Chapter 4. Recommended Walkway and Bikeway Network

Normal has potential to build on the existing walkway and bikeway networks and transform itself into a community where walking and bicycling for transportation and recreation are popular activities. This chapter lays out a 20-year plan for completing this system of walkways and bikeways. The recommended network builds upon previous and on-going local and regional planning efforts, and reflects the extensive input offered by Town staff, the Master Plan Steering Committee, bicycle/pedestrian stakeholder groups, and Normal residents.

The recommended walkway and bikeway network includes a comprehensive and diverse set of pedestrian and bicycle facilities connecting key destinations in and around Normal. System improvements include upgrading intersections for safer bicycle and pedestrian crossings, establishing pedestrian priority corridors to target sidewalk infill, establishing a formalized bikeway system, and other non-infrastructure projects to encourage bicycling and walking. Suggested improvements include low-cost measures yielding immediate results, such as spot-infill of sidewalks and re-striping of streets to accommodate bike lanes. Other suggested improvements, such as expanding the local trail system, represent longer-term strategies for transforming Normal into a truly bicycle- and pedestrian-friendly community.

This chapter contains a long list of suggested improvements, yet projects at the top of the priority list will substantially improve the walking and bicycling environment within the first five years of Plan implementation. Chapter 5 describes programmatic strategies to enhance Normal’s walking and bicycling environment. This chapter is organized into walkway and bikeway improvements, first discussing best practice design guidelines for each proposed facility type and then specifically suggesting where the Town could implement each of these designs. It should be noted that final pedestrian and bicycle facility design will be subject to relevant standards (e.g., IDOT) depending on their location.

Recommended Walkway Improvements

The recommended pedestrian network builds upon Normal’s existing system of sidewalks, shared use paths, and other pedestrian infrastructure elements currently in place. Map 4 depicts recommended pedestrian system improvements, which include intersection improvements and “pedestrian priority corridors” to target sidewalk infill and spot improvements.

Best practice design guidelines are based on guidance from the Manual on Uniform Traffic Control Devices (MUTCD), Americans with Disabilities Act (ADA) standards and guidelines, American Association of State Highway and Transportation Officials (AASHTO) bicycle and pedestrian facility design guidelines and other relevant design manuals. The sections following describe pedestrian improvements and proposed projects in greater detail.
Sidewalks

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel that is separated from vehicle traffic. Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped planting strip area. Sidewalks are a common application in urban and suburban environments but are less common in rural areas and environments where objections to the “urban” character of sidewalks can arise. In rural areas, pedestrian travel commonly occurs along the shoulder of the roadway, which is often unpaved.

Installing new sidewalks can be costly, particularly if drainage improvements such as undergrounding of roadside culverts and installation of curb/gutter are part of the design. However, fixing short gaps in an existing sidewalk network is important to maximize system continuity and can be relatively low-cost. Alternatives to sidewalks in rural areas include pedestrian paths separated from a roadway by a bioswale (to serve drainage purposes), or traffic-calming measures on low-volume streets where pedestrians share the road with motorists.

Figure 33 and Figure 34 show examples of poorly-designed and well-designed sidewalks, respectively. This section addresses design considerations contributing to a good pedestrian environment both along sidewalks and at intersections.

Figure 33. Narrow sidewalks are often blocked by utilities and do not provide adequate pedestrian space

Figure 34. A well-designed sidewalk provides plenty of pedestrian space, as well as trees, bike parking, and a planter zone
Sidewalk Design Guidelines

The sidewalk corridor is the portion of the pedestrian realm between the roadway edge and right-of-way boundary, generally along the sides of streets. A variety of considerations are important in sidewalk design. Providing adequate and accessible facilities should lead to increased numbers of people walking, improved safety, and the creation of social space. Attributes of well-designed sidewalks include the following:

- **Accessibility**: A network of sidewalks should be accessible to all users and meet ADA requirements.
- **Adequate width**: Two people should be able to walk side-by-side and pass a third person comfortably, and different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should be wider to accommodate the higher volume of walkers.
- **Safety**: Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.
- **Continuity**: Walking routes should be obvious and should not require pedestrians to travel out of their way unnecessarily.
- **Landscaping**: Plantings and street trees within the roadside area should contribute to the overall psychological and visual comfort of sidewalk users, without providing hiding places for attackers.
- **Social space**: Sidewalks should be more than areas to travel; they should provide places for people to interact. There should be places for standing, visiting, and sitting. The sidewalk area should be a place where adults and children can safely participate in public life.
- **Quality of place**: Sidewalks should contribute to the character of neighborhoods and business districts and strengthen their identity.

The following sections describe specific sidewalk elements in greater detail.
# Zones in the Sidewalk Corridor

## Design Summary

The Sidewalk Corridor is typically located within the public right-of-way between the curb or roadway edge and the property line. The Sidewalk Corridor contains four distinct zones: the Curb Zone, the Furnishings Zone, the Through Pedestrian Zone, and the Frontage Zone, shown right.

### The Curb Zone

Curbs prevent water in the street gutters from entering the pedestrian space, discourage vehicles from driving over the pedestrian area, and facilitate street sweeping. In addition, the curb helps to define the pedestrian environment within the streetscape, although other designs can be effective for this purpose. At the corner, the curb is an important tactile element for pedestrians who are finding their way with the use of a cane.

### The Furnishings/Planting Zone

The Furnishings Zone buffers pedestrians from the adjacent roadway and is also the area where elements such as street trees, signal poles, utility poles, street lights, controller boxes, hydrants, signs, parking meters, driveway aprons, grates, hatch covers, and street furniture are properly located. This is the area where people alight from parked cars.

### The Through Pedestrian Zone

The Through Pedestrian Zone is the area intended for pedestrian travel. This zone should be entirely free of permanent and temporary objects.

### The Frontage Zone

The Frontage Zone is the area between the Through Pedestrian Zone and the property line. This zone allows pedestrians a comfortable “shy” distance from the building fronts in areas where buildings are at the lot line or from elements such as fences and hedges on private property.

## Design Examples

<table>
<thead>
<tr>
<th>Curb/Gutter Zone</th>
<th>Furnishings/Planting Zone</th>
<th>Through Pedestrian Zone</th>
<th>Frontage Zone</th>
</tr>
</thead>
</table>

Sidewalk Zones

This sidewalk has plantings in the furnishing zone and in the frontage zone and provides sufficient through passage zone width.
Proposed sidewalk guidelines apply to new development and depend on available street width, motor vehicle volumes, surrounding land uses, and pedestrian activity levels. Standardizing sidewalk guidelines for different areas of the Town, dependent on the above listed factors, ensure a minimum level of quality for all sidewalks.

Generally, sidewalks should be at least six feet wide, exclusive of the curb and other obstructions. This width:

- Enables two pedestrians (including wheelchair users) to walk side-by-side or to pass each other comfortably
- Allows two pedestrians to pass a third pedestrian without leaving the sidewalk

The table to the right provides guidance for minimum sidewalk widths by street type.

In some cases, it is possible to increase the dimensions of the sidewalk corridor, either through acquisition of right-of-way or public walkway easements, or by reallocation of the overall right-of-way (such as by narrowing roadway travel lanes or reducing the number of lanes). As part of a roadway reconstruction project on a street with a narrow sidewalk corridor, project planners should first analyze the impact of reclaiming a portion of the existing right-of-way. If this proves impractical, the feasibility of acquiring additional right-of-way should be examined. Acquisition should be considered where its cost is reasonable in proportion to the overall project cost.

In the case of infill development, the dedication of public right-of-way or the granting of a public walkway easement to widen the sidewalk corridor may be included as a requirement for obtaining a building permit or land use approval.

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proposed sidewalk guidelines</strong></td>
<td><strong>Recommended Minimum Sidewalk Widths by Street Type:</strong></td>
</tr>
<tr>
<td>Proposed sidewalk guidelines apply to new development and depend on available street width, motor vehicle volumes, surrounding land uses, and pedestrian activity levels. Standardizing sidewalk guidelines for different areas of the Town, dependent on the above listed factors, ensure a minimum level of quality for all sidewalks. Generally, sidewalks should be at least six feet wide, exclusive of the curb and other obstructions. This width: Enables two pedestrians (including wheelchair users) to walk side-by-side or to pass each other comfortably Allows two pedestrians to pass a third pedestrian without leaving the sidewalk The table to the right provides guidance for minimum sidewalk widths by street type. In some cases, it is possible to increase the dimensions of the sidewalk corridor, either through acquisition of right-of-way or public walkway easements, or by reallocation of the overall right-of-way (such as by narrowing roadway travel lanes or reducing the number of lanes). As part of a roadway reconstruction project on a street with a narrow sidewalk corridor, project planners should first analyze the impact of reclaiming a portion of the existing right-of-way. If this proves impractical, the feasibility of acquiring additional right-of-way should be examined. Acquisition should be considered where its cost is reasonable in proportion to the overall project cost. In the case of infill development, the dedication of public right-of-way or the granting of a public walkway easement to widen the sidewalk corridor may be included as a requirement for obtaining a building permit or land use approval.</td>
<td><strong>Recommended Minimum Sidewalk Widths by Street Type:</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Curb</strong></td>
</tr>
<tr>
<td>Arterial and Collector Street</td>
<td>1 ft.</td>
</tr>
<tr>
<td>Local Neighborhood Street</td>
<td>0-1 ft.</td>
</tr>
<tr>
<td>Commercial Walkways</td>
<td>1 ft.</td>
</tr>
</tbody>
</table>

*Note: short sidewalk segments can have narrower widths in physically-constrained areas.

Example of a sidewalk with trees and sufficient space for pedestrians to walk together
## Sidewalk Surfaces

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidewalk surfaces should be smooth and continuous. It is also desirable that the sidewalk surface be stable, firm and slip resistant. Preferred materials include Portland Cement Concrete (PCC) and Asphalt Concrete (AC). PCC provides a smooth, long-lasting and durable finish that is easy to grade and repair. AC has a shorter life expectancy but may be more appropriate in less urbanized areas and in park settings. Crushed aggregate may also be used as an all-weather walkway surface in park areas, but this material generally requires a higher level of maintenance to maintain accessibility. The <em>Americans with Disabilities Act</em> allows a maximum two percent cross-slope on sidewalks and other walkways. Where sidewalks meet driveways, curb cuts or intersections, a three-foot wide area should be maintained with a two percent cross-slope.</td>
<td>Concrete is often used as a trail material and can be used for sidewalks</td>
</tr>
<tr>
<td></td>
<td>Asphalt is a common sidewalk surfacing material</td>
</tr>
</tbody>
</table>
**Addressing Sidewalk Obstructions**

<table>
<thead>
<tr>
<th><strong>Design Summary</strong></th>
<th><strong>Design Examples</strong></th>
</tr>
</thead>
</table>
| Obstructions to pedestrian travel in the sidewalk corridor typically include sign posts, utility and signal poles, mailboxes, fire hydrants and street furniture. Obstructions should be placed between the sidewalk and the roadway to create a buffer for increased pedestrian comfort. When sidewalks abut perpendicular or angle on-street parking, wheelstops should be placed in the parking area to prevent parked vehicles from overhanging in the sidewalk. When sidewalks abut hedges, fences, or buildings, an additional two feet of lateral clearance should be added to provide appropriate shy distance. Driveways represent another sidewalk obstruction, especially for wheelchair users. The following techniques can be used to accommodate wheelchair users at driveway crossings:  
- Reducing the number of accesses reduces the need for special provisions. This strategy should be pursued first.  
- Constructing wide sidewalks avoids excessively steep driveway slopes. The overall width must be sufficient to avoid an abrupt driveway slope.  
- Planter strips allow sidewalks to remain level, with the driveway grade change occurring within the planter strip (top graphic at right).  
- Where constraints preclude a planter strip, wrapping the sidewalk around the driveway has a similar effect (middle graphic at right). However, this method may have disadvantages for visually-impaired pedestrians who follow the curb line for guidance.  
- When constraints only allow curb-tight sidewalks, dipping the entire sidewalk at the driveway approaches keeps the cross-slope at a constant grade (bottom graphic at right). However, this may be uncomfortable for pedestrians and could create drainage problems behind the sidewalk. | ![Driveway apron utilizing the planting strip](image1.png)  
![Sidewalk wrapped around driveway](image2.png)  
![Entire sidewalk dips at driveway](image3.png) |
# Sidewalk Maintenance

## Design Summary

Sidewalk surfaces that have settled or heaved over time can be a significant barrier for pedestrians. Surfaces that are smooth when newly installed may not stay that way, particularly where masonry units are installed without an adequate subbase. Knowledgeable design, wise material selection, good construction practices, and regular maintenance procedures can help ensure that differences in level between adjacent units do not exceed the limits of usability. Surface provisions for an accessible route limit allowable vertical differences in level between abutting surfaces.

## Root Protection

Most sidewalk damage is caused as subsurface roots become thicker, lifting up the concrete slabs. To prevent extensive sidewalk damage, the appropriate rootstocks should be chosen for trees planted at each location. Trees and rootstocks that have extensive, shallow root systems should not be planted adjacent to sidewalks. Also, tree selection should be made based on the available soil, water and light conditions, and most importantly, the width of the planting strip.

## Plantings

Street trees are a highly desirable part of the pedestrian environment, especially large-canopied shade trees. Tree limbs should be trimmed to leave at least eight feet of clear space above the sidewalk. Where mature trees are in place, root barriers, root pruning techniques, and interlocking sidewalk pavers could be used to minimize damage.

## Grates

All grates within the sidewalk should be flush with the level of the surrounding sidewalk surface, and should be located outside the Through Pedestrian Zone. Ventilation grates and tree well grates shall have openings no greater than $\frac{1}{2}$" in width. Designers should consider using tree well grates or treatments such as unit pavers in high pedestrian use areas.

