4 TRANSIT INVESTMENT FRAMEWORK

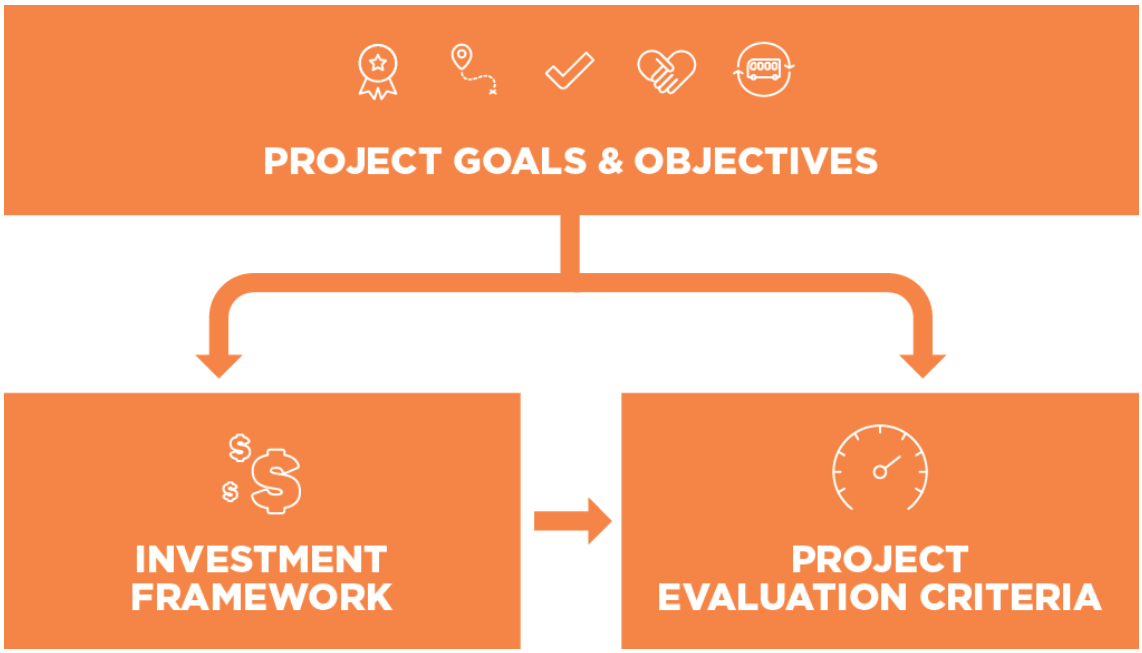
The OC Transit Vision includes a Transit Investment Framework that was presented to the OCTA Board of Directors in spring 2017. The Transit Investment Framework serves two primary purposes:

- **To guide OCTA** in allocating operating resources for bus service and in allocating capital resources for both bus and rail projects, and
- **To guide Orange County cities and other agencies** in developing transit-supportive land use, street design, and other transportation policies (further addressed in Chapter 8).

As shown in Figure 4-1, the Transit Investment Framework builds from the OC Transit Vision goals and objectives and provides a basis for the capital project evaluation process described in Chapter 5. The framework's guidelines incorporate industry standards, state and federal grant program evaluation criteria, and research into existing policies adopted by OCTA and peer agencies, including Los Angeles Metro, King County Metro (Washington State), and TransLink (Vancouver, British Columbia).

The framework consists of two categories: Service Allocation Guidelines and Capital Investment Guidelines. The complete Transit Investment Framework is available in Appendix C.

Figure 4-1 Relationship of Transit Investment Framework to Other Transit Vision Elements



SERVICE ALLOCATION GUIDELINES

The Service Allocation Guidelines for fixed-route bus operations and other non-paratransit services open to the general public are based on seven characteristics of transit corridors:

- **Land-Use Factors**
  - Residential Density
  - Employment/College and University Student Density (combined)
  - Other Trip Generators (hospitals and medical centers, retail centers, and other major destinations)
  - Traffic Volumes
- **Equity Factors**
  - Density of Low-Income Residents
- **Access Factors**
  - Transit Connectivity (stations, transit centers, park-and-rides, and transfers to other routes)
  - Intersection Density

These corridor characteristics, the thresholds set for each, and the resulting service guidelines were selected based on a peer review and an assessment of the role of each characteristic in demand for transit service in Orange County.

