board technology solutions, their relevance to SLO operations, and an estimate of costs involved with procuring each technology.

Table 2: Recommendations related to Improvements to On-Board Technology

#	Recommendation	Relevance to SLO	Impact to Ridership	Timeframe	Cost	Priority
4	Replace CAD/AVL System on Fixed-Route Vehicles	High	Low	Short	High	**HIGH**
5	Upgrade Automatic Passenger Counters on Fixed-Route Vehicles	High	Low	Short	Medium	**HIGH**
6	Replace and Improve Camera Systems	High	Low	Short	Medium	**MEDIUM**

3.1 CAD/AVL System Replacement

Computer Aided Dispatch/Automated Vehicle Location (CAD/AVL) technology provides tools to track vehicle position at a predefined interval and provides tools to manage operations in real-time from a centralized or remote-control center. CAD tools provide the capabilities to communicate with drivers, monitor route and schedule adherence and respond to events/incidents. AVL technology serves as a core component to many other transit technology applications that rely on vehicle location (e.g., real-time passenger information signage and on-board next stop announcements).

CAD/AVL systems also provide data for offline reporting and analyses. The system includes mobile data computer (MDC) on vehicles that are equipped with schedule data and communicate with a central control software in real-time.

Many CAD/AVL systems designed for fixed-route transit are feature-rich and boast comprehensive integration with other transit systems (such as APCs, Headsigns, etc.). However, there are also CAD/AVL Lite systems that can be cheaper and focus primarily on vehicle tracking and microtransit capabilities. On-board features typically include GPS antenna

and receiver, on-board computer, mobile data terminal, and radio or cellular data communications modem. Software is typically cloud-based and allows for operation on a variety of central-end hardware.

Based on SLO Transit operational needs as shown in **Error! Reference source not found.**, SLO Transit's current CAD/AVL system is not functioning properly and lacks many of the features critical for fixed-route operations. Operations staff reported instances of the current system glitching and freezing, and difficulties performing reporting. Staff also identified issues with incorrect vehicle locations appearing on the SLO Transit app and vehicle estimated time of arrival (ETAs) not always being correct.

Because the CAD/AVL system interfaces with critical components such as real-time passenger information signs at SLO Transit Center, the SLO Transit application, and annunciators on board, it means that sometimes, incorrect location data from the CAD/AVL system is being shared, which affects the arrival times and stop announcements that riders see and hear when using the bus. This has a direct impact on rider experience and impacts evaluations of the system as a whole.

The replacement of the CAD/AVL system is a high priority recommendation that addresses needs for improved dispatch, administration reporting, and customer service operations. Despite limited impacts to ridership directly, the project team determined this solution directly addresses a critical need relating to unreliable information and dysfunctional technology, and that such a solution would greatly benefit current and future SLO Transit riders.

3.1.1 Cost

For the traditional CAD/AVL systems which would be recommended for fixed-route vehicles, the major cost components are divided across three categories: central systems, onboard systems and project implementation and testing. The cost for CAD/AVL systems is dependent on the included features and functionality but is typically in the range of $15,000-$20,000 per vehicle for onboard systems and $500,000-$1,500,000 for central software and systems, plus 10-20% of the total amount for project management, testing, documentation and training. In addition, ongoing warranty and support costs can be significant, ranging from 10-20% of the total project hardware, software, and implementation cost on an annual basis.

Total costs for a project of this size for SLO Transit could be on the lower side, depending on the features included. For a fleet of SLO Transit's size, an improved CAD/AVL system would likely be in the range of $300,000-$500,000.

3.2 APC Replacement

Automated Passenger Counters (APCs) are useful tools for system planning, performance monitoring and reporting. APCs provide detailed boarding and alighting information at each doorway for each stop and time along a route. Data on passenger volumes and stop-level passenger activity can be used to plan route changes, service level adjustments and investments in bus stop amenities. APC technology consists of sensors located on the bus (door-mounted or overhead) along with controllers and a central software that collects and process the data.

APC software can either be a stand-alone system or it can be integrated into a CAD/AVL on-board computer. APC systems can provide real-time capacity data (through CAD/AVL system) or provide data for offline analysis after download and post-processing. An integrated system reduces additional post processing and allows for a single data repository.

Based on SLO Transit's operational needs in **Error! Reference source not found.**, SLO Transit's existing APC system is run through the AVL system. It was installed on most of the buses, but they have not worked as intended since installation. Because the APC system directly estimates ridership, an improved APC system can provide 100% passenger mile data for annual NTD reporting, which would eliminate need for extensive sampling and help improve accuracy. This also directly impacts funding the agency may receive. It also impacts planning efforts related to increasing ridership as it provides a helpful gauge of system performance.

3.2.1 **Cost**

APC system costs for onboard APC equipment range from $2,000 to $3,500 per vehicle for 2 door vehicles. APC software costs range from $10,000-$15,000 for software that does not post-process counts to $50,000-$100,000 for software that does complex post-processing and generates multiple reports and visual dashboards.

Total costs for SLO Transit would be near $75,000 for a system that does not perform post processing, or $125,000 for a system that does include those functions.

3.3 Improved Camera Systems

Video surveillance is often used to ensure safety and deter theft or violence on vehicles. Camera technology can also allow agencies to perform additional functions such as automatic bus lane enforcement, passenger count, and incidence management. This can include cameras (either IP or analog), a digital/network video recorder (DVR, NVR), a router or WLAN to connect to a central system.

SLO Transit vehicles have two different camera systems. Most vehicles have older SEON systems, while 3 buses have more modern cameras that interface with CAD/AVL software. The two different systems result in procedural inconsistencies for data backup and incident reporting. In addition, some of the equipment is older and becoming outdated.

Because of the inconsistent and aging systems, incidents that occur onboard are often reviewed through DriveCam, which is reliable but only captures one angle and is not useful for incidents that occur on the side of the bus. An improved camera system could allow SLO Transit to capture multiple angles for incident reporting, allow for wireless transfer of data, and standardize processes. The City would also benefit from ensuring WLAN functionality on new buses for ease of data transfer in the future. Improved camera capabilities are considered a short-term and high-need issue for safety and security purposes.

3.3.1 Cost

Costs for camera systems are largely contingent on the resolution of data capture and number of cameras installed within a vehicle. For a typical 40-foot vehicle for a fleet of SLO Transit's size, the costs are as follows:

- On-Board Equipment and Installation:

  - Hardware: $10,000-$12,000 per vehicle
  - Integration with other systems, including emergency alarm and CAD/AVL for login information tagging: $10,000 - $25,000, based on previous experience integrating.
- Camera system software:
  - $50,000-$200,000 for implementation, software, documentation, training, and testing.
  - $20,000-$100,000 per year for ongoing support (the higher end assumes hosted software and data storage)

This would put total costs for a project of this size in the range of $150,000 to $200,000 for all materials, software, and installation on 17 vehicles. This would not include ongoing storage costs.

4 Technologies that Improve Riders' User Experience

When community members ride on SLO Transit, they use technology to find out when the bus is coming, where they should wait, and to pay for their fare. As smartphone technology becomes increasingly ubiquitous, SLO Transit has an opportunity to invest in technology that reduces friction and increases convenience for bus riders. The user-facing technology improvements recommended in this section are vital to operating a convenient transit system, winning over the next generation of San Luis Obispo's transit users, and seamlessly provide discounted passes and reduced costs for low-income riders and other eligible community members.

While SLO Transit riders would benefit from any improvements in payment, real-time passenger information, and other trip planning technologies, this study recommends pursuing user-facing technology improvements at a regional scale and in close collaboration with community partners and key stakeholders including SLORTA, SLOCOG, Cal Poly, and social services providers that manage income-verified programs in the community.

Table 3: Recommendations Related to Innovative Mobility Concepts

#	Recommendation	Relevance to SLO	Impact to Ridership	Timeframe	Cost	Priority
2	Pursue open loop payments through Cal-ITP, in coordination with RTA and SLOCOG	High	High	Medium	Medium	**HIGH**
6	Enhance Real-Time Passenger Information	Medium	High	Short	Medium	**HIGH**
13	Establish a Mobility-as-a-Service Platform	Medium	Medium	Long	High	**LOW**

4.1 Enhanced Real-Time Passenger Information Systems

Real-Time Passenger Information Systems (RTPI) provide customers with information about the nature and status of transportation services. RTPI systems and technology can vary between the information they provide and how they are presented. In recent years, there has been increased focus on providing schedule information in a standardized format (most commonly General Transit Feed Specification (GTFS) or GTFS-Flex) for integration with trip-planning applications, real-time vehicle location signage, and systems that relay service-related alerts to customers.

RTPI can also include enroute information, like on-board next stop announcements and predictions for stop arrival times. RTPI technology consists of a real-time data feed with prediction information, on-board audio and visual announcement components, stop dynamic message signs (DMS), customer self-service tools, interactive voice response systems that can be interfaced with scheduling systems and CAD/AVL to obtain static and real-time information.

According to SLO Transit, the current RTPI signage at SLO Transit Center and the trip planning application currently used by travelers don't always reflect accurate times. This lack of correct

information can reduce trust in the system, which hurts ridership restoration efforts. An improved and accurate RTPI system at SLO Transit Center and more accurate times relayed through the app may improve customer experience, and in turn boost ridership efforts.

