BIKE HIGHWAYS

Creating a Path to the Future of Bicycling

August 20, 2025

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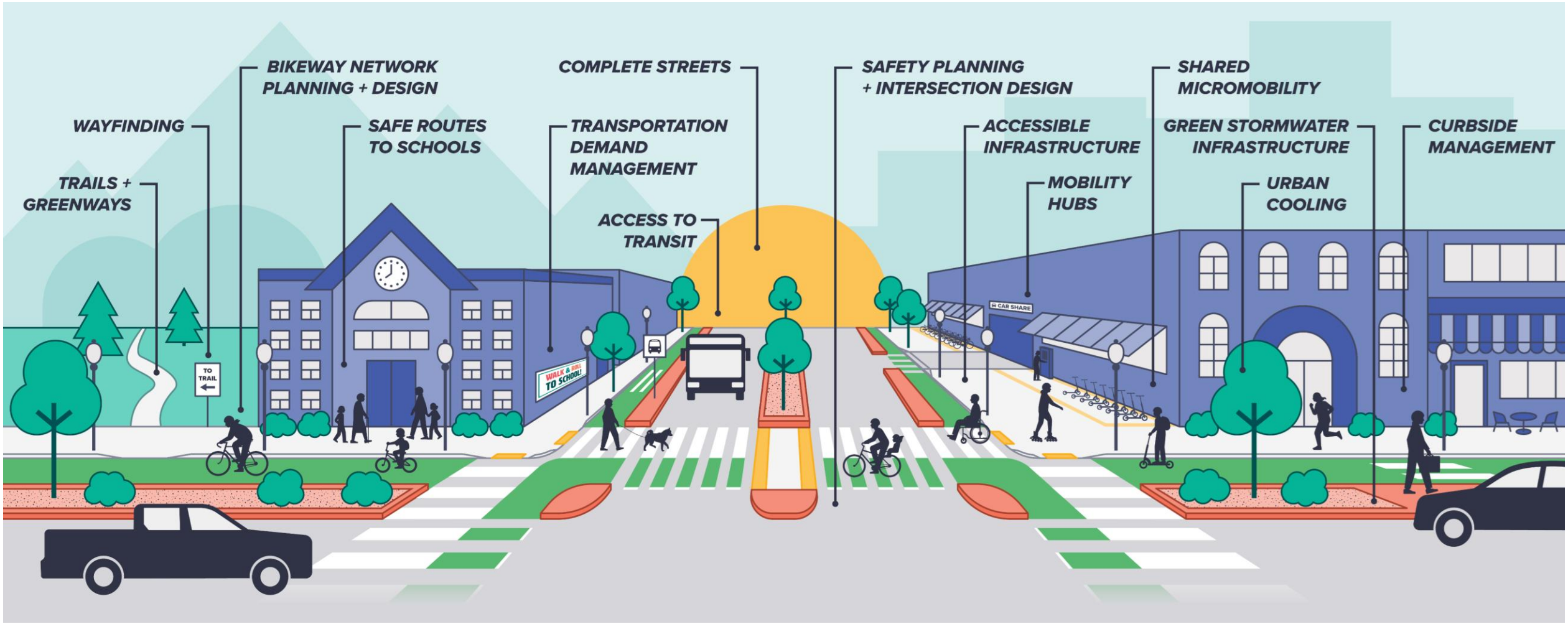
About Alta


WAYFINDING
BIKEWAY NETWORK PLANNING + DESIGN
SAFE ROUTES TO SCHOOLS
TRANSPORTATION DEMAND MANAGEMENT
COMPLETE STREETS
SAFETY PLANNING + INTERSECTION DESIGN
SHARED MICROMOBILITY
ACCESSIBLE INFRASTRUCTURE
GREEN STORMWATER INFRASTRUCTURE
CURBSIDE MANAGEMENT
TRAILS + GREENWAYS
ACCESS TO TRANSIT
MOBILITY HUBS
URBAN COOLING
TO TRAIL
WALK & ROLL TO SCHOOL!
CAR SHARE

BACKGROUND

What are Bike Highways?*

- High-quality, direct or dedicated, and long-distance bikeways
- Support higher speed travel
- Support large volumes of people bicycling
- Connect regional destinations

** Based on review of worldwide best practices*

Bike Highway in Denmark. Photo: Maurits Lopez Cardozo

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Intended Users

- Bicycle Commuters
- Recreational riders
- Powered micromobility
- E-bikes

Bike Highways in Bogotá, Netherlands, Xiamen.
Photos: Maurits Lopez Cardozo; Ma Weiwei

