

CHAPTER 9

OPERATION AND MAINTENANCE

OPERATION & MAINTENANCE PROGRAM

Proper maintenance helps protect the investment of public funds in bicycle facilities – as well as all public infrastructure – and allow their safe use and enjoyment. Careful construction management allows people to continue to travel safely by bicycle when roadwork is being done or road access is otherwise disrupted.

The City of Cambridge has a monthly street cleaning program from April through December that includes bikeways. Travelway litter – such as broken glass, sand, gravel and wet leaves – is a hazard demanding regular pickup and sweeping. The April and November sweepings include the use of a vacuum sweeper in addition to mechanical sweepers in order to remove excess debris. These will also be included in the Department of Public Works (DPW) spring pothole patching program.

Roadway maintenance considers the needs of people who ride bicycles. Full width pavement overlays will be completed per the DPW's Five Year Street and Sidewalk program. DPW also maintains paved surfaces through the use of asphalt patches and crack sealing. Where utilities cuts occur, permanent patches will be made per DPW specifications. All new asphalt paving will be flush with utility covers. Traffic control during maintenance activities will include providing safe passage for bicyclists including clearly marked raised castings and signed detours when bikeways are obstructed.

Signs and pavement markings should be inspected regularly and kept in good condition. Every spring the Traffic, Parking, and Transportation Department prepares a pavement marking plan. Bicycle facility markings are included. Off-road facilities require specific plans. For example, the path along Fresh Pond Parkway/Fresh Pond Reservation is



DPW has a pothole hot line (617-349-4854) and a mobile app, iReport, to encourage the public to report locations that need patching. This information is included in bicycle information materials to encourage bicyclists to alert DPW to potholes in bikeways.

maintained by the Cambridge Water Department along with the path around the reservation.

UNIQUE CHARACTERISTICS & NEEDS OF USERS

A roadway surface that appears to be adequate for automobiles may actually treacherous for people riding bicycles. Small rocks can deflect a bicycle wheel, a minor ridge in the pavement can cause a crash, or a pothole can cause a wheel rim to bend. Wet leaves are slippery and can cause a bicyclist to fall. Gravel and sand that are blown off the travel lane by automobile traffic accumulate near the edge of the road, where bicyclists usually ride.



Figure 9.1: LED signs placed around Cambridge remind road users to share the road during construction or after major snowfall events.



Figure 9.2: The Western Ave separated bike lane shown after a major snowfall event.

WINTER MAINTENANCE

Snow management poses particular challenges in a dense urban environment with limited space for snow storage. The City's first priorities are to ensure that emergency vehicles are able to get where they need to go. Toward that end, DPW will clear the streets as soon as possible after a storm event. The goals are to chemically treat all major arteries within three hours of when snow begins, to keep main arteries plowed during all stages of a storm, and to clear all streets and the sidewalks bordering City property once a storm has stopped.

An essential element of ensuring safe travel during and after snow events is proactively reminding the traveling public the importance of sharing the roadway. This is extremely important given that the roadways are typically narrowed during and after a snow event. DPW often deploys variable message boards around the City to highlight these messages.

Special bicycle facilities such as the separated bicycle lane on Western Avenue are addressed as soon as possible after the essential public ways, including key sidewalks, have been treated. Some of these facilities are maintained under separate agreements; Vassar Street, for example, is maintained by MIT (Massachusetts Institute of Technology), which clears the separated bicycle lane with the same vehicles they use on the adjoining sidewalks. As these facilities are contemplated in the future, snow operations will be a key consideration in the design details and long-term maintenance expectations.

CONSTRUCTION MANAGEMENT

GUIDELINES FOR BICYCLE ACCOMMODATION DURING CONSTRUCTION

APPLICABILITY

These guidelines shall apply to all construction projects in the City of Cambridge, whether the work is being undertaken by the City, private developers, contractors, utility companies or state agencies. The types of projects include:

- + **Street reconstruction and new street construction**
- + **Sewer, storm drainage and water projects**
- + **Private site development, involving work within a City street (e.g., utility connections, temporary occupancy of parking or traffic lanes)**
- + **Utility construction**

GENERAL

Bicycles are legal vehicles on all the streets of Cambridge. Through bicycle movement must be maintained during construction and other projects that disrupt travel (e.g., special events) subject to the approved construction management plan. People riding bicycles are particularly susceptible to disruptions in their normal travel routes because of their slower speeds and exposure to noise, dirt and fumes. Temporary lane restrictions, detours and other traffic control measures instituted during construction or other travel disruptions should be designed to accommodate non-motorized travelers.

For all construction projects, an approved Traffic Management Plan must meet these guidelines for bicycle accommodations.

PAVEMENT SURFACE QUALITY AND STRUCTURE

People riding bicycles, particularly those riding on narrow, high-pressure tires, need to have pavement as free of defects and debris as possible to ensure control of their bicycles. As most road bikes do not have a suspension system, high-pressure tires transmit every bump to the rider. Loss of control on deteriorated pavement with loose aggregates, potholes, litter, etc., is also a major risk.

Pavement seams parallel to the roadway should not be located on the portion of the road where bicycling is expected. Utility covers and drainage grates should be flush with the pavement surface and should be adjusted with pavement overlays. Approaches to railroad crossings should be improved as necessary to provide for safe bicycle crossings.

Pavement surfaces should be smooth, and the edge of the pavement should be uniform. Narrow slots in the surface that could catch a bicycle wheel, such as a gap in the longitudinal joint between two concrete slabs, should not be more than 1/2 inch wide. Ridges in the pavement that could cause people riding bicycles to lose control should not be more than 3/8 inch high when parallel to travel or 3/4 inch high when perpendicular to travel.

When pavement is overlaid, the edge of the overlay should be matched to the height of the adjacent pavement or smooth transitions should be provided.

