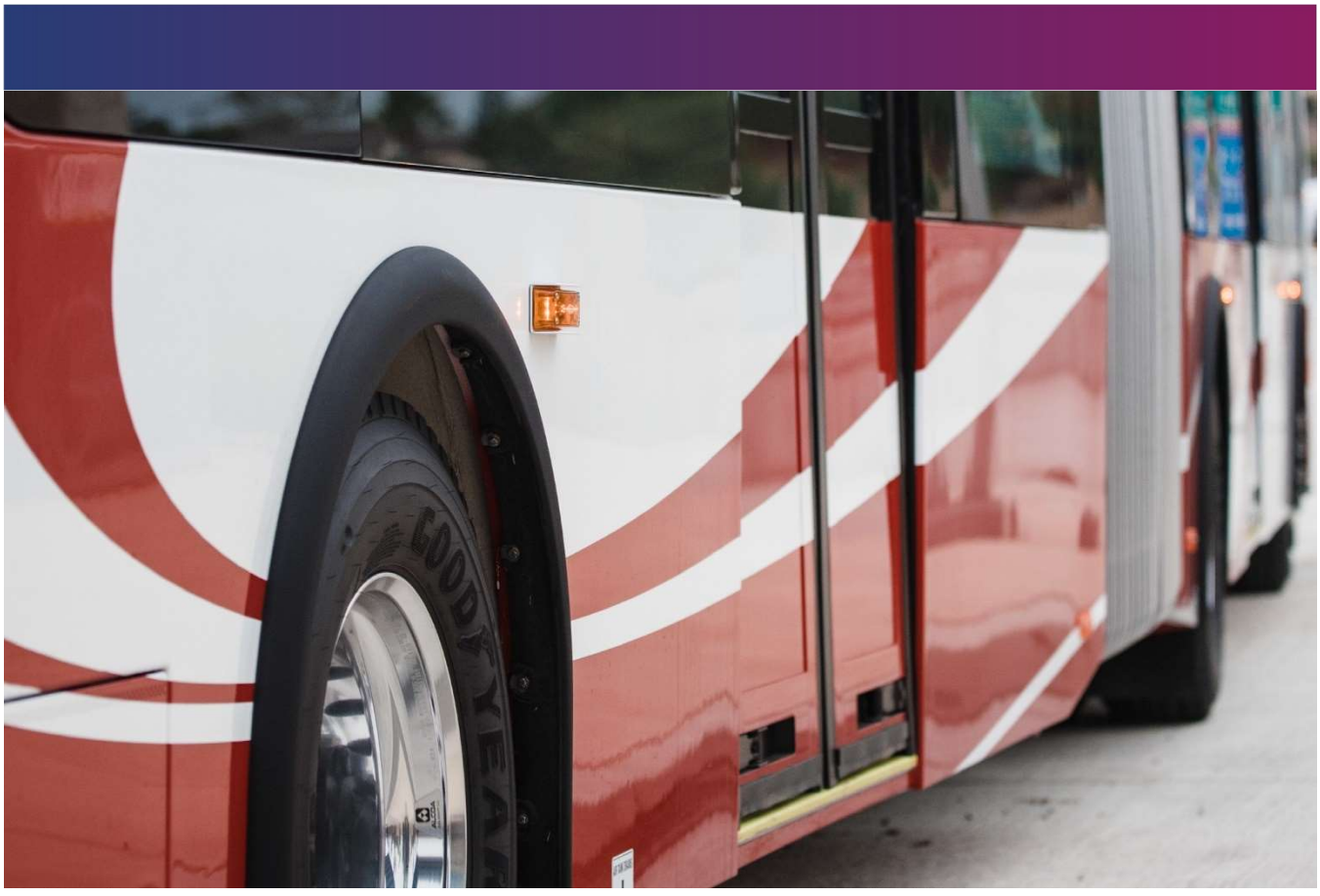
SANDAG | Caltrans

NEXT GEN *RAPID*

CONCEPTUAL PLANNING BLUEPRINT

OCTOBER 2023



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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ADA	Americans with Disabilities Act
BAT	Business Access and Transit
BRT	Bus Rapid Transit
GEN	Generation
GPS	Global Positioning System
O&M	Operations and Maintenance
PDT	project development team
PMT	project management team
ROW	right-of-way
SANDAG	San Diego Association of Governments
TOD	transit-oriented development
TPI	transit propensity index
TSP	Transit signal prioritization

1.0 Introduction

1.1 SANDAG Regional Plan and Next Gen *Rapid*

With the adoption of the 2021 Regional Plan[1] and via updates made in the 2025 Regional Plan, San Diego Association of Governments (SANDAG) is set to implement Next Generation (Gen) *Rapid*: a system of faster, more reliable bus service that will reshape how travelers move throughout San Diego County. Though the 2021 Regional Plan identifies approximate route alignments and stop locations, additional analysis is needed to define service characteristics and identify transit-supportive improvements along Next Gen *Rapid* corridors. Doing so will position SANDAG, San Diego Metropolitan Transit System, and North County Transit District to secure the funding needed to provide quality, reliable transit; maximize ridership by ensuring travel times that are competitive with automobiles; eliminate first- and last-mile barriers; serve basic needs, opportunities, and major destinations; and improve transit service while maximizing corridor passenger throughput.

