The Complete Street Myth: Can we get to AAA?
Complete Streets is a transportation policy and design approach that requires streets to be planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation. Complete Streets allow for safe travel by those walking, cycling, driving automobiles, riding public transportation, or delivering goods.
Transportation and Storm Water Department

- Bicycle Master Plan 2013
- Bicycle Advisory Committee 2014
- Comprehensive Sidewalk Assessment 2015
- Vision Zero 2015
- Pedestrian Crosswalk Policy update 2015
- Pedestrian Master Plan 2015
- Continental Crosswalk Standard 2015
- Climate Action Plan 2015
- Bicycle Advisory Board 2016
- Street Design Manual Update 2017
Transportation & Storm Water Department

Engineering
Creating safe, connected, and comfortable places for bicycling and walking

Encouragement
Fostering a culture that supports and encourages active transportation

Education
Equipping people with the knowledge, skills and confidence to bike and walk

Enforcement
Building safe and responsible behaviors on the road and building respect among all road users

Evaluation
Monitoring efforts to active transportation and planning for the future

Figure 1.4: The Five E’s Framework, including the overarching principle of equity.

Increasing access and opportunity for all residents, including disadvantaged, minority and low income populations.

sandiego.gov
Celebrating 50 Years!

Davis, CA
The Small City
Responsible for
America's First
Bike Lane in
1967
Figure 2.2: City Projected GHG Emission Levels and Reduction Targets.

- **Forecasted BAU**
  - 2010 Baseline: 12,984,993
  - 2015: 14,124,690
  - 2020: 15,856,604
  - 2025: 16,716,020

- **2010 Baseline**
  - 2015: 12,984,993
  - 2020: 13,950,661
  - 2025: 15,016,329

- **Reduction Targets**
  - 2015: 11,037,244
  - 2020: 9,793,744
  - 2025: 7,790,996

- **After CAP Implementation**
  - 2015: 7,579,800
  - 2020: 6,492,497
  - 2025: 6,287,035
The City has identified FIVE BOLD STRATEGIES to reduce GHG emissions to achieve the 2020 and 2035 targets:

1. ENERGY & WATER EFFICIENT BUILDINGS
2. CLEAN & RENEWABLE ENERGY
3. BICYCLING, WALKING, TRANSIT & LAND USE
4. ZERO WASTE
5. CLIMATE RESILIENCY

**STRATEGY 3: BICYCLING, WALKING, TRANSIT & LAND USE**

**GOAL:**
Increase commuter bicycling opportunities.

**ACTION 3.3:**
Implement the City of San Diego’s Bicycle Master Plan to increase commuter bicycling opportunities.

**TARGET:**
Achieve 6% bicycle commuter mode share by 2020 and 18% mode share by 2035 in Transit Priority Areas.

**GHG REDUCTIONS:**

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG</td>
<td>19,077 MT/CO₂ₑ</td>
<td>50,574 MT/CO₂ₑ</td>
</tr>
</tbody>
</table>

**Table 18 Key Assumptions and Results for Commuter Bicycling**

<table>
<thead>
<tr>
<th>Year</th>
<th>Labor Force in TPAs</th>
<th>Mode Share Goals in TPAs (%)</th>
<th>Projected Number of Commuters Commuting by Bike</th>
<th>Round-trip Commute Distance (Miles)</th>
<th>VMT Avoided Due to Bicycle Commuters (Miles)</th>
<th>GHG Reduced (MT CO₂ₑ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>433,128</td>
<td>6.0%</td>
<td>25,988</td>
<td>8</td>
<td>53,016,150</td>
<td>19,077</td>
</tr>
<tr>
<td>2035</td>
<td>482,540</td>
<td>18.5%</td>
<td>89,270</td>
<td>8</td>
<td>182,110,596</td>
<td>50,574</td>
</tr>
</tbody>
</table>
## New Crosswalk Policy

### CROSSING TREATMENTS

<table>
<thead>
<tr>
<th>Crossing Distance</th>
<th>Roadway ADT (vehicles per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 1,500</td>
</tr>
<tr>
<td>&lt; 40’</td>
<td>A</td>
</tr>
<tr>
<td>40’ to 52’</td>
<td>A</td>
</tr>
<tr>
<td>&gt; 52’</td>
<td>A</td>
</tr>
</tbody>
</table>

- **A** Standard Signage Only
- **B** One Additional Treatment
- **C** Two Additional Treatments
- **D** Signal or Combination of Treatments
Green Zones & Diets

