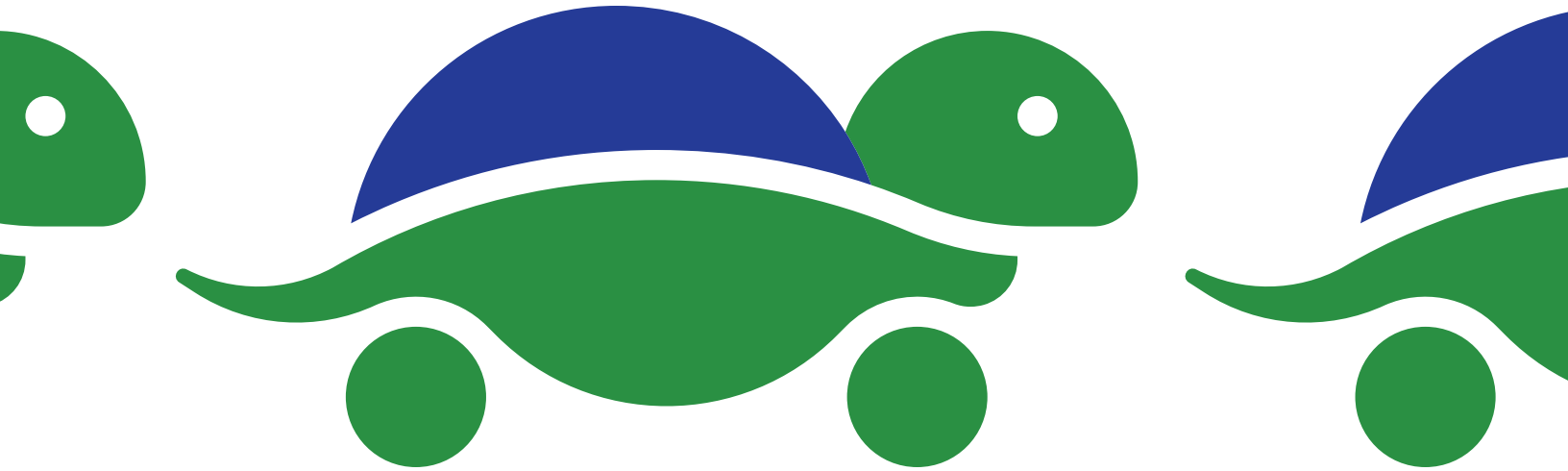

Local Travel Network Playbook

FEBRUARY 2024

SOUTH BAY CITIES
COUNCIL OF GOVERNMENTS

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Acknowledgments

Thank you to the SBCCOG member cities and staff for their participation in the creation of this playbook and development of the "rolling turtle" brand.

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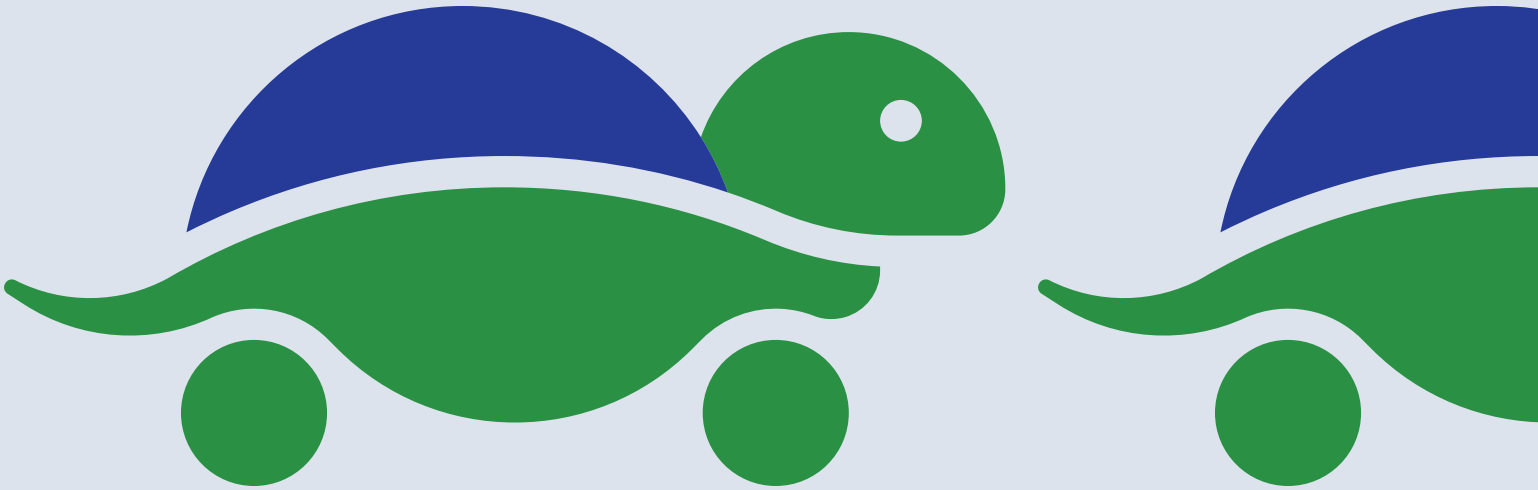
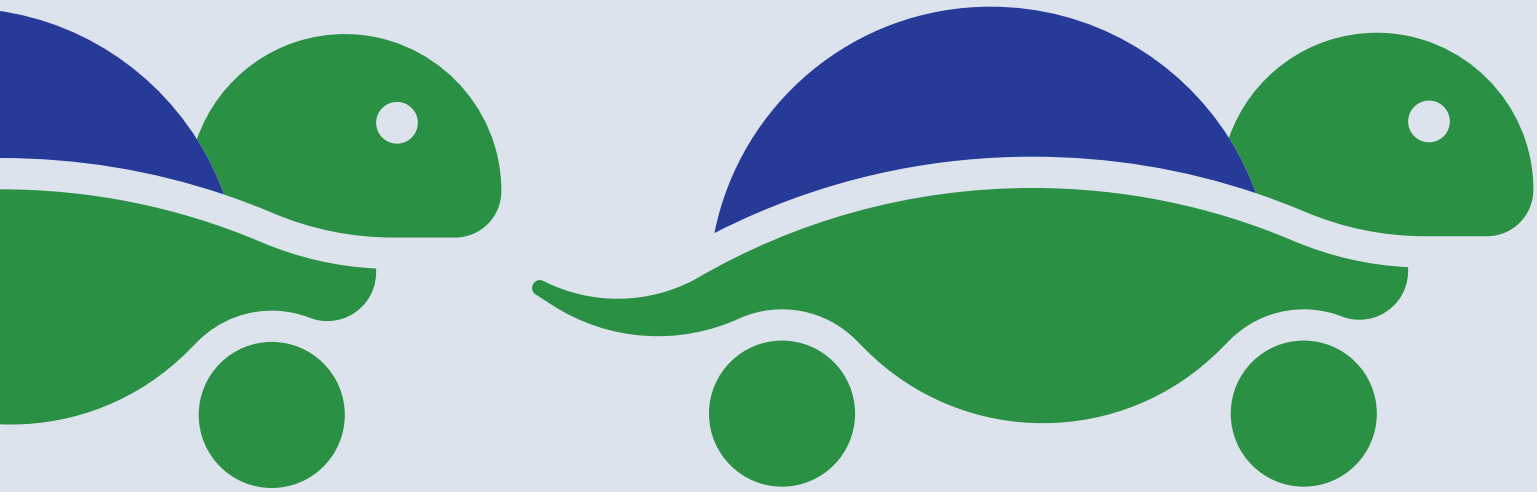
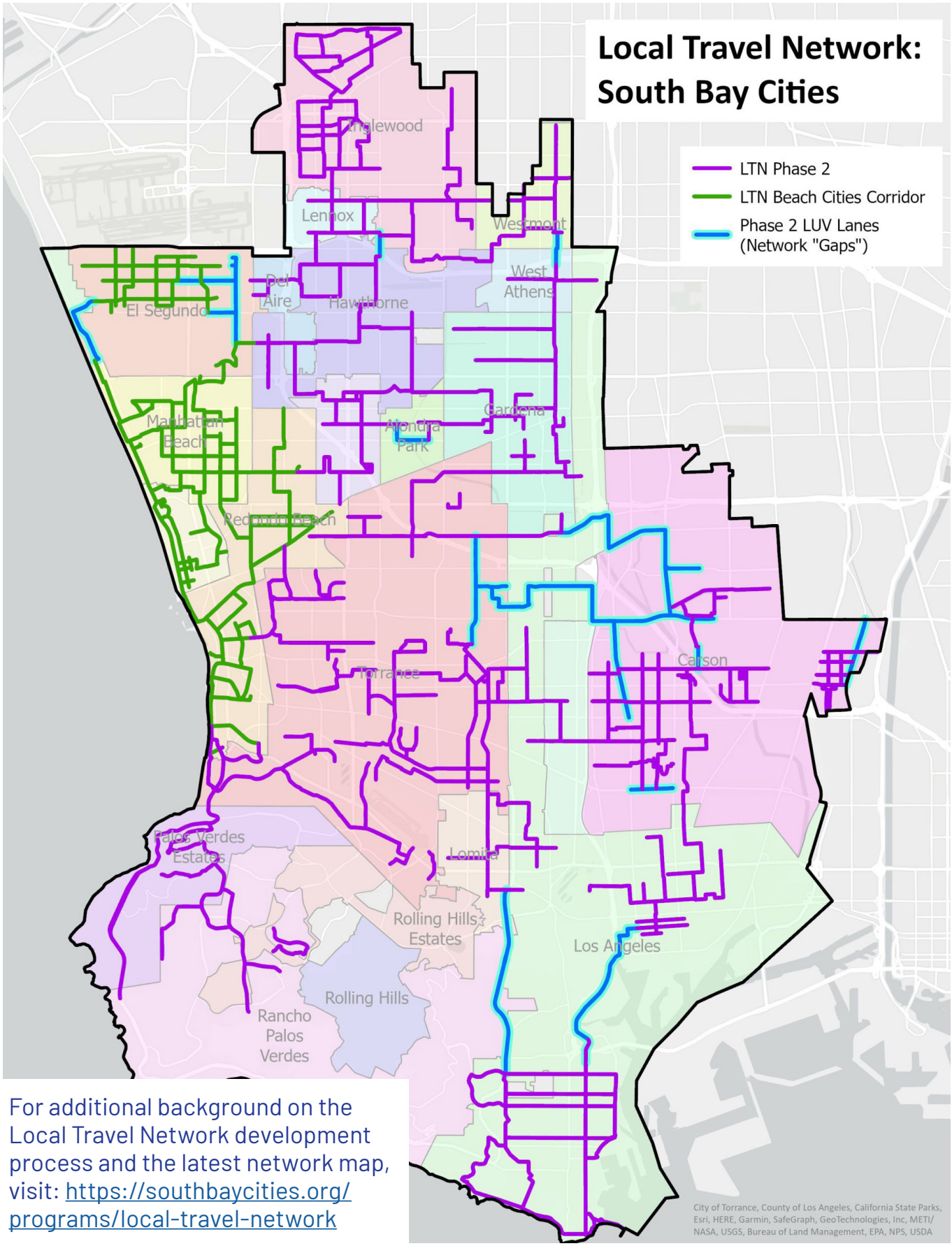


SECTION 1

Introduction





For additional background on the Local Travel Network development process and the latest network map, visit: https://southbaycities.org/programs/local-travel-network

Map current as of February 2024

Bring the Local Travel Network to Your Community

The Local Travel Network (LTN) is a system of routes for people traveling by personal zero-emission low-speed vehicles, which are collectively referred to as "micromobility." Micromobility devices include Neighborhood Electric Vehicles (NEV), bicycles, electric bicycles, cargo bicycles, electric scooters, and other human-powered electric personal mobility devices. The LTN spans all communities in the South Bay Cities Council of Governments region and will extend more than 240 miles when fully implemented.

How the LTN Supports Low-Speed, Zero-Emission Travel

The LTN will support the growing local use of micromobility by providing a system of slow-speed routes for all modes of travel. Designating LTN streets can help to indicate that the street is shared space for all modes and serves as a reminder for drivers to go slow and be aware of people traveling via micromobility modes. This playbook provides guidance on how wayfinding signs, pavement markings, posted speeds, and traffic calming strategies can reduce vehicle speeds and increase the visibility of vulnerable road users. If the LTN operates as intended, residents and visitors will feel more comfortable shifting towards zero-emission low-speed vehicles for local trips, which in turn will help cities and the region meet their climate action goals.

How to Use This Playbook

This playbook will help you bring the LTN to your community. It explains the types of signs and markings you'll need, the brand established for the LTN, and how to implement wayfinding, parking, and supportive amenities for micromobility and neighborhood electric vehicles (NEVs). It also includes resources for developing an NEV plan, a review of best practices for wayfinding signage, pavement markings, and intersection treatments, LTN safety strategy and parking strategy considerations, a cost calculator, and wayfinding sign plans.

This playbook builds on best practices gathered from around the country where slow street networks and NEV communities are finding success, including the Lincoln, CA NEV Plan, Neighborhood Greenway networks in Seattle and Portland, Bicycle Boulevards in Berkeley, and Neighborhood Slow Streets in Boston and Philadelphia.

Implementation Support

Though implementation challenges may vary by jurisdiction, SBCCOG and member jurisdictions can provide support and collaboration. In the SBCCOG service territory, implementation is supported for member cities through the Measure M sales tax. To secure funding, Cities submit LTN implementation applications including project description, preliminary cost estimates, and LTN Map.

LTN Pilot Project

In the fall of 2023, the City of El Segundo was the first community in the South Bay to start implementing the LTN. It did so through a quick-build pilot project of LTN branded and wayfinding signage on select El Segundo streets, including those with existing bicycle sharrow markings. El Segundo was able to quickly and efficiently install signage through use of lower cost signage materials and identification of signage opportunity locations on existing poles.

The City also supported LTN implementation through the re-designation of standard vehicle parking spaces to use for NEV and bicycle priority parking at key community destinations.

El Segundo and SBCCOG will monitor use of this pilot project of the LTN over the coming months, and gather feedback from El Segundo residents to inform future LTN implementation throughout the South Bay.

Wayfinding Overview

Wayfinding is a system of visual cues that guides people through the physical environment. For the LTN, wayfinding includes signs and pavement markings. Wayfinding formalizes key routes for connecting neighborhoods and accessing destinations by helping travelers identify their location, reinforce that they are traveling in the right direction, navigate junctions and other decision-making points, and identify their destination upon arrival.

Accessibility Considerations

Making the LTN accessible to people of all ages and abilities is of key importance. The design guidelines for Local Travel Network wayfinding in this playbook build on successfully implemented models used in other leading jurisdictions for low-speed networks across the country. For example, the LTN signage and color palette in this playbook incorporate principles of color accessibility and encourage the use of consistently applied standards. Implementation strategies, such as engagement programs and traffic calming features, focus on an approach for the LTN that welcomes people of all ages and abilities to use shared streets for local travel. Following the implementation of the LTN, cities should evaluate feedback from a diverse cross-section of community members to understand barriers they may be facing to traveling on the LTN.

Audience

Using micromobility modes can be a safe and fun activity for people of all ages and an eco-friendly, low-cost way to get around. The LTN wayfinding system has been designed to encourage micromobility as a viable, practical, and reasonable choice for local trips. It is intended to create a more safe and comfortable environment for people riding on micromobility devices and increase their visibility in the South Bay region. The LTN wayfinding system was created with a large target audience in mind:

Current Micromobility Users

Commuters, recreational, and utilitarian riders.

Future Micromobility Users

People who are potentially interested in micromobility but may have concerns about safety.

Drivers

Automobile drivers who are attuned to the needs and benefits of micromobility and want to understand how they can most effectively share space on the road.

Placemakers

Those who care about creating vibrant neighborhoods and communities where low-speed, zero-emission travel can flourish.

Applying Playbook Guidance

For consistency and continuity, local jurisdictions are encouraged to apply the design principles, destination selection, and sign placement guidance described in these guidelines when implementing the LTN.

Guidance Adherence

These LTN wayfinding design guidelines should be adhered to when developing signing plans for the LTN throughout the South Bay. The system design principles, destination hierarchies, and sign placement guidance should remain consistent with these guidelines. Designers should exercise professional judgment to best align the tenets of these guidelines with the unique goals and contexts of individual projects, and reference MUTCD guidance where applicable. Artwork files are available by request from SBCCOG. Use only these approved elements when designing signs.

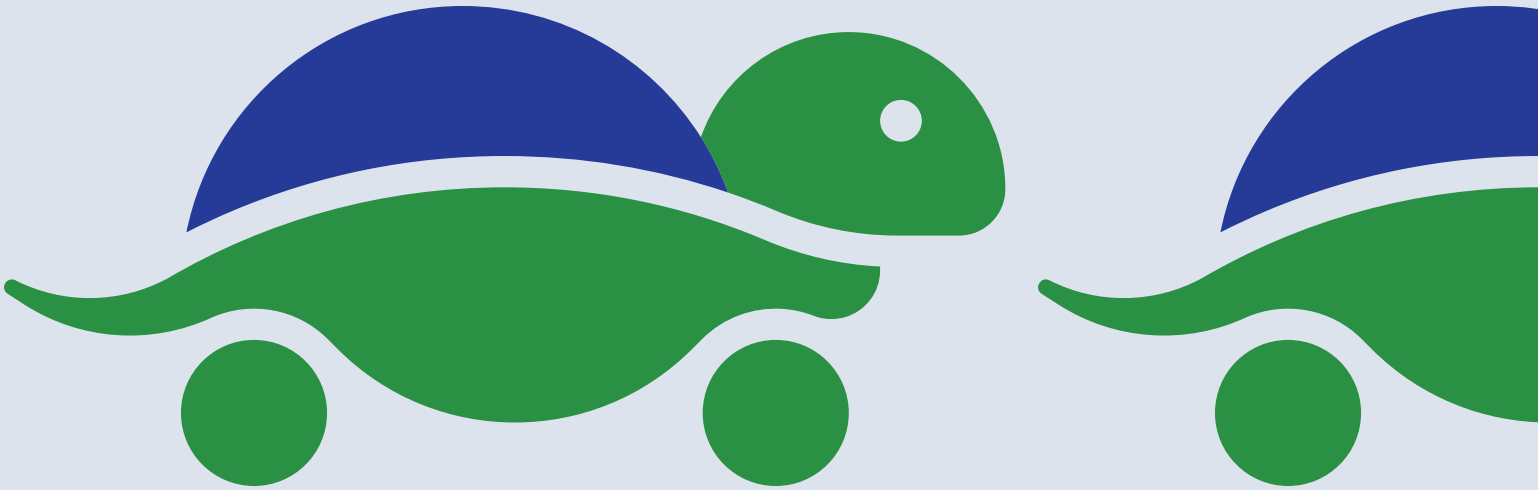
Beyond Wayfinding

Network designation through signage and markings is only the start of a successful LTN. While branded signs, wayfinding signs, and pavement markings are the foundation of LTN implementation, a regional network of safe and comfortable shared streets for all micromobility users is the ultimate goal. LTN routes were selected due to lower vehicle volumes and controlled intersections, but additional work may be required to make these streets more comfortable for all users. Throughout this playbook, you'll see options for additional roadway design and other strategies for creating safer low-speed shared streets.

Integration with Existing Local Signage Systems

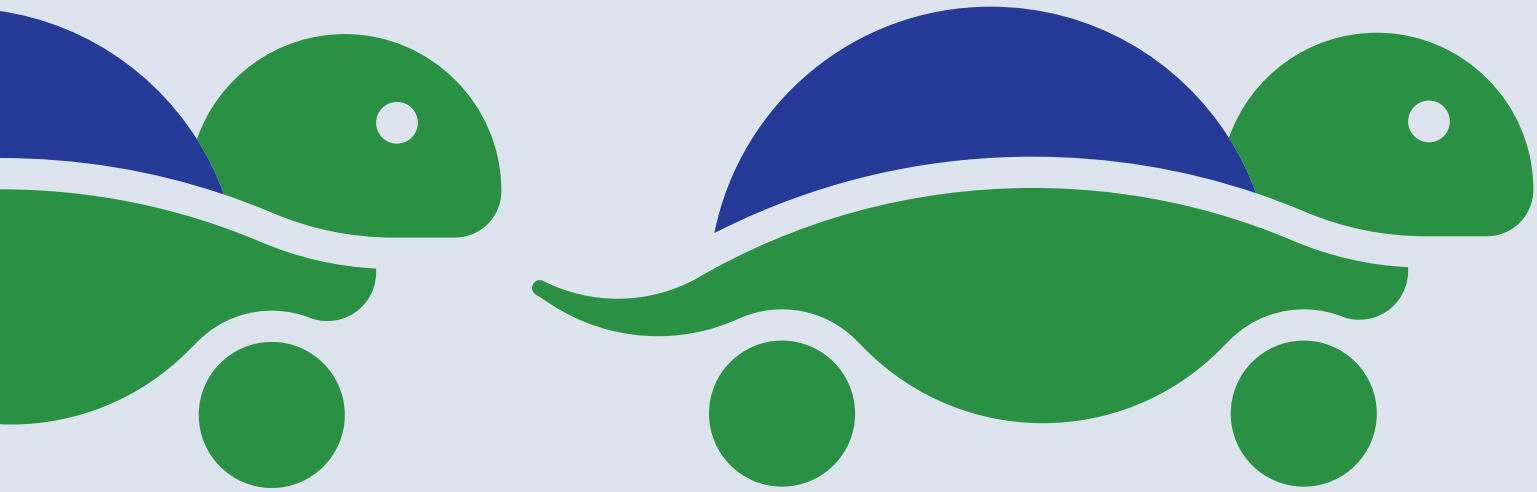
In some cases, local jurisdictions may already have existing wayfinding systems or wish to add supplemental information to LTN wayfinding signs. This playbook provides recommendations for jurisdictions considering local variation to the standard LTN brand signage. For example, the standard LTN brand sign can be installed at existing wayfinding locations, but is only recommended in locations where all destinations shown on the sign are accessible via the LTN. This playbook also provides guidance for local jurisdictions interested in providing NEV-specific markings or signage.

City of El Segundo LTN Pilot Project



SECTION 2

LTN Branding



Logo

Primary Logo

Always use the Primary Logo lockup exactly as shown above. Do not recreate the artwork; add, remove, or alter any logo elements; or change colors, except as specified for the One-Color Variant and Turtle Icon.

Sign templates, fonts, color swatches, and logo artwork files are available by request from SBCCOG. Use only these approved elements when designing signs.

One-Color Variant

The Primary Logo is the preferred logo. The One-Color Variant should be used when the Primary Logo is not practical. Examples include when the logo is placed over a color background that has insufficient color contrast with the Primary Logo colors, when the logo is to be featured in another brand with its own color palette, when the logo is presented alongside other one-color logos, and when the logo is used on the Alternate Design of the LTN Wayfinding Identification Sign. The One-Color Variant may be used in any of the LTN palette colors, provided that there is sufficient contrast with the background color (see facing page). Note that for enhanced legibility, the One-Color Variant includes a gap between the turtle shell and head, which is not present on the Primary Logo.

Turtle Icon

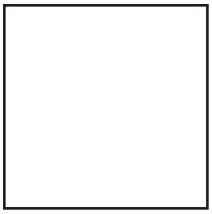
The Turtle Icon may be used alone for "artistic use" in marketing materials where the full Local Travel Network brand is also present. The icon may be used in any of the LTN palette colors, with any tint variation. The Turtle Icon always uses the artwork from the One-Color Variant, which includes a gap between the turtle shell and head.

Modal Icons

The modal icons represent the primary Local Travel Network users: people biking, using neighborhood electric vehicles, riding scooters, and using other small personal electric vehicles. The icons are a supplement to the Primary Logo. When used on wayfinding signs, they are displayed in Pacific Blue as shown above. Like the Turtle Icon, the modal icons can also be used alone for "artistic use" in any of the LTN palette colors, with any tint variation. The icons are always presented inside a circle to maintain similar visual proportions. Do not scale or distort the icon artwork or present the icons inside other shapes.

Colors

LTN Color Palette



White

C=0
M=0
Y=0
K=0

R=255
G=255
B=255

#FFFFFF

PANTONE
N/A

Black

C=0
M=0
Y=0
K=100

R=0
G=0
B=0

#000000

PANTONE
Black C

Coastal Fog

C=12
M=7
Y=3
K=0

R=220
G=227
B=235

#DCE3EB

PANTONE
656 C

Pacific Blue

C=100
M=93
Y=0
K=0

R=18
G=38
B=170

#1226AA

PANTONE
2736 C

Spring Grass

C=81
M=20
Y=100
K=6

R=52
G=143
B=65

#348F41

PANTONE
7740 C

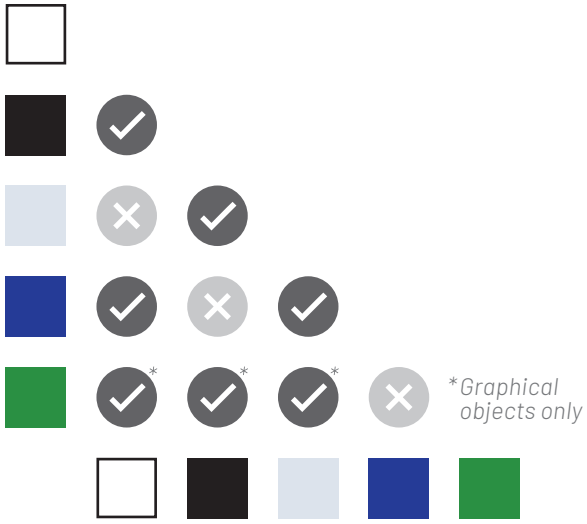
Color Accessibility

No Color Blindness

Protanopia

Deuteranopia

Color Contrast Suitability



Font

Highway Gothic

Aa	Bb	Cc	Dd	Ee	Ff	Gg	Hh	Ii	Jj	Kk	Ll	Mm
Nn	Oo	Pp	Qq	Rr	Ss	Tt	Uu	Vv	Ww	Xx	Yy	Zz

The brand uses FHWA 2000 C Series font, also known as Highway Gothic Narrow.
This font may be used in promotional materials where the Local Travel Network logo is used.

Education & Engagement Opportunities

The implementation of the Local Travel Network and its brand present new opportunities for South Bay residents to travel within their communities - new opportunities for slower and more comfortable local streets, taking trips together with neighbors and families, or simply by choosing a different mode. Through use of the friendly and engaging LTN brand, education and engagement opportunities include:

- Education events for kids along the LTN, such as bike buses (group rides to and from school)
- Website and social media engagement content, such as a "name the turtle" contest
- Branded collateral, such as educational brochures, "swag" for community events, public art, and yard signs

See Section 7 of this playbook for additional details.

Yard signs, Portland, OR and Seattle, WA

Logo Use

Do

Consistent and correct use of the Local Travel Network logo communicates cohesion of the network throughout the South Bay Region.

The Primary Logo may be used on white backgrounds.

The Primary Logo may be used on Coastal Fog color backgrounds.

Use the One-Color Variant in any color from the color palette. Logo may include modal icons.

The Turtle Icon may be used alone for "artistic use" in marketing materials. The full-color option, on a white or Coastal Fog background is encouraged.

