



CAPE COD
COMMISSION

Complete Streets/Living Streets A Design Manual for Cape Cod



October 2012
Cape Cod Commission



CAPE COD
COMMISSION

Complete Streets/Living Streets

A Design Manual for Cape Cod

October 2012

Prepared by:

Cape Cod Commission

3225 Main Street, PO Box 226

Barnstable, MA 02630



A Department of Barnstable County Regional Government, Massachusetts

Acknowledgments

Prepared by the Cape Cod Commission Staff:

Sarah Korjeff, Preservation Specialist. Project Manager
Philip Dascombe, AICP, Senior Community Design Planner
Tabitha Harkin, Landscape Design Specialist
Steven Tupper, Technical Services Planner

AICP: American Institute of Certified Planners

Table of Contents

Introduction	1
I. Cape Cod Character and Context Sensitive Design	
II. Complete Streets/Living Streets and their Benefits	
III. Principles for Designing Complete Streets/Living Streets	
IV. Typical Cape Cod Street Types	
V. Special Issues to Consider for Cape Cod Roadways	
Toolkit	11
I. Suggestions for Road Segments/Traveled Ways	
II. Suggestions for Intersections	
III. Suggestions for Pedestrian Accommodations	
IV. Suggestions for Bicycle Accommodations	
V. Suggestions for Transit	
VI. Suggestions for Land Use/Streetscape Ecosystem	
Case Studies	35
I. Main Streets/Village Center Streets	
II. Highway Commercial Areas	
III. Regional and Scenic Roadways	
Next Steps	41
I. Implementing Complete Streets/Living Streets	
II. Measures of Success	
III. On-Line Resources	

Complete Streets and Living Streets are streets that address the mobility needs of all users – pedestrians, cyclists, drivers and transit riders – making streets safer, sustainable, and more accessible to a wide variety of people. This guidebook aims to explain and illustrate the concepts of Complete Streets and Living Streets, and to encourage people to consider these design options when planning roadway improvement projects.

There are many different types of roads and neighborhood settings, which requires a wide range of possible solutions to enhance mobility and address environmental conditions. While some roads function well with all users sharing the same pavement, others would benefit from physical changes to slow traffic or accommodate other uses. Through this guidebook, we hope to help change attitudes about appropriate street design and encourage people to approach streets as public spaces, not just as conduits for moving vehicles.

Introduction

I. Cape Cod Character and Context-Sensitive Design

The fifteen towns of Barnstable County make up a distinctive region known for its coastlines, historic villages, and environmental resources. While each town has unique characteristics, they all share a common history. Cape Cod's early development produced a pattern of small villages oriented around narrow transportation corridors and working harbors, with less dense agricultural settlements in between. Towns were populated with small-scale wooden structures often located close to the road edge, especially in village centers. The region grew quickly in the early 1800s as maritime industries thrived and created dense village centers near the region's many small harbors. In the late 1800s, the area's appeal as a tourist destination drove a new wave of development, this time focused along railroad lines and previously undeveloped waterfront areas. This pattern continued until well into the 20th century, when the arrival of the automobile and post-war construction carried development to inland areas, adding highway commercial corridors and suburban residential subdivisions to the regional landscape. The Cape's population has since grown significantly to include a large proportion of retirees and seasonal visitors, as well as young families. But Cape Cod is still defined by the tightly-knit village clusters and narrow roadways that remain from its early years. Protecting these elements and the natural resources around them are important to both the character and economy of the region.

Context-sensitive design recognizes the features that make a place special, whether they are historical, physical, environmental or social attributes, and seeks to preserve those features in any design proposals. Context-sensitive design is an important goal of Cape Cod's Regional Policy Plan and the Cape Cod Commission's Design Guidelines for Cape Cod. The MassDOT Design Guide (2006) also acknowledges the importance of understanding a road's context, and suggests noting the surrounding land uses and land cover (open fields, forest and forest types, agricultural land, town village, city or commercial corridors); visually distinct areas such as buildings, land forms, valleys, hilltops, water bodies, rivers, streams, and watercourses; prominent views and vistas along



Historic view of Route 6A in Yarmouth Port by Samuel Chamberlain. Samuel Chamberlain photograph collection, Phillips Library, Peaody Essex Museum.

the road; public facilities or places; recreational facilities; trees; and the relationship to intersecting roads and activity centers. It also suggests noting existing bicycle and pedestrian movements, and the potential for these movements, as well as the availability of public transportation and the proximity of connection points for other modes of transportation. Designated growth areas, historic districts, designated scenic roads and areas, unique natural areas, agricultural conservation districts, and areas designated for future access management also need to be recognized.

In planning for any infrastructure improvements, we need to preserve the region's important environmental and cultural resources, acknowledge its varied population of young people, seniors and visitors, and address long-term goals of sustainability and equitability. That means thinking more broadly when designing roadway improvements. In addition to providing safe access for all users to explore on foot, bicycle, bus and car, new designs should address concerns about storm water quality and environmental protection, and take forms that respect historic structures and regional character. Design improvements should



Cars parked along Main Street in Centerville.

also acknowledge the varying traffic volumes that many Cape towns experience from summer to winter, and consider non-structural solutions in areas where traffic volumes and user populations are significantly lower for much of the year.

When considering the design suggestions that are represented in this guidebook, select design elements that reflect the surrounding context and unique character (both natural and built) of the location. Draw from an area's natural setting and local history to showcase local assets, and solicit input from the local community and users. Elements that define the surrounding context include: adjacent land uses, neighborhood density, neighborhood character and aesthetics, environmental features, and the existing transportation system. Context also includes social and demographic factors that influence who is likely to use the street. This acknowledges the location of schools and family housing, elderly residents, people with disabilities, and households without access to a car.

II. Complete Streets/Living Streets and their Benefits

Complete Street design promotes enhancements that make road networks safer, more livable, and welcoming to everyone - including bicyclists, public transportation vehicles and riders, and pedestrians of all ages and abilities. A Complete Street is safe, comfortable, and convenient for travel via automobile, foot, bicycle and transit, and offers connectivity and access to a variety of users.

Living Streets expand upon the Complete Streets concepts by combining elements of environmental engineering with pedestrian enhancements to create roadways that benefit and enhance the community. Living Streets promote healthy communities by transforming streets into vibrant places for walking, bicycling, and socializing, building on the idea that streets that are enjoyable to use will better support neighborhoods and businesses.

Complete Streets and Living Streets offer:

- * mobility options for the roughly 1/3 of Americans who don't drive,
- * reduced congestion through alternatives to short automobile trips,
- * improved safety for all users by moderating vehicle speeds and facilitating alternate modes,
- * connections for transit users from their home to work, shopping, and schools,
- * equity benefits providing walking, biking and transit options for all,
- * benefits for people with disabilities through accessible curb cuts and high visibility crosswalks,
- * increased connectivity between neighborhoods for a stronger community,
- * improved environment by encouraging non-motorized transportation and reducing emissions,
- * increased economic viability of commercial areas,
- * health benefits by increasing active options for healthy walking and bicycling activities,
- * improved stormwater control and protection of nitrogen sensitive areas.

Complete Streets are designed to respect the surrounding context, so they can look very different and contain different elements depending on their location. Main Street in Hyannis, with its active sidewalks, connections to transit, and slow vehicle speeds that allow for bicycle travel is one example of a Complete Street. Setucket Road in Dennis, which offers a multi-use path for bicycles and pedestrians separated from the roadway, is another example. Commercial Street in Provincetown is also a successful, though atypical, Complete Street, where all users share the same narrow width of pavement. Each case clearly reflects its surrounding context and accommodates multiple users, but in different ways.