- Improve Roadway Safety
- Highlight Conflict Areas
- Assign More Space for Bikeways
- Increase Bike Mode Share with Low Cost Quick Deployment Efforts
Fairmount Avenue at Olive Street
Transportation & Storm Water Department

Ulric Street
Madison Avenue
5th Avenue at Laurel Street
Transportation & Storm Water Department

Linda Vista Road at Via Las Cumbres

Uphill Bike Lanes and Downhill Shared Use Lanes

Narrow Lanes with Consistent Right Edge Control
Transportation & Storm Water Department

Via Las Cumbres

Uphill Bike Lanes and Downhill Shared Use Lanes
Conflicts Zone Treatments – Green Zones

Design Guidance

Colored Bike Facilities

Optional Features

- Color may be applied within conflict areas for increased visibility of bicyclists.
- Color may be applied along a dashed pattern within a dashed bicycle lane to indicate merging areas. Dashed application of colored pavement mimics typical traffic signing layouts, where dashed markings indicate areas where merging maneuvers are permitted.

Required Features

- The color green shall be used to minimize confusion with other standard traffic control markings.
- Color shall be applied to the road surface to delineate areas to increase visibility and emphasize proper vehicle priority.
- Normal white bike lane lines shall be provided along the edges of the colored lanes to provide consistency with other facilities and to enhance nighttime visibility.

Recommended Features

- The colored surface should be skid-resistant and retro-reflective.
- The color green shall be used at intersections or driveway crossings to reinforce that bicyclists have the right-of-way at colored bike lane areas.
- The configuration of color should be consistently applied throughout the corridor.
Conflict Zone, Bike Lane and Cycle Track

Friars Road at Napa Street
Transportation & Storm Water Department

Voltaire Street at Mendocino Blvd

- Uphill Bike Lanes
- Downhill Shared Use Lanes
- Conflict Zone Treatment

sandiego.gov
Transportation & Storm Water Department

Conflict Zone at Free Right

W Morena Blvd at Morena Blvd
Morena Blvd at Linda Vista Road
Wabaska Drive
Parking Buffered
Cycle Track
Transportation and Storm Water Department

<table>
<thead>
<tr>
<th>Total Bicycle Lane Miles Designed</th>
<th>Pavement Preservation</th>
<th>Group Job</th>
<th>Traffic Request</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>193.0</td>
<td>26.9</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Total (mi)</strong></td>
<td><strong>232.9</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Breakdown:**
- **Bicycle Facility Improvement Type**
  - New Bicycle Facility (Class II) 57.1
  - Existing Bicycle Facility Improvements 171.9
  - Existing Bicycle Facility Replaced In Kind 4.0
  - **Total (mi) 232.9**

- **Bicycle Facility Category Type**
  - Class I - Bike Path
  - Class II - Painted Bicycle Lane 1.3
  - Class II - Bicycle Lane Buffered on Both Sides 2.4
  - Class II - Outside Buffered Bicycle Lane 197.0
  - Class II - Inside Buffered Bicycle Lane 0.5
  - Class II - Standard Bicycle Lane 9.4
  - Class III - Standard Bicycle Route 1.6
  - Class III - Bicycle Route with Sharrow 17.7
  - Class IV - Two Way Cycle Track w/Barrier 3.0
  - **Total (mi) 232.9**

- **Other Bicycle Facility Improvements**
  - Green Painted Conflict Zone Treatment 92
  - Bike Racks 637
  - Bike Corrals 13

<table>
<thead>
<tr>
<th>Bikeway</th>
<th>Existing</th>
<th>Improved</th>
<th>% Improved</th>
<th>Proposed</th>
<th>Implemented</th>
<th>% Implemented</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I - Bike Path</td>
<td>74.0</td>
<td>--</td>
<td>--</td>
<td>90.6</td>
<td>--</td>
<td>--</td>
<td>164.6</td>
</tr>
<tr>
<td>Class II - Bike Path</td>
<td>638.1</td>
<td>154.0</td>
<td>22.2%</td>
<td>307.9</td>
<td>57.1</td>
<td>18.5%</td>
<td>946</td>
</tr>
<tr>
<td>Class III - Bike Route</td>
<td>278.6</td>
<td>17.7</td>
<td>6.4%</td>
<td>347</td>
<td>--</td>
<td>--</td>
<td>625.6</td>
</tr>
<tr>
<td>Class II or III (TBD)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>285.4</td>
<td>--</td>
<td>--</td>
<td>285.4</td>
</tr>
<tr>
<td>Freeway Shoulder</td>
<td>16.1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>16.1</td>
</tr>
<tr>
<td>Bicycle Boulevard</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>78.8</td>
<td>--</td>
<td>78.8</td>
</tr>
<tr>
<td>Cycle Track</td>
<td>4.3</td>
<td>3.1</td>
<td>61.0%</td>
<td>18.3</td>
<td>0.5</td>
<td>2.7%</td>
<td>22.6</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>1011.1</td>
<td>175.3</td>
<td>17.3%</td>
<td>1123.7</td>
<td>45.6</td>
<td>4.1%</td>
<td>2134.8</td>
</tr>
</tbody>
</table>