## Hatch Covers

Hatch covers should be located within the sidewalk Furnishings Zone. Hatch covers must have a surface texture that is rough, with a slightly raised pattern. The surface should be slip-resistant even when wet. The cover should be flush with the surrounding sidewalk surface.
**Intersections**

In general, pedestrians are not inclined to travel very far out-of-direction to access a designated crosswalk, so providing sufficient crossings is critical for a safe pedestrian environment. Crosswalks can also be designed for increased visibility of pedestrians, and curb ramps as well as vehicle turning radii should also be considered for the pedestrian environment.

In areas of high pedestrian use, where priority is given to walking trips by Town policies, it may be appropriate to design for the convenience of pedestrians when considering signal placement and timing, even if it means reducing the efficiency of vehicle progression. For example, longer pedestrian phases may be desirable.

**Intersection Design Guidelines**

Attributes of pedestrian-friendly intersection design include:

- **Clear Space** — Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.

- **Visibility** — It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.

- **Legibility** — Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.

- **Accessibility** — All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, textures, must meet accessibility standards.

- **Separation from Traffic** — Corner design and construction must be effective in discouraging turning vehicles from driving over the pedestrian area.

Although some intersections in Normal create challenging pedestrian crossing conditions, improvement opportunities exist. This Plan proposes an overall strategy to improve intersections and other pedestrian crossings throughout the town through a variety of treatments. Most intersections that could benefit from improvements are located on streets with higher vehicle speeds and volumes, higher pedestrian volumes, limited sight distance, and/or other conditions complicating pedestrian crossing movements.
### Improving Visibility at Crossings

At signalized intersections, all crosswalks should be marked. At un-signalized intersections, crosswalks should be marked in the following situations:

- To help orient pedestrians find their way across a complex intersection;
- To show pedestrians the shortest route with the least exposure to vehicular traffic; and
- To help position pedestrians where they can best be seen by oncoming traffic.

Several provisions can increase safety for all roadway users by clearly marking or increasing the visibility of a crossing location, or by providing a pedestrian refuge island, as described below.

### Mid-block Crossings

Crosswalks can be provided at mid-block locations if sufficient pedestrian demand exists or where pedestrians would be required to walk out-of-direction to access a crosswalk at an intersection. Mid-block crossings should be aligned where possible with logical pedestrian travel patterns. Mid-block crossings should always include pavement markings and warning signs.

### High-Visibility Crosswalks

Where there is poor motorist awareness of an existing crossing or at high-use locations such as a school crosswalk or a crossing of the Constitution Trail, high-visibility crosswalks can increase safety for pedestrians and bicyclists. High-visibility crosswalks are particularly important along routes to school to improve visibility of school children.

### Flashing Warning Signs and In-Street “Yield to Pedestrians” Signs

Another method for increasing the visibility of a crossing, flashing warning signs call attention to the pedestrian crossing location. They can be continuous, timed for rush hours, or activated by a pedestrian push-button.

In-Street Yield to Pedestrian Signs are flexible plastic “paddle” signs installed in the center of a roadway to enhance a crosswalk at uncontrolled crossing locations.

### Pedestrian Refuge Islands

Pedestrian refuge islands minimize pedestrian exposure at a crossing by shortening the crossing distance and increasing the number of available gaps for crossing. Refuge islands allow pedestrians to make a crossing in multiple stages by focusing on one direction of traffic at a time.
Signal Accommodation for Pedestrians

Pre-timed signals accommodate pedestrian crossings through automatic “phasing” concurrent with parallel vehicle traffic, while at actuated signals pedestrians usually push an activation button to trigger the walk signal. Providing adequate pedestrian crossing time is a critical element of the walking environment at signalized intersections. The MUTCD recommends traffic signal timing to assume a pedestrian walking speed of 4’ per second, meaning that the length of a signal phase with parallel pedestrian movements should provide sufficient time for a pedestrian to safely cross the adjacent street. At crossings where older pedestrians or pedestrians with disabilities are expected, crossing speeds as low as 3’ per second may be assumed.

Pedestrian-Activated Push Buttons

A push button permits the signal controller to detect pedestrians waiting to cross. When push buttons are used, they should be located so that someone in a wheelchair can reach the button from a level area of the sidewalk without deviating significantly from the natural line of travel into the crosswalk.

Pedestrian signal buttons are used in cases where actuated signals for the signal controller detect the presence of pedestrians. Where needed, pedestrian call buttons should be located to meet the following criteria:

- The closest push button to a crosswalk should call the pedestrian signal for that crosswalk;
- An arrow should indicate which crosswalk the button will affect;
- The push button should be visible to a pedestrian facing the crosswalk, unless space constrains placement; and
- The push button must be accessible from the landing at the top of the curb ramp or the dropped landing of a parallel curb ramp.

Leading Pedestrian Interval (LPI)

An LPI gives pedestrians an advance walk signal before the motorist signal releases vehicle traffic, which makes pedestrians more visible to motorists.

Audible Pedestrian Signal

Audible signals provide a cue to visually-impaired pedestrians that there is a ‘Walk’ signal. Audible signals typically include chirping sounds and or a pre-recorded voice indicator, which are activated by the pedestrian push-button.

The MUTCD states that installation of audible signals should be based on an engineering study considering:

- Potential demand or requests for accessible pedestrian signals
- The complexity of intersection geometry
- Traffic volumes when pedestrians might be present including periods of low traffic volumes or high turn-on-red volumes
- The complexity of traffic signal phasing

Pedestrian Countdown Signals

The countdown signal displays the number of seconds remaining for an individual to complete his or her crossing. This feature allows pedestrians of all walking speeds to determine if they complete their crossing movement during the current signal phase or wait for the next cycle.
### ADA-Compliant Curb Ramps

**Design Summary**

Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed curb ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a curb ramp can be useless to someone in a wheelchair, forcing them back to a driveway and out into the street for access.

The ADA defines two types of curb ramp systems, “perpendicular ramps” and “parallel ramps” (see right). The first provides a ramp into a crosswalk, while the second provides a ramp into a landing that is flush with the street surface, sometimes called a “dropped landing.”

**Discussion**

Every curb ramp must have a landing at the top and at the bottom. The maximum ramp slope in the right-of-way is 1:12 with a cross slope of no more than 1:50. The minimum width of a ramp should be 3'-0'.

The landing at the top of a ramp should be at least 4'-0" long and at least the same width as the ramp itself. It should slope no more than 1:50 in any direction.

If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway. The landing, 4'-0" long, should be completely contained within the crosswalk and should not have a running slope of greater than 1:20.

If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 5'-0" long and at least as wide as the ramp, although a width of 5'-0" is preferred. The landing should not slope more than 1:50 in any direction.

A single landing may serve as the top landing for one ramp and the bottom landing for another.

**Curb Ramp Maintenance**

It is critical that the interface between a curb ramp and the street be maintained adequately. Asphalt street sections typically have a shorter life cycle than a concrete ramp. Potholes in the asphalt at the foot of the ramp can catch the front wheels of a wheelchair, causing it to tip over.

In some cases, existing ramps and streets create a tipping hazard because of a sharp change in slope. As an interim solution, this sharp transition can be eased with a tapered infill of asphalt at the foot of the ramp.
### Modifying Wide Corners

#### Design Summary

In general, the smaller the curb radius, the better for pedestrians. In comparison to a large curb radius, a tight curb radius:
- provides additional pedestrian space;
- allows more flexibility in the placement of curb ramps;
- results in a shorter crosswalk; and
- requires vehicles to reduce speed while turning.
- is beneficial to street sweeping operations.

Historically, roadway design standards have called for wide curb radii at intersections to increase capacity for motor vehicles. As a result, many of Normal’s intersections have corners that force pedestrians to walk longer to cross the street than at intersections with smaller turning radii. This design also allows vehicles to make right-turns at relatively high speeds.

#### Discussion

**Choosing a Curb Radius**

Several factors govern the choice of curb radius in any given location:
- the turning radius of the design vehicle;
- the geometry of the intersection;
- street classification; and
- whether on-street parking or a bike lane (or both) exists between the travel lane and the curb.

The presence of a lane for parking or bicycles creates an “effective curb radius” that allows the designer to choose a radius for the curb that is smaller than the turning radius required by the design vehicle.

The designer must balance all factors, keeping in mind that the chosen radius should be the smallest possible. The radius may be as small as 3'-0" where there are no turning movements, or 5'-0" where there are vehicle turning movements and there is adequate street width and a larger effective curb radius created by parking or bike lanes.

**Parking Control and Corner Radii**

Designers sometimes consider that on-street parking will begin or end at the point of tangency or point of curvature of the corner radius. In practice, this point is not always evident in the field. Parking control should not be a factor in selecting curb radius.
Modifying Wide Corners (continued)

Modifying the Curb

At some intersections where wide curb radii induce higher vehicle turning speeds, the recommendation is to rebuild corners to reduce speeds and render the intersection safer for all users. This treatment was recommended in Normal’s *Main Street Redevelopment Plan*.

Two methods can be used to reduce curb radii and increase safety for pedestrians crossing the street.

**Design Example: Main Street at Hovey/Beaufort**

<table>
<thead>
<tr>
<th>Curb Reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curb reconstruction (shown to the right) is the recommended approach, as the removal of the right-turn slip lane forces automobiles to reduce speed while making turning maneuvers. This approach also shortens the crossing pedestrian distance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soft Curbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>The alternative to curb reconstruction is to narrow the right turn slip lane with a soft curb, which vehicles can cross over (shown right). This visual narrowing will reduce vehicle turning speeds and encourage drivers to be more cautious in approaching intersections. It also allows emergency vehicles to make the turn at-high speed.</td>
</tr>
</tbody>
</table>
Pedestrian Priority Corridor Recommendations

Normal benefits from a relatively complete sidewalk system in several areas (particularly Uptown Normal), while streets in some outlying areas have fragmented sidewalks or no sidewalks at all. As a result, the major challenge lies in retrofitting existing streets where sidewalks are fragmented or lacking altogether and in areas where significant redevelopment is not expected to occur. Several corridors have been identified as potentially benefiting from targeted pedestrian improvements, including sidewalk infill and widening as well as intersection improvements. Intersections along these corridors should also receive additional pedestrian treatments, described earlier. Table 13 and Map 4 show the corridors where the Town of Normal should concentrate its sidewalk and intersection improvements first.

Table 13. Recommended Priority Pedestrian Corridors

<table>
<thead>
<tr>
<th>Street</th>
<th>From-To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Street/Kingsley Street</td>
<td>South town limits to Raab Road</td>
</tr>
<tr>
<td>College Avenue/Mulberry Street</td>
<td>School Street to Hershey Road</td>
</tr>
<tr>
<td>Towanda Avenue</td>
<td>Jersey Avenue to Raab Road</td>
</tr>
<tr>
<td>Raab Road</td>
<td>Parkside Road to Towanda Avenue</td>
</tr>
<tr>
<td>Linden Street</td>
<td>South town limits to Northtown Road</td>
</tr>
<tr>
<td>Willow Street/Fort Jesse Road</td>
<td>Beech Street to Northpointe Drive</td>
</tr>
<tr>
<td>Airport Road</td>
<td>Fort Jesse Road to Raab Road</td>
</tr>
<tr>
<td>Hershey Road</td>
<td>Fort Jesse Road to Raab Road</td>
</tr>
<tr>
<td>Shepard Road</td>
<td>Hershey Road to Airport Road</td>
</tr>
<tr>
<td>Veterans Parkway</td>
<td>Vernon Avenue to Shepard Road</td>
</tr>
</tbody>
</table>

Intersection Improvement Recommendations

Although many intersections throughout Normal could be targeted for enhancements, the intersections identified on the Proposed Walkways Map (Map 4) were recognized by Town staff and residents as having a relatively high importance. Most highlighted intersections are located on streets with wide cross-sections (e.g., with multiple travel lanes in each direction), higher vehicle speeds and volumes, and/or other conditions complicating pedestrian crossing movements. Among the intersections highlighted for improvements are those located along Veterans Parkway. It should be noted that several proposed intersection improvement projects are located on the “pedestrian priority corridors” described above, providing opportunities to combine projects and streamline corridor improvements.

In addition, this Plan recommends intersection improvements where the Constitution Trail crosses major streets. Specific locations include:

- Northtown Road
- Raab Road
- Shelbourne Drive
- Willow Street
- Locust Street
- Vernon Avenue
- College Avenue
- Mulberry Street
Shared Use Paths

Shared use paths (also referred to as “trails” and “multi-use paths”) are often viewed as recreational facilities, but they are also important corridors for utilitarian trips. Shared use paths serve both bicyclists and pedestrians and provide additional width over a standard sidewalk. These facilities may be constructed adjacent to roads, through parks or open space areas, along creeks, or along linear corridors such as abandoned railroad lines. In rural areas, shared use paths can serve as an alternative to formal curb, gutter and sidewalks. If an asphalt or concrete surface is not desired, paths can be constructed with decomposed granite or another aggregate material to better fit in with the rural environment. Regardless of the type, paths constructed next to the road must have some type of vertical (e.g., curb or barrier) or horizontal (e.g., landscaped strip) buffer separating the path area from adjacent vehicle travel lanes.