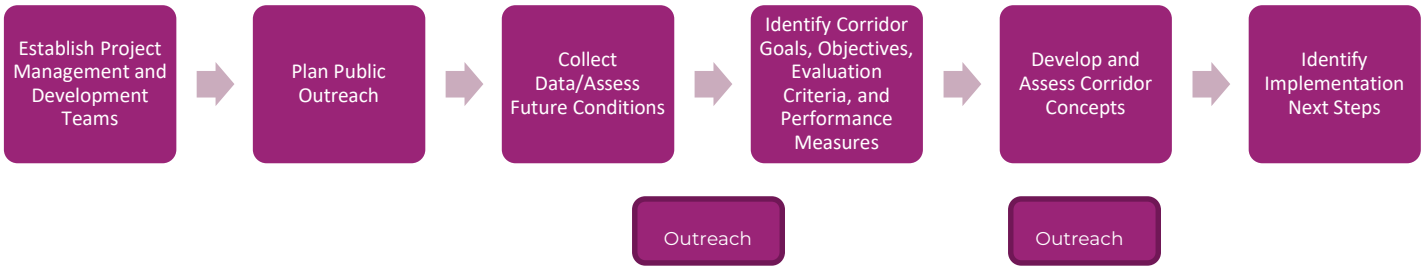
1.2 Purpose of this Document

This Conceptual Planning Blueprint provides a guide for practitioners wishing to implement Next Gen *Rapid* service in their jurisdiction. Practitioners may include SANDAG, local jurisdictions, California Department of Transportation, and key stakeholders and the public in specific corridors. This guide provides a step-by-step overview of the activities that should be taken, and when, to implement Next Gen *Rapid* service.

This document is organized as follows and shown in Figure 1-1.

- Section 2: Establish Project Management Team (PMT) and Project Development Team (PDT)
- Section 3: Plan and Conduct Public Outreach
- Section 4: Collect Data and Assess Future Conditions
- Section 5: Identify Corridor Goals, Objectives, Evaluation Criteria, and Performance Measures
- Section 6: Develop and Assess Corridor Concepts
- Section 7: Identify Implementation Next Steps

Figure 1-1. Conceptual Planning Process



[1] SANDAG (San Diego Association of Governments). 2021. 2021 Regional Plan. December 2021. Available at: https://www.sandag.org/regional-plan/2021-regional-plan/-/media/8D0F181A086844E3A84C3D44576BED6B.ashx.

2.0 Establish Project Management and Project Development Teams

Both a PMT and PDT should be established at the onset of a conceptual planning study. The PMT oversees the day-to-day activities of the study and is typically comprised of the lead agency and consultant or community-based organization partners, if applicable. The PDT provides input at key decision-making points and is comprised of the PMT, local agency staff, and transit operators.

PDT Meetings should be held at key milestones. It is recommended the following information be shared at each:

- **Meeting #1**: Study Overview, Existing Conditions Assessment Approach, Outreach Process Approach
- **Meeting #2**: Existing Conditions Assessment Review
- **Meeting #3**: Goals, Objectives, Evaluation Criteria, Performance Measures Overview; Goals and Objectives Prioritization; Improvement Type Potential
- **Meeting #4**: Draft Concept (alignment routing, roadway/intersection improvements, stop locations) Review
- **Meeting #5**: Public Outreach Summary, Corridor Concept Performance
- **Meeting #6**: Concept Alternatives Assessment Summary, Implementation Recommendations, Immediate Next Steps

3.0 Plan and Conduct Public Outreach

Effective public outreach is key to ensuring community members are involved in the planning process and have an opportunity to influence the development of *Rapid* routes. As such, a public outreach plan should be developed in coordination with SANDAG and the PDT at the onset of any conceptual planning effort.

Once the study commences, public outreach activities should be conducted at the following study milestones to maximize stakeholder input:

- **Existing Conditions** – Stakeholders and members of the public should be engaged once existing conditions have been assessed. This allows participants to validate the findings of the assessment and recommend updates as needed.
- **Draft Concepts** – At this stage, participants can review draft Next Gen *Rapid* concepts, communicate potential concept enhancements, and identify a preferred concept.

Outreach efforts should be tailored to the needs of stakeholders along study corridors and could include the following:

- **Community Roundtables** – These are meetings with key stakeholders and community leaders in each corridor, including representatives from community planning groups, partner agencies, community-based organizations, transportation advocacy groups, educational institutions, and faith-based organizations.
- **Pop-up Outreach** – These include in-person outreach at key activity centers or events in corridor communities.
- **Public Meetings** – Held in-person or virtually, these provide participants with a more in-depth understanding of study corridors and proposed services and allows for interaction with and ask questions to the project team.
- **Surveys** – Offered at pop-up outreach events, or electronically, these can be used to solicit input from community members who might not be able to attend public meetings. Surveys can also be used in lieu of public meetings and may increase public participation because of the range distribution.