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PRINCIPLES AND ELEMENTS

Design Principles

- Direct
- Dedicated
- Higher speed
- Low Effort
- Increased Mobility

Bike Highways in Denmark, Bay Area.
Photos: Alta Planning + Design; Maurits Lopez Cardozo; Sergio Ruiz

Design Elements

- Alignment
- Intersections
- Materials and Amenities

Bike Highways in Denmark, Bay Area, Spain.
Photos: Alta Planning + Design- Maurits Lopez Cardozo; Sergio Ruiz

Alignment

- Levels of Separation
- Design Speeds
- Width
- Slope
- Vehicles Permitted

Bike Highway in Amsterdam . Photo: Alta Planning + Design

Intersections

- Access Points and Connections to Local Bikeways
- Intersection/Crossing Treatments
- Intelligent Transportation System Features

Bike Highways in Denmark.
Photos: Alta Planning + Design
Maurits Lopez Cardozo

Materials and Amenities

- Surface Materials
- Branding/Wayfinding
- Lighting
- Support Facilities

Bike highways in Spain, Denmark. Photos: Alta Planning + Design; Maurits Lopez Cardozo

DESIGN CONSIDERATIONS

Bike Highway Design Guiding Principle

In the Bay Area and California, Bike Highways may best be thought as a route "**overlay**" intended for a specific type of user (i.e., higher speed, longer distance cycling), rather than a single specific facility type.

User Speed and Needs*

- People Bicycling
- People Walking
- Other Rolling Users







User Type	Average Speed of Travel	Dimensional Needs	
WALKERS	1 to 3 mph	• Physical Width • Preferred Operating Space • Eye Level • Min. Eye Level	1'-10" 5'-0" 4'-6" - 5'10" 2'-6"
RUNNERS	5 to 9 mph		
WHEELCHAIR USERS	1 to 3 mph (non-motorized) 3-5 mph (motorized)	• Physical Width • Minimum Operating Space • Space Needed for 180° Turn • Eye Level • Arm Rest	2'-6" 3'-0" 4'-0" 3'-8" 2'-5"
CASUAL AND NEW CYCLISTS	6 to 12 mph		
EXPERIENCED CYCLISTS	12 to 25 mph	• Physical Width • Minimum Operating Space • Preferred Operating Space • Handle Bar • Eye Level	2'-6" 3'-6" 5'-0" 3'-8" 5'-0" - 5'-10"
E-BIKE USERS*	16 to 28 mph	* Class 1, 2 and 3 (use, access and equipment restrictions apply to Class 3); electric tricycles; electric cargo bikes; and pedal-les e-bikes. Class 1 and 2 e-bikes are throttle-limited to 20 mph.	
E-SCOOTER USERS	Up to 20 mph	• Physical Width • Minimum Operating Space • Preferred Operating Space • Handlebar • Eye Level	2'-6" 3'-6" 5'-0" 3'-8" 4'-6" - 5'-10"

