San Francisco Bicycle Route Network

Bike Network: 208 Total Miles

31 Miles of Bike Path

45 Miles of Bike Lanes

132 Miles of Shared Roadways (23 with sharrows)

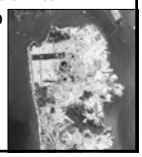
- 53 Miles of Wide Curb Lanes
- 79 Miles of Narrow Curb Lanes

San Francisco – General Info

Area: ~50 square miles

Pop: ~750,000

Terrain: Hilly



Shared Lane Roadways

- **High incidence of "dooring,"**
- **Wrong-way riding,**
- **Sidewalk riding, and**
- **Motorists squeezing cyclists against the curb or parked cars, or exhibiting other aggressive behaviors.**

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Doorings

Doorings are one of the most common bicycle collision type in San Francisco.

www.cardoordeathtrap.org

"The Door is Always Open"

Courtesy of "Department of Public Art" - 1993

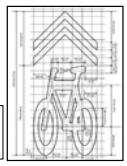
History

1995 – Denver develops "bike-in-house"
1998 – SF applies elongated version of bike-in-house in green
2000 – SF goes to California Traffic Control Device Committee
2001 – Plan for experiment approved
2003 – Study by Alta completed
2004 – CTCDC approves study and recommends language for CA MUTCD
2007 – Marking included in draft MUTCD

SF Mayor Willie Brown - 1998

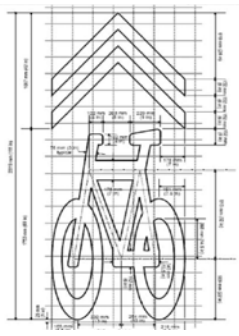
- *1300 markings installed in SF*
- *4000+ additional markings planned*

"Bike-in-House" in Denver



Final approved design

Shared Lane Marking – aka Sharrow



New replacing the old

In study of shared roadways, marking was found to:

- **Increase distance between cyclists and parked cars**
- **Increase distance between motorists and cyclists**
- **Reduce number of cyclists on sidewalk**
- **Reduce number of cyclists riding the wrong way on road**

However, not meant to replace bike lanes!

Tailcard for back of buses – part of educational campaign

Draft Language for MUTCD

Section 9C.07 Shared Lane Marking

Option:

The Shared Lane Marking shown in Figure 9C-9 may be used to:

A. Assist bicyclists with lateral positioning in a shared lane with on-street parallel parking in order to reduce the chance of a bicyclist's impacting the open door of a parked vehicle,
B. Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane,
C. Alert road users of the lateral location bicyclists are likely to occupy within the traveled way,
D. Encourage safe passing of bicyclists by motorists, and
E. Reduce the incidence of wrong-way bicycling.

Guidance:

The Shared Lane Marking should not be placed on roadways that have a speed limit above 50 km/h or 35 mph.

Standard:

Shared Lane Markings shall not be used on shoulders or in designated bicycle lanes.

If used in a shared lane with on-street parallel parking, Shared Lane Markings shall be placed so that the centers of the markings are at least 3.4 m (11 ft) from the face of the curb, or from the edge of the pavement where there is no curb.

Guidance:

If used on a street without on-street parking that has an outside travel lane that is less than 4.3 m (14 ft) wide, the centers of the Shared Lane Markings should be at least 1.2 m (4 ft) from the face of the curb, or from the edge of the pavement where there is no curb.

If used, the Shared Lane Marking should be placed immediately after an intersection and spaced at intervals not greater than 75 m (250 ft) thereafter.

Placement Guidelines for San Francisco

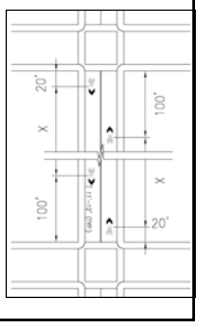
Laterally:

- 11' minimum with parking
- 11.5' general standard with parking
- May increase if higher cycling speeds are expected

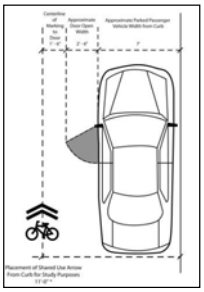
If no parking, marking should be placed far enough from curb to direct cyclists away from gutters, seams, and other obstacles, or near center of lane if lane is less than 14' wide

Longitudinally (along roadway):

- X = 250' +/- 50'
- X may be decreased if ADT divided by number of lanes is greater than 5000 or if prevailing speeds are 30mph or greater
- X may be increased if ADT divided by number of lanes is less than 2000 or curb lane is wider than 22'



Plan View of Marking Placement



Marking placed 11' from curb face for study:
Doors open to ~ 9'6"
Bicyclist width: ~ 2'

Summation: 9'6" + 2'/2 = 10'6"

Round up for some buffer to 11' for minimum

Placement Along Roadway

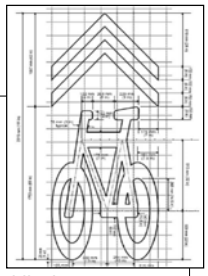
Number of markings along a roadway should correspond to difficulty of cyclists trying to take proper travel path.