4.0 Collect Data and Assess Future Conditions

Planning for a new Next Gen *Rapid* service requires a comprehensive understanding of mobility conditions and the transportation needs of communities that would be served by it. Collecting and analyzing data is a crucial step in this process. This section summarizes the process of collecting and analyzing data in study corridors.

4.1 Corridor Definition

The first and most important step in assessing corridor conditions is to define the corridor. Practitioners should consider the following when defining study corridors:

- How study routes have been defined previously, either in regional or local planning documents
- Travel demand along or across study corridors
- Locations of key activity centers

4.2 Data Collection and Review

Practitioners should work with regional and local agencies to identify the types of data that should be collected. It is recommended that, at a minimum, the following types of data be collected:

- **Mobility Networks**: includes existing and planned transit, active transportation, micromobility (Flex Fleet), mobility hub, and roadway classification information.
- **Ridership**: includes historic transit boardings by stop and/or route, where available.
- **Travel Times**: includes existing travel times and delays along potential *Rapid* routes. This can be used to assess the impact of congestion and identify areas where Bus Rapid Transit (BRT) can improve travel times.
- **Demographics**: includes existing and forecasted locations and concentrations of population, employment, housing, and social equity focus populations (i.e., low-income, minority, and senior)
- **Land Use, Key Activity Centers, Key Community Resources**: includes existing and planned land uses, key activity centers (e.g., higher education, civic centers, and regional retail centers), and key community resources (e.g., medical campuses).
- **Safety**: includes historic pedestrian- and bicycle-involved collisions along or adjacent to study roadways. This can be used to identify areas where safety improvements could increase *Rapid* ridership.
- **Travel Markets**: includes the types of trips (e.g., work-based, recreational, etc.) that are being made in the corridor, and if possible, via existing transit services.
- **Travel Patterns**: includes areas with high levels of trip activity. The SANDAG Activity Based Model is an appropriate data source to review both work- and non-work based trips. Transit travel patterns can be assessed using historic onboard survey data provided by SANDAG.
- **Resilience**: includes data that shows where severe weather events, such as wildfires and flooding may occur. This can be used to identify projects (e.g., levees) that could be constructed along Next Gen *Rapid* routes to minimize service disruptions caused by severe weather events.

Practitioners should also review relevant planning documents to identify key planning considerations and previously recommended mobility improvements in each corridor.

The data sets and planning documents reviewed should be vetted by the PDT.

4.3 Data Analysis

The data and planning documents described above should be used to develop an overview of existing and future conditions in a study corridor.

Mobility data should be assessed both qualitatively and quantitatively to understand current and future corridor conditions and needs. For example, a corridor that may reasonably anticipate population or employment growth where high concentrations do not currently exist. In such instances, practitioners should look to serve future population and/or employment centers with Next Gen *Rapid* service.

Recently completed planning documents should be reviewed to understand planned mobility projects that could complement – or possibly conflict with – potential corridor treatments to support *Rapid* service. For example, a community plan may identify future transit priority lanes along a study corridor roadway. In this instance, practitioners should work to include planned improvements in concepts that support *Rapid* service.

The project team should utilize the findings of this effort to develop study goals, objectives, evaluation criteria, and performance measures. These should be used to identify, evaluate, and prioritize site-specific Next Gen *Rapid* routing alternatives and site- or corridor-specific improvements.

5.0 Identify Corridor Goals, Objectives, Evaluation Criteria, and Performance Measures

Practitioners should use the findings of the existing conditions assessment to develop a series of goals and objectives, performance measures, and evaluation criteria in coordination with the PDT. Study goals, objectives, evaluation criteria, and performance measures should be vetted with the PDT early in the planning process and should be tailored to the specific needs of the region and study corridor.

Practitioners should also include performance measures that may be required if the study is funded via external funding sources (e.g., Sustainable Transportation Planning Grant). Potential goals and objectives, performance measures, and evaluation criteria are shown in Table 5-1.

Table 5-1. Sample Goals, Objectives, Evaluation Criteria, and Performance Measures

Goals	Objectives	Evaluation Criteria	Performance Measures
Provide reliable, high-quality transit service that is competitive with automobile travel	Implement strategies that minimize delays to buses caused by congestion along roadways and at intersections Provide station amenities that expedite the boarding and alighting process	Transit Service Reliability	New miles of dedicated bus facilities[a]
			Percent difference in trip time between proposed *Rapid* routes and automobiles on the corridor
			Percent difference in trip time between existing or assumed local bus and proposed *Rapid* routes on the corridor
			Change in person throughput along each corridor
Maximize ridership potential	Serve key activity centers and areas with high concentrations of population and employment	Ridership Potential	Total number of people and jobs within 0.5 mile travelshed of stations
			Number of known activity centers within 0.5 mile of stations
	Enhance non-motorized access to transit beyond a 5- or 10-minute travelshed		Total number of people and jobs that can access stations within 10 to 20 minutes (bicycle, Flex Fleet access market)
	Identify active transportation (AT) improvements that have the potential to improve safety		Miles of existing/proposed AT facilities on alternative (miles)[a]