Don't Do

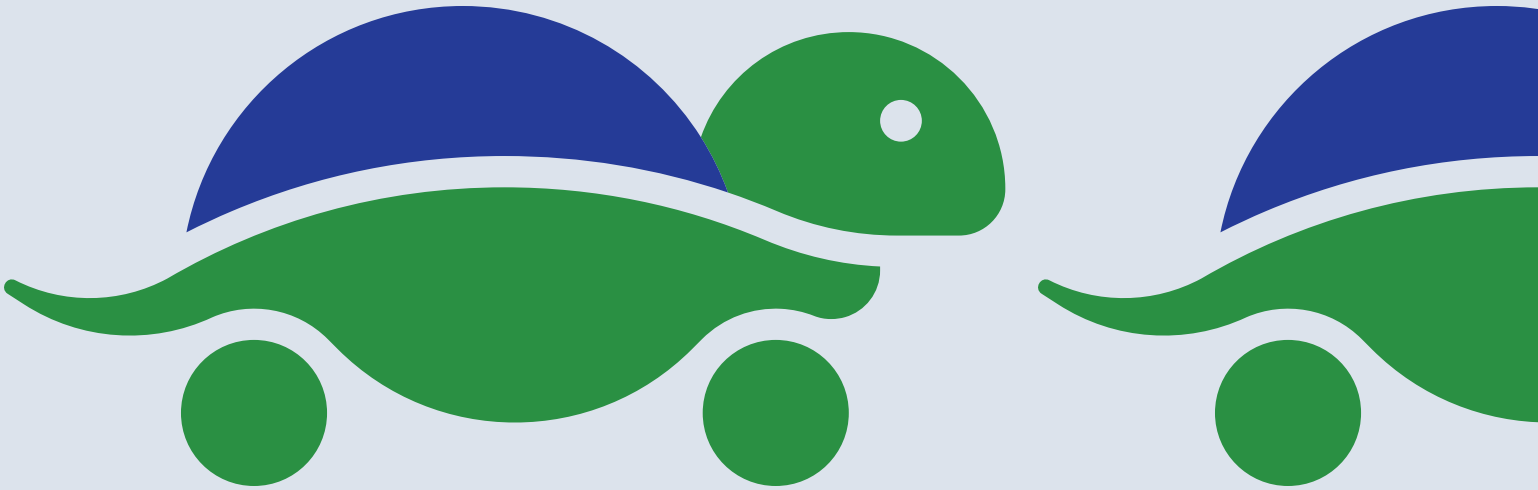
Here are some examples of misuse of the logo. These and any other alterations should be avoided at all times.

Provide sufficient space around the logo and do not stretch logo.

Only use the One-Color Variant version of the logo for one-color use.

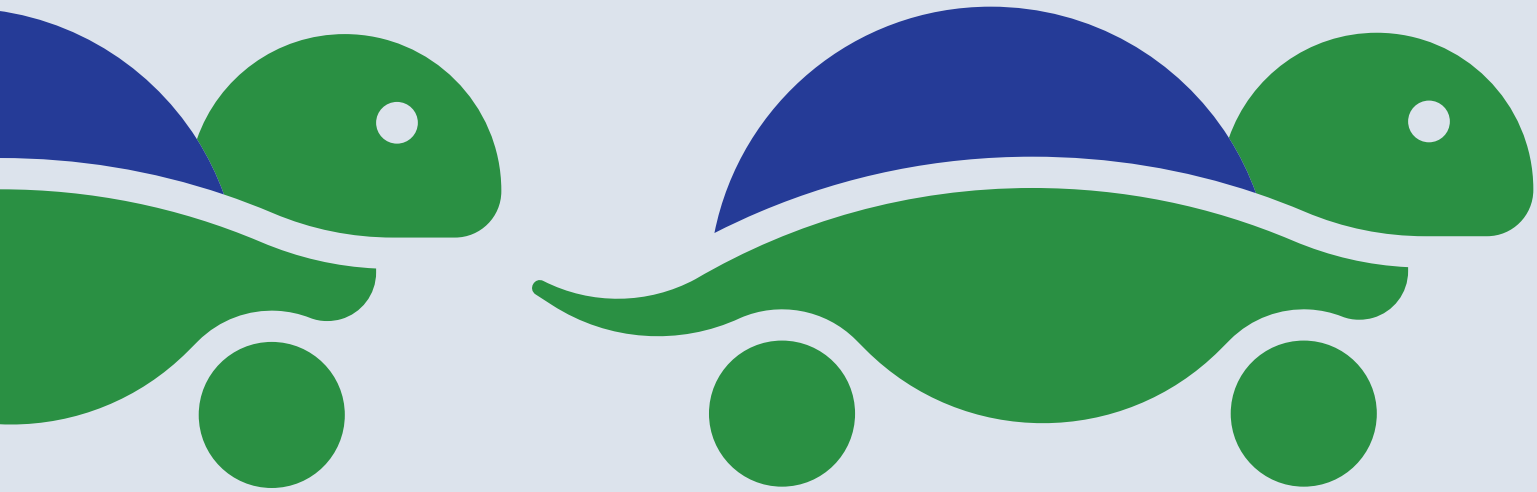
Only use approved color palette in logo.

Use color combinations with sufficient contrast.



SECTION 3

Wayfinding System & Siting



Sign Types

Three Basic Sign Types

As shown in Figure 1, there are three basic Local Travel Network wayfinding sign types:

- Decision
- Confirmation
- Turn

Sign Purposes

Each sign type has a unique purpose, location, and message; however, all three work together. The three sign types guide people along the designated Local Travel Network and to specific destinations.

Design Guidance

Table 1 (page 19) provides detailed technical guidance on the purpose, location, and messaging for each sign type. Later sections of the playbook will describe sign components and specifications.

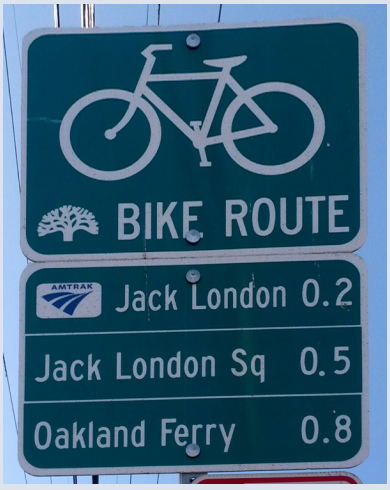
Examples from Other Cities

The design guidelines for Local Travel Network wayfinding build on successfully implemented models used in other leading jurisdictions for low-speed networks across the country, such as Bicycle Boulevards. The photos below illustrate sign application examples found in these jurisdictions.

DECISION

Chicago, IL

CONFIRMATION



Oakland, CA

TURN

San Francisco, CA

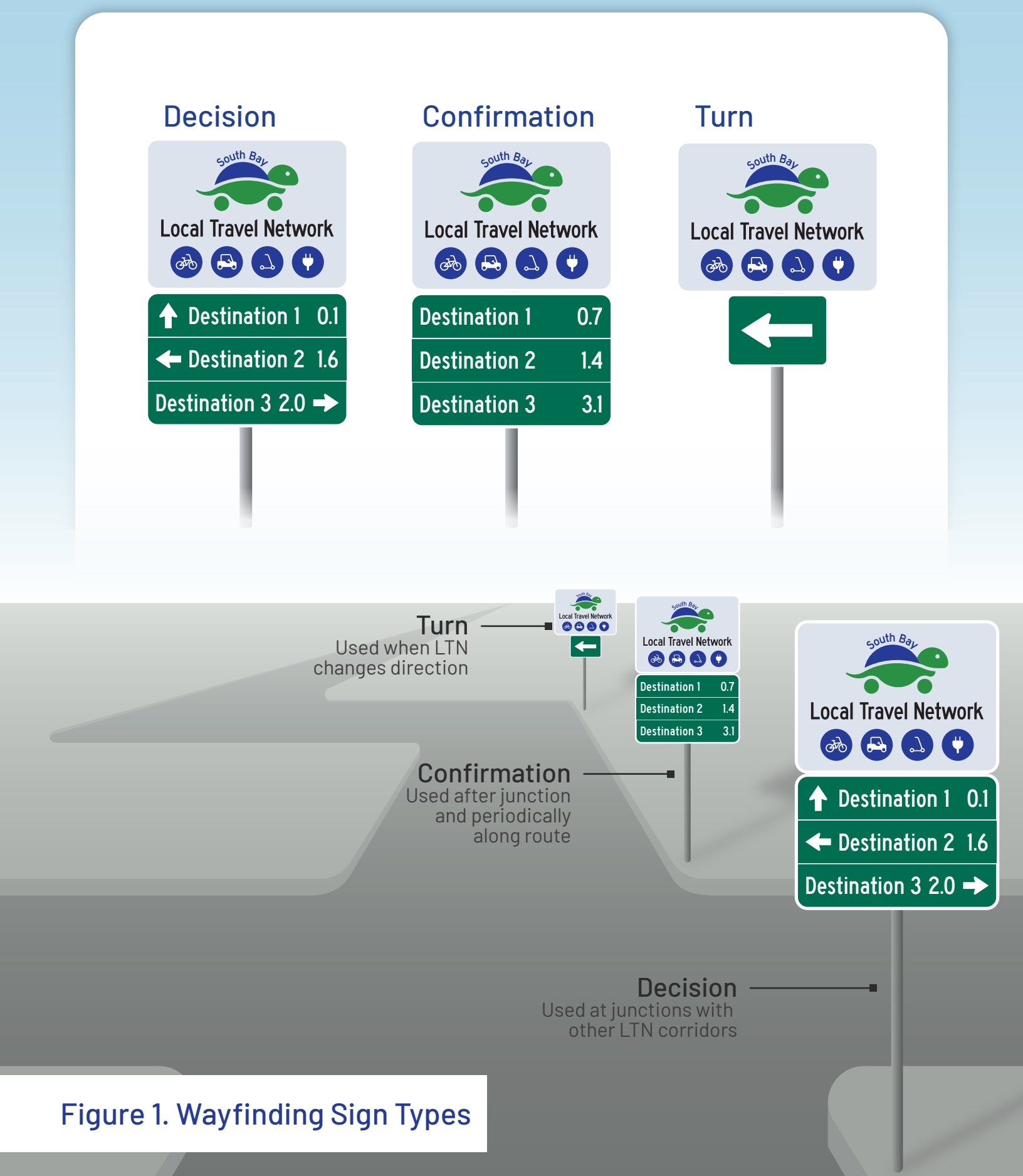
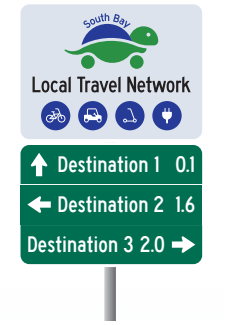
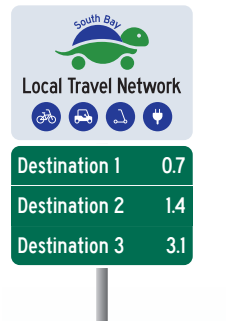


Figure 1. Wayfinding Sign Types

Table 1. Three Local Travel Network Wayfinding Sign Types

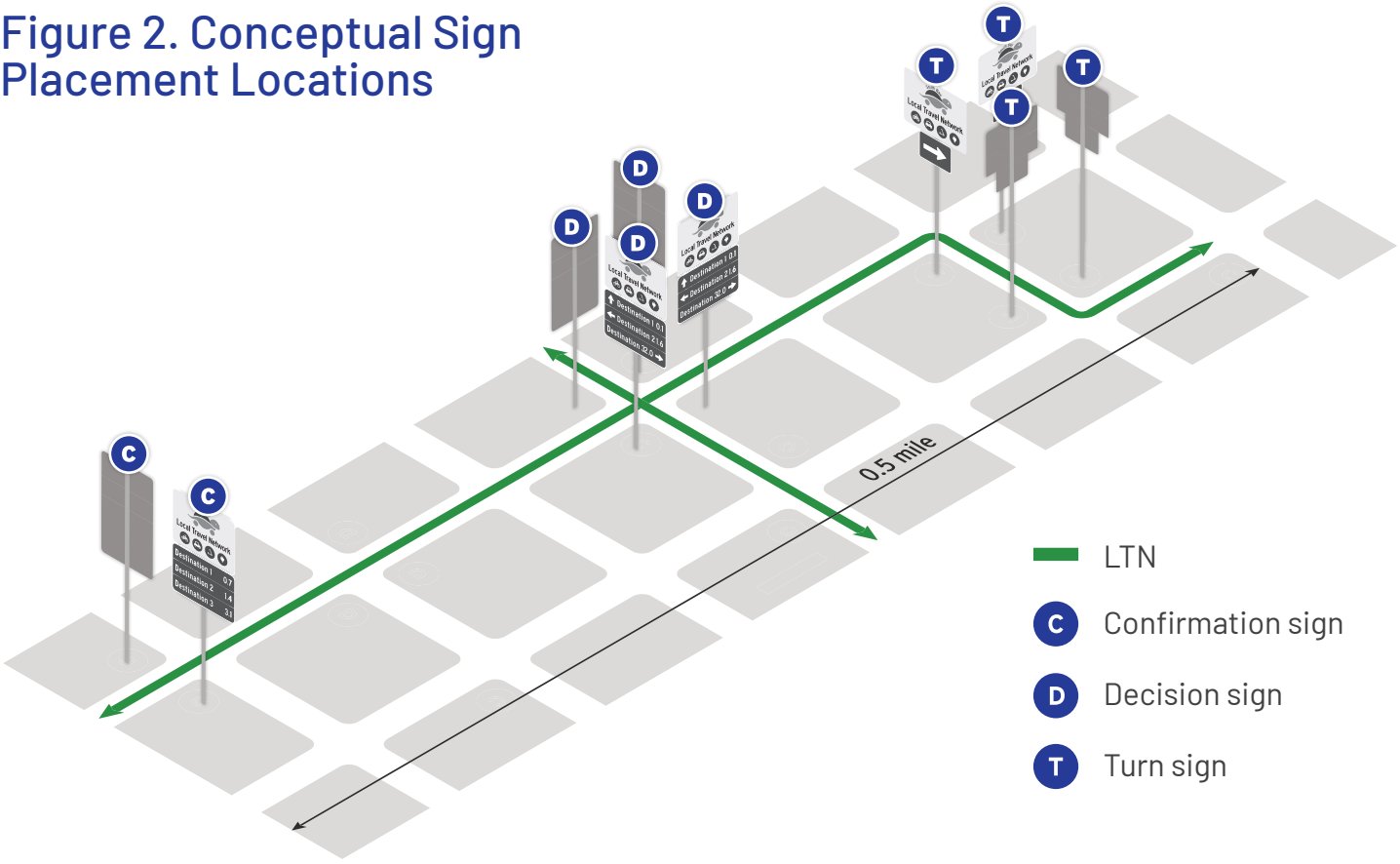
Sign Type	Decision	Confirmation	Turn
			
Purpose	• Shows connections • Marks the junction of two LTN corridors and provides turning guidance through the junction • Informs people of the preferred LTN corridor to key destinations • Provides distance to key destinations	• Informs all roadway users (including drivers of motor vehicles) that they are traveling on a designated LTN corridor • Provides distance to key destinations ahead	• Indicates where LTN corridor turns, either from one street onto another street or where the geometry of the roadway or intersection may be confusing
Location	• Near side of decision-making point (50' – 150' in advance), either an intersection with another LTN corridor • Can be used on arterials at signalized junctions with LTN to direct users onto LTN at key points • Can be used at exit point of key destinations (e.g. regional park driveways) to direct users onto LTN	• At start of LTN corridor • Can be used shortly (50' – 150') after signalized junction with major arterial to provide confirmation of LTN for users remaining on corridor or joining at signal • Every quarter- to half-mile, unless another type of sign is needed (e.g. fills in gaps to provided consistent signage)	• Near-side of intersection or other turn where LTN corridor changes direction (50' – 150' in advance)
Primary Message	• Direction arrow to up to three destinations, including: • Destinations ahead along the current LTN corridor • Lateral destinations, either to the left or right, accessed via intersecting LTN corridors • Mileage to destinations	• Up to three destinations that lie ahead on the given LTN corridor, including mileage to each • Jurisdictions may choose to use the branded sign alone for route confirmation, without the green wayfinding sign	• Arrow in direction that LTN corridor turns
Notes	• N/A	• Pavement markings also provide visual cues that a person is traveling on a designated LTN corridor • In areas with significant LTN corridor density, confirmation signs may not be needed as Decision Signs will be provided at regular intervals	• Decision sign is used to show intersections with other LTN corridors, whereas turn sign is placed where a user must make a turn to remain on the LTN corridor they are traveling

Sign Placement

Best practice provides for wayfinding signs to be placed in both directions of a street unless the street itself is one-way. Typically, one mile of the Local Travel Network is recommended to include eight wayfinding signs in each direction, plus additional signs at LTN junctions or major signalized intersections (for up to 16 to 20 signs per mile). For areas of the LTN with lower intersection density, fewer signs can be used and still provide sufficient user guidance. Table 1 (page 19) shows the roles and positioning of each sign type.

Figure 2 below illustrates conceptual sign placement locations and how the different sign types interact over a typical half-mile of the LTN. Note that actual sign placement is subject to engineering judgment and availability of existing poles, visibility of destination, straightness or curvature of route, and other contextual elements. Jurisdictions may choose to use fewer signs than shown here, and may use the branded sign alone for route confirmation.

Figure 2. Conceptual Sign Placement Locations



Destinations & Distance

Destination Types

Destination types recommended for wayfinding signs include the following three categories:

Regional

- Cities
- Transit centers and rail stations
- Regional landmarks
- Regional parks
- Regional shopping centers
- Sports stadiums and event venues

Subregional

- Colleges
- Beaches
- Bike paths
- High schools
- Hospitals
- Local Travel Network corridors
- Neighborhoods and districts

Local

- Community centers
- Local parks
- Elementary and middle schools
- Other public facilities

Destination Selection

Destinations orient people to their surroundings and convey the geographic coverage of the LTN. Destinations should be immediately familiar to the majority of users. This maximizes their potential of being meaningful landmarks. Jurisdictions can use their discretion when selecting which destinations to include on signs. Signs may include one, two, or three destinations.

In the intrinsic sense, a user may be attempting to reach an actual destination shown on a wayfinding sign. In this case, the sign will guide the person directly to their destination. However, destinations also serve a broader, instrumental role. They paint a general picture of the direction the bikeway travels, the key areas it serves, and its eventual terminus. People may not necessarily be traveling to a destination shown on a sign for the sign to still provide useful orientation. For example, if people know their destination is relatively close to, or in the same direction as, a destination shown on a wayfinding sign, they can use the posted directions to approximate the path to their own destination.

Jurisdictions may have already completed a wayfinding sign program and selected destinations. These destinations can be used for the LTN wayfinding program as well, with removal of any destinations that are not accessible via the LTN.

Signing Distance

A destination's regional significance determines how far away signs are placed from the destination. Regional destinations are signed from greater distances; local destinations are signed only in their vicinity. As people travel along the LTN, each sign progressively discloses new destination information based on their location. Passed destinations are removed, new nearby destinations are added, and one or two long-range destinations are maintained for orientation. No more than three destinations are shown on one sign.

Confirmation and decision signs show distances to the destinations listed on the signs. For all distances, use miles (rounded to the nearest tenth of a mile). Units are not shown (see Figure 3).

Mileage was selected to show distance because it is a standard concept that travelers are readily familiar with. Unlike measuring distance with units of time, there is no subjectivity of units or variability based on travel speed or mode.

When measuring distances to destinations, always use the intended route of travel. Distances should be measured from the location of the sign to the point at which the LTN reaches the given destination. In many instances, this point will be at an intersection or the address of a building. For larger destinations like cities, neighborhoods, or beaches, distance should be measured from the edge of the municipality, district, or property line that the LTN first touches.

Consider the following rules of thumb in selecting the distance at which destination types are shown on wayfinding signs:

- Regional: Up to 5 miles
- Subregional: Up to 2 miles
- Local: Up to 1 mile

Jurisdictions may choose to include Regional destinations on wayfinding signs that are within a quarter-mile distance from the LTN, if low-stress, direct routes are available to access those destinations.

When including an LTN street name as a destination, a jurisdiction may use the one-color turtle icon on the destination line to support navigation throughout the LTN. The use of this icon is optional.

Figure 3. Distance to Destinations

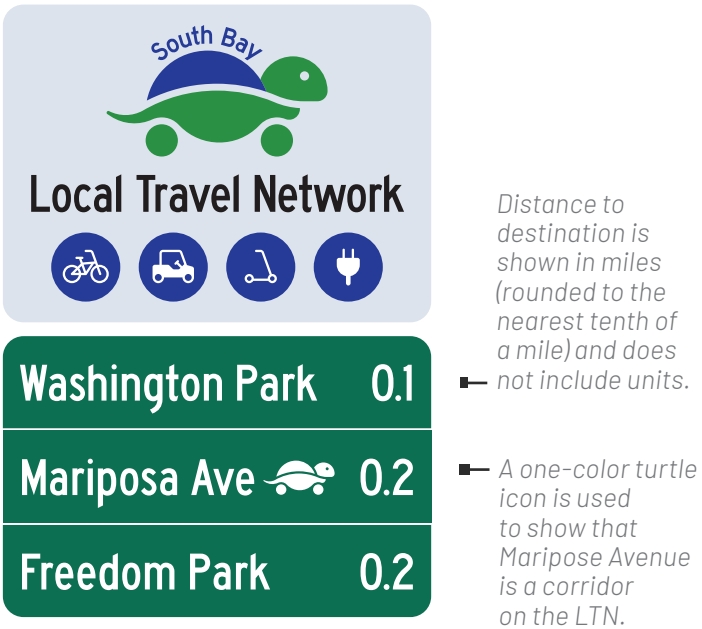


Table 2. Sign-Specific Messaging Standards

Sign Type	Decision	Confirmation	Turn
Number of Destinations	• Up to three destinations per sign, listed vertically	• Up to three destinations per sign, listed vertically	• No destination shown
Organization of Destinations	• List destinations from top to bottom as follows: • Top destination: through • Upward-facing arrow • Sign for the through LTN corridor's next major destination or terminal • Middle destination: left, onto perpendicular LTN corridor • Left-facing arrow • Sign for the closest destination on the perpendicular LTN corridor • Bottom destination: right, onto perpendicular LTN corridor • Right-facing arrow • Sign for the closest destination on the perpendicular corridor	• List destinations from shortest to farthest distance, such that destinations "fall off" the sign once they have been passed • List only destinations downstream from the current sign, preferably destinations directly accessible from the LTN • If one destination is accessible using multiple routes, include "via" routing information (e.g., "via Downtown")	• No destination shown
Text Justification and Arrow Placement	• Top destination: through • Text justification: Left align • Arrow placement: Left side • Middle destination: left • Text justification: Left align • Arrow placement: Left side • Bottom destination: right • Text justification: Right align • Arrow placement: Right side	• Left-align all text (arrows are not used on confirmation signs)	• Center-align arrow on sign
Distance Information	• Include mileage to destinations	• Include mileage to destinations	• N/A

Sign Components

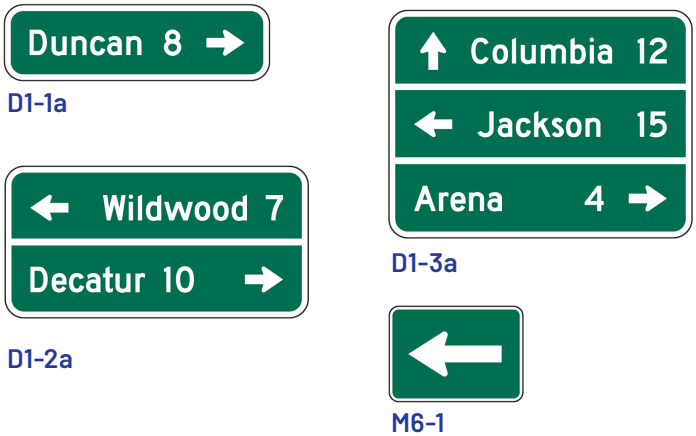
Figure 4. Sign Components

Messaging and Content Guidelines

The success of a signage system depends on consistently applied standards. Users develop a familiarity with the look and feel and do not need to spend extra time interpreting superfluous details of any one sign. This consistency is also essential in every sign's messaging. Accordingly, the conventions listed in Table 2 and in the following bullets will be used when producing LTN wayfinding signs.

- Do not use periods after abbreviations
- Always use abbreviated street suffixes
- Spell out all words other than street suffixes unless space does not permit
- Consider using abbreviations to fit long names onto one line of text
- Long names that do not fit on one line of text can be distributed across two lines by increasing the height of the D1-series wayfinding panels shown in Figure 5
- Jurisdictions may choose to use the white One-Color Turtle Icon on destination lines that include an LTN corridor (see Sample Corridor for example)
- Signs must be retroreflective
- Use CA MUTCD guidance for any standards not listed in this section

Figure 5. CA MUTCD Signs



Wayfinding Sign Standards

The CA MUTCD sign standards used for the LTN are consistent with standard destination guide signs used for bicycle facility wayfinding. The wayfinding components of the signs follow CA MUTCD standards set forth in Parts 2 and 9. The LTN Decision signs follow the standards for signs D1-1a (one destination), D1-2a (two destinations), and D1-3a (three destinations). LTN Confirmation signs are a variation of these signs. The LTN Turn sign uses the M5 and M6 sign families. Additional details are outlined in Table 2.

Source: CA MUTCD 2014 Revision 6. Note that the white outlines shown around the edges of the D1-series signs above are not required.

Supplemental Sign Information

Providing Supplemental Information

Certain types of additional information may be added to LTN wayfinding signs, for example:

- Jurisdiction name, seal, or logo
- Beach name or logo
- Cross street
- Gateway sign (as was used for El Segundo pilot)
- Barcode or QR code to download maps, navigation information, trip planning apps, etc.

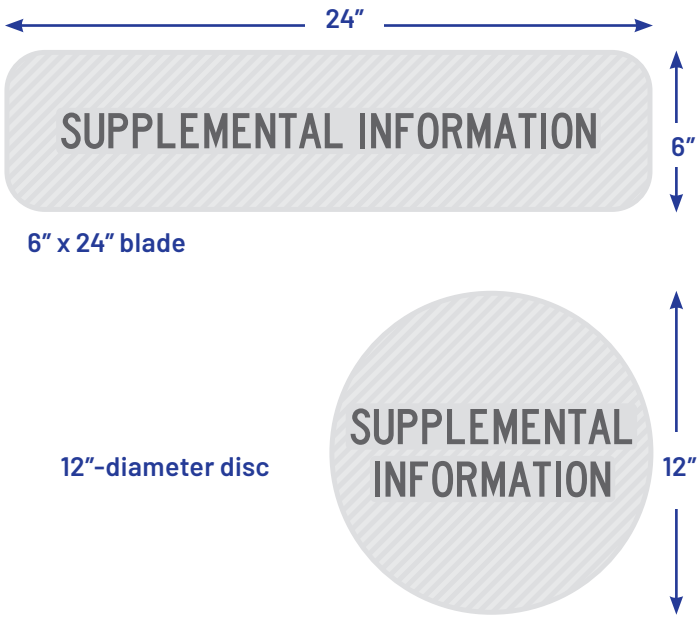
Supplemental information is presented using separate placards placed either above or below the LTN wayfinding sign. This arrangement allows the supplemental information to be added while maintaining the LTN brand as a discrete identity. To avoid information overload and minimize sign height, only one piece of supplemental information should be added to any LTN sign. There are two configurations for doing so:

- 6" x 24" blade below LTN sign
- 12"-diameter disc below LTN sign

Figure 6 illustrates the dimensions of each supplemental sign. Note that the construction specifications of the 6" x 24" blade are consistent with the MUTCD D1-1b sign. MUTCD guidance should be followed when fabricating signs of this type. Supplemental sign components can be incorporated onto a single sign panel. Jurisdictions are responsible for the content and design of supplemental signs, although they are encouraged to consult SBCCOG for consistency. Supplemental information, such as city seals, should not be placed on the LTN brand or wayfinding component signs.