The improvement in the RTPI system will require an improvement in the entire real-time data pipeline, including:

- Data generation as part of scheduling and CAD/AVL system, including onboard announcements
- Real-time prediction information generation and dissemination
- Real-time information display and presentation (through display signs, mobile apps, and other means)

Figure 3. An example of an RTPI sign at a Massachusetts Bay Transportation Authority (MBTA) Implementation Bus Stop

4.1.1 Cost

Costs for RTPI systems are contingent on the type of technology implemented on vehicles and at stops and transit centers. Costs associated with each system are as follows:

- On-Board Announcements:
  - Hardware: $1,000-$3,000 per vehicle
  - Creation of announcement database with geo-triggers $30,000 - $50,000
- CAD/AVL System: covered in Section 3.1.1.
- Real-time prediction and dissemination system: $30,000 – 60,000 annually (Software as a Service, subscription-based business model).
- LED/LCD wayside signage: $5,000 - $20,000 per location (dependent on the type of signage, and needs for power and communications)

- E-paper wayside signage: $2,000 - $4,000

This would put total costs for a project of this size in the range of $30,000 to $100,000 for backend prediction generations, plus some additional cost for stop-level predictions. For budgeting purposes, SLO Transit could allocate $100,000 for total real-time passenger information improvements.

4.2 Open Loop Payments

Open Payments refer to the use of finance sector cards or mobile payment apps that may be used for payment of goods and services, offering more payment modes for customers. Open payments can help reduce cash handling expenses and expensive ticket vending machines (TVMs). The majority of the fare vendors are developing this functionality, and the system can be integrated with mobile wallets which help users integrate pay directly through their Apple or Google wallets.

While closed-loop payments utilizing tap cards (currently used by SLO Transit) can still play a big role in introducing and maintaining incentives for regular riders, open loop payments can facilitate ease of ridership particularly for visitors or infrequent users of the system. In previous discussions, SLO Transit staff expressed strong interest in allowing customers to pay for transit services with direct use of credit cards to make ridership easier. This recommendation also has potential to increase ridership by attracting new riders who may not have a transit card or app and do not wish to use one.

4.2.1 Cost

Like Cal-ITP and Clipper 2.0 projects in California, open loop payment projects are often pursued at a state or regional level. SLOCOG is leading a regionwide effort to pursue open loop payment systems. The effort would require collaboration with financial vendors and other stakeholders, but this would allow for pooling of resources in what can be a cost-intensive endeavor, sometimes in the multiple millions of dollars. For an agency of SLO Transit's size, this collaborative approach would be recommended for implementing an open-loop payment system.

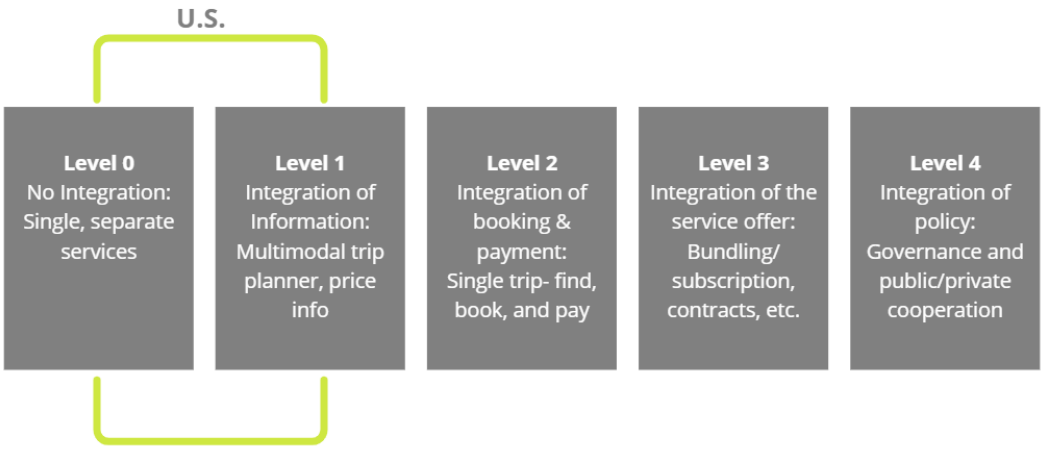
4.3 MaaS Platform

Mobility-as-a-Service (MaaS) refers to the integration of various transportation services into a single, comprehensive, and on-demand mobility application. MaaS offers users the value of accessing mobility applications through one single application and payment channel (instead of multiple ticketing and payment operations). MaaS applications can host a diverse menu of transport options, including (but not limited to) public transport options, taxi and ridesharing services, and active transportation options such as bikeshare, e-scooter share and walking directions or a combination thereof when programs are established at SLO Transit. The functions of a MaaS application may range, but typical functionality includes trip discovery, trip planning, and trip payment options.

There are five different levels of MaaS, as depicted in **Error! Reference source not found.** While there have been several implementations of MaaS in recent years, most agencies have

yet to realize the full potential of a Level 4 Integrated Application. Most United States-based examples are Level 0 or 1 MaaS systems, with a couple examples of Level 2 and 3 deployments that the industry hopes to progress to in the near future.

Figure 4: Levels of MaaS



As SLO Transit pursues its bikeshare efforts and potentially adds other services like micro-transit, a MaaS platform that can integrate those options and allow for booking and payment in one place becomes particularly relevant. This idea is in line with goals expressed in the Active Transportation Plan which discusses the need for a streamlined process for riders using bikeshare, carshare, and transit in the future. A MaaS platform could also allow for easier disbursement of transit passes and application of certain discounts, or a combined transportation 'wallet' which allows users to spend money on a variety of services from one account.

Because MaaS platforms thrive when a diverse set of transportation modes are presented, the recommendation is that SLO Transit first identify and expand what those modes are, and then establish and incorporate them into one application. This could also be pursued as a regional effort incorporating services and improving planning, payment, and booking for not just SLO Transit but also RTA and others. Overall, MaaS presents an opportunity to gain new riders who may more easily compare and use a variety of transit modes when presented in a single interface, but this is a long-term solution dependent on the success of individual services and not a high priority need as identified in the needs assessment.

4.3.1 Cost

Costs for MaaS platforms vary depending on the number of modes, contract details with 3rd party platforms and the level of integration. Contract costs may include development costs, software integration fees, ticketing fees, transaction fees, and other operational costs. Depending on the model used, costs can range from $100,000 into the millions depending on the scale of the project. Grant funding is typically pursued to assist with this effort.

5 Fare Program Updates to Increase Transit Accessibility

This category of recommendations focuses on pre-negotiated fares and other programs that make it cheaper and easier for certain users to take the bus. There are dozens of ways to create fare programs to increase ridership and provide affordable fares. This study recommends improvements to fare programs for students, seniors and low-income riders that would extend fare-free periods and better support community members who depend on the bus to get around. It also recognizes an opportunity to explore additional institutional partnerships with local businesses and developers, and to create a program that makes it easier for organizations and associations to buy bulk bus passes for their members. Lastly, this study recommends changes to SLO Transit's existing Downtown Access Program to reduce program enrollment burdens and increase benefits. It is important to note however, that fare program updates and new offerings are only as successful as the marketing and communications campaigns that spread the word in the community.

Table 5 provides more information on those programs along with their strengths and limitations.

Table 4: Recommendations Related to Fare Policies and Programs

#	Recommendation	Relevance to SLO	Impact to Ridership	Timeframe	Cost	Priority
3	Implement Fare Changes for Students, Seniors, and Low-Income Riders	High	High	Short	Low	**HIGH**
8	Explore Institutional Partnerships	Medium	High	Medium	Low	**MEDIUM**
10	Expand Downtown Access Program	High	Medium	Short	Low	**MEDIUM**

Table 5: SLO Transit Fare Programs

NAME	DESCRIPTION	ELIGIBILITY	STRENGTHS	LIMITATIONS
Downtown Access Pass (DAP)	A physical or mobile bus pass that is free for employees in downtown To be used for commute purposes to and from downtown Currently used by about 30 people	Employees in the Downtown SLO Parking District Renewed Annually	Ridership tracked by physical/digital taps Reduces demand for parking by encouraging downtown employees to take the bus Available as both a physical card and through the Token Transit App	Limited to employees who work in downtown only Requires renewal efforts by the rider about every three months

Partnership with Cal Poly TAPS	Cal Poly students, faculty, and staff ride free	Must have valid Cal Poly ID	Cal Poly affiliates make up ~58% of annual passenger trips Is funded by parking citation revenue from the Cal Poly	Excludes other schools in and near the city

There are also a variety of rider categories that qualify for free or reduced fare depending on the circumstances. Those category-based policies are outlined in Table 6.

Table 6: SLO Transit Fare Categories

NAME	DESCRIPTION	ELIGIBILITY	STRENGTHS	LIMITATIONS
Summer Youth Ride Free	A regional program that allows K-12 students to ride for free during the summer months by using their student ID as verification	Lasts from Mid-June to Late August Must be in grades K-12 with a student ID	Youth make up 4.8% of population Applies to all transit agencies in the region	Is for summer only and does not provide free service for students during the school year
Senior and Disabled Card	"VIP" riders 80+ years old ride free A physical ID card that allows riders to purchase the discount single-ride and multiday passes on SLO Transit	Disabled riders with verification Riders 65-79 Years Old Legal residents of San Luis Obispo	Elderly population makes up ~5.2% of population and disabled makes up ~6.4% Provides free or discounted travel to all riders 65+ years old and riders with disabilities	Restricted to legal City residents Requires application processes and identification

While these programs and policies go a long way toward providing affordable rides and incentivizing transit ridership, there are several steps SLO Transit could take to further bolster incentives and expand policies to best recruit and maintain riders.

5.1 Fare Changes for Student, Senior, and Low-Income Riders

Providing accessible fare options can help riders get to destinations, shorten boarding times, and welcome new riders to the transit system. The suggestions below expand on the current accessible fare programs offered at SLO Transit for student, senior, and low-income riders.

5.1.1 Fare-Free Periods

Fare-free periods are periods in which SLO Transit offers free fares for riders. Currently, SLO offers Cal-Poly students and K-12 students free fares during the summer by presenting their student IDs to drivers. Fare-Free Periods will need to be balanced with the state's requirement for transit agencies to maintain a minimum 20% farebox recovery ratio.