Goals	Objectives	Evaluation Criteria	Performance Measures
Improve access for social equity focus and transit-dependent populations	Implement service that directly connects social equity focus populations with employment centers, higher education institutions, and basic needs (e.g., healthcare and grocery stores)	Socially Equity Focus and Transit-Dependent Population Benefits	Percentage of total corridor social equity focus populations (low-income, minority, and senior) within 0.5 mile travelshed of each route alternative's proposed stations
	Ensure stations are accessible		Feedback from Social Services Transportation Advisory Council (SSTAC) meeting on station access strategies
Gain support from the public and key stakeholders	Implement context sensitive strategies	Stakeholder Support	Feedback from stakeholders on conceptual design elements
	Implement services that serve multiple travel markets in each corridor		Number of unique land uses accessible within 0.5 mile of stops[a]
Implement cost-effective and financially feasible Next Gen service	Design cost-effective routes; design a project with high funding feasibility	Cost Effectiveness and Financial Feasibility	Annual O&M cost per potential rider
	Identify transit-oriented development (TOD) opportunities that could be used to fund a portion of capital and/or Operations and Maintenance (O&M) costs		Redevelopment Potential Index
Implement service that is resilient to severe weather events	Implement strategies that minimize or eliminate potential disruption from severe weather events, such as wildfires or flooding	Resilience	Percentage of route within potential high-risk wildfire or flooding areas that cannot be mitigated in a cost-effective manner

Note:

[a] Index scores were calculated for the following performance measures: new miles of dedicated bus facilities, miles of existing/proposed AT facilities, and number of unique land uses accessible within 0.5 mile of stops.

6.0 Develop and Assess Corridor Concepts

6.1 Develop Corridor Concepts

The first step in developing corridor concepts is to identify the universe of improvement types that could be implemented in the study corridor and to qualitatively assess each against study goals and objectives. Improvement types could include corridor-specific improvements (e.g., bus only lanes), station amenities (e.g., level boarding), or technology-based improvements (e.g., transit signal priority).

Table 6-1 shows what this assessment could look like for one of the sample study goals previously mentioned. It is important to note that this assessment should compare how well one improvement type would achieve study goals compared to other improvement types. Improvement types with low or no ability to achieve study goals may be removed from further consideration.

Table 6-1. Assessment against Study Goals

Improvement Type	**Goal**: Provide reliable, high-quality transit service that is competitive with automobile travel	
	Rating[a]	**Explanation**
Bus-Only Lanes	High	Bus-only lanes will increase transit speed and reliability as buses will not be slowed by vehicular congestion.
Business Access and Transit (BAT) Lanes	Medium	This will allow buses to avoid vehicular congestion; however, conflicts with vehicles turning in and out of driveways will exist.
Dedicated Guideway	High	A strategy that provides a dedicated guideway would allow buses to avoid vehicular congestion.
Queue Jump Lanes	Medium	This allows buses to bypass congestion at signalized intersections but does not improve speed/reliability along congested roadway segments (unless coupled with transit priority measures).

[a] Ratings are shown to demonstrate what a qualitative assessment could look like and do not reflect an analysis that was performed.

Once improvement types have been assessed, practitioners should examine study corridors and identify locations—either specific points or along roadway segments—where improvements might best achieve study goals and objectives. An effective first step to take in doing this is to develop a transit propensity index (TPI) for the study area. The TPI combines demographic and socioeconomic data to identify areas within a corridor where people are more likely to use transit. The following data types should be used when developing a corridor specific TPI:

- SANDAG Activity Based Model Forecast Data
    - Population density, including:

        - Low-Income residents
        - Minority residents
        - Senior residents
    - Employment density
    - Housing density
- United States Census American Community Survey 5-Year estimates
    - Vehicle ownership
    - Youth population
    - Senior population
    - Disabled population

The approach described below should be taken to identify improvements.

6.1.1 Alignments/Segments

Practitioners should utilize any initial routing that has been identified in regional planning documents (e.g., SANDAG 2021 Regional Plan[2]) as a starting point for this assessment. The findings of the existing conditions and TPI assessments, historic ridership, right-of-way (ROW), planned mobility networks, and existing/planned transit should be used to determine segmentation and locations of improvements.

Practitioners should focus on maximizing transit competitiveness in corridors, while balancing the need to reserve ROW for other modes (e.g., bicycles).

Multiple concept options could be explored as a way to serve different areas along a corridor or evaluate different configurations.

6.1.2 Stop Locations

Practitioners should utilize any initial stop locations that have been identified in regional planning documents (e.g., SANDAG 2021 Regional Plan[2]) as a starting point for this assessment. The findings of the existing conditions and TPI assessments, BRT stop spacing principles, planned mobility networks, and existing/planned transit should be used to determine stop locations.

At this stage, it is appropriate to identify detailed initial stop locations, such as near-side, far-side, or at a transit center. If routes serve transit centers, stops may be sited on-street to streamline operations, or to minimize impacts at transit facilities that are at capacity.