Shared Use Path Design Guidelines

Shared use paths can provide a desirable facility particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic. Shared use paths should generally provide directional travel opportunities not provided by existing roadways. Elements that enhance shared use path design include:

- Frequent access points from the local road network; if access points are spaced too far apart, users will have to travel out of direction to enter or exit the path, which will discourage use
- Directional signs to direct users to and from the path
- High building standards to allow heavy maintenance equipment to use the path without causing it to deteriorate
- Few at-grade crossings with streets or driveways
- Path terminus that is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street. If poorly designed, the point where the path joins the street system can put pedestrians and cyclists in a position where motor vehicle drivers do not expect them
- Identification and addressing of potential safety and security issues up front
- Separate bicycle and pedestrian ways to reduce conflicts whenever possible, and especially where heavy use can be expected

Shared Use Paths Along Roadways

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared use paths directly adjacent to roadways. Also known as “sidepaths”, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where cyclists enter or leave the path. This can also result in an unsafe situation where motorists entering or crossing the roadway at intersections and driveways do not notice bicyclists coming from their right, as they are not expecting traffic coming from that direction. Stopped cross-street
motor vehicle traffic or vehicles exiting side streets or driveways may frequently block path crossings. Even bicyclists coming from the left may also go unnoticed, especially when sight distances are poor. Additional concerns about shared use paths directly adjacent to roadways (e.g., with minimal or no separation) include:

- Half of bicycle traffic would ride against the normal flow of vehicle traffic, contrary to the rules of the road.
- When the path ends, cyclists riding against traffic tend to continue to travel on the wrong side of the street, as do cyclists making their way to the path. Wrong-way bicycle travel is a major cause of vehicle/bicycle crashes.
- At intersections, motorists crossing the path often do not notice bicyclists approaching from certain directions, especially where sight distances are poor.
- Bicyclists on the path are required to stop or yield at cross-streets and driveways, unless otherwise posted.
- Stopped vehicles on a cross-street or driveway may block the path.
- Because of the closeness of vehicle traffic to opposing bicycle traffic, barriers are often necessary to separate motorists from cyclists. These barriers serve as obstructions, complicate facility maintenance and waste available right-of-way.
- Paths directly adjacent to high-volume roadways diminish users’ experience by placing them in an uncomfortable environment. This could lead to a path’s underutilization.

As bicyclists gain experience and realize some of the advantages of riding on the roadway, some riders stop using paths adjacent to roadways. Bicyclists may also tend to prefer the roadway as pedestrian traffic on the shared use path increases due to its location next to an urban roadway. When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bike lane width on the roadway, as the on-street bicycle facility will generally be superior to the “sideway” for experienced cyclists and those who are cycling for transportation purposes. Bike lanes should be provided as an alternate (more transportation-oriented) facility whenever possible. Shared use paths may be considered along roadways under the following conditions:

- The path will generally be separated from all motor vehicle traffic
- Bicycle and pedestrian use is anticipated to be high
- To provide continuity with an existing path through a roadway corridor
- The path can be terminated at each end onto streets with good bicycle and pedestrian facilities, or onto another well-designed path
- There is adequate access to local cross-streets and other facilities along the route
- Any needed grade separation structures do not add substantial out-of-direction travel
- The total cost of providing the proposed path is proportionate to the need

These issues should be carefully considered as the Town of Normal develops shared use paths along roadways.
CHAPTER 4

70  Normal Bicycle and Pedestrian Master Plan

Shared Use Paths

Design Summary

<table>
<thead>
<tr>
<th>Width:</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 10' is the minimum allowed for a two-way shared use path and is only recommended for low traffic situations</td>
<td><img src="image1.png" alt="Recommended shared use path design" /></td>
</tr>
<tr>
<td>• 12' is recommended in most situations</td>
<td></td>
</tr>
<tr>
<td>• 12-14' or greater is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians.</td>
<td></td>
</tr>
</tbody>
</table>

Lateral Clearance:

• A 2’ or greater shoulder on both sides

Overhead Clearance:

• Clearance to overhead obstructions should be 8’ minimum, with 10’ recommended.

Separation From Roadway:

• 5’ min. buffer should separate the path from the edge of the roadway, or a physical barrier of sufficient height should be installed where a shared use path must be adjacent to a roadway

Discussion

Asphalt is the most common surface for shared use paths. However, the material composition and construction methods used can substantially affect the longevity of the pathway. Thicker asphalt sections and a well-prepared subgrade will reduce deformation over time and reduce long-term maintenance costs.

The use of concrete surfacing for paths has proven to be the most suitable for long-term use. Using modern construction practices, concrete provides a smooth ride with low maintenance costs. Concrete paths can be placed with a slip-form paver. The surface must be cross-broomed. Crack-control joints should be saw-cut, not troweled. Concrete paths cost more to build than asphalt paths but do not become brittle, cracked and rough with age, or deformed by roots.

Shared use paths should be designed with sufficient surfacing structural depth for the subgrade soil type to support maintenance and emergency vehicles. Where the path must be constructed over a very poor subgrade (wet and/or poor material), treatment of the subgrade with lime, cement or geotextile fabric should be considered.

The Cedar Lake Regional Trail in Minneapolis, MN has sufficient width to accommodate a variety of users
Shared Use Path Recommendations

The Constitution Trail, a popular and well-used facility, is the backbone of Normal’s shared use path system. Additional paths will create a comprehensive network of trails for recreation and commuting purposes.

Most of the shared use path recommendations in this Plan represent components of longer corridors comprised of varying bicycle and pedestrian facility types. While many of the longer proposed trails are likely to be used primarily for recreational purposes, many of the shorter and connecting shared use paths should be considered commuter routes.

Proposed shared use path locations are shown on Map 4. Several shared use paths are recommended in western and northern Normal, including along Raab Road, Airport Road, Shepard Road (between Greenbriar and Airport), Northtown Road, connecting Main/Raab to the Constitution Trail, and along other corridors.

Accessways

Accessways provide direct routes between residential areas, retail and office areas, institutional facilities, industrial parks, transit streets, neighborhood activity centers, and transit oriented developments. Accessways are necessary where routes for pedestrians and bicyclists are not otherwise provided by the street system, particularly in neighborhoods with a disconnected street grid that requires both out-of-direction travel and walking or biking on a major street. Accessways should be considered when ‘desire lines’ or informal, unauthorized and unmaintained paths have been created. These routes are intended to provide safe, direct, and convenient connections to reduce out-of-direction travel and make walking and bicycling easier.

Accessway Design Guidelines

The design of accessways varies according to the functional classification of the facility as well as the expected user group. Safety for bicyclists and pedestrians on these routes is paramount, as they often intersect busy roadways, are located in residential areas without regular surveillance, and can be quite dark.
Accessways

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Width</strong></td>
<td><img src="image1" alt="Preferred accessway design" /></td>
</tr>
<tr>
<td>The appropriate width of an accessway depends on the predicted usage.</td>
<td><img src="image2" alt="Preferred accessway design" /></td>
</tr>
<tr>
<td>• 12’ right-of-way with a centered 8’ wide paved surface and two 2’ planter strips is appropriate for a heavily-used accessway</td>
<td></td>
</tr>
<tr>
<td>• 8’ is the minimum width generally recommended</td>
<td></td>
</tr>
<tr>
<td>• Narrower widths can be acceptable in less-heavily trafficked physically-constrained areas. If such a trail is long, bulb-outs should be provided to allow pedestrians to pass each other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discussion</th>
<th><img src="image3" alt="This accessway connects two cul-de-sac streets" /></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surface</strong></td>
<td></td>
</tr>
<tr>
<td>Pervious surface materials such as pervious concrete and interlocking pavers are ideal for accessways, as they reduce rainwater runoff into neighboring yards. If the accessway is built to accommodate all users, including pedestrians with disabilities, bicyclists, strollers, and roller-skaters, it should not exceed a 5% slope.</td>
<td></td>
</tr>
</tbody>
</table>

| **Fencing** | |
| As a general policy, fencing requests should be reviewed on case-by-case bases. If credible evidence suggests that trespassing and crime issues on a specific property result from an accessway, then installation of fencing should be considered. There are numerous fencing types that can be considered. Solid fencing that does not allow any visual access to the trail should be discouraged. Fencing that allows a balance between the need for privacy, while simultaneously allowing informal surveillance of the accessway should be encouraged. If fencing is requested purely for privacy reasons, vegetative buffers should be considered. | |
**Recommended Bikeway Improvements**

Although Normal currently lacks a comprehensive bikeway network, the Town has potential to create an excellent system. The recommended bicycle network builds upon the system of previously-proposed improvements. The network has been developed to fill system gaps, continue expansion of the regional trail network, formalize existing routes used by bicyclists, and improve access between residential, employment, civic, and commercial destinations.

Map 5 depicts the recommended bikeway network for Normal. Similar to today, shared use paths would comprise the region’s future off-street bikeway system. Depending on their location and context, Normal’s on-street bikeway network would include the following facilities:

- **Bike Lanes**: Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and also include pavement stencils. Bike lanes are most appropriate on streets where higher traffic volumes and speeds indicate a need for greater separation.

- **Shared Lane Markings**: Shared lane markings (also known as “sharrows”) are high-visibility pavement markings that help position bicyclists within a shared vehicle/bicycle travel lane. These markings are typically used on streets where dedicated bike lanes are desirable but are not possible due to physical or other constraints.

- **Bicycle Boulevards**: Bicycle Boulevards are developed through a combination of traffic calming measures and other streetscape treatments, and are intended to slow vehicle traffic while facilitating safe and convenient bicycle travel. Appropriate treatments depend on several factors including traffic volumes, vehicle and bicycle circulation patterns, street connectivity, street width, physical constraints, and other parameters.

- **Signed Connections**: A signed connection accommodates vehicles and bicycles in the same travel lane (similar to a Bicycle Boulevard, but treatments focus exclusively on wayfinding amenities). The most suitable roadways for signed connections are those with low posted speeds or low traffic volumes. In addition to bicycle wayfinding signs, signed connections may also include on-street pavement markings to serve as a route reinforcement tool.

- **Cycle Tracks**: A cycle track is a hybrid type bicycle facility combining the experience of a separated path with the on-street infrastructure of a conventional bike lane. Cycle tracks provide exclusive space for bicycles that is physically separated from pedestrians and cars.

It is important to note that bicycles are permitted on all roads in the state of Illinois. As such, Normal’s entire street network is effectively the community’s bicycle network, regardless of whether or not a bikeway stripe, stencil, or sign is present on a given street. The designation of certain roads as bike routes is not intended to imply that these are the only roadways intended for bicycle use, or that bicyclists should not be riding on other streets. Rather, the designation of a network of on-street bikeways recognizes that certain roadways are preferred bicycle routes for most users, for reasons such as directness or access to significant destinations, and allows Normal to then focus resources on building out this primary network.
**Bike Lanes**

Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and also include pavement stencils. Bike lanes are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

Most commuter bicyclists would argue that on-street facilities are the safest and most functional facilities for bicycle transportation. Bicyclists have stated their preference for marked on-street bike lanes in numerous national surveys. The fact is that many bicyclists – particularly less experienced riders – are far more comfortable riding on a busy street if it has a striped and signed bike lane. Part of the goal of this Plan is to encourage new riders, and providing marked facilities such as bike lanes is one way of helping to persuade residents to give bicycling a try.

If properly designed, bike lanes can increase safety and promote proper riding. For this reason, bike lanes are desirable for bicycle commute routes along major roadways. Bike lanes help to define the road space for bicyclists and motorists, reduce the chance that motorists will stray into the cyclists’ path, discourage bicyclists from riding on the sidewalk, and remind motorists that cyclists have a right to the road. One key consideration in designing bike lanes in an urban setting is to ensure that bike lanes and adjacent parking lanes have sufficient width so that cyclists have enough room to avoid a suddenly opened vehicle door.

**Bike Lane Design Guidelines**

Bike lanes have been developed in a large variety of configurations and can have special characteristics including coloring if beneficial.

The AASHTO *Guide for the Development of Bicycle Facilities* guidance notes that “longitudinal pavement markings should be used to define bicycle lanes.” The guideline states that “if used, the bicycle lane symbol marking shall be placed immediately after an intersection and other locations as needed. The bicycle lane symbol marking shall be white. If the word or symbol pavement markings are used, Bicycle Lane signs shall also be used, but the signs need not be adjacent to every symbol to avoid overuse of the signs.”

The following pages describe guidelines for implementing bike lanes on streets with on-street parking (both parallel and diagonal) and without parking. Additional sheets highlight particular considerations for bike lanes, including conflicts with right-turning motorists, left-turning bicycle movements, bike lanes at intersections, and innovative techniques for improving bike lane visibility (including colored bike lanes and bike boxes). The following sections discuss a variety of methodologies for retrofitting bike lanes to existing roadways.
Bike Lane Adjacent to On-Street Parallel Parking

Design Summary

Bike Lane Width:
- 5' recommended when parking stalls are marked
- 7' maximum (may encourage vehicle loading in bike lane)
- 12' for a shared lane adjacent to a curb face or 11' minimum for a shared bike/parking lane where parking is permitted but not marked on streets without curbs

Discussion

Bike lanes adjacent to on-street parallel parking are common in the United States and can be dangerous for bicyclists if not designed properly. Crashes caused by a suddenly opened vehicle door are a common hazard for bicyclists using this type of facility. Wide bike lanes may encourage the cyclist to ride farther to the right (door zone) to maximize distance from passing traffic.

Wide bike lanes may also cause confusion with unloading vehicles in busy areas where parking is typically full. Some alternatives include:
- Installing parking “T’s” and smaller bike lane stencils placed to the left (see graphic at top left)
- Using diagonal stripes to encourage cyclists to ride on the left side of the bike lane (shown top right; this treatment is not standard and should be studied before use)
- Provide a buffer zone (preferred design; shown lower right). Bicyclists traveling in the center of the bike lane will be less likely to encounter open car doors. Motorists have space to stand outside the bike lane when loading and unloading.
### Bike Lane Adjacent to On-Street Parallel Parking (continued)

<table>
<thead>
<tr>
<th>Additional Discussion - Bike Lane Adjacent to On-Street Parallel Parking</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>From AASHTO Guide for the Development of Bicycle Facilities:</td>
<td></td>
</tr>
<tr>
<td>• “If parking is permitted, the bike lane should be placed between the</td>
<td></td>
</tr>
<tr>
<td>parking area and the travel lane and have a minimum width of 5’. Where</td>
<td></td>
</tr>
<tr>
<td>parking is permitted but a parking stripe or stalls are not utilized,</td>
<td></td>
</tr>
<tr>
<td>the shared area should be a minimum of 11’ without a curb face and</td>
<td></td>
</tr>
<tr>
<td>adjacent to a curb face. If the parking volume is substantial or</td>
<td></td>
</tr>
<tr>
<td>turnover is high, an additional 1’- 2’ of width is desirable.”</td>
<td></td>
</tr>
<tr>
<td>Bike lane with parking “T’s” to minimize the danger of ‘dooring’ from</td>
<td></td>
</tr>
<tr>
<td>cars parked too close to the bike lane</td>
<td></td>
</tr>
<tr>
<td>Extra-wide bike lane with signage to clarify the parking area</td>
<td></td>
</tr>
</tbody>
</table>
Bike Lane Adjacent to On-Street Diagonal Parking

Design Summary

<table>
<thead>
<tr>
<th>Bike Lane Width:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 5’ minimum</td>
</tr>
<tr>
<td>• White 4” stripe separates bike lane from parking bays</td>
</tr>
<tr>
<td>• Parking bays are sufficiently long to accommodate most vehicles (vehicles do not block bike lane)</td>
</tr>
</tbody>
</table>

Discussion

In areas with high parking demand such as urban commercial areas, diagonal parking can be used to increase parking supply. Conventional “head-in” diagonal parking is not compatible or recommended in conjunction with high levels of bicycle traffic or with the provision of bike lanes as drivers backing out of conventional diagonal parking spaces have poor visibility of approaching bicyclists.