Complete Streets can change character along their length depending on the need to compliment the surrounding land use context, manage vehicular speeds, provide room for bike lanes, or other factors. Sidewalks may be critical to Main Streets and village centers, but not to more rural areas. While sidewalks are the cornerstone of any pedestrian network, their width and their setback from the roadway will vary depending on the roadway type and surrounding context, and they may not be necessary at all along roadways in rural areas.



Route 130 along Shawme Lake in Sandwich Village.

III. Principles for Designing Complete Streets/Living Streets

Complete Streets/Living Streets seeks to shift the balance from a car-dominated transportation network to one that accommodates a wider variety of users. The following principles are the basis for designing any roadway improvement project as a Complete Street and Livable Street.

Principles for designing Complete Streets/Living Streets:

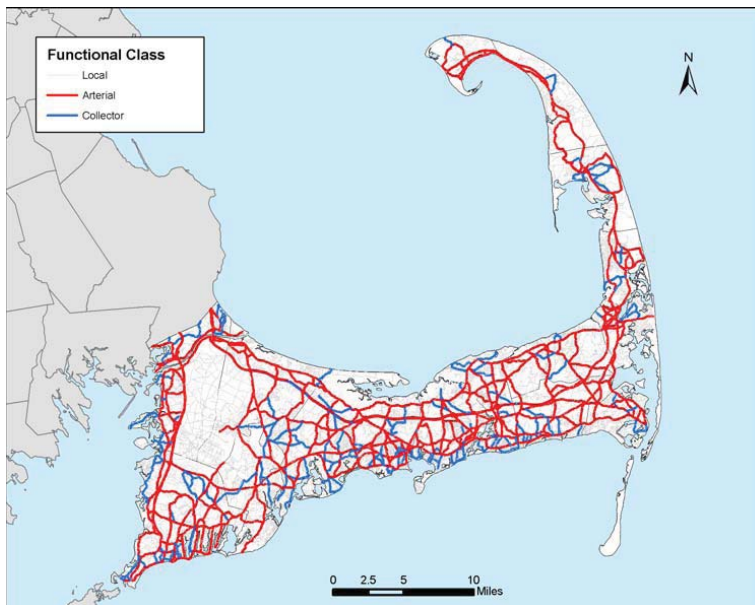
- * Safety. Design streets with safety of all users as a priority, and vehicle speeds limited, with the goal of reducing injuries and fatalities
- * Connectivity. Design streets to provide connectivity that satisfies travel needs with alternate routes and links to other modes of transportation
- * Human Health. Design streets to increase opportunities for active transportation (walking, cycling, etc.) and to decrease air pollution and particulate levels caused by motor vehicles.
- * Livability. Design streets to support a built environment that enhances the quality of life in our communities.
- * Context. Design streets to respect and enhance the distinctive identity of our communities, preserving their scenic and historic resources and other unique characteristics that draw residents and visitors to the region.
- * Equity. Design streets to provide for the needs and safety of all users, particularly people with disabilities, the elderly, children, and people who cannot afford a private vehicle.
- * Aesthetics. Design streets with attention to their aesthetic character, including materials, lighting, landscaping, street furniture and maintenance.
- * Economic Development. Design streets that provide multiple transportation options and easy access to village centers and commercial areas, drawing customers and supporting economic development.
- * Environment. Design streets that effectively manage storm water runoff to protect the Cape's fresh and salt water resources, and support non-motorized transportation, decreasing vehicle miles travelled and thereby reducing air pollution and emissions.



Downtown Falmouth.

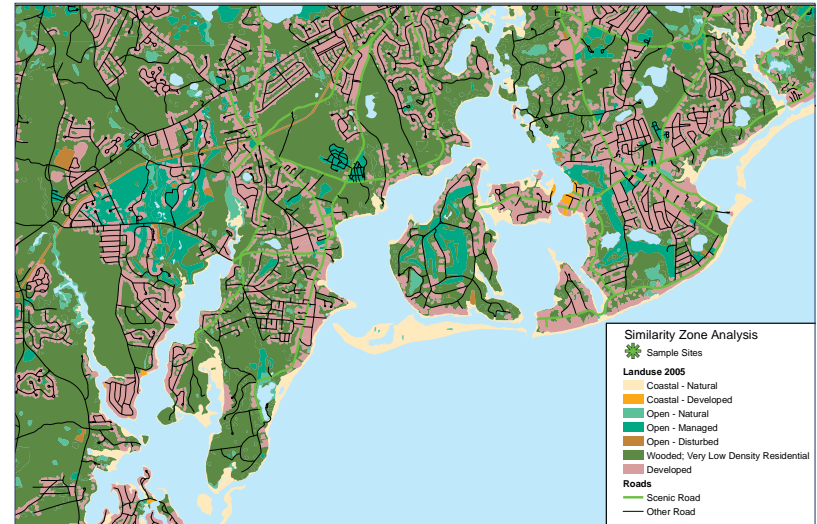
IV. Typical Cape Cod Street Types

Cape Cod has roughly 4,000 miles of paved roads, according to the 2008 Mass Roadway Inventory File. There is a lot of variety in street type throughout the region: approximately 15% of the region's roads are classified as 'arterials' (linking towns and carrying traffic between centers), and 6% as collector roadways (providing connections between local roads and arterials). While the vast majority of those roads (over 3,000 miles, or roughly 80%) are classified as local roads.



Functional Classification of Cape Cod Roads: Massachusetts Roadway Inventory File 2008.

Historically, street typologies were developed based on the volume of traffic roads convey, the speed of travel, and the connectivity they provide. Context-sensitive design recognizes that roadway classification also requires an understanding of the land uses and environmental resources in the area surrounding the roadway.



Landscape Classification Analysis of a portion of Cape Cod, illustrating the variety of open, wooded and developed landscapes in the region.

The MassDOT Design Guide developed 'Area Types' to help illustrate the variety of contexts encountered, acknowledging that different contexts call for specific design solutions. By their definitions, many of the roads on Cape Cod fall into the 'Rural' and 'Suburban' area types, but portions of the region's roadways also have some urban characteristics. Roadways within the Cape Cod National Seashore and other lightly developed areas generally have characteristics found in the "Rural" area types. Roads through many villages and outlying residential and commercial areas in the region more closely follow the descriptions in the "Suburban" area types. Though the region is not generally thought of as urban in nature, more densely developed downtowns like Main Street in Hyannis and Commercial Street in Provincetown have some elements that approach the "Urban" area descriptions, such as transit centers and driveways consolidated over an entire block. The "Rural" and "Suburban" area types can be helpful in highlighting different road characteristics, so they are summarized here.

Rural Area types:

These typify the quieter or less developed corners of the Cape where conservation land and agricultural land are significant in size. Portions of the Lower and Outer Cape, and other areas “off the beaten path” have small scale villages and residential neighborhoods that fit these descriptions. Sections of roadways that lead between villages and traverse less developed areas may also fit these types.

Natural – Where the roadway travels through forest land, farm land, and other open space. Few access points along the roadway and little or no development. Design constraints tend to involve topographic, environmental, scenic or historic resources. Pedestrian, bicycle and transit activity is usually infrequent and of low volume, though bicyclists and pedestrians may be drawn to low-volume roadways traversing scenic rural areas.

Village – An isolated built-up area with storefronts, civic uses, and interspersed housing, with varied building setbacks, frequent driveways and intersections. Individual property frontage is generally less than 200 feet, and right of way is usually constrained by the built environment. Pedestrian activity and bicycle activity can be moderate to high. Transit activity may be present, but is uncommon. A rapid transition between the village and surrounding areas creates an important safety consideration.

Developed – An area of low-density residential development or occasional commercial uses. Buildings generally have large setbacks from the roadway and are frequently invisible due to tree cover, with driveways requiring alertness for entering and exiting vehicles. Pedestrian and bicycle activity are generally of modest scale, and transit is uncommon.

Source: MassDOT Design Guide (2006).