Initial stop locations should be reviewed by transit operators in advance of assessing corridor concepts against study performance measures.

6.1.3 Transit Signals and Queue Jumps

Transit signal prioritization (TSP) is used to modify traffic signal timing and/or phasing when transit vehicles are present. In doing so, TSP allows transit vehicles to enter an intersection in advance of vehicular traffic, giving transit vehicles an opportunity to access stations or maneuver across lanes where necessary.

During conceptual planning, it should be assumed that TSP is included at all signalized intersections along study routes. The specific characteristics of TSP would likely vary depending on the intersection and the type of movements that would occur (e.g., buses traveling through an intersection or turning

[2] https://www.sandag.org/regional-plan/2021-regional-plan/final-2021-regional-plan

from one bus only lane to another). At a minimum, TSP is required at intersections where bus turn movements are made.

Queue jumps should be considered in locations where there is not sufficient ROW to add bus-only lanes, or where buses are required to move between mixed traffic and dedicated lanes.

6.1.4 Resilience Measures

Measures that minimize or eliminate disruptions caused by severe weather events, such as wildfires or flooding, should be identified. These measures could include civil engineering projects such as levees, flood channels, or grade separation of roadways.

6.2 Conceptual Engineering Feasibility Assessment

Before fully developing corridor concepts and sharing them with the PDT and the public, a high-level engineering feasibility assessment should be conducted to determine what would be required to implement improvements identified in Sections 6.1.1 through 6.1.3 along and at study corridor roadways and intersections. This review can be done using geospatial information system (GIS) or other mapping software (e.g., Google Earth) and readily available ROW data from SanGIS[3]. Practitioners should use the findings of this assessment to determine where proposed improvements should be located.

6.3 Review Draft Corridor Concepts

Draft corridor concepts should be presented to the PDT and at public outreach events. Feedback should be collected from both entities, and concepts should be revised as needed based on feedback received.

6.4 Assess Corridor Concepts

6.4.1 Performance Measure Assessment

Once corridor concepts have been developed, they should be evaluated against the performance measures established in Section 5.0. Quantitative performance measures should be calculated for all corridor concepts. Performance measures may be calculated using GIS software or Microsoft Excel, and for some measures (e.g., travel time savings) with online mapping websites (e.g., Google Maps). Qualitative performance measures (e.g., stakeholder support) may be derived via public surveys or polling at stakeholder (e.g., SANDAG Mobility Working Group) meetings.

Once performance measures have been calculated, rankings should be assigned to study concepts based on how they perform compared to other concepts. Once performance measures and rankings have been assigned, rankings for each should be multiplied by weights assigned based on PDT prioritization established in PDT Meeting #3. In the example shown in Table 6-2, Concept 3 outperforms Concepts 1 and 2 by a substantial margin.

[3] SanGIS (San Diego Geographic Information Source). 2023. SanGIS Website. Available at: https://www.sangis.org/.

Table 6-2. Performance Measure Calculations and Associated Rankings

Evaluation Criteria (PDT Priority)	Performance Measure	Concept 1	Concept 2	Concept 3
Transit Service Reliability (1)	New miles of dedicated bus facilities	5	10	15
	Ranking	3	2	1
Ridership Potential (2)	Population within .5 mile of stations	50,000	25,000	75,000
	Ranking	2	3	1
Socially Equity Focus and Transit-Dependent Population Benefits (4)	Percentage of total corridor social equity focus populations (senior, minority, and low income) within 0.5 mile travelshed of each route alternative's proposed stations	60%	35%	70%
	Ranking	2	3	1
Stakeholder Support (5)	Stakeholder preference	10%	35%	55%
	Ranking	3	2	1
Cost Effectiveness and Financial Feasibility (3)	Annual O&M cost per potential rider	$100	$110	$90
	Ranking	2	3	1
Overall Score (sum of rankings multiplied by PDT priority)		**36**	**39**	**15**

6.4.2 Cost Estimates

At this stage, it is appropriate to estimate planning-level capital and operations and maintenance (O&M) costs. The level of detail of the capital cost estimates should correspond with the level of concept definition and conceptual engineering (less than 5% design) that is performed at this stage. The level of estimating detail should increase as projects progress through the various phases of development during preliminary engineering/environmental review, and eventually into final design. Cost estimates should be developed with the following assumptions:

- The base year—the year in which a study is conducted—should be used for definition of the unit prices and development of the capital cost estimates. Escalation does not have to be included at this time but can if stakeholders desire.
- During conceptual planning, the intended use of cost estimates is for strategic planning and programming. At this stage of the study, there is typically not sufficient definition of scope to prepare true construction cost estimates for alternatives under consideration. Rather, cost estimates should be developed using representative typical unit costs or allowances on a per unit basis that is consistent with the level of alternatives definition. Cost estimates should be presented as a range to cover the uncertainty in scope of the project elements.