To increase fare-free periods, it is recommended that SLO Transit implements the following suggestions:

- Extend student free period beyond summer or to include holidays
- Extend the program to allow Seniors access to free rides for part of the year

5.1.2 Fare-Free Categories

Fare-free categories are a type of fare program where a specific rider demographic or fare category does not need to pay for fares at any time. These programs are typically supported by either an eligibility verification program, fare collection technology, or in the simplest instances, by simply requiring operators to visually verify a known government agency issued ID.

To expand fare-free categories it is recommended that SLO Transit implement the following:

- **Low-Income Rider Pilot Program**. This would allow riders who qualify for federally funded social welfare programs, for example, to receive discounted rides. The recommendation would involve starting this as a 12-month pilot.
- **Senior/Disabled and VIP program.** The discounts and pass types can be the same as Senior/Disabled as well, but further market and rider research is recommended before confirming program eligibility and discounts.

5.2 Institutional Program Recommendations

Institutional Pass Programs are institutional affiliate-oriented fare programs that provide discounted or free travel for affiliates of participating organizations. Institutional programs are typically supported by a designated point of contact from each institution who serves as a coordinator and point of contact between the transit agency and employees.

The organizations benefit by paying an upfront cost to give their employees free or subsidized transit for the decided duration of time. The transit agencies benefit by receiving program fees that are independent from the affiliate use, or sometimes tied to the total population of the affiliates within the institution, making an institutional program a reliable source of funding.

In this model, the eligibility criteria are set by the transit agency and the institutional partner through program policies:

- Participants – all affiliates or defined subsets (e.g., off-campus students only)
- Services – full system or specific routes

The program can be funded by participating organizations through:

- Standard fee schedule (e.g., price per participant, number of participants)
- Negotiated funding agreements (specific to one organization)

- Price per trip/transaction

In the cases where programs are tied to fare transactions or trips by affiliates, the agencies are then required to implement technology to account for those fare transactions separately from other transactions. Institutional pass programs are typically supported by fare collection technology, with riders typically required to validate their affiliation through ID cards, affiliated smart cards, or more recently, mobile app-based fare media.

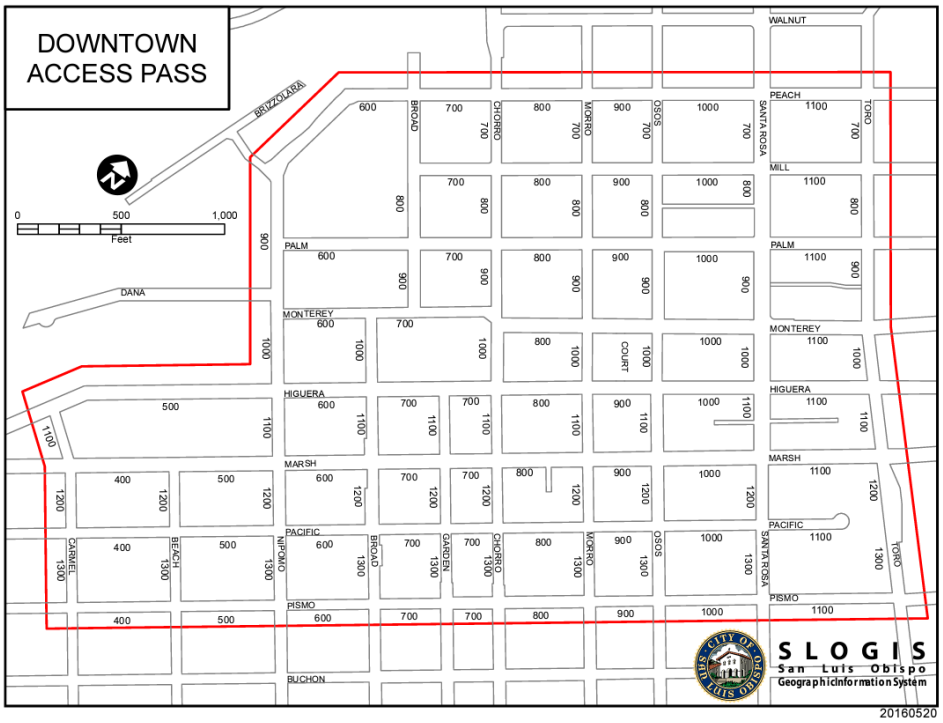
Below are core recommendations for expanding the current institutional programs at SLO Transit:

- Expand Cal Poly SLO Ridership program to other organizations served by SLO Transit. A few partnerships that could be explored include:
  - Cuesta College
  - County of San Luis Obispo Government
  - Various Unified School Districts
  - Surrounding motels and hotels
    - Hotel San Luis Obispo
    - Garden Street Inn
    - SLO Brew Lofts
    - Granada Hotel & Bistro
    - Hostel Obispo
  - Medical Centers (e.g. French Hospital, Sierra Vista Medical Center)
  - Other Major Employers
- Simplify process for bulk bus passes, expanding this option beyond just developers.

5.3 Downtown Access Passes

The Downtown Access Pass is a physical or electronic bus pass that can be used by employees in downtown San Luis Obispo to ride the bus for free. It is intended to encourage bus commutes to and from downtown and is currently used by about 30 people. All employees that work in the Downtown SLO Parking District are eligible for the program, however, utilization of this program is relatively low. There are two ways SLO Transit could consider expanding the program in an effort to boost ridership.

Figure 5: Downtown Access Pass Program Boundaries



5.3.1 Geographic Expansion

The eligibility area for the Downtown Access program was designed to help alleviate the demand for parking in the downtown area while providing a transit benefit to its employees. There may be additional areas that would benefit from similar programs.

Key areas of expansion are districts that are already relatively well served by existing transit routes and have existing businesses and population. Any areas with new housing developments, notably mixed-use developments are also recommended places to consider.

Looking at SLO Transits current service, the following areas are:

- The Historic Railroad District
- South Higuera St. near SLO Public Market
- Mill Street Historic District
- Old Town Historic District

5.3.2 Policy Changes

Policy changes will also play a large part in expanding the program. The project team recommends SLO Transit transform Downtown into a fare-free boarding zone for all riders. This policy benefits riders who are both leaving downtown and traveling with the downtown fare free zone and further encourages transit use as the primary mode of transportation downtown. Further analysis to farebox ratio should be incorporated in making this decision, but initial review indicates farebox revenue impacts would be minimal for a small enough boarding and alighting area.

Another recommendation would be to improve the downtown access pass enrollment and reenrollment process. Currently, eligibility expires after 90 days, and users must email SLO Transit with identification to have their pass extended. Then they must send an annual renewal email as well. Eliminating the 90-day reverification requirement and making this simply an annual renewal process could facilitate participation and simplify program administration. Instead of email, it is also recommended that users can enroll online by completing an easy to access form, which could be made available by the City through the Laserfiche platform. Another possibility to improve the process would be to provide reloadable smartcards limited to downtown access as the pass that riders receive.

The project team also recommends that the program be expanded to include regional services such as RTA as well. While additional coordination may be required, this would further bolster enrollment and could attract more people to transit.

6 Bus Shelter and Street Improvements for Rider Safety and Comfort

Bus stops are a ubiquitous symbol of transit systems that may influence perception of the system. For riders, a bus stop can provide informational value, in addition to comfort and security while waiting for a bus. These features can vary widely from stop to stop and include amenities ranging from information systems that can provide riders with arrival estimates, to benches and coverings for comfortability. It is critical for bus stops to reinforce comfortability and safety to maintain and attract riders. Security for transit riders will be attained through updating and thoroughly maintaining bus stop amenities. Accessibility will be increased through the interrelation of physical improvements, enhanced service, and updated technology.

Furthermore, bus stops have been a focus for many transit agencies' accessibility improvements, after the enactment of the Americans with Disabilities Act in 1992. Outcomes from studies have also shown that increased levels of amenities at bus stops can make elderly and disabled riders comfortable with using transit systems and that appropriate amenities can increase overall appeal.

This study recommends three types of bus stop enhancements to improve rider experiences and outcomes.

Table 7: Recommendations Related to Bus Stop Enhancements

#	Recommendation	Relevance to SLO	Impact to Ridership	Timeframe	Cost	Priority
9	Install Lighting, Shelters, and Bike Parking at Applicable Bus Stops	Medium	Medium	Short	Medium	**MEDIUM**
14	Investigate and Establish Mobility Hubs	Medium	Medium	Medium	High	**LOW**
17	Add Bus Bulb-outs Downtown	Medium	Low	Long	Medium	**LOW**

6.1 Update Bus Stop Amenity Inventory

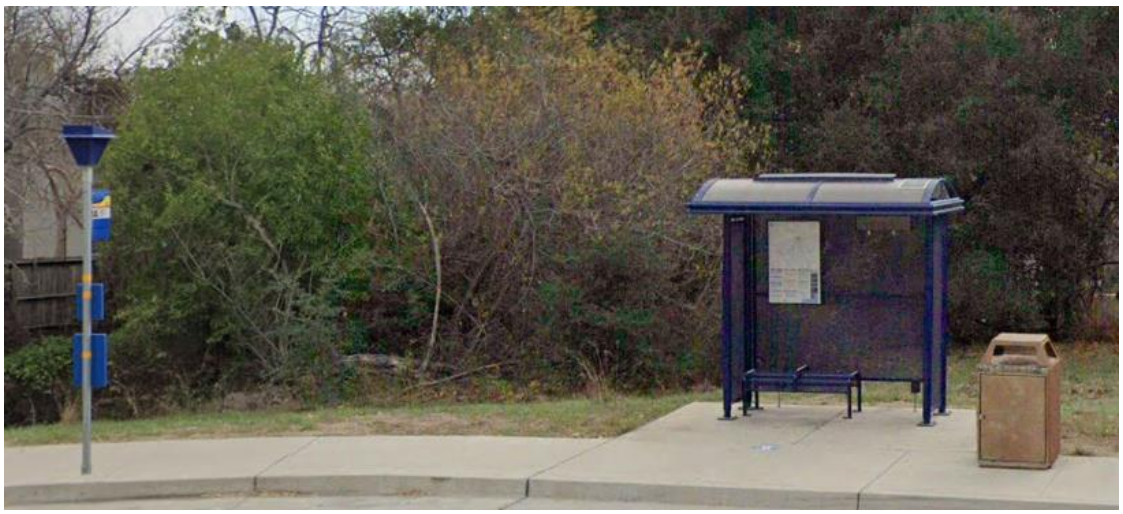
SLO Transit currently operates 165 bus stops, outfitted with varying amenities. While some stops feature modern and up to date technology and design, much of the infrastructure that supports SLO Transit is aged and is nearing the end of its lifespan.