Additional CA MUTCD signs may be used in conjunction with LTN wayfinding signs on the same pole (installed below, see Figure 7), or may be sited separately. The D11-1 sign may be used where shared lane markings (sharrows) are used to denote a Class III bike route. The R81(CA) sign must be used where Class II bike lanes are present, with optional R81A(CA) and R81B(CA) signs. Consult CA MUTCD Part 9 for more information.

Figure 6. Supplemental Sign Options



City of El Segundo LTN Pilot Project with supplemental gateway sign option

Figure 7. CA MUTCD Bike Facility Signs

R81 (CA)

D11-1

R81A (CA)

R81B (CA)

Source: CA MUTCD 2014 Revision 6

City of El Segundo
LTN Pilot Project

Integration with Existing Wayfinding Systems

South Bay jurisdictions may have existing wayfinding systems they wish to incorporate with the LTN. The standard LTN brand sign can be installed at existing wayfinding locations, as shown in Figure 8 (see mounting height and clearance constraints in Section 5 of this playbook). Though not preferred, the LTN brand sign may be scaled as needed.

When considering compatibility with existing wayfinding systems, the following is recommended:

- Only add the LTN brand to wayfinding signs where all destinations are accessible via the LTN in the directions shown on the sign
- Do not add the LTN brand where existing wayfinding signage is auto-oriented (e.g. signs are mounted in a way that would not be visible to LTN users; wayfinding destinations are parking garages)

Figure 8. Existing Wayfinding Examples

City of El Segundo
LTN Pilot Project

Pavement Markings

Facility Selection

Pavement markings should be used to designate LTN corridors, supplementing wayfinding signage. Standard pavement markings with use approved by the CA MUTCD are described below. Only pavement markings for bicycles are approved for standard use at this time. Several jurisdictions in California have developed and implemented NEV and scooter markings, some of which have experimental approval from the California Traffic Control Devices Committee (CTCDC). South Bay cities may be interested in seeking experimental approval status to use non-standard markings on the LTN. See facing page and Appendix A for more information.

Figure 9 provides guidance for how vehicle volume and speed should be taken into consideration to determine a preferred bikeway type. Generally, the higher the speed and volume of a road, the more protective the recommended bikeway.

Shared Lane Markings

Due to low speeds and low vehicle volumes, the majority of corridors on the LTN will be suitable for shared lane markings (also known as sharrow markings). Shared lane markings are not recommended on streets with speeds higher than 35 mph (25 mph is preferred) and volumes higher than 3,000 ADT. Sharrow markings:

- Encourage multimodal use of the center of the travel lanes
- Bring awareness to the presence of LTN routes for people driving and people using low-speed modes
- Strengthen connections in a network
- Clarify movement and positioning for people using low-speed modes
- Are used in contexts where travel speed differential between people driving and people using low-speed modes is low

Sharrow markings are also used in many communities as part of Bicycle Boulevard systems, where they are paired with traffic calming strategies and wayfinding to provide continuous networks that prioritize bicycle travel on neighborhood streets with low vehicle volumes. The Local Travel Network can use these same strategies to build on this successful model. More information can be found in Appendix B.

Additional Bike Facility Options

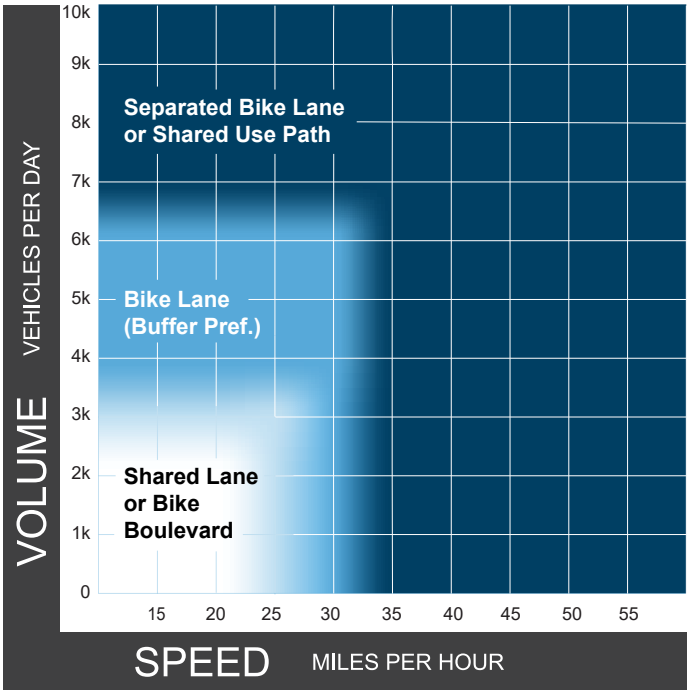
For LTN roads with higher speeds and vehicle volumes, shared lane markings are not appropriate. Based on the FHWA Bikeway Selection Guide, one of the following facilities may be selected:

- Class II bicycle lane
- Class II+ buffered bicycle lane
- Class IV on-street separated bikeway
- Class I off-street path

Green-Backed Sharrows

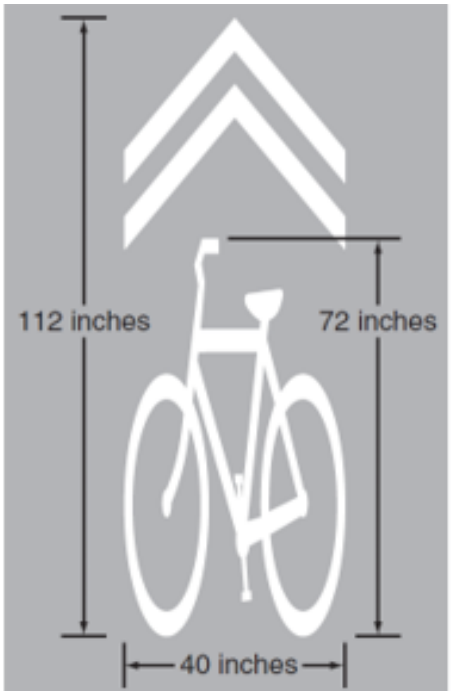
Green-backed sharrows are used by jurisdictions interested in a more conspicuous marking option. This marking option is now allowed under CA MUTCD Revision 8 Section 9C, though green-backed sharrows are prohibited in the 2023 Federal MUTCD Update, Section 3H.06.

Figure 9. Bikeway Selection Guide



Source: FHWA Bikeway Selection Guide

Figure 10. Shared Lane Marking



Source: CA MUTCD 2014 Revision 6, Figure 9C-9

Non-Standard Micromobility Markings: These markings are in use in CA, but are not included in the CA MUTCD.

Bicycle Boulevard Marking
Berkeley, CA

Scooter Lane Marking
UCLA Campus

Shared Bike and Golf Cart Lane Markings
Palm Desert, CA

NEV Considerations

See Appendix A of this playbook for further guidance on NEV plan and facility development.

For jurisdictions interested in providing NEV-specific markings or signage, a number of experimental options are in use throughout the state. California Assembly Bill 2432, signed into law in 2022, allows for jurisdictions within Los Angeles County to develop local NEV transportation plans. Per AB 2432, jurisdictions must develop a local NEV plan and coordinate with the CTCDC when implementing the facilities in this section.

Shared Bike/NEV Facilities

Jurisdictions that adopt a local NEV transportation plan may be interested in developing one of the following facilities along the LTN:

- **Shared Class III routes for bikes and NEVs**: NEVs may operate in the travel lane on LTN corridors with speed limits up to 35 mph. However, jurisdictions may be interested in supplementing markings and signage to include NEVs. Signage previously approved by Caltrans is shown in Figure 11, but should be installed in coordination with the state and after adoption of a local NEV transportation plan. Pre-approved markings for Class III shared NEV markings are not currently available, and custom markings would require state approval.
- **Shared Class II, Class II+, or Class IV lanes for bikes and NEVs**: These lanes should be wider than Class II minimums as outlined by the CA MUTCD to accommodate NEVs. Markings and signage must also be used to designate the lane. Signage previously approved by Caltrans is shown in Figure 11, but should be installed in coordination with the state and after adoption of a local NEV transportation plan. Pre-approved markings for shared bike/NEV Class II lanes are not currently available, and markings would require state approval. Experimental markings are shown in Figure 12.
- **Shared off-street paths for bikes and NEVs**: Where vehicle volumes and/or speeds are high and right-of-way widths permit, off-street facilities wide enough to accommodate NEVs and bikes should be considered.

Designing for Small Things with Wheels, NACTO

In February 2023, NACTO released their "Designing for Small Things with Wheels" guidance, as an update and supplement to their Urban Bikeway Design Guide and Urban Street Design Guide. This document is focused on strategies for designing for all ages, abilities and micromobility options. Additional NACTO guidance that is relevant to LTN design and implementation includes "City Limits" about speed management and "Don't Give Up at the Intersection," which can provide additional guidance on designs for major and minor crossing locations on the LTN.

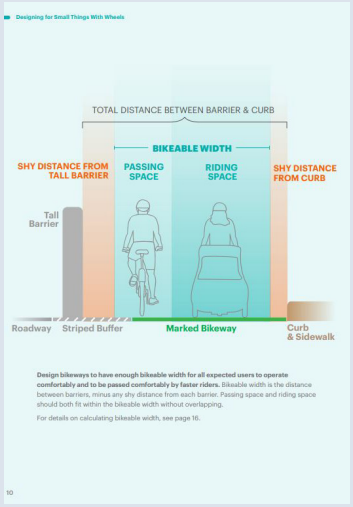
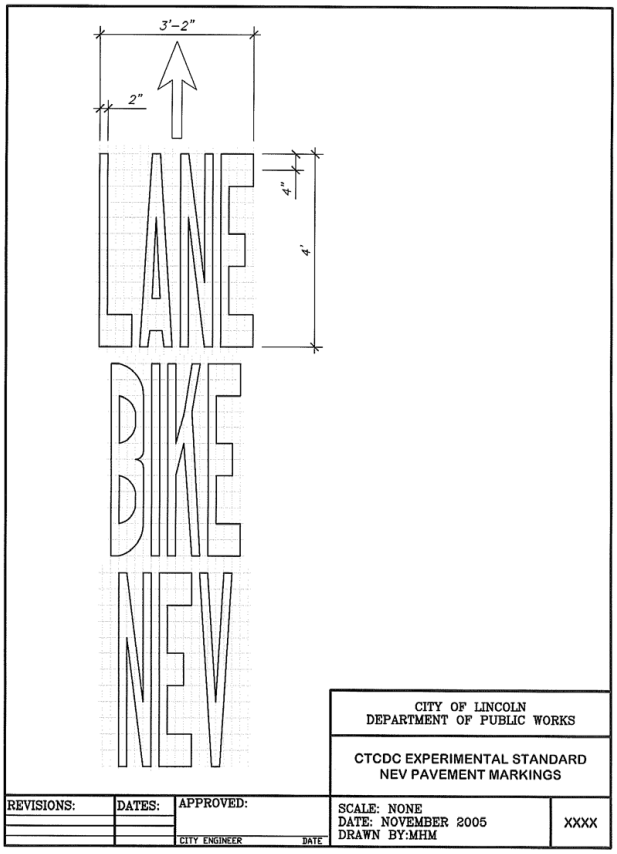


Figure 11. Caltrans NEV Signage

Source: Caltrans

Figure 12. Experimental NEV/Bike Lane Marking



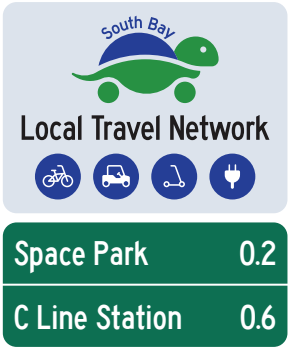
Source: City of Lincoln, CA

Sample Corridor

This section shows how the different sign types and sharrow markings can be used together on one sample corridor, based on spacing guidance in this section. A partial list of sample corridor signs that match the map on the facing page are shown below. This example also shows how implementation can be completed corridor-by-corridor, with a phased approach to full LTN implementation where needed. Full sample corridors can be found in Appendix F.

1. Confirmation Sign

2. Confirmation Sign



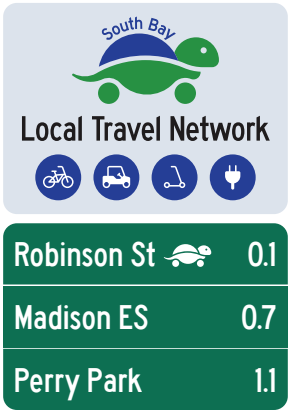
3. Turn Sign

4. Turn Sign

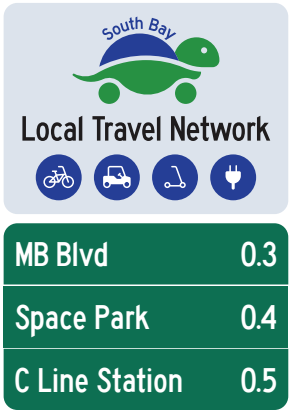
5. Turn Sign

6. Turn Sign

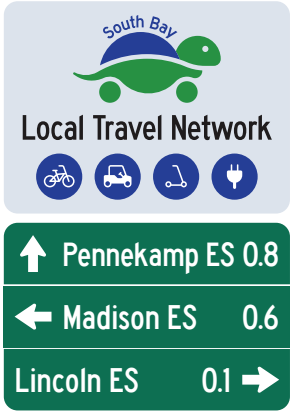
7. Confirmation Sign



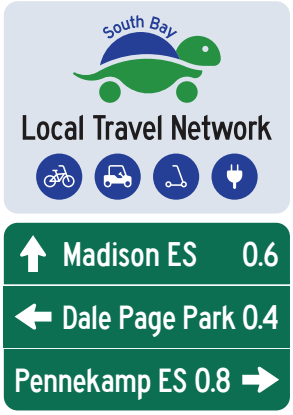
8. Confirmation Sign



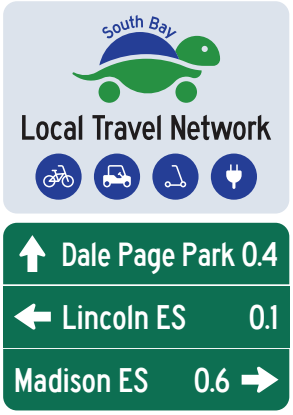
9. Decision Sign



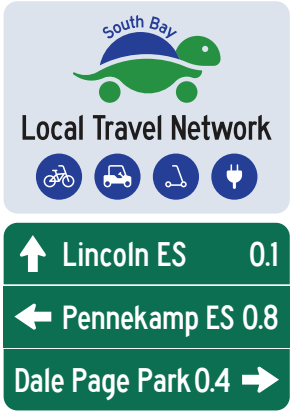
10. Decision Sign

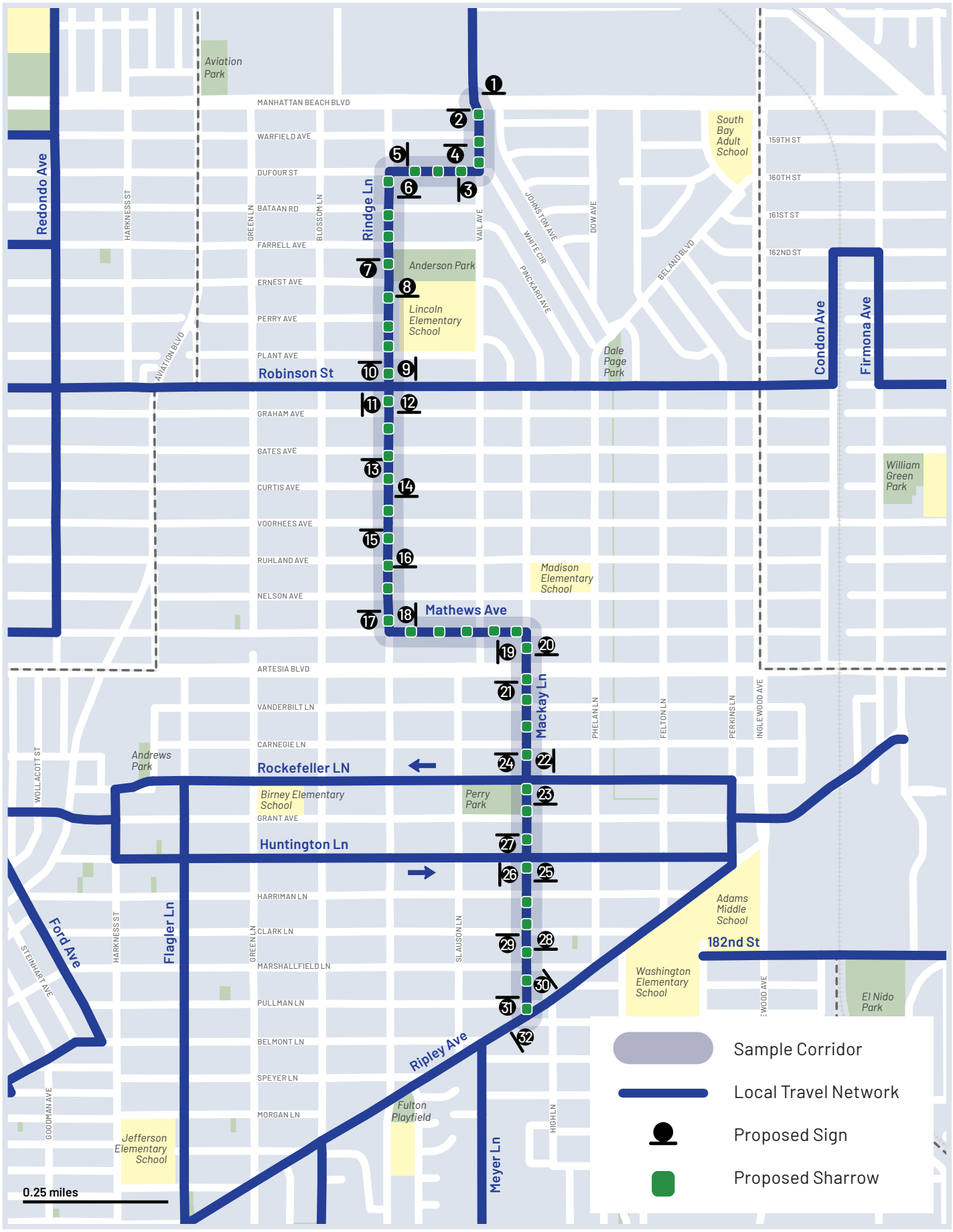


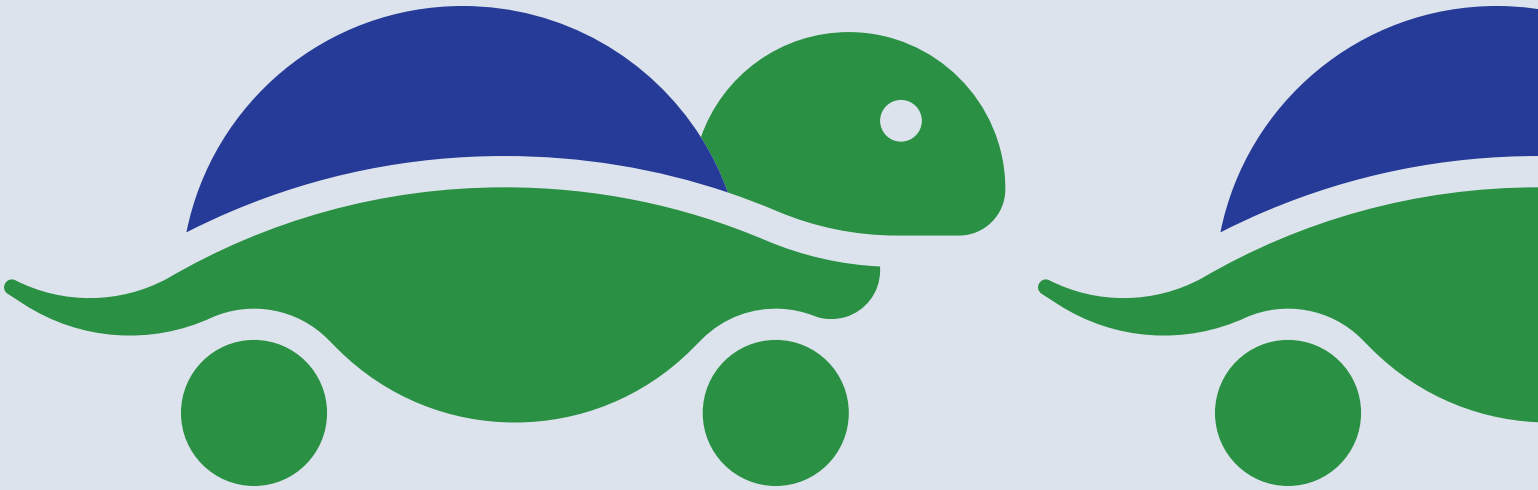
11. Decision Sign



12. Decision Sign

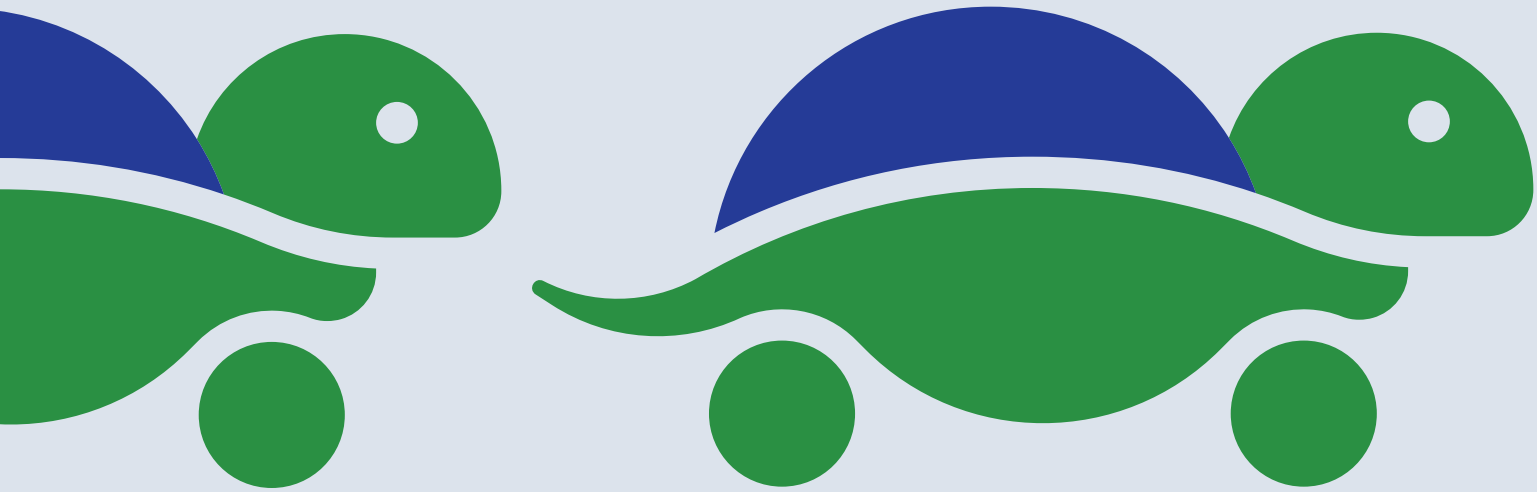



Aviation Park
MANHATTAN BEACH BLVD
WARFIELD AVE
DUFOUR ST
BATAAN RD
FARRELL AVE
ERNEST AVE
PERRY AVE
PLANT AVE
Robinson St
GRAHAM AVE
GATES AVE
CURTIS AVE
VOORHEES AVE
RUHLAND AVE
NELSON AVE
Mathews Ave
ARTESIA BLVD
VANDERBILT LN
CARNEGIE LN
Rockefeller LN
GRANT AVE
Huntington Ln
HARRIMAN LN
CLARK LN
MARSHALLFIELD LN
PULLMAN LN
BELMONT LN
SPEYER LN
MORGAN LN
Ripley Ave
Redondo Ave
HARKNESS ST
GREEN LN
BLOSSOM LN
Rindge Ln
VAIL AVE
JOHNSTON AVE
WHITE CIR
PINCKARD AVE
DOW AVE
BELAND BLVD
159TH ST
160TH ST
161ST ST
162ND ST
Condon Ave
Firmona Ave
AVIATION BLVD
Mackay Ln
PHELAN LN
FELTON LN
PERKINS LN
INGLEWOOD AVE
WOLLACOTT ST
Ford Ave
STEINHART AVE
Flagler Ln
SLAUSON LN
182nd St
GOODMAN AVE
HIGH LN
Meyer Ln
South Bay Adult School
Anderson Park
Lincoln Elementary School
Dale Page Park
William Green Park
Madison Elementary School
Andrews Park
Birney Elementary School
Perry Park
Adams Middle School
Washington Elementary School
El Nido Park
Fulton Playfield
Jefferson Elementary School
0.25 miles
Sample Corridor
Local Travel Network
Proposed Sign
Proposed Sharrow



SECTION 4

Implementation



Marking Specifications

Marking Overview

Pavement markings should be used to designate LTN corridors, supplementing wayfinding signage. The markings described here are for bikeways, not NEV lanes. Once the appropriate marking is selected for the context (see Section 3 of this playbook), CA MUTCD and Highway Design Manual guidance should be followed for pavement marking implementation. The NACTO Urban Bikeway Design Guide also has best practice recommendations for implementation. Jurisdictions should also review the appropriateness of existing bicycle facilities on corridors selected for LTN implementation and modify markings where needed when wayfinding signs are installed.