- Contingencies should be higher at this stage and applied to cover the uncertainty in the estimating process due to the insufficient level of design. As the level of design detail increases, more and more items are specifically costed, leading to lower contingency costs in the estimate.
- Estimates can, but do not necessarily have to include the cost of new vehicles, potential charging infrastructure for electric vehicles, and cost of expanded or new maintenance facilities.

6.4.3 Identify Funding Sources

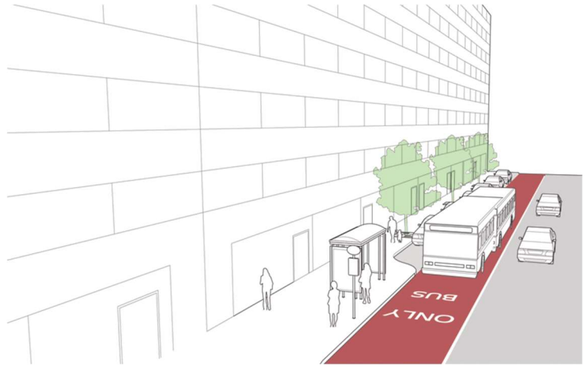
Local, state, federal, and other revenue sources that could be used to fund transit capital and/or operations should be identified. A detailed overview of each funding program should be summarized, and funding potential (dollars) should be provided, when available. Practitioners may also elect to assess funding competitiveness by evaluating corridor concepts against various funding program evaluation criteria.

7.0 Identify Implementation Next Steps

Once the findings of the concept assessment described in Section 6.0 are understood, practitioners should identify next steps required to implement a corridor concept. If a preferred alternative is not identified during conceptual planning, practitioners could conduct more advanced planning where concepts would be refined and evaluated in further detail. Once a preferred alternative has been identified (either in conceptual or advanced planning) and funding has been secured to advance to subsequent phases of study, practitioners should seek to commence preliminary engineering/environmental review for the preferred concept. Once preliminary engineering/environmental review is complete, concepts should advance into final design, construction, and ultimately, revenue service.

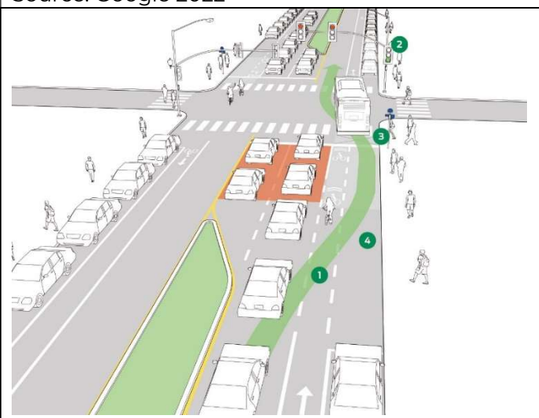
Appendix A. Strategy Types

Table A-1. Strategy Types

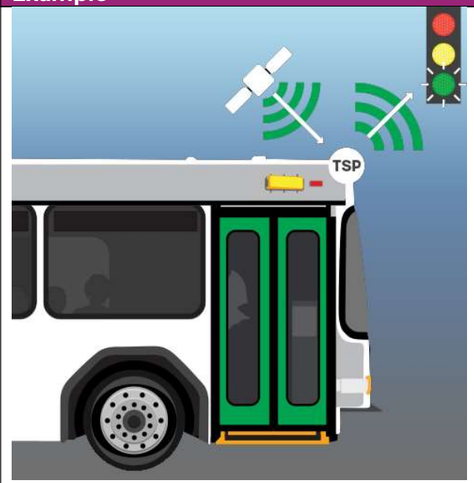
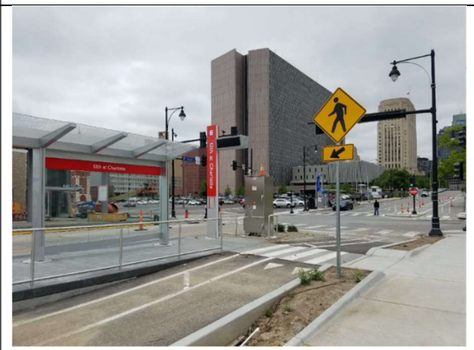
Strategy Type	Description	Example
Bus-Only Lanes	Bus-only lanes provide a dedicated space for transit vehicles to operate while minimizing interactions and potential conflicts with vehicular traffic. Bus-only lanes can be used to allow transit vehicles to bypass vehicular congestion along arterial roadways, reducing travel times and improving service reliability. Bus-only lanes can also allow for increased transit service levels by providing space for multiple routes to operate without being affected by congestion.	 Source: NACTO 2023[4]
BAT Lanes	BAT lanes are a variation of bus-only lanes that allow for right-turn movements into businesses or other driveways. Similar to bus-only lanes, BAT lanes can increase transit service capacity along arterial roadways by reducing or eliminating delays caused by vehicular congestion.	 Source: Portland Bureau of Transportation 2018[5]

[4] NACTO (National Association of Transportation Officials). 2023. NACTO Website. Available at: https://nacto.org/