The use of ‘back-in diagonal parking’ or ‘reverse angled parking’ is recommended over head-in diagonal parking. This design addresses issues with diagonal parking and bicycle travel by improving sight distance between drivers and bicyclists and has other benefits to vehicles including:
• loading and unloading of the trunk occurs at the curb, not in the street
• passengers are directed by open doors towards the curb
• no door conflict with bicyclists.

While there may be a learning curve for some drivers, using back-in diagonal parking is typically an easier maneuver than conventional parallel parking.

Guidance

This treatment is currently slated for inclusion in the 2009 AASHTO Guide for the Development of Bicycle Facilities

Recommended Design

‘Back-in’ diagonal parking is safer for cyclists than ‘head-in’ diagonal parking due to visibility
## Bike Lane Without On-Street Parking

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bike Lane Width:</strong></td>
<td>![Recommended Design]</td>
</tr>
<tr>
<td>4’ minimum when no gutter is present  (rural road sections)</td>
<td></td>
</tr>
<tr>
<td>5’ minimum when adjacent to curb and gutter (3’ more than the gutter pan width if the gutter pan is wider than 2’)</td>
<td></td>
</tr>
<tr>
<td><strong>Recommended Width:</strong></td>
<td></td>
</tr>
<tr>
<td>6’ where right-of-way allows</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Width:</strong></td>
<td>Streets without on-street parking tend to be larger roads with higher vehicle speeds, and wider bike lanes are recommended</td>
</tr>
<tr>
<td>8’ adjacent to arterials with high travel speeds (45 mph+)</td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

Wider bike lanes are desirable in certain circumstances such as on higher speed arterials (45 mph+) where a wider bike lane can increase separation between passing vehicles and cyclists. Wide bike lanes are also appropriate in areas with high bicycle use. A bike lane width of 6 to 8 feet makes it possible for bicyclists to ride side-by-side or pass each other without leaving the bike lane, increasing the capacity of the lane. Appropriate signing and stenciling is important with wide bike lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane.

### Guidance

**AASHTO Guide for the Development of Bicycle Facilities**
## Bike Lanes at Intersections With Right Turn Pocket

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bike Lane Width:</strong></td>
<td><img src="image" alt="Recommended Design" /></td>
</tr>
<tr>
<td>- Bike lane should be at least 4’ wide (5’ preferred)</td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to drop the bike lane entirely approaching the right-turn lane. The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area. While the dashed lines in this area are currently an optional treatment, it is recommended that they be an integral part of any intersection with this treatment in Normal.

Dropping the bike lane is not recommended and should only be done when a bike lane cannot be accommodated at the intersection.

### Guidance

* AASHTO Guide for the Development of Bicycle Facilities

Continuing a bike lane straight while providing a right-turn pocket reduces bicycle/motor vehicle conflicts.
## Shared Bicycle/Right Turn Lane

### Design Summary

<table>
<thead>
<tr>
<th>Width:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared turn lane - min. 12' width</td>
</tr>
<tr>
<td>Bike lane pocket - min. 4’-5’ preferred</td>
</tr>
</tbody>
</table>

### Discussion

This treatment is recommended at intersections lacking sufficient space to accommodate a standard bike lane and right turn lane.

The shared bicycle/right turn lane places a standard-width bike lane on the left side of a dedicated right turn lane. A dashed strip delineates the space for bicyclists and motorists within the shared lane. This treatment includes signage advising motorists and bicyclists of proper positioning within the lane.

Case studies cited by the Pedestrian and Bicycle Information Center indicate that this treatment works best on streets with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less).

**Advantages of the shared bicycle/right turn lane:**

- Aids in correct positioning of cyclists at intersections with a dedicated right turn lane but insufficient space for a dedicated bike lane
- Encourages motorists to yield to bicyclists when using the right turn lane
- Reduces motor vehicle speed within the right turn lane

**Disadvantages/potential hazards:**

- May not be appropriate for high-speed arterials or intersections with long right turn lanes
- May not be appropriate for intersections with large percentages of right-turning heavy vehicles

### Guidance

Coverage in the draft 2009 AASHTO Guide For the Development of Bicycle Facilities

Previously implemented in: City of San Francisco; City of Eugene, Oregon

---

**Recommended Design**

![Recommended Design](image)

**Shared bicycle/right turn lanes require warning signage as well as pavement markings**
## Colored Bike Lanes in Conflict Areas

<table>
<thead>
<tr>
<th>Discussion</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclists are especially vulnerable at locations where the volume of conflicting vehicle traffic is high and where the vehicle/bicycle conflict area is long. Some cities are using colored bike lanes to guide cyclists through major vehicle/bicycle conflict points. These conflict areas are locations where motorists and cyclists must cross each other’s path (e.g., at intersections or merge areas). Colored bike lanes typically extend through the entire bicycle/vehicle conflict zone (e.g., through the entire intersection, or through the transition zone where motorists cross a bike lane to enter a dedicated right turn lane.</td>
<td></td>
</tr>
</tbody>
</table>

### Guidance

Although colored bike lanes are not an official standard at this time, they continue to be successfully used in cities, including Portland, OR, Philadelphia, PA, Cambridge, MA, Toronto, Ontario, Vancouver, BC and Tempe, AZ. This treatment typically includes signage alerting motorists of vehicle/bicycle conflict points. Portland’s *Blue Bike Lane* report found that significantly more motorists yielded to bicyclists and slowed or stopped before entering the conflict area after the application of the colored pavement.

### Color Considerations:

There are three colors commonly used in bike lanes: blue, green, and red. All help the bike lane stand out in conflict areas. Green is the color recommended for use in Normal.

### Advantages of colored bike lanes at conflict points
- Draws attention to conflict areas
- Increases motorist yielding behavior
- Emphasizes expectation of bicyclists on the road

### Disadvantages / potential hazards
- Not currently an adopted standard marking in the U.S.

### Guidance

This treatment is not currently present in any state or federal design standards. The City of Colombia, MO is currently testing this application for possible inclusion in the 2009 MUTCD update.

Bike Box

Design Summary

Bike Box Dimensions:
- 14’ deep to allow for bicycle positioning.

Signage:
Appropriate signage as recommended by the MUTCD applies. Signage should be present to prohibit ‘right turn on red’ and to indicate where the motorist must stop.

Discussion

A bike box is generally a right angle extension of a bike lane at the head of a signalized intersection. The bike box allows bicyclists to move to the front of the traffic queue on a red light and proceed first when that signal turns green. Motor vehicles must stop behind the white stop line at the rear of the bike box.

Bike boxes can be combined with dashed lines through the intersection for green light situations to remind right-turning motorists to be aware of bicyclists traveling straight, similar to the colored bike lane treatment described earlier. Bike Boxes can be installed with striping only or with colored treatments to increase visibility.

Bike Boxes should be located at signalized intersections only, and right turns on red should be prohibited. On roadways with one travel lane in each direction, the bike box also facilitates left turning movements for cyclists.
Retrofitting Existing Streets with Bike Lanes

This section describes several strategies for retrofitting bike lanes to existing streets. Most major streets in Normal are characterized by conditions (e.g., high vehicle speeds and/or volumes) for which dedicated bike lanes are appropriate to accommodate safe and comfortable riding. Although opportunities to add bike lanes through roadway widening may exist in some locations, most major streets in Normal pose physical and other constraints requiring street retrofit measures within existing curb-to-curb widths. As a result, many of the recommended measures effectively reallocate existing street width through striping modifications to accommodate dedicated bike lanes.

Although largely intended for major streets, these measures may be appropriate on some lower-order streets where bike lanes would best accommodate cyclists.

### Roadway Widening

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bike Lane Width:</strong></td>
<td><img src="image" alt="Design guidance for widening roadway shoulders to accommodate bicycles" /></td>
</tr>
<tr>
<td>• 6’ preferred</td>
<td></td>
</tr>
<tr>
<td>• 4’ minimum (see bike lane guidance)</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

Bike lanes could be accommodated on several streets with excess right-of-way through shoulder widening. Although street widening incurs higher expenses compared with re-striping projects, bike lanes could be added to streets currently lacking curbs, gutters and sidewalks without the high costs of major infrastructure reconstruction.

As a long-term measure, the Town of Normal should find opportunities to add bike lanes to other major streets where they are needed. Opportunities include adding bike lanes as streets and bridges are widened for additional auto capacity or as property development necessitates street reconstruction.

**Guidance**

AASHTO Guide for the Development of Bicycle Facilities

Roadway widening is preferred on roads lacking curbs, gutters and sidewalks
Lane Narrowing (Road Diet 1)

**Design Summary**

<table>
<thead>
<tr>
<th>Vehicle Lane Widths:</th>
<th>Design Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before: 12 to 15 feet; after: 10 to 11 feet</td>
<td><img src="image1.png" alt="Example of vehicle travel lane narrowing to accommodate bike lanes" /></td>
</tr>
</tbody>
</table>

**Bike Lane Width:**
- See bike lane design guidance

**Discussion**

Also called a ‘Road Diet’, lane narrowing utilizes roadway space that exceeds minimum standards to create the needed space to provide bike lanes. Many Normal roadways have existing lanes that are wider than those prescribed in local and national roadway design standards. Most standards allow for the use of 11-foot and sometimes 10-foot wide travel lanes to create space for bike lanes.

Special consideration should be given to the amount of heavy vehicle traffic and horizontal curvature before the decision is made to narrow travel lanes. Center turn lanes can also be narrowed in some situations to free up pavement space for bike lanes.
### Lane Reconfiguration (Road Diet 2)

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle Lane Widths:</strong>&lt;br&gt;• Width depends on project. No narrowing may be needed if a lane is removed.</td>
<td>![Image] This road was re-striped to convert four vehicle travel lanes into three travel lanes with bike lanes</td>
</tr>
<tr>
<td><strong>Bike Lane Width:</strong>&lt;br&gt;See bike lane design guidance</td>
<td></td>
</tr>
</tbody>
</table>

#### Discussion

The removal of a single travel lane will generally provide sufficient space for bike lanes on both sides of a street. Streets with excess vehicle capacity provide opportunities for bike lane retrofit projects. Depending on a street’s existing configuration, traffic operations, user needs, and safety concerns, various lane reduction configurations exist. For instance, a four-lane street (with two travel lanes in each direction) could be modified to include one travel lane in each direction, a center turn lane, and bike lanes. Prior to implementing this measure, a traffic analysis should identify impacts.

#### Guidance

This treatment is currently slated for inclusion in the 2009 AASHTO Guide for the Development of Bicycle Facilities.

#### Recommended Design

- Example of vehicle travel lane reconfiguration to accommodate bike lanes
**Parking Reduction (Road Diet 3)**

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Example</th>
</tr>
</thead>
</table>
| **Vehicle Lane Widths:**
  Width depends on project. No narrowing may be needed depending on the width of the parking lane to be removed. | |
| **Bike Lane Width:**
  See bike lane design guidance | ![Some streets may not require parking on both sides](image1.png) |

**Discussion**

Bike lanes could replace one or more on-street parking lanes on streets where excess parking exists and/or the importance of bike lanes outweighs parking needs. For instance, parking may be needed on only one side of a street (see right). Eliminating or reducing on-street parking also improves sight distance for cyclists in bike lanes and for motorists on approaching side streets and driveways. Prior to reallocating on-street parking for other uses, a parking study should be performed to gauge demand.

**Recommended Design**

![Example of parking removal to accommodate bike lanes](image2.png)
**Bike Lane Recommendations**

Normal’s major streets currently lack dedicated bike lanes. Safely accommodating bicyclists on major roadways is important for several reasons. First, major streets generally offer the most direct routes between bicyclist destinations while providing better connectivity compared with lower-order streets. Consequently, commuter cyclists and those traveling longer distances often gravitate to these routes. Second, the commercial character of major streets (e.g., employment, shopping, etc.) makes these corridors destinations in and of themselves. To safely accommodate bicyclists on corridors with current or anticipated high traffic volumes, bike lanes are proposed on several major streets throughout Normal. In developing the proposed bike lane network, consideration was given to several factors, including:

- Gaps in the existing bikeway system
- Previous and on-going planning efforts identifying the need for bike lanes on specific streets
- Planned street improvements that will or could include bike lanes as part of construction
- Whether an existing street could be retrofitted to include bike lanes
- Planned land development projects with the potential to increase bicycle travel demand on major streets

Normal’s bike lane implementation projects would primarily occur through roadway re-striping. Depending on funding or other constraints, bike lane project implementation could occur in multiple phases. Streets in Normal that could be retrofitted with bike lanes through parking reduction include:

- Beech Street – Shelbourne to Raab
- Blair Drive – College to Fort Jesse
- Jersey Avenue – Linden to Towanda
- Parkside Road – Hovey to Gregory
- Summit Street/Shelbourne Drive – Main to Walnut
- Linden Street – Pine to Shelbourne

Locations where bike lanes could be accommodated through narrowing existing vehicle travel lanes include:

- College Avenue – Broadway to Linden
- Linden Street – Cypress to Pine
- Mulberry Street – Linden to School
- Shepard Road – Hershey to Airport
Bike lanes could also be achieved through vehicle travel lane reductions, noted below.

