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Chapter 1: Project Overview & Purpose

Overview

In 2011, the Town of Aberdeen commissioned planning and design consultants, Alta/Greenways, to conduct bicycle planning services, building upon work completed for the Town’s Pedestrian Plan. This Bicycle Plan provides an overall vision and strategy for the Town of Aberdeen to grow into a bicycle-friendly community. This Plan’s Steering Committee met in September 2011 to confirm project visions and goals, identify desired outcomes of the Plan, and determine areas of need for bicyclists. The vision statement is as follows:

“The Town of Aberdeen will become a bicycle-friendly community by developing a combination of infrastructure, education programs, and policies that support and encourage bicycling as a safe means of transportation to schools, downtown, retail areas, healthy foods and offers connections to neighboring communities.”

This Plan outlines a purpose (Chapter 1), an assessment of where things stand today (Chapter 2), recommendations for bicycle facilities (Chapter 3), and implementation strategies (Chapter 4). Also included in this plan is an appendix with design guidelines for bicycle facilities. For more implementation resources, such as funding sources and State & Federal policies, please refer to the Town of Aberdeen’s Pedestrian Plan.

The Planning Process

The planning process was led by the Town’s planning staff, with assistance from Alta/Greenways, as well as a project Steering Committee. Steering Committee members were selected by the Town of Aberdeen representing multiple city departments, regional partners, local business interests, and citizen advocates. They are listed in the Acknowledgements section of this Plan on page ii.

Data Collection and Analysis

Baseline information about the study area was collected during the planning process for the Pedestrian Plan in Spring 2011, including the review of existing plans, preliminary field analysis, and study-area base maps. In Summer 2011, project consultants held a second round of fieldwork to confirm current conditions for bicycle transportation. Consultants also used aerial photography and geographic information systems (GIS) data, to further identify opportunities and constraints for bicycle facility development.

Public Involvement

Citizen representatives served on this Plan’s Steering Committee, providing guidance during the Kick-Off meeting, draft plan review, and the final plan’s presentation. The draft for this plan was also announced in official press releases by the Town, and was available and on public display for comment.
Benefits of a Bicycle-Friendly Community

A bicycle-friendly Aberdeen will help to improve the health and fitness of residents, enhance environmental conditions, decrease traffic congestion, and contribute to a greater sense of community. Scores of studies from experts in the fields of public health, urban planning, urban ecology, real estate, transportation, and economics consistently back-up such claims and affirm the value of supporting bicycling as it relates to active living and alternative transportation. Communities across the United States and throughout the world are implementing strategies for serving the bicycle needs of their residents, and have been doing so for many years. They do this because of their obligations to promote health, safety and welfare, and also because of the growing awareness of the many benefits of bicycling.

Increased Health and Physical Activity

A growing number of studies show that the design of our communities—including neighborhoods, towns, transportation systems, parks, trails and other public recreational facilities—affects people’s ability to reach the recommended daily 30 minutes of moderately intense physical activity (60 minutes for youth). According to the Centers for Disease Control and Prevention (CDC), “physical inactivity causes numerous physical and mental health problems, is responsible for an estimated 200,000 deaths per year, and contributes to the obesity epidemic.”  

The CDC determined that creating and improving places to be active could result in a 25 percent increase in the number of people who exercise at least three times a week. This is significant considering that for people who are inactive, even small increases in physical activity can bring measurable health benefits. Establishing a safe and reliable bicycle network in Aberdeen will positively impact the health of local residents. The Rails-to-Trails Conservancy puts it simply: “Individuals must choose to exercise, but communities can make that choice easier.”
**ECONOMIC BENEFITS**

Bicycling is an affordable form of transportation. According to the Pedestrian and Bicycle Information Center (PBIC), of Chapel Hill, NC, the cost of operating a bicycle for a year is approximately $120, compared to $7,800 for operating a car over the same time period.\(^4\) Bicycling becomes even more attractive from an economic standpoint when the unstable price of oil is factored into the equation (e.g., in spring 2010, gasoline prices approached $4 a gallon).\(^5\) The fluctuating cost of fuel reinforces the idea that local communities should be built to accommodate people-powered transportation, such as walking and biking. Aberdeen’s current mixed-use downtown area and surrounding land development patterns, combined with new strategies for improving bicycle transportation, could facilitate a substantial local reduction in auto- and oil-dependency.

From a real estate standpoint, consider the positive impact of trails and greenways, which are essential components of a complete bicycle network. According to a 2002 survey of home buyers by the National Association of Home Realtors and the National Association of Home Builders, trails ranked as the second most important community amenity out of a list of 18 choices.\(^6\) Additionally, the study found that ‘trail availability’ outranked 16 other options including security, ball fields, golf courses, parks, and access to shopping or business centers. Findings from the American Planning Association (How Cities Use Parks for Economic Development, 2002), the Rails-to-Trails Conservancy (Economic Benefits of Trails and Greenways, 2005), and the Trust for Public Land (Economic Benefits of Parks and Open Space, 1999) further substantiate the positive connection between trails and property values across the country.

Finally, from a tourism perspective, cyclists can add real value to local economies. For example, in the Outer Banks, NC, bicycling is estimated to have an annual economic impact of $60 million; 1,407 jobs are supported by the 40,800 visitors for whom bicycling was an important reason for choosing to vacation in the area. The annual return on bicycle facility development in the Outer Banks is approximately nine times higher than the initial investment.\(^7\) Similarly, Damascus, VA, the self-proclaimed ‘Friendliest Trail Town’, features 34 miles of trail where approximately $2.5 million is spent annually related to recreation visits. Of this amount, non-local visitors spend about $1.2 million directly into the economies of Washington and Grayson counties.\(^8\) While these examples feature beach and mountain destinations, the Town of Aberdeen also has key advantages, such as Aberdeen Lake Park and it’s proximity to Carolina Horse Park, 43 golf courses and the Triangle area.

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**Right: Apex, NC: A residential development added $5,000 to the price of 40 homes adjacent to the greenway – and those homes were still the first to sell. (Rails to Trails Conservancy, 2005)**

**Far right: Download “Pathways to Prosperity” www.ncdot.gov/bikepad/researchreports**
Developers are taking advantage of the positive impact of trails on property values by marketing their greenways; left and below are examples of two magazine advertisements from developers that focus their marketing on greenways.

A place where video games get lonely from lack of use. A place where people are always going somewhere—families hiking on the miles of trails, or kids biking to our onsite top-rated schools. A place with best-in-class amenities, including a huge Aquatic Club. A place with a natural setting and tight-knit neighbors that always seem to be doing something together. All this and beautiful homes to match? That’s FishHawk Ranch.
**ENVIRONMENTAL IMPROVEMENTS**

As demonstrated by the Southern Resource Center of the Federal Highway Administration, when people get out of their cars and onto their bicycles, they reduce measurable volumes of pollutants. Other environmental impacts include a reduction in overall neighborhood noise levels and improvements in local water quality as fewer automobile-related discharges wind up in the local rivers, streams, and lakes.

Trails and greenways are also part of any bicycle network, conveying unique environmental benefits. Greenways protect and link fragmented habitat and provide opportunities for protecting plant and animal species. Aside from connecting places without the use of air-polluting automobiles, trails and greenways also reduce air pollution by protecting large areas of plants that create oxygen and filter air pollutants such as ozone, sulfur dioxide, carbon monoxide and airborne particles of heavy metal. Finally, greenways improve water quality by creating a natural buffer zone that protects streams, rivers and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff.

**TRANSPORTATION BENEFITS**

In 2001, the National Household Travel Survey found that roughly 40% of all trips taken by car are less than 2 miles (see chart at bottom right). By taking these short trips on a bicycle, rather than in a car, citizens can substantially impact local traffic and congestion. Traffic congestion reduces mobility, increases auto-operating costs, adds to air pollution, and causes stress. Bicycle users can help alleviate overall congestion because each cyclist is one less car on the road. Incidentally, cyclists take up significantly less space on the road (see image below).

Additionally, many people do not have access to a vehicle or are not able to drive. 4.3% of Aberdeen’s population does not have access to a vehicle. According to the National Household Travel Survey (NHTS), one in 12 U.S. households does not own an automobile and approximately 12 percent of persons 15 or older do not drive. An improved bicycle network provides greater and safer mobility for these residents.

![Daily Trip Distances chart](https://www.pedbikeinfo.org)

**Source:** The Association for the Advancement of Sustainability in Higher Education, 2007.

**Above:** ‘Daily Trip Distances’ chart from the Bicycle and Pedestrian Information Center website, www.pedbikeinfo.org
QUALITY OF LIFE

Many factors go into determining quality of life for the citizens of a community: the local education system, prevalence of quality employment opportunities, and affordability of housing are all items that are commonly cited. Increasingly though, citizens claim that access to alternative means of transportation and access to quality recreational opportunities such as parks, trails, greenways, and bicycle routes, are important factors for them in determining their overall pleasure within their community. Communities with such amenities can attract new businesses, industries, and in turn, new residents. Furthermore, quality of life is positively impacted by bicycling through the increased social connections that take place by residents being active, talking to one another and spending more time outdoors and in their communities.

According to the Brookings Institution, the number of older Americans is expected to double over the next 25 years. All but the most fortunate seniors will confront an array of medical and other constraints on their mobility even as they continue to seek both an active community life, and the ability to age in place. Trails built as part of the bicycle transportation network generally do not allow for motor vehicles; however, they do accommodate motorized wheelchairs, which is an important asset for the growing number of senior citizens who deserve access to independent mobility.

Children under 16 are another important subset of our society who deserve access to safe mobility and a higher quality of life. According to the U.S. Environmental Protection Agency, fewer children walk or bicycle to school than did so a generation ago. In 1969, 48% of students walked or bicycled to school, but by 2001, less than 16% of students between 5 and 15 walked or bicycled to or from school. This trend can be identified locally in Aberdeen as interviews with Aberdeen Elementary School staff indicate that very few children bike to school, regardless of living in close proximity to the school.

According to the National Center for Safe Routes to School, “Walking or biking to school gives children time for physical activity and a sense of responsibility and independence; allows them to enjoy being outside; and provides them with time to socialize with their parents and friends and to get to know their neighborhoods.” In a 2004 CDC survey, 1,588 adults answered questions about barriers to walking to school for their youngest child aged 5 to 18 years. The main reasons cited by parents included distance to school, at 62%, and traffic-related danger, at 30%. Strategic additions to Aberdeen’s bicycle and trail system could shorten the distance from homes to schools, and overall bicycle improvements can improve the safety of our roadways.
Footnotes from, “Benefits of a Bicycle-Friendly Community”:


9. Federal Highway Administration, Southern Resource Center. (1999). Off-Mode Air Quality Analysis: A Compendium of Practice. To calculate air quality benefits of bicycling, first calculate the Daily VMT reduction. VMT Reduction = PD * Area * L * BMS, where PD = Population density, persons/mile; Area = Project length * 1 mile radius, mile; L = Round trip length, one-half of the project length times 2 daily trips, miles; BMS = Bike mode share, %. Last, calculate the Daily Emission reductions for a pollutant. Ed = EFx * VMT Reduction, where Ed = Daily Emissions, grams/day; EFx = Emission factor for pollutant x, grams/mile; VMT = vehicle mile/day.


11. U.S. Department of Transportation (DOT), Bureau of Transportation Statistics (BTS) and the Federal Highway Administration (FHWA). (2002). National Household Travel Survey.


