

SAN FRANCISCO

The Key Capacity Challenge for the San Francisco Metro Study Area: Muni Metro trains are overcrowded today, and continued population growth in San Francisco – particularly along the Market Street corridor – is projected to increase strain on the system as ridership continues to grow.

The main goal of the short/medium-term San Francisco Metro packages is to maximize the use of the Muni Metro Tunnel and increase capacity in the crowded central portion of the system.

Infrastructure with great potential: The Muni Metro Tunnel, which runs from Embarcadero Station to West Portal under Market Street and through Twin Peaks, is equipped with a highly advanced automatic train control system. This system could allow SFMTA to greatly increase service levels in the tunnel, with capacity for more than 40 trains per hour.

Unpredictable delays on city streets hold Muni Metro back: Unpredictable delays on the surface portions of Muni Metro lines (due to traffic, variations in boarding time at certain stops, and other issues) make it nearly impossible to take advantage of the tunnel's potential.

Challenges where lines come together: The complicated nature of operations at West Portal and the intersection of Church and Duboce streets, where multiple Muni Metro lines merge, also makes it difficult to run consistent service.

Impact on how the tunnel works: Without knowing exactly when trains will enter the tunnel, it is difficult to put trains in the proper order or ensure that trains are spaced as close together as they can be while still ensuring passenger safety, which is the key to maximizing the tunnel's capacity.

Potential to handle longer trains: The tunnel's stations are also equipped to handle trains that are twice as long as the longest ones Muni runs today. Train lengths are constrained to one or two cars because of the size of Muni's light rail fleet and the challenging operating conditions on the surface portions of the lines.



IMPROVING TRAIN OPERATIONS ON CITY STREETS

This package considers whether implementing operational improvements recommended through SFMTA Muni Forward initiative on all of the Muni Metro lines would, on its own, improve surface operations enough to allow the Muni Metro Tunnel to reach its potential.

Package Summary: Make train operations more predictable by fixing issues where trains run on city streets while maintaining the system’s basic six-line structure

- **Building on Muni Forward:** For more than five years, SFMTA’s Muni Forward team has been analyzing Muni’s surface operations and generating proposals for improving them, to reduce travel times and make service more reliable. The team developed a toolkit of travel-time-reduction strategies, including those listed below under “Key Components,” as well as specific plans for improving operations along a number of bus and rail lines.
- **Evidence of success in other cities:** Based on the experience of other cities, infrastructure improvements could reduce travel-time and increase reliability significantly.
- **The potential benefits:** Travel-time savings and reliability improvements can translate to more cost-efficient service, which can enable more frequent trains without increasing overall costs. Reliability improvements will also make trains more predictable and more able to adhere to schedules.
- **The potential trade-offs:** These improvements may not increase service enough to fully maximize capacity in the tunnel.
- **Expected performance on evaluation:** Significantly improve reliability, and in turn, increase capacity and resiliency. Likely a cost-effective approach, given potential reductions in operating costs.



Key Components:

- **Transit signal priority:** Stop lights equipped to turn or stay green when a train is approaching
- **Left-turn restrictions:** Prevent cars from blocking trains while they wait to turn left
- **Improved boarding islands:** Islands that are long enough to make it easier to board all doors of each train car
- **Two-way stops with traffic calming:** Remove stop signs along train routes and implement measures to maintain pedestrian safety by slowing private car traffic down
- **Stop consolidation:** Reduce the number of times a train stops by optimizing stop spacing

COUPLING TRAINS AT MUNI METRO TUNNEL PORTALS

This package considers whether joining certain trains, or “coupling” them, at stations where lines merge is a feasible way to increase capacity in the Muni Metro Tunnel.

Package Summary: Link trains together where lines join to enable longer trains where ridership is higher

- **Most crowding in the Core:** Muni Metro trains are crowded in the peak direction every morning and afternoon, with the most crowded conditions occurring between West Portal and Civic Center stations.
- **The potential benefits:** Coupling trains near where they enter the tunnel would target increased capacity in the part of the system where it is most needed, without creating unnecessary capacity at the lower-ridership edges of the system. Muni used this approach until the late 1990s, when the agency discontinued the practice because of problems with train equipment and staffing issues.
- **The likely trade-offs:** This approach might create confusion for riders on lines that join together, particularly in the outbound direction. Riders would need to pay close attention to identify the specific car on a multi-car train that matches the line for their ultimate destination.
- **Expected performance on evaluation - fatally flawed:** An initial analysis of this concept revealed that without near-perfect reliability in the surface portions of the system (implementation of most improvements included in Package #1), it would be difficult to effectively manage the routine, scheduled linking of trains. For example, if one train were to arrive late to the point at which it was to couple with another train, it could lead to highly inconvenient delays for passengers on the waiting train and could exacerbate spacing and sequencing issues in the Muni Metro Tunnel.