**Bicycling & Walking in the United States 2016**

City of San Diego
Bicycle Master Plan
San Diego, California

Benchmarking Report

sandiego.gov
APPENDIX B
REVENUE CONSTRAINED BICYCLE NETWORK

SAN DIEGO
REGIONAL BICYCLE PLAN

PROPOSED REGIONAL BICYCLE NETWORK

CLASS I - BIKE PATH

CLASS II - BIKE LANE

CLASS III - BIKE ROUTE

BICYCLE BOULEVARD

ENHANCED CLASS II - BIKE LANE

ENHANCED CLASS III - BIKE ROUTE

FREeway SHOULDER

Transportation & Storm Water Department

Regional Bikeway Projects

Introduction

The Bike Plan engages stakeholders to identify new bike facilities and bikeway network elements. In order to ensure that the projects identified for construction are consistent with existing bike facilities within the regional network, the Bike Plan projects were developed through the Regional Transportation Plan (RTP). The Bike Plan projects are consistent with the goals and strategies of the RTP.

Implementation

Implementation of the Bike Plan projects is expected to begin in 2023. The Bike Plan projects will be implemented in phases, with the first phase expected to be completed by 2026. The projects will be prioritized based on their alignment with the regional transportation network and their potential to improve connectivity and accessibility for bike riders.

Conclusion

The Bike Plan projects are an important step in the development of a regional bike network that is safe, convenient, and accessible to all. The Bike Plan will continue to evolve as new projects are identified and implemented, and as the bike network continues to grow and improve.
Class IV Bikeway (Cycle Track) – Also referred to as separated or protected bikeways, cycle tracks provide a right-of-way designated exclusively for bicycle travel within the roadway and physically protected from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, or on-street parking.

### Table 9-1
Short-Range Parking Changes

<table>
<thead>
<tr>
<th>Improvement Type</th>
<th>Spaces Lost/Gained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycleways</td>
<td>-331</td>
</tr>
<tr>
<td>14th St. &amp; E St. Greenways</td>
<td>-242</td>
</tr>
<tr>
<td>Angled Parking Conversion</td>
<td>+600</td>
</tr>
<tr>
<td>East Village Green Garage</td>
<td>+200</td>
</tr>
<tr>
<td><strong>Net Change</strong></td>
<td><strong>+227</strong></td>
</tr>
</tbody>
</table>

### Table 13-4
Planning Level Cost Estimation

<table>
<thead>
<tr>
<th>Improvement Type</th>
<th>Cost (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenways</td>
<td>$25.75</td>
</tr>
<tr>
<td>Pedestrian Improvements</td>
<td>$7.22</td>
</tr>
<tr>
<td>Bicycle Improvements</td>
<td>$10.50</td>
</tr>
<tr>
<td>Roadway Improvements</td>
<td>$19.32</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$62.79</strong></td>
</tr>
</tbody>
</table>
Attachment IA-16-2
Example of How to Prohibit a Left-Turning Bike Movement

Legend
=> Direction of travel

★ Four-section signal faces are typically used when the straight through green arrow and right-turn (or left-turn) green arrow always begin and terminate together.
★ ★ Five-section signal faces are typically used when the straight through green arrow and the right-turn (or left-turn) green arrow do not begin and/or terminate together.
National Association of City Transportation Officials
Recent FHWA Pedestrian and Bicycle Resources

Available at www.fhwa.dot.gov/environment/bicycle_pedestrian
Achieving Multimodal Networks: Design Speed

“The severity of pedestrian crashes, a significant concern in urban areas, is greatly increased as speeds increase.”