Suburban area types:

Much of the Cape’s developed area falls into this category, including the region’s larger villages and downtowns, and the vast majority of commercial corridors and residential subdivisions from the 20th century.

High Density – Areas where the majority of the roadside is intensively developed with a mix of property types and building setbacks. Residential property frontage is often less than 200 feet and intensive commercial development, including strip development, is frequent. There are frequent driveways, and properties are often designed primarily for motor vehicle access. Pedestrian and bicycle activity may occur. Transit is sometimes present.

Village/Town Center – A built-up area of commercial and residential uses. Commercial uses are usually concentrated together and follow a uniform building setback. Residential areas consisting of properties with frontage of less than 200 feet often define the edges of a suburban town center. Pedestrian and bicycle activity are higher than other suburban areas, and sidewalks are usually present. On-street parking is often found in these areas, and travel speeds are usually lower than in other suburban areas.

Low Density – Transitional areas where roadways have a mix of natural and developed characteristics. Residential development is low to moderate in density, with isolated commercial properties. Large building setbacks are common and individual property frontage usually exceeds 200 feet. Frequent low-volume driveways and intersections impact travel speeds. Pedestrian and bicycle activity is higher than rural areas, but transit is still occasional.

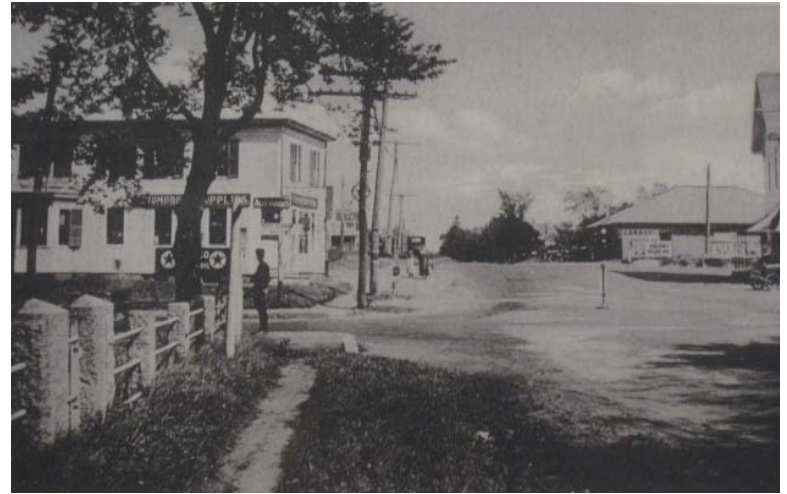
V. Special Issues to Consider for Cape Cod Roadways:

There are several unique features of Cape Cod roads that should be considered when determining what designs are appropriate to accommodate other users.

Historic Villages – Most Cape Cod villages were established in the 18th and 19th centuries and have distinctive architecture and development patterns that make them unique. They vary widely in size and density based on their historic role in the region's maritime and tourist industries. Many are constrained not only by a narrow right-of-way, but also by limited space between the road edge and the front of buildings, stone walls or other structural features that define the road edge. Along Route 6A, for example, travel lane width ranges from 10.5 to 12 feet and shoulder width varies from 1 to 3 feet, leaving limited room for redesign.



Downtown Chatham.



Historic view of Main Street/Route 6A intersection in Orleans.



Historic buildings close to the road in Yarmouth Port.

Commercial Corridors - Some of the region's commercial corridors are outside village centers and developed in the first half of the 20th century, responding to the Cape's growth as a tourist destination and people's increased mobility due to the automobile. Other commercial areas grew in the second half of the 20th century as the Cape's population increased after World War II and later. Some were extensions of existing developed areas, while others introduced development to a previously undeveloped area such as along new highway corridors.

The character of these commercial areas varies greatly, due partly to the number of travel lanes in each direction, the presence of medians and other roadway features, and the scale of commercial uses along their length.



Route 6A/Route 28 in Orleans - transition from one travel lane each direction to two lanes each direction, with moderate size commercial uses and varying setbacks.



Route 132 in Hyannis - two travel lanes in each direction, divided by a raised median strip, with large scale commercial uses and deep setbacks.



Route 28 in West Chatham - one travel lane in each direction, plus a center turning lane, with commercial uses focused on one side.

Tourist Destinations – The Cape is a popular tourist destination. Visitors to the region bring increased automobile traffic on area roads, particularly in the summer months, and also increased numbers of recreational bicyclists and pedestrians. They are often drawn to the region’s villages and coastal areas.

Scenic and Coastal Roadways – The geography of the Cape offers opportunities to view the ocean and significant marsh systems from many locations. Scenic roads exist in every Cape town, and many that travel along the coast or through natural areas are also environmentally sensitive.

Environmental Sensitivity - The Cape’s unique geography also means that many streets pass through environmentally sensitive areas, such as groundwater protection areas, wetlands and salt water marshes, and rare species habitat.

Seasonal Fluctuations – Due to summer visitors and second home owners, the Cape experiences dramatic seasonal changes in population. While the volume of visitors in warm weather months makes some area roads very busy, they are often uncongested for the majority of the year. These fluctuations do not affect all Cape roads. Many local Cape roads (about half of paved roads) remain low volume even on the average summer day.

Regional Roadways – Some roads traverse several towns and villages, with significant changes in character along their length. Roads such as Route 6A and Route 28 look very different in different communities, and should be divided into two or more context zones if there is a diversity of characteristics that could fall under multiple context zones. Route 6 also experiences significant changes in character and context as it passes from the Upper Cape to the Lower Cape and the Outer Cape.



Seasonal traffic backup on Route 6 in Wellfleet.



Scenic ocean views along Grand Avenue in Falmouth Heights.



Road crossing salt marshes at Bridge Road in Eastham.

Toolbox

I. Suggestions for Road Segments/Traveled Ways:

Road Narrowing/"Road Diet" or "Lane Diet"

Wide roads and travel lanes can encourage faster driving speeds and reduce safety for other users. Narrow roads force vehicles to move more slowly to stay in their lane and prepare for potential conflicts. A "road diet" which removes one or more lanes of travel, or a "lane diet" which narrows the travel lane will slow vehicle traffic and make shared roadway use more comfortable. Consider narrowing lane widths to 10 or 11 feet, depending on travel speeds and the volume of traffic, and using the extra feet to create a bike lane or pedestrian way, center median or buffer strip. Where there are multiple travel lanes in each direction, consider reducing the number of travel lanes, using the gained space to provide facilities for other users.



Travel lanes were narrowed in Buzzards Bay to slow traffic and allow for on-street parking that supports area businesses and buffers pedestrians on the sidewalk.

Roadway Surface Treatments

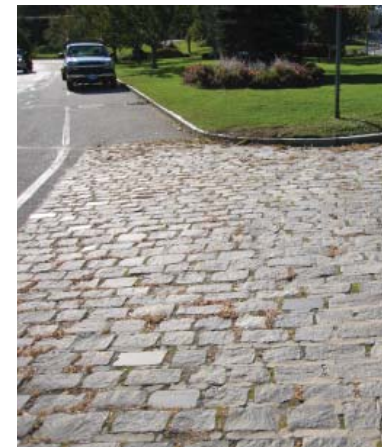
Use different colors or textures of paving material to draw attention to different areas of the roadway, or to differentiate between travel lanes, bicycle lanes or shoulders, and parking areas. Colored asphalt, concrete or painted surfaces can also draw attention to crossings and high pedestrian areas and to make drivers more aware of other users in the area.



Pedestrian Crosswalk on Old Townhouse Road in Yarmouth.



Colored bicycle travel lanes.



Stone paving at Orleans intersection.