Three-to Two-Lane Road Diet:
- Beaufort Street – School to Fell
- College Avenue – School to Broadway
- Gregory Street – Cottage to Adelaide
- Shelbourne Drive – Walnut to Beech

Four-to Three-Lane Road Diet:
- Beaufort Street – Main to School
- Beech Street – Pine to Shelbourne
- Cottage Avenue – Martin Luther King Jr. to College
- Hovey Avenue – Cottage to Main
- Landmark Drive – College to Fort Jesse
- Linden Street – Shelbourne to Raab
- Parkside Road – Gregory to Raab
- Shelbourne Drive – Beech to Towanda

Bike lanes could be accommodated on Main Street between College Avenue and Raab Road in the form of a five-to-four lane road diet, which includes the construction of a center median. The graphics in Appendix C lay out specifically how the Town of Normal could retrofit bike lanes to the roadways listed above.

Bike lanes are recommended through shoulder widening at the following locations:
- White Oak Road – Martin Luther King Jr. to Raab
- Cottage Avenue future street extension – Gregory to Raab
- Linden Street – Raab to Northtown
- Towanda Avenue – Raab to south of Interstate 55 bridge
- Hershey Road – Fort Jesse to Raab

**Main Street Corridor**

The *Main Street: A Call for Investment* Plan makes suggestions regarding bicycle facilities along Main Street (Figure 35). Most of the suggested improvements are included in this Plan; however some deviations from the Main Street Plan are recommended. One modification would provide 6.5-foot wide bike lanes compared with six-foot wide lanes proposed in the Main Street Plan. This difference is due to the anticipated popularity of the facility, the need to provide adequate width to minimize conflicts with motor vehicles, and the availability of roadway space. Another difference is that this Plan proposes dedicated bicycle facilities on the corridor’s entire length, rather than forcing cyclists to share the road with motorists in some locations. Bike lanes could be retrofitted on Main Street by reducing travel lane or median widths in some locations. Cycle tracks, described later, are proposed on the corridor’s far northern end.

![Figure 35. Bike lanes will be added to Main Street as part of a corridor-wide redevelopment plan](image)
**Shared Lane Markings**

Shared lane markings (also known as “sharrows”) are high-visibility pavement markings that help position bicyclists within the travel lane. These markings are often used on streets where dedicated bike lanes are desirable but are not possible due to physical or other constraints. Sharrows are placed strategically in the travel lane to alert motorists of bicycle traffic, while also encouraging cyclists to ride at an appropriate distance from the “door zone” of adjacent parked cars. Placed in a linear pattern along a corridor (typically every 100-200 feet), sharrows also encourage cyclists to ride in a straight line so their movements are predictable to motorists. These pavement markings have been successfully used in many small and large communities throughout the U.S. Shared lane markings made of thermoplastic tend to last longer than those using traditional paint.

**Shared Lane Markings Design Guidelines**

The following page provides design guidance for shared lane markings.
## Shared Lane Markings

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Examples</th>
</tr>
</thead>
</table>
| **Door Zone Width:**  
The width of the door zone is generally assumed to be 2.5 feet from the edge of the parking lane. |  |
| **Recommended Placement:**  
- At least 11’ from face of curb (or shoulder edge) on streets with on-street parking  
- At least 4’ from face of curb (or shoulder edge) on streets without on-street parking |  |

### Discussion

The Draft 2009 MUTCD language notes that sharrows should not be placed on roadways with a speed limit over 35 MPH, and that when used, the marking should be placed immediately after an intersection and spaced at intervals no greater than 250 feet thereafter.

Placing shared lane markings between vehicle tire tracks (if possible) will increase the life of the markings.

### Guidance

The shared lane marking is not currently an adopted standard marking. The National Committee on Uniform Traffic Control Devices (NCUTCD) has recommended to the Federal Highway Administration (FHWA) that this marking be included in the next edition of the MUTCD, expected to be published in 2009.

- **Shared lane marking placement guidance for streets with on-street parking**
- **Shared lane markings can be used minor and major roadways**
Shared Lane Marking Recommendations

Shared lane markings are recommended at the following locations in Normal:

- Adelaide Street - North of Gregory to Warriner
- Beaufort Street - Fell to Constitution Trail
- Beech Street - Pine to College
- Beech Street - Raab to Pfitzer
- College Avenue - Parkside to School
- Cottage Avenue - Gregory to College
- Fell Avenue - North to Division
- Grandview Drive - College to Jersey
- Gregory Street - Parkside to Cottage
- Gregory Street - Adelaide to Main
- Henry Street - Raab to Pine
- Hovey Avenue - White Oak to Cottage
- Parkway Plaza Drive - Landmark to Susan
- Pine Street - Linden to Beech
- School Street - Raab to North
- Susan Drive - Fort Jesse to Parkway
- Towanda Avenue - Norhtown to Interstate 55
- Virginia Avenue - University to Linden

In addition to the corridors listed above, shared lane markings could also serve as an interim/experimental treatment on streets eventually targeted for bike lane retrofits.

Bicycle Boulevards

Bicycle Boulevards are low-volume streets where motorists and bicyclists share the same space. A motorist will usually have to cross over into the adjacent travel lane to pass a bicyclist unless a wide outside lane or shoulder is provided.

Traffic calming and other treatments along the corridor reduce vehicle speeds so that motorists and bicyclists generally travel at the same speed, creating a safer and more comfortable environment for all users. Bicycle Boulevards also incorporate treatments to facilitate safe and convenient crossings where bicyclists must traverse major streets. Bicycle Boulevards work best in well-connected street grids where riders can follow reasonably direct and logical routes with few “twists and turns.” Boulevards also work best when higher-order parallel streets exist to serve thru vehicle traffic.

Why Bicycle Boulevards are Important

Bicycle Boulevards serve a variety of purposes:

- **Parallel major streets lacking dedicated bicycle facilities:** Higher-order streets such as arterials and major collectors typically include major bicyclist destinations (e.g., commercial and employment areas, and other activity centers). However, these corridors often lack bike lanes or other dedicated facilities thereby creating an uncomfortable, unattractive and potentially unsafe riding environment. Bicycle Boulevards serve as alternate parallel facilities allowing cyclists to avoid major streets for longer trip segments.
Parallel major streets with bicycle facilities that are uncomfortable for some users: Some cyclists may not feel comfortable riding in bike lanes on major streets for various reasons, including high traffic volumes and vehicle speeds, conflicts with motorists entering and leaving driveways, and/or conflicts with buses occupying the bike lane while loading and unloading passengers. Children and less-experienced riders might find these environments especially challenging. Utilizing lower-order streets, Bicycle Boulevards provide alternate route choices for bicyclists uncomfortable using the major street network. It should be noted however that bike lanes on major streets provide important access to key land uses, and the major street network often provides the most direct routes between major destinations. For these reasons, Bicycle Boulevards should complement a bike lane network and not serve as a substitute.

Ease of implementation on most local streets: Bicycle Boulevards incorporate cost-effective and less physically-intrusive treatments than bike lanes and cycle tracks. Most streets could be provided relatively inexpensive treatments like new signage, pavement markings, striping and signal improvements to facilitate bicyclists’ mobility and safety. Other potential treatments include curb extensions, medians, and other features that can be implemented at reasonable cost and are compatible with emergency vehicle accessibility.

Benefits beyond an improved bicycling environment: Residents living on Bicycle Boulevards benefit from reduced vehicle speeds and thru traffic, creating a safer and more-attractive environment. Pedestrians and other users can also benefit from boulevard treatments (e.g., by improving the crossing environment where boulevards meet major streets). Bicycle Boulevards can employ a variety of treatments from simple signage to traffic calming and/or pavement stenciling. The level of treatment to be provided for a specific location or corridor depends on several factors, discussed on the following pages.
Bicycle Boulevard

Design Summary

Bicycle Boulevards generally are installed on minor or local roadways. No standard design exists. See following page for additional guidance.

Discussion

Treatments for Bicycle Boulevards fall within five main “application levels” based on their level of physical intensity, with Level 1 representing the least physically-intensive treatments that could be implemented at relatively low cost. Identifying appropriate application levels for individual Bicycle Boulevard corridors provides a starting point for selecting appropriate site-specific improvements. The five Bicycle Boulevard application levels include the following:

- Level 1: Signage
- Level 2: Pavement markings
- Level 3: Intersection treatments
- Level 4: Traffic calming
- Level 5: Traffic diversion

These treatments are discussed in more detail on the following pages.

Guidance

Coverage in the draft 2009 AASHTO Guide For the Development of Bicycle Facilities
It should be noted that corridors targeted for higher-level applications would also receive relevant lower-level treatments. For instance, a street targeted for Level 3 applications should also include Level 1 and 2 applications as necessary. It should also be noted that some applications may be appropriate on some streets while inappropriate on others. In other words, it may not be appropriate or necessary to implement all “Level 2” applications on a Level 2 street. Furthermore, several treatments could fall within multiple categories as they achieve multiple goals. To identify and develop specific treatments for each Bicycle Boulevard, the Town of Normal should involve the bicycling community and neighborhood groups. Further analysis and engineering work may also be necessary to determine the feasibility of some applications.
Level 1: Bicycle Boulevard Signing

Design Summary

Signage is a cost-effective yet highly-visible treatment that can improve the riding environment on a Bicycle Boulevard network.

Design Example

Bicycle Boulevard wayfinding sign in Berkeley, CA

Guidance

AASHTO Guide for the Development of Bicycle Facilities
### Level 1: Bicycle Boulevard Signing (continued)

#### Wayfinding Signs

Wayfinding signs are typically placed at key locations leading to and along Bicycle Boulevards, including where multiple routes intersect and at key bicyclist “decision points.” Wayfinding signs displaying destinations, distances and “riding time” can dispel common misperceptions about time and distance while increasing users’ comfort and accessibility to the Boulevard network.

Wayfinding signs also visually cue motorists that they are driving along a bicycle route and should correspondingly use caution. Note that too many signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists and pedestrians, rather than per vehicle signage standards.

![Wayfinding signs help bicyclists stay on designated bicycle routes](image)

#### Warning signs

Warning signs advising motorists to “share the road” and “watch for bicyclists” may also improve bicycling conditions on a Bicycle Boulevard network. These signs are especially useful near major bicycle trip generators such as schools, parks and other activity centers. Warning signs should also be placed on major streets approaching Bicycle Boulevards to alert motorists of bicyclist crossings.

![‘Share the Road’ signage can remind both bicyclists and motorists to watch for other vehicles](image)
# Level 2: Bicycle Boulevard Pavement Markings

## Pavement Markings

### On-Street Parking Delineation

Delineating on-street parking spaces with paint or other materials clearly indicates where a vehicle should be parked, and can discourage motorists from parking their vehicles too far into the adjacent travel lane. This helps cyclists by maintaining a wide enough space to safely share a travel lane with moving vehicles while minimizing the need to swerve farther into the travel lane to maneuver around parked cars. In addition to benefiting cyclists, delineated parking spaces also promote the efficient use of on-street parking by maximizing the number of spaces in high-demand areas.

![Example of On-Street Parking Delineation](image)

### Bicycle Boulevard/Directional Pavement Markings

Directional pavement markings (also known as “Bicycle Boulevard markings”) lead cyclists along a Boulevard and reinforce that they are on a designated route. Markings can take a variety of forms, such as small bicycle symbols placed every 600-800 feet along a linear corridor, as currently used on Portland, Oregon’s Boulevard network (see right).

When a Bicycle Boulevard follows several streets (with multiple turns at intersections), additional markings accompanied by directional arrows are provided to guide cyclists through turns and other complex routing areas. Directional pavement markings also visually cue motorists that they are traveling along a bicycle route and should exercise caution.

![Bicycle Boulevard directional marker](image)

### Shared Lane Markings

As previously discussed, shared lane markings are often used on streets where dedicated bike lanes are desirable but not possible due to physical or other constraints. Such markings delineate specifically where bicyclists should operate within a shared vehicle/bicycle travel lane.

Shared Lane Markings could be used as Bicycle Boulevard markings. See Shared Lane Marking Design Guidelines for additional information on this treatment.

![Shared lane marking](image)
## Level 3: Bicycle Boulevard Intersection Treatments

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Design Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection treatments represent a critical component of Bicycle Boulevards. Intersection traffic controls favoring thru bicycle movement on the boulevard facilitate continuous and convenient bicycle travel. Intersection treatments also provide convenient and safe crossings where boulevards intersect major roads. The following sections discuss various intersection improvement tools.</td>
<td>Intersection treatments are critical to bicyclists’ safety on Bicycle Boulevards</td>
</tr>
</tbody>
</table>

### Guidance

Berkley Bicycle Boulevard Design Tools and Guidelines Available at: webserver.ci.berkeley.ca.us/uploadedFiles/Public_Works/Level_3_-_General/ch4_.pdf

### Levels of Bicycle Boulevard intersection treatments

1. Placement of Stop Signs Giving Priority to Bicycle Boulevard
2. Mini Traffic Circle
3. Curb Bulbouts and High Visibility Crosswalks
4. Patterned Pavement, Logo, or Design Treatment
Level 3: Bicycle Boulevard Intersection Treatments (continued)

Stop Signs on Cross-Streets

The installation of stop signs on cross streets along a Bicycle Boulevard maximizes thru bicycle connectivity and momentum and forces motorists crossing the facility to stop and proceed when safe.

This treatment should be used judiciously. It can be combined with traffic-calming efforts to prevent excessive vehicle speeds on the Bicycle Boulevard.

Stop signs are relatively inexpensive treatments that are quite effective at minimizing bicycle and cross-vehicle conflicts. However, placing stop signs at all intersections along Bicycle Boulevards may be unwarranted as a traffic control device.

Mini Traffic Circle

 Typically, mini traffic circles are implemented where the Bicycle Boulevard intersects a local street or even a Collector if ADT is less than 2,000. Stop signs may be added on the cross streets if necessary, otherwise all traffic yields. Signage and striping treatments should be implemented based on expected traffic volumes.