Examples:

- **On quiet neighborhood street with wide lanes, place marking every 250' or more**
- **On arterial with heavy traffic, narrow lanes, and high parking turnover, place marking every 100' or less**

Consider: If motorists travel 30mph (or ~45 feet per second), motorist will pass marking placed 200' every ~4.5 seconds

Warrants



Data/Information to Consider

- Bike Route?
- Curb lane width
- Parking turnover
- Traffic volumes
- Dooring, overtaking, mid-block bicycle collision history
- Gap in otherwise continuous bike path or bike lane
- Current demand by cyclists
- Prevailing speeds by motor vehicles and cyclists
- Prevalence of cyclists riding on sidewalk or in wrong direction
- Observations of cyclists using improper lane placement
- Anticipated addition of bike lane to street

Specific Scenarios

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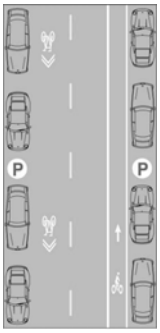
Hill or Narrow Street

- **On hills, where downhill bike lanes are generally not desirable, or**
- **Where street width has space for bike lane in only one direction***
- **Place marking in middle of lane**

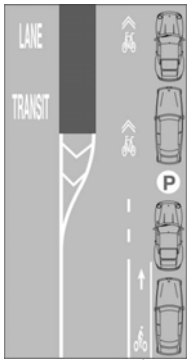


***Undesirable to split road width and have two 12' to 13' lanes that are not wide enough to ride outside door zone and share lane with motorists, and not narrow enough to easily "take the lane"**

Discontinued Bike Lane due to Roadway Narrowing

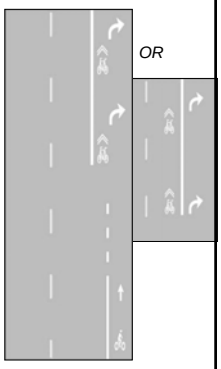
- **No room for bike lane or for cyclists and motorists to share lane side by side**
- **Guide cyclists to "take the lane"**
- **Discontinuity of bike lane undesirable but generally for short distance, so use marking somewhat frequently: spaced 50' – 100'**

- **Consider using BIKE MERGE AHEAD pavement message**



Discontinued Bike Lane for Right Turn Lane

- **No room for through bike lane**
- **Guide cyclists away from right side of right turn lane**
- **Use judgment for placing marking in left half of right turn lane or in through lane**



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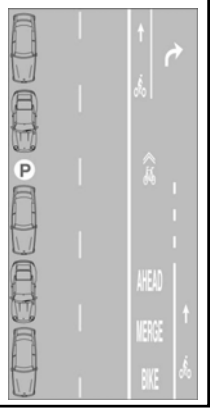
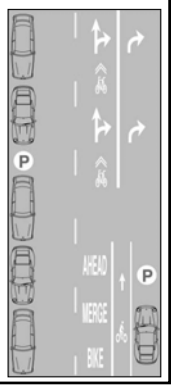
Lane Drop for Right Turn Only Lane

- **Travel lane along bike lane becomes right turn only. Avoid this design.**
- **If unavoidable, use marking to tell motorists that cyclists will be merging across lane**
- **Place marking in the middle of the lane. Consider using multiple markings if movement is difficult for cyclists**
- **Consider supplementing with BIKE MERGE AHEAD pavement message**



Double Turn Lanes

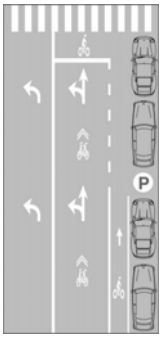
- **Double turn lanes not desirable for cyclists (or peds)**
- **If unavoidable, add markings in middle of through/turn lane**
- **Consider adding BIKE MERGE AHEAD pavement marking**



Double Turn Lanes with Bike Box

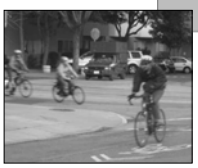
Two basic scenarios for cyclists approaching bike box designed to position cyclists for turns or for "taking the lane" after the intersection:

- **On a red light, via a bike lane**
- **On a green, by being in the lane; SLM can be used to help cyclist take the lane**



Route Finding

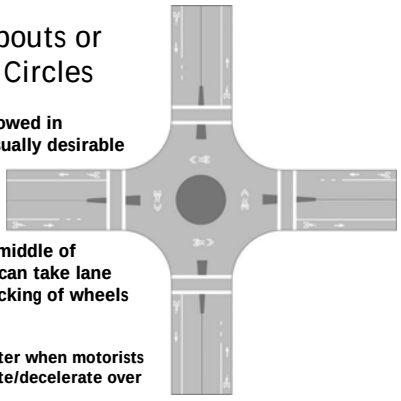
- **Helpful for guiding cyclists**



- **Place first marking on each block fairly close to intersection (10' to 20' away) - easier to see from cross streets**

Roundabouts or Traffic Circles

- **Bike lanes not allowed in roundabouts, nor usually desirable**

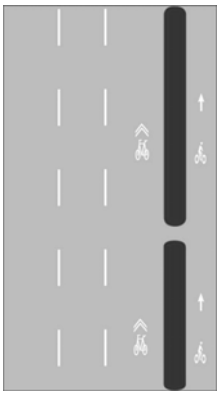


- **Place marking in middle of roadway so cyclists can take lane and to minimize tracking of wheels over marking***

***markings wear out faster when motorists turn across or accelerate/decelerate over them**

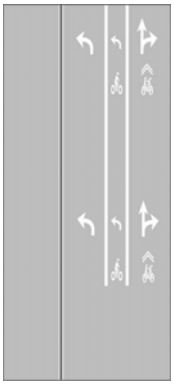
Along Separated Bikeways

- **Separated bikeways along the roadway include one- or two-way paths**
- **Preferable to still allow cyclists to use roadway, especially faster cyclists**
- **Marking notifies motorists that cyclists may use roadway**
- **Place marking in middle of the lane, unless lane is wide enough for cyclists and motorists to safely share lane side-by-side**



Space for Only One Bike Lane

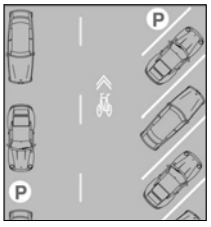
- **Desire for bike lanes for through cyclists and left turning cyclists, but space available for only one bike lane**
- **Preferable to give space to left turns, the more difficult movement**
- **SLM still gives cyclists some marking in right lane**
- **Place marking in middle of the lane**

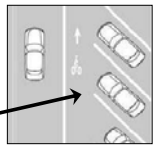


Diagonal Parking

- **Bike lane generally not desirable along angled parking***
- **Place marking in middle of lane, unless space from edge of largest anticipated parked vehicle to centerline is very wide (~18'+)**
- **If lane is very wide, may place marking outside of travel way for motor vehicles**
- **Still place as far left as possible, 11' to 12' from yellow stripe, to give buffer between backing vehicles and cyclists**

***Consider back-in angled parking**



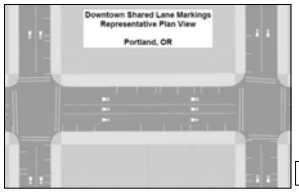


Other Applications

Salt Lake City

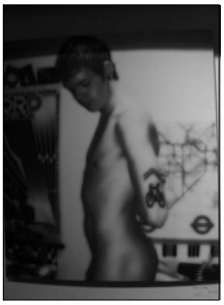
Montreal

Paris



Portland

Other Applications



Materials, Cost, Maintenance

Material Used: Methylmethacralate

Cost per marking: ~$150
includes planning/engineering and paint shop labor and material, somewhat conservative estimate

Maintenance: 2-5+ years (rough estimate)
depends on care of installation, location of marking relative to tire tracks and intersection, and number of vehicles

Same Marking, after 10-11 million tires:

Installation Spring 2003

July 2007

Market @ Gough Sharrow	
Peak Hour Traffic	693 v/hr
ADT	6,930 v/day
2 lanes	3,465 v/lane/day
x 2 axles / vehicle	6,930 tires/marking/day
x 365 days	2,529,450 tires/marking/year
x 60 months/12 mo/yr	10,539,375 Total Tire Contact
Rounded	**10 to 11 million tires**

Various Outreach Examples

Bicycling Continues to Grow

- **2007 Census ACS:**
  - 2.7% bicycle to work in SF
  - US Average = 0.5%
  - CA Average = 0.9%
- **Citywide Bicycle Count :**
  - 14% increase in bicycling 2006- 07
  - 25% increase in bicycling 2007- 08
- **2008 SFMTA Survey Results:**
  - 6% of all trips in San Francisco made by bicycle