*Based on HDM Guidance

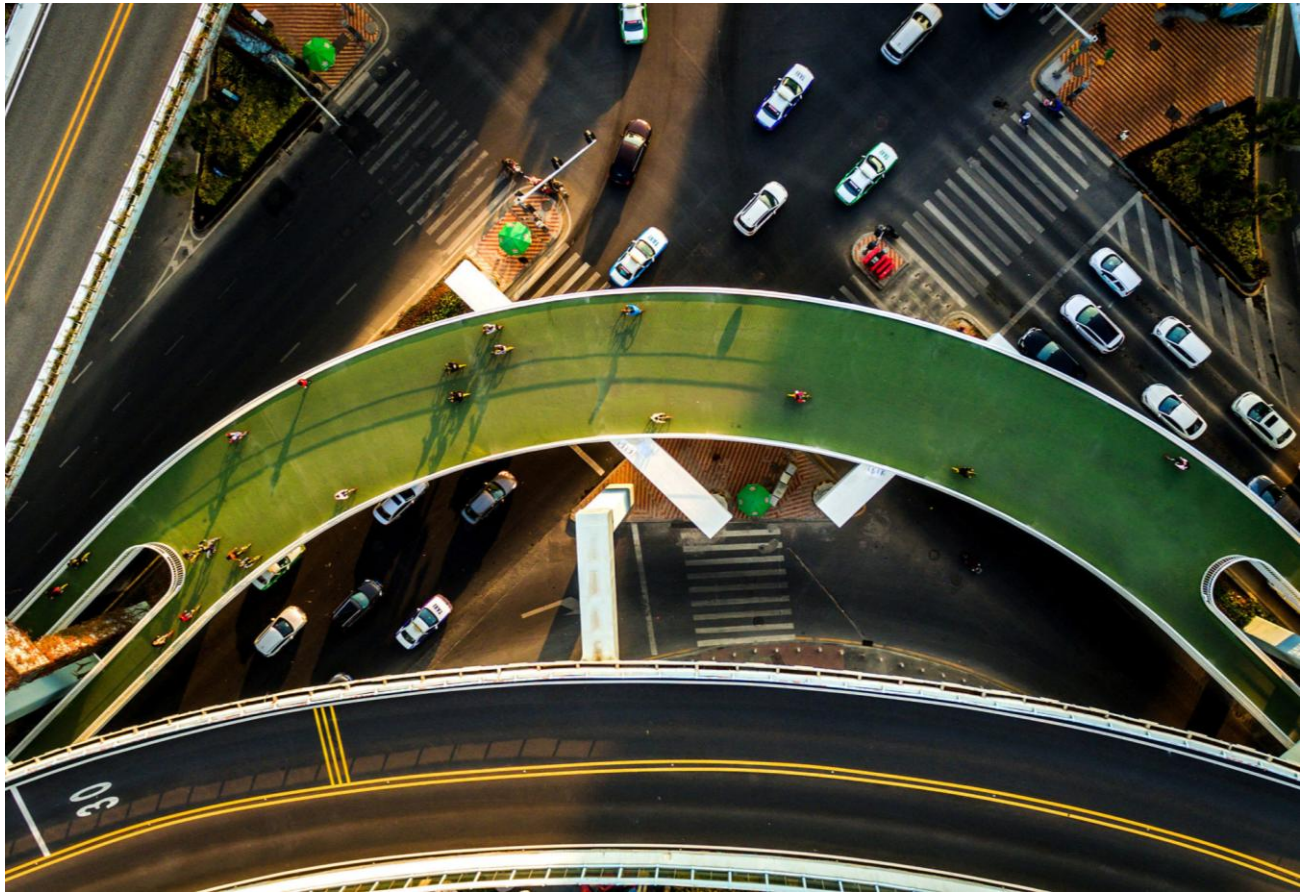
Facility Design | Design Speed

Selected speed used to determine the geometric features of the facility

- Increase in e-bikes = increase in design speed
- International average: 18-25 mph

Recommended Design Speed for BHs

- Separated facility: 25 mph
- Shared facility: 20 mph



Bike Highway in the Xiamen.

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Facility Design | Width

Based on user demand, separations of users and modes, and physical constraints

- International min.: 10 ft (bi-directional)

  6.5-8.5 ft (unidirectional)

Recommended Widths for Bi-directional BHs

- Preferred - Bike/Rolling/Fast path: 14 ft.
- Preferred - Ped/Slow path: 14 ft.
- Minimum - shared path: 8 ft.
- Preferred - shared path: 16 ft.

Bike Highway in Denmark. Photo: Maurits Lopez Cardozo

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Facility Design | Grade

Slope - affects safety and comfort

- Maximum of 5% if pedestrian route
- International maximum: 6%

Recommended Grade for BHs

- Maximum: 5%
- Sustained grades: Limited to 2%

Bike Highway in Bogotá. Photo: Maurits Lopez Cardozo

Facility Design | Route Identification and Wayfinding

Provides sense of safety, security and comfort, and improves coherency of network

Facility Design | Lighting

Increases actual and perceived safety

- Particularly important at crossings

Recommended Illumination for BHs

- Minimum: 7 lux*

Bike Highway in the Netherlands. Photo: Maurits Lopez Cardozo

* HDM 1000.18

Facility Design | Materials and Surface

Important for user comfort and safety

- International guidance: smooth, well-drained surfaces free of inconsistencies (often concrete/asphalt)

Recommended Surfaces for BHs

- Stable, firm, slip resistant
- Well-drained

Bike Highway in Amsterdam utilizes different surfaces to delineate user areas. Photo: Maurits Lopez Cardozo

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Facility Design | Intersections and Crossings

Important for efficient, low-effort BHs

International guidance:

- Advance bicycle detection
- Intersection signal improvements
- Protected intersections
- Grade separated crossings

Bike Highway crossing in Rotterdam. Photo: Maurits Lopez Cardozo

Facility Design | Transitions

Moving from a BH to another facility

- Must be intuitive for users

Recommended Transition Principles

- Minimize conflict exposure
- Reduce speeds at conflict points
- Communicate ROW priority
- Provide adequate sight distances

Bike Highway in Denmark. Photo: Maurits Lopez Cardozo

Facility Design | Amenities

Increase attractiveness, comfort and enjoyment

International examples:

- Bicycle tools and lockers
- Seating and water fountains
- Trash and recycling receptacles
- Shared mobility resources
- Landscaping

Bike parking along a Bike Highway in the Netherlands.
Photo: Maurits Lopez Cardozo