As shown in Figure 7, the most feature-rich amenities at bus stops are located at the downtown transit center. Here, riders can find four deluxe shelters with seating, route maps, real-time arrival information and refuse bins. The road features a concrete pad for bus stops, and sawtooth bays to accommodate boarding for multiple routes.

Figure 6: Downtown SLO Transit Center

By contrast, **Error! Reference source not found.**8 is representative of most other SLO Transit stops, that have significantly fewer amenities. Most stops feature static bus arrival information in the form of printed schedules, smaller waiting areas and more outdated shelters. Others have just a route and destination indicator sign with no seating, shelter, or refuse bins.

Figure 7: Orcutt at Laurel Bus Stop



However, there needs to be a complete inventory of all bus stops, their associated amenities, and ridership at each stop to best determine priority locations for improvements. One way to assess priority locations is by utilizing stop level ridership data. Simply put, the more a bus stop is used, the more riders it serves and the more it may benefit from upgrades and improvements.

The process for identifying these high ridership stops generally includes sorting Automated Passenger Counter (APC) stop-level data from highest to lowest. If APC data is unavailable or unreliable, fare collection information can also be used to evaluate boardings and lightings at each stop. Neither APC nor fare data was reliable enough or available for this study. Therefore, performing a complete bus stop amenity inventory and ridership analysis to properly assess

the benefits to each stop is recommended. This process would not yield any direct benefits to ridership but would help determine appropriate improvements discussed in subsequent sections.

6.1.1 Costs

A full bus stop amenity inventory and analysis could cost around $25,000 which would likely include inventory as well as location specific recommendations based on ridership data.

6.2 Lighting Improvements

Adequate lighting is an important component to safety and security at bus stops. When existing streetlights don't provide adequate lighting, proper lighting should be provided to ensure the safety and security of all transit riders. Bus stops should also be visible from nearby buildings, roads, near crosswalks and well-lit so transit riders and bus operators are able to locate the stop. Lighting can be affixed within bus stop shelters or on bus sign poles. Lighting can often leverage solar power for operation.

Lighting improvements was expressed as a high priority for SLO Transit, and identifying appropriate locations is contingent on the analysis mentioned in Section 6.1.

6.2.1 Costs

Costs for lighting improvements are contingent on the complexity of installation, wattage and other factors. Prices range between $1,000 to $15,000.

6.3 Shelter Improvements

Shelters or shade coverings at bus stops provide riders with increased comfort regardless of the time of the year. Shelters can reduce the impact of winds and provide relief for rain or intense sunshine. Shelters can also house a variety of amenities for riders that can improve satisfaction with wait times, improve safety perceptions, and provide information systems.

Through previous discussion, adequate shade and shelter improvements were listed as high priority items from SLO Transit engineering team. After the full inventory described in **Error! Reference source not found.** is complete, priority can be placed on making improvements to shelter at locations with the highest ridership without shelter.

Figure 8: South at Parker (E) Bus Stop

6.3.1 Costs

Cost of shelters may vary based on the complexity of their design, but generally have a base cost of at least $4,000[2]. As a general rule, transit shelters are recommended at all stops with more than 30 riders per day. In addition, shelters should be considered at locations that are exposed to weather, at transfer points or at stops with relatively high use by seniors and children. Implementation of shelter improvements is contingent on the analysis mentioned in Section **Error! Reference source not found.**.

6.4 Bike Parking

Supplying adequate bike parking at bus stops and transit centers can supplement transit ridership by enhancing access to stop-adjacent destinations and boosting intermodal connectivity. Often, this takes the shape of bike corrals or dedicated bike lockers near bus shelters. Most of the bike racks offered in SLO are similar to those shown in **Error! Reference source not found.**, which offer on-street parking for 2-3 bicycles on the sidewalk.

[2] Source: Metro Transit https://www.greatermadisonmpo.org/planning/documents/BusStopAmenitiesStudy.pdf

Figure 9: Bike racks at Chorro and Monterey St

Selection of the type of bike parking an agency offers is contingent on the volume of bike traffic on a given road, weather, and available space. This ranges from on-street bike parking (e.g., corrals or U-rack clusters) to on-demand parking options such as Bike Link lockers. On-street bike racks should be located close to, without being directly in front of entrances of high demand locations for bicyclists and can take the place of one to two vehicle parking spaces where bicycle parking demand is high and sidewalk space is constrained. These corrals typically provide parking for 6 bikes (per single parking space) or 18 bikes for two 10' parking spaces.

For more long-term parking options, some agencies or organizations install dedicated bike lockers that provide bicyclists with a secure bike locker that keeps the bike clean, dry, and ready to ride any time of the year. These lockers typically have a higher installation cost and are offered to bicyclists at an hourly or monthly rate. CalPoly offers this service at 14 locations across the university's campus (See **Error! Reference source not found.**).

Figure 10: CalPoly Bike Lockers Located on Village Dr.

6.4.1 Costs

Costs for bike racks and lockers are contingent on the type of infrastructure chosen, and how many bicycles can park at the given location. Cost estimates can be found below:

- Single U-style bike rack (1-2 bicycles): $125-150 per rack
- Contemporary U-style bike corral (6-8 bicycles): $450-800 per corral
- Bike lockers (1 bike per locker): ~$2000 per locker.

Single-occupancy vehicle trips dominate transportation mode splits in most cities, including San Luis Obispo. To reduce traffic and achieve more sustainable outcomes, a much larger percentage of people taking transit trips alongside other modes will be necessary. One way to achieve that increase in transit share is to incentivize public transit use by implementing initiatives to provide strategic advantages to transit operations in the transportation network. These transit priority strategies allow transit to be more competitive on travel times, reliability, comfort, and convenience as compared to other vehicles.

Some examples of transit priority measures include bus-only lanes, signal priority for transit vehicles, or other physical or regulatory modifications that give public transit priority over other vehicles.

Studies of various deployments have shown that the cities with clear priority policies and strategic implementation plans have had the most successful deployments. It is critical to identify individual initiatives within the larger deployment and assign priority levels according to the city's predefined criteria such as budget, resource usage, and schedule.

Initial projects are often selected based on their ability to demonstrate the benefits of the measures so that they can serve as benchmarks for future implementations. It can also help in placing standards for organizing planning work as well as drawing up a guidebook for including external and internal stakeholders who play an important role in the overall success of the project.

6.5 Mobility Hubs

Mobility hubs are places in communities that bring together services such as public transit, bikeshare, carshare and other options in one place to provide first-last mile solutions without use of a private vehicle. Mobility hubs are typically located where transit services already come together, or in communities and locations where transportation is needed the most to support transit connectivity and ridership as well as improved overall mobility for the region.

Mobility choices are constantly evolving, and features of a mobility hub are tailored to the unique needs of an individual community. When executed properly, they not only cater to the transportation needs of today, but those of the future as well. Implementing one or more mobility hubs in San Luis Obispo would require follow-up work to identify specific locations most beneficial to SLO Transit. One location of interest would be SLO Transit Center given the existing confluence of fixed-route service. **Error! Reference source not found.** shows an example mobility hub mock up from San Diego with 12 different services and amenities, including bikeshare, package delivery, EV charging and more.

Figure 11: Mobility Hub Example (Source: SANDAG)

6.5.1 Costs

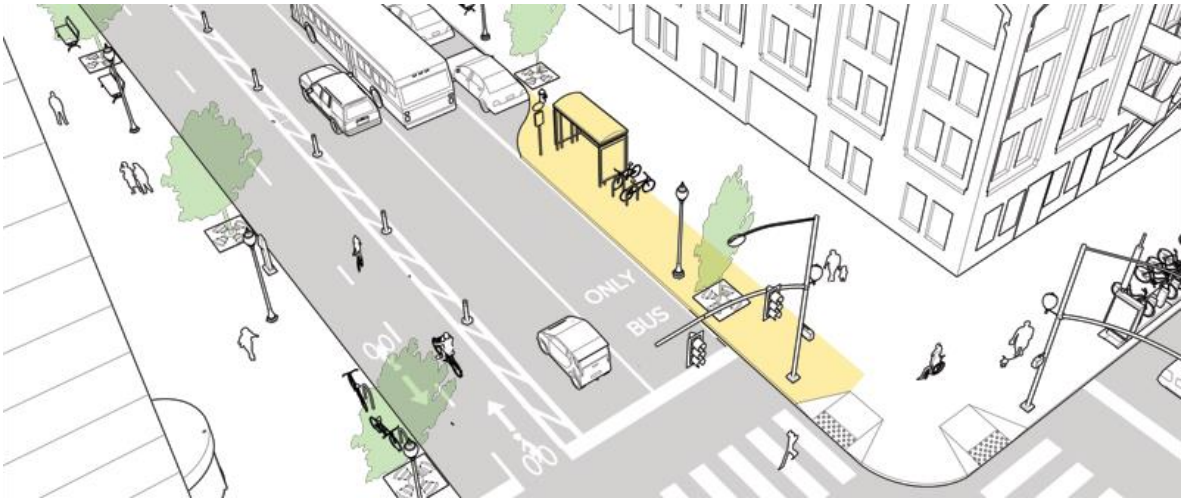
Funding for mobility hub projects depends on the types of amenities provided, location of the hub, and more. Funding varies from traditional government grants and dedicated revenue streams to more cooperative implementation partnerships. In general, project costs range between $250,000 - $2 million for complete hubs, including planning, design, construction, and marketing. One approach the City could take is testing a few low-cost amenities at a central location and testing the viability of the hub concept, without committing to resources that cannot be later removed or altered. Additional investment could then be applied to high-performing mobility hub locations.