Pavement Markings

Roadway pavement markings can be used to improve street safety and functionality. Markings including directional arrows, advanced yield triangles, on-street parking spaces, bicycle lanes, pedestrian crossing warnings, and school zone markings can all draw attention to other users and improve awareness. These markings are particularly important at mid-block pedestrian crossings.



Directional markings on Main Street in Orleans.



Arrows to indicate raised pedestrian crossing.

Curb Extensions or Bump-Outs

Bump-outs extend the curb into the adjacent roadway or shoulder at mid-block or corner crossings, narrowing the roadway both visually and physically. They slow vehicles, shorten pedestrian crossings, and make pedestrians more visible. They also prevent illegal parking in crossing zones.



Curb extensions narrow pedestrian crossing on Main Street, Hyannis.



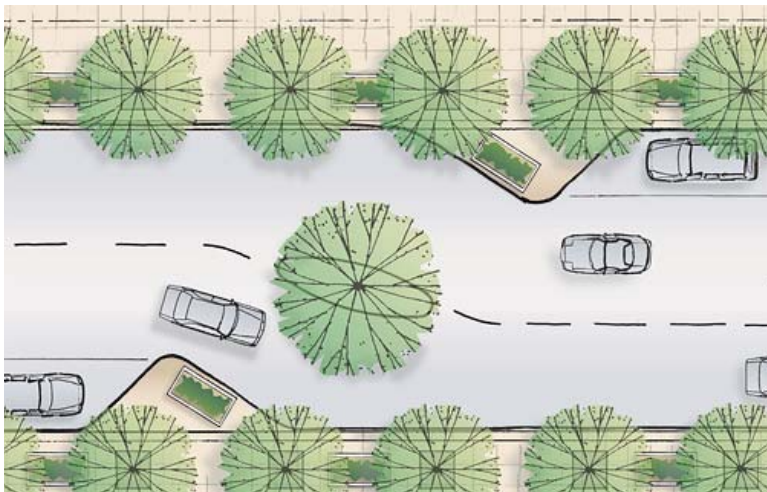
Bump outs on Route 6A in Barnstable Village.

Chicanes or Lateral Shifts

Chicanes shift traffic from one side of the street to the other through the use of staggered curb extensions, making it impossible for drivers to drive in a straight line. They can be effective at limiting cut-through traffic. A lateral shift in the travel lane can also be used to slow traffic approaching an area where slower speeds are desired, such as a heavy pedestrian area or a school zone.



Source: Calm Streets Boston.



Source: sfbetterstreets.org

Changes in Traffic Patterns

Traffic patterns may be changed to ease vehicle flow or to increase safety with the addition of a roundabout or a traffic signal at an intersection. Changes in traffic pattern could also include changing a street from two-way travel to one-way travel, or adding a center median with restricted left-turn movements. Any redesign of intersections should be done carefully to avoid increasing vehicle speeds and/or destroying the unique geometries that are part of the history and charm of a neighborhood.



Roundabout at Route 39 and Queen Anne Road in Harwich.



One-way traffic on Main Street in Hyannis.

On-Street Parking

On street parking is traditionally found in village centers and along Main Streets on Cape Cod. Using a pavement width of approximately 7 feet, it supports adjacent retail businesses, provides a buffer for pedestrians, and helps to calm traffic speeds, making the area more comfortable for a variety of users. On street parking also uses about half the surface area of off-street parking lots, which require driveways and aisles for access and maneuvering, making it more desirable from an economic standpoint.



On-street parking on both sides of Main Street in Chatham.



On-street parking on one side of Route 28 in Dennisport.

Medians

Medians are raised areas that define the edges of travel lanes. They can serve a number of purposes, including limiting turning movements to reduce conflict points, narrowing travel lanes and road profile, providing refuge for pedestrians crossing the street, and creating space for landscaping and stormwater management. Wider medians can also be used to create tree canopies over travel lanes and contribute to a sense of enclosure, provided that these areas are generally free from utility lines that might conflict with tree plantings.



A raised median guides traffic and protects pedestrians on Phinney's Lane in Barnstable.

Traffic calming

Traffic calming includes a variety of the methods described above to slow vehicle speeds and safely accommodate other users, such as pavement markings, curb extensions, and on street parking. It is desirable in areas with high pedestrian traffic, or in areas where you want to encourage pedestrians to come – such as village centers, Main Streets, waterfronts, neighborhoods with cut-through traffic, and school zones.



Narrow travel lanes and on-street parking slow traffic in Sandwich.



Traffic calming to increase safety at mid-block pedestrian crossing.

Access Management

Access management involves limiting the number of conflict points between vehicles and other users along a roadway to increase safety. Generally, that is accomplished by combining existing curb cuts to reduce the number of places that vehicles, bicycles and pedestrians cross paths. It is also done by narrowing curb cuts to shorten the crossing distance for pedestrians and bicyclists. Fewer driveways result not only in safety improvements and improved traffic flow, but also in more space available for higher and better uses. Significant reduction in curb cuts could lead to increased travel speeds in some situations, so other measures may be necessary to slow travel speeds.



Multiple curb cuts were consolidated into one access point on Bracket Road in Eastham.

II. Suggestions for Intersections:

Tightened Corner Radii

Reducing the corner radii at intersections slows vehicle turning speeds, creating a safer environment for pedestrians and other users. It also creates smaller, more-pedestrian scaled intersections with better geometry for perpendicular corner crosswalks and a shorter crossing distance. The presence of on-street parking and bicycle lanes can make the effective curb radius larger, so curb extensions should also be considered. A particular area of concern is where free-flow right turn lanes cross pedestrian or bicycle pathways and vehicle travel speeds need to be reduced to improve safety for other users.



Curb extensions reduce turning speeds and protect pedestrians in Hyannis.



Tighter corner radii on Route 6A in Orleans shorten crossing distances.

Roundabouts

Modern roundabouts are circular roadways with a central island around which all traffic travels counterclockwise. They require drivers to slow down on approach and yield to drivers already in the roundabout. Vehicle speeds are reduced by the sharp turns needed to enter the roundabout and by the central island, and the potential for crashes is greatly reduced. When pedestrian movements are expected, each leg of the roundabout has refuge islands to allow for safe pedestrian crossing. Roundabouts have a smaller carbon footprint than signalized intersections because no electricity is required for operation and motor vehicles spend less time idling.



Roundabout in East Harwich.

Signal timing with Pedestrian Phases

Signalized intersections usually handle large numbers of turning vehicles, which can conflict with bicycle and pedestrian movements. To better accommodate a wide variety of users, signalized intersections should have short signal cycle lengths which allow frequent opportunities to cross roadways, and signals should be able to detect bicycles. Pedestrian countdown clocks are preferred on wide intersections to give the best information about the crossing time available.



Pedestrian signal crossing and detail at Route 6 in Eastham.

III. Suggestions for Pedestrian Accommodations:

Pedestrian Walkways and Buffers

Walkways for pedestrians are most often sidewalks that parallel the road, providing a safe place for people to walk between the roadway and adjacent land uses. Sidewalks vary according to the type of street. The busier the street and the higher the speed of traffic, the more there is need for a buffer between pedestrians and motor vehicles. Landscaped strips, curbing, and on-street parking each provide a form of buffer, and should be chosen based on the surrounding neighborhood character and traffic speeds/volume. Inserting pedestrian paths in areas with narrow roadways and structures close to the road edge requires sensitivity. (See also Shared use paths in Suggestions for Bicycle Accommodations.)



Sidewalk with grass buffer along Route 28 in Chatham.



Sidewalk protected by curb and on-street parking on Route 6A in Barnstable.

Crosswalks

Crosswalks should be installed at controlled intersections and placed to minimize crossing distances and conflicts between pedestrians and vehicles. Midblock crosswalks, which are appropriate in high pedestrian traffic areas and near transit locations, should generally be used in conjunction with other tools such as curb extensions, signage and special Pavement Markings (see Suggestions for Road Segments above) to slow traffic and alert vehicles to their presence. Special flashing pedestrian beacons may be appropriate where crossings are necessary in areas with high travel speeds and volumes.