Figures 4-2 and 4-3, respectively, describe the corridor characteristics and service guidelines associated with each category of OCTA fixed-route bus service as well as the characteristics of corridors requiring either non-traditional transit solutions or lacking the demand to justify public investment. The categories as defined for this framework are:

- ***Major:*** These routes operate every 15 minutes or better during peak times, with the exception of Routes 42 and 83. Major routes operate seven days a week throughout the day. Together, the Major routes form a grid on arterial streets throughout the highest transit propensity portions of the OC Bus service area, primarily in northern parts of the county. Bravo! limited-stop services are included in this category. These routes carry more than 75 percent of the system's riders.
- ***Local:*** Local routes operate on arterials within the grid created by the Major routes, but at lower frequencies. Local routes also operate in parts of Orange County with lower transit demand. Most Local routes operate seven days per week, however some operate on weekdays only. Local routes carry about 20 percent of the system ridership and are less productive than Major routes, averaging about 20 boardings per revenue hour.
- ***Community:*** Community routes provide service to connect pockets of transit demand with major destinations and offer local circulation. Routes tend to be less direct than Local routes due to service design focused on serving neighborhoods and destinations off the arterial grid. Half of Community routes operate seven days per week while half operate on weekdays only. Community routes carry less than three percent of OC Bus ridership, averaging 15 boardings per revenue hour. They have the second-highest farebox recovery of any route category (23 percent). City-operated shuttles funded by Measure M Project V in La Habra, Westminster, and Mission Viejo fall into this category.

- ***Stationlink*** routes provide connections solely between Metrolink stations and nearby destinations such as job centers. They should operate only during peak periods, in the peak direction (from the station in the morning, and to the station in the afternoon).
- ***Express:*** Express routes serve long trips during peak periods, primarily commute trips to job centers. As they mainly serve white-collar commuters who own automobiles, access to these routes is primarily by car. Express routes rely on proximity to park-and-ride lots.

Service guidelines are not absolute requirements. Few corridors have characteristics consistent with just one category, and OCTA must allocate service based on other factors in addition to those stated above, including productivity, equity, and funding.