6.6 Bus Bulb Outs

Bus bulb-outs are curb extensions that are placed in line with curb-side parking areas and help passengers board and alight in travel lane itself. This helps eliminate the need for buses to pull in and out of travel lanes and reduces the overall dwell time buses incur from it, in-turn making transit service faster and more and reliable. Bus bulb-outs also provide spaces for essential amenities like wayfinding maps, bio-swells, transit shelters, and others, that plays an important role in enhancing the overall experience of the transit user.

While the length and width of the extensions are allowed to vary somewhat based on street geometry, vehicle types, and urban context, the length should be about two buses long, especially at far side stops and routes with frequent service, so that buses do not block the intersection while queuing up. The width should be enough to deploy a wheelchair accessible lift onto the bulb. Another important factor is to keep in mind at the design stage is to include cut throughs for easy movement of bikes, so that it doesn't block a bike lane, if present on the approach.

Figure 12: Bus Bulb Outs (Source: NACTO)



6.6.1 Costs

The price range for bus bulbs can range between $15,000 and $70,000 per bulb and depends on variables such as drainage needs, utility relocation, construction materials and patron amenities[3].

[3] PedSafe http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=16

7 Service Enhancements

Service enhancements are instrumental to improving current rider experiences and to attracting future riders. Community stakeholders unanimously agree that "enhanced service on fixed routes" is the number one recommendation that is capable of increasing SLO Transit ridership. Specifically, focused efforts on decreasing headways on priority routes has been underscored as a preferred method to streamline and develop confidence towards transit within riders.

In addition, there are several newer mobility concepts that may help improve a city or region's transportation ecosystem. These concepts focus on services and mobility improvements beyond traditional fixed-route and on-demand service that transit agencies are typically expected to provide. When implemented, these concepts can help to provide a more holistic and complete approach to transportation which may help reduce car-dependence and emissions in line with San Luis Obispo's mode split objectives and carbon neutrality goals.

Table 8: Recommendations Related to Service Enhancements

#	Recommendation	Relevance to SLO	Impact to Ridership	Timeframe	Cost	Priority
1	Enhance Service on Fixed Routes	High	High	Medium	High	**HIGH**
11	Pursue Micro-Transit Mobility Services	Medium	High	Long	Medium	**MEDIUM**
12	Launch a Bikeshare Program	Medium	Low	Short	Low	**MEDIUM**
15	Launch a Carshare Program	Medium	Low	Medium	Medium	**LOW**
16	Implement a Transit Signal Priority Strategy	Low	Low	Medium	High	**LOW**

7.1 Enhanced Service on Fixed Routes

One of the most critical needs identified by SLO Transit and stakeholders was the need to improve existing fixed-route bus service. While several strategies in this study relate to that effort (i.e., improving onboard technology, investing in transit-friendly infrastructure), this section refers primarily to planning strategies that can be utilized to facilitate more frequent service. Improving frequency is one of the most direct ways of transporting more riders and improving evaluations of the system. According to the most recent SRTP, SLO Transit averages 3,615 daily boardings on weekdays, and roughly 950-1,200 boardings on weekends. Per the National Association of City Transportation Officials' (NACTO) categorizations, that weekday ridership number falls under 'moderate volume', which generally warrants headways between 10 and 15 minutes.[4] Even along SLO Transit's highest ridership routes (routes 3 and 4, which constitute roughly half of all SLO service) headways are occurring at 30-minute intervals, or two buses per hour. As updates to the SRTP are made, the City should consider

[4] NACTO https://nacto.org/publication/transit-street-design-guide/introduction/service-context/transit-frequency-volume/

improving frequency along these two routes on weekdays, particularly during the academic year, to accommodate more passengers and improve service performance. If any other routes or periods of time are determined to be moderate or high demand through the course of the City's SRTP update, those routes and periods should also be considered for frequency improvements. Consideration of increased service frequency (or headways) needs to consider passenger transfer behavior and timed or pulse transfer policy. Given the stated priority of these improvements, the project team recommends these modifications be explored further while updating the SRTP over the next year, and implemented shortly thereafter (within two years), acknowledging that some improvements may take longer to implement than others.

There are several strategies to improve fixed-route service frequency. Those that are particularly relevant to the SLO operating environment are:

1. **Optimizing Existing Routes**: Optimizing routes can reduce wait times by better aligning service with peak demand and can further reduce travel times by improving transfers between routes. It can also bolster reliability by ensuring proper buffer times to accommodate delays, resulting in more predictable and efficient service. This strategy may involve modifications to existing routes or changes to schedules to accommodate specific stops more frequently. Implementation of schedule and route changes is often done in phases, to allow for continuous monitoring and fine-tuning to ensure the schedules meet passenger needs and sufficiently reduce wait times. It's critical that any such changes be communicated to the public in advance.
2. **Establishing Express Bus Services:** Express buses offer quicker, skip-stop service along predetermined routes. Express service can often drastically reduce travel times and are particularly useful if there are specific origins and destinations with high demand that are not sufficiently served by current routes. For example, express routes could be explored as a faster service to get downtown. This can also work to promote economic development by providing quicker access to business districts, job centers, and shopping areas.
3. **Increasing Available Fleet and Drivers**: Putting more buses on the road, especially during peak periods, is one of the most direct ways to decrease headways. While this does come with cost and hiring drivers is still difficult for many agencies like SLO Transit at this time, adding to this capacity allows for more buses to be dispatched and can drastically improve frequency. It can also serve as a reliability backstop by providing maintaining service when a bus faces mechanical problems or delays.
4. **Expanding Service Operating Hours**: Extending service hours can help ensure passengers are able to rely on transit throughout the day and night. This strategy should be implemented only if data suggests there is a demand for trips outside of current operating hours. However, such changes were made in the 2016 SRTP and will likely be valuable to revisit again. This expansion does not affect the time between buses but rather overall frequency of buses visiting a given stop and improves transit accessibility. It can be particularly useful for those working irregular hours. This strategy also affects the schedule optimization process outlined above.

Evaluating where and when to make these changes will require several data sources that should be used when updating the SRTP. These include:

- **Ridership Data**: To understand passenger demand and ridership patterns, including transfers.

- **Historical Performance Data:** To assess on-time performance, delays, and regular service interruptions.
- **Stop Utilization Data**: Information about the number of passengers boarding and alighting at each stop, helping to identify high demand stops and areas.
- **Travel Time Data**: Data on the time it takes for buses to travel between stops, helping to pinpoint areas with significant delays.
- **Traffic Data**: Information including traffic congestion, road conditions, and infrastructure that might affect bus service speeds.
- **Demographic Data**: Demographic information about the areas surrounding stops and routes, which can provide insights into the potential demand for transit service.
- **Origin-Destination Data**: To determine passenger travel patterns and the need for express routes.

Once the data has been analyzed and specific implementations of these strategies has been finalized, the City should also ensure that key performance indicators related to frequency of service are up to date and able to track performance by any given time interval. Important KPIs for evaluating frequency include:

- **Ridership:** Has the number of passengers changed by route or route segment?
- **Headways:** How frequently are buses operating along a given route in one hour? Is this number below the targeted threshold (i.e., 15 minutes)?
- **Average Wait Time:** How long are passengers waiting for a vehicle when they arrive at a stop?
- **Customer satisfaction:** How happy are customers with bus frequencies? Can they rely on fixed-route transit to get them where they need to go in a timely manner? Are transfer times coordinated amongst route schedules?

Tracking these variables should allow the City to report on the impact of frequency improvements and identify specific areas in which further improvement may be warranted. Further, it is important to consider the impact on transportation equity and accessibility for vulnerable or underserved populations - evaluate whether increased headways disproportionately affect certain communities.

7.1.1 Costs

The cost of implementing any frequency improvements can be quite high. While some minor modifications to schedules and routes may be relatively inexpensive, hiring additional drivers, implementing express bus service, and expanding operating hours can add hundreds of thousands of dollars in operating costs. New buses, particularly electric buses, are typically in the range of one million dollars as well. Although these costs are high, research shows that the benefits of improved frequency can outweigh the costs by multiple fold.[5] Funding sources to assist with these costs are discussed further in section 8.2.

[5] Human Transit https://humantransit.org/basics/the-transit-ridership-recipe

7.2 Pursue Microtransit Mobility Services

In addition to traditional fixed-route service improvements, there are several opportunities to implement on-demand mobility or fixed-route microtransit that may help supplement current service and further expand ridership. This section outlines a step-by-step approach to determining what specific alternative mobility transit solution would be most appropriate for SLO Transit's needs and the impacts on cost and ridership.

7.2.1 Identifying Zones or Market Segments of Focus

This is the first step in the process for determining if alternative service is necessary and feasible is establishing zones or market segments to focus on. This will provide a better understanding of what locations and geographic span is being considered for something like microtransit service, and what riders that are not currently being served by fixed route would be served by new modes. This is important before using the framework described below to select an alternative/supplemental service solution.

7.2.2 Using the Ridership and Cost Assessment Model

A Cost and Ridership Estimation Model was developed in an effort to assist the City in the planning and deployment of, or modifications to, mobility service scenarios in the future. The model can be found as an attachment.

Once zones or market segments have been established as areas of focus, the ridership and cost assessment tool can be used to evaluate the impacts of each proposed alternative service model to see what would be most beneficial to SLO Transit. Specific variables of the model are pre-filled with industry-informed values but can be modified by any user to calculate costs and ridership per any defined set of criteria.