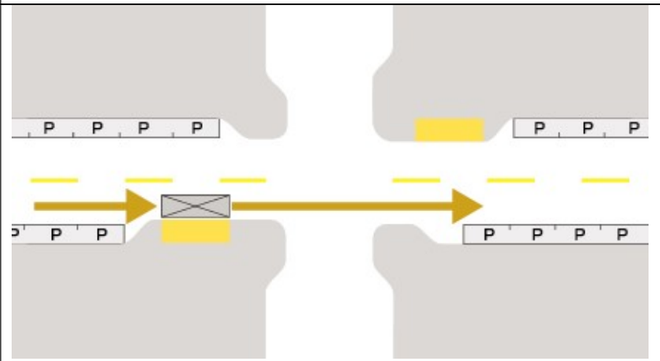
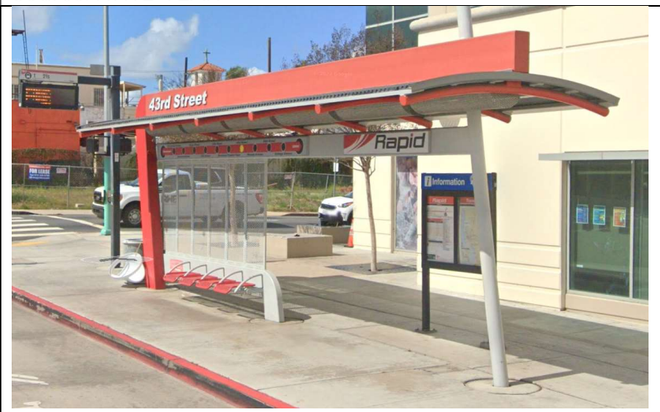
[5] Portland Bureau of Transportation. 2018. Portland Bureau of Transportation Twitter News Blog: Have your say about the future of biking, walking, and public transit. September 5, 2018. Available at: https://twitter.com/PBOTinfo/status/1037410480141164544/photo/1

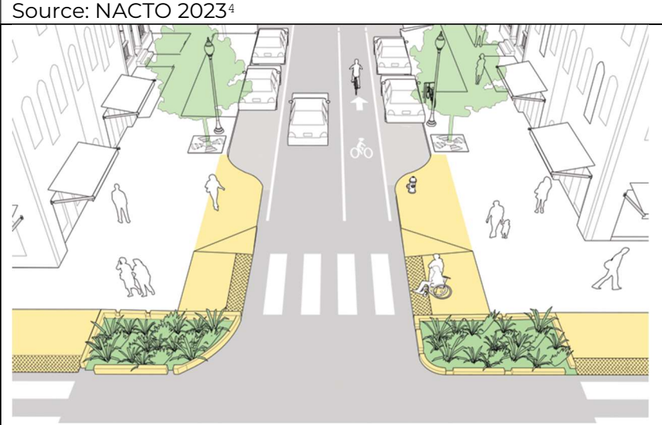
Strategy Type	Description	Example
Dedicated Guideway	Dedicated guideways allow transit vehicles to be operated in a space that is completely separated from other modes. These lanes allow transit vehicles to bypass traffic with no interruptions. Dedicated guideways can lead to faster, more reliable service along heavily congested arterial corridors.	 Source: Google 2022[6]
Queue Jump Lanes	Queue jump lanes are short, dedicated bus lanes that allow transit vehicles to bypass vehicular queuing at signalized intersections. When coupled with TSP, queue jumps allow buses to enter an intersection in advance of vehicular traffic, giving transit vehicles an opportunity to access stations or maneuver across lanes where necessary.	 Source: NACTO 2023[4]

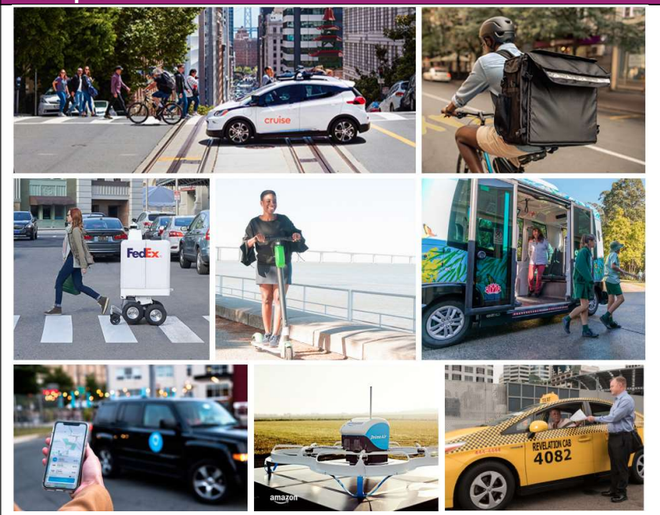
[6] Google Maps. 2022. Google Maps Website. Available at: https://www.google.com/maps.