Figure 4-2 Service Allocation Guidelines: Demographics and Connections

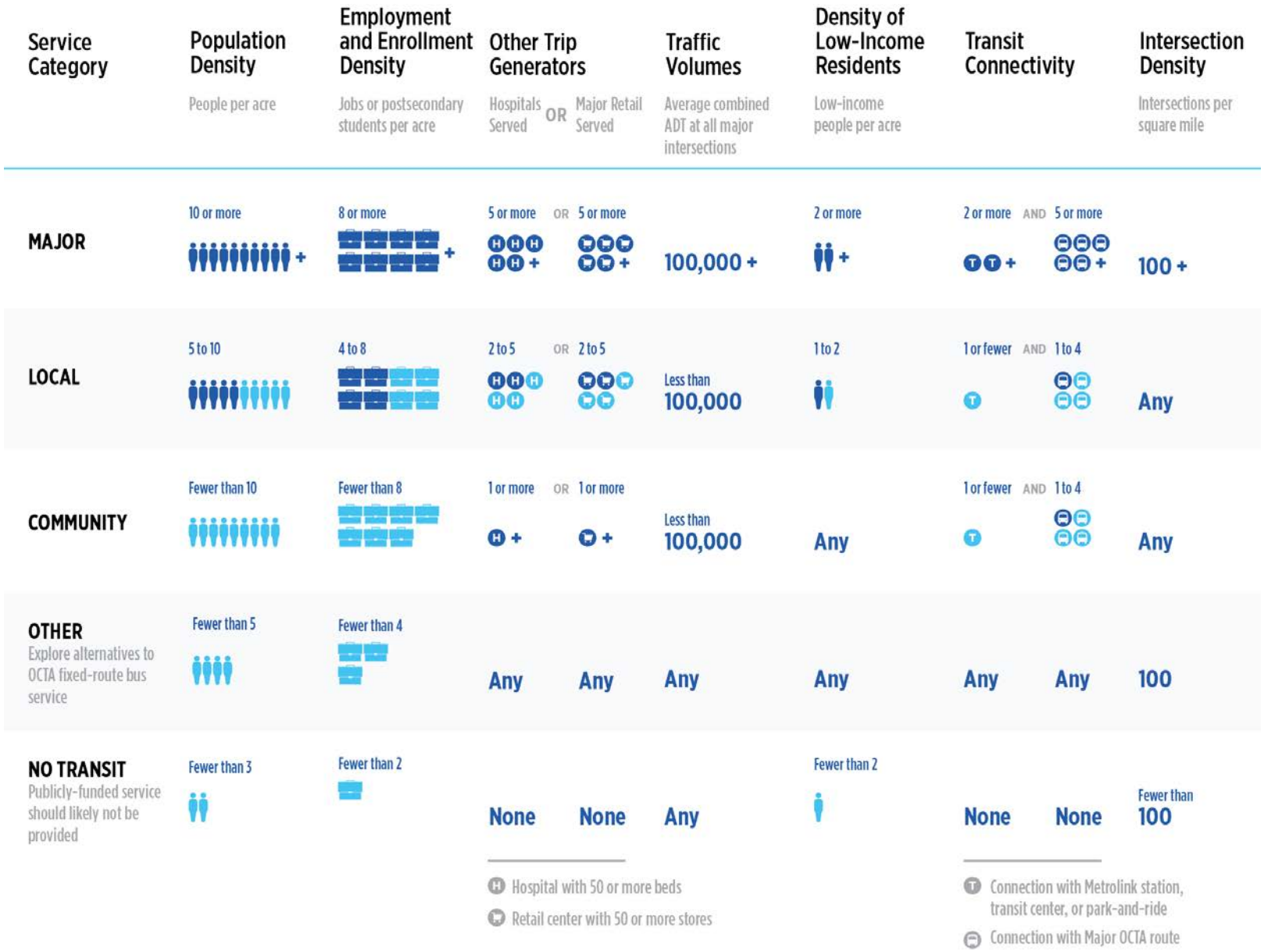


Figure 4-3 Service Allocation Guidelines: Level of Service

Service Category	Peak Frequency Buses per hour	Base Frequency Buses per hour	Weekday Span	Weekend Span
MAJOR	4+	2+	5 AM to 12 AM	6 AM TO 12 AM
LOCAL	2+	2+	5:30 AM to 8:30 PM	7 AM to 7 PM
COMMUNITY	1+	1+	5:30 AM to 8:30 PM	7 AM to 7 PM
OTHER Explore alternatives to OCTA fixed-route bus service	N/A	N/A	N/A	N/A
NO TRANSIT Publicly-funded service should likely not be provided	N/A	N/A	N/A	N/A

CAPITAL INVESTMENT GUIDELINES

The Capital Investment Guidelines are divided into two categories of infrastructure spending: investments supporting existing bus operations, and investments in new high-capacity transit lines (such as rapid streetcars or bus rapid transit [BRT]). These guidelines help to identify both existing and future corridors where capital investments—in addition to potential service investments—may be justified.

Bus Investment Guidelines

Capital investments in existing bus service fall into three categories: vehicles; transit-priority improvements to the right-of-way; and major improvements to stops and stations (including operational improvements and enhanced passenger amenities). Some of these can be implemented by OCTA; others, such as transit priority and operational improvements at intersections, are the responsibility of Orange County cities or Caltrans and would require partnerships with other jurisdictions and agencies (see Chapter 8).