It is recommended that SLO Transit follow this process for evaluating and selecting alternative transit services to complement fixed-route service and further expand mobility offerings.

7.3 Implement Bikeshare Program

Bike sharing is one example of micromobility in action. Typically, micromobility refers to small, lightweight vehicles used by one person to travel distances usually less than 10 miles. Typically, travel using these modes does not exceed roughly 15 MPH. While some personal devices like skateboards, roller skates, and hoverboards may fall under the category of micromobility, this category largely consists of bikes, e-bikes, and e-scooters.

Many cities offer access to shared bikes as part of a micromobility program. These programs can vary widely in size and structure as well as the types of devices provided. While some cities offer shared bikes with fixed docking locations around the city, others offer bikes that are "dockless" and can be parked anywhere (though even in these cases, parking regulations such as "lock-to" requirements can be implemented). Cities typically partner with third-party companies for the provision, deployment, and maintenance of micromobility devices. Monitoring of the program can either be done by reporting and coordination between cities and companies or through other third-party software monitoring and tracking tools.

Bikeshare programs can play a major role in addressing first-last mile transit concerns and offer relatively affordable rides to the general public for trips within a predefined geographic area. Bikeshare is particularly appealing for densely populated communities where residents and visitors can travel to several key destinations within a relatively short trip.

Bikeshare has been of particular interest to the San Luis Obispo community for some time. As outlined in the City's Active Transportation Plan, the City is currently reassessing the viability of a bikeshare program in partnership with Cal Poly. The City has been working to identify potential locations for future bikeshare stations in pursuit of this effort.

7.3.1 Costs

Costs to implement a city-managed bikeshare program typically range from $3,000 to $5,000 per bike. These costs include the bike itself but also docking stations, rental kiosks, and other minor capital costs. For programs delivered by third parties, particularly used in dockless bike scenarios, contracts can be cheaper or of no cost to the city and require less direct oversight by staff. SLO Transit is most interested in pursuing a third-party provided docked bikeshare system at no cost to the City.

7.4 Implement Carshare Program

Carsharing is a type of car-rental service in which passengers can rent vehicles for hours or days at a time. This is in contrast to traditional car-rental services which charge by the day and typically only allow for pickup at brick-and-mortar locations. Carsharing is often provided under two models: peer-to-peer rentals and company-based rentals. Peer-to-peer rentals (like Turo) allow individual car owners to lease their vehicle to others looking to borrow a car for a hours or days at a time. Company-based rentals involve a company (like ZipCar) owning vehicles and often renting parking spaces from a city, and then renting those vehicles to individuals for either hours or days.

Carsharing aims to provide additional flexibility in travel to those who may not own a car. Like ridesharing (e.g., Uber, Lyft) it can allow people to take trips otherwise inaccessible without a vehicle. In addition to affordability and convenience, carsharing can help alleviate emissions by reducing reliance of personal vehicles. Often, carsharing services include both app-based and web-based interfaces for reserving, booking, and paying for rentals.

For SLO Transit, carsharing will likely not have a large impact on ridership. However, it does support car light and car free lifestyles, which are key to achieving the mode split goals the City has established. Beyond furthering those goals, it can also provide access to key destinations for those who may not have a private vehicle, further expanding mobility offerings for all groups.

7.5 Implement a Transit Signal Priority Strategy

Single-occupancy vehicle trips dominate transportation mode splits in most cities, including San Luis Obispo. To reduce traffic and achieve more sustainable outcomes, a much larger

percentage of people taking transit trips alongside other modes will be necessary. One way to achieve that increase in transit share is to incentivize public transit use by implementing initiatives to provide strategic advantages to transit operations in the transportation network. These transit priority strategies allow transit to be more competitive on travel times, reliability, comfort, and convenience as compared to other vehicles.

Some examples of transit priority measures include bus-only lanes, signal priority for transit vehicles, or other physical or regulatory modifications that give public transit priority over other vehicles.

Studies of various deployments have shown that the cities with clear priority policies and strategic implementation plans have had the most successful deployments. It is critical to identify individual initiatives within the larger deployment and assign priority levels according to the city's predefined criteria such as budget, resource usage, and schedule.

Initial projects are often selected based on their ability to demonstrate the benefits of the measures so that they can serve as benchmarks for future implementations. It can also help in placing standards for organizing planning work as well as drawing up a guidebook for including external and internal stakeholders who play an important role in the overall success of the project.

7.5.1 Conducting a TSP Plan

Transit Signal Priority (TSP) is an operational strategy that facilitates the movement of transit vehicles through traffic-signal controlled intersections. Some key benefits of implementing a TSP project include reducing queues, minimizing delays, and decreasing travel time for emergency vehicles. TSP can improve traffic flow and safety and enhance public response. By reducing time lost at traffic signals, TSP can also reduce bus running time; and with conditional priority one can reduce the variability in the running time. This can lead to improved transit service and increased transit attractiveness.

A TSP plan would be a follow-up project and should be largely considered if there continue to be traffic impacts along specific routes post-construction. A TSP plan would likely follow the process identified herein.

7.5.1.1 Community Engagement

Community engagement is a critical component of any planning study. For transit priority measures, constituents and users of the system can play a key role in identifying transit reliability issues and travel time delays. Stakeholders can also be consulted when developing a list of what transit traffic measures are realistic for SLO Transit's context and the impact those adjustments may have on other related services or programs. A few ways to engage the public on these topics may include onboard passenger surveys, online surveys disseminated through the website or social media, and in-person tabling at local community events.

7.5.1.2 Data Collection and Analysis

Survey data can be combined with operations data to identify choke points, high delay areas, and other corridors that may require treatments depending on KPIs. Areas where high ridership routes currently operate with recurring delay are ideal candidates for improvements. Some of the operational data that can be used to find to determine these areas of focus include:

- Ridership by stop and by route
- Travel time
- Vehicle delay
    - Running delay: delays on on-time performance associated with traffic on a route
    - Signal delay: delays related to intersection red lights
    - Merge delay: delays associated with buses pulling over from a general traffic lane to a bus stop, or from a bus stop back into general traffic
- Passenger delay
    - Load delay: delays associated with boarding and alighting of passengers. Typically weighted by ridership.
- Revenue vehicles/hour

Once a list of potential sites has been identified from the data, a number of additional factors may help the City narrow down the list of sites and determine which treatments to pursue. This analysis includes examination of:

- Physical constraints
    - Existing curb-to-curb roadway capacity opportunities
    - Locations of bus stops relative to intersections
- Infrastructure jurisdiction analysis
    - Jurisdiction that manages and owns each identified roadway segment and immediately adjacent bridges, underpasses, overpasses, ramps, etc.
    - Jurisdiction that manages and owns each traffic signal along each identified segment of roadway
- Pedestrian, bus stop, and accessibility considerations:
    - Number of current bus stops impacted
    - Inventory of existing stop amenities (shelters, floating stop, etc.)
- General pedestrian conditions assessment
    - Curb ramps and other accessibility needs
    - Street crossings and pedestrian safety
    - Other items identified by the project team
- Existing or planned bike infrastructure.
    - Future bike infrastructure as identified in the SLO Active Transportation Plan
- Existing or planned roadway investments

    - Whether the roadway has had repaving, major tactical projects, or capital reconstruction implemented in the past ten years, and/or whether reconstruction or reinvestment in the roadway is planned in the near future.

- Cost
    - How much is each intervention being considered going to cost in the specific context in which it would be implemented
- Potential Improvement
    - Comparing real operational data to potential data after improvements (e.g., transit signal priority infrastructure at intersection X is estimated to reduce travel times on that route by 10%)

7.5.1.3 Steps towards Implementation

Once specific treatment(s) and location(s) have been identified, the city would then take formal steps to pursue the project. This generally includes identifying funding sources, getting approval from City Council, and releasing any associated RFPs/RFQs for the proposed work. Implementation on transit traffic projects can take one year or more depending on the scale of the project.

SLO may need to partner with other jurisdictions or agencies if the improvements involve changes to shared infrastructure (such as moving a bus stop) or improvements in roadways owned by other entities. Even in the event no other services are impacted, it will be critical for SLO to maintain involvement of other regional stakeholders and communicate with the community regarding improvements throughout the process.

7.5.2 Costs

TSP planning efforts can cost vary depending on the scope of the analysis and the number of locations being considered. Once a plan is complete, prices for TSP infrastructure can range from $8,000 to $35,000 per intersection, not including supporting central software.

8 Summary

The SLO Transit Innovations Study investigated a broad variety of transit technologies and mobility opportunities and presents SLO Transit with only the most applicable solutions that may be of value to incorporate into short-range transportation planning efforts. The tailored list of recommendations was evaluated and sorted based on relevance to SLO, impact to ridership, timeframe, cost, and stakeholder feedback in order to determine each recommendation's overall priority. This provides clear and actionable next steps for the City as it looks to improve service and add to future planning documents.

8.1 Recommendations

Table 11 summarizes the recommendations discussed in this plan. Each of the columns and the values displayed are described in more detail below.

Relevance to SLO: While each of these recommendations is generally relevant (other potential solutions have already been eliminated over the course of this project) this helps evaluate how directly each solution maps to the established needs of the city.

Impact to Ridership: Some recommendations will help restore ridership or aim to improve transit reliability so as to expand ridership. These are coded as high impact. Others are internal planning efforts or operational improvements that will help SLO Transit but may not have as direct an impact on ridership. These are coded as low impact.

Timeframe: Short range projects are recommended to be implemented within the next 6-12 months. Medium range items are projects that could be initiated between 12-24 months. Long-term items, while still worth pursuing, have dependencies or other long range planning efforts that make those efforts more realistic to be pursued 24+ months from the publishing of this study. Note that this is distinct from 'Timeline' which only provides guidance on how long each effort may take to complete once initiated.