Crosswalk in Falmouth Village.

ADA Compliant Curb Ramps

Proper curb ramp design enables pedestrians using mobility devices (ie. wheelchairs, walkers, crutches, scooters) to transition between the street and the sidewalk. ADA compliant crosswalk ramps and curb ramps with detectable warning strips should be installed wherever a sidewalk crosses a curb, and existing ramps should be upgraded to meet current ADA guidelines.



Curb ramp with slope and detectable warning strip on Route 28 in Harwichport.



Detectable warning strip at pedestrian crossing at Crowell Road in Chatham.

Universal Pedestrian Access

Universal pedestrian access means sidewalks wide enough to maneuver a wheelchair or a walker, and free from obstructions like signposts and utility poles. This accommodates people with disabilities, as well as people with strollers and rolling suitcases. Removal of sidewalk obstructions and uneven surfaces is beneficial to all sidewalk users.



Unobstructed sidewalk in Orleans.

Cross-lot Connections

Cross-lot connections can provide important links in the pedestrian network. In busy town centers, walkways that cross interior lots to connect high-use pedestrian areas are often desirable. Note Cape Cod Pathways trails can provide pedestrian connections between two areas on a larger scale – using off-road trails as an alternative to conventional sidewalks in areas where they are difficult to accommodate.



Alley path through lot in Barnstable Village.



Cross-lot connection near Hyannis waterfront.

Sidewalk Surface Treatments

Sidewalks are typically surfaced in concrete or asphalt, but alternative materials such as brick, stone pavers, or tinted concrete can be used to create a distinctive character in village centers and main street areas. Unique sidewalk treatments can serve as a wayfinding tool to guide visitors through high activity areas and is discussed more in Suggestions for Land Use/Streetscape Ecosystems. Permeable pavers can be used to improve stormwater control in conjunction with other improvements.



Stone and concrete sidewalk in Falmouth.



Brick sidewalk in Orleans.

Pedestrian Refuge Islands

Islands between vehicle travel lanes enhance pedestrian safety and accessibility on streets with two-way traffic by reducing crossing distances and providing refuge for pedestrians to cross one direction of traffic at a time. They can also serve as a traffic calming tool by narrowing the roadway at intersections, forcing vehicles to move more slowly.



Pedestrian refuge island at Sisson Road and Route 28 in Harwich.

Crosswalk lighting

Lighting at pedestrian crossings provides an advance cue to drivers to expect pedestrians. Crosswalk lighting should provide color contrast from standard roadway lighting, and when placed just in front of crosswalks created optimal visibility of pedestrians. It is most appropriate at crosswalks that are placed mid-block.



Lighting at crosswalk on Main Street in Hyannis.



Lighting at crosswalk in downtown Falmouth.

IV. Suggestions for Bicycle Accommodations:

Shared Roadways/Bicycle Routes

Shared roadways where automobiles and cyclists use the same pavement without special markings to delineate their travel areas are appropriate on many Cape roads with lower traffic volumes and travel speeds. Neighborhood streets with 3,000 to 5,000 vehicles per day and 25 to 30 mph are generally suitable for sharing. Signage to remind motorists of the presence of cyclists is appropriate, especially on collector roads where a large volume of visitors who may be unfamiliar with road are expected.



Share the road signage in Eastham.

Paved Bicycle Shoulders

Paved shoulders that are at least 4 feet wide are recognized by the state as formal bicycle lanes if they are delineated with pavement markings. These shoulders are good for routes favored by cyclists and those roads serving as connections to destinations, neighborhoods, and existing bike facilities, especially where truck and vehicle volumes and speeds make cycling on the road difficult. Lane narrowing and road diets noted above may create sufficient width for bicycle shoulders. Any additional width you can gain on a paved shoulder can be beneficial to a cyclist, even if it is not a designated bike lane.



Bicycle lane with pavement markings on George Ryder Road in Chatham.

Pavement Markings for Cyclists

Various markings on the pavement can be used to delineate areas for cycling. White lines can separate on-road bike lanes from vehicle travel lanes; colored pavement can differentiate the bike way from the rest of the roadway, and stencils can be painted along the shoulder and at stop lines to illustrate areas for bicycle travel. Pavement markings can be used to reduce the perceived width of the street and act as a traffic calming measure to slow vehicle speeds and make bicycle travel safer. On wide, busy streets where you can't have a separate bike path, consider buffered bike lanes with additional pavement markings that delineate a safe area between bicycle travel and automobile travel lanes.



Defined shoulder accommodates bicyclists in Barnstable.



Colored pavement indicating bicycle lane.



Stencil and fog line mark bicycle lane in Provincetown.

Sharrows

Shared travel lanes are often marked by a "sharrow" – a painted stencil symbolizing a bicycle along with arrows to denote their direction of travel. These symbols can be painted adjacent to the shoulder to illustrate areas where bicycles travel. They remind bicyclists where to ride and the correct direction of travel, and they make motorists aware that bicycles may be sharing the travel lane. On-road stencils of a bicycle are also useful in denoting crossings or places where bicycle routes intersect with vehicle travel ways. Similar painted symbols are used to mark bicycle waiting areas (known as "bicycle boxes") behind vehicle stop lines in areas where bicycle use is encouraged.



Sharrows indicate the correct direction of bicycle travel.



Stencil of bicycle denotes trail crossing in Eastham.

Shared Use Paths Alongside Roadways

For streets where bicycle travel cannot safely be accommodated, or to provide an alternative route for recreational or less skilled riders who prefer to be away from vehicle traffic, separate off-road bicycle paths that run roughly parallel to main travel corridors may be appropriate.



Forest Road Path in Yarmouth.



Setucket Road path in Dennis.

Shared Use Paths on Dedicated Rights-of-Way

Paths on dedicated rights-of-way designed for use by bicycles, pedestrians and other non-motorized vehicles may be appropriate in some areas where there is heavy recreational bicycle use. Large adjacent parcels of land or existing rail or utility corridors may facilitate developing these paths. Where bicycle paths meet village centers or other destinations, bicycle parking and wayfinding signage should be provided. See Suggestions for Land Use/Streetscape Ecosystem below.



Rail Trail in Harwich.



Cape Cod Rail Trail in Orleans.

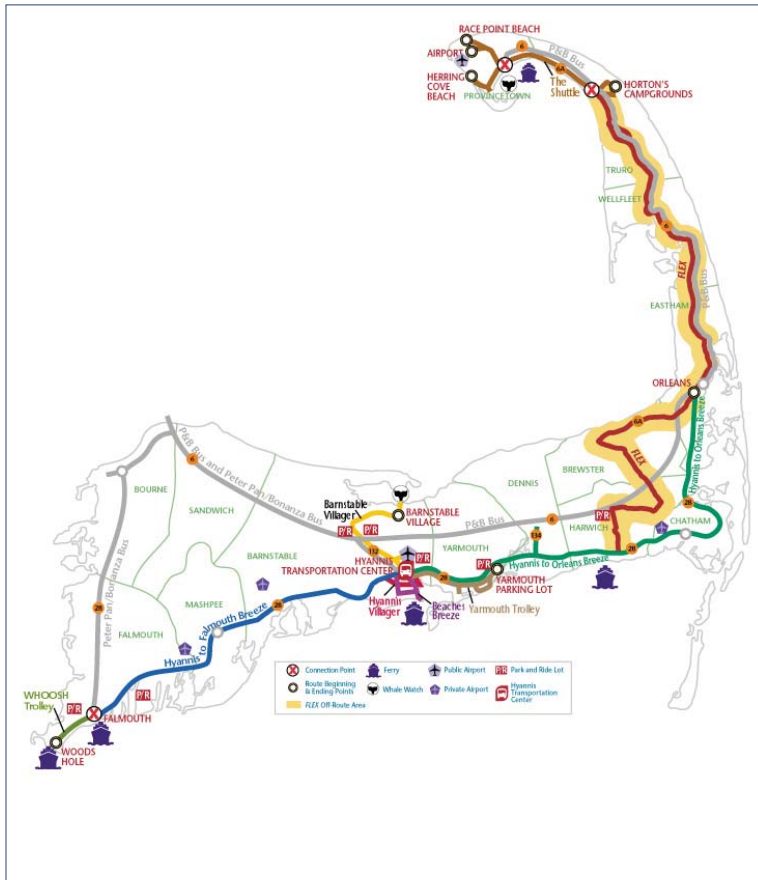


Cape Cod Canal bike trail.