For example, the circle itself may be appropriate for local intersections with very low ADT, while increased signage and splitter striping may be appropriate experiencing higher traffic volumes. Mini traffic circles can be landscaped for added visual impact and traffic calming effect. This treatment should be designed with adequate curb radii for emergency vehicle access.

Mini traffic circles are very effective at reducing though bicycle and cross vehicle conflicts and add overall traffic calming in all directions. Mini traffic circles have a moderate cost (approx $20,000 per intersection).
## Level 3: Bicycle Boulevard Intersection Treatments (continued)

### Curb Bulb-Outs and High-Visibility Crosswalks

These treatments are appropriate for Bicycle Boulevards near activity centers that may generate large amounts of pedestrian activity, such as schools or commercial areas. The bulb-outs should only extend across the parking lane and should not obstruct bicyclists' path of travel or the travel lane. This treatment may be combined with a stop sign on the cross street if necessary.

Curb bulb-outs and high-visibility crosswalks both calm traffic and also increase the visibility of pedestrians waiting to cross the street. However, they may impact on-street parking.

![Curb bulb-outs can be a good location for pedestrian amenities, including street trees, newspapers and benches](image)

### Treatment 4: Patterned Pavement, Logo, or Design Treatment

Intersections that also serve as gateways to neighborhoods, schools, or commercial centers may be treated with a special design consisting of colored pavers, imprinted asphalt, or other adhesive patterns to provide added emphasis. This treatment adds special attention to an intersection and acts as a traffic calming device.

Patterned pavement acts as a traffic calming device and also enhances the look and feel of an intersection. These treatments can be community-building activities and provide a sense of place.

![Example of patterned pavement used for traffic calming purposes](image)
### Level 3: Bicycle Boulevard Intersection Treatments (continued)

<table>
<thead>
<tr>
<th>Bicycle Left-Turn Lanes</th>
<th>Design Examples</th>
</tr>
</thead>
</table>
| **Bike Turn Pocket Width:**
The bike turn pockets should be at least 5 feet wide, with a total of 11 feet for both turn pockets and center striping |

#### Discussion

Bicycle Boulevards crossing major streets at offset intersections can incorporate “bicycle left-turn lanes” to facilitate easier bicyclist crossings. Similar to medians/refuge islands, bicycle left-turn lanes allow the crossing to be completed in two phases. A bicyclist on the Bicycle Boulevard could execute a right-hand turn onto the cross-street, and then wait in a delineated left-turn lane (if necessary to wait for a gap in oncoming traffic).

#### Guidance

Coverage in the draft 2009 AASHTO Guide For the Development of Bicycle Facilities
### Level 3: Bicycle Boulevard Intersection Treatments (continued)

<table>
<thead>
<tr>
<th>Bicycle Left Turn Pocket</th>
<th>Design Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bike Lane Width:</strong></td>
<td></td>
</tr>
<tr>
<td>4’ minimum</td>
<td></td>
</tr>
<tr>
<td>5’ preferred</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

A bike-only left-turn pocket permits bicycle left turn movements while restricting vehicle left turn movements. If the intersection is signal-controlled the left turn pocket may have a left arrow signal, depending on bicycle and vehicle volumes. Signs should be provided that prohibit motorists from turning, while allowing access to bicyclists. Bicycle signal heads may also be used at busy or complex intersections. Ideally, the left turn pocket should be protected by a raised curb, but the pocket may also be defined by striping if necessary.

Because of the restriction on vehicle left-turning movements, this treatment also acts as traffic diversion.

**Guidance**

Coverage in the draft 2009 AASHTO Guide For the Development of Bicycle Facilities

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**Recommended Design**

This bike-only left-turn pocket guides cyclists along a popular bike route
## Level 3: Bicycle Boulevard Intersection Treatments (continued)

### Signal Detection and Placement of Bicyclists

Easy and accurate detection by a traffic signal controller can be provided by way of one of the following:

- An embedded loop with placement and sensitivity to detect a bicycle via video detection technology or a bicyclist-activated push button (as long as they do not require cyclists to dismount or make unsafe leaning movements). These devices should be placed as close to the street as possible in a location that is unobstructed by parked vehicles or motorists making right-hand turns.

- Safe location to wait for green signal: bicyclists awaiting a green light should not block vehicle right turns (if allowed). Lane width, stenciling, or a bike box can help with lane positioning and traffic flow.

### Half-Signals

In situations where there are few crossable gaps and where vehicles on the major street do not stop for pedestrians and cyclists waiting to cross, “half signals” could be installed to improve the crossing environment. Half signals include pedestrian and bicycle activation buttons and may also include bicycle loop detectors on the Bicycle Boulevard approach. Many of these models have been used successfully for years overseas, and their use in the U.S. has increased dramatically over the last decade.

### Medians/Refuge Islands

At uncontrolled intersections of Bicycle Boulevards and major streets, a bicycle crossing island can be provided to allow cyclists to cross one direction of traffic at a time when gaps in traffic allow. The bicycle crossing island should be at least 8’ wide (measured perpendicular to the centerline of the major road) to be used as the bike refuge area. Narrower medians can accommodate bikes if the holding area is at an acute angle to the major roadway, which allows stopped cyclists to face oncoming motorists. Railings can also be provided so bicyclists do not have to put their feet down, thus making it quicker to start again. Crossing islands can be placed in the middle of the intersection, prohibiting left and thru vehicle movements.
# Chapter 4

## Level 4: Bicycle Boulevard Traffic Calming

Traffic calming treatments on Bicycle Boulevards improve the bicycling environment by reducing vehicle speeds to the point where they generally match cyclists’ operating speeds, enabling motorists and cyclists to safely co-exist on the same facility. Specific traffic calming treatments are described below.

### Chicanes

Chicanes are a series of raised or delineated curb extensions on alternating sides of a street forming an S-shaped curb, which reduce vehicle speeds through narrowed travel lanes (see right). Chicanes can also be achieved by establishing on-street parking on alternate sides of the street. These treatments are most effective on streets with narrower cross-sections.

### Mini Traffic Circles

Mini traffic circles are raised or delineated islands placed at intersections, reducing vehicle speeds through tighter turning radii and narrowed vehicle travel lanes (see right). These devices can effectively slow vehicle traffic while facilitating all turning movements at an intersection. Mini traffic circles can also include a paved apron to accommodate the turning radii of larger vehicles like fire trucks or school buses.

### Speed Humps

Shown right, speed humps are rounded raised areas of the pavement requiring approaching motor vehicles to reduce speed. These devices also discourage thru vehicle travel on a street when a parallel route exists.
Level 5: Bicycle Boulevard Traffic Diversion

Traffic diversion treatments maintain thru bicycle travel on a street while physically restricting thru vehicle traffic. These treatments direct thru vehicle traffic onto parallel higher-order streets while accommodating bicyclists and local vehicle traffic on the Bicycle Boulevard. Traffic diversion is most effective when higher-order streets can sufficiently accommodate the diverted traffic associated with these treatments.

Choker Entrances

Choker entrances are intersection curb extensions or raised islands allowing full bicycle passage while restricting vehicle access to and from a Bicycle Boulevard. When they approach a choker entrance at a cross-street, motorists on the Bicycle Boulevard must turn onto the cross-street while cyclists may continue forward. These devices can be designed to permit some vehicle turning movements from a cross-street onto the Bicycle Boulevard while restricting other movements.

Traffic Diverters

Similar to choker entrances, traffic diverters are raised features directing vehicle traffic off the Bicycle Boulevard while permitting thru travel.

Advantages:
- Provides safe refuge in the median of the major street so that bicyclists only have to cross one direction of traffic at a time; works well with signal-controlled traffic platoons coming from opposite directions
- Provides traffic calming and safety benefits by preventing left turns and/or thru traffic from using the intersection

Disadvantages:
- Potential motor vehicle impacts to major roadways, including lane narrowing, loss of some on-street parking and restricted turning movements
- Crossing island may be difficult to maintain and may collect debris
CHAPTER 4

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Bicycle Boulevard Recommendations

Normal generally benefits from a well-connected system of lower-volume streets that, with the addition of relatively small-scale treatments, could become spectacular Bicycle Boulevards for riders of all ages and skills. Bicycle Boulevard recommendations throughout the community are shown on Map 4.

Specific Bicycle Boulevard recommendations in Normal include:

- Orlando Avenue/Aurora Way/Warren Avenue – Main to School
- McKinley Street/Clay Street/Lincoln Street – Main to One Normal Plaza
- Chippewa Street – Redman to Henry
- Bryan Street/Dale Street/University Street/ Belt Drive – Parkside to Towanda
- Grove Street – Hovey to Gregory
- Locust Street/Old Fort Jesse Road/Harter Lane/George Drive/Courtland Avenue – Main to Towanda
- Karin Drive/Centennial Avenue/Spear Drive/Hammitt Drive/Keller Road – Victor to Towanda
- Normal Avenue/Bakewell Street – Locust to Orlando
- Blair Drive – Vernon to College
- Susan Drive/Taft Drive – Fort Jesse to Hershey

Signed Connections

Signed connections provide routes between popular bikeways and major destinations. Signed connections are generally located on streets with higher automobile volumes than Bicycle Boulevards, but less than on routes with shared lane markings.

Signed connections in Normal should include wayfinding signage to help cyclists navigate between major bikeways and nearby destinations, and along roadway segments between more well-defined bikeways (e.g., bike lanes or shared use paths).

Signed Connection Recommendations

Signed connections are recommended for Normal’s bikeway network to provide access between various bikeways and destinations.
Signed connections are recommended in the following areas:

- Orlando Avenue – Constitution Trail to Main
- Fairview Park Service Road – Constitution Trail to Main
- Bowles Street – Main to Normal
- Kerrick Road – Main to the Constitution Trail
- Sycamore Street /Linden Street – Constitution Trail to Pine
- Arborwalk Drive – North Branch Sugar Creek Trail to Landmark
- Hanson Drive – Blair to Towanda
- Hunt Drive – Sugar Creek Elem to Landmark
- Parkinson Street /Dewey Street – Constitution Trail to Maple
- Brookwood Drive – Jersey to Constitution Trail
- North Street – Fell to School
- Schroeder Drive/Orr Drive – Constitution Trail accessway to Spear
- Watkins Drive/College Hills Mall Loop/Landmark Drive – Towanda to College

**Cycle Tracks**

A cycle track is an exclusive bicycle facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. Cycle tracks have different forms, but all share common elements. Cycle tracks provide space that is intended to be exclusively or primarily for bicycles and are separated from vehicle travel lanes, parking lanes and sidewalks. Cycle tracks can be either one-way or two-way, on one or both sides of a street, and are separated from vehicles and pedestrians by pavement markings or coloring, bollards, curbs/medians or a combination of these elements.

**Cycle Track Design Guidelines**

While only recently implemented in the United States, cycle tracks have been used in European countries for several decades. The cycle track design guidance provided in the following pages was developed using European experience applied to situations in the U.S.
## Cycle Tracks

### Design Summary

<table>
<thead>
<tr>
<th>Cycle Track Width:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 7 foot minimum to allow passing and obstacle avoidance</td>
</tr>
<tr>
<td>• 12 foot minimum for two-way facility</td>
</tr>
</tbody>
</table>

### Discussion

Cycle tracks provide increased comfort for bicyclists and greater clarity about expected behavior on the part of cyclists and motorists. Properly designed cycle tracks eliminate conflicts between bicycles and parked cars by placing the cycle track on the inside of the parking lane. They also provide adequate space to remove the danger of “car dooring.” Danish research has shown that cycle tracks can increase bicycle ridership 18 to 20 percent, compared with the five to seven percent increase associated with bike lanes.

However, bicyclists are less visible to motorists as are they not traveling directly alongside one another, leading to increased vulnerability at intersections. In addition, regular street sweeping trucks cannot maintain the cycle track; smaller street sweepers are required. Finally, conflicts with pedestrians and boarding or deboarding bus passengers can occur, particularly on cycle tracks that are un-differentiated from the sidewalk or that are between the sidewalk and a transit stop.

### Guidance

This treatment is not currently present in any state or federal design standards.
Cycle Tracks (continued)

Separation

Cycle tracks can be separated from vehicle traffic by a barrier or through grade-separation. Physical barriers can include bollards, parking, a planter strip, an extruded curb, or parking. Cycle tracks using barrier separation typically share the same elevation as adjacent travel lanes. Openings in the barrier or curb are needed at driveways or other access points. The barrier should be dropped at intersections to allow vehicle crossing. Grade-separated cycle tracks should incorporate a rolled curb (right), which allows cyclists to enter or leave the cycle track at will and enables motorists to drive over it at intersections and crossings. When on-street parking is present, it should separate the cycle track from the roadway. The cycle track should have a 2-foot buffer between parking and the cycle track to minimize the hazard of opening car doors to passing cyclists.

Placement

Cycle tracks should be placed along slower speed urban/suburban streets with long blocks and few driveways or mid-block access points for vehicles. Cycle tracks located on one-way streets will have fewer potential conflicts than those on two-way streets. A two-way cycle track is desirable when there are more destinations on one side of a street or if the cycle track will connect to a shared use path or bicycle facility on one side of the street. Cycle tracks should only be constructed along corridors with adequate right-of-way. Sidewalks or other pedestrian facilities should not be narrowed to accommodate the cycle track as pedestrians will likely walk on the cycle track if sidewalk capacity is reduced. Visual and physical cues (e.g., pavement markings) should be used to warn drivers and instruct bicyclists where they should be moving.

Intersections

Cycle tracks separate cyclists and motor vehicles to a greater degree than bike lanes. This produces added comfort for cyclists on the cycle track, but it creates additional considerations at intersections that must be addressed. A right-turning motorist conflicting with cycle track users represents the most common conflict. Both roadway users have to expand their visual scanning to see potential conflicts. To address this issue, several treatments can be applied at intersections:

- **Protected Phases at Signals**: With this treatment, left- and right-turning movements are separated from conflicting thru movements. The use of a bicycle signal head is required in this treatment to ensure all users know which signals to follow. Demand-only bicycle signals can be implemented to reduce vehicle delay and prevent an empty signal phase from regularly occurring. With this scenario, a push button or imbedded loop within the cycle track should be available to actuate the signal. If many cyclist left turns are expected, this movement should be given its own signal phase and push button. This treatment requires additional signal phases and could potentially increase vehicle delays.