Shared Lane Markings

For shared lane markings (sharrows), see CA MUTCD Section 9C.07 for guidance. Key installation considerations include:

- Size: Markings are 112" x 40" (see CA MUTCD Figure 9C-9)
- Lateral Positioning: Install markings in the center of the lane (or the effective lane width where on-street parking is present, accounting for the door zone) for lanes less than 14' wide; minimum placement is 4' from curb or 11' from curb when parking lane is present; markings should be placed to position users away from the door zone where on-street parking is present
- Spacing: Install markings immediately after intersections and at intervals of no greater than 250' (consider 50-100' on streets with higher vehicle volumes, sight distance constraints, or where there is a higher potential for conflict with vehicles)
- Use: Do not use shared lane markings on shoulders, for bicycle detection locations at signals, or on streets with separated bikeways or designated bicycle lanes

Class II Bicycle Lanes and Buffered Bicycle Lanes

Refer to Caltrans HDM Section 301.2 and CA MUTCD Section 9C.04. Key installation considerations include:

- Width: 5-7' recommended (greater width is desirable where gutter is present)
- Buffer: A minimum 2' buffer is recommended with higher vehicle volumes and speeds. Wider buffers can included chevron or diagonal markings
- Markings: Use bicycle lane word, symbol, and/or arrow markings, placed at the beginning of the lane and at periodic intervals; green paint may be used under CA MUTCD Revision 8
- Intersections: Place through bicycle lanes to the left of right-turn lanes. Conflict striping ahead of intersection is recommended. Bicycle lane treatments can be continued through the intersection at locations with high potential for conflict with drivers

Class IV Bikeways

Refer to Caltrans Design Information Bulletin 89-01, CA MUTCD Section 9C.102 and FHWA "Separated Bike Lane Planning and Design Guide." Key installation considerations include:

- Width: 5' minimum width, with 6-7' wide recommended
- Buffer and Separation: A Class IV Separated Bikeway has one of four vertical separation elements: grade separation, flexible posts, inflexible barrier, on-street parking, or a raised island. A 1.5-3' minimum buffer width would be needed, depending on which vertical separation was chosen, with 3' width recommended
- Markings: The Bike Lane word marking, Bike Symbol or Helmeted Bicyclist Symbol shall be placed on the far side of the intersection
- Intersections: Separation elements should be continued to the intersection where possible, with "protected intersection" elements recommended

Sign Specifications

Sign Overview

The following pages illustrate the LTN wayfinding signs. Appendix F provides detailed sign specifications. Follow CA MUTCD standards set forth in Parts 2 and 9 for wayfinding sign components.

The LTN brand sign artwork is sized for 24" x 18". For Decision and Confirmation Signs, follow standards for CA MUTCD D1-1, D1-2, or D1-3. For Turn Signs, follow standards for CA MUTCD M5-1, M5-2, M6-1, M6-2, M6-3, M6-4, M6-5, M6-6, or M6-7. Refer to CA MUTCD Section 2D.50 for additional legibility considerations.

Placement Principles

As a general rule, signs should be mounted in consistent, conspicuous locations. Clear sightlines, free of landscaping and other obstructions, should be present between the user's path of travel and the signs.

Wayfinding signage tends to be smaller than primary directional signs for conventional highways, but about the same size as ancillary signage for conventional highways, like parking restriction signs. It is easy for micromobility wayfinding to get lost in a clutter of similarly proportioned signs. Signs that are harder to locate make for a slower wayfinding awareness. Or worse, people may miss them altogether. The LTN brand identity helps alleviate this problem, but to further reduce the occurrence, LTN wayfinding signs should be mounted with a visual buffer of at least one foot to the nearest sign of any other type (see Figure 13).

Best practice is to mount LTN wayfinding signs on their own poles. Freestanding signs are easier for people to locate and less susceptible to clutter from other signs.

Signs need to be placed in consistent, predictable locations in order to be most effective. Avoid mounting LTN wayfinding to traffic signal, lighting, utility, and transit stop poles. These locations, while opportunistic, are highly unpredictable. Signs in these locations are at greatest risk of blending in with or becoming obscured by their surroundings. Further, people traveling via bikes and scooters may not expect to look for signs in these places. Nonstandard mountings may even increase the complexity of installation and maintenance. Finally, signs should be positioned so that the directions they give obviously point to the corresponding path of travel. No signs—especially decision and turn signs—should be placed near any streets, paths, or divergences that might be mistaken for anything other than the LTN user's intended path.

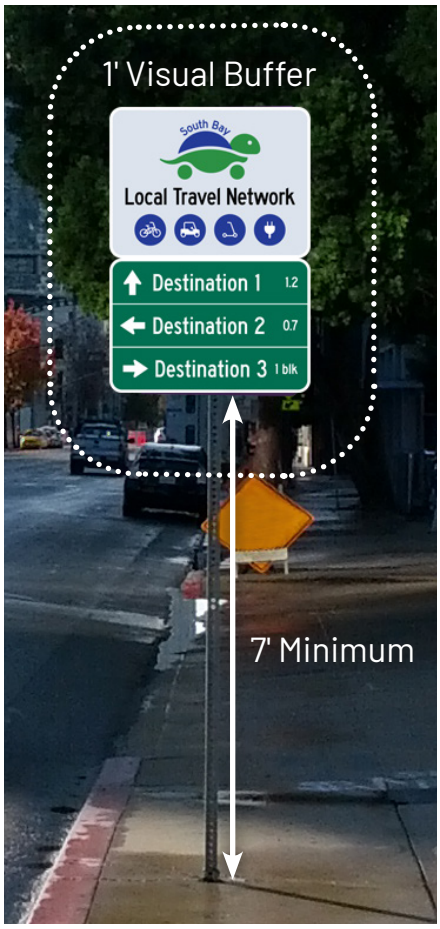
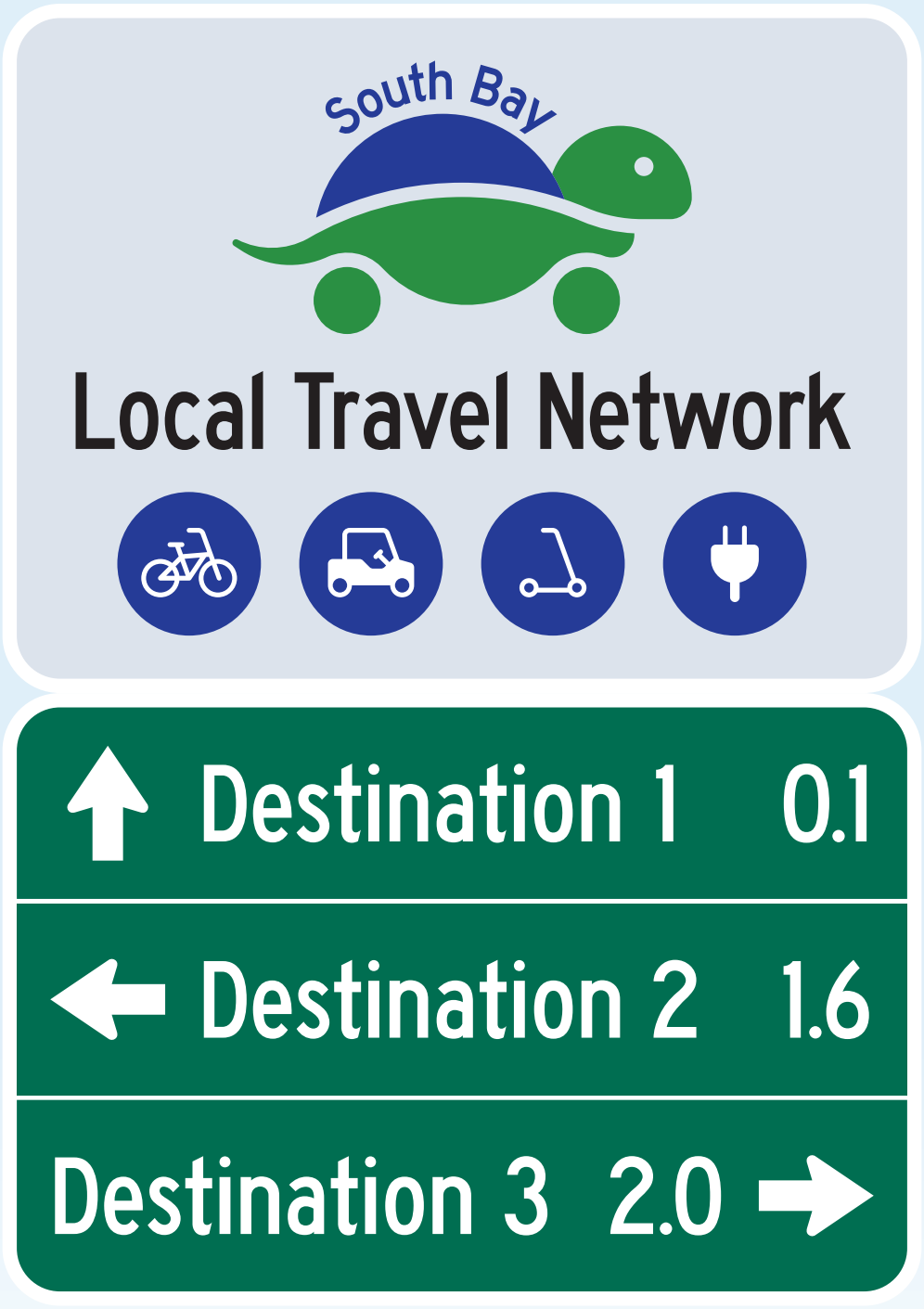


Figure 13. Sign Mounting

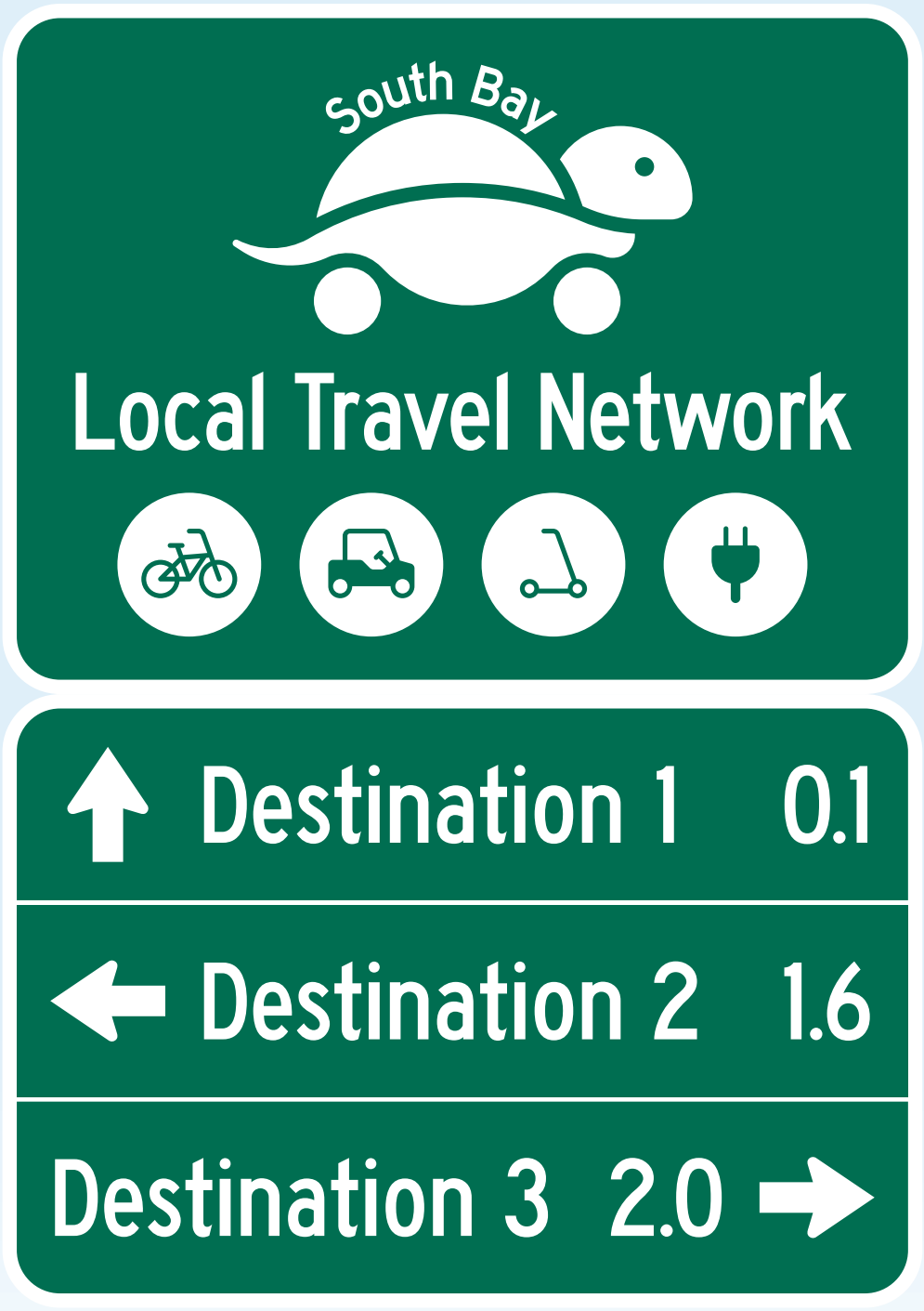
Mounting Height

The CA MUTCD provides helpful guidance for sign mounting, height, and ground clearance. It should be followed when crews install signs. Always maintain a minimum 7 foot clearance between the ground and the bottom-most sign element, either the bottom edge of the sign or the bottom edge of a supplemental item (see Figure 6). Signs may be mounted higher for enhanced visibility or to deter graffiti; however, avoid mounting signs too high, generally above 12 feet from the ground, as LTN users' field of view is much lower and closer than typical drivers.

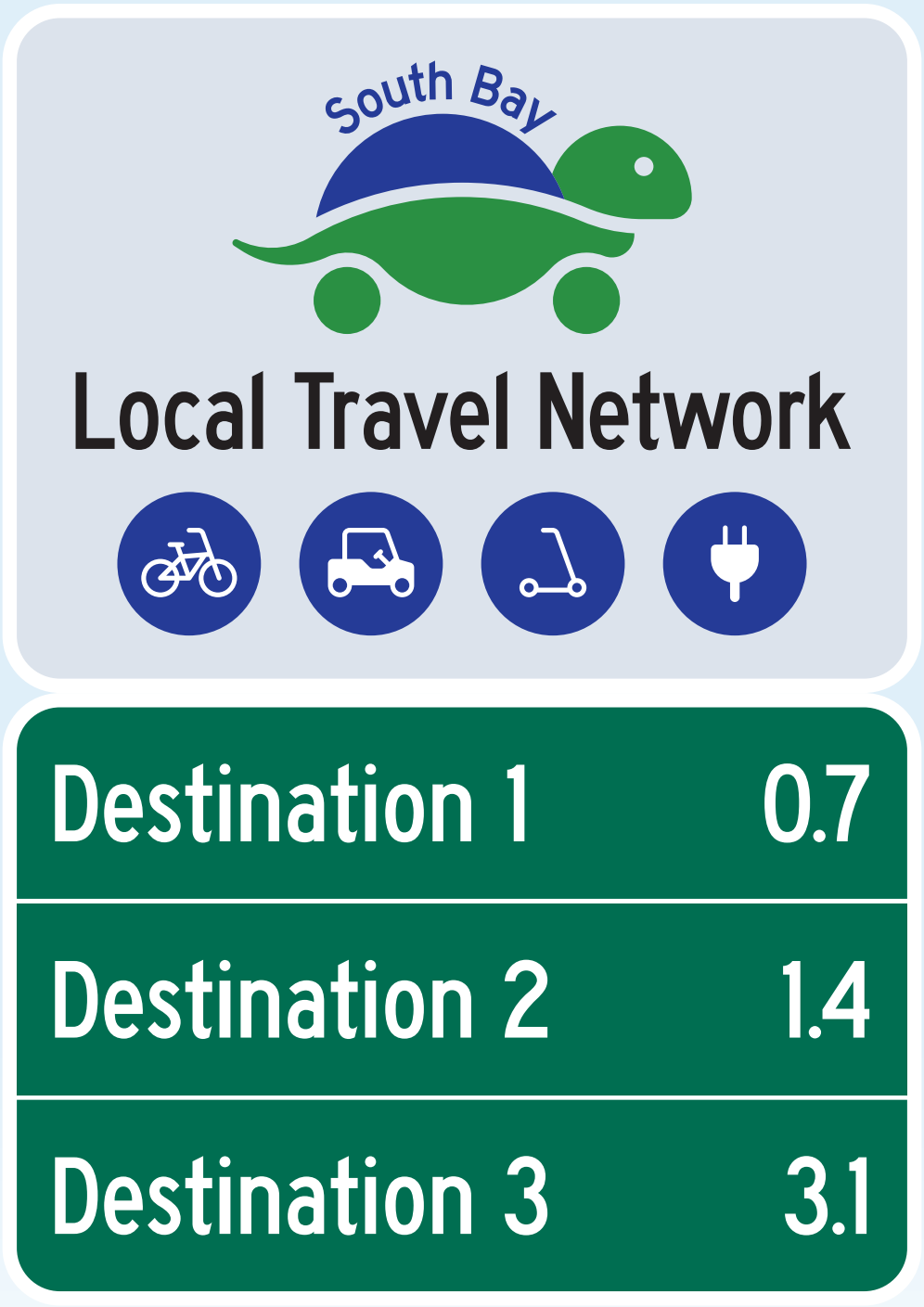
See CA MUTCD Part 2, Sections 2A.18, 2A.19 and 2A.20 for additional detail, including guidance for mounting height and clearance in cases where using supplemental information signs.



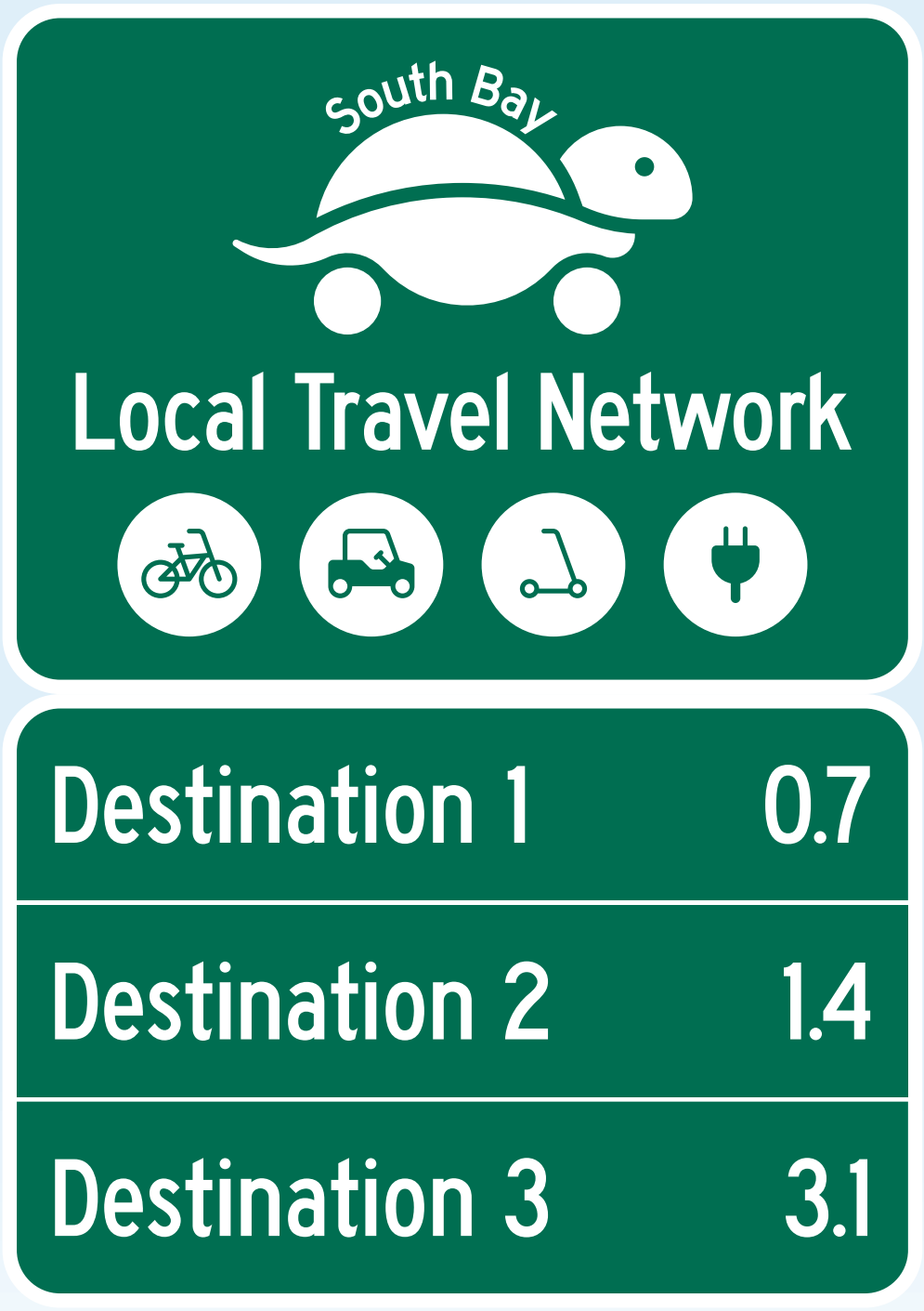
LTN Wayfinding Identification Sign
Rolling Turtle: Primary Design
with Decision Sign



LTN Wayfinding Identification Sign
Rolling Turtle: Alternate Design with Decision Sign



LTN Wayfinding Identification Sign
Rolling Turtle: Primary Design
with Confirmation Sign



LTN Wayfinding Identification Sign
Rolling Turtle: Alternate Design
with Confirmation Sign

LTN Wayfinding Identification Sign
Rolling Turtle: Primary Design
with Turn Sign

LTN Wayfinding Identification Sign
Rolling Turtle: Alternate Design with Turn Sign

Costs & Implementation Considerations

Costs

Estimated unit costs for LTN wayfinding signs and markings are included in Table 3. Jurisdictions are advised to adjust cost estimate assumptions based on local experience. A cost estimation calculator is included as an appendix to this playbook.

Considerations that may impact costs include:

- Streets with existing Class III or Class II facilities may not need new markings
- For streets with existing markings or striping that require changes, repaving vs. grinding and restriping
- Type of striping (waterborne paint vs. thermoplastic)
- Type of sign post to be used
- Adjustment to assumed number of signs per sign type or per mile
- If additional signage is required (e.g. bike lane signs) or desired
- Integration with existing wayfinding systems (fewer signs may be needed)
- Assumed share of Class III and Class II facilities within the jurisdiction
- Cost assumptions related to traffic control, mobilization and contingency
- Lower cost signage options using high-quality temporary materials, such as those used in the El Segundo pilot project, are available through local sign vendors
- Jurisdictions may save on signage costs by installing signs on existing sign poles, where space is available and MUTCD guidance can be met, or installing branded signs alone for route confirmation, without wayfinding signage

Challenges to Implementation

Jurisdictions may find challenges to implementation of the LTN, which are listed here, along with potential solutions. SBCCOG and member jurisdictions can also provide support and collaboration.

- Existing signage might present a challenge to finding suitable places for LTN signs: Jurisdictions may be able to install LTN signage on existing wayfinding systems or other sign poles, combine LTN signage and bike lane or route signage together on one post, use the LTN branded sign alone, or use fewer signs where appropriate.
- For new Class II bike lanes, especially those where a buffer is desired, roadway width constraints may be encountered: Consider narrowing travel lanes if wider than 10' to allow for additional bike lane width, or implement other traffic calming elements to help reduce vehicle volumes and/or speeds, allowing for a suitable Class III facility as an alternative.
- Poor existing pavement condition could result in short lived pavement markings/striping: Plan for LTN installation as part of existing repaving program.
- Full LTN cannot be completed all at once due to cost or other constraints: Choose shorter contiguous segments of the LTN for near-term implementation, prioritizing popular destinations, equity priority areas, and corridors with existing bicycle facilities or traffic calming elements. Consider reduced number of signs per mile. In areas with LTN corridor density, Confirmation Signs may be eliminated, while still maintaining Decision Signs at a regular interval.

Measure M Applications

SBCCOG will support local jurisdictions in developing their subregional funds Measure M applications to secure funding for LTN implementation, including project description, preliminary cost estimates, and LTN map. In addition to cost estimates, there are several application components that will need to be developed by the jurisdiction:

- Budget for staff time to refine sign and marking locations, and manage the project
- Project schedule
- Project description summaries and cost estimates for any additional LTN design elements (e.g. additional signs, traffic calming, parking and charging infrastructure)

Table 3. Unit Cost Estimates

Item	Unit Type	Unit Cost
Wayfinding Signs		
Two-panel LTN sign (all three sign types), includes post	ea	$1,000
Class III Bicycle Facility		
Green-backed sharrow pavement marking (thermoplastic)	ea	$500
Class II Bicycle Facility		
R81(CA) sign - Bike Lane (required for Class II only)	ea	$300
Class II Bike Lane pavement marking (thermoplastic)	ea	$450

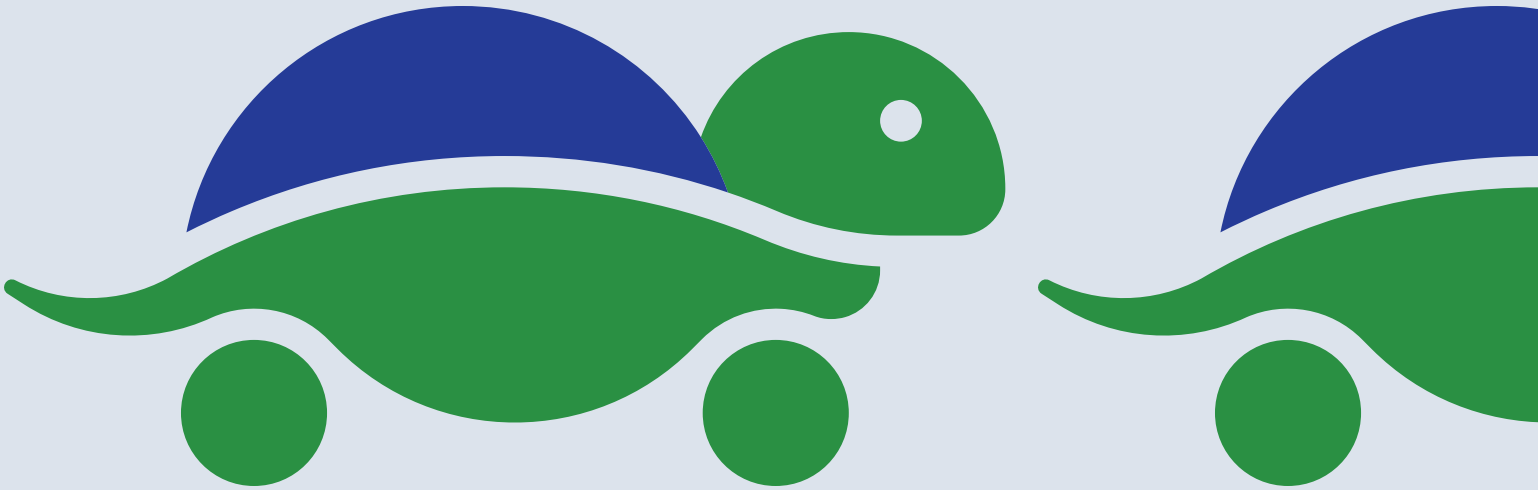
Notes:

Potential costs currently not included in estimate, which can be accounted for in contingency: existing pavement marking removal, signal detection, additional optional sign types (e.g. D11-1).

Individual unit costs are to furnish and install each item, and reflect an approximate cost when part of a larger project.