V. Suggestions for Transit:

Transit routes

Public transit provides an important means of access to jobs, school, shopping, recreation and other functions. Transit routes should connect villages and downtowns with other popular destinations and should be consistent with regional goals for shaping future growth.



Cape Cod Regional Transit Authority System map.

Bus Stops/Bus Shelters

Transit stops should be attractive public spaces, integrated with activity centers whenever possible. They should be easily accessible and provide shelter and seating for passengers waiting to board. They are often best sited at the far side of signalized intersections. The transit shelter design developed by the Cape Cod Regional Transit Authority (CCRTA) and Cape Cod National Seashore is a recognizable design that highlights traditional building forms and materials.



Bus shelter in Barnstable Village.



Seating at bus stop in Harwichport.

Bus Pull-outs

Pull-outs provide an area for transit vehicles to leave the travel lane when the stop occurs on along roadway. They can be designed in conjunction with sidewalk improvements at key pedestrian locations to facilitate loading and unloading of transit vehicles in busy areas. Stopping areas may also be designated at destinations off the road.



Bus pull-out and shelter at Salt Pond Visitor Center, Cape Cod National Seashore.



Bus pull-out at rear of mall in Hyannis.

Pedestrian Crossings at Transit Stops

Clearly marked pedestrian crossings are needed at transit stops to allow safe pedestrian access and to alert drivers of the frequent presence of transit vehicles and pedestrians.



Flex and RTA bus stop in Harwichport.

Bicycle Connections to Transit

Bicycle connections to transit can be facilitated by choosing transit stops at clear connections to bicycle routes and by providing secure bike parking at transit stops or accommodating bicycles on transit vehicles.



Transit connections to Rail Trail in Orleans.



Bicycle carrier on front of transit bus.

VI. Suggestions for Land Use/Streetscape Ecosystem:

The area surrounding streets is sometimes referred to as the 'Streetscape Ecosystem.' Adjacent land uses and their design have a strong impact on the accessibility of streets. Suggestions from this section should be integrated with those in other sections to help create street designs that foster community and attract pedestrians, bringing the 'place' back to streets and street edges.

Street Furniture

Street furniture includes a variety of elements, including benches and seating, planters, bike racks, street lights, information kiosks, and refuse cans that are appropriate in heavy pedestrian areas. Street furniture should be located in gathering places such as Main Streets and transit stops and at pedestrian-oriented destinations. It can be used to maintain a buffer between pedestrians and vehicles where there is fast moving traffic. Choose designs that highlight existing distinctive elements or create a consistent theme to unify an area.



Seat wall in downtown Falmouth.

Public gathering spaces

In downtowns and villages, gathering spaces with room to sit in proximity to the road corridor can enliven an area by drawing pedestrians and cyclists. Seating, public art, and landscaping that make it comfortable to spend time in an area can support local businesses by drawing and keeping customers nearby. In environmentally sensitive and scenic areas away from historic resources, undevelopment in strategic locations can help to open viewsheds and provide opportunities for public seating and access.



Park with seating on Main Street in Orleans.



Seating area along Route 28 in Harwichport.

Landscaping

Understory or low-height plantings adjacent to the road edge can reduce the perceived width of a street by breaking up expanses of pavement. They can also create a buffer between vehicles and pedestrians to make sidewalk areas more comfortable, especially where there is no on-street parking to provide a similar barrier. Landscaping can support neighborhood identity by following a specific palette of trees, shrubs and plants that are consistent throughout the area, and can be useful in stormwater management. Green walls are effective along pedestrian corridors where there is little definition to adjacent building walls.



Landscaping defines the street edge in Falmouth.



Plantings bring color to Main Street, Orleans.

Street Trees/Tree Belt Enhancements

Many Cape villages and residential neighborhoods are defined and enhanced by their street trees. Tree planting that is consistent throughout an area can be a wayfinding tool for visitors. Trees also provide shade for pedestrians, define streetscape edges, improve air quality by sequestering carbon dioxide, and reduce energy use by shading buildings and cooling the air through transpiration.



Street Trees along Main Street in Falmouth.

Unique Surface Treatments

Unique paving materials and colors can be used to tie an area together or to highlight its unique identity. (See also Roadway Surface Treatments in Suggestions for Road Segments, and Sidewalk Surface Treatments in Suggestions for Pedestrian Accommodation above.)



Stone paving blocks mark curb cuts in Orleans.



Concrete and patterned paving on Main Street in Hyannis.

Wayfinding

Uses a variety of techniques, including signage, unique paving materials, and plantings to distinguish different areas and help users find their way around a place. In areas with high visitor populations, signage and more subtle means of directing people to destinations are helpful. Use of QR codes and wayfinding applications allows visitors quick access to more detailed information.



Bicycle and pedestrian signage in Harwich and Hyannis.



Wayfinding kiosk in Hyannis.

Building Orientation

Orient buildings to the street, and place parking to the rear to encourage pedestrian and bicycle activity. Use frequent entrances, design features in human scale, and incorporate display windows to create 'transparency' and add interest for those traveling at a slower speed. Encourage active ground floor uses in adjacent buildings.



Buildings oriented to the street edge in Woods Hole.



Display windows along Main Street in Hyannis

Parking Buffers

Where paved parking areas are adjacent to streets, separate parking from sidewalks with landscape buffers, hedges or fences to create safer, more comfortable pedestrian spaces.



Fencing reinforces the narrow street width in Chatham.



Stone wall and tree plantings separate parking from the street in Harwichport.

Green Stormwater Design

Green or Low Impact Design (LID) seeks to direct stormwater for on-site absorption and infiltration to clean it naturally and use it as a resource to support landscaping. In this situation, storm drains become the overflow support system. Stormwater management is especially important in nitrogen-sensitive watersheds. It can be accomplished through a variety of means in small landscaped areas such as swales, planters, buffer strips, rain gardens, and permeable pavers.



Low Impact Design for stormwater and streetscape improvement.



Different levels of accommodation are appropriate for different types of streets, depending on the volume of activity and the characteristics of the roadway and surrounding land uses. These examples highlight some recent projects of the Cape Cod Commission that look at possible solutions for creating Complete Streets on some of the Cape's most common road types.

Case Studies

Main Streets /Village Center Streets:

Cape Cod villages vary considerably in their character, but they are typically constrained by a narrow road right-of-way, buildings placed close to the road edge, and the presence of mature trees, stone walls and other structures. The relationship of historic buildings to the street edge and the narrowness of the roadway are often important parts of the village character, so widening is rarely appropriate. Instead, accommodations often must work within the existing pavement.

In outlying areas and on secondary roads where traffic volumes are generally low, the narrow roadway helps to slow travel speeds and make sharing the road safely with other users possible. On primary streets with heavier traffic volumes, it is more important to make efforts to accommodate pedestrian and bicycle traffic, especially if travel speeds are over 35 miles per hour.