2. Current Conditions

Overview
In order to propose a comprehensive bicycle system for Aberdeen, it is critical to examine the existing environment. The area’s geographic characteristics, existing roadway configurations, and existing bicycle facilities significantly affect bicycle transportation and the everyday decisions by bicyclists and motorists. Map 2.5 illustrates the locally-owned and state-owned road network. This chapter covers the following:

- Field Inventory and Observations
- Geographic Information Systems (GIS) Analysis
- Summary of Existing Plans

Field Inventory and Observations
The consultant team conducted an extensive field analysis of the roadway network throughout Aberdeen. The analysis focused on existing strengths and deficiencies of the current roadway network as related to bicycling and the potential for bicycle facilities. The summary of existing conditions are summarized below:

STRENGTHS OF EXISTING BICYCLE FACILITIES:

- **Narrow paved shoulders**: Existing 1-2 foot paved shoulder on several two-lane roadways throughout is a starting point for separated space (4 feet is the desired minimum standard).
- **Neighborhood roads**: Some neighborhood roads have low speed limits and low traffic volumes allowing for recreational riding.
- **New neighborhoods**: There are residential neighborhoods currently under construction that will offer continuous sidewalk networks for their residents.
- **Aberdeen Lake Park**: This park features a trail that loops around and across the lake providing a scenic recreational and exercise option.
- **Greenway trail opportunities can be found along existing sewer easements**:
  1) A sewer easement connects rural sections of Aberdeen and the Malcolm Blue Farm/Bethesda Cemetery area to Downtown Aberdeen. The easement connects from Bethesda Road to Sycamore Street in Downtown underneath the railroad bridge.
  2) There is an opportunity to connect the Aberdeen Lake Park/Aberdeen Elementary area to Aberdeen Middle School along the waterway and sewer easement.
  3) There is also significant right-of-way along the west side of the main railroad line from Downtown northward to Saunders Blvd. A rail-with-trail is a possibility connecting Aberdeen to Southern Pines. This will require railroad cooperation.
DEFICIENCIES OF EXISTING BICYCLE FACILITIES:

- **Lack of connectivity:** There are limited on-road or off-road bicycle facilities within Aberdeen.
- **No bicycle parking:** There are limited bicycle racks at public locations, shopping centers, and schools.
- **Bicyclist behavior:** Only a few recreational bicyclists were observed, and of the bicyclists that were observed, half were not wearing bicycle helmets. All cyclists were bicycling on the correct side of the road.

STRENGTHS OF EXISTING ROAD NETWORK (MAP 2.5):

- **Residential street network:** Many collector roadways generally connect to destinations and to more than one arterial roadway.
- **Poplar Street and Main Street (east of Railroad):** Poplar Street features wider lanes and on-street parking in the Downtown area. Traffic moves through this main arterial relatively slowly (though some speeding was noted by Committee Members). There are opportunities for on-road bicycle facilities and a side path here. Main Street features wide lanes with on-street parking east of the Railroad offering opportunity for an on-road bicycle facility.
- **Shoulders:** Several roadways throughout the Town have clear and level shoulders and/or on-street parking, offering opportunities to add bicycle lanes, paved shoulders, or multi-use trails.

DEFICIENCIES OF EXISTING ROAD NETWORK:

- **Connectivity issues:** Sandhills Boulevard and Poplar Street provide the primary access to the commercial area on the north end of Town and therefore, are heavily trafficked. There is a lack of grid connectivity in most of the Town’s overall street network.
- **High-volume, high-speed roadways:** There are several high-volume roadways with heavy vehicles and rural two-lane roadways throughout with higher speeds and/or little shoulder where bicyclists are not safe. Some of these roads include US 1, NC 5, US 15, US 501, and parts of NC 211.
- **Narrow roadways and lanes:** There are also many roadways that are too narrow for bicyclists to travel safely. These roads have little or no shoulder and have relatively high vehicle travel speeds which pose multiple hazards for bicyclists (such as Pee Dee, Bethesda, Keyser, Glasgow, Roseland, etc.). With the existing roadway widths, there is very little opportunity for restriping to fit bicycle lanes or paved shoulders.
- **Lack of curb and gutter:** Most roadways through Aberdeen have a rural two-lane configuration lacking curb and gutter (including neighborhood roadways). Curb and guttered roadways offer greater opportunity for bicycle lanes and shared-lane markings.
- **Roadways currently designed for automobiles only:** Many roads were designed around the automobile and need to be redesigned to become more bicycle friendly. Narrowing existing lanes and adding planted medians, sidewalks, and shade trees could also help reduce speeding and the hazards that speeding presents to cyclists, pedestrians, and drivers.

**Geographic Information Systems (GIS) Analysis**

Geographic Information Systems (GIS) data was received from the Town of Aberdeen and Moore County during the development of the Pedestrian Transportation Plan and was analyzed as part of the development of this Bicycle Plan. The analysis included information about popular destinations, land use, the locally and state-
owned road network, and demographic patterns that may be useful in assessing need for future bicycle facilities.

**TRIP ATTRACTORS (MAP 2.1)**
People currently drive, walk, or bicycle to a variety of destinations across Aberdeen for various purposes. These potential destinations and points of origin for bicyclists are referred to as ‘trip attractors’. Examples include:

- Downtown
- Aberdeen Lake Park
- Schools
- Shopping locations (Grocery Stores, Pharmacies, etc.)
- Places of worship
- Places of employment
- Parks
- Malcolm Blue Farm/Aberdeen Cemetery

Each of these categories of bicycle trip attractors was considered when determining locations for recommended bicycle improvements. They represent important starting and ending points for bicycle travel and provide a good basis for planning ideal routes.

**DEMOGRAPHIC ANALYSIS (MAPS 2.2-2.4)**
Needs and demands related to bicycling can be better understood through an analyses of demographic information. US Census demographic data provide geographic information such as the means of transportation to work and median family income, however the latest data available regarding mode to work (2000) showed zero people bicycling for transportation to work in Aberdeen.

The Town has a 2010 population of 6,350 up from 3,400 in 2000. With new development planned and continued development pressure across this region, the population should continue to grow. The realignment at Fort Bragg added thousands of civilian and government employment opportunities in the region over the past several years, contributing to the recent population growth in Aberdeen (information from http://www.bracrtf.com/development.php).

As of the 2000 Census, the population density was 551.6 people per square mile, and there were 1,655 housing units at an average density of 268.5/sq mi. The racial makeup of the town was 73.0% White, 21.8% African American, 4.0% Hispanic/Latino, and 2% other.

The median income for a household in the town was $31,911 which is significantly lower than the State average of $39,184. About 9.8% of families and 13.8% of the population were below the poverty line.

In 2000, approximately 0% of the working population over age 16 biked to work. On average, about 4.3% do not own a vehicle. When examined in more detail (by block group), there are geographic trends in car ownership. When looking at the population not owning a vehicle, there is greater variability with higher percentages on the southern end of Aberdeen.

Maps 2.2 - 2.4 show census-related information (population density, median family income by block group, and population percentage not owning a vehicle by block group). This information was used to help determine areas where there is greater need for bicycle facility enhancements. Dense areas will be important to connect with the bicycle network, serving a greater numbers of residents. The need for greater bicycle and pedestrian access and mobility may be greater for lower-income communities and high-density areas, where more people would be impacted.
Map 2.1 Trip Attractors
Map 2.2 Population Density

Maps based on data from 2009 US Census estimates. Maps should be updated when 2010 US Census data is available.
Map 2.4 Population Not Owning a Vehicle

Maps based on data from 2009 US Census estimates. Maps should be updated when 2010 US Census data is available.
Map 2.5 Roadway Network
**Summary of Existing Plans**

**ABERDEEN GREENWAY CONCEPTUAL PLAN (2009)**
This Plan focuses on the visionary, conceptual expansion of the Town’s existing one-mile Aberdeen Lake greenway at Aberdeen Lake Park into a 7-mile greenway system that connects schools, residential areas, and Downtown. One of the goals of the plan is to provide eligibility for funding from the North Carolina Clean Water Management Trust Fund, the North Carolina Parks and Recreation Trust Fund, and NCDOT. The plan sites the benefits of an expanded greenway system that include water quality protection, quality of life improvement, health and fitness opportunity, Downtown revitalization, walk to school opportunity, etc. The plan proposes two phases, with a detailed analysis of property owners along these recommended routes:

Phase 1) Development of 3.5 mile Aberdeen Creek Trail to connect Aberdeen Lake Park with Southern Middle School along the east side of Aberdeen Creek; development of 0.2 mile Schoolhouse Walk connecting Aberdeen Lake Park with Aberdeen Elementary School along tributary.

Phase 2) Development of 1.6 mile Powell’s Pond Trail along tributary to connect Aberdeen Elementary School with Powell’s Pond; Development of 0.6 mile Downtown Connector to connect Downtown with Powell’s Pond Trail.

The Plan also provides an implementation schedule and cost estimate.

**ABERDEEN 2030 LAND DEVELOPMENT PLAN (2005)**
The Aberdeen Land Development Plan was developed to guide the town’s future growth and development. In the transportation section of this plan, it discusses the effect of US 1 and US 15/501 as a barrier to connectivity. Many goals of this Plan are relevant in regards to pedestrian planning and include:

- To maintain, enhance, and expand Aberdeen’s system of parks and recreational areas to better serve the needs of its diverse and growing population.
  - Construct bike and nature trails along Aberdeen Creek and its tributaries
  - Create a greenway system that connects Aberdeen’s parks with other town greenways.
- Goal 6: To develop, adopt, and enforce a well thought-out appearance and beautification plan for Aberdeen.
- To develop a well maintained, aesthetically pleasing, and efficient transportation system that serves all areas of town and its extra-territorial planning area.

In addition, the plan recommends that the town require new developments to connect to the parks and trail system. Local trails should also be connected with surrounding communities and the All American Trail.

**BRAC (Base realignment and closure commission) Comprehensive Regional Growth Plan**
The regional growth plan was developed to address mission growth at Fort Bragg and includes an eleven-county region that includes Moore County. Over 8,700 military-related personnel will be relocating to region through 2013. The plan addresses employment, education, transportation, housing, health care, infrastructure, services, etc. While the focus geographically is in and around Fort Bragg, there are regional recommendations that impact Moore County and Aberdeen. These are mostly focused on providing infrastructure and services for the Aberdeen area. There are some over-arching transportation goals. For example, one of the recommended actions of this plan is to prepare a regional, multi-modal transportation growth. Specifically, the plan states that “No one alternative mode will be suitable for everybody, so a balanced system of alternatives is needed.” Finally, an important action identified is to promote participation of the region’s municipalities in the North Carolina Main Street Program to address Complete Streets, pedestrian-friendly streetscapes, and context-sensitive design.

**MOORE COUNTY COMPREHENSIVE TRANSPORTATION PLAN**
Initiated at the time of this study, this transportation plan will have a focus on, among other things, the US Highway 1 corridor that traverses Aberdeen. At this time, there is not yet a recommendation for improvements to US 1 but there are many different possibilities. The fate of US 1 is both a barrier and a potential opportunity to address pedestrian improvements. Regardless of the recommendations for US 1, pedestrian connectivity along and across the US 1 barrier should be taken into account.
3. Recommendations

Overview & Methodology

The recommended bicycle network (page 3-5) represents a connected system that will allow transportation and recreation-based bicycle travel throughout Aberdeen. The recommended network is composed of numerous types of on-street and off-street bicycle facilities that serve to connect people and neighborhoods to local destinations. This chapter contains descriptions of the bicycle facility types, an overall map of key recommendations, small focus area maps, and a regional connectivity map.

This diagram illustrates the many inputs and levels of analysis used to design the Bicycle Facility Network.

The recommended bicycle network builds on a key principle that bicyclists (both current bicyclists and potential future bicyclists) have a range of skill levels. Type “C” bicyclists are beginners, often seniors and children. Type “B” bicyclists are intermediate level, typically occasional commuters and recreational cyclists. Type “A” bicyclists are experienced, regular commuters and recreational cyclists who are comfortable sharing the road with motor vehicles. These groups are not always exclusive – some elite level athletes still like to ride on shared-use paths with their families, and recreational bicyclists will sometimes use their bicycles for utilitarian travel. Most importantly, the majority of the population falls in the “Type B” or “Type C” category. This Plan seeks to accommodate all current and future users of the system.
Type “A” bicyclists are experienced, regular commuters and recreational cyclists who are comfortable sharing the road with motor vehicles.