Vehicles

New vehicles can help to improve the current fleet in terms of capacity, emissions, reliability, maneuverability, comfort, and brand identity, among other factors. Vehicle-related investments are illustrated in Figure 4-4, and include the following:

A. Vehicle capacity, and the related issue of overcrowding

B. Comfort, both aboard vehicles and while waiting at stops

C. Vehicle and station branding, to enhance awareness of specialized and premium services such as BRT

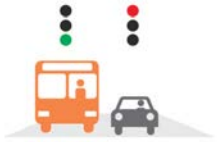
Figure 4-4 Vehicle and Waiting Enhancements

Transit Priority Improvements

Transit priority improvements to the right-of-way can include the following treatments:

- Business, Access, and Transit (BAT) lanes prohibit general-purpose travel except for right turns and access to businesses and curbside parking; may be 24-hour lanes or peak-only
- "Queue jumps" or short bus lanes at intersections (often right-turn lanes) allow buses to proceed in advance of general-purpose traffic using a transit-only advance signal phase
- Transit priority signals
- Changes to signal timing to benefit transit operations

Business Access and Transit (BAT) Lanes



Queue Jumps

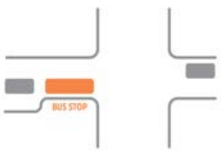
Transit Priority Signals

Signal Timing

Stop and Station Improvements

Major improvements to stops and stations include the following:

- Operational improvements:
  - "Bulb-out" or curb extension stops allow buses to stop in the travel lane, eliminating the need to merge back into traffic
  - Relocation of stops to improve operations, for example from the near to the far side of an intersection
  - Removal of parking spaces at or near stops to allow buses to access the curb or create more space to access stops
  - Off-vehicle fare collection and all-door boarding



Bulb-Out Stop

Stop Relocation

Curb Management

Streamlined Fare and Boarding

- Enhanced passenger amenities:
  - Shelters at additional stops, and additional or larger shelters at the busiest stops
  - Seating at additional stops, and more seating at the busiest stops
  - Trash cans at additional stops
  - Real-time arrival information displays at stops
  - Maps, schedules, and other information at additional stops

The guidelines recommend varying degrees of capital investment for each category of OCTA bus service (similar to the Service Allocation Guidelines), as shown in Figure 4-5.

Figure 4-5 Bus Capital Investment Guidelines

Service Type	Investment Level	Investment Types
Major	High	▪ Higher-capacity vehicles ▪ Vehicle branding (Bravo! routes only) ▪ All types of transit priority treatments, including transit lanes ▪ Operational stop improvements and enhanced stop amenities ▪ Off-vehicle fare collection and all-door boarding
Local	Medium	▪ Signal timing improvements ▪ Enhanced passenger amenities at busier stops
Community	Low	▪ Standard bus stop
Express	Medium	▪ Comfortable vehicles designed for longer trips ▪ High-occupancy vehicle facilities on freeways and direct access ramps ▪ Enhanced passenger amenities at park-and-ride lots
Stationlink	Low	▪ Standard bus stop
Other	Low	▪ Vehicle branding (shuttles only) ▪ Technology integration

High-Capacity Transit Investment Guidelines

In developing guidelines for high-capacity transit investments, it is important to understand the following:

- Rail and (to a lesser extent) BRT infrastructure requires a sizeable capital investment. High ridership is required to justify these investments, and corridor characteristics must support transit.
- Historically, research into the minimum population and employment densities required to justify investment in high-capacity transit has resulted in a range of findings. But as a general rule, the bigger the capital investment, the more density required to justify the expense: subways require more density than at-grade light rail or streetcars, which in turn require more density than BRT.
- High-capacity transit uses larger vehicles, and investment in high-capacity transit may be called for if standard buses at frequent headways cannot comfortably accommodate ridership.
- Larger vehicles also reduce operating costs because a single operator can provide service to more passengers. While a 40-foot bus can only carry around 50 passengers[1], a 60-foot bus can carry 80 or more, and a 66-foot streetcar may hold more than 120 people. Light-rail trains consisting of multiple railcars can carry hundreds of passengers at a time. Since labor costs are the single largest factor in transit operating costs, this can greatly reduce overall operating costs[2].
- Capital costs for BRT projects have varied widely, but transit-priority investments like those described above are essential elements of BRT projects. Any Major corridor should be considered a candidate for some form of rapid bus or BRT.
- Urban rail projects like the OC Streetcar typically serve both major job centers (such as Downtown Santa Ana) as well as relatively dense residential areas (such as neighborhoods in the corridor to the west of downtown).
- Commuter rail lines such as Metrolink may serve a variety of contexts, but typically have major employment centers such as downtown Los Angeles as a terminus.