Cost: In line with purchasing policies from the City of San Luis Obispo, recommendations may be considered:

- Low cost: Tier 1 and Tier 2 purchases (<$40,000 for professional services or <$60,000 for capital projects)
- Medium cost: Tier 2 or 3 purchases ($40,000-$70,000 for professional services or $60,000-$200,000 for capital projects)
- High cost: Tier 4 and Tier 5 purchases (<$70,000 for professional services or >$200,000 for capital projects)

Priority: This provides an overall priority level considering all other factors presented in this table.

Table 9: Recommendations for SLO Transit

#	Recommendation	Category	Relevance to SLO	Impact to Ridership	Timeframe	Cost	Priority
1	Enhanced Service on Fixed Routes	Enhanced Service	High	High	Medium	High	**HIGH**
2	Pursue open loop payments through Cal-ITP, in coordination with RTA and SLOCOG	User Experience	High	High	Medium	Medium	**HIGH**
3	Fare Changes for Students, Seniors, Low-Income Riders	Fare Programs	High	High	Short	Low	**HIGH**
4	Replace CAD/AVL System on Fixed-Route Vehicles	Critical Tech	High	Low	Short	High	**HIGH**
5	Upgrade Automatic Passenger Counters on Fixed-Route Vehicles	Critical Tech	High	Low	Short	Medium	**HIGH**
6	Enhance Real-Time Passenger Information	User Experience	Medium	High	Short	Medium	**HIGH**
7	Replace and Improve Camera Systems	Critical Tech	High	Low	Short	Medium	**MEDIUM**
8	Explore Institutional Partnerships	Fare Programs	Medium	High	Medium	Low	**MEDIUM**
9	Install Lighting, Shelters, and Bike Parking at Applicable Bus Stops	Shelter and Streets	Medium	Medium	Short	Medium	**MEDIUM**
10	Expand Downtown Access Program	Fare Programs	High	Medium	Short	Low	**MEDIUM**
11	Pursue Micro-Transit Mobility Services	Enhanced Service	Medium	High	Long	Medium	**MEDIUM**
12	Launch a Bikeshare Program	Enhanced Service	Medium	Low	Short	Low	**MEDIUM**
13	Establish a Mobility-as-a-Service Platform	User Experience	Medium	Medium	Long	High	**LOW**
14	Investigate and Establish Mobility Hubs	Shelter and Streets	Medium	Medium	Medium	High	**LOW**
15	Launch a Carshare Program	Enhanced Service	Medium	Low	Medium	Medium	**LOW**
16	Implement a Transit Signal Priority Strategy	Enhanced Service	Low	Low	Medium	High	**LOW**
17	Add Bus Bulb-outs Downtown	Shelter and Streets	Medium	Low	Long	Medium	**LOW**

8.2 Funding Sources

The following presents current and potential funding sources for SLO Transit's consideration in pursuing the recommendations outlined above.

The City receives its funding from fare revenues generated from its fixed-route service mode as well as contributions from local, state, and federal grant subsidy programs. The funding sources discussed in this section include both actual and projected revenue sources from the latest adopted budget supporting operations and capital.

Note that partnerships with third-party providers (i.e., contracting microtransit on-demand services to a company) can also limit upfront costs to agencies. Such strategies are not outlined in detail here and would need to be explored further in coordination with any such provider.

8.2.1 Local Transit Funding Sources

Passenger Fares: One of the largest direct local revenue sources is derived from SLO Transit's farebox, which helps support operations and meet state-required performance measures. Farebox revenues are composed of cash fares sold on the bus, passes purchased at various vendors (including City Hall Finance counter, SLO Chamber of Commerce, Boo Boo Records, Laguna Middle School, and SLO High School), and digital passes purchased through the Token Transit mobile app.

Parking Fund: SLO Transit typically receives $20,000 annually from the parking fund; opportunities to increase parking fees to subsidize transit improvements could be explored further.

Tourism Business Improvement District (TBID): The TBID assessment is currently 2%, which is comparable to other TBIDs in the state. To increase funding, opportunities to expand the TBID assessment fee to 2.5% or 3% based on geographic zones could be explored.

Sponsored Routes or Services: SLO Transit does not currently collect revenue from local businesses for sponsoring routes or services. While this strategy does come with some costs and benefits, some agencies do use sponsorships to fund particular improvements or services throughout the city.

Transportation Development Act (TDA): Enacted by the State Legislature in 1971 to make funds available for transit, pedestrian way and bikeway projects, transportation planning, ridesharing and street and road improvements. TDA funds are the largest sole source of operating revenue for most public transportation systems in the state. Funds for the TDA come from 1/4 cent of the retail sales tax (for LTF), and from sales taxes on diesel fuel (for STA). These funds are allocated annually by SLOCOG to eligible claimants under two funding programs: the Local Transportation Fund (LTF) and the State Transit Assistance (STA).

Local Transportation Fund: LTF tax revenues are collected by the Board of Equalization but administered locally through SLOCOG, which then allocates the revenue to local jurisdictions based on population. Local jurisdiction LTF contributions are made to RTA as a requirement of their membership in the Authority to fund the regional transit service.

G-20 Measure: SLO residents passed a new city sales tax measure, G-20, in November 2020 that is anticipated to provide approximately $20 million annually to preserve and enhance quality of life by accomplishing a variety of objectives, one of which is for transportation

improvements such as repairing potholes, reducing traffic congestion, and expanding bike lanes. SLO Transit will benefit from this new tax measure indirectly through City projects that enhance local operating conditions and multimodal access and connectivity. The measure expenditure plan does not include direct funding to SLO Transit.

8.2.2 State Transit Funding Sources

Senate Bill 1: The most recent development at the state level concerns the passage and signing into law of SB 1 (Beall) in April 2017. SB 1, The Road Repair and Accountability Act of 2017, provides the first significant, stable, and ongoing increase in state transportation funding in more than two decades. SB 1 is composed of a series of measures and revenue enhancements such as increases in the diesel and gasoline excise and sales taxes and vehicle registration fees.

State of Good Repair: The State of Good Repair (SGR) program is the result of the passage of SB1 and provides approximately $105 million annually to transit operators in California for eligible transit maintenance, rehabilitation and capital projects. The SGR program benefits the public by providing public transportation agencies with a consistent and dependable revenue source to invest in the upgrade, repair and improvement of their agency's transportation infrastructure, and in turn improve transportation services. These funds are allocated under the State Transit Assistance (STA) Program formula to eligible agencies pursuant to Public Utilities Code (PUC) section 99312.1. Half is allocated according to population and half according to transit operator revenues.

Proposition 1B – Public Transportation Modernization, Improvement, and Service Enhancement Account: On November 7, 2006, California voters approved Proposition 1B, the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006. This act authorized the issuance of $19.925 billion in general obligation bonds to invest in high-priority improvements to the state's surface transportation system and to finance strategies to improve air quality. Among the programs contained in Proposition 1B is the $3.6 billion Public Transportation Modernization, Improvement, and Service Enhancement Account (PTMISEA). PTMISEA funds are to be used to fund various mass transportation projects, including rehabilitation, safety, or modernization improvements, capital enhancements or expansion, rail transit improvement, bus rapid transit improvements, the acquisition of rolling stock, and other similar investments.

California Air Resources Board – Low Carbon Transit Operations Program: The Low Carbon Transit Operations Program (LCTOP) is one of several programs that are part of the Transit, Affordable Housing, and Sustainable Communities Program established by the California Legislature in 2014 by Senate Bill 862 (SB 862). The LCTOP was created to provide operating and capital assistance for transit agencies with the goal of reducing greenhouse gas (GHG) emissions and improve mobility, with an emphasis on serving Disadvantaged Communities (DAC) and low-income communities. This program is administered by Caltrans in coordination with the California Air Resources Board (CARB) and the State Controller's Office (SCO). These funds are part of the State Cap-and-Trade program and are derived from annual auction proceeds in the GHG Reduction Fund.

CARB issues competitive grant solicitations for the Air Quality Improvement Program (AQIP) and Low Carbon Transportation Greenhouse Gas Reduction Fund Investments pursuant to AB 118. Each fiscal year, CARB must submit a proposed funding plan to its board for approval. The funding plan serves as the blueprint for expending the AQIP funds appropriated to CARB

in the state budget. Annual funding allocations could aid in future procurements of low- or zero-emission transit and support vehicles.

California Air Resources Board - Sustainable Transportation Equity Project (STEP): Includes implementation grants for transportation strategies that include Active Transportation, Fixed-Route Transit, and Shared Mobility. These strategies are meant to encourage mode shift from single-occupancy combustion vehicles, fill transportation gaps, and prioritize first/last mile connections.

8.2.3 Federal Revenue Sources

The Federal Transit Administration (FTA) provides financial and technical assistance to local public transit systems. Since 1964, the FTA has partnered with state and local governments to create and enhance public transportation systems, investing more than $11 billion annually to support and expand public transit services. The FTA provides annual formula grants to transit agencies nationwide as well as discretionary funding in competitive processes.