Type “B” bicyclists are intermediate level, typically occasional commuters and recreational cyclists.

Type “C” bicyclists are beginners, often seniors and children.
**Recommended Bicycle Facility Network**

According to North Carolina State Law, bicyclists have the same rights and responsibilities as motorists and are allowed to ride on all roads in Aberdeen. Modifications to roadways in Aberdeen as well as the addition of off-street pathways, will make bicycling a safer and more viable form of transportation. The key facility types for this plan are shared-lane markings (sharrows), bicycle lanes, paved shoulders, multi-use greenways, multi-use sidepaths and bicycle parking. These facilities should be included in all new roadway design and roadway reconstruction/widening projects in the Town of Aberdeen, especially as they are recommended in the Map 3.1 of this Plan. Important regional connections to existing and recommended bicycle facilities in Southern Pines can be found on Map 3.6 at the end of this chapter. Bike route signage may be considered for any of the six bicycle facilities. Below are brief descriptions of six types of bicycle facilities recommended in Aberdeen (for more about bicycle facility design, see Appendix A).

**BICYCLE SHARED-LANE MARKINGS (SHARROWS)**

Shared lane markings, or “sharrows,” are placed in a linear pattern along a corridor, typically every 100-250 feet and after intersections. They function in several important ways:

- They make motorists more aware of the potential presence of cyclists;
- Direct cyclists to ride in the proper direction; and
- Remind cyclists to ride further from parked cars to avoid ‘dooring’ collisions.

*(see A-3 for more on Sharrows)*

**BICYCLE LANES**

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential and exclusive use of bicyclists. The minimum width for a bicycle lane is four feet; five- and six-foot bicycle lanes are typical for collector and arterial roads. There are some opportunities for bicycle lanes in Aberdeen in the long term when roadways are widened and curb and gutter are added. As a general practice, any local roadway that is widened should incorporate bicycle lanes, with consideration for speed limit reductions.

**PAVED SHOULDERS**

Paved shoulders are the part of a roadway which is contiguous and on the same level as the regularly traveled portion of the roadway. There is no minimum width for paved shoulders; however a width of at least four feet is preferred. Ideally, paved shoulders should be included in the construction of new roadways and/or the upgrade of existing roadways, especially where there is a need to more safely accommodate bicycles. Recreational bicycling is very common across this region of the Triangle. Most rural roadways in their existing configuration, either feature no shoulder or only a 1-2 foot paved shoulder which is not adequate for bicyclists. Roadways in which paved shoulders should be added or widened to a minimum of four feet are shown on Map 3.1. In cases where curb and gutter is added to roadways where paved shoulders are recommended, bicycle lanes should replace paved shoulders. Current two-lane roads that would still benefit from short-term paved shoulder widening include: Saunders Blvd, Roseland Rd, Pinehurst St, Bethesda Rd and Johnson St (see A-7 for more on Paved Shoulders)
Multi-Use Trails (a.k.a. Greenways)

A greenway is defined as a linear corridor of land that can be either natural, such as rivers and streams, or man-made, such as utility corridors or abandoned railroad beds. Many greenways contain trails that can be designed to accommodate a variety of trail users, including bicyclists, walkers, hikers, joggers, skaters, horseback riders, and those confined to wheelchairs (hence, the term ‘multi-use trail’). Greenway corridors can also serve environmental purposes, protecting forests and water quality, and offering ample opportunities for environmental education. Greenway trails in Aberdeen should be integrated with and serve as an off-road extension of the on-road bicycle network.

This is a planning level of analysis for trails. Trails can be constructed of many different materials, however, for trails that serve the purpose of bicycle transportation, hard surfaces such as asphalt or concrete are recommended. Each trail project will also require close coordination with nearby property owners. Design features such as landscaped screening, fencing, and other treatments should be considered to help ensure privacy where desired.

Multi-Use SidePaths

In order to best serve different types of bicyclists (see page 3-2) multi-use trails located adjacent to roadways (middle photo to the left) should not prohibit the provision of adequate on-road bicycle facilities (such as paved shoulders or bicycle lanes). Furthermore, multi-use trails next to roadways are most appropriate in corridors with few driveways and intersections and should be at least 10’ wide.

Multi-use trails are the most highly desired facility types identified during this planning process and the pedestrian planning process (2011). This is common across the State of North Carolina and the United States as a whole. Families and novice bicyclists are most comfortable in an off-road situation. Therefore, the multi-use trail network is a very integral part of the overall bicycle network, and it’s development should be a priority of the Town.

Bicycle Parking

This plan recommends adding bicycle racks to destinations throughout town, including Downtown Aberdeen, at parks, schools, the library, post office, grocery stores, shopping/employment centers, and multi-family housing communities.

Bicycle parking is recommended at the following locations in Aberdeen:

- Downtown Core (near Poplar & Main)
- Aberdeen Lake Park
- Food Lions
- Harris Teeter
- Rays Mill Pond
- Malcolm Blue Farm
- All Town Parks
- All Schools
- Wal-Mart
- Town Hall
- Commercial Areas
- Post Office

(see A-18 for more on Bicycle Parking)
Map 3.1 Overall Bicycle Facility Network
<table>
<thead>
<tr>
<th>Area/Location</th>
<th>Road Pavement</th>
<th>Lane Width</th>
<th># of Lanes</th>
<th>Speed Limit</th>
<th>Parking</th>
<th>B-O-W Available</th>
<th>Bicycle Facility Recommendations</th>
<th>Method of Construction for Recommendation</th>
<th>Alternative Recommendation</th>
<th>Other Recommendations/Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poplar St near Johnson St</td>
<td>3.5 ft</td>
<td>11</td>
<td>3 (1 center turn lane)</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Sharrow</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Poplar St (from Johnson to Providence)</td>
<td>3.5 ft</td>
<td>12</td>
<td>3</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Multi-Use Side Path</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Poplar St (from Providence to Sld)</td>
<td>3.5 ft</td>
<td>11.5</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Multi-Use Side Path</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Poplar St (from Sld to Cadiz)</td>
<td>3.5 ft</td>
<td>11.5</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Multi-Use Side Path</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Poplar St (from Cadiz to Peach)</td>
<td>3.5 ft</td>
<td>9.5</td>
<td>2</td>
<td>35</td>
<td>Yes</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Magnolia Dr (from Attention to Sand Hills)</td>
<td>33 ft</td>
<td>14</td>
<td>2</td>
<td>35</td>
<td>Yes</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Magnolia Dr (West of Attention)</td>
<td>15 ft</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Johnson St</td>
<td>22 ft</td>
<td>10</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>No</td>
<td>Sharrow</td>
<td>Pavement Markings</td>
<td>Pavement Markings</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Saunders Blvd (NE)</td>
<td>22 ft</td>
<td>10</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Midway Rd</td>
<td>18 ft</td>
<td>no marked lanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unpaved</td>
<td>New Construction</td>
<td>New Construction</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Barbosa Rd / Eve St</td>
<td>18 ft</td>
<td>10</td>
<td>2</td>
<td>35</td>
<td>Yes</td>
<td>No</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Elmr St</td>
<td>18 ft</td>
<td>no marked lanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unpaved</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Main St</td>
<td>44 ft</td>
<td>11.5</td>
<td>2</td>
<td>35</td>
<td>Yes</td>
<td>No</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Maple St (from Blue to downtown)</td>
<td>18 ft</td>
<td>no marked lanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unpaved</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>South St (from Finley to Grace)</td>
<td>29 ft</td>
<td>12</td>
<td>2</td>
<td>35</td>
<td>Yes</td>
<td>No</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>South St (from Downtown to Cove)</td>
<td>29 ft</td>
<td>9.5</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>No</td>
<td>Sharrow</td>
<td>Pavement Markings</td>
<td>Pavement Markings</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Glasgow St</td>
<td>18 ft</td>
<td>8</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Keyser St</td>
<td>18 ft</td>
<td>8</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Blue St (from Maple St to Main St)</td>
<td>18 ft</td>
<td>8</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Blue St (from Main St to South St)</td>
<td>20 ft</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>NC 211</td>
<td>28.40 ft</td>
<td>22</td>
<td>(2 periodic center turn lanes)</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Pea Dee Rd</td>
<td>20 ft</td>
<td>8</td>
<td>2</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Pinhook St</td>
<td>24 ft</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Keith St</td>
<td>20 ft</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>US 25 / 501 Downtown to Pea Dee</td>
<td>25 ft</td>
<td>12</td>
<td>2</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>US 25 / 501 Pea Dee to Academy Moor</td>
<td>25 ft</td>
<td>7.3</td>
<td>2</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Saunders Blvd (from Pinhook to Colorado)</td>
<td>30 ft</td>
<td>11</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Sanders Blvd (from Colorado to NC 5)</td>
<td>30 ft</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Foreland Rd</td>
<td>25 ft</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Sandhills Blvd (south of Johnson)</td>
<td>82 ft</td>
<td>12.9</td>
<td>5 (1 center turn lane)</td>
<td>45</td>
<td>No</td>
<td>No</td>
<td>Paved Shoulders</td>
<td>Bike Lanes</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Shepherd Trail</td>
<td>24 ft</td>
<td>no marked lanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unpaved</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Downtown Co. Pad</td>
<td>24 ft</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Unpaved</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td>Reduce speed from 35 mph to 30 mph</td>
</tr>
<tr>
<td>Area/Location</td>
<td>Road Pavement</td>
<td>Lane Width</td>
<td># of Lanes</td>
<td>Speed Limit</td>
<td>Parking R-O-W Available</td>
<td>Bicycle Facility Recommendation #1</td>
<td>Method of Construction for Recommendation #1</td>
<td>Alternative Recommendation</td>
<td>Other Recommendations / Information</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
<td>------------</td>
<td>------------</td>
<td>-------------</td>
<td>-------------------------</td>
<td>------------------------------------</td>
<td>----------------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>Downtown Core streets: Sycamore, South, Pine, Main, Maple, Poplar, Elm, Knight, Keith</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poplar St near Johnson St</td>
<td>33.5 feet</td>
<td>11</td>
<td>3</td>
<td>20</td>
<td>Yes</td>
<td>No</td>
<td>Sharrows</td>
<td>Pavement Markings</td>
<td>Reduce speed from 35mph to 30 mph</td>
<td></td>
</tr>
<tr>
<td>Poplar St (from Johnson to Providence)</td>
<td>28 feet</td>
<td>12</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Multi-Use Side Path</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td></td>
</tr>
<tr>
<td>Poplar St (from Providence to 3rd)</td>
<td>29.5 feet</td>
<td>11.5</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Multi-Use Side Path</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td></td>
</tr>
<tr>
<td>Poplar St (from 3rd to Cedar)</td>
<td>28.5 feet</td>
<td>11.5</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Multi-Use Side Path</td>
<td>New Construction</td>
<td>Bike Lanes</td>
<td></td>
</tr>
<tr>
<td>Poplar St (from Cedar to Peach)</td>
<td>29'</td>
<td>9.5</td>
<td></td>
<td>30</td>
<td>Yes</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>Restripe</td>
<td>Sharrows</td>
<td>Reduce speed from 30mph to 25mph Add pedestrian and bicycle signage</td>
</tr>
<tr>
<td>Magnolia Dr. (from Atrium to Sandhills)</td>
<td>33</td>
<td>14</td>
<td>2</td>
<td>35</td>
<td>Yes</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction / Restripe</td>
<td>Paved Shoulders</td>
<td></td>
</tr>
<tr>
<td>Magnolia Dr. (West of Atrium)</td>
<td>19</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Bike Lanes</td>
<td>New Construction / Restripe</td>
<td>Paved Shoulders</td>
<td></td>
</tr>
<tr>
<td>Johnson St</td>
<td>22</td>
<td>10</td>
<td>2</td>
<td>25</td>
<td>No</td>
<td>No</td>
<td>Sharrows</td>
<td>Pavement Markings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saunders Blvd (NE)</td>
<td>22</td>
<td>10</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>Restripe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midway Rd</td>
<td>18</td>
<td>no marked lanes</td>
<td>unpainted</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bethesda Rd / Hwy 211</td>
<td>8</td>
<td>18</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction / Restripe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elm St</td>
<td>18</td>
<td>no marked lanes</td>
<td>unpainted</td>
<td>25</td>
<td>Yes</td>
<td>No</td>
<td>Sharrows</td>
<td>Stripe / Pavement Markings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bicycle Lane - Stripe: Refers to projects that require only the striping of a bicycle lane, with no other changes needed to the roadway or existing roadway striping.