- **Advanced Signal Phases**: Signalization can also be set to provide cycle track users a green phase in advance of vehicle phases.

- **Unsignalized Treatments**: Warning signs, special markings and the removal of on-street parking (if present) in advance of the intersection can all raise visibility of cyclists.

- **Access Management**: Reducing the number of potential conflict points can also benefit a cycle track corridor. Medians, driveway consolidation, or restricted movements reduce the potential for conflict.
CHAPTER 4

**Normal Bicycle and Pedestrian Master Plan**

**Cycle Track Recommendations**

As a relatively new treatment in the United States, cycle tracks represent an important and innovative opportunity for Normal to develop a world-class bicycle facility. The recommended locations for cycle tracks in Normal are along streets with sufficient right-of-way to accommodate this treatment, and have limited vehicle access points (e.g., side streets or driveways) that create user conflicts. The recommended treatment for cycle tracks in Normal is a raised bike lane with bollards providing physical separation in key locations.

The segment of Main Street north of Raab Road exhibits characteristics suitable for cycle track installation (e.g., minimal driveways and intersections). Installation of cycle tracks would create a safer and more comfortable bicycling environment, thereby potentially reducing demand for vehicle travel on this corridor.

**Route 66 Bikeway**

Development of the Route 66 Bikeway through Normal yields tremendous potential for the Town to realize the extensive recreation and economic benefits of bicycling. Regional and national efforts are currently underway to develop a formalized bicycle route along the historic highway corridor linking Chicago with Los Angeles, California. Nationally, the American Cycling Association is working with AASHTO to develop a designated U.S. Bicycle Route System (USBRS). The planning effort currently stands at the “corridor level”, and is intended to provide state departments of transportation and local partners guidance to identify specific routing options. The Route 66 Bikeway, passing directly through Normal, represents a prominent element of the USBRS.

Regionally, MCRPC completed the *Project Development Report: U.S. Route 66 Bikeway*, a detailed document containing design drawings for the Bikeway’s routing through unincorporated McLean County. The Report does not specify specific routing through Normal and Bloomington, though it is assumed the existing Constitution Trail would serve as a key element. Approaching Normal from the northeast, the Report depicts a shared use path paralleling Old Route 66, terminating west of Towanda Avenue at a new trailhead.

The Normal Bicycle and Pedestrian Master Plan proposes an on-street bikeway linking the proposed shared use path with the existing Constitution Trail. From the trailhead west of Towanda Avenue, cyclists would follow the proposed “Lincoln Corridor”, consisting of Bicycle Boulevard treatments along Lincoln and Chippewa streets. Identified as a top priority project in this Plan, the corridor takes advantage of lower-volume streets attractive to cyclists of all ages and confidence levels. Developing this critical link would bring Normal one step closer to completing a high-profile bikeway through the community. A separate section in this Plan describes the proposed Lincoln Corridor in greater detail.

To maximize the Route 66 Bikeway’s recreational, educational, and other elements, the Town of Normal should develop interpretive signage or other features along the route. Equally important, wayfinding signage should be installed to serve as a route reinforcement to for users. The Town should consider using signage currently under development for the USBRS.
Bicycle Parking

This section outlines design guidance for providing high-quality bicycle parking. Bicycle parking can be broadly defined as either short-term or long-term parking:

- **Short-term parking**: Bicycle parking meant to accommodate visitors, customers, messengers and others expected to depart within two hours; requires approved standard rack, appropriate location and placement, and weather protection.

- **Long-term parking**: Bicycle parking meant to accommodate employees, students, residents, commuters, and others expected to park more than two hours. This parking is to be provided in a secure, weather-protected manner and location.

**Short-Term Parking**

Short-term bicycle parking facilities are intended to provide short-term bicycle parking, and include racks which permit the locking of the bicycle frame and at least one wheel to the rack and support the bicycle in a stable position without damage to wheels, frame or components. Short-term bicycle parking is currently provided at no charge at various locations in Normal. Such facilities should continue to be free, as they provide minimal security, but encourage cycling and promote proper bicycle parking.

Figure 36 illustrates appropriate rack design elements, while Table 14 summarizes recommended bike rack placement guidelines.

![Figure 36. Inverted “U” Rack](image)
### Table 14. Bicycle Rack Placement Guidelines

<table>
<thead>
<tr>
<th>Design Issue</th>
<th>Recommended Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum Rack Height</strong></td>
<td>To increase visibility to pedestrians, racks should have a minimum height of 33 inches or be indicated or cordoned off by visible markers.</td>
</tr>
<tr>
<td><strong>Signing</strong></td>
<td>Where bicycle parking areas are not clearly visible to approaching cyclists, signs at least 12 inches square should direct them to the facility. The sign should include the name, phone number, and location of the person in charge of the facility, where applicable.</td>
</tr>
<tr>
<td><strong>Lighting</strong></td>
<td>Lighting of not less than one foot-candle illumination at ground level should be provided in all bicycle parking areas.</td>
</tr>
<tr>
<td><strong>Frequency of Racks on Streets</strong></td>
<td>In popular retail areas, two or more racks should be installed on each side of each block. This does not eliminate the inclusion of requests from the public which do not fall in these areas. Areas officially designated or used as bicycle routes may warrant the consideration of more racks.</td>
</tr>
<tr>
<td><strong>Location and Access</strong></td>
<td>Access to facilities should be convenient; where access is by sidewalk or walkway, ADA-compliant curb ramps should be provided where appropriate. Parking facilities intended for employees should be located near the employee entrance, and those for customers or visitors near main public entrances. (Convenience should be balanced against the need for security if the employee entrance is not in a well traveled area). Bicycle parking should be clustered in lots not to exceed 16 spaces each. Large expanses of bicycle parking make it easier for thieves to operate undetected.</td>
</tr>
<tr>
<td><strong>Locations within Buildings</strong></td>
<td>Provide bike racks within 50 feet of the entrance. Where a security guard is present, provide racks behind or within view of a security guard. The location should be outside the normal flow of pedestrian traffic.</td>
</tr>
<tr>
<td><strong>Locations near Transit Stops</strong></td>
<td>To prevent bicyclists from locking bikes to bus stop poles - which can create access problems for transit users, particularly those who are disabled - racks should be placed in close proximity to transit stops where there is a demand for short-term bike parking.</td>
</tr>
<tr>
<td><strong>Locations within a Campus-Type Setting</strong></td>
<td>Racks are useful in a campus-type setting at locations where the user is likely to spend less than two hours, such as classroom buildings. Racks should be located near the entrance to each building. Where racks are clustered in a single location, they should be surrounded by a fence and watched by an attendant. The attendant can often share this duty with other duties to reduce or eliminate the cost of labor being applied to bike parking duties; a cheaper alternative to an attendant may be to site the fenced bicycle compound in a highly visible location on the campus. For long-term parking needs of employees and students, attendant parking and/or bike lockers are recommended.</td>
</tr>
<tr>
<td><strong>Retrofit Program</strong></td>
<td>In established locations, such as schools, employment centers, and shopping centers, the Town should conduct bicycle parking audits to assess bicycle parking availability and access, and add additional bicycle racks where necessary.</td>
</tr>
</tbody>
</table>
Where the placement of racks on sidewalks is not possible (e.g., due to narrow sidewalk width, sidewalk obstructions, or other issues), bicycle parking can be provided in the street where on-street vehicle parking is allowed. Two possible options for creating parking in the street include clustered racks in a vehicle parking space protected by bollards or curbs (see Figure 37), and racks installed on sidewalk curb extensions where adequate sight distance exists. Installing bicycle parking directly in a car parking space incurs only the cost of the racks and bollards or other protective devices.

A curb extension is more expensive to install, and can be prohibitively expensive if substantial drainage and/or utility work is necessary. Costs may be less if the curb extension is installed as part of a larger street or pedestrian improvement project. While on-street bicycle parking may take space away from the automobile parking, there are ways to mitigate auto parking loss: Additional auto parking spaces can be created by consolidating driveways, moving fire hydrants, or otherwise finding places where it may be possible to permit auto parking where it is currently prohibited. Options for combining bicycle and motorcycle parking also exist.

On-street bicycle parking may be installed at intersection corners or at mid-block locations. Mid-block on-street parking may be closer to cyclists’ destinations, although it could force cyclists to dismount and walk to the parking site if access from the street is difficult or dangerous. Combining a mid-block pedestrian crossing with mid-block on-street parking could mitigate this situation.

**Long-Term Parking**

Long-term bicycle parking facilities are intended to provide secure long-term bicycle storage. Long-term facilities protect the entire bicycle, its components and accessories against theft and against inclement weather, including snow and wind-driven rain. Examples include lockers, check-in facilities, monitored parking, restricted access parking, and personal storage.

Long-term parking facilities are more expensive to provide than short-term facilities, but are also significantly more secure. Although many bicycle commuters would be willing to pay a nominal fee to guarantee the safety of their bicycle, long-term bicycle parking should be free wherever automobile parking is free. Potential locations for long-term bicycle parking include transit stations, large employers and institutions where people use their bikes for commuting, and not consistently throughout the day (see Figure 38). An advantage of lockers is that they can be configured to more easily accommodate different styles of bicycles, such as recumbent bicycles (see Figure 39).
Normal’s bicycle parking is generally adequate for current use within the Uptown area and near ISU; however, there are locations in other parts of town where bicycle parking is missing, lacking or difficult to access.

**Bikeway Maintenance**

This section presents guidelines for incorporating bicycle facilities into construction, maintenance and repair activities. The guidelines are presented as a menu of options and considerations for maintenance activities, and not strict guidelines. The Town of Normal should consider these recommended guidelines and implement them as possible within budget constraints. Safety for all road users is the top priority during construction and repair activities.
Bikeway Maintenance - Street Construction and Repair

Safety of all roadway users should be considered during road construction and repair. Wherever bicycles are allowed, measures should be taken to provide for the continuity of a bicyclist’s trip through a work zone area. Only in rare cases should pedestrians and bicyclists be detoured to another street when travel vehicle lanes remain open. To accommodate bicyclists through various lane closures and detours, the following actions are recommended:

- Bicyclists should not be led into conflicts with work site vehicles, equipment, moving vehicles, open trenches or temporary construction signage
- Efforts should be made to re-create the bike lane (if one exists) to the left of the construction zone if enough space exists and it is safe to do so
- Where there is insufficient space to provide a bike lane adjacent to the construction zone, then a standard-width travel lane should be considered. If steel plating is used, special care should be taken to ensure that bicyclists can traverse the plates safely.
- Contractors performing work for Normal should be made aware of the needs of bicyclists and be properly trained in how to safely route bicyclists through or around work zones

Signage Actions

Signage related to construction activities should be placed in a location that does not obstruct the path of bicyclists or pedestrians, including bike lanes, wide curb lanes, or sidewalks. In areas where there are grades, signs may be placed at the street-side edge of sidewalks so as not to encroach onto a bike lane.

Detour and closure signage related to bicycle travel may be included on all bikeways where construction activities occur. Signage should also be provided on all other roadways.

The following MUTCD signs should be used:
- W21-4A: Road Work Ahead
- W20-5: Right Lane Closed
- W4-2: Lane Shift, Left Sign
- W11-1: Bicycle Warning Sign
- W16-1: Share The Road

Open Trenches

Plates used to cover trenches are typically not flush with the pavement and have a 1”-2” vertical transition on the edges. This can puncture a hole in a narrow bicycle tire and cause a cyclist to lose control due to the shock of the vertical transition.

At such places, bicyclists often are left to their own devices to merge with vehicles in the adjacent travel lane. The interim condition of trenches during non-construction hours also impacts bicyclist travel. Although a common practice is to use steel plates during non-construction hours, these plates can be dangerously slippery, particularly when wet.

The Town of Normal should consider:
- Ensuring that steel plates used during construction activities do not have a vertical edge greater than ¾” without an asphalt lip
- Using non-skid steel plates with no raised steel bar on top
- Requiring temporary asphalt (cold mix) around plates to create a smooth transition and ensure the plates stay in place
- Using steel plates only as a temporary measure during construction, not for extended periods
## Bikeway Maintenance - Regular Maintenance

Like all roadways, bicycle facilities require regular maintenance. This includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flat, and installing bicycle-friendly drainage grates. Pavement overlays should be used as a good opportunity to improve bicycle facilities. The following recommendations are provided as a menu of options for Normal to consider as it augments and enhances its maintenance capabilities. Many of the recommendations listed below are already part of Normal’s regular maintenance activities.

### Sweeping

Bicyclists often avoid shoulders and bike lanes filled with sanding materials, gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface), nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept.

<table>
<thead>
<tr>
<th>Action items involving sweeping activities include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Establish a seasonal sweeping schedule that prioritizes roadways with major bicycle routes</td>
</tr>
<tr>
<td>• Sweep walkways and bikeways whenever there is an accumulation of debris on the facility</td>
</tr>
<tr>
<td>• In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders</td>
</tr>
<tr>
<td>• Pave gravel driveway approaches to minimize loose gravel on paved roadway shoulders</td>
</tr>
<tr>
<td>• Provide extra sweeping in the Fall in areas where leaves accumulate in bike lanes</td>
</tr>
</tbody>
</table>

### Roadway Surface

Bicycles are much more sensitive to subtle changes in roadway surface than are motor vehicles. Various materials are used to pave roadways, and some are smoother than others. Compaction is also an important issue after trenches and other construction holes are filled. Uneven settlement after trenching can affect the roadway surface nearest the curb where bicycles travel. Sometimes compaction is not achieved to a satisfactory level, and an uneven pavement surface can result due to settling over the course of days or weeks.