The region's village centers and main streets vary in scale from densely developed downtowns to small crossroads with only a few closely-placed commercial buildings. Many provide on-street parking on one or both sides of a portion of the roadway. Providing for Complete Streets in these areas requires creativity and flexibility. The more travel or parking lanes exist, the more possibilities for re-drawing lanes and accommodating other users within the existing paved area.

Denser village downtowns in the region generally have a number of attached buildings or very little space between buildings, as well as on-street parking, a consistent street setback, and commercial storefronts with display windows. Sidewalks are typically located on both sides of the street, separated from the roadway by granite curbing, and are often deep enough to allow for sitting areas or street furniture without hampering pedestrian travel.



Downtown Falmouth.

Many Cape villages have centers that are less densely developed than downtowns. These areas generally have a somewhat rural setting with few urban characteristics and more visible lawn area. Buildings are typically detached and sidewalks are narrow, with little or no 'furniture zone.' Walkways are usually separated from the roadway by a grass strip and may abut stone walls or plantings that establish the edge of adjacent properties. Town greens, when they are present, are often informally landscaped and fenced from the roadway. Any improvements considered should retain these characteristics.



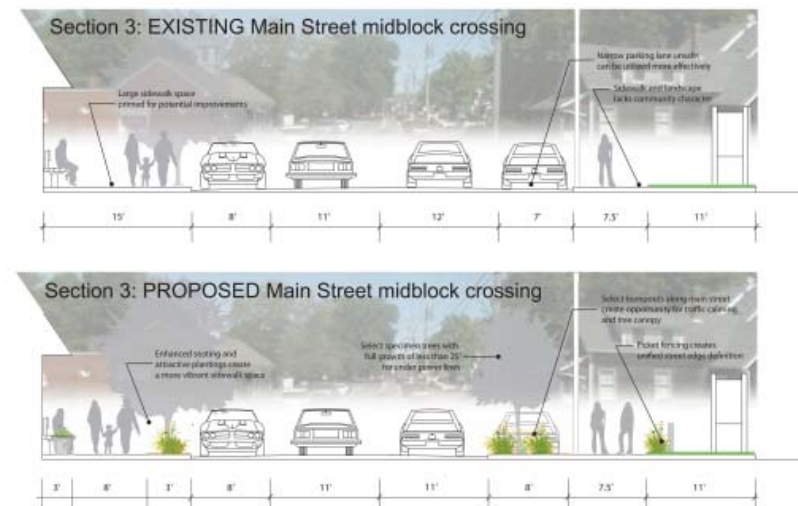
Route 6A in Yarmouth Port.

The smallest of the Cape's villages may be considered crossroads, which typically have a very limited number of commercial and public buildings. These areas are more rural in character and, depending on the level of activity, may not have formal pedestrian walkways. Depending on the travel speed and volume of the roadway, a Pedestrian Walkway or even a pedestrian trail on one side of the street may be appropriate. Methods to slow vehicle speeds and accommodate bicycles should be informal in character and consistent with the individual village's pattern.



South Chatham.

In this example from a downtown Streetscape project on Main Street in Orleans, several Complete Streets/Living Streets elements were worked into the proposed design improvements. Sidewalks were already sufficient in width along both sides of the street, but Curb Extensions were recommended at crosswalk locations to increase pedestrian safety. While travel and parking lane widths were adjusted slightly, bicycle lanes were not recommended. Sharrows on the pavement were considered to alert drivers to the possible presence of bicycles sharing the travel lane. Low travel speeds and on-street parking make sharing the road possible, but bicycles can also be encouraged with signage to use Alternative Bicycle Routes on less traveled roads nearby. Street Furniture and improvements to Landscaping are recommended in areas with greater sidewalk width, and Green Stormwater Design is proposed in appropriate locations. Picket fencing was recommended in front of parking lots to provide a Parking Buffer and maintain the streetscape edge.

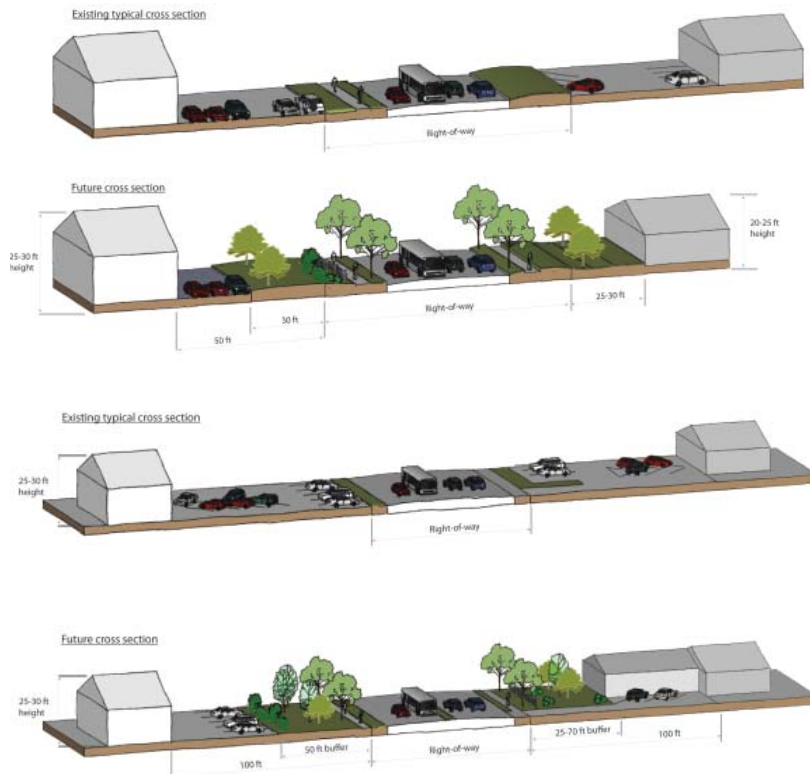


Source: 2011 Orleans Village Center Streetscape Plan by Cape Cod Commission.

Highway Commercial Areas:

Highway Commercial areas can be challenging places to implement Complete Streets principles because these places were clearly developed to focus on automobile travel. Strip Development often has multiple travel lanes, high speed travel, numerous wide curb cuts, and discontinuous pedestrian walkways.

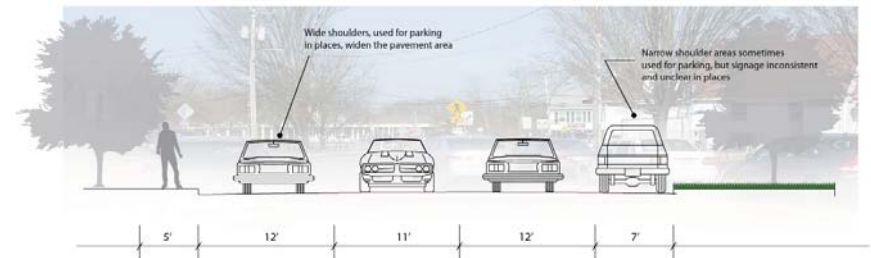
In the example below from Route 132 in Hyannis, Complete Streets improvements were recommended for one of the region's largest highway commercial areas. The cross sections illustrate slightly different solutions for two different portions of the corridor. In both, however, enhanced pedestrian facilities and consistently good landscaping between the roadway and buildings were deemed essential.