Bicycle Lane - Restripe: Refers to projects that require restriping travel lanes (often to a more narrow width) allowing adequate space for bicycle lanes. Narrowing the widths of travel lanes has been demonstrated to have no affect on overall roadway capacity (for more on this topic, refer to the Implementation Chapter of this Plan).

Bicycle Lane & Paved Shoulder - New Construction: Refers to projects that require adding additional pavement width to the roadway to allow adequate space for bicycle lanes or to allow cyclists to safely travel on a wide, paved shoulder.
Aberdeen Bicycle Transportation Plan 2012

Map 3.3 Northern Area Map

Chapter 3: Recommendations

- Bicycle Lane - Stripe: Refers to projects that require only the striping of a bicycle lane, with no other changes needed to the roadway or existing roadway striping.
- Bicycle Lane - Restripe: Refers to projects that require restriping travel lanes (often to a more narrow width) allowing adequate space for bicycle lanes. Narrowing the widths of travel lanes has been demonstrated to have no effect on overall roadway capacity (for more on this topic, refer to the Implementation Chapter of this Plan).
- Bicycle Lane & Paved Shoulder - New Construction: Refers to projects that require adding additional pavement width to the roadway to allow adequate space for bicycle lanes or to allow cyclists to safely travel on a wide, paved shoulder.
### Table 3.3 Bicycle Facility Recommendations - Southern Area

<table>
<thead>
<tr>
<th>Area / Location</th>
<th>Road Pavement</th>
<th>Lane Width</th>
<th># of Lanes</th>
<th>Speed Limit</th>
<th>Parking</th>
<th>R-O-W Available</th>
<th>Bicycle Facility Recommendation #1</th>
<th>Method of Construction for Recommendation #1</th>
<th>Alternative Recommendation</th>
<th>Other Recommendations / Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bethesda Rd / Hwy 211</td>
<td>8</td>
<td>18</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction / Restripe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elm St</td>
<td>18</td>
<td>no marked lanes</td>
<td>unpainted</td>
<td>25</td>
<td>Yes</td>
<td>No</td>
<td>Sharrow</td>
<td>Stripe / Pavement Markings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main St</td>
<td>44.5’</td>
<td>11.5</td>
<td>2</td>
<td>20/35</td>
<td>Yes</td>
<td>No</td>
<td>Bike Lanes</td>
<td>Restripe / Pavement Markings</td>
<td>Sharrow</td>
<td>remove OSP along one side of Main street and add bike lanes OR keep OSP and add sharrow thru DT core.</td>
</tr>
<tr>
<td>Maple St (from Blue thru downtown)</td>
<td>18</td>
<td>no marked lanes</td>
<td>2</td>
<td>25</td>
<td>No</td>
<td>No</td>
<td>Sharrow</td>
<td>Stripe / Pavement Markings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South St (from Finley to Garrett)</td>
<td>20’</td>
<td>12</td>
<td>2</td>
<td>35</td>
<td>Yes</td>
<td>No</td>
<td>Bike Lanes</td>
<td>Restripe / Pavement Markings</td>
<td>Sharrow</td>
<td></td>
</tr>
<tr>
<td>South St (thru Downtown Core)</td>
<td>20</td>
<td>9.5’</td>
<td>2</td>
<td>20</td>
<td>No</td>
<td>No</td>
<td>Sharrow</td>
<td>Pavement Markings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glasgow St</td>
<td>18</td>
<td>8</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction / Restripe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keyser St</td>
<td>18</td>
<td>8</td>
<td>2</td>
<td>25</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction / Restripe / Pavement Markings</td>
<td>Sharrow</td>
<td>very narrow stretch of road with speed limit 25mph</td>
</tr>
<tr>
<td>Blue St (from Maple St to Main St)</td>
<td>18</td>
<td>8</td>
<td>2</td>
<td>25</td>
<td>No</td>
<td>Yes</td>
<td>Sharrow</td>
<td>Pavement Markings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue St (from Main St to South St)</td>
<td>20</td>
<td>9</td>
<td>2</td>
<td>25</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC 211</td>
<td>23-40</td>
<td>22</td>
<td>2 (sporadic center turn lane)</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td>signed as bike route</td>
<td></td>
</tr>
<tr>
<td>Pee Dee Rd</td>
<td>20</td>
<td>8</td>
<td>2</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinehurst St</td>
<td>24</td>
<td>11.5</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td></td>
<td>bike lanes recommended if growth occurs and curb &amp; gutter are installed</td>
</tr>
<tr>
<td>Keith St</td>
<td>20</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 15 / 501 Downtown to Pee Dee</td>
<td>25</td>
<td>12</td>
<td>2</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>Paved Shoulders</td>
<td>New Construction / Restripe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 15 / 501 Pee Dee to Academy Moore</td>
<td>2</td>
<td></td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Side Path</td>
<td>New Construction</td>
<td>Paved shoulders</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For information on Bike Lane Restripe, Stripe, New Construction, see page 3-8.
For information on Bike Lane Restripe, Stripe, New Construction, see page 3-8.
### Table 3.4 Bicycle Facility Recommendations - Western Area

<table>
<thead>
<tr>
<th>Area/Location</th>
<th>Road Pavement</th>
<th>Paved Shoulders</th>
<th>New Construction / Restripe</th>
<th>Bike Lanes</th>
<th>Restripe</th>
<th>Existing wide paved shoulders, reduce lane width to 9.5 and restripe to create bike lanes</th>
<th>Existing wide road corridor, stripe 9.5 lanes with bike lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinehurst St</td>
<td>24</td>
<td>11.5</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Keith St</td>
<td>20</td>
<td>9</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>New Construction</td>
</tr>
<tr>
<td>US 15/501 Downtown to Pee Dee</td>
<td>25</td>
<td>12</td>
<td>2</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>New Construction / Restripe</td>
</tr>
<tr>
<td>US 15/501 Pee Dee to Academy Moore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paved shoulders</td>
</tr>
<tr>
<td>Saunders Blvd (from Pinehurst to Colonial)</td>
<td>30</td>
<td>11</td>
<td>2</td>
<td>25</td>
<td>Yes</td>
<td>Yes</td>
<td>Bike Lanes</td>
</tr>
<tr>
<td>Saunders Blvd (from Colonial to NC 5)</td>
<td>24</td>
<td>9</td>
<td>2</td>
<td>25</td>
<td>No</td>
<td>Yes</td>
<td>New Construction / Restripe</td>
</tr>
<tr>
<td>Roseland Rd</td>
<td>25</td>
<td>10</td>
<td>2</td>
<td>35</td>
<td>No</td>
<td>Yes</td>
<td>Restripe</td>
</tr>
<tr>
<td>Sandhills Blvd (south of Johnson)</td>
<td>82</td>
<td>12.5</td>
<td>5 (1 center turn lane)</td>
<td>45</td>
<td>No</td>
<td>No</td>
<td>Restripe</td>
</tr>
<tr>
<td>Shepard Trail</td>
<td>19 - 27</td>
<td>no marked lanes</td>
<td>2</td>
<td>25 - 35</td>
<td>Yes</td>
<td>No</td>
<td>Bike Lanes</td>
</tr>
<tr>
<td>Downtown Core</td>
<td>20</td>
<td></td>
<td>2</td>
<td>20</td>
<td>Yes</td>
<td>No</td>
<td>Sharrows</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pavement Markings</td>
</tr>
</tbody>
</table>

For information on Bike Lane Restripe, Stripe, New Construction, see page 3-8.
Map 3.5 Western Area Map
The Town of Aberdeen should work with the towns of Southern Pines and Pinehurst to ensure bicycle and pedestrian connectivity. Future connections to the All American Trail should be made when the All American Trail is constructed.
4. Implementation

Overview

This chapter outlines the implementation priorities, staffing, evaluation and facility development methods, implementation resources, and more than 20 specific action steps. Table 4.1 summarizes the action steps, along with all other recommendations made throughout the plan, and defines recommended actions, lead & support agencies, and action step phasing.

Implementation Priorities

Adopt This Plan
Through adoption, this Plan becomes an official planning document of the Town. Adoption shows that the Town of Aberdeen has undergone a successful, supported planning process. The Town can then use this document to improve it's chances in receiving funding through NCDOT and other outside resources. The Town Council and Planning Board should become knowledgeable of this Plan and support bicycle-related projects and policies. Finally, this Plan’s recommendations should also be integrated into future Town of Aberdeen planning documents.

Begin Building Projects
Steering Committee input, public input, existing plans, connectivity, and other factors were used to develop the recommended bicycle network (see Chapter 3). These projects should be supported by a combination of grants, local funding, and state funding, and should be constructed in coordination with local development and state transportation projects (see Funding Appendix in Aberdeen’s Pedestrian Plan and refer to page 4-4 and 4-5 for facility development methods).

Improve and Enforce Bicycle-Related Regulations.
Regulations should be enforced to ensure that future development provides for bicycle facilities on adopted plans. Some bicycle & pedestrian policy recommendations are provided in detail in Chapter 4 and Appendix D of Aberdeen’s Pedestrian Plan. For state roadways (which comprise most of Aberdeen’s recommended bicycle network) see the “Complete Streets” policy that was adopted by NCDOT in 2009. The policy directs the Department to consider and incorporate several modes of transportation when building new projects or making improvements to existing infrastructure. Under the new policy, the Department will collaborate with cities, towns and communities during the planning and design phases of projects. Together, they will decide how to provide the transportation options needed to serve the community and complement the context of the area. The guidance in the updated cross sections establishes design elements that emphasize safety, mobility, and accessibility for multiple modes of travel. For more information, contact the State Roadway Design Engineer, or visit: www.nccompletestreets.org
CREATE A BICYCLE AND PEDESTRIAN ADVOCACY GROUP.
Many communities across the State have committees or groups who advocate for the needs of local bicyclists and pedestrians. The Town of Aberdeen should create an advocacy group committee to embrace an advocacy role for bicycle and pedestrian issues. The committee should help coordinate the implementation of this Plan, develop programs, listen to community needs, promote the pedestrian network, and keep positive momentum going. Consider planning board members, Town staff, Steering Committee members, and Moore County representatives for advocacy group members.

There are a few optional structures for this group:

- A Town-appointed group/committee that reports to the Town Council
- A standalone advocacy group that provides support to the Town and community
- A subcommittee of the Town Planning Board

The committee can also help monitor the progress of the Town and NCDOT as they develop new facilities and programs. This group can assist in researching and applying for trail and bicycle-related construction grants. Coordination with NCDOT, specifically the Division of Bicycle and Pedestrian Transportation and the local Division 8 office, will prove critical if this plan is to be implemented successfully.