AASHTO Flexibility Guide 2004, p. 19
### Table 1. Levels of Traffic Stress (LTS)

<table>
<thead>
<tr>
<th>LTS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTS 1</td>
<td>Presenting little traffic stress and demanding little attention from cyclists, and attractive enough for a relaxing bike ride. Suitable for almost all cyclists, including children trained to safely cross intersections. On links, cyclists are either physically separated from traffic, or are in an exclusive bicycling zone next to a slow traffic stream with no more than one lane per direction, or are on a shared road where they interact with only occasional motor vehicles (as opposed to a stream of traffic) with a low speed differential. Where cyclists ride alongside a parking lane, they have ample operating space outside the zone into which car doors are opened. Intersections are easy to approach and cross.</td>
</tr>
<tr>
<td>LTS 2</td>
<td>Presenting little traffic stress and therefore suitable to most adult cyclists but demanding more attention than might be expected from children. On links, cyclists are either physically separated from traffic, or are in an exclusive bicycling zone next to a well-confined traffic stream with adequate clearance from a parking lane, or are on a shared road where they interact with only occasional motor vehicles (as opposed to a stream of traffic) with a low speed differential. Where a bike lane lies between a through lane and a right-turn lane, it is configured to give cyclists unambiguous priority where cars cross the bike lane and to keep car speed in the right-turn lane comparable to bicycling speeds. Crossings are not difficult for most adults.</td>
</tr>
<tr>
<td>LTS 3</td>
<td>More traffic stress than LTS 2, yet markedly less than the stress of integrating with multilane traffic, and therefore welcome to many people currently riding bikes in American cities. Offering cyclists either an exclusive riding zone (lane) next to moderate-speed traffic or shared lanes on streets that are not multilane and have moderately low speed. Crossings may be longer or across higher-speed roads than allowed by LTS 2, but are still considered acceptably safe to most adult pedestrians.</td>
</tr>
<tr>
<td>LTS 4</td>
<td>A level of stress beyond LTS 3.</td>
</tr>
</tbody>
</table>

MTI Report 11-19

sandiego.gov
**Complete Streets** is a transportation policy and design approach that requires streets to be planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation. Complete Streets allow for safe travel by those walking, cycling, driving automobiles, riding public transportation, or delivering goods.

*Wikipedia · Text under CC-BY-SA license*
Conflicts Increase with Speed & Volume

This chart illustrates the number of passing events (at increasing motor vehicle average speed and volume) experienced over a 10-minute period by a bicyclist riding 10 mph. As motor vehicle speed and volume increase, they magnify the frequency of stressful events for people bicycling.
Sources of Stress Change Throughout the Day

Large fluctuations in motor vehicle traffic volume between morning, mid-day, afternoon, and nighttime result in radically different bicycling conditions on the same street throughout the day. The example at right shows a street with roughly 500 vehicles per direction per hour during the peak. While queuing stress occurs at peak times, low off-peak volume results in dangerously high motor vehicle speeds.
### Table 2. Criteria for Bike Lanes Alongside a Parking Lane

<table>
<thead>
<tr>
<th>Criterion</th>
<th>LTS ≥ 1</th>
<th>LTS ≥ 2</th>
<th>LTS ≥ 3</th>
<th>LTS ≥ 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street width (through lanes per direction)</td>
<td>1</td>
<td>(no effect)</td>
<td>2 or more</td>
<td>(no effect)</td>
</tr>
<tr>
<td>Sum of bike lane and parking lane width (includes marked buffer and paved gutter)</td>
<td>15 ft. or more</td>
<td>14 or 14.5 ft.*</td>
<td>13.5 ft. or less</td>
<td>(no effect)</td>
</tr>
<tr>
<td>Speed limit or prevailing speed</td>
<td>25 mph or less</td>
<td>30 mph</td>
<td>35 mph</td>
<td>40 mph or more</td>
</tr>
<tr>
<td>Bike lane blockage (typically applies in commercial areas)</td>
<td>rare</td>
<td>(no effect)</td>
<td>frequent</td>
<td>(no effect)</td>
</tr>
</tbody>
</table>

*Note: (no effect) = factor does not trigger an increase to this level of traffic stress.
*a If speed limit < 25 mph or Class = residential, then any width is acceptable for LTS 2.

### Table 3. Criteria for Bike Lanes Not Alongside a Parking Lane

<table>
<thead>
<tr>
<th>Criterion</th>
<th>LTS ≥ 1</th>
<th>LTS ≥ 2</th>
<th>LTS ≥ 3</th>
<th>LTS ≥ 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street width (through lanes per direction)</td>
<td>1</td>
<td>2, if directions are separated by a raised median</td>
<td>more than 2, or 2 without a separating median</td>
<td>(no effect)</td>
</tr>
<tr>
<td>Bike lane width (includes marked buffer and paved gutter)</td>
<td>6 ft. or more</td>
<td>5.5 ft. or less</td>
<td>(no effect)</td>
<td>(no effect)</td>
</tr>
<tr>
<td>Speed limit or prevailing speed</td>
<td>30 mph or less</td>
<td>(no effect)</td>
<td>35 mph</td>
<td>40 mph or more</td>
</tr>
<tr>
<td>Bike lane blockage (may apply in commercial areas)</td>
<td>rare</td>
<td>(no effect)</td>
<td>frequent</td>
<td>(no effect)</td>
</tr>
</tbody>
</table>

*Note: (no effect) = factor does not trigger an increase to this level of traffic stress.