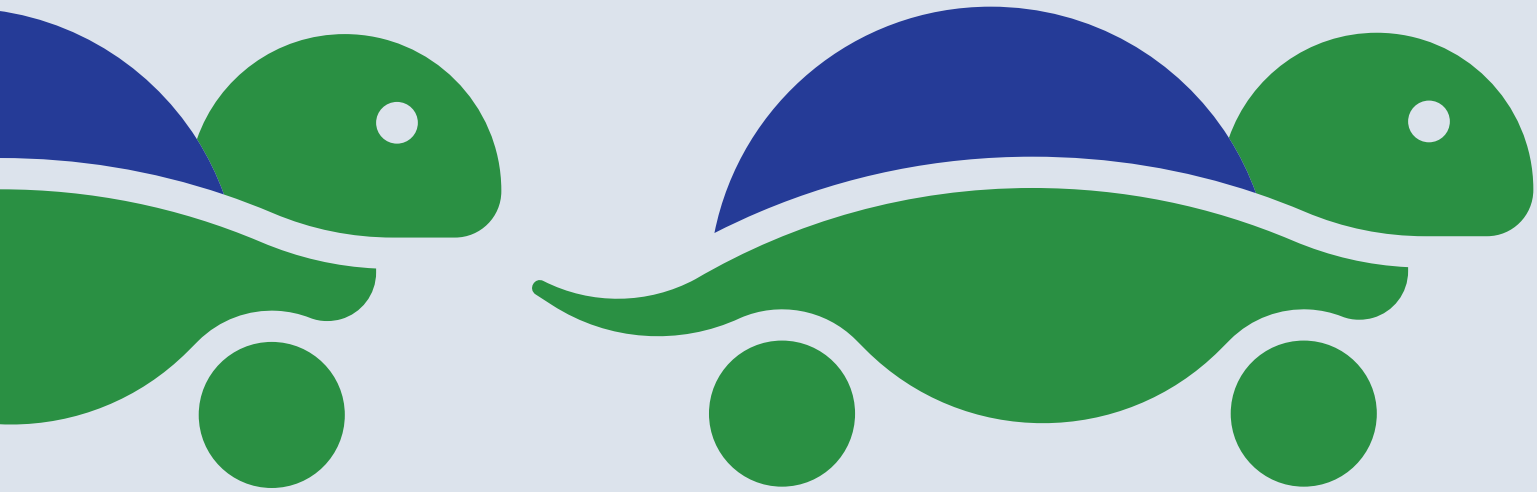
Mobilization typically includes the cost for a contractor to assemble the items needed to do the work (i.e. signs, posts, anchors/bolts, etc.), and mobilize their crew, and any necessary equipment to get to the job site.

Custom signs are two panels (LTN logo + wayfinding sign), for a combined size of 24" x 36". LTN logo panel sign alone is 24" x 18". For planning-level estimates, no difference in sign cost is assumed.



SECTION 5

Safer Streets & Crossings



Strategies for Achieving Safer, Calmer Streets & Crossings

Key Elements of an LTN Safety Strategy

Safety is a critical consideration when implementing a low-speed network built for micromobility uses as people traveling on micromobility devices are more vulnerable to severe injury than people in vehicles. Developing a safety strategy ahead of implementation can encourage greater use of the LTN by helping more people feel safe and comfortable on these shared streets. The Safe System Approach, which both U.S. DOT and Caltrans have adopted as their guiding paradigm, should be at the foundation of the safety strategy. This framework emphasizes designing a system with redundancies that focuses both on preventing crashes from happening and minimizing harm in the event a collision occurs. The safety strategy should acknowledge that micromobility users are more vulnerable than people traveling in vehicles, and as a result, focus on:

- Lowering vehicle speeds
- Limiting the transfer of kinetic energy when crashes do occur through lower speeds and less severe crash angles
- Separating micromobility users from vehicles in both time (signal phasing) and space (separate facilities)
- Limiting the number of conflict points between micromobility users and vehicles

An effective safety strategy will seek to achieve these goals through multiple components, such as roadway design, speed management, enforcement, and education. Implementation of the LTN provides an important opportunity for setting norms for micromobility use in the South Bay, as well as for collaboration on safety and traffic calming topics among South Bay jurisdictions and partner agencies, schools, and other organizations.

Roadway Design

Roadway design features can help to provide a safer and more comfortable experience for LTN users by encouraging lower vehicle speeds, reducing vehicle volumes, increasing the visibility of more vulnerable users, and reducing conflicts with vehicles. Bicycle Boulevards and similar low-speed networks in Portland, Seattle, and Boston all incorporate roadway design features in addition to signage and markings. Cities and SBCCOG can leverage a variety of traffic calming techniques to reduce vehicle speeds on the LTN. In Seattle, all Neighborhood Greenways have speed humps and side-street stop control. Additional speed reduction mechanisms include planting street trees, installing medians, which create a pinchpoint for traffic in the center of the roadway, and introducing chicanes, which slow drivers by creating a horizontal diversion of traffic (i.e., alternate parking along a corridor if there is only space for one side of parking). See additional details in Table 5.

Figure 14. Safe System Wheel, FHWA

Posted Speeds

A goal of the LTN is to create a network of streets that people view as shared space for all modes. Vehicle speeds play an important role in the perceived and actual safety and comfort of people riding, walking, and rolling on the LTN. Lower posted speeds can complement roadway design features to ensure the LTN functions as a low-speed network of streets. In California, the most widely accepted method of determining the posted speed limit is the "85th percentile" standard, which uses the speed at or below which 85 percent of the traffic is moving. However, local jurisdictions have more flexibility to set lower speeds since California Assembly Bill 43 (AB 43) passed in 2021. AB 43 features components that cities can use to lower speeds on the LTN, including:

- Speed Limit Reduction - reduction of 5 mph in certain cases, including designation of local "Safety Corridors"
- Business Activity Districts - option for 20 or 25 mph

By giving local jurisdictions flexibility to set lower speeds, AB 43 enables local jurisdictions to expand the network of streets eligible for shared lane markings and reduce speeds on streets with shared lane markings through lower posted speeds. Shared lane markings are recommended on streets with a maximum speed limit of 35 mph (25 mph recommended). Micromobility devices typically do not reach speeds above 25 mph: NEVs can reach speeds of up to 25 mph, most e-bikes can reach speeds of up to 20, and e-scooters can reach speeds up to 15 mph. So, a posted speed of 25 mph or lower on streets with shared lane markings would be more in line with the maximum speed attainable on micromobility devices. As a point of comparison, in Seattle, all Neighborhood Greenways have a posted speed of 20 mph. When lowering posted speeds, always consider complementary roadway design changes.

Cities have new flexibility to lower posted speeds

Legislative language from AB 43 is now part of the CA MUTCD, giving cities the flexibility to lower posted speeds on LTN streets that meet safety or other criteria.

Enforcement

Enforcement activities can encourage drivers to comply with posted speeds and traffic laws, consequently improving safety and comfort on the LTN for people who are traveling using non-vehicle modes. According to the National Highway Traffic Safety Administration (NHTSA), traffic enforcement is most effective when it is highly visible and publicized, as the goal is to deter unsafe driving behaviors and create the expectation that failure to comply may result in legal consequences. NHTSA also recommends law enforcement officers complete training on pedestrian, bicycle, and micromobility laws to raise awareness around driver yielding laws. Enforcement activities may take the form of automated red-light cameras or officers on roads and could be a useful strategy for addressing hotspots of unsafe driver behavior along the LTN. A state law passed in October 2023 allows six cities—Los Angeles, Long Beach, Glendale, San Jose, Oakland, and San Francisco—to install automated speed cameras as a pilot project. Though speed cameras cannot currently be used in most of California, this recent legislation suggests speed cameras could be an option for South Bay cities in the future.

Collision data can inform where enforcement activities should be targeted by identifying intersections with high rates of collisions due to road violations and vehicles traveling at unsafe speeds. Jurisdictions may want to focus resources on collecting accurate collision data for micromobility devices to help inform future enforcement and other strategies.

Enforcement activities require ongoing resources, are reactive, and can have equity implications. When developing an approach to traffic safety enforcement on the LTN, consider where education may be more impactful. A share of micromobility riders will be young and new to traveling in the roadway—providing opportunities to learn about the rules of the road and the benefits of wearing a helmet may be more effective than issuing citations. Newer micromobility users may be good candidates for diversion education programs, in lieu of fines. Diversion programs for non-motor vehicle citations are allowed in California under AB 902, signed in 2015, and have been used successfully in communities such as Marin County.

Strategies for Achieving Safer, Calmer Streets & Crossings

Education

Safety education for drivers and micromobility users is a proactive strategy for helping people on all modes feel safe and comfortable on the LTN. City or SBCCOG-led public messaging campaigns about the LTN can incorporate reminders about how to safely share the roadway with other modes and educate motorists on best practices for driving in the presence of pedestrians, bicyclists, and people on micromobility devices. Other strategies to consider include micromobility-oriented safety classes, especially those geared towards new riders, "rodeos," and community informational sessions.

Case Study: E-Bike Safety Classes

Safety education presents an opportunity for cities and SBCCOG to partner with local non-profits and the private sector. In Manhattan Beach, the Manhattan Beach Police Department partnered with the nonprofit Bike LA to host an e-bike safety class. Employers and manufacturers of slow mode vehicles and technology could be engaged to promote safety best practices on their internal and external communication channels.

Existing Roadway Safety Policies & Guidance

Cities should follow state guidance when establishing local safety policies and guidance related to the operation of micromobility devices. The California Vehicle Code's (CVC) "Division 11. Rules of the Road" includes rules specific to the operation of motorized scooters, electrically motorized boards, and low-speed vehicles (NEVs). Bicycles, e-bikes, and motorized bicycles are grouped together in the CVC and subject to the same rules with a few exceptions. Many of the rules that apply to the operation of bicycles apply to the operation of motor scooters: operators under the age of 18 must wear a helmet, any person operating a motorized scooter upon a highway has all the rights and is subject to all the provisions applicable to the driver of a vehicle. Similarly, many of the rules that apply to motor vehicles apply to the operation of low-speed vehicles: a low-speed vehicle is subject to all the provisions applicable to a motor vehicle, and the driver of a low-speed vehicle is subject to all the provisions applicable to the driver of a motor vehicle or other vehicle. Table 4 summarizes the CVC rules related to the operation of micromobility devices.

The CVC grants local jurisdictions the authority to regulate the operation of e-bikes, e-scooters, and NEVs on local streets, pedestrian facilities, and bicycle facilities if the regulation does not conflict with the state code. City-level policies specifying whether bicyclists are permitted to travel on sidewalks exist today and vary from city to city. Local coordination on micromobility safety policies can help the region move towards having consistent policies and guidelines across the LTN. More information about enforcement related to NEVs can be found in Appendix A.

Table 4. California Vehicle Code Rules of the Road for Micromobility

	Roadway and Device Speeds	Other Regulations for Operation	Permitted Roadway Types for Operating Vehicle/Device	Local Authority
E-bikes class 1-3	• Class 1 and 2 have a top speed of 20 mph. • Class 3 have a top speed of 28 mph.	• No age restrictions on Class 1 and 2 e-bikes. • Riders must be at least 16 to operate a Class 3 e-bike, and all Class 3 riders must wear helmets. • All riders under 18 must wear a helmet on any type of bike.	• Class I Bike Path • Bicycle lanes (Class II and IV) • Any roadway	• Local jurisdictions can regulate operation on pedestrian and bicycle facilities if regulation does not conflict with state code, including on equestrian, hiking and recreational trails.
Motorized scooter	• Can operate on roads with a speed limit up to 25 mph. • Device speed shall not exceed 15 mph.	• Operator must have a valid driver's license. • All riders under 18 must wear a helmet.	• Class I Bike Path • Bicycle lanes (Class II and IV) • Roadways with posted speed 25 mph or lower (25+ mph with no bike facility okay, where allowed locally) • Not permitted to travel on sidewalks	• Local jurisdictions can regulate operation on pedestrian and bicycle facilities and local streets if regulation does not conflict with state code. • Local jurisdictions have authority to allow on roads with a speed limit up to 35 mph.
Electrically motorized board	• Can operate on roads with a speed limit up to 35 mph. • Device speed shall not exceed 15 mph.	• Riders must be at least 16. • All riders must wear a helmet.	• Class I Bike Path • Bicycle lanes (Class II and IV) • Roadways with a speed limit of 35 mph or lower (35+ okay in Class II or Class IV bike lane)	• N/A
Low-speed vehicles (NEVs)	• Can operate on roads with a speed limit up to 35 mph. • May be permitted to travel on roads with higher posted speeds if an NEV transportation plan has been adopted. • Device speed shall not exceed 25 mph.	• Subject to all vehicle code provisions applicable to a motor vehicle and driver of a motor vehicle.	• Any roadway with a speed limit of 35 mph or lower • On-street NEV lanes, where NEV transportation plan has been adopted and approved signs are used	• Local jurisdictions may prohibit the operation of a low-speed vehicle on any roadway under their jurisdiction if it deems the prohibition is in the best interest of public safety.

Roadway Design & Traffic Calming Strategies

Although the LTN design provides for safe crossings at controlled intersections, crossings at major arterials can still present an implementation challenge. Recommended crossing treatments, as well as other traffic calming elements are summarized below. Roadway design features can help to provide a safer and more comfortable experience for LTN users. They also help reinforce the LTN goals through encouraging lower vehicle speeds, reduced vehicle volumes, increased visibility, and reduced conflicts with vehicles. Case studies for similar low-speed networks were summarized for the cities of Portland, Seattle, and Boston - all of which incorporate roadway design features in addition to signage and markings. Case studies and photos can be found in the **Appendix B** of this playbook.

Table 5. Roadway Design and Traffic Calming Strategies

Strategy	Recommended Context	Considerations	Best Practice Resources
Goal: Reduce Vehicle Speeds			
Bulbouts/ Curb Extensions	Major crossings and arterials/ Minor crossings and local streets	> Quick build/low cost option > Works best in locations with on-street parking	NACTO Curb Extensions
Raised Intersection	Major crossings and arterials	> May be better option for emergency vehicles than speed humps > Relatively high cost of installation	NACTO Raised Intersections Chicago Metropolitan Agency for Planning
Signal Timing and Coordination	Major crossings and arterials	> Quick build/low cost > Shorter cycles, longer pedestrian crossing times, and coordination timed to slower modes can support micromobility	FHWA BikeSafe Virginia DOT
Speed Feedback Signs	Major crossings and arterials	> Can use mobile speed trailer or permanently install below a posted speed limit sign	NHTSA Traffic Tech ITE Unsignalized Intersection Improvement Guide
Traffic Circle	Minor crossings and local streets	> Quick build/low cost option > Mitigate turning issues for larger vehicles through use of aprons/mountable curbs	NACTO Mini Roundabout Chicago Metropolitan Agency for Planning
Speed Humps, Cushions, Tables	Minor crossings and local streets	> Quick build/low cost option > Speed cushions have wheel cut outs to allow bicyclists and emergency vehicles to pass	NACTO Speed Cushion NACTO Speed Table NACTO Speed Hump
Chicanes	Minor crossings and local streets	> Quick build/low cost option	NACTO Chicane
Median Islands	Major crossings and arterials/ Minor crossings and local streets	> Can provide two-stage crossing opportunities	FHWA Proven Countermeasure
Roadway Re-configuration	Arterials	> Can convert 4-lane roads along the LTN to 2 lanes to provide separate space for bikes and NEVs	FHWA Proven Countermeasure
Lane Narrowing	Arterials	> Where lanes are over 10 feet, narrower lanes can encourage	Johns Hopkins University Study on Lane Widths
Separate Micromobility Facilities	Arterials	> Cities with NEV plans can use approved Caltrans NEV/bike lane signage	FHWA Separated Bike Lane Design Guide

Strategy	Recommended Context	Considerations	Best Practice Resources
Goal: Increase Visibility			
Lighting	Major crossings and arterials/ Minor crossings and local streets	> Consider additional lighting at crossing locations > Upgrade to LED lighting	FHWA Proven Countermeasure
Leading Pedestrian Intervals	Major crossings and arterials	> Quick build/low cost > Allow micromobility to use ped signal at LPI locations	FHWA Proven Countermeasure
Signalized Intersection or Pedestrian Hybrid Beacon	Major crossings and arterials	> LTN routes selected for controlled crossings; new signals or PHBs will be rare	FHWA Proven Countermeasure
Intersection Crossing Markings (cross-bike)	Major crossings and arterials	> Quick build/low cost > Provide designated space for micromobility at crosswalks	NACTO Intersection Crossing NACTO Protected Intersections
Raised Crossing	Major crossings and arterials/ Minor crossings and local streets	> Consider drainage impacts > Pedestrian access and reduced vehicle speed benefits	FHWA Raised Crosswalk
Bike Box for Advance Stop Staging	Major crossings and arterials	> Quick build/low cost > Provides priority for micromobility at signals	NACTO Bike Boxes
Daylighting / Clear corners (red curb)	Minor crossings and local streets	> Quick build/low cost > US cities have seen high safety efficacy	Boston Clear Corners Daylighting CA Law, 2023
Additional Signage	Minor crossings and local streets	> Consider gateway or additional posted speeds (incl. advisory speed signs)	San Francisco Slow Streets Toolkit Oakland Slow Streets Toolkit
Goal: Reduce Conflicts with Turning Vehicles			
Bike/NEV facility Placed to Left of Right-Turn Lane	Major crossings and arterials	> Where possible, keep bike/ NEV facility separate on the intersection approach	NACTO Through Bike Lanes
Mixing/ Conflict Zone Markings	Major crossings and arterials	> Use on intersection approach where micromobility and vehicle conflicts may occur	NACTO Combined Bike Lane Turn Lane
Separate Signal Phases	Major crossings and arterials	> Consider protected left turn phases or separate bicycle signal phases	NACTO Signal Phasing Strategy
Restrict Right Turns on Red	Major crossings and arterials	> Consider signage options, including blank-out signs	ITE No Right Turn on Red
Goal: User Detection			
Mode-Specific Detection (e.g. bike)	Major crossings and arterials	> Video or other technology options > Include confirmation light	ITE Signal Detection for Bicycles
Goal: Reduce Vehicle Volumes			
Diverters or Full/ Partial Closures	Major crossings and arterials/ Minor crossings and local streets	> Can provide access for micromobility while limiting access for standard vehicles > Must be mindful to impacts on nearby streets	NACTO Volume Management

South Bay Roadway Safety Trends

Collision data from 2017 to 2021 for the SBCCOG region was used to understand traffic safety trends in the South Bay. The data comes from the Berkeley Safe Transportation Research and Education Center's Transportation Injury Mapping System (TIMS), which only includes collisions that resulted in an injury or fatality. Collisions resulting in property damage only are not included in this analysis.

This study analyzed all injury collisions, separated by mode (i.e. collisions involving pedestrians, collisions involving bicycles, and collisions involving all other vehicle types). A subset of the collisions involving micromobility vehicle modes was also analyzed. For the purposes of this analysis, micromobility is defined as motorized, low speed vehicle modes identified in collision records such as motorized bicycles, ATVs, and golf carts; this definition does not include regular bicycles.

South Bay cities should continue to monitor these trends as part of their evaluation efforts after installation of the LTN. Additional details are included in Appendix C.

The number of severe and fatal collisions in the South Bay has increased since 2017, even as injury collisions on the whole have declined.

Over 80% of collisions in the South Bay occur at intersections.

The number of injury collisions decreased during the pandemic years in the South Bay by nearly 1,000 collisions, however more collisions resulted in a severe injury or fatality. Figure 15 illustrates the growth in collisions that resulted in a severe injury or fatality (KSI collisions) by mode. Nearly a third of KSI collisions involved a pedestrian.

The majority of injury collisions (84%) and KSI collisions (81%) occurred at an intersection, shown in Figure 16. The same trend holds true when examining just micromobility collisions.

Figure 17 shows that while the highest share of collisions occurred on roadways with 4-5 lanes, roadways with 3 lanes or less accounted for only a slightly smaller share of collisions. For micromobility collisions, roadways with 3 lanes or less accounted for the largest share of collision locations, underscoring the importance of applying safety strategies proactively to the LTN.

Figure 18 shows that vehicle drivers are most often proceeding straight when they hit a person walking or biking. But turning movements do factor into a number of collisions, including drivers making right turns in over 20% of bicycle collisions and drivers making left turns in over 20% of pedestrian collisions.

Figure 15. Fatal and Severe Collisions by Mode, 2017-2021

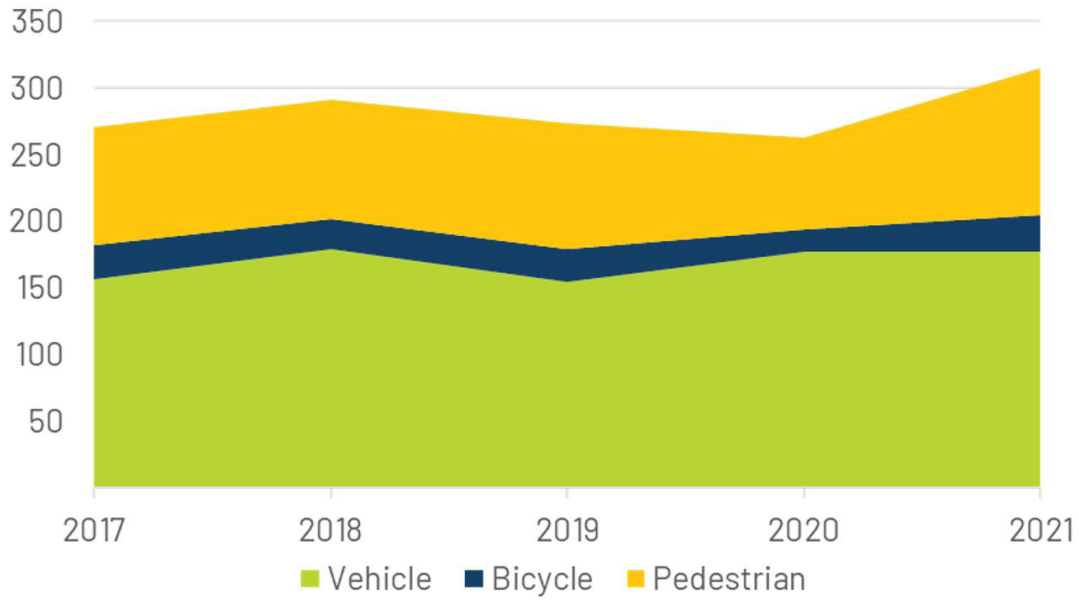


Figure 16. Collision Location, 2017-2021

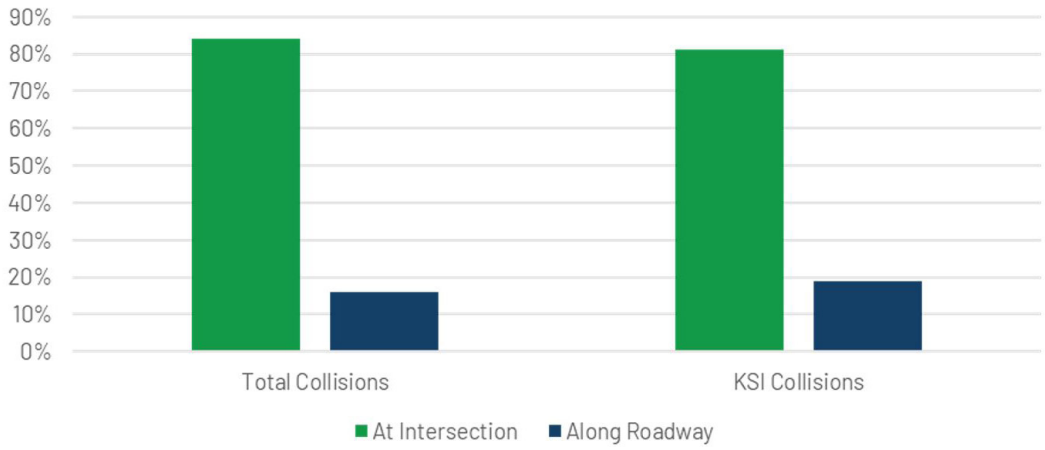


Figure 17. Roadway Number of Lanes, 2017-2021

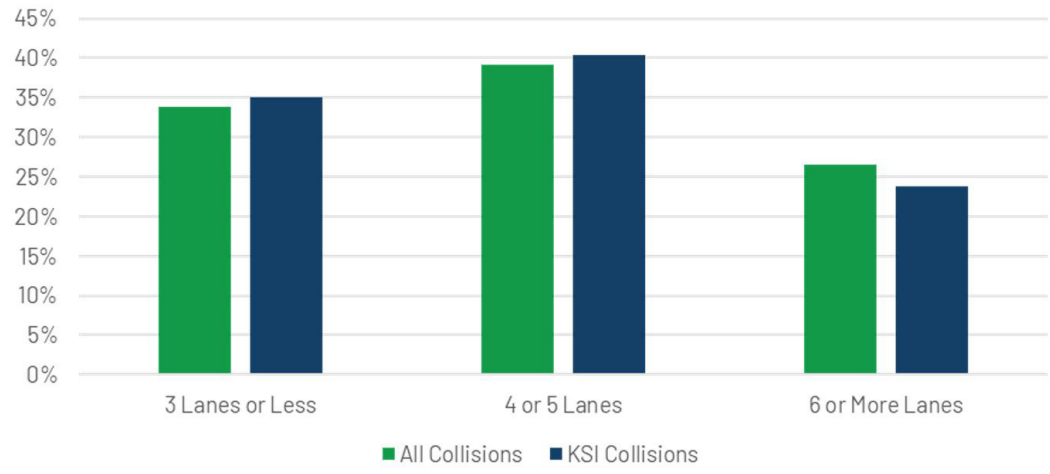
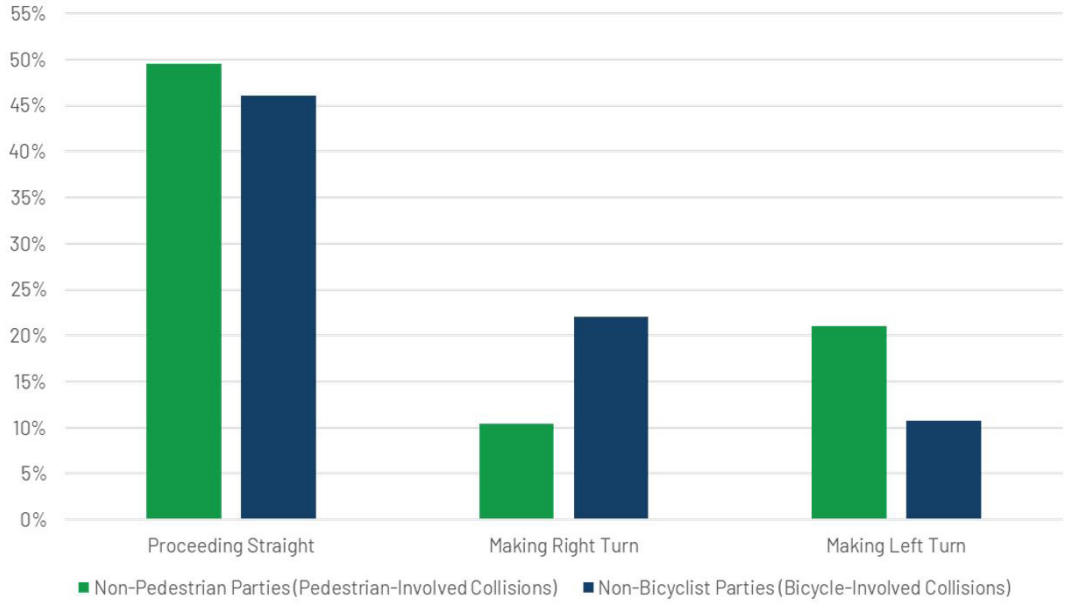
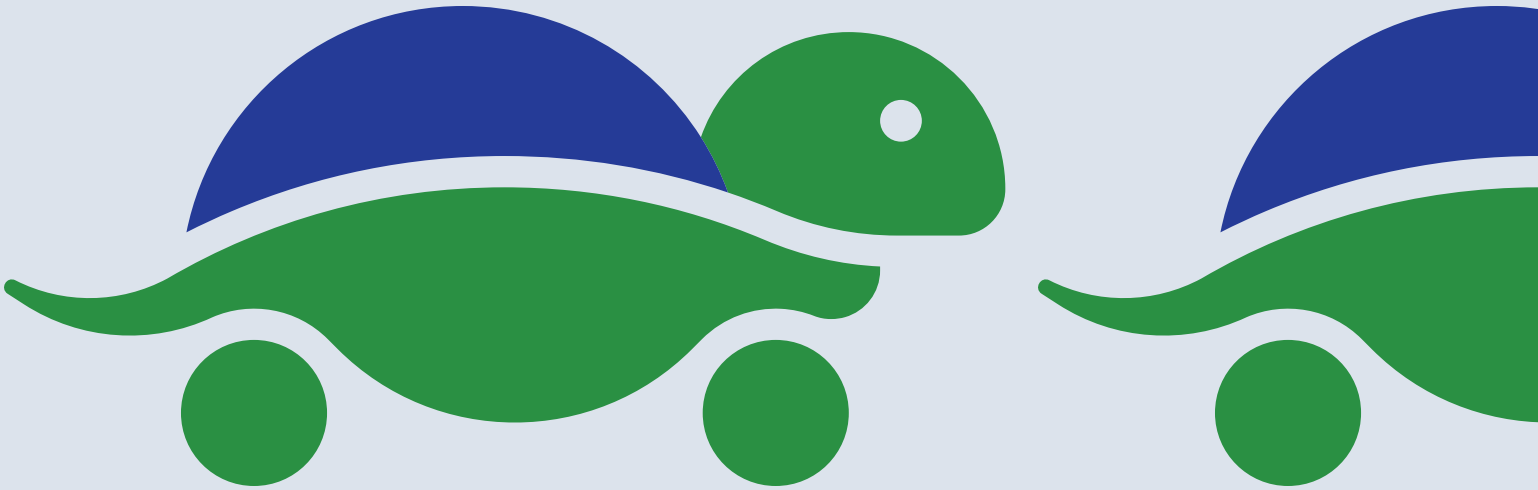