TAKE ADVANTAGE OF ALL OPPORTUNITIES.
Some of the most cost-effective opportunities to provide bicycle facilities are during routine roadway construction, reconstruction, and repaving projects. A new commercial development or a roadway widening project, for instance, would provide a good opportunity to add shoulder width or paint shared lane markings as part of an existing effort, potentially saving costs.

SEEK MULTIPLE FUNDING SOURCES AND FACILITY DEVELOPMENT OPTIONS.
Multiple approaches should be taken to support bicycle facility development and programming. It is important to secure the funding necessary to undertake short-term projects but also to develop a long term funding strategy to allow continued development of the overall system. Capital and Powell Bill funds for bicycle facility and greenway construction should be set aside every year, even if only for a small amount (small amounts of local funding can be matched to outside funding sources). A variety of local, state, and federal options and sources exist and should be pursued. These funding options are described in Appendix B of Aberdeen’s Pedestrian Plan. Other methods of bicycle facility development that are efficient and cost-effective are described later in this chapter.

DEVELOP BICYCLE PROGRAMMING
Programs such as Safe Routes to School can help educate and encourage users. Safe Routes to School offers a number of school workshop opportunities and construction funding for improvements around schools. Public events and media involvement should occur when announcing new walkways and projects. Refer to Chapter 4 of Aberdeen’s Pedestrian Plan for a comprehensive list of program ideas.

ENSURE PLANNING EFFORTS ARE INTEGRATED REGIONALLY.
Combining resources and efforts for bicycle planning and trail planning with surrounding municipalities, regional entities, and stakeholders is mutually beneficial to all parties involved. Regional, long-distance trails often spark the most excitement, use, and tourism. The Town should remain coordinated with Moore County and neighboring municipalities on regional trail initiatives. It is important to stay aware and communicative with other municipal, county, state, and NCDOT efforts to ensure the Town takes advantage of funding opportunities and support. A BPAC member, for example, could have the responsibility of staying in tune and updating the Town on regional trail initiatives.

After adoption by the Town, the Town should ensure that this document is recognized by regional transportation planning agencies, such as NCDOT Division 8, and the MPO. The plan’s recommendations should be programmed into the official work schedule and planning of these organizations.
BECOME DESIGNATED AS A BICYCLE FRIENDLY COMMUNITY.
This Bicycle Plan should help to transform Aberdeen into a “Bicycle Friendly Community” (BFC). The Bicycle Friendly Community Campaign is an awards program that recognizes municipalities that actively support bicycling. A Bicycle Friendly Community provides safe accommodation for cycling and encourages its residents to bike for transportation and recreation. The League of American Bicyclists (LAB) administers the Bicycle Friendly Community Campaign and a committee of the LAB reviews and scores the BFC application. An award of platinum, gold, silver, or bronze status is designated for a period of four years. The LAB and technical assistance staff continue to work with awardees and those communities that do not yet meet the criteria to encourage continual improvements.

The development and implementation of this Plan is an essential first step in eventually becoming a Bicycle Friendly Community. Having a citizen’s board officially dedicated to these issues also helps tremendously. For example, the Town of Durham has had a BPAC in place for many years (http://www.bikewalkdurham.org/) and they recently received BFC status from the LAB. Even smaller communities, such as Davidson, NC, and Carrboro, NC, also have BPACs and are among the few communities in NC that are designated as “Bicycle Friendly”. Aberdeen should make progress in accomplishing the goals of this Plan, and then apply for BFC status.

Staffing

TOWN OF ABERDEEN
The Town Manager, Director of Public Works, Transportation Projects Manager, and Planning Director are responsible for leading the implementation of this Plan. The Town will continue to spearhead initiatives to manifest tangible, on the ground results, based on the recommendations of this plan.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
NCDOT Division 8 maintains the state-owned roads in Aberdeen, affecting the bicycle facilities (or lack thereof) on much of Aberdeen’s roadway environment. Recommendations for bicycle facilities on NCDOT roads will have to be carried out through a coordinated effort between the Town of Aberdeen and NCDOT Division 8. Some technical assistance could also be provided through NCDOT’s Division of Bicycle and Pedestrian Transportation. The Town should be proactive in seeking such assistance, and should refer the departments back to this plan whenever possible.

POLICE DEPARTMENT
The Aberdeen Police Department plays a vital role in bicycle safety. All local police officers should be knowledgeable about North Carolina’s bicycle laws to promote positive interactions between bicyclists and motorists. The Guide to North Carolina Bicycle and Pedestrian Laws, written by the NCDOT Division of Bicycle and Pedestrian Transportation, should be distributed to local law enforcement. The Police Department should continue to specifically target any know areas of bicycle use and speeding, such as along Main Street.

Volunteers
For trail development, services from volunteers, students, and seniors, or donations of material and equipment may be provided in-kind, to offset construction and maintenance costs. Formalized maintenance agreements, such as adopt-a-trail/greenway or adopt-a-highway can be used to provide a regulated service agreement with volunteers. Other efforts and projects can be coordinated as needed with senior class projects, scout projects, interested organizations, clubs or a neighborhood’s community service to provide for many of the program ideas outlined in Chapter 4 of Aberdeen’s Pedestrian Plan. Advantages of utilizing volunteers include reduced or donated planning and construction costs, community pride and personal connections to the Town’s greenway and pedestrian networks.
Performance Measures (Evaluation and Monitoring)

The Town of Aberdeen should establish performance measures to benchmark progress towards implementing this plan. These performance measures should be stated in an official report within two years after the Plan is adopted. Performance measures could address the following aspects of bicycle transportation and recreation in Aberdeen:

- **Safety.** Measures of bicycle crashes and injuries or speeding in the Town.
- **Facilities.** Measures of how many bicycle facilities have been funded and constructed since the Plan’s adoption.
- **Maintenance.** Measures of existing bicycle facility deficiency or maintenance needs.
- **Education, Encouragement and Enforcement.** Measures of the number of people who have participated in part of a bicycle program since the Plan’s adoption.

Bicycle Facility Development Methods

This section describes various construction methods for the proposed bicycle facilities outlined in Chapter 3. Note that many types of transportation facility construction and maintenance projects can be used to create new bicycle facilities. It is much more cost-effective to provide bicycle facilities during roadway construction and re-construction projects than to initiate the improvements later as “retrofit” projects.

To take advantage of upcoming opportunities and to incorporate bicycle facilities into routine transportation and utility projects, the Town should keep track of NCDOT’s projects and any other local transportation improvements. While doing this, staff should be aware of the different procedures for state and local roads and interstates.

NCDOT Transportation Improvement (TIP) Process

The Transportation Improvement Program (TIP) is an ongoing program at NCDOT which includes a process asking localities to present their transportation needs to state government. Bicycle facility and safety needs are an important part of this process. Every other year, a series of TIP meetings are scheduled around the state. Following the conclusion of these meetings, all requests are evaluated. Bicycle transportation improvement requests, which meet project selection criteria, are then scheduled into a four-year program as part of the state’s long-term transportation program.

There are two types of projects in the TIP: incidental and independent. Incidental projects are those that can be incorporated into a scheduled roadway improvement project. Independent are those that can stand-alone such as a greenway, not related to a particular roadway.

The Town of Aberdeen, guided by the priority projects within this Plan, should present bicycle projects along State roads to the MPO and State. Local requests for small bicycle projects, such as shared lane markings or signage, can be directed to the MPO or the local NCDOT Division 8 office. Further information, including the criteria evaluated can be found at: [www.ncdot.org/transit/bicycle/funding/funding_TIP.html](http://www.ncdot.org/transit/bicycle/funding/funding_TIP.html)

Local Roadway Construction and Reconstruction

Bicyclists should be accommodated when a new road is constructed or an existing road is reconstructed. All new roads with moderate to heavy motor vehicle traffic should have bicycle facilities and safe intersections. The Town of Aberdeen should take advantage of any upcoming construction projects, including roadway projects outlined in local comprehensive and transportation plans.
Residential and Commercial Development
Construction of bicycle facilities that corresponds with site construction is more cost-effective than retrofitting, and should be required during development. In commercial development, emphasis should also be focused on bicycle parking and safe bicycle access into, within, and through large parking lots. This ensures the future growth of the bicycle network and the development of safe communities.

Retrofit Roadways with New Bicycle Facilities
It may be necessary to add new facilities before a roadway is scheduled to be reconstructed, especially on roadways that are not expected to be modified or improved in the foreseeable future. In some places, it may be relatively easy to add facilities to fill gaps, but other segments may require removing trees, relocating landscaping or fences, re-grading ditches or cut and fill sections.

Bicycle Lane Development Through Travel Lane Narrowing
One means of developing bicycle lanes is through re-striping or travel lane narrowing. In laying out the bicycle network facility recommendations and methods, it was determined that 10' travel lanes were acceptable in order to fit bicycle lanes into the existing roadway environment. In fact, some existing State roadways in Holly Springs feature lane widths less than 9'. For example, an existing two lane cross section with 15' lanes (Total roadway width of 30') could be altered to 10' lanes with 5' bicycle lanes (Total roadway width of 30'). This methodology used in developing recommendations is supported by research in both automobile traffic safety and bicycle level of service improvements.

Current AASHTO literature, research, and precedent examples support the notion of reducing 12’ travel lanes to 10’ lanes. The 2004 AASHTO Green Book states that travel lanes between 10 and 12 feet are adequate for urban collectors and urban arterials. (1) “On interrupted- flow operating conditions at low speeds (45 mph or less), narrow lane widths are normally adequate and have some advantages.” At the 2007 TRB Annual Meeting, a research paper using advanced statistical analysis, supported the AASHTO Green Book in providing flexibility for use of lane widths narrower than 12 feet on urban and suburban arterials. The paper indicates there is no difference in safety on streets with lanes ranging from 10 to 12 feet. “The research found no general indication that the use of lanes narrower than 12 feet on urban and suburban arterials increases crash frequencies. This finding suggests that geometric design policies should provide substantial flexibility for use of lane widths narrower than 12 feet.” The research paper goes on to say “There are situations in which use of narrower lanes may provide benefits in traffic operations, pedestrian safety, and/ or reduced interference with surrounding development, and may provide space for geometric features that enhance safety such as medians or turn lanes. The analysis results indicate narrow lanes can generally be used to obtain these benefits without compromising safety” and “Use of narrower lanes in appropriate locations can provide other benefits to users and the surrounding community including shorter pedestrian crossing distances and space for additional through lanes, auxiliary and turning lanes, bicycle lanes, buffer areas between travel lanes and sidewalks, and placement of roadside hardware.” (2)

Precedent examples also show the large number of communities around the United States that have narrowed travel lanes to enable the development of bicycle lanes. The Missoula Institute for Sustainable Transportation accumulated a list of these communities by asking members of the Association of Pedestrian and Bicycle Professionals. The webpage titled “Accommodating Bike Lanes in Constrained Rights-of-Way (http://www.strans.org/travellanessurvey.htm) lists the community, their methods, and contact information. Cities such as Arlington, VA, Cincinnati, OH, Charlotte, NC, Houston, TX, and Portland, OR have regularly narrowed travel lanes to 10’ or even commonly use them in new roadway development. Arlington, VA has been installing bicycle lanes on streets when they are repaved and have a number of streets with 10’ lanes and bicycle lanes that have been functioning well without operational issues and complaints. Cincinnati, OH uses a policy that 10 foot lanes on collections and arterials are always permitted. New installations of 10 foot lanes with bicycle lanes require a speed limit of 35 mph or under. By restriping 12 foot lanes to 10 feet, the City of Houston, TX has converted 30 miles of arterial streets. Lane narrowing and the addition of bicycle lanes will require further analysis beyond this planning effort.
Changing the roadway design may also require a reduction in speed limit and consideration of traffic calming designs such as median islands. For roadways with higher speed limits and traffic volumes, wider bicycle lanes may be warranted. Further analysis of bicycle lane restriping projects is warranted to determine appropriateness of lane narrowing, bicycle lane widths, and speed limits that impact both motorists and bicyclists.