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Bicycling Context

U.S. Comparison

2007 Census ACS		
CITY	**POPULATION**	**% COMMUTING BY BICYCLE**
Portland, OR	550,795	4.2
San Francisco, CA	**764,976**	**2.7**
Seattle, WA	577,231	2.4
Washington, DC	588,292	1.8
Boston, MA	613,117	1.0
New York, NY	8,274,527	0.7

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Cities Using Shared Lane Markings

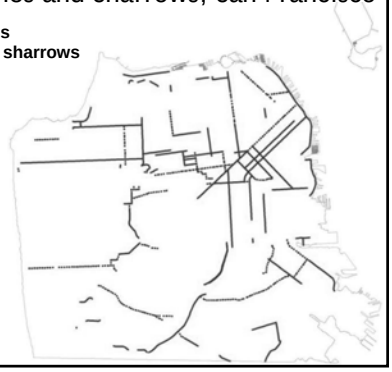
77 cities, 30 states + D.C

Compiled February, 2009 by Roger Geller

Alexandria (VA)
Ann Arbor (MI)
Arcata (CA)
Arlington (VA)
Athens (GA)
Austin (TX)
Baltimore (MD)
Bellevue (WA)
Berkeley (CA)
Bethlehem (PA)
Bloomington (IN)
Boston (MA)
Boulder (CO)
Burlington (VT)
Cambridge (MA)
Capitola (CA)
Carlisle (MA)
Chattanooga (TN)
Chicago (IL)
Cleveland (OH)
Columbia (MO)
Corvallis (OR)
Denver (CO)
El Cerito (CA)
Elgin (IL)
Emeryville (CA)
Evansville (IN)
Flagstaff (AZ)
Fort Collins (CO)
Goleta (CA)
Greenville (SC)
Ithaca (NY)
Jefferson Parish (LA)
Lafayette (CA)
Long Beach (CA)
Los Angeles (CA)
Louisville (KY)
Miami Beach (FL)
Missoula (MT)
New York (NY)
Northbrook (IL)
Oakland (CA)
Ocean City (NJ)
Oceanside (CA)
Olympia (WA)
Pasadena (CA)
Petaluma (CA)
Philadelphia (PA)
Pittsburgh (PA)
Plaquemines Parish (LA)
Plano (TX)
Portland (OR)
Richmond (CA)
Sacramento (CA)
Salt Lake City (UT)
San Anselmo (CA)
San Francisco (CA)
San Rafael (CA)
Santa Barbara (CA)
Santa Clara (CA)
Santa Cruz (CA)
Santa Cruz County (CA)
Santa Fe (NM)
Seattle (WA)
Sheboygan (WI)
Somerville (MA)
Spartanburg (SC)
St. Louis (MO)
Somerville (MA)
Spartanburg (SC)
St. Louis (MO)
Sunnyvale (CA)
Tallahassee (FL)
Tucson (AZ)
UCLA Campus (CA)
Vancouver (WA)
Washington (DC)
West Hartford (CT)
Winter Park (FL)
In Canada:
Brantford (ON)
Calgary (AL)
Cambridge (ON)
Hamilton (ON)
Montreal (QU)
Saanich (BC)
Vancouver (BC)
University of BC (BC)

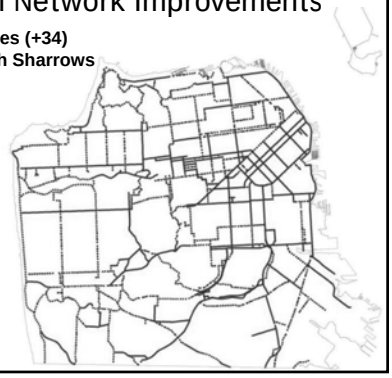
Existing Bike Lanes and Sharrows, San Francisco

45 miles of bicycle lanes
23 miles of streets with sharrows



Near Term Network Improvements

79 miles of bicycle lanes (+34)
98 miles of streets with Sharrows (+75)



For more information:

www.sfmta.com/bikes
Click on "Projects & Planning", then "Sharrow Planning"

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Sharrow along Grand Prix de San Francisco race course

Thanks to Alta for their work on the study and their assistance with the CTCDC approval process, to James Mackay for initiating the shared lane marking effort in the US, to James Shahamiri for development of many graphics for this presentation, and to Oliver Gajda for coining the handy and beloved term "sharrow."