The following table lists key FTA formula and competitive discretionary grant opportunities:

Table 10: FTA Grant Opportunities

FORMULA	DISCRETIONARY
Section 5307: Urbanized Area Formula Funding Program	Sections 5303, 5304, and 5305: MPO/Statewide/Non-MPO Transportation Planning
Section 5329: Public Transportation Safety and Oversight	Section 5309: Capital Investment Grant program (New Starts, Small Starts, Core Capacity)
	Section 5337: State of Good Repair (High Intensity Fixed Guideway and High Intensity Motorbus)
	Section 5339: Bus and Bus Facilities and No and Low Emission

Appendix A – Existing Systems

Table 11: Systems Inventory

TECHNOLOGY	VENDOR	DESCRIPTION	END USERS	MAJOR FUNCTIONS AND USERS
Onboard Systems				
Mobile Data Terminal	Bishop Peak	The onboard central processing unit that is connected to and manages data across all the onboard systems, automatic vehicle location (AVL), audio announcement system, internal signs, headsigns, and camera system (for some vehicles).	Bus Driver	Operator communications, performance viewing
AVL Tablet	Bishop Peak	The onboard central processing unit that is connected to and manages data across all the onboard systems, automatic vehicle location (AVL), audio announcement system, internal signs, headsigns, and farebox.	Bus Driver, Maintenance	Communications, data processing, data storage, real-time location and schedule tracking, headsign management, internal sign management
Farebox	Genfare	Is a validating farebox that accepts cash and magnetic stripe paper tickets.	Driver, Finance, Maintenance	Validating cash and fare media payments. Collecting and storing cash transactions.
Onboard Camera Systems	SEON	Onboard security video monitoring and management system equipment installed across the vehicle fleet except three (3) vehicles. Each set of onboard system equipment consists of an HVR integrated with multiple interior and exterior cameras.	Operations	Security video footage
Driver-facing Camera Systems	DriveCam	Onboard security video equipment comprising of gyroscope and accelerometer used for performance and incident monitoring	Operations, Reporting	Security video footage
Central Systems				

Fixed Route Scheduling System	Excel/Email	Software that is used to generate the fixed route schedule, blocks, runs, and driver rosters	Scheduling	Timetables, operator runs, mileage for NTD
Dispatching	Bishop Peak	The central software used for vehicle tracking and real-time dispatching, operations.	Dispatch, Maintenance	Dispatch management, messaging, location and schedule monitoring, operations data communications.
Operations Reporting	Bishop Peak, internally developed reports	A data warehouse and reporting tool for operational data captured by the AVL system.	Planning, Management	On-time performance and other reporting on AVL data.
Maintenance and Management System	Hexagon	The central software that is used for managing workflows for all work orders related to preventive maintenance (PM) and repairs for vehicle components, purchase order management for parts and generating maintenance reports. Repairs conducted by contractors are also tracked in this system.	Maintenance	Work order management, parts inventory management, parts fulfillment.
Fare System	Genfare Data System, Token Transit	Central data management and processing system for all Genfare fare system equipment.	Finance, Maintenance, Planning	Revenue collection, Planning data analysis
Video Management Software	SEON	Central video management software to manage camera video from HVRs and cameras installed across the SLO fleet. The software allows staff to search, tag, download video wirelessly and playback videos.	Maintenance, Safety	System video monitoring, training, risk management, claims management.
Garage Systems				

Vehicle Diagnostic Software	Engine Diagnostic software	Used to assess vehicle health and performance; software can vary depending on vehicle model and is often different depending on manufacturer.	Maintenance, Safety	Vehicle health, maintenance and monitoring
Farebox Probing	Genfare	Farebox data probe system to export fare data from fareboxes into central fare data system	Finance, Maintenance	Farebox data collection and management system.
EV Charging Infrastructure	ChargePoint	Chargers, dispensers, and related equipment that is used to power electric vehicles. Currently SLO has a mobile charging set-up, but permanent charging infrastructure is planned for the yard.	Operations, maintenance, planning	Charging and fuel monitoring, operations
Customer Systems				
Real-time Information	SLO Transit app	The real-time information dissemination software used to provide passengers information about the vehicle locations and arrival predictions.	Customers, Community Relations	Customer information dissemination.
Fare Payment	Token Transit App	Mobile application that lets customers buy and activate transit tickets from their phone	Finance, Maintenance, Planning	Revenue collection, Planning data analysis
Third-Party Applications	Transit App, Moovit App, Twitter	A variety of platforms that are used to provide customers information about SLO service on customers preferred platform.	Community Relations	Customer information dissemination and detour management.

Appendix B – Needs Assessment

Table 12: SLO Transit Needs

NO.	NEEDS	SUPPLMENTARY INFORMATION	CATEGORY	PRIORITY
1	Eliminate glitching/freezing of CAD system	Dispatchers currently report system freezing periodically and are sometimes unable to tell where the buses are through the CAD/AVL system.	Dispatch	High
2	Annunciators in the buses should work 100% of the time	Right now, annunciators work around 70% of the time. Sometimes drivers must announce stops.	Customer Service, Operations	High
3	Transit app should work across all device types	Sometimes app works well on iPhones but not on Android.	Customer service	High
4	Electronic incident reporting features that allow for distribution, electronic filing, and ability to run reports in more automated fashion.	Incident reports are currently done on paper and dispatch scans paper reports and sends them out to all relevant departments. This can cause delays and increases manual burden on staff.	Administration	High
5	Replace technology systems that have reached the end of their useful life	SEON camera system aboard certain buses have reached the end of its useful life and should be replaced.	Operations	High
6	A more reliable method of counting passengers	The existing APC system is run through the AVL system. It was installed on most of the buses, but they have not worked as intended since installation. City would like this replaced with an NTD-compliant system.	Administration	High
7	Improved CAD/AVL reporting capabilities	A system that can perform runtime reports or more reliable passenger counts would alleviate manual reporting requirements and improve processes.	Administration, Reporting	High
8	Improved fare payment interface and open-loop contactless payments	Currently, only a few residents know about Token Transit app that they can use to pay fares on SLO Transit buses. It does not allow for the use of credit cards or contactless payment on buses directly.	Customer Service	High
9	A Mobility-as-a-Service (MaaS) application that integrates transit, carshare, parking, EV charging, and bikeshare	The city's Active Transportation Plan includes a goal of better integrating transit, carshare, and bikeshare.	Active Transportation	High

10	Initiate or expand bike and car share services	City staff would like to initiate docked bikeshare and expand the carshare program (ZipCar) currently at CalPoly.	Active Transportation	High
11	A customer-facing transit app that shows real-time bus location and predicted arrival times more accurately	The current transit application shows bus location but is not always reliable. The predicted bus arrival times does not always consider on-route delays or detours. The City would like to explore other technologies that do allow for rerouting and reflect accurate arrival times.	Customer Service	High
12	A user-friendly hotline for supporting common bus location-based inquiries.	SLO gets calls from customers about bus arrival times when there are delays or detours that are not reflected in the app. Current operations would benefit from some real-time information to be available to customers over the phone without manual intervention. City would like to explore IVR in multiple contexts for providing information to customers.	Customer Service	High
13	A reliable, user friendly interface for reporting	Currently MS Access is used to prepare reports for the city, and the interface is outdated. City would like to use staff time as efficiently as possible.	Administration	High
14	Integrated camera system on buses that provides the same capabilities fleet-wide	Currently, buses have two different systems- most have older SEON systems, while 3 buses have camera systems that interface with CAD/AVL software. The two different systems result in procedural inconsistencies for data backup and incident reporting. Upgrading to a single camera system that allows for wireless transfer of data would be beneficial.	Operations	Medium
15	An integrated system where drivers can log-in fewer times	Currently, every time before starting a shift, drivers must log-in to three different systems: Bishop Peak, NFC, and the Genfare platform.	Operations	Medium

16	Additional camera angles and seamless file sharing for onboard video	Checking video footage after an incident is primarily done through DriveCam because it is more user-friendly. However, DriveCam only captures one angle and is not useful for incidents that occur on the side of the bus. These incidents require using a thumb drive to manually extract the footage from the onboard camera systems hard drive.	Administration	Medium
17	Integrated software for 3 different models of EV buses	SLO Transit may soon have Battery Electric Buses from 3 different vendors (moving forward, it will be a single manufacturer)- New Flyer, Proterra, and Gillig. While the chargers will be universal, the diagnostic software will be proprietary for each vendor. This could lead to using three different software products for vehicle diagnostics.	Maintenance	Medium
18	Bike locker locations and reservation capability	Riders do not currently have the ability to easily reserve bike locker spaces and track their availability.	Active Transportation	Medium
19	Working detour communication features on transit application	This feature on the transit app has not been working as intended.	Customer Service	Medium
20	Address service reliability routes 2a and 3	Long wait times on these routes is partially a product of construction work but impacts riders' ability to get where they need to go on time.	Service Planning	Medium
21	Bus stops should incorporate real-time ETA signage at more stops and ETAs should be accurate	Real-time posts are not always accurate and are only located at a few select stops. Other stops could benefit from upgraded infrastructure and accurate prediction data.	Bus stops	Medium
22	Dashboard for easy access to operational statistics	City staff relies on First Transit for reporting information such as revenue, miles, and vehicle hours. An accessible dashboard to check operational data from the city side would assist with NTD reporting and verification.	Administration, Reporting	Medium

23	Easier process for acquiring free transit passes and potential integration with a MaaS application for doing this	Downtown employees in San Luis Obispo are permitted to receive free transit passes, but passes require going to a specific office location and employees must re-enroll every month	Fareless/Commuter Programs	Medium
24	Digital wayfinding capabilities	Bike and pedestrian wayfinding are inadequate in some areas. A digital wayfinding system could be an affordable solution in targeted areas.	Active Transportation	Low
25	A way of conveying bike parking locations and availability	There is currently no system for residents to know the locations and availability of bike parking spaces.	Active Transportation	Low
26	E-bike charging infrastructure	As e-bikes become more prevalent, there may more demand for public bike charging stations.	Active Transportation	Low
27	More automated process for schedule changes	Schedule changes from the City to the operator are currently communicated via email. While the process works fine, there is interest in exploring technologies that may be available to ease schedule change burden or lessen the number of steps involved.	Service Planning	Low
28	City access to maintenance data	Currently, First Transit is responsible for reporting all maintenance data to SLO Transit; this process would be simplified and data could be more easily verified if city staff had a login to review data or information from Hexagon were shared directly into SLO Transit systems, or if the operator were required to use SLO City systems for data sharing.	Administration, Reporting	Low