**Signal and Wayfinding Projects**

When more bicycle facilities are constructed, the Town should consider designing and implementing a wayfinding program around Downtown Aberdeen. A comprehensive style policy and procedure, should be applied throughout the entire community, to make it easier for people to find destinations and to provide consistency for users. For a step-by-step guide to help non-professionals participate in the process of developing and designing a signage system, as well as information on the range of signage types, visit the Project for Public Places website: www.pps.org/info/amenities_bb/signage_guide.

**Existing Town Easements**

The Town may have several existing easements offering an opportunity for greenway facilities. Sewer easements are very commonly used for this purpose; offering cleared and graded corridors that easily accommodate trails. This approach avoids some of the difficulties associated with acquiring land, and it utilizes the Town’s existing resources. Refer to Appendix C of the Aberdeen Pedestrian Plan for an example sewer-greenway trail easement that could be adapted for Aberdeen to use when pursuing updates to older easements.

**Greenway Acquisition**

Since not all greenways can be built on existing Town easements, land acquisition is an important component of greenway development. It will be necessary to work with landowners and future development projects. For more on this topic please refer to the Town of Aberdeen’s Pedestrian Transportation Plan (Chapter 5: Implementation and Appendix C).

**Implementation Resources**

A series of supplemental implementation resources are available as appendicies in this plan, and as part of Aberdeen’s 2011 Pedestrian Transportation Plan.

**Bicycle Plan Appendix A: Design Resources**

This toolbox provides design guidelines for bicycle facilities that are used in various locations across the United States. These guidelines can be used to determine a comprehensive bike network throughout Aberdeen, while still providing for flexibility on a project by-project basis. For pedestrian and trail-related facilities, please refer to Chapter 6 of Aberdeen’s 2011 Pedestrian Transportation Plan.

**Program, Policy, Trail Development, and Funding Resources**

See the appendicies included in Aberdeen’s 2011 Pedestrian Transportation Plan for more on related programs and policies, as well as strategies for land acquisition in trail development and potential funding resources for bicycle, pedestrian, and trail development.
**Table 4.1 Policy, Program, and Administrative Action Steps Table**

<table>
<thead>
<tr>
<th>Task</th>
<th>Lead Agency</th>
<th>Support</th>
<th>Details</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Plan to Town Council</td>
<td>Planning Staff</td>
<td>Town Council</td>
<td>Presentation to Town Council in Spring 2012</td>
<td>Spring 2012</td>
</tr>
<tr>
<td>Adopt this Plan</td>
<td>Town Council</td>
<td>Planning Staff, Project Consultants</td>
<td>Through adoption, the Plan becomes an official planning document of the Town. Adoption shows that the Town of Aberdeen has undergone a successful, supported planning process.</td>
<td>Spring 2012</td>
</tr>
<tr>
<td>Designate Staff</td>
<td>Town Council &amp; Director of Public Works</td>
<td>Leadership of Town Departments</td>
<td>Designate staff to oversee the implementation of this plan and the proper maintenance of the facilities that are developed. It is recommended that a combination of existing Planning and Engineering Staff oversee the day-to-day implementation of this plan.</td>
<td>Spring 2012</td>
</tr>
<tr>
<td>Utilize Existing Bicycle and Pedestrian Advisory Committee (BPAC)</td>
<td>Town Council</td>
<td>Planning Staff</td>
<td>The committee should continue to help support this Plan by helping coordinate the implementation of this Plan, developing programs, listening to community needs, promoting the bicycle network, and keep positive momentum going.</td>
<td>Spring 2012</td>
</tr>
<tr>
<td>Begin Annual Meeting With Key Project Partners</td>
<td>Planning Staff</td>
<td>Town Departments, NC-DOT, BPAC, and local &amp; regional stakeholders</td>
<td>Key project partners should meet on an annual basis to evaluate the implementation of this Plan. Meetings could also occasionally include on-site tours of locations where facilities are recommended.</td>
<td>Ongoing/ Beginning Spring 2012</td>
</tr>
<tr>
<td>Seek Multiple Funding Sources and and Begin Facility Development</td>
<td>Planning Staff</td>
<td>Finance Director, BPAC</td>
<td>Chapter 3 contains recommended projects. See 4-4 and 4-5 for facility development options. See Appendix B of the Aberdeen Pedestrian Plan for potential funding opportunities.</td>
<td>Ongoing/ Beginning Spring 2012</td>
</tr>
<tr>
<td>Develop Bicycle Facility and Trail Specifications</td>
<td>Engineering Staff</td>
<td>Planning Staff</td>
<td>Town Staff could prepare these in-house to save resources using the design resources of this plan as a starting point. Specifically, the resources listed on A-20 will be very useful in drafting such documents.</td>
<td>Ongoing/ Beginning Spring 2012</td>
</tr>
<tr>
<td>Launch Programs as New Projects are Built</td>
<td>BPAC</td>
<td>Planning Staff</td>
<td>Assist in the coordination of education and encouragement programs, such as Bicycle Rodeos.</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Provide police officers with educational material to hand out with warnings</td>
<td>Police Department</td>
<td>NCDOT Bike/Ped Division</td>
<td>Provide officers with an informational handout to be used during bicycle and pedestrian-related citations and warnings.</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Present this Plan to other local and regional bodies and agencies.</td>
<td>Planning Staff</td>
<td>BPAC</td>
<td>This Plan should be presented to other local and regional bodies and agencies. Possible groups to receive a presentation might include: the regional transportation and greenway planners, health clubs and fitness facilities, schools and youth organizations, environmental clubs, civic organizations, chambers of commerce, and large neighborhood groups.</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Develop a long term funding strategy</td>
<td>Town Manager &amp; Finance Director</td>
<td>Planning Staff &amp; Town Council</td>
<td>To allow continued development of the overall system, capital and Powell Bill funds for bicycle facility construction should be set aside every year, even if only for a small amount (small amounts of local funding can be matched to outside funding sources). Funding for an ongoing maintenance program should also be included in the Town’s operating budget. Prioritized list of projects should be submitted to the RPO for inclusion in the RPO’s list of projects for STP funding.</td>
<td>Short-Term (2012-2013)</td>
</tr>
</tbody>
</table>
Present this Plan to other local and regional bodies and agencies.

Planning Staff | BPAC
--- | ---
This Plan should be presented to other local and regional bodies and agencies. Possible groups to receive a presentation might include: the regional transportation and greenway planners, health clubs and fitness facilities, schools and youth organizations, environmental clubs, civic organizations, chambers of commerce, and large neighborhood groups.

<table>
<thead>
<tr>
<th>Task</th>
<th>Lead Agency</th>
<th>Support</th>
<th>Details</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notify Town Planning Staff of all upcoming roadway reconstruction or resurfacing/re-striping projects, no later than the design phase.</td>
<td>Public Works Director, and NCDOT Division 8</td>
<td>Planning Staff, NCDOT Bike/Ped Division</td>
<td>Provide sufficient time for comments; Incorporate pedestrian recommendations from this Plan. If a compromise to the original recommendation is needed, then contact NCDOT Division of Bicycle and Pedestrian Transportation for guidance on appropriate alternatives.</td>
<td>Ongoing/Beginning Spring 2012</td>
</tr>
<tr>
<td>Explore possibility of a regional multi-modal coordinator</td>
<td>Town Manager</td>
<td>Planning Staff, BPAC, regional planning organizations, and neighboring municipalities</td>
<td>Explore the possibility of partnership with neighboring municipalities in hiring a regional Multi-Modal Transportation Coordinator</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Ensure planning efforts are being integrated regionally</td>
<td>Planning Staff</td>
<td>Regional planning organizations, neighboring municipalities, BPAC</td>
<td>Combining resources and efforts with surrounding municipalities, regional entities, and stakeholders is mutually beneficial, especially with trail development. Communicate and coordinate with the regional partners on regional trails and bicycle facilities; partner for joint-funding opportunities. After adoption by the Town, this document should also be recognized in regional transportation plans.</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Apply for further Safe Routes to School Grants and Infrastructure Funding</td>
<td>Planning Staff</td>
<td>NCDOT Division 8 &amp; BPAC</td>
<td>Establish ‘bike-to-school’ groups, ‘walking school buses’ or other similar activities for children through the Safe Routes to School Program. Inquire about pedestrian infrastructure funding for projects within 1.5 miles of schools through NC-DOT Division 8.</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Policy Orientation</td>
<td>All Stakeholders</td>
<td>NCDOT Bike/Ped Division</td>
<td>Become familiar with State and Federal bicycle and pedestrian policies (refer to Appendix D of Aberdeen’s Pedestrian Plan, which also contains bicycle policies).</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Design Orientation</td>
<td>Public Works and NCDOT Division 8</td>
<td>NCDOT Bike/Ped Division</td>
<td>Become familiar with the guidelines featured in Appendix A of this Plan, as well as state and national standards for bicycle facility design.</td>
<td>Short-Term (2012-2013)</td>
</tr>
<tr>
<td>Become familiar with the bicycle facility recommendations for NCDOT roadways in this Plan (Chapter 3); take initiative in incorporating this plan’s recommendations into the Division’s schedule of improvements.</td>
<td>NCDOT Division 8</td>
<td>Planning Staff, NCDOT Bike/Ped Division</td>
<td>Construct and maintain pedestrian facilities using the highest standards allowed by the State (including the possibility of using innovative treatments on a trial-basis). Seek guidance and direction from the NCDOT Division of Bicycle and Pedestrian Transportation on issues related to this Plan and its implementation.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Task</td>
<td>Lead Agency</td>
<td>Support</td>
<td>Details</td>
<td>Phase</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>---------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>If the Town determines that there are streets where speeds need to be lowered for safety purposes, contact NC-DOT to lower them.</td>
<td>Town Council</td>
<td>Planning Staff, NCDOT Division 8, NCDOT Bike/Ped Division, BPAC</td>
<td>The authority to lower speeds is set out in NC General Statute 20-141(f) - Whenever local authorities within their respective jurisdictions determine upon the basis of an engineering and traffic investigation that a higher maximum speed than those set forth in subsection (b) is reasonable and safe, or that any speed hereinbefore set forth is greater than is reasonable and safe, under the conditions found to exist upon any part of a street within the corporate limits of a municipality and which street is a part of the State highway system (except those highways designated as part of the interstate highway system or other controlled access highway) said local authorities shall determine and declare a safe and reasonable speed limit. A speed limit set pursuant to this subsection may not exceed 55 miles per hour. Limits set pursuant to this subsection shall become effective when the Department of Transportation has passed a concurring ordinance and signs are erected giving notice of the authorized speed limit.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Create a user-friendly walking and bicycling map for the Town of Aberdeen</td>
<td>GIS/ Planning Staff</td>
<td>BPAC, local businesses (to sponsor design &amp; printing costs)</td>
<td>Once more facilities are in place, produce and distribute the user-friendly walking and bicycling map of Aberdeen. Provide basic safety information, commuting information, trail etiquette, transit information (if and when transit is available), and a list of local resources on the back side of the map.</td>
<td>Mid-Term (2013)</td>
</tr>
<tr>
<td>Offer Training for Enforcement</td>
<td>Police Department</td>
<td>BPAC, National Highway Traffic Safety Administration (NHTSA) or Association of Pedestrian and Bicycle Professionals (APBP)</td>
<td>Training for Aberdeen’s officers could be done through free online resources, such as APBP webinars. If the Town is able to find and secure grants for education, they could also seek instructor-led courses offered by the NHTSA or groups such as the League of American Bicyclists (LAB).</td>
<td>Mid-Term (2013)</td>
</tr>
<tr>
<td>Become Designated as a Bicycle Friendly Community</td>
<td>Planning Staff</td>
<td>BPAC</td>
<td>Aberdeen should make progress in accomplishing the goals of this Plan, and then apply for Bicycle Friendly Community status. See <a href="http://www.bikeleague.org/programs/bicycletriendlyamerica/communities/">www.bikeleague.org/programs/bicycletriendlyamerica/communities/</a> for more information.</td>
<td>Long-Term (2014)</td>
</tr>
<tr>
<td>Attend a bicycle planning and design training session</td>
<td>Planning and/or Engineering Staff</td>
<td>BPAC</td>
<td>Sponsor at least one town staff member to attend a bicycle and pedestrian planning and design training session. NCDOT, in partnership with the Institute for Transportation Research and Education (ITRE), offers pedestrian planning and design workshops for practicing professionals. Free or inexpensive webinars are also available online through such groups as the Association of Pedestrian and Bicycle Professionals (APBP).</td>
<td>Opportunity-Based</td>
</tr>
</tbody>
</table>
Chapter 4: Implementation

Aberdeen Bicycle Transportation Plan

Main Street, Downtown Aberdeen
A. DESIGN RESOURCES

Overview

This appendix provides design guidelines for bicycle-related facilities that are used in various locations across the United States. The guidelines should be used with the understanding that design adjustments will be necessary in certain situations in order to achieve the best results. Facility installation and improvements should be evaluated on a case-by-case basis, in consultation with local or state bicycle coordinators, and/or a qualified engineer and landscape architect. Some new treatments may require formal applications to the North Carolina Department of Transportation (NCDOT) and the Federal Highway Administration (FHWA) for approval as experimental uses. On facilities maintained by NCDOT, the State’s design guidelines will apply. Aberdeen has the potential to exceed minimum guidelines where conditions warrant (within their jurisdiction).