BICYCLE TRAVEL THROUGH CONSTRUCTION ZONES

The following general considerations apply to accommodating bicyclists in construction zones:

- + Where construction is occurring on a street that already has a bicycle lane, the area through which the construction is occurring should maintain that space.
- + Every effort should be made to avoid using bicycle lanes for staging of site construction work or temporary construction signage.
- + Minimize the time that construction work occupies bicycle lanes. For example, if the added work space is only needed for operation of a crane for a limited number of days that will be the only time that occupancy of the bicycle lane is permitted.
- + Where bicycles lanes are not present, provide a shared vehicle lane as wide as physically feasible.
- + If a bicycle lane is taken or if the area used by bicyclists is impacted by construction, contractors must use the “Bikes May Use Full Lane” sign, standard R4-11 MUTCD sign. Orange signage in construction zones is preferred.
- + If the disruption occurs in a bicycle lane over a short distance (approximately 500 feet or less), bicyclists may be routed to share a motor vehicle lane (as wide as possible).
- + If the disruption occurs over a longer distance (more than 500 feet), and on busy roadways, a temporary bicycle lane should be provided. In the event that it is not possible to provide a temporary bicycle lane, provide a wide outside lane (at least 14 feet wide). If neither of these is possible, provide ramps to allow bicycles to access the sidewalk within the construction zone (provided the site is not within one of the zones where sidewalk bicycle riding is prohibited).
- + Bicyclists should not be specifically directed onto sidewalks with pedestrians unless there is no reasonable alternative.



Figure 9.3: “Bikes May Use Full Lane” sign, MUTCD R4-11

CONSIDERATIONS FOR STREET DISRUPTIONS AND CONSTRUCTION

Metal plates create a slick and dangerous surface for bicyclists, and are not easily visible at night or in the rain.

- + Advance warning signs (Caution – Metal Plates Ahead) may be required to be posted if conditions warrant.
- + It is preferable that the plates be recessed so that the top of the plate is level with the adjacent pavement.
- + Where this is not possible, provide a temporary bituminous concrete lip painted reflective pink all around the plate to alert bicyclists to a road hazard.
- + All metal plate edges should be painted with high visibility (reflective pink) paint.
- + Type II or II Barricades (see MUTCD for description) with flashers should be placed at least 20 feet in advance.
- + Steel plates should have a non-slippery textured surface; this is required within an intersection or a crosswalk.

Construction excavations or depressions should never be left without physical barriers preventing bicyclists from falling in.

- + The preferred treatment is the provisions of temporary fill and a temporary bituminous concrete patch.
- + Where the excavation is outside the motor vehicle and bicycle lanes, provide traffic barriers (concrete barriers, barricades, or where the depression is less than 18 inches, cones or barrels may be used)



Figure 9.4: Street repaving zone featuring manholes painted with reflective pink paint.

- + If the excavation must be maintained for more than two days and it is located within lanes to be used by bicyclists, temporary steel plates may be used. See guidelines for the use of metal plates above.

Narrow cuts that are parallel with the direction of travel create an extreme hazard for bicyclists, whose tires could get caught. These should never be made and left in an area where bicyclists will be traveling. If necessary, they should be blocked off and bicyclists routed around the hazard.

- + **When performing advance pavement cutting for trenching or other roadway excavation, use only saw cutting (approximately 1/4 inch or narrower).**

Site access and ramps: Temporary (usually asphalt) ramps are sometimes proposed to access a site from a sidewalk where no driveway or other vehicle access exists. The creation of ramps in the roadway is not desirable unless being created in an area that is otherwise used by on-street parking. If necessary for pedestrian accessibility reasons, the ramp edge will be painted pink and/or a barricade placed alongside so a person bicycling does not inadvertently run into it.

Raised castings: After cold planing of pavement is performed, utility castings (e.g., manhole covers, valve box covers, and catch basin grates) will be 1 to 2 inches higher than the surrounding pavement. This presents a hazard for bicyclists and motor vehicles alike. This condition will also occur during roadway construction just before the next lift of pavement is to be placed. Wherever raised casting are present, the following should be provided:

- + **Provide advance warning signs saying: "Caution – Raised Castings Ahead."**
- + **Spray paint reflective pink on the raised portions of the castings.**



Figure 9.5: Construction zone featuring temporary bike lane.

Cold planing and pavement installation: After cold planing, there is a vertical lip at the limits of pavement removal. A smooth bituminous transition slope should be provided to eliminate the jarring hazard of hitting the vertical lip. In roadway construction, there may be a similar vertical lip between the different lifts of pavement installed. In these conditions, a similar transition is also needed.

- + Provide advance warning signs saying: “Bump” at these transitions.
- + Paint the transition sloped area in reflective pink.

Pavement Sweeping and Debris Removal: Road surfaces in construction zones may experience a greater build-up of debris than other roadway segments. Special attention must be given to keeping roadways surfaces free of debris, including sand, gravel, stones, trash, and miscellaneous construction debris. Pavement in construction zones should be swept to maintain a reasonably clear riding surface in bicycle lanes and in the outer 5 or 6 feet of roadway.

Pot holes: Pot holes are more likely to be found in construction zones due to the impact of construction equipment and due to temporary pavement patching. Special attention must be given to monitoring for the development of pot holes and for promptly filling in and patching pot holes.

Temporary Traffic Sign Placement: The placement of advance construction signs must not obstruct bicyclists’ path. In particular, temporary signs shall not be placed in bicycle lanes.

Restoration of Pavement Markings: As soon as reasonably possible after paving, install pavement markings, particularly bicycle lanes markings and other markings associated with bicycle facilities.



Figure 9.6: Construction crew installing bicycle decal and green pavement markings.