Corridor analysis suggests that, at least for the time being, it would be difficult to argue for investment in the highest-capacity transit modes—such as subways—in Orange County. However, the county exhibits characteristics comparable with peer regions that operate light rail, streetcars, and BRT running in exclusive lanes. In Southern California, the Los Angeles Metro system includes light rail and BRT lines in moderate-density areas such as the San Gabriel Valley (the Metro Gold Line) and San Fernando Valley (the Metro Orange Line BRT). The San Diego Trolley system also primarily serves moderately dense suburban areas. Each of these has proven popular, and light-rail systems now exist in nearly every large metropolitan area in the Southwest, including Phoenix, Salt Lake City, and Denver.

In Orange County today, the busiest OC Bus routes feature both high loads and, in some cases, on-time performance that could be improved by investments in high-capacity transit. While improving frequencies can add capacity, this can be expensive. Alternately, larger vehicles can be used to accommodate more passengers at roughly the same cost, and improving the speed of service can

[1] This can vary depending on seating configuration and definitions of "standing room." OCTA defines a "full" 40-foot bus as carrying between 46 and 49 passengers.

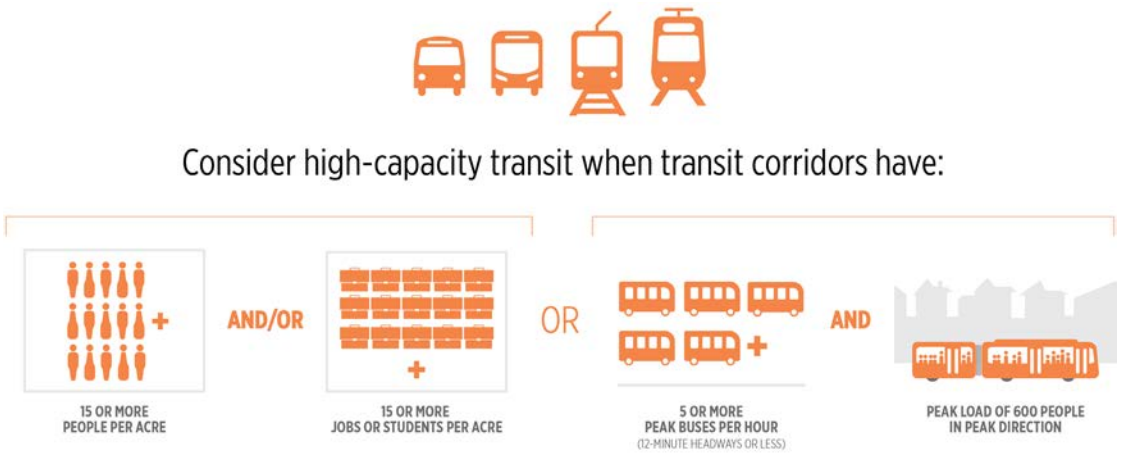
[2] Higher-capacity vehicles may be more expensive to operate in other ways, such as required maintenance of rail tracks, which may offset some of the savings from improving the operator-to-passenger ratio.

allow the same number of vehicles to operate more frequently. Investments in high-capacity transit, then, may pay off over the long term as service is provided more cost-effectively.

The OC Transit Vision helps to answer the question of where light rail, streetcar, BRT, or other high-capacity transit lines might make sense in Orange County (see Chapter 5). In general, the following thresholds should be viewed as appropriate when considering high-capacity transit capital investments (Figure 4-6):

- Corridors with population densities greater than 15 persons per acre (9,600 residents per square mile) and/or employment densities greater than 15 employees or students per acre (9,600 jobs/students per square mile)
- Corridors in which existing service has all seats full (i.e., peak loads greater than 1.0) and peak headways of 12 minutes or less

Figure 4-6 Thresholds for Consideration of High-Capacity Transit



A number of major corridors in the north-central core of Orange County appear to be at or near these thresholds. Many of these corridors feature other major trip generators identified in the Service Investment Guidelines, including large retail centers, hospitals, and other destinations.