<table>
<thead>
<tr>
<th>Recommended action items involving maintaining the roadway surface include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• On all bikeways, use the smallest possible chip for chip sealing bike lanes and shoulders</td>
</tr>
<tr>
<td>• Ensure that on new roadway construction, the finished surface on bikeways does not vary more than ¼&quot;</td>
</tr>
<tr>
<td>• Maintain a smooth surface of all bikeways that is free of potholes</td>
</tr>
<tr>
<td>• Maintain pavement so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings</td>
</tr>
<tr>
<td>• Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred</td>
</tr>
</tbody>
</table>
### Bikeway Maintenance - Regular Maintenance (continued)

#### Gutter-to-Pavement Transition

On streets with concrete curbs and gutters, 1'–2' of the curbside area is typically devoted to the gutter pan, where water collects and drains into catch basins. On many streets, the bikeway is situated near the transition between the gutter pan and the pavement edge. It is at this location that water can erode the transition, creating potholes and a rough surface for travel. The pavement on many streets is not flush with the gutter, creating a vertical transition between these segments. This area can buckle over time, creating a hazardous environment for bicyclists. Since it is the most likely place for bicyclists to ride, this issue is significant for bike travel.

<table>
<thead>
<tr>
<th>Action items related to maintaining a smooth gutter-to-pavement transition include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ensure that gutter-to-pavement transitions have no more than a ¼&quot; vertical transition</td>
</tr>
<tr>
<td>• Examine pavement transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets</td>
</tr>
</tbody>
</table>

#### Drainage Grates

Drainage grates are typically located in the gutter area near the curb of a roadway. Drainage grates typically have slots through which water drains into the municipal stormwater system. Many grates are designed with linear parallel bars spread wide enough for a tire to become caught so that if a bicycle were to ride on them, the front tire would become caught and fall through the slot. This would cause the cyclist to tumble over the handlebars and sustain potentially serious injuries.

<table>
<thead>
<tr>
<th>The Town of Normal should consider the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Continue to require all new drainage grates be bicycle-friendly, including grates that have horizontal slats on them so that bicycle tires do not fall through the vertical slats</td>
</tr>
<tr>
<td>• Creating a program to inventory all existing drainage grates, and replace hazardous grates as necessary</td>
</tr>
</tbody>
</table>

#### Pavement Overlays

Pavement overlays represent good opportunities to improve conditions for cyclists if done carefully. A ridge should not be left in the area where cyclists ride (this occurs where an overlay extends part-way into a shoulder bikeway or bike lane). Overlay projects offer opportunities to widen a roadway or to re-stripe a roadway with bike lanes.

<table>
<thead>
<tr>
<th>Action items related to pavement overlays include the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge</td>
</tr>
<tr>
<td>• If there is adequate shoulder or bike lane width, it may be appropriate to stop at the shoulder or bike lane stripe, provided no abrupt ridge remains</td>
</tr>
<tr>
<td>• Ensure that inlet grates, manhole and valve covers are within ¼ inch of the pavement surface</td>
</tr>
<tr>
<td>• Pave gravel driveways to property line to prevent gravel from spilling onto shoulders or bike lanes</td>
</tr>
</tbody>
</table>
## Bikeway Maintenance - Regular Maintenance (continued)

### Signage

<table>
<thead>
<tr>
<th>Bike lanes, shared shoulders, Bicycle Boulevards and paths all have different signage types for wayfinding and regulations. Such signage is vulnerable to vandalism or wear requiring regular maintenance and replacement as needed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Town of Normal should consider the following:</td>
</tr>
<tr>
<td>- Occasionally check regulatory and wayfinding signage placed along bikeways for signs of vandalism, graffiti, or normal wear</td>
</tr>
<tr>
<td>- Replace signage along the bikeway network on an as-needed basis</td>
</tr>
<tr>
<td>- Perform a regularly-scheduled check on the status of signage with follow-up as necessary</td>
</tr>
<tr>
<td>- Create a Maintenance Management Plan</td>
</tr>
</tbody>
</table>

### Landscaping

<table>
<thead>
<tr>
<th>Bikeways can be rendered inaccessible due to overgrown vegetation overgrowing. To prevent this, shoulder plants should be trimmed twice a year. After a flood or major storm, bikeways should be checked along with other roads, and fallen trees or other debris should be removed promptly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action items related to landscaping maintenance include:</td>
</tr>
<tr>
<td>- Ensure that shoulder plants do not hang into or impede passage along bikeways</td>
</tr>
<tr>
<td>- After major damage incidents, remove fallen trees or other debris from bikeways as quickly as possible</td>
</tr>
</tbody>
</table>

### Maintenance Management Plan

<table>
<thead>
<tr>
<th>Bikeway users will need accommodation during construction and maintenance activities when segments of bikeways may be closed or unavailable to users. Users must be warned of impending bikeway closures and given adequate detour information to bypass the closed section. Users should be warned through the use of standard signing approaching each affected section (e.g., “Bike Lane Closed,” “Trail Closed”), including (but not limited to) information on alternate routes and dates of closure. Alternate routes should provide a reasonable level of directness and equivalent traffic characteristics and be signed consistently.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action items related to a Maintenance Management Plan include:</td>
</tr>
<tr>
<td>- Provide fire and police departments with map of system, along with access points to gates/bollards</td>
</tr>
<tr>
<td>- Enforce speed limits and other rules of the road</td>
</tr>
<tr>
<td>- Enforce all trespassing laws for people attempting to enter adjacent private properties</td>
</tr>
</tbody>
</table>

Table 15 outlines the recommended frequency of regular maintenance activities for walkways and bikeways. Estimated costs of regular maintenance and funding strategies are discussed in Chapter 7.
Table 15. Recommended Walkway and Bikeway Maintenance Activities

<table>
<thead>
<tr>
<th>Maintenance Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspections</td>
<td>Seasonal – at beginning and end of Summer</td>
</tr>
<tr>
<td>Pavement sweeping/blowing</td>
<td>As needed, weekly in Fall</td>
</tr>
<tr>
<td>Pavement sealing, potholes</td>
<td>5 - 15 years</td>
</tr>
<tr>
<td>Culvert and drainage grate inspection</td>
<td>Before Winter and after major storms</td>
</tr>
<tr>
<td>Pavement markings replacement</td>
<td>1 - 3 years</td>
</tr>
<tr>
<td>Signage replacement</td>
<td>1 - 3 years</td>
</tr>
<tr>
<td>Shoulder plant trimming (weeds, trees,</td>
<td>Twice a year; middle of growing season and</td>
</tr>
<tr>
<td>brambles)</td>
<td>early Fall</td>
</tr>
<tr>
<td>Tree and shrub plantings, trimming</td>
<td>1 - 3 years</td>
</tr>
<tr>
<td>Major damage response (washouts, fallen</td>
<td>As quickly as possible</td>
</tr>
<tr>
<td>trees, flooding)</td>
<td></td>
</tr>
</tbody>
</table>

Community-wide Improvements

The following recommendations outline supporting facilities for pedestrians and bicyclists.

*Bicycle Wayfinding Signage Plan*

The ability to navigate through a town or city is informed by landmarks, natural features, and other visual cues. Placing signs throughout the town indicating to bicyclists their direction of travel, location of destinations, and the riding time/distance to those destinations will increase users’ comfort and accessibility to the bicycle system. Wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs shown in both Figure 40 and Figure 41 are MUTCD-approved for use along bicycle facilities.

![Figure 40. Model MUTCD-Approved Wayfinding Signage](image)

Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists and pedestrians, rather than per vehicle signage standards.
Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the bikeway system
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a “barrier to entry” for people who do not bicycle often (e.g., “interested but concerned” cyclists)

Costing about $125 each, wayfinding signs are a relatively cost-effective means for improving the walking and bicycling environment.

A community-wide Bicycle Wayfinding Signage Plan would identify:

- Sign locations along existing and planned bicycle routes
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and riding time to each destination

Normal should consider partnering with the City of Bloomington to conduct a joint twin-cities plan, which could serve bicyclists in both communities.

**Shared Use Path Pavement Upgrades**

The Constitution Trail is a critical element of Normal’s bikeway and walkway system. However as previously noted, the trail surface is degrading due to weather, time and usage in some locations. This renders the trail inaccessible to pedestrians with disabilities and reduces comfort and safety for bicyclists using the trail.

Normal should maintain the Constitution trail by repairing or replacing areas where the path surface is damaged or deteriorated (e.g., where there is cracked/heaving pavement).
Crosswalk Marking Upgrades

As previously discussed, at some intersections in Normal, crosswalks have faded or are otherwise difficult to see. These locations could be targeted through a Crosswalk Marking Upgrade Program, which would re-stripe existing crosswalks with high-visibility markings. The Program should establish a goal highlighting the number of crossings to be upgraded each year.

Uptown Normal “Bike Oasis”

A bike oasis is a high-quality short-term bicycle parking facility, appropriate at major bicycle destinations such as Uptown Normal (Figure 42). A bike oasis can be built on a curb extension or on a wide sidewalk, where the oasis will not create conflicts with pedestrians.

Sidewalk Infill

A Sidewalk Infill Program places emphasis on completing sidewalk gaps along major pedestrian routes and near major pedestrian destinations.

Completing some sidewalk links can be challenging, especially in older residential areas where residents have developed fencing and landscaping within the public right-of-way and may consider those areas to be part of their personal space. In addition, some residents may not want traditional sidewalks due to the rural look of their neighborhoods and potential impacts to mature landscaping and trees. Regardless, the public right-of-way that is generally located on either side of the paved driving and parking area is intended for walking, whether or not a sidewalk currently exists.

Normal should continue its existing Sidewalk Infill Program whereby Town staff periodically inventory the street network to identify sidewalk gaps and develop strategies, project prioritization criteria and funding for completing these gaps. Potential project prioritization criteria include filling gaps along key pedestrian routes, near major pedestrian trip generators like schools, and along streets with high vehicle volumes.

Damaged Sidewalk Repair/Replacement

Sidewalk surfaces become degraded over time, with tree roots, weather and other factors creating an uneven surface. Normal should continue its program of repairing/replacing damaged and deteriorated sidewalks where surfaces have cracked or pavement has heaved.

The Pedestrian Priority Corridors identified in this Plan should take priority for sidewalk infill and upgrades. After these, areas that have high pedestrian use or where the condition of sidewalks is particularly problematic should be targeted for improvements first.
ADA-Compliant Curb Ramp Upgrades

With the advent of the Americans with Disabilities Act (ADA) in 1990, the nation recognized the need to provide equal access to all residents. Since its inception, ADA has significantly changed design requirements for the construction of public space. However, much of the pedestrian environment built prior to the ADA’s inception does not adequately accommodate people with disabilities. Normal’s approach is to gradually change this situation through land development project requirements, unrelated capital street improvement projects, and capital projects that specifically retrofit antiquated public pedestrian facilities. Normal should continue this process and also target improvements along identified Pedestrian Priority Corridors and other high-pedestrian use locations.

It is important to note that a pedestrian environment that is strategically built to be accessible for people with disabilities is also more accessible for all. Curb ramps, for instance, can accommodate strollers, shopping carts and dollies for the movement of goods. Accessible intersection crossings can increase safety for people regardless of ability. In recognition of this, the Town’s philosophical approach is to create pedestrian environments that are attractive, functional, and accessible to all people.

Transit Stop Upgrades

To increase safety for transit users and to encourage more transit use, Normal should work with BNPTS to upgrade existing transit stops. These upgrades would include shelters, benches, lighting, bike parking, posted maps and schedules, and trash receptacles. The Town should also consider the pedestrian environment approaching the transit stop, including adequate sidewalk widths and ADA-compliant curb ramps to help pedestrians access the stop.

Bike Racks on Buses

Integrating bicycles with transit combines the long-distance coverage of bus travel with the door-to-door service of bicycle riding. Transit use can overcome large obstacles to bicycling, including distance, hills, riding on busy streets, night riding, inclement weather, and breakdowns. Providing space for bicycles on buses can increase transit uses in lower-density suburban areas, where transit stops are beyond walking distance of many residents. People are often willing to walk only a quarter- to half-a-mile to a bus stop, while they might bike as much as two or more miles to reach the bus station. As the majority of bus stops in Normal lack long-term, secure parking options for bicycles, most people who ride to a bus stop will want to bring their bicycle with them on the transit portion of their trip.

Normal should work with BNPTS and ISU to retrofit the remaining transit and campus bus fleet with bike racks, enabling Normal residents and students to use transit in conjunction with bicycling.

At-Grade Railroad Crossing Upgrades

Bicycle wheels and tires are very susceptible to getting caught within the gap of a railroad flange. This situation occurs when a bicyclist is required to cross the tracks at an angle less than 60 degrees. When a track “catches” a wheel, a bicyclist may be thrown from his or her
bicycle and possibly suffer a severe, traumatic injury. Crossing treatments that reduce the number of situations in which bicyclists must cross railroad tracks at unsafe shallow angles will increase bicyclists’ safety and comfort.

The Town of Normal should examine places where bikeways make at-grade railroad crossings in order to provide safe bicycle crossings. Appropriate crossing treatments should facilitate right-angle turns by bicyclists as well as warning signs (Figure 43) and/or pavement markings that lead cyclists to cross the tracks at a safe angle. These improvements should be implemented by the Town in partnership with the Union Pacific Railroad and Norfolk Southern Railroad.

**Drainage Grate Retrofits**

The Town should continue its efforts to retrofit existing drainage grates as roads are being resurfaced. Drainage grates that have parallel metal strips prevent bicycle tires from slipping and significantly increases comfort and safety for bicyclists riding in the road. Figure 44 demonstrates examples of bicycle-safe drainage grate coverings.

Normal should establish a goal for the number of drainage grates to retrofit each year, conditional on funding. Retrofitting and replacing existing drainage grates will facilitate safe bicycle crossing movements.

**ADA Improvements in Parks**

Access for all users is a particularly important consideration for parks. As previously discussed, path and sidewalk surfaces degrade over time, and require regular maintenance and repair. Paved paths and sidewalks within parks should be retrofitted to meet ADA requirements.
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