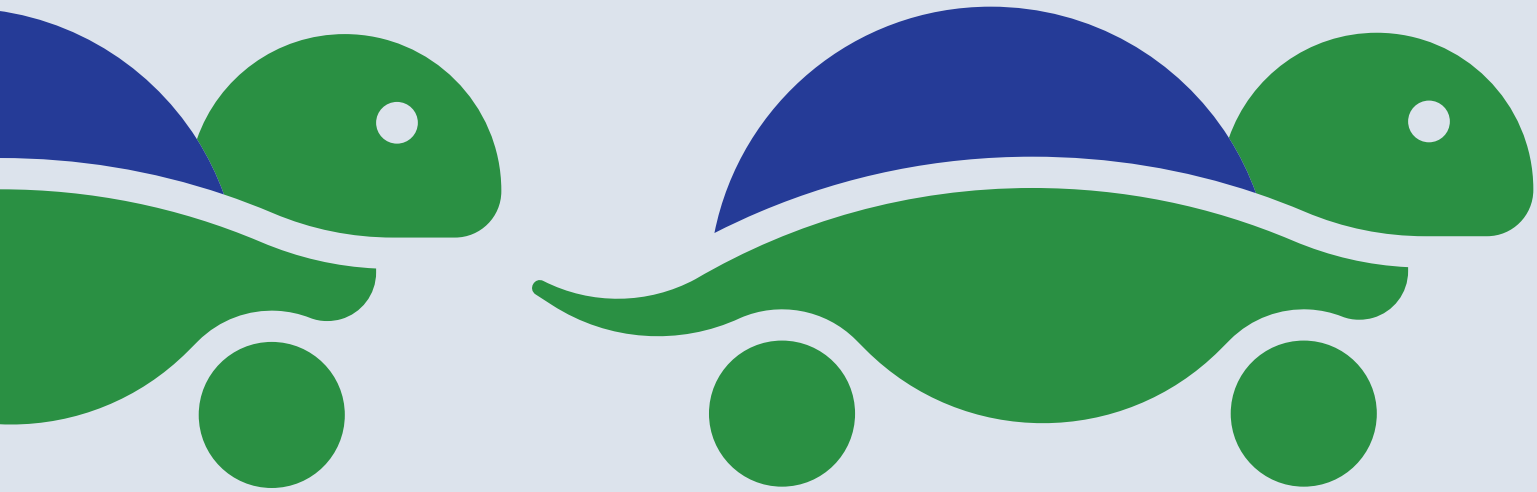
Figure 18. Driver Turning Movement Prior to Collision, 2017-2021





SECTION 6

Parking & Supportive Amenities



Key Factors for Parking & Supportive Amenities

In recent years, demand for micromobility devices and neighborhood electric vehicles (NEVs) has dramatically increased. A rapidly evolving industry has emerged that is dedicated to providing support infrastructure for these vehicles. This section of the playbook summarizes parking and charging options available for e-bikes, e-scooters, NEVs, and other micromobility devices. Providing these types of amenities for slower-speed micromobility devices will be key in encouraging zero emission modes of transportation.

1

Universality

What types of devices can be parked and/or charged?

2

Security

How are devices locked, if at all?

3

Modularity

Can spaces be expanded or reduced depending on need?

4

Technology

Can a smartphone or smartcard be used to access device or real-time availability (e.g. for public chargers)?

5

Sustainability

Can stations use clean energy for charging?

6

Suitability

Where are charging stations best-suited (e.g. on-street vs. private parking lot)?

7

Deployment

How widely have solutions been adopted, and what is their availability for purchase?

Charging Overview

Charging Classifications

Level 1

Level 1 charging is the level required for NEVs and other electric devices using the LTN. Level 1 charging refers to the use of a standard household outlet, typically 110v-120v. Level 1 charging equipment is standard on vehicles and therefore does not require the installation of specialized equipment. On one end of the provided cord is a standard, three-prong plug. On the other end is a connector, which plugs into the vehicle. The most common place for Level 1 charging is at the vehicle owner's home and is typically conducted overnight (between 6 and 12 hours for full charge), but public outlets may be provided (including in locations like retrofitted light poles).

Level 2

Level 2 charging used for EVs, typically 208-v240v, can be adapted for use with NEVs. In some cases, Level 2 chargers are also equipped with 110v outlets or adapters. Level 2 chargers are commonly found in residential settings, public parking areas, places of employment, and commercial settings. Level 2 charging systems often require changes to building wiring and electric services. Cities siting Level 2 chargers should consider providing co-located Level 1 charging.

Level 3

Level 3 chargers are not compatible with e-bikes, e-scooters and NEVs.

Charger Funding Options

Subsidized

Land owners pay for the full cost of installation, maintenance, and providing electricity for users. There are several grant opportunities available to help with providing a public service:

- CARB Low Carbon Fuel Standards (LCFS) program
- California Electric Vehicle Infrastructure Project (CALeVIP)
- Mobile Source Air Pollution Reduction Review Committee (MSRC)

P3

Under a public-private partnership (P3), EV charging companies pay for the full cost of installation and maintenance. Users pay either a one-time fee or a membership fee to charge their personal devices.

Hybrid

Land owners pay for a portion of installation or maintenance. Users pay either a one-time fee or a membership fee charge their personal devices to the EV charging company to pay for electricity and/or cost of building EV charging infrastructure.

Case Study: Funding the West Coast Electric Highway (WCEH)

WCEH is a public-private partnership, funded by a combination of federal and state funds, that provides a network of EV Charging Solutions (EVCS)-managed chargers along the West Coast. In 2022, Oregon funded upgrades to its 44 chargers that allow the devices to serve a wider range of vehicles, including e-bikes. Adding 110v outlets so that e-bikes could use them did not incur any further costs to the project. In total, ODOT funded $4 million of the project and EVCS is contributing a greater than 20% match share of the funding required. EV users pay a fee to charge, while micromobility device/e-bike users can charge for free.

NEV Parking & Charging

NEV Parking

Cities may want to consider providing preferential parking to NEV drivers in public parking facilities, including on-street or in public lots such as at city buildings or parks (NEV and EV parking in private facilities such as shopping centers and residential developments can be addressed through the zoning code). In some cases, jurisdictions have prohibited NEVs from parking, which has resulted in confusion (as NEVs largely resemble standard vehicles to the public).

NEV size varies and can range from approximately 45 to 55.5 inches wide and 95 to 135 inches long (a small golf cart-type versus GEM electric vehicle), with some shuttle and truck models even longer. As a result, NEV parking space sizes may also vary. To accommodate NEVs of all sizes would require parking spaces approximately 15' long and 7' wide, in comparison to 18-20' long and 8.5-9' wide standard vehicle on-street spaces (off-street standard vehicle spaces may be shorter - approximately 15'-18'). Many NEV models do not include doors, also allowing for narrower spaces.

For smaller NEV models (e.g. GEM e2), two NEVs could be parked for every one standard on-street space, depending on parking configuration. Cities may choose to adapt standard or compact vehicle spaces to take advantage of the smaller size of NEVs and provide additional parking, both on-street and in private lots and garages.

NEV size is variable, and flexible parking layout options can be considered to accommodate the range of NEV types and sizes. This flexibility can be maximized in off-street parking lot layouts. Figure 22 shows one option where individual NEV spaces are not striped and tandem parking for small NEVs is allowed. NEV parking could also fit into otherwise unused spaces, such as behind pillars and next to elevators.

NEV parking space components may include:

- NEV parking signage and/or NEV parking space markings (signage may indicate if charging is available)
- Parking or charging payment collection system (see facing page for incentive options)
- Charger or available electrical outlet
- Solar panel to power charger (could also act as shade structure)

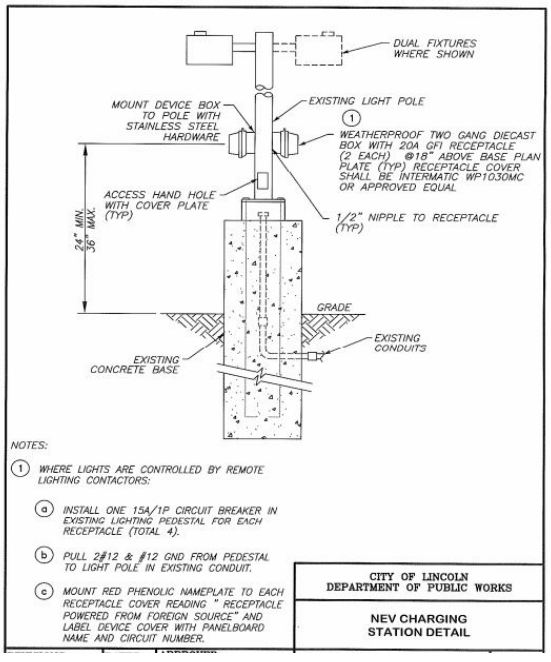
NEV Charging

Level 1 charging is the level required for NEVs, which are equipped with chargers suited for standard electric vehicles, for easy charging at home. NEVs are largely owned by individuals or as part of a working fleet. Most NEVs take between 6-8 hours to fully charge. NEVs typically have the charger onboard. In NEV communities, such as Lincoln, CA, some free public charging is available through metered outlets on light poles or similar structures (see plans in Figure 19 below).

Figure 19. NEV parking sign, marking, and charging options

Source: https://dot.ca.gov/programs/safety-programs/nev

City of El Segundo LTN Pilot Project



Source: Lincoln, CA NEV and Golf Cart Master Plan Update

Figure 20.
On-Street NEV Parking Layout

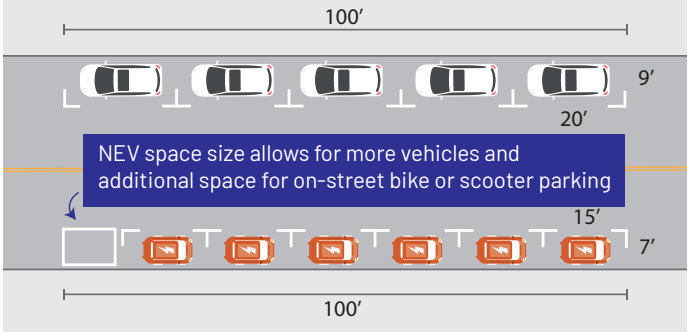


Figure 21.
NEV Parking in Unused Spaces

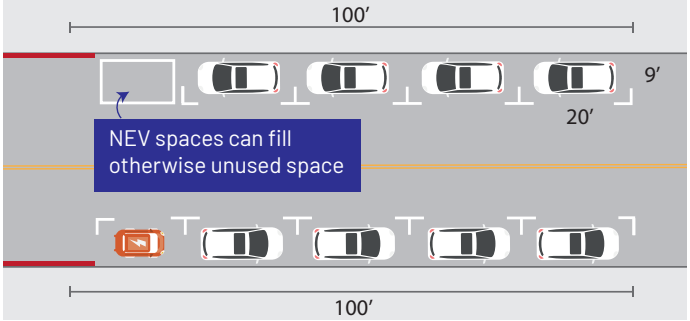
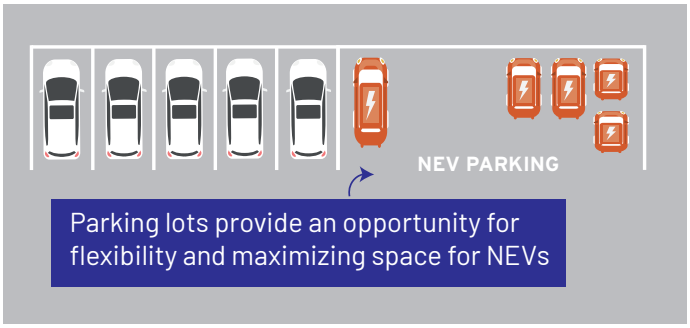


Figure 22.
Parking Lot NEV Layout Option



NEV Parking Policy Options

1. Have an NEV-ready building code in place

Local jurisdictions may consider:

- Defining and requiring a ratio of regular parking spaces to NEV parking, and a percentage of spaces to be equipped with NEV charging capability.
- Given their variable size, allow NEV parking in spaces that would otherwise be empty in an off-street facility (and craft standards so that walkways or other rights-of-way are not impeded). For example, for every 20 regular spaces, require or allow 1 NEV space depending on land use need (e.g. retail may have higher demand than office).
- Requiring or encouraging electrification for NEV charging (e.g. having Level 1 charging available at EV charging stations).
- Encouraging ADA accessible design for some NEV spaces.

2. Develop incentives for NEVs

Local jurisdictions may consider:

- Updating permitting policies to accelerate private installation of charging facilities that support NEVs.
- Allowing NEV drivers to park and charge for free or at discounted rates at public facilities (e.g. city lots), or provide a reservation system for NEV spaces.
- Providing subsidies for charging equipment at target sites (e.g. multi-family dwellings) or a "right-to-install" ordinance allowing tenants to install charging without seeking permission of the building owner.

3. Track NEV parking and charging development

Local jurisdictions may consider:

- Collecting data of NEV charging and parking to see who has access to these facilities (e.g. work sites) and identify any gaps in the NEV network.

Other Micromobility Parking & Charging

E-Bikes

Charging

Personal e-bikes are usually equipped with chargers suited for normal outlets, for easy charging at home. Broadly, their batteries are compatible with Level 1 chargers. Most e-bikes take between 2-6 hours to charge. Some models have detachable batteries, with the option to swap out depleted batteries for fully-charged ones. The chargers may be integrated with the e-bike itself or as a separate attachable component. In some cases, users can purchase adapters that work at EV stations.

Parking

If multiple bicycle racks are installed, they should be at least three feet apart to allow access. Four feet of clearance is recommended between the bicycles themselves and the sidewalk, but two feet of clearance is typically recommended from them when parked. Bikes typically are 72" L, 30" W, 48" H.

E-Scooters

Charging

Personal e-scooters are usually equipped with chargers suited for normal outlets, for easy charging at home. Broadly, their batteries are compatible with Level 1 chargers. Most e-scooters take between 3-7 hours to charge. Typically, the battery is mounted underneath the deck of the scooter or at the stem of the scooter (underneath the handlebars). The chargers may be integrated with the e-scooter itself or as a separate attachable component. In some cases, users can purchase adapters that work at EV stations.

Parking

If multiple parking racks are installed, they should be at least three feet apart to allow access. Four feet of clearance is recommended between the devices themselves and the sidewalk, but two feet of clearance is typically recommended from them when parked. Device size varies.

Other Device Types

Self-Balancing Devices

This category includes hoverboards, unicycles and/or Segways, which account for a much smaller share of the micromobility market than e-bikes and e-scooters. Broadly, their batteries are compatible with Level 1 charging. Most users typically charge at home or charge via battery swap. Parking could be compatible with some parking type options (e.g. corrals or lockers).

Shared Systems

E-bikes and e-scooters part of shared systems have typically relied on operators exchanging empty batteries with fully charged batteries, called "battery swaps" or "juicing." Some systems have taken strides to allow charging directly at shared mobility stations. Shared micromobility systems are not currently a focus of the LTN.

Other Parking Considerations

Micromobility vehicle parking policies are most effective when they are context-sensitive. For example, in high-traffic sidewalk areas, micromobility vehicles may need to be parked within a parking space on the street so as not to obstruct an already crowded sidewalk. In areas with larger sidewalks, parking within the landscape or furniture zone on the sidewalk may work well. Alternatively, some neighborhoods lack sidewalks, where micromobility vehicles should be parked in a location that does not impede other street uses or obstruct pedestrians.

Case Study: Micromobility Loading Zones

Micromobility vehicles are becoming increasingly popular as a solution for food and goods delivery in urban areas. Santa Monica set up a Zero-Emissions Delivery Zone pilot that prioritizes loading spaces for micromobility vehicles in convenient locations near high-density residential and retail areas to help support this delivery option.

Parking & Charging Options

Table 6. Summary of Parking & Charging Options

Type	Description	Parking	Charging	Option
Traditional bike parking	Includes bike racks/corrals, typically designed for bicycles and could service type 1 e-scooters with appropriate locking devices. There are several types of bike racks ranging from U-Racks, bollards, to grid. They are generally easy to install and vary on the basis of aesthetics (e.g. circular v. u-shaped).	Yes	No	1, 2, 3
Bike lockers	Fully enclosed units which are typically designed for bicycles and could service e-scooters. Some provide charging.	Yes	Varies	4, 8
E-bike parking	Units which are outfitted to park, lock and charge e-bikes specifically.	Yes	Varies	1-8
Scooter parking	Units which are outfitted to park and lock type 1 e-scooters. Some provide charging.	Yes	Varies	1-4, 6-8
Solar powered charging kiosks	Units which are outfitted to provide charging to micromobility devices, but do not necessarily include secure parking.	No	Yes	10
Micromobility fleet parking & charging	Units which are outfitted to park, lock, and charge micromobility fleets. Does not include space for personal devices. Applicable only if South Bay cities adopt shared micromobility systems.	Yes	Yes	6
Micromobility parking & charging	Units which are outfitted to park and charge all micromobility devices with an appropriate attachment.	Yes	Yes	5-12
NEV/EV charging	Units which are designed to charge EVs, which can include NEVs and in some cases micromobility devices. Types include: -Pole-mounted on-street -Pole-integrated on-street -On-Street -Lot/Parking Space	Varies	Yes	9-12

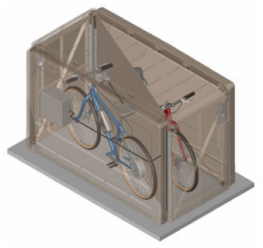
The numbers above correspond with the entries shown in the following Comparison of Parking & Charging Options table.

Table 7. Comparison of Parking & Charging Options

Option	Vehicle Type	Sizing	Modular
 **1. Dock-Style Rack** Vendors include Ground Control Systems, Dero	• Bikes • Scooters	H: 32" W: 19" L: 18" (size is for single bike unit, fits two bikes; scooter-only unit is typically larger with space for 4+ scooters)	Yes
 **2. U-Rack/Wave Bike Rack**	• Bikes • Scooters	L: 24.48″ H: 34″ OD: 1.9″ (single unit) Racks are available in various shapes (e.g. circle); typically installed on sidewalk	Yes
 **3. Corral**	• Bikes • Scooters	Replaces 1 – 2 vehicle parking spaces; typically installed on street	No
 **4. Bike Locker or Pod** Vendors include OONEE, Dero	• Bikes • Scooters	W: 39″+ L: 75″+ H: 92″+ (varies; typically rectangular)	Yes

Charging Capacity	Power Requirements	Cost Level $-$$$ (cost estimate shown where available)	Pros	Cons
N/A	None	$	• Provides ability for secure locking • Fits a variety of micromobility devices (with appropriate locking) • Lower cost • Easy to use • Can be combined with pole-integrated charging (see #9)	• No device charging • Requires users to bring their own locking devices
N/A	None	$200 (1 space) $1,000 (13 spaces)	• Modular • Can potentially serve a variety of micromobility devices with different sizing, with appropriate locking & spacing • Lower cost • Can be combined with pole-integrated charging (see #9)	• No device charging • Not as secure as other rack options • Requires users to bring their own locking devices
N/A	None	$3,000	• Fits a variety of micromobility devices (with appropriate locking) • Lower cost • Can be installed on-street • Can be combined with pole-integrated charging (see #9)	• No device charging • Not as secure as other rack options • Requires users to bring their own locking devices
N/A	None	Starts at $2,000	• Fits a variety of micromobility devices • Users do not have to bring a lock	• No device charging • Not as secure • Requires more space per unit

Table 7. Comparison of Parking & Charging Options (Continued)

Option	Vehicle Type	Sizing	Modular
 **5. E-bike Charging Rack** Vendors include Saris Infrastructure, Bikeep	• E-bikes	H: 29-37″ W: 21-24″ L: 29-31″	Yes
 **6. Shared Mobility Fleet Charging Station** (applicable only if South Bay cities adopt shared micromobility systems)	• E-bikes • Type 1 e-scooters Wheel wells designed for system mobility devices	Requires direct inquiry	Yes
 **7. Micromobility Charging Hub** Vendors include Bikeep, Kuhmute, Swiftmile	• E-bikes • E-scooters	H: 42″ W: 12″ L: 82″	Yes (some models)
 **8. Power Station Bike Locker** Vendors include CycleSafe	• E-bikes • E-scooters	Requires direct inquiry (for both bike locker & power box)	Yes

Charging Capacity	Power Requirements	Cost Level $-$$$ (cost estimate shown where available)	Pros	Cons
Level 1	Requires one connection point to power grid	Starts at $1,500 per station	• Modular • Has lockable charging box door • Users can lock e-bicycle with U-lock • Options to integrate with smart phones • Options with 24hr camera monitoring	• Pricing may be high for some vendor options • Some options do not accommodate e-bikes with wider tires • Only for e-bikes
100v – 240v	Requires one connection point to power grid	$$$	• Modular • Has solar option • Has integrated kiosk system for users to unlock devices with smartphones or smartcards • Can allow both e-bikes and e-scooters to use the same charging dock	• For shared mobility providers only, not for individual device owners • Systems are not deployed in Southern California (but includes Boston, New York, and Chicago) • Pricing may be high (further inquiry required for pricing and technical specifications)
Level 1	Requires one connection point to power grid	$$$	• Integrated with smartphone application/ smartcard to monitor parking availability& lock/unlock device • Designed as scooter security system with locks • Users do not have to bring a lock • Users do not need to bring device chargers	• Some options do not accommodate e-bikes • Some options do not accommodate e-scooters with wider (3”+) stems • Kuhmute version requires adapter to be installed on device
Level 1	Requires one connection point to power grid	$$$	• Can be retrofitted to existing bike lockers • Allows charging of any device • Users do not have to bring a lock	• May require power station to be installed only with CycleSafe Bike Locker • Requires bike locker • Users need to bring device chargers

Table 7. Comparison of Parking & Charging Options (Continued)

Option	Vehicle Type	Sizing	Modular
 **9. Pole-Integrated Charging**	• E-bikes • E-scooters • NEVs • EVs	Does not take up space beyond the existing pole or structure	Yes
 **10. Solar Charging Station** Vendors include Sol Design Lab, Intelligen Power, Paired Power	• E-bikes • E-scooters • Other small electronic devices • Solar EV charging options available (likely separate from Level 1)	Requires direct inquiry (varies depending on need)	No
 **11. Charging Station (On-Street or in Lot)** Vendors include Chargepoint, EVConnect, EVCS, EVgo, Flo, and Shell Recharge	• EVs • Can accommodate NEVs, e-bikes and e-scooters if Level 1 charging is present	Requires direct inquiry (varies depending on need)	No
 **12. Pole-Mounted EV Chargers** Vendors include Chargepoint and Voltrek	• EVs • Can accommodate NEVs, e-bikes and e-scooters if Level 1 charging is present	Requires direct inquiry (typically smaller, mounted on pole)	Yes

Charging Capacity	Power Requirements	Cost Level $-$$$ (cost estimate shown where available)	Pros	Cons
Level 1	Requires connection to power grid	$	• Simple to design and install • No outside vendor required, can be installed directly by jurisdiction • Can use existing light poles or other structures • Already in use in NEV communities, such as Lincoln, CA	• Users need to bring device chargers • Does not provide integrated locking (relevant for use with e-bikes and e-scooters)
Level 1	None	$$$	• Uses solar • Can function as public amenity • Used in US cities	• Users need to bring device chargers • Does not provide integrated locking • May require substantial space
Level 1 – Level 2	Requires connection to power grid; may require additional electrical work for Level 2 charging	$$$ Free or paid for through grant opportunities; users pay to charge as part of a subscription or as a one-time use	• Installation and maintenance sometimes can be covered by the company, if users are paying to charge • Deployed throughout Southern California	• Does not provide charging typically for e-bikes and e-scooters • May require substantial space (e.g. parking lot space • Does not provide integrated locking • May require substantial space
Level 1 – Level 2	Requires connection to power grid; may require additional electrical work for Level 2 charging	$$ Free or paid for through grant opportunities; users pay to charge as part of a subscription or as a one-time use	• Takes up very little space • Can be used in on-street spaces • If connected to streetlight, may be able to use existing electrical circuitry • Cheaper to install than new free-standing chargers • Deployed in Los Angeles	• Does not provide charging typically for e-bikes and e-scooters • May require special retrofitting for mounting • Cord must extend between parking vehicle and sidewalk; may block bike lanes

Mobility Hubs

Mobility hubs are places where people can make seamless connections between multiple transportation options. Mobility hubs offer visibility to, and connection between, public transit and other mobility services that in turn support sustainability and connectivity. Building mobility hubs at key locations along the LTN can help provide easy connections to local and regional transit, other mobility options like shared mobility services (car, bike or scooter share), and conveniently located neighborhood services for people traveling via NEVs or micromobility modes. Mobility hubs provide an opportunity to site parking and charging amenities for the LTN, while connecting the LTN into the broader transportation network.