### Table 4. Criteria for Level of Traffic Stress in Mixed Traffic

<table>
<thead>
<tr>
<th>Speed Limit</th>
<th>2-3 lanes</th>
<th>4-5 lanes</th>
<th>6+ lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 25 mph</td>
<td>LTS 1* or 2*</td>
<td>LTS 3</td>
<td>LTS 4</td>
</tr>
<tr>
<td>30 mph</td>
<td>LTS 2* or 3*</td>
<td>LTS 4</td>
<td>LTS 4</td>
</tr>
<tr>
<td>35+ mph</td>
<td>LTS 4</td>
<td>LTS 4</td>
<td>LTS 4</td>
</tr>
</tbody>
</table>

*Note: Use lower value for streets without marked centerlines or classified as residential and with fewer than 3 lanes; use higher value otherwise.

### Table 5. Level of Traffic Stress Criteria for Pocket Bike Lanes

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Level of Traffic Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single right-turn lane up to 150 ft. long, starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤ 15 mph.</td>
<td>LTS ≥ 2</td>
</tr>
<tr>
<td>Single right-turn lane longer than 150 ft. starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤ 20 mph.</td>
<td>LTS &gt; 3</td>
</tr>
<tr>
<td>Single right-turn lane in which the bike lane shifts to the left but the intersection angle and curb radius are such that turning speed is ≤ 15 mph.</td>
<td>LTS &gt; 3</td>
</tr>
<tr>
<td>Single right-turn lane with any other configuration; dual right-turn lanes; or right-turn lane along with an option (through-right) lane.</td>
<td>LTS = 4</td>
</tr>
</tbody>
</table>
## Contextual Guidance for Selecting All Ages & Abilities Bikeways

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Any</td>
<td>Any</td>
<td>Any</td>
<td>Any</td>
<td>Any of the following: high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts</td>
<td>Protected Bicycle Lane</td>
</tr>
<tr>
<td>&lt; 10 mph</td>
<td>Less relevant</td>
<td>≤ 1,000 – 2,000</td>
<td>No centerline, or single lane one-way</td>
<td>Pedestrians share the roadway</td>
<td>Shared Street</td>
</tr>
<tr>
<td>≤ 20 mph</td>
<td></td>
<td>≤ 500 – 1,500</td>
<td>Single lane each direction, or single lane one-way</td>
<td>&lt; 50 motor vehicles per hour in the peak direction at peak hour</td>
<td>Bicycle Boulevard</td>
</tr>
<tr>
<td>≤ 25 mph</td>
<td></td>
<td>≤ 1,500 – 3,000</td>
<td>Single lane each direction, or single lane one-way</td>
<td>Low curbside activity, or low congestion pressure</td>
<td>Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤ 3,000 – 6,000</td>
<td>Multiple lanes per direction</td>
<td></td>
<td>Protected Bicycle Lane</td>
</tr>
<tr>
<td></td>
<td>Greater than 6,000</td>
<td>Any</td>
<td>Any</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater than 26 mph</td>
<td></td>
<td>≤ 6,000</td>
<td>Single lane each direction</td>
<td>Low curbside activity, or low congestion pressure</td>
<td>Protected Bicycle Lane, or Reduce Speed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multiple lanes per direction</td>
<td></td>
<td></td>
<td>Protected Bicycle Lane, or Reduce to Single Lane &amp; Reduce Speed</td>
</tr>
<tr>
<td></td>
<td>Greater than 6,000</td>
<td>Any</td>
<td>Any</td>
<td></td>
<td>Protected Bicycle Lane, or Bicycle Path</td>
</tr>
<tr>
<td></td>
<td>High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts</td>
<td>Any</td>
<td>High pedestrian volume</td>
<td>Bike Path with Separate Walkway or Protected Bicycle Lane</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low pedestrian volume</td>
<td></td>
<td></td>
<td>Shared-Use Path or Protected Bicycle Lane</td>
</tr>
</tbody>
</table>
Questions?