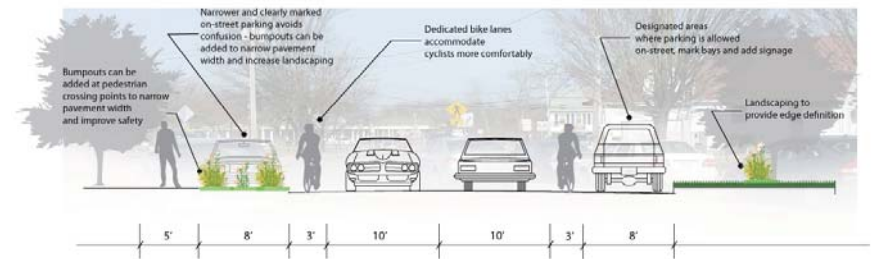
Source: 2010 Route 132 Corridor Report

Pedestrian and bicycle paths along the road length should be separated from the roadway by a grass strip and landscaping because of the high speed of adjacent traffic. Liner buildings or front additions to existing buildings are recommended to better define the street edge and shield vast parking areas typically associated with large retail and commercial strip development. Combined curb cuts and narrowed curb cuts improve safety for all users. In some areas where buildings cannot be located at the street frontage, it may be appropriate to move pedestrian walkways back along building facades to bring pedestrians away from heavy traffic and closer to walking destinations.

Section: EXISTING Old Colony at CVS



Section: PROPOSED Old Colony at CVS



Source: 2011 Orleans Village Center Streetscape Plan

Old Colony Way in Orleans provides an example of a much smaller commercial corridor, with a mix of residential and commercial uses. Here, existing uneven travel lanes and very wide paved shoulders were recommended for re-striping to establish Narrower Travel Lanes, a 3-foot Paved Shoulder for Bicycle travel, and more clearly defined On-Street Parking. Curb Extensions were recommended at Pedestrian Crossings to increase safety and provide space for landscaping to address stormwater and distinguish the area.

Regional and Scenic Roadways:

As noted in the contextual design section of this guide, some roadways change character along their length and shouldn't have the same treatment in all areas. Route 6A and Route 28, for example, pass from village centers to suburban commercial areas to outlying rural areas, so appropriate accommodations for bicycles and pedestrians may change along the course of the route. An effort should be made to provide consistent treatment in similar areas to provide predictability for roadway users, but recommendations should also reflect an area's unique characteristics and environmental constraints.

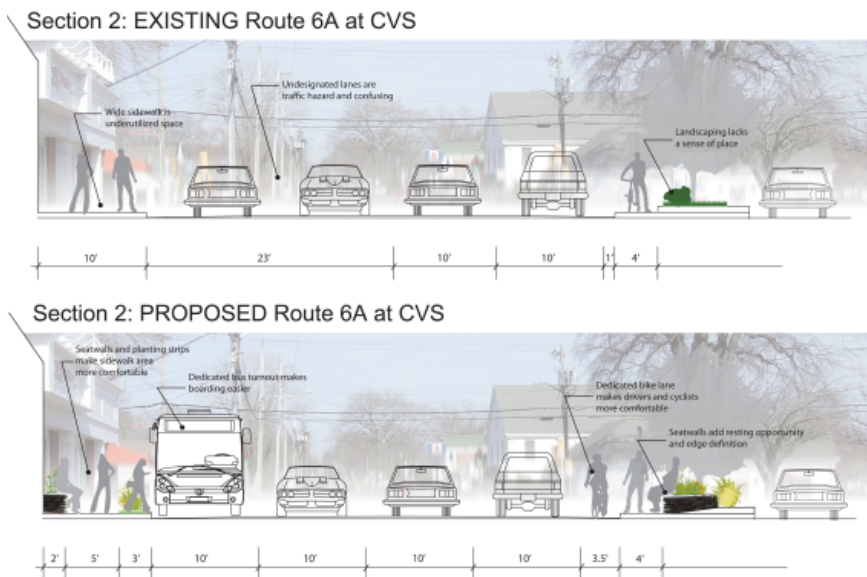
Along Route 6A in Orleans, minor improvements were recommended to better accommodate transit and improve the pedestrian environment. The proposed cross section shows a dedicated Bus Pull-out at the existing transit stop, Share the Road markings to identify shared space with bicyclists, and Seat Walls to create better pedestrian gathering places.



Sandwich village improvements at Route 6A and Jarves Street.

Past road improvements to Route 6A in Sandwich included elements to support Complete Streets. Existing wide travel lanes and wide shoulders were narrowed to make them more consistent with lane widths elsewhere on Route 6A. Excess width was used to establish wide Pedestrian Walkways and a Paved Shoulder to facilitate bicycling. Reducing the width of existing curb cuts along the length of the roadway also improved safety for cyclists and pedestrians. Narrowed lane width at intersections with village streets improved walkability and enhanced connections with surrounding residential neighborhoods.

In a Complete Streets project being developed along Route 6A in Brewster, a recommended cross section includes slightly Narrowed Travel Lanes and re-lining to increase the width of paved shoulders. This, in combination with Shared Roadway signage and Sharrows, will improve conditions for experienced cyclists. The presence of a nearby bicycle trail (the Cape Cod Rail Trail) provides a viable alternative for inexperienced bicyclists. In addition, a Pedestrian Walkway is recommended on one side of the roadway, separated from the pavement by a narrow grass strip to retain the more rural character of the area.



Source: 2011 Orleans Village Center Streetscape Plan



Next Steps

Next Steps: Implementing Complete Streets/Living Streets

Complete Streets/Living Streets projects stimulate the local economy by making it easier for people to walk, bike or take transit to their destinations, relieving traffic congestion and increasing sustainability. Improving bicycle, pedestrian and transit facilities also creates additional construction jobs, provides infrastructure to support the region's tourism industry, and stimulates further investment in nearby businesses.

One misconception about Complete Streets is that they are expensive. In fact, efficiency and safety benefits realized by incorporating Complete Streets principles in the early stages of project development can result in long term cost savings for the community. Following Complete Streets principles also provides a significant economic boost to the area by attracting new business and customers as well as increasing property values.

Communities can realize great benefits from Complete Streets, but community involvement and advocacy is critical to ensure that their principles are incorporated into the community landscape. Members of the public are encouraged to participate in public meetings on roadway improvements in their community and advocate for Complete Streets design. The best Complete Streets are those that reflect the needs and vision of their community, and it takes a dedicated community effort to make this happen.



Sidewalk along Main Street in Orleans.

Measures of Success

The following performance measures are easily-measured statistics that can be used to illustrate the region's progress in implementing Complete Streets/Living Streets projects.

- * Total miles of new on-street bicycle routes, defined by clearly marked or signed bicycle accommodation
- * Linear feet of new pedestrian accommodation
- * Number of new curb ramps installed along streets
- * Number of new street trees planted along streets
- * Number of LID landscape areas installed
- * Increase in the number of users of public transportation
- * Decrease in the number of traffic accidents involving vehicles, bicycles and pedestrians in Complete Streets areas.

On-Line Resources

MassDOT Project Development & Design Guide (2006)

<http://www.mhd.state.ma.us/default.asp?pgid=content/designguide&sid=about#para4>

Introduction to Complete Streets - National Complete Streets Coalition

www.smartgrowthamerica.org/documents/cs/resources/cs-intro.pptx

www.smartgrowthamerica.org/complete-streets/espanol/ (Spanish)

Complete Streets Factsheets - National Complete Streets Coalition

www.smartgrowthamerica.org/complete-streets/complete-streets-fundamentals/factsheets

Pedestrian and Bicycle Information Center (PBIC)

www.walkinginfo.org/

NACTO Urban Bikeway Design Guide

<http://nacto.org/cities-for-cycling/design-guide/>

FHWA – Context Sensitive Solutions

http://www.fhwa.dot.gov/context/css_primer/index.htm

Traffic Calming

www.trafficalming.org/

FHWA - Street Design: Part 1—Complete Streets

www.fhwa.dot.gov/publications/publicroads/10julaug/03.cfm

Boston Complete Streets

www.bostoncompletestreets.org



CAPE COD
COMMISSION



Cape Cod Commission
3225 Main Street, PO Box 226
Barnstable, MA 02630
www.capecodcommission.org

A Department of Barnstable County Regional Government, Massachusetts