These resources (and those listed on A-20) can be consulted for more information on design standards.
Bicycle Facilities and Related Streetscape Improvements

A wide variety of on-road bicycle facilities are recommended to meet different transportation needs in different roadway situations. The appropriate bicycle facility for any particular roadway, whether new or existing, should be dictated primarily by vehicle volume and speed of the roadway. The figure below provides a matrix for evaluating bicycle facilities. The speed of the travel lane is shown along the x-axis and total traffic volumes per day are shown along the y-axis. The different colors represent the type of bikeway facility prescribed given the volume and speed of the travel lane. This chart represents a broad guideline, rather than a hard standard.

![North American Speed-Volume Chart](chart.png)

Source: M. King: Bicycle Facility Selection: A Comparison of Approaches

Neighborhood Streets

Many bicyclists can safely share the road with vehicles on low volume (less than 3,000 cars per day), low speed roadways (e.g., a residential or neighborhood street).

Left: Neighborhood street examples.
Shared Lane Marking

A bicycle shared lane marking (or ‘sharrow’) can serve a number of purposes, such as making motorists aware of bicycles potentially traveling in their lane, showing bicyclists the appropriate direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent “dooring” collisions. The shared lane marking stencil is used:

- Where lanes are too narrow for striping bike lanes
- Where the speed limit does not exceed 35 MPH
- With or without on-street parking (with on-street parking, the center of the sharrow should be placed a minimum of 11 feet from the curb face; without on-street parking, the center of the sharrow shall be placed 4 feet from the curb face or edge of pavement)

Cities throughout the United States have effectively used this treatment for many years; it is now officially part of the 2009 Manual for Uniform Traffic Control Devices (MUTCD). Additional guidance will also be available in the update of the AASHTO Bike Guide.

Sharrow with Back-in Angle Parking

Back-in/head-out diagonal parking and conventional head-in/back-out diagonal parking have common dimensions, but the back-in/head-out is superior for safety reasons due to better visibility when leaving. This is particularly important on busy streets or where drivers find their views blocked by large vehicles, tinted windows, etc. (drivers do not back blindly into an active traffic lane). Furthermore, with back-in/head-out parking, drivers can see bicyclists as they prepare to pull out. See the “Back-in/Head-out Angle Parking” study by Nelson\Nygaard Consulting Associates for more information:

www.bicyclinginfo.org/library/details.cfm?id=4413
Bicycle Lanes

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential and exclusive use of bicyclists. Bicycle lanes are located on both sides of the road, except one way streets, and carry bicyclists in the same direction as adjacent motor vehicle traffic. In some communities, local cyclists may prefer to use striped shoulders as an alternative to bicycle lanes (see guidelines for ‘Striped/Paved Shoulders’).

- Recommended bicycle lane width: 6’ from the curb face when a gutter pan is present (or 4’ from the edge of the gutter pan); 4’ from the curb face when no gutter pan is present.
- As speed and volume increase, greater width is preferred. Per the AASHTO Guidebook, page 23, a width of 5 feet or greater is preferable and additional widths as desirable where substantive truck traffic is present, or where motor vehicle speeds exceed 50 mph.
- Should be used on roadways with average daily traffic (ADT) counts of 3,000 or more
- Not suitable where there are a high number of commercial driveways
- Suitable for 2-lane facilities and 4-lane divided facilities
Below: 2009 MUTCD examples of word, symbol, and pavement markings for bicycle lanes.
**COLORIZED BIKE Lanes** *(Not part of the 2009 MUTCD)*

In addition to markings presented in the MUTCD, the following experimental pavement markings may be considered. Colored pavement is used for bicycle lanes in areas that tend to have a higher likelihood for vehicle conflicts. Examples of such locations are freeway on- and off-ramps and where a motorist may cross a bicycle lane to move into a right turn pocket. In the United States, the City of Portland and New York City have colorized bike lanes and supportive signing with favorable results. Studies after implementation showed more motorists slowing or stopping at colored lanes and more motorists using their turn signals near colored lanes. Green is the recommended color (some cities that have used blue are changing to green, since blue is associated with handicapped facilities).

**Consideration:**

- Colorized bike lanes are not currently included in the MUTCD but there are provisions for jurisdictions to request permission to experiment with innovative treatments (and thus with successful application, future inclusion of colorized bike lanes in the MUTCD could occur).

**Bike Lanes with On-Street Parking**

Where on-street parking is permitted, and a bike lane is provided, the bike lane must be between parking and the travel lane. Appropriate space must be allocated to allow passing cyclists room to avoid open car doors. The distance between the curb face and the outer marking of the bicycle lane is typically 13 to 15 feet (parking stall of 8 to 10 feet and bike lane of 5 feet).

**‘Road Diets’ for Bicycle Lanes**

Road diets typically involve reducing the number of travel lanes (from a four-lane road to a two-lane road with center turn lane, for example) allowing adequate space for bicycle lanes. These are generally recommended only in situations where the vehicular traffic count can be safely and efficiently accommodated with a reduced number of travel lanes. Study may be necessary for recommended road diets to ensure that capacity and level-of-service needs are balanced against bicycle level of service needs.
**Striped/Paved Shoulder**

Paved shoulders are the part of a roadway which is contiguous and on the same level as the regularly traveled portion of the roadway. There is no minimum width for paved shoulders, however a width of at least four feet is preferred. Ideally, paved shoulders should be included in the construction of new roadways and/or the upgrade of existing roadways, especially where there is a need to more safely accommodate bicycles.

- Most often used in rural environments, although not confined to any particular setting
- Should be delineated by a solid white line, and provided on both sides of the road
- Should be contiguous and on the same level as the regularly traveled portion of the roadway
- 4’ minimum width; however, if site conditions are constrained, then the option of a smaller shoulder should be weighed against simply having a wider outside lane.
- For roads with speeds higher than 40 MPH with high ADT, a shoulder width of more than 4’ is recommended.
- Rumble strips should be avoided, but if used, then a width of more than 4’ is needed.
- Paved shoulders should not be so wide as to be confused with a full automobile travel lane.

**Wide Outside Lanes**

Even without a bicycle facility or marking, the conditions for bicycling are improved when the outside travel lane in either direction is widened to provide enough roadway space so that bicyclists and motor vehicles can share the roadway without putting either in danger (e.g., higher volume roadways with wide (14’) outside lanes). For outside lanes wider than 14’, striping a bicycle lane should be considered.
**Bicycle Boulevards**

To further identify preferred routes for bicyclists, the operation of lower volume roadways may be modified to function as a through street for bicycles while maintaining local access for automobiles. Traffic calming devices reduce traffic speeds and through trips while limiting conflicts between motorists and bicyclists, as well as give priority to through bicycle movement.

For a complete overview, see www.ibpi.usp.pdx.edu/guidebook.php

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**Bikeway planners and engineers may pick and choose the appropriate mix of design elements needed for bicycle boulevard development along a particular corridor. Mix and match design elements to:**

- Reduce or maintain low motor vehicle volumes;
- Reduce or maintain low motor vehicle speeds;
- Create a logical, direct, and continuous route;
- Create access to desired destinations;
- Create comfortable and safe intersection crossings;
- Reduce cyclist delay.

Bicycle Facilities at Intersections
Intersections represent one of the primary collision points for bicyclists, with many factors involved:

- Larger intersections are more difficult for bicyclists to cross.
- On-coming vehicles from multiple directions and increased turning movements make it more difficult for motorists to notice non-motorized travelers.
- Most intersections do not provide a designated place for bicyclists.
- Loop and other traffic signal detectors, such as video, often do not detect bicycles.
- Bicyclists making a left turn must either cross travel lanes to a left-turn lane, or dismount and cross as a pedestrian.
- Bicyclists traveling straight may have difficulty maneuvering from the far right lane, across a right turn lane, to a through lane of travel.

Solutions to some these issues are illustrated below and in the following pages, including intersection configurations for bicycle lanes, pega-tracking, signage, and bicycle-activated detector loops.

Typical Intersection Configuration for Bike Lanes
See the Manual on Uniform Traffic Control Devices (MUTCD) for guidance on lane delineation, intersection treatments, and general application of pavement wording and symbols for on-road bicycle facilities and off-road paths (updated version was released in 2009); example from the MUTCD at right.
Pega-tracking for Bike Lanes & Sharrows at Intersections

Pega-tracking is a type of pavement marking that connects bicycle facilities on opposite sides of the intersection, placed along the desired path for bicyclists. This use of the sharrow marking carries the bicycle facility through the intersection, rather than entirely ‘dropping’ the facility before the intersection. This treatment is being used in major cities throughout North America.

Chevrons (similar to those used in sharrow pavement markings) are placed through the intersection, connecting the bicycle facilities on opposite sides of the intersection. These can also be accompanied by dashed lines as shown in the images above.

Chevrons (similar to those used in sharrow pavement markings) are placed through the intersection, connecting the bicycle facilities on opposite sides of the intersection. These can also be accompanied by dashed lines as shown in the images above.

Optional transition from bicycle lane to sharrow in advance of the intersection to allow cyclists greater flexibility, while still alerting motorists of their presence and continuing the facility.

Example of application where parking is prohibited

Example of application where parking is permitted

Normal width solid white line

Normal width solid white line (optional)
**Example of Intersection Pavement Marking - Designated Bicycle Lane with Left-Turn Area, Heavy Turn Volumes, Parking, One-Way Traffic, or Divided Highway**
(Image below from the 2009 MUTCD, Figure 9C-1).