Key Components:

- Coupling (linking the cars of two separate train lines) Muni Metro trains together near where they enter the Muni Metro tunnel to increase rider capacity inside the tunnel.



SIMPLIFYING MUNI METRO

This package considers whether maximizing capacity in the central part of the system through improved service on a limited set of key lines would outweigh the potential inconveniences to passengers who would need to transfer to reach the San Francisco Core in a simplified system.

Package Summary: Dramatically improve reliability in the Muni Metro Tunnel by simplifying the system's structure

- **Creating a more efficient system:** This package looks at how changing Muni Metro routes could improve capacity and reliability.
- **Requires some surface optimization:** To maximize the utility of this approach, the strategies for improving operations on surface streets explored in Package #1 would need to be implemented along any lines traveling into the Muni Metro Tunnel.
- **The potential benefits:** Simplifying the system by concentrating high-frequency and high-capacity service on a more limited set of lines would improve operations at the stations where lines currently merge. It would also limit the extent to which lines traveling in the Muni Metro Tunnel are exposed to the unpredictable surface operating conditions that currently make it difficult to put trains in the right order or create the ideal amount of space between them.
- **The potential trade-offs:** These scenarios trade one-seat (transfer-free) trips on certain lines for increased frequency and an overall reduction in passenger travel times system-wide. For riders that would need to transfer to reach the Core, travel times could be slower than current delay-free trips. However, faster and more reliable service on lines in the Muni Metro Tunnel would mean quick and easy transfers and fewer unexpectedly long trips for everyone in the system.
- **Expected performance on evaluation:** Likely offers the biggest improvement in reliability of the three packages, improving capacity and resiliency at the same time. Likely only cost effective if service levels on lines in the Muni Metro tunnel grow significantly.



Key Components:

- Increased frequency and reduced travel time in Muni Metro Tunnel (West Portal Station to Embarcadero Station) on key lines in all scenarios
- Passengers on certain lines would need to transfer to the higher frequency service and longer trains on core lines to reach downtown.

PROJECTS INCLUDED IN ALL PACKAGES

The projects common to all packages include investments that would enable major components of the approaches described in previous pages or common sense investments that have simply not received detailed study by the agencies to date.

PROJECT	DESCRIPTION
<p>Enhance Muni Metro Embarcadero Turnback</p>	<p>Improvements the way trains on certain lines turn back east of Embarcadero Station, to make the process faster and more reliable. This would create capacity for more trains per hour in the Muni Metro Tunnel and reduce staff needs, among other benefits.</p>
<p>Four-Car Brannan Street Turnback Track</p>	<p>Construct a “pocket” track between the existing Muni Metro Extension tracks along the Embarcadero between Bryant and Harrison Streets. The new middle track would allow eastbound trains to divert into the “pocket” to prepare for a westbound return to the Muni Metro Tunnel and the city’s western neighborhoods.</p>
<p>Geary BRT</p>	<p>Dedicated bus lanes, enhanced platforms, new bus passing zones, adjustments to local bus stops, turn-lane restrictions, new signalization with Transit Signal Priority, real-time arrival information, low-floor buses, and safety improvements in support of Vision Zero to improve Geary bus service between Market Street and Point Lobos Avenue. All of this would markedly improve service in one of the highest ridership bus corridors in the country, reducing travel times, increasing frequencies, and making operations more efficient overall.</p>
<p>Fleet Expansion and Increased Maintenance and Storage Yard Space</p>	<p>Purchase additional rail cars, beyond current plans, to support increases in service made possible by efficiency improvements offered by each of the SF Metro packages. New rail cars and buses should be less prone to maintenance issues than the older vehicles in SFMTA’s existing fleet, increasing reliability. Expanding the fleet overall will enable service increases on key lines.</p>
<p>Secure Eastern Entrance to the Muni Metro Tunnel (Ferry Portal)</p>	<p>Install a system that would alert station agents and the Transportation Management Center of a pedestrian or vehicle intrusion at the eastern entry point to the Muni Metro tunnel, at the intersection of the Embarcadero and Folsom Street. This would improve safety and security, and it is a prerequisite to improving the efficiency of the Embarcadero turnback.</p>