While a series of hubs can form a cohesive network, the design and accommodations at each hub location will vary based on the unique transportation needs of the area. Comprehensive mobility hubs may include advanced technology, wayfinding, access to goods/services, and information; and can create a sense of place where communities come together to work, live, shop, and play—strengthening community bonds and providing a community gathering place.

Minneapolis, MN: mobility hub integrated with bus stop

Gilbert, AZ: mobility hub in small downtown

Berlin, Germany: mobility hub in commercial parking lot

Mobility Hub Amenity Types

Physical

- Commercial loading
- EV/NEV charging
- Information center
- Micromobility device charging
- Micromobility device parking (racks/secure bike lockers)
- Mobility kiosk/services
- Passenger loading
- Pedestrian friendly streetscape and safe connections
- Restrooms
- Seating/waiting area
- Shade
- Taxi/rideshare loading zones
- Transit service/stops
- Transit stop enhancements
- Wayfinding/branding

Placemaking

- Flexible and programmable spaces (for events, food trucks, etc.)
- Gathering spaces
- Green space
- Public art
- Wayfinding

Services

- Bike and scooter share
- Bike repair or other end-of-trip amenities
- Co-location with neighborhood services:
  - Amazon/parcel lockers
  - Banks
  - Mailing centers
  - Retail/dining (mobile and permanent)
- Emergency resources
- Device charging stations
- Microtransit
- Point-to-point car share
- Public Wi-Fi connection
- Real time travel & trip planning information

Case Study: Regional Implementation of Mobility Hubs

In September 2021, the Metropolitan Transportation Commission awarded seven mobility hub pilot projects throughout the Bay Area, totaling $2.7 million. These projects represent a variety of mobility hub types and anchor services, including local bus, regional rail, ferry, bike share and car share, quick-build and permanent construction, and are located in Priority Development Areas, Equity Priority Communities and High-Resource Areas.

Components of the seven mobility hubs include:

- Mobility information kiosks
- Micromobility park-and-charge ports for personal bikes and scooters
- Electric vehicle charging
- E-lockers
- Bike fix-it stations

Long Beach, CA: downtown mobility hub

Pittsburgh, PA: transit center mobility hub kiosk

Mobility Hub Siting Considerations

Destination Types

Regional destinations are centers of economic and cultural activity, such as event venues and major shopping centers, with a high density of nearby destinations.

Neighborhood destinations tend to be in locally-serving commercial or residential areas, such as parks and schools. Mobility hubs here can be located on sidewalks and in on-street parking spaces.

Transit station/major stop locations are primarily characterized by the presence of high frequency transit, connecting to regional and local travel destinations, such as the Harbor Gateway Transit Center.

Site Selection Considerations

- Population density
- Job density
- Transit density, and key transit transfer points
- Distance to existing transit, pedestrian and bicycle routes, as well as the LTN
- Equity indicators, such as demographics, income, and access to a private vehicle
- Opportunities for pilot and retrofit mobility hubs
- Partnerships with public and private entities
- Leveraging new development sites
- Utilize leftover parcels or unused slivers of land

Site-Specific Considerations

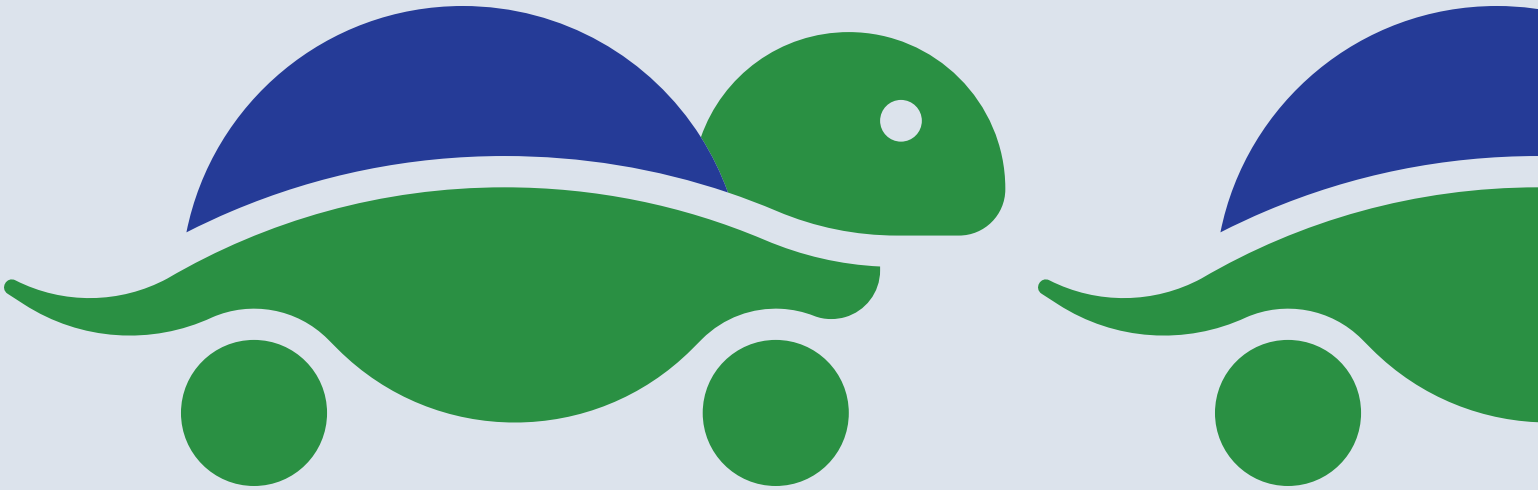
- Proximity and safe connections to mobility and community services
- Amenity space (on and off-street)
- Electrical infrastructure
- Broadband to support high-speed Wi-Fi

Case Study: Circuit

Circuit provides on-demand microtransit service in a NEV-style vehicle, operating throughout southern California (including Long Beach and Venice). Rides are typically free or heavily discounted for users. Circuit does not follow any fixed routes, but is limited to specified map zones. Riders can request a ride by using the app or flag down a passing Circuit vehicle.

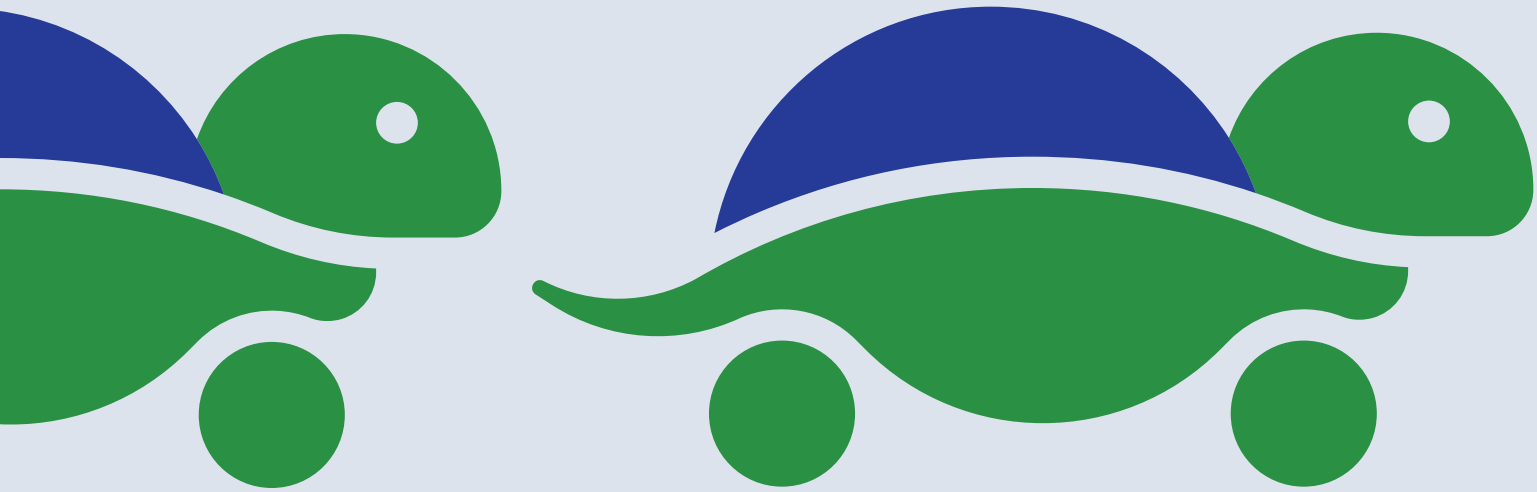
Table 8. Mobility Hub Typologies

Amenities	Regional Destination	Neighborhood Destination	Transit Station/ Major Stop
Physical & placemaking			
Commercial loading	●	●	
EV/NEV charging	●	●	●
Flexible & programmable spaces	●		
Gathering spaces	●		
Green space	●		
Information center	●		
Micromobility device charging	●	●	●
Micromobility device parking	●	●	●
Mobility kiosk/services	●		●
Passenger loading	●	●	●
Pedestrian friendly streetscape	●	●	●
Public art	●	●	●
Restrooms	●		●
Seating/waiting area	●		●
Shade	●		●
Taxi/rideshare loading zones	●		●
Transit service/stops	●	●	●
Transit stop enhancements	●		●
Wayfinding/branding	●		●
Services			
Bike & scooter share	●		●
Co-location with neighborhood services	●	●	●
Device charging stations	●	●	●
Microtransit	●		●
Point-to-point car share	●		●
Public Wi-Fi connection	●		●
Real time travel & trip planning information	●		●



SECTION 7

Engagement & Evaluation



Evaluation

Defining Success

The vision for the South Bay Local Travel Network (LTN) is a 243-mile network of comfortable, slow-speed streets that would connect neighborhoods and local South Bay destinations to one another. The goal of the LTN is to support the growing local use of micromobility—defined as zero-emission, low-speed vehicles. The expected benefits of the LTN include a reduction in carbon emissions, a reduction in the cost of travel, improved road safety, and improved ability to get around in the South Bay. The LTN aims to achieve its goals through 5 key strategies:

1. Establish a designated network of smaller streets that are clearly marked for safe sharing
2. Connect neighborhoods with destinations
3. Separate local traffic from thru traffic
4. Expand access to bike lanes to all forms of micromobility
5. Build public awareness of the benefits

Following the implementation of the LTN's key components—sharrow markings and wayfinding signs—the SBCCOG and cities should begin to evaluate the program. Some components of the program may be implemented more fully in future phases, including traffic calming treatments, reduced posted speeds, or other treatments. The questions and metrics in Table 9 can be used to guide evaluation efforts and understand needs for future phases of implementation.

In addition to the evaluation criteria above, the SBCCOG and cities may choose to evaluate how the LTN helps meet existing regional safety, mobility, or climate change policies and goals. At the regional scale, the implementation of the LTN would support the SBCCOG goals and strategies listed below.

- The LTN supports the Environment, Transportation and Economic Development goal in the South Bay Cities Council of Governments Strategic Plan, which includes a strategy to implement regional transportation strategies of benefit to the South Bay through Measure R funding and other regional, state, and federal funds.
- The LTN also supports three of the four components of the South Bay Land Use and Transportation Strategies within the SBCCOG Sub-Regional Climate Action Plan: (1) Expand the use of slow-speed electric vehicles (2) Encourage the use of shared mobility and (3) Facilitate more walking and biking through investments in bike and pedestrian infrastructure.
- SBCCOG, through its South Bay Environmental Services Center (SBESC), and local cities completed greenhouse gas emissions (GHG) inventories of government operations and communitywide activities for the years 2005 and 2007 for each city in the South Bay. Each report included GHG reduction targets for 2020 and 2050. By supporting a mode shift away from vehicles for local trips, the LTN could help cities meet their community reduction targets for 2050.
- The LTN and the South Bay Bicycle Master Plan have several goals in common. The safety improvements associated with the LTN would support the Bicycle Master Plan's goals of creating a bicycle-friendly environment for all types of bicycle riders and developing infrastructure that respects and accommodates all users of the road.

Table 9. Program Evaluation Criteria for Measuring Success

Evaluation Criteria	Primary Metric	Relevant Supporting Data
1. Has local use of micromobility increased?	Micromobility vs. vehicle mode share in community for short trips (less than 3 miles)	• Micromobility mode share (all trips) • Public attitude towards micromobility • NEV, e-bike, e-scooter, bicycle, and other electric personal device ownership
2. Is the LTN operating as a safe, shared roadway network for all modes?	Collisions on LTN	• Vehicle volume on LTN (by mode) • Vehicle speeds on LTN • Collisions on LTN • Public perception of safety on LTN
3. Is the LTN connecting people to where they need to go?	Micromobility volume on LTN	• Top destinations for micromobility vs. vehicle trips under 3 miles • Public awareness of LTN • Proximity to LTN by race, age, and income • Micromobility mode share on LTN

Note: The Slow Speed Network Strategic Plan for the South Bay (Metro, 2017) assumed 20% of short trips (under three miles) would be made in zero emissions vehicles by the year 2025. The time horizon for reaching this goal should be adjusted to reflect individual cities' LTN implementation timelines.

Evaluation

Measuring Success

Evaluating the impact of the LTN will require qualitative and quantitative data collection. The following subsections provide considerations for designing a community survey and possible approaches for evaluating the LTN beyond a survey.

Post-implementation Survey

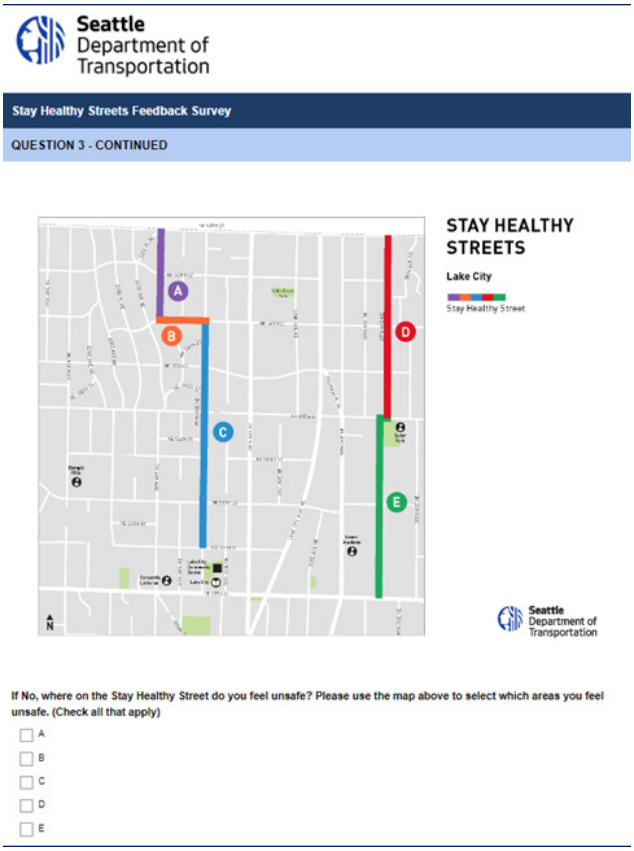
A post-implementation survey can provide insight into how members of the community perceive and engage with the LTN. Suggested questions are listed in Table 10. Several of these questions are adapted from the Seattle Department of Transportation's online survey about its Stay Healthy Streets program, which closed Neighborhood Greenways to pass through traffic in response to the COVID-19 pandemic.

Collecting demographic data in the survey can be helpful for identifying barriers or concerns with using the LTN specific to subsets of the community. Consider the groups listed below when designing your survey response collection strategy. Strategies to reach a more diverse set of respondents include offering the survey in multiple languages, advertising through online and in-person channels, and offering the option to complete the survey online, via phone, or in-person:

- People with disabilities
- Households with children
- High school students
- University students
- Seniors
- People with limited English proficiency

A final consideration when designing the post-implementation survey is the format of the survey questions. Many of the questions related to the usage of the LTN and perception of safety on the LTN would benefit from a map-based component. For example, the Seattle Department of Transportation presented survey respondents with the labeled map in Figure 23 to pinpoint sections of Stay Healthy Streets where people felt most unsafe. The map was accompanied by a predetermined set of options, shown in Figure 24, that respondents could choose from to describe why they felt unsafe in the selected areas. This approach can streamline survey response categorization.

Figure 23. Sample Map-Based Survey Question



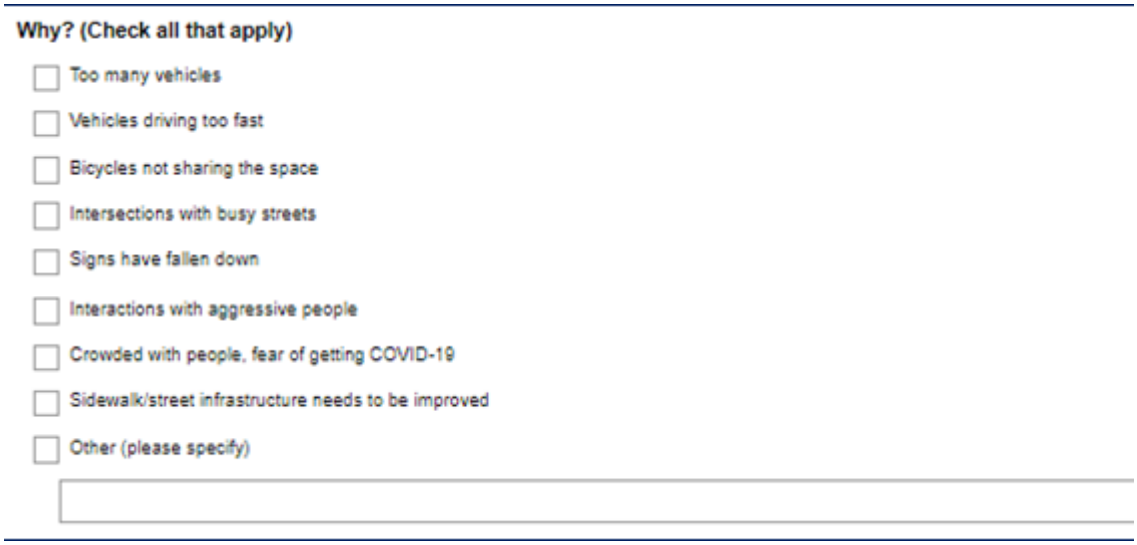
Source: SDOT

Table 10. Possible Questions for Post-Implementation Survey

Topic	Suggested Questions
Awareness and perception of LTN	• How familiar are you with the South Bay Local Travel Network (LTN)? (Provide a photo of a branded wayfinding sign) • How do you feel about the LTN? (Dislike, neutral, like with free response to elaborate) • How could the LTN improve your community?
Usage of LTN	• Have you or your household used the LTN for micromobility trips? If yes, what type of micromobility device? If no, why not? • What types of trips do you use the LTN for? • Where do you go when traveling on the LTN? Is parking available? Are chargers available? • Do you stay on the LTN for the entirety of your journey? • Where would you want the LTN to go that it doesn't?
Perception of safety on LTN	• When using the LTN on a micromobility device, do you feel safe and comfortable? If no, where do you feel unsafe or uncomfortable and why?
NEV/e-bike/e-scooter ownership	• Do you currently own a micromobility device? If yes, what kind? • Would you consider purchasing a micromobility device since the establishment of the LTN? If no, why not?

Note: For most questions, consider providing a set of predetermined options as well as an "other, please specify" option.

Figure 24. Additional Sample Questions



Source: SDOT

Evaluation

Beyond Surveys

Additional evaluation efforts can help validate or quantify trends from the survey and highlight other challenges with the LTN. Ideas for relevant analyses to conduct are listed below.

Vehicle, NEV, biking, e-bike, e-scooter, and walking counts

Collect weekday and weekend counts at various points along the LTN to understand travel volumes by mode on the LTN. Ideally, counts would be collected prior to the implementation of the LTN as well. Overall volume can help inform whether there is growing local use of micromobility on the LTN, while volume by street can highlight preferred versus avoided or less useful routes. Consider incorporating qualitative observations, such as the approximate age of micromobility users, whether people are riding alone or in groups, and crossing behaviors, into any manual counting efforts. Sensor technology could support ongoing evaluation efforts beyond one-time counts.

Origin-destination analysis

One of the key strategies of the LTN is to separate local traffic from through traffic. GPS-based data or other user generated data can be used to understand what share of people traveling on the LTN are using the network to travel between local destinations, to identify popular destinations along the LTN, and to analyze route choice. A common vendor for this data type is StreetLight location-based services data.

Parking analysis at destinations served by LTN

Counts of parked NEVs, bicycles, e-bikes, e-scooters, and vehicles at destinations along the LTN can be used to identify the most popular destinations along the LTN and whether there has been a mode shift towards micromobility with the implementation of the LTN.

Vehicle speeds

Vehicle speeds play an important role in the perceived and actual safety of people walking, rolling, and biking on the LTN. Measure vehicle speeds at various points along the LTN to gauge where speed might pose barriers to using the LTN. The 85th percentile vehicle speed and the percent of vehicles exceeding the speed limit by 10 miles per hour or more are useful measures. Vehicle speeds can be measured using a vehicle counts vendor, by cities with staff who perform their own engineering speed studies, or through the purchase of GPS or connected vehicle big data sets.

Collisions

Local police department data and public health data can be used to identify the location and details of traffic collisions. Collisions that occur along the LTN should be documented as part of evaluation efforts and prompt follow up analysis of roadway conditions at the site. The state maintains a public collision database that can be accessed online through California Highway Patrol or the UC Berkeley SafeTREC office. See page 53 for details.

Video analytics for other safety metrics

There are several safety-focused video analytic data firms that collect and analyze video data at specific locations to understand patterns related to vehicle speed, driver behavior such as crosswalk encroachment, and near misses between vehicles and micromobility users.

Walk audit

Engaging City staff and/or neighborhood volunteers to conduct a walk audit can supplement vehicle count and speed data with more detailed assessments of conditions along the LTN. ArcGIS Quick Capture and Survey123 are commonly used mobile survey tools that can be used to document observations from the walk audit.

Social media engagement

Analyzing mentions of the LTN on social media can be used to gauge awareness and public sentiment towards the LTN. The geo-location of posts can also highlight popular routes and destinations along the LTN.

Engagement

Additional Engagement Opportunities

While the wayfinding signage represent opportunities for public engagement themselves, additional public education and engagement around micromobility options can further promote the use of the LTN. Ideas for additional engagement opportunities listed below draw on efforts from similar Neighborhood Greenway programs in other cities.

Free branded signage for residents

In addition to the official LTN wayfinding signage, cities could offer residents the opportunity to order LTN-branded yard signs. The City of Portland has an online tool where residents can enter their address online to see if they live on a Neighborhood Greenway. If they do, they can order a free sign, which promotes the program and driving at slow speeds.

NEV sharing program

The cost of purchasing an NEV may be too high for some residents. Explore an NEV sharing program that offers reduced pricing for eligible groups to expand access to NEVs in the community. Car share, bike share, and e-scooter share programs are available in many cities but limited NEV sharing services exist.

Social media campaign

Launch and maintain social media accounts (Twitter, Instagram, Facebook) dedicated to documenting and sharing updates about the LTN. Posts could address frequently asked questions, events along the LTN, and any expansions to the LTN. Social media accounts can also become a channel for direct feedback from the community.

LTN email and social media marketing from SBCCOG

Engagement

Safety education programs

E-bikes can reach speeds of up to 20 mph and e-scooters can reach speeds up to 15 mph. Micromobility-oriented safety programs geared towards new riders like the e-bike safety class held by the Manhattan Beach Police Department and the nonprofit Bike LA represent a proactive approach to improving traffic safety. Upon course completion, participants could receive LTN-branded accessories—helmets, bike locks, stickers—that promote safety and the LTN.

Organized rides

Opportunities to ride on the LTN with a group can make first-time micromobility users feel more comfortable and spark interest among non-micromobility users. Organized tours and scavenger hunts along the LTN could promote awareness of destinations that can be reached via the LTN. Partnering with schools to set up a bike bus could encourage regular use of the LTN to get to school. In South Pasadena, there is a Bike Bus to two of the local elementary schools that started with a Bike and Walk to School Day in 2022, and has since evolved into a weekly ride led by designated ride leaders. Figure 25 shows the South Pasadena Bike Bus routes and an image of a morning ride.

Partner with businesses

Engage businesses located on the LTN to put up storefront signage or indicate online that they're "On the LTN" and install end-of-trip facilities such as bike, scooter, and NEV parking and charging stations. These efforts could raise awareness of destinations that can be reached via the LTN and can be framed to businesses as a way to attract more customers. Additionally, consider providing businesses with fliers that provide information about the LTN and FAQs for public distribution.

Web tools to track progress and plan routes

A website tracking LTN implementation progress can be a useful tool for community members interested in traveling on the LTN. The Seattle Department of Transportation keeps a running list of active projects on their website. An LTN-focused web page could also incorporate route planning to help residents plan trips along the LTN.

Partner with Google Maps

Google Maps takes its understanding of real-world conditions based on data from government authorities into account when generating bike routes. Providing the latest LTN network to Google Maps via its Maps Content Partners portal can help direct more micromobility users to these slower speed streets. A more extensive partnership with Google Maps could explore how routing algorithms could be adjusted to decrease non-local vehicle traffic on the LTN.

Figure 25.
South Pasadena Bike Bus Route and Rider Snapshot

Quick Facts

- All routes leave at 7:55am sharp
- Fun, escorted rides to school with priority from crossing guards
- Riders are welcome to join anywhere along any route.