Strategy Type	Description	Example
Transit Signal Prioritization	TSP is used to modify traffic signal timing and/or phasing when transit vehicles are present. In doing so, TSP allows transit vehicles to enter an intersection in advance of vehicular traffic, giving transit vehicles an opportunity to access stations or maneuver across lanes where necessary. TSP is only effective if transit vehicles can enter an intersection unobstructed. As such, in many applications, TSP is only successful when coupled with dedicated bus lanes, queue jumps, or other dedicated transit ROW. One form of TSP involves using GPS to communicate with downstream traffic signals. Buses can alert traffic signals that they are approaching from further distances than traditional TSP. Once alerted, signals will modify their signal timing, giving more green time in advance of the bus arriving at the intersection. This can be used to clear vehicular queuing in advance of a bus arriving and reduce the amount of time a bus waits to travel through an intersection. The effects of this technology on opposing/conflicting traffic movements at intersections and adjacent intersections and roadways should be evaluated in greater detail before implementation.	 Source: HNTB 2022[7]
Other Intersection/Roadway Improvements	Improvements to roadways and intersections can be used to mitigate potential conflicts between transit vehicles and other modes. For example, a bicycle facility can be rerouted behind a transit station to eliminate conflicts between bicyclists and transit vehicles that are approaching or departing stations. Improvements like this can enhance station accessibility, increase safety, and improve service reliability.	 Source: HNTB YEAR[7]
Off-Board Fare Payment	Off-board fare collections allow riders to pay from a variety of different methods. Allowing riders to pay at a stop or station before boarding a transit vehicle can reduce station dwell times and improve service reliability. The development of the PRONTO app, which allows riders to load passes to their phones, can also be applicable to the off-board payment systems. This can reduce the need for payments to be made while onboard, which can expedite the boarding process.	 Source: PRONTO 2023[8]

[7] HNTB. 2022.
[8] PRONTO. 2023. PRONTO Website. Available at: https://www.ridepronto.com/

Strategy Type	Description	Example
Level Boarding	Level boarding, also referred to as transit curbs, allows transit vehicles to provide a level plane with the stop or station. Transit curbs allow drivers to pull within two inches of a curb without risking damage to the transit vehicle. Providing level boarding services can reduce the need for ramp deployment or vehicle kneeling, which can make the boarding process more seamless and improve service reliability.	 Source: NACTO 2023[4]
Station/Stop Relocations or Consolidations	Stations may be relocated or consolidated to improve passenger experience and maximize travel time effectiveness. In instances where stops are too frequent or do not provide high ridership, relocation of or consolidation of service in that station/stop area may also be considered. Stopping less frequently has the potential to decrease travel times and attract choice riders.	 Source: HNTB YEAR[7]
Enhanced Station Amenities	All stations should be retrofitted with seating, shelters, off-board payment systems, wayfinding, arrival boards, bicycle parking, and other amenities, as needed. Seating allows passengers to rest while waiting for their bus to arrive. Off-board payment machines enable riders to prepay, which can reduce dwell times. Wayfinding maps and arrival boards help riders plan their trips and coordinate their schedules. Bike lockers promote security at transit stations and encourage biking to transit stations. These amenities can improve the overall rider experience and can attract choice riders.	 Source: Google 2022[6]

Strategy Type	Description	Example
Pedestrian/Bicycle Improvements	Improvements to bicycle and pedestrian infrastructure include upgrades to existing bicycle facilities, new bicycle facilities, and new or improved pedestrian facilities. Each can improve station accessibility, increase ridership, and improve safety for non-motorized users.	 Source: NACTO 2023[4]
Accessibility Improvements	All stations should be Americans with Disabilities Act (ADA) compliant, allowing all riders to access transit. ADA accessibility improvements can include simplified station layouts, sidewalk slopes, warning pads, level boarding infrastructure, new or enhanced seating, shelter, and other infrastructure where applicable.	 Source: NACTO 2023[4]

Strategy Type	Description	Example
Flexible Fleets	Flexible Fleets services like micromobility, ridesharing, and ride-hailing can improve transit accessibility by improving first- and last-mile connectivity. Providing e-scooters, bicycles, and designated pick-up and drop-off services for Uber, Lyft, or neighborhood electric vehicle shuttle services at transit stations can make transit more accessible for potential riders and increase ridership.	 Source: SANDAG 2022[9]
Modifications to Planned Alignments	Existing or planned alignments could be modified by extending, truncating, or rerouting to avoid or minimize duplicative service.	
Reconfiguration of Intersecting or Interlined Bus Routes	Routes that intersect or are interlined with study routes could be reconfigured to avoid or minimize duplicative service.	
TOD Opportunities	TOD includes dense, mixed-use, walkable developments near a transit station. TOD have multiple benefits, including increased transit use and reduced vehicle miles travelled and greenhouse gases. TOD can also be used as a funding mechanism as a portion of the revenue generated from the development can be used to fund transit services.	 Source: National CORE 2023[10]

[9] SANDAG (San Diego Association of Governments). 2022. SANDAG Website. Available at: https://www.sandag.org/projects-and-programs/innovative-mobility/flexible-fleets
[10] National CORE. 2023. National CORE Website: Image of Encanto Village Project. Available at: https://nationalcore.org/communities/encanto-village/.