RIDE LEADERS

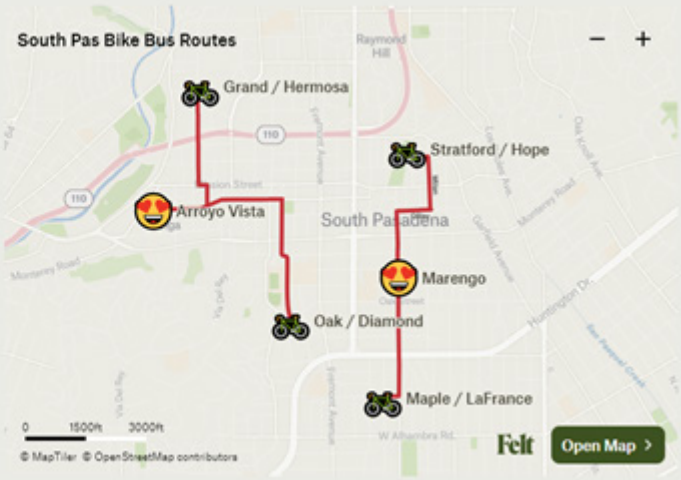
Arroyo Vista South - Kris Miller and Casey Law

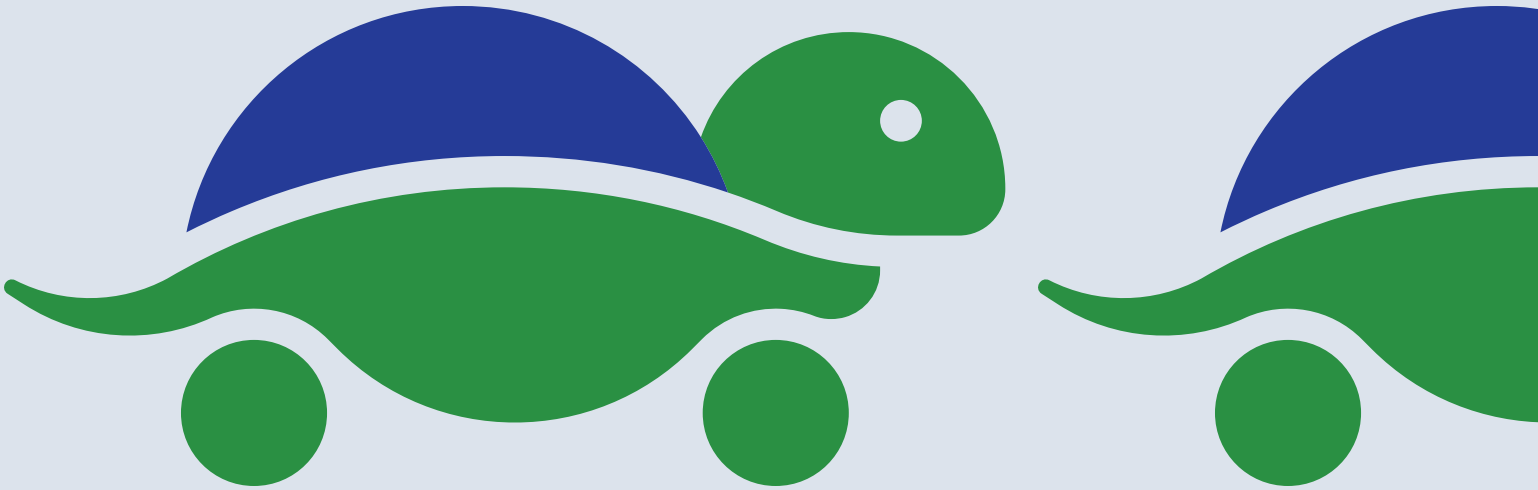
Arroyo Vista North - Philipp Knopf and Jason Claypool

Marengo South - Frederick Eberhardt and Khairi Mdnor

Marengo North - Mike Siegel

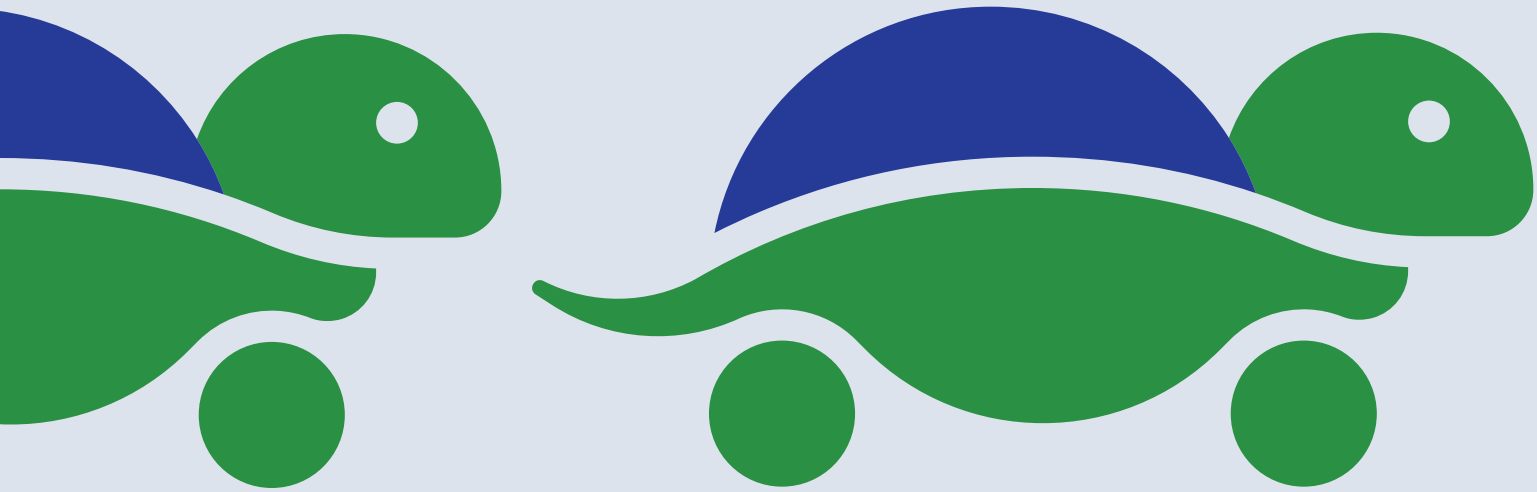
Riders assume risks by riding on the street. Ride leaders are present to increase safety by escoring the group, but are not responsible for rider safety.

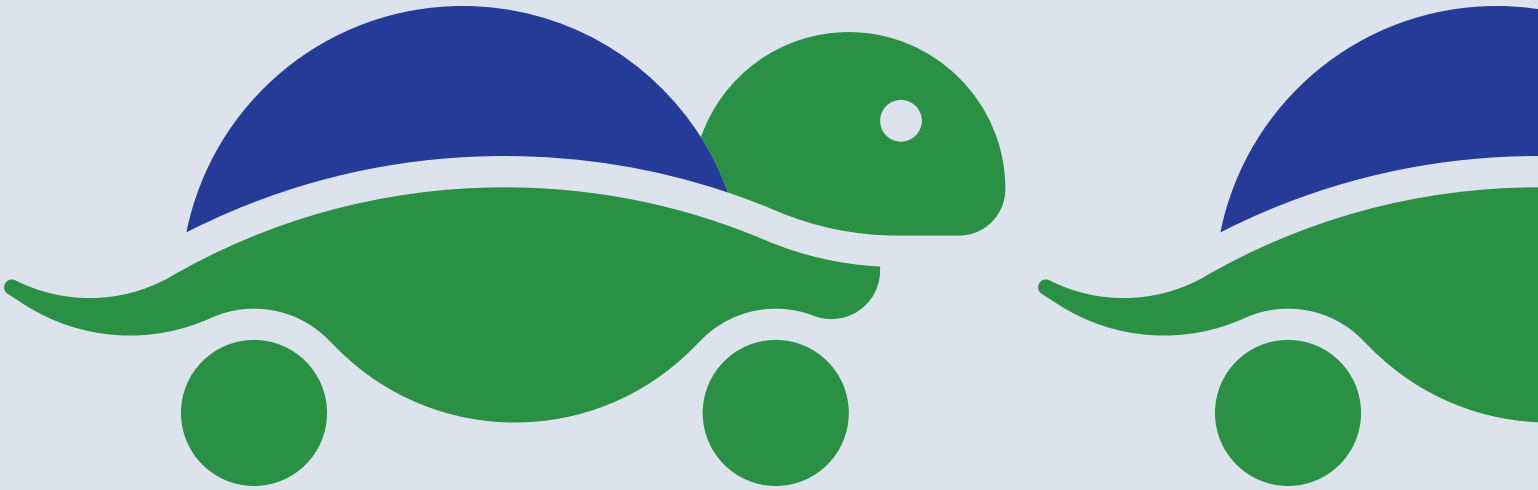




APPENDIX A

NEV Plan Template

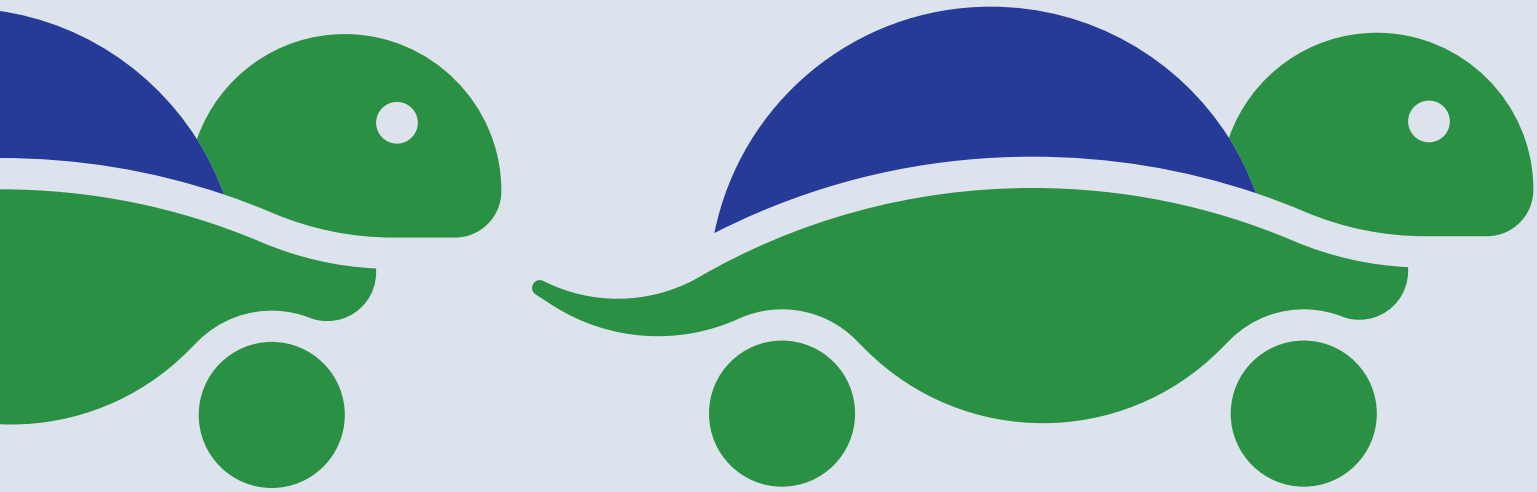


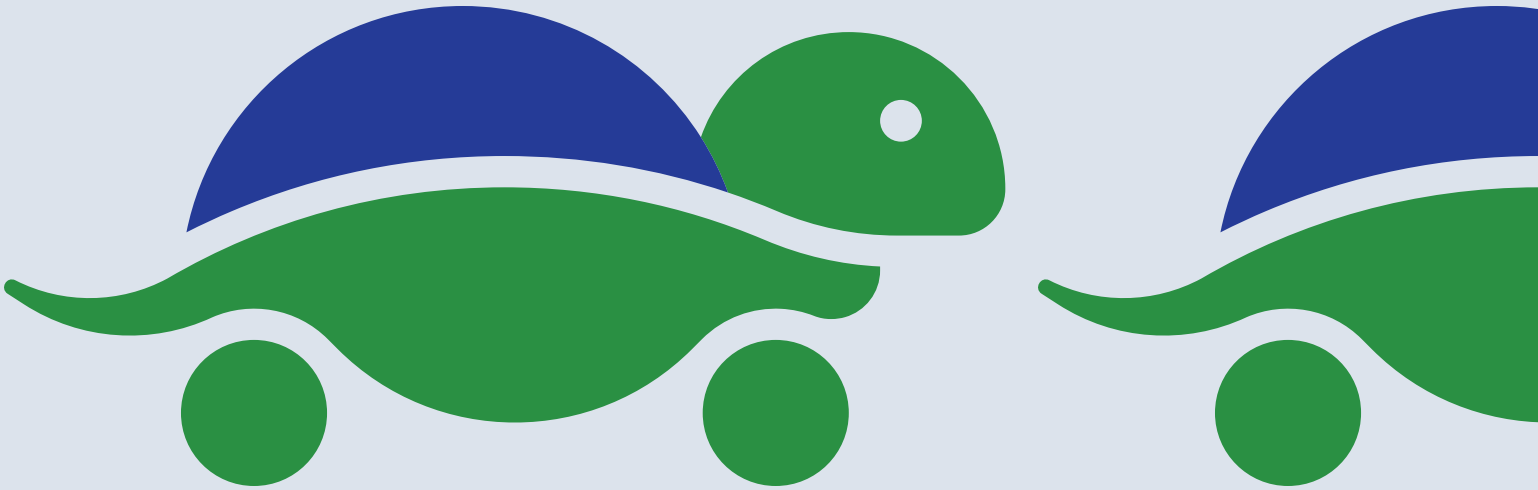


APPENDIX B

Best Practices Review

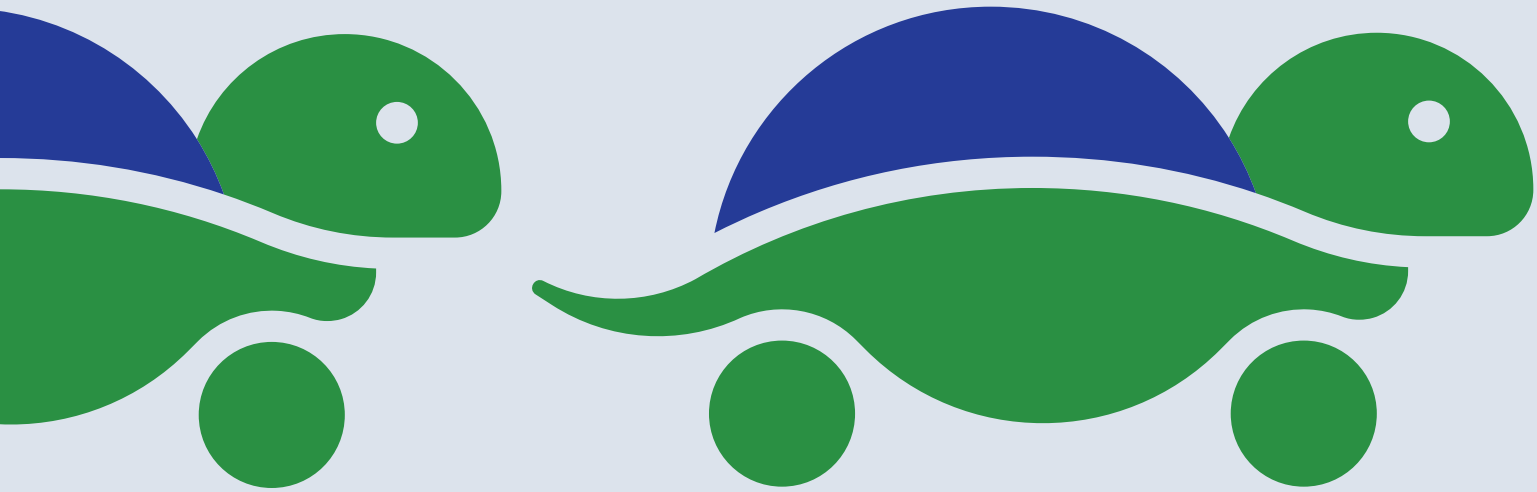
Standards & Guidance References

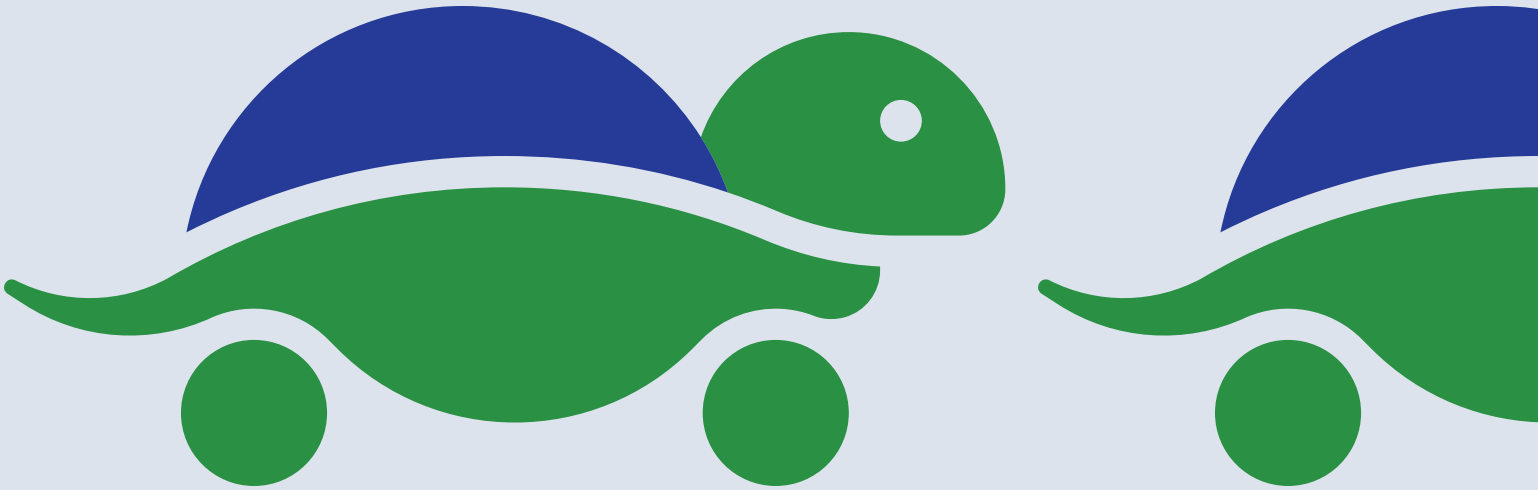




APPENDIX C

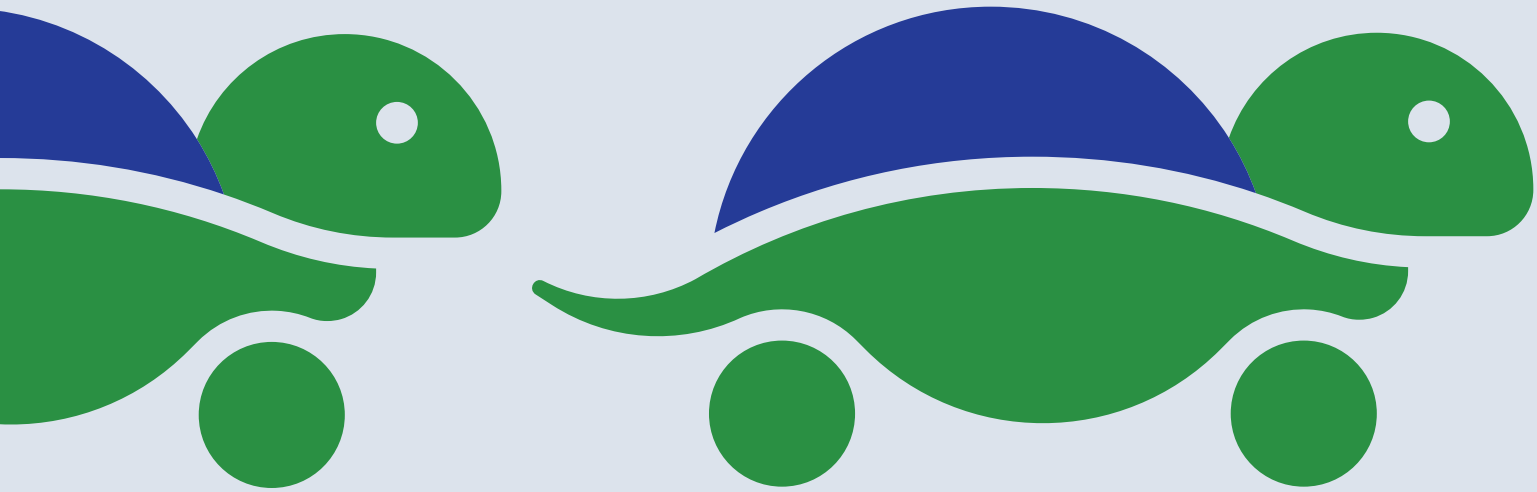
Safety Analysis Summary

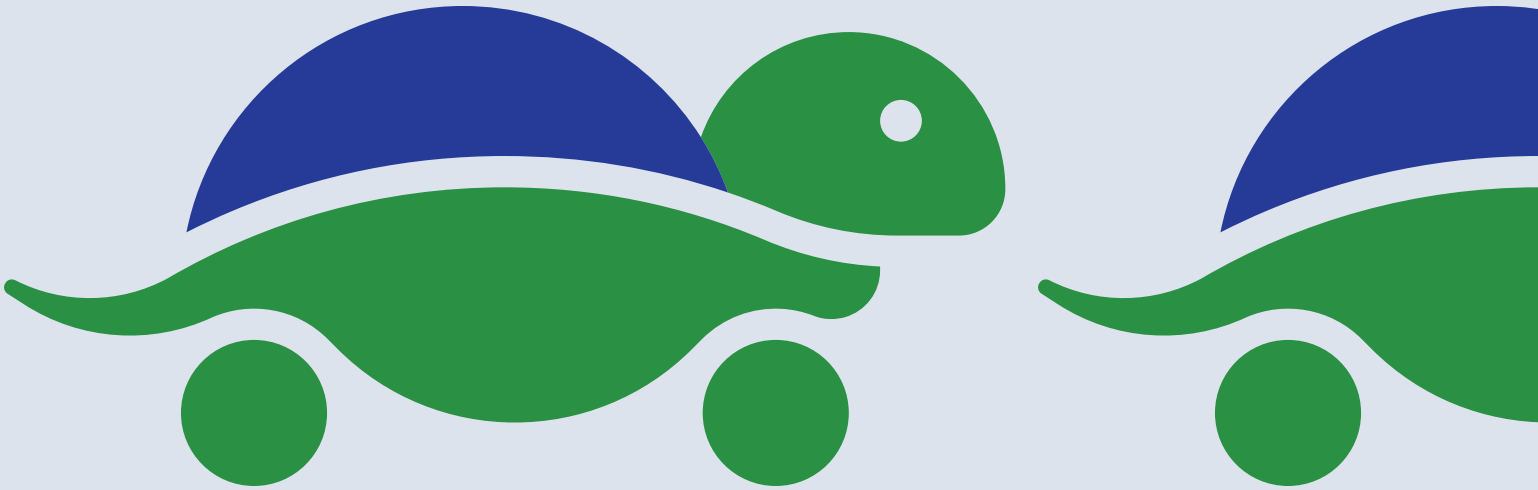




APPENDIX D

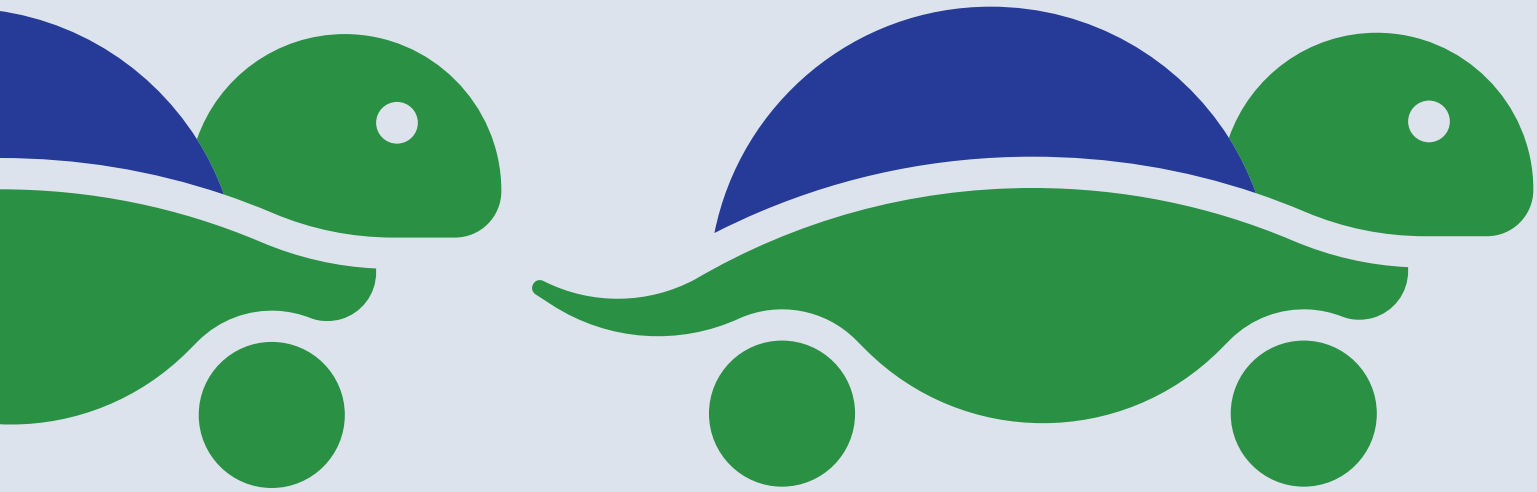
Parking Analysis Summary

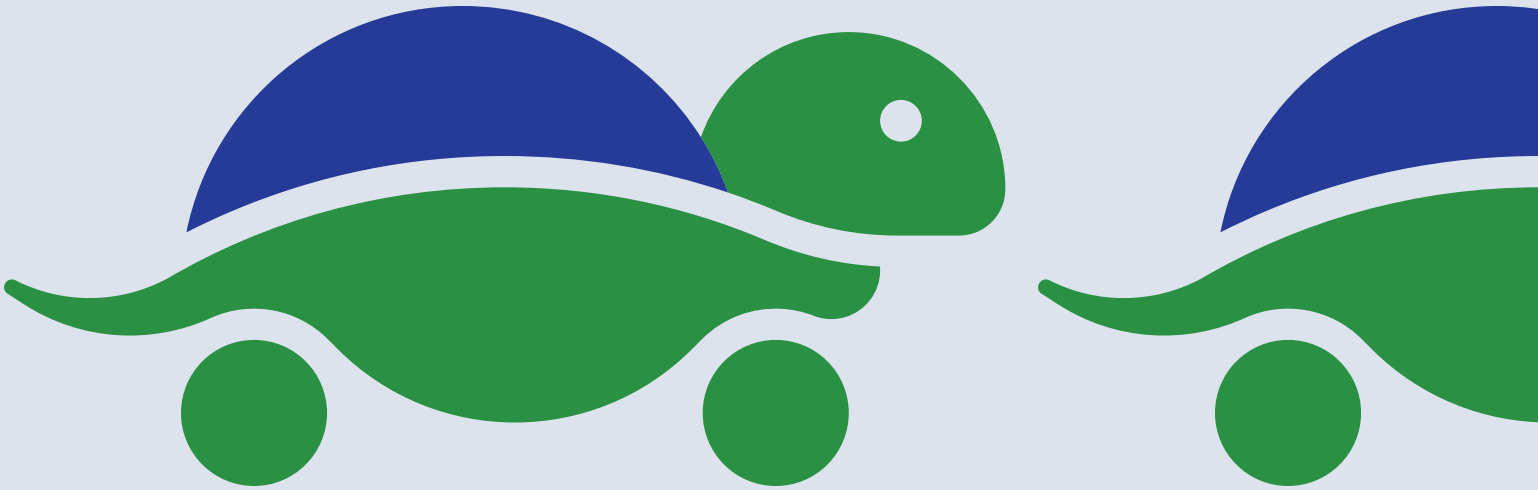




APPENDIX E

Cost Calculator & Funding Sources





APPENDIX F

Wayfinding Sign Plans