See previous page on the experimental use of 'pega-tracking' for connecting the bicycle facilities on opposite sides of the intersection.
BICYCLE-ACTIVATED DETECTOR LOOP

Changing how intersections operate can help make them more “friendly” to bicyclists. Improved traffic signal timing for bicyclists, bicycle-activated loop detectors, and camera detection make it easier and safer for cyclists to cross intersections. Bicycle-activated loop detectors are installed within the roadway to allow the weight of a bicycle to trigger a change in the traffic signal. This allows the cyclist to stay within the lane of travel and avoid maneuvering to the side of the road to trigger a push button, which ultimately provides extra green time before the light turns yellow to make it through the light. Current and future loops that are sensitive enough to detect bicycles should have pavement markings to instruct cyclists on how to trip them. These common loop detector types are recommended:

Quadruple Loop
(Recommended for bike lanes)
- Detects most strongly in center
- Sharp cut-off sensitivity

Diagonal Quadruple Loop
(Recommended for shared lanes)
- Sensitive over whole area
- Sharp cut-off sensitivity

Standard Loop
(Recommended for advanced detection)
- Detects most strongly over wires
- Gradual cut-off

(See: Implementing Bicycle Improvements at the Local Level, FHWA, 1998, p. 70)
Bike Box / Advance Stop Line
(Not part of the 2009 MUTCD)
A bike box is a relatively simple innovation to improve turning movements for bicyclists without requiring cyclists to merge into traffic to reach the turn lane or use crosswalks as a pedestrian. The bike box is formed by pulling the stop line for vehicles back from the intersection, and adding a stop line for bicyclists immediately behind the crosswalk. When a traffic signal is red, bicyclists can move into this “box” ahead of the cars to make themselves more visible, or to move into a more comfortable position to make a turn. Bike boxes have been used in Cambridge, MA; Eugene, OR; and European cities.

Potential Applications:
• At intersections with a high volume of bicycles and motor vehicles
• Where there are frequent turning conflict and/or intersections with a high percentage of turning movements by both bicyclists and motorists
• At intersections with no right turn on red (RTOR)
• At intersections with high bicycle crash rates
• On roads with bicycle lanes
• Can be combined with a bicycle signal (optional)

Considerations:
• Bike boxes are not currently included in the MUTCD but there are provisions for jurisdictions to request permission to experiment with innovative treatments (and thus with successful application, future inclusion of bike boxes in the MUTCD could occur).
• If a signal turns green as a cyclist is approaching an intersection, they should not use the bike box.
• Motorists will need to be educated to not encroach into the bike box.
Roundabouts/Traffic Circles

Roundabouts are one-way circular intersections in which traffic flows around a center island without stop signs or signals. Because roundabout traffic enters and exits through right turns only and speeds are reduced, the occurrence of severe crashes is substantially less than in many traditional four-way intersections. The lower speeds within roundabouts also allow entering traffic to access smaller gaps between circulating vehicles, increasing traffic volume and decreasing delays, congestion, fuel consumption and air pollution.

Modern roundabouts greatly reduce the potential for high-speed, right-angle, rear-end and left turn/head-on collisions. In traditional four-way traffic intersections, there are 32 points of conflict in which two vehicles may collide. Modern roundabouts have only eight conflict areas, greatly reducing potential crashes.

- Roundabouts with only one circulating lane are much safer to navigate than are multi-lane roundabouts, especially for bicyclists.
- The diagrams below show two ways for bicyclists to navigate roundabouts, depending on comfort and skill level.

Below: Circulating as a Pedestrian: If a cyclist is uncomfortable riding with traffic, a cyclist can choose to travel instead as a pedestrian.

Above: Circulating as a Vehicle: Bike lanes are not recommended within a roundabout. Instead, cyclists merge with traffic before entering the roundabout, circulate with traffic, and then re-enter the bike lane after existing.
Bicycle Facilities at Railroad Crossings

Railroad crossings are particularly hazardous to those who rely on wheeled devices for mobility (railroad crossings have flangeway gaps that allow passage of the wheels of the train, but also have the potential to catch wheelchair casters and bicycle tires). In addition, rails or ties that are not embedded in the travel surface create a tripping hazard. Recommendations:

- Make the Crossing Level: Raise approaches to the tracks and the area between the tracks to the level of the top of the rail.
- Bikes Should Cross RR at Right Angle
- When bikeways or roadways cross railroad tracks at grade, the roadway should ideally be at a right angle to the rails. When the angle of the roadway to the rails is increasingly severe, the approach recommended by Caltrans (Highway Design Manual, Section 1003.6) and AASHTO (Guide for the Development of Bicycle Facilities, 1999, p.60) is to widen the approach roadway shoulder or bicycle facility, allowing bicycles to cross the tracks at a right angle without veering into the path of passing motor vehicle traffic.

- Use Multiple Forms of Warning: Provide railroad crossing information in multiple formats, including signs, flashing lights, and audible sounds.
- Clear Debris Regularly: Perform regular maintenance to clear debris from shoulder areas at railroad crossings.
- Fill Flangeway with Rubberized Material or Concrete Slab: Normal use of rail facilities causes buckling of paved-and-timbered rail crossings. Pavement buckling can be reduced or eliminated by filling the flangeway with rubberized material, concrete slab, or other treatments. A beneficial effect of this is a decrease in long-term maintenance costs.

Installing a rubber surface rather than asphalt around railroad flangeways reduces changes in level and other maintenance problems.

The “flangeway filler” eliminates the gap in the path of travel for pedestrians crossing railroad tracks. The filler, consisting of a rubber insert, will deflect downward with the weight of a train and does not affect railway function.
**Bicycle Friendly Drainage Grates**

Drainage grates usually occupy portions of roadways, such as bicycle lanes, where bicycles frequently travel. Often drainage grates are poorly maintained or are of a design that can damage a bicycle wheel or in severe circumstances, cause a bicyclist to crash. Improper drainage grates create an unfriendly obstacle a cyclist must navigate around, often forcing entrance into a motor vehicle lane in severe cases. Bicycle friendly drainage grates should be installed in all new roadway projects and problem grates should be identified and replaced.

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*Right: Bicycle Friendly Drainage Grate Designs*

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*Right: MUTCD example of obstruction pavement marking; if dangerous drainage grates (or other obstructions) are not to be fixed in the short term, then this pavement marking should direct cyclists away from the obstruction.*

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*Dangerous Drainage Grate Condition; this example is dangerous due to the grate running parallel to the roadway, creating a trap for bicycle tires.*

*Dangerous Drainage Grate Condition; this example is dangerous due to the surrounding paving condition (when the road was resurfaced the drainage grate remained at the same height).*

*Bicycle-Friendly Drainage Grate*
Bicycle Access on (future) Transit

Integrating bicycle facilities with transit modes allows bicyclists to greatly expand the area accessible. Below are examples of bus services with customized facilities allowing for simple and secure storage of bicycles without hindering or impeding other passengers. The Town of Aberdeen should advocate for the inclusion of bicycle-transit integration, if an when transit service becomes available. Future buses should be equipped with bicycle racks, and bus stops should accommodate bicycle parking with City-wide bicycling and walking maps available on the buses and at popular stops. Below is example guidance for mounting a bicycle on a typical bus rack.

1. Have your bike ready to load—always approach the bus from the curbside. Remove water bottles or other loose items.

2. Make eye contact with the driver to alert him/her to your presence.

3. If the rack is empty, lift the metal handle and pull the folded bike rack down flat.

4. Load the bike in the space nearest the bus.
   If another bike is on the rack, load your bike in the open position. You are responsible for loading and securing your bike on the rack. Drivers are not allowed to load or unload bicycles.

5. Lift the support arm and hook it over the front tire.
   Make sure the support arm clamps the tire and not the fender or frame. Your bike now is securely fastened in the rack.

6. Hop on and pay your fare.

7. When you reach your stop, tell the driver before you exit the bus that you’ll be removing your bike.
   Raise the support arm, lower it into place and lift your bike off the rack.
   Fold up the rack if it is empty, and step onto the sidewalk with your bike.
   NEVER cross in front of the bus—wait until the bus has left the stop.
   If the rack is full, please wait for the next bus.

Instructions on how to load a bicycle onto a bus equipped with a bicycle rack, developed for a bicycle user map by Fremont, CA
**Bicycle Parking**

As more bikeways are constructed and bicycle usage grows, the need for bike parking will climb. Long-term bicycle parking at future transit stops and work sites, as well as short-term parking at shopping centers and similar sites, can support bicycling. When choosing bike racks, there are a number of things to keep in mind:

- The rack element (part of the rack that supports the bike) should keep the bike upright by supporting the frame in two places allowing one or both wheels to be secured.
- Install racks so there is enough room between adjacent parked bicycles. If it becomes too difficult for a bicyclist to easily lock their bicycle, they may park it elsewhere and the bicycle capacity is lowered. A row of inverted “U” racks should be installed with 15” minimum between racks.
- Empty racks should not pose a tripping hazard for visually impaired pedestrians. Position racks out of the walkway’s clear zone.
- When possible, racks should be in a covered area protected from the elements. Long-term parking should always be protected.

The table below provides basic guidelines on ideal locations for parking at several key activity centers as well as an optimum number of parking spaces.

### BICYCLE PARKING LOCATIONS AND QUANTITIES

<table>
<thead>
<tr>
<th>Use Category</th>
<th>Specific Use</th>
<th>Required Long-term Parking Spaces</th>
<th>Required Short-term Parking Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>Boarding houses</td>
<td>2, or 1 per ten sleeping rooms</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Hotels, motels</td>
<td>2, or 1 per 50 employees</td>
<td>None</td>
</tr>
<tr>
<td>Commercial / Industrial</td>
<td>Retail sales, service operations *</td>
<td>2, or 1 per 50,000 square feet of gross floor area</td>
<td>2, or 1 per 25,000 square feet of gross floor area</td>
</tr>
<tr>
<td></td>
<td>Office buildings **</td>
<td>2, or 1 per 50,000 square feet of gross floor area</td>
<td>2, or 1 per 50,000 square feet of gross floor area</td>
</tr>
<tr>
<td></td>
<td>Museums, libraries</td>
<td>2, or 1 per 50 employees</td>
<td>4, or 1 per 25,000 square feet of gross floor area</td>
</tr>
<tr>
<td></td>
<td>Movie theaters</td>
<td>2, or 1 per 50 employees</td>
<td>4, or 1 per 50 seats</td>
</tr>
<tr>
<td></td>
<td>Restaurants, ice cream shops, coffee shops</td>
<td>2, or 1 per 50 employees</td>
<td>4, or 1 per 50 seats</td>
</tr>
<tr>
<td></td>
<td>Recreation centers</td>
<td>2, or 1 per 50 employees</td>
<td>4, or 1 per 25,000 square feet of gross floor area</td>
</tr>
<tr>
<td></td>
<td>Major event entertainment (e.g., stadiums, arenas)</td>
<td>2, or 1 per 50 employees</td>
<td>8, or 1 per 500 seats</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td>2, or 1 per 50 employees</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Warehousing</td>
<td>2, or 1 per 50 employees</td>
<td>None</td>
</tr>
<tr>
<td>Institutional</td>
<td>Medical centers</td>
<td>2, or 1 per 50 employees</td>
<td>2, or 1 per 25,000 square feet of gross floor area</td>
</tr>
<tr>
<td></td>
<td>Transit park and ride lots</td>
<td>1 per 50 daily boardings</td>
<td>None</td>
</tr>
</tbody>
</table>

* Retail businesses below 3,000 square feet of gross floor area are exempt from bicycle parking requirements
** Office buildings below 10,000 square feet of gross floor area are exempt from bicycle parking requirements
The rack element should:
- Support the bicycle upright by its frame in two places
- Prevent the wheel of the bicycle from tipping over
- Enable the frame and one or both wheels to be secured
- Support bicycles without a diamond-shaped frame with a horizontal top tube (e.g., a mixte frame)
- Allow front-in parking: a U-lock should be able to lock the front wheel and the down tube of an upright bicycle
- Allow back-in parking: a U-lock should be able to lock the rear wheel and seat tube of the bicycle

Comb, toast, school-yard, and other wheel-bending racks that provide no support for the bicycle frame are NOT recommended.

The rack element should resist being cut or detached using common hand tools, especially those that can be concealed in a backpack. Such tools include bolt cutters, pipe cutters, wrenches, and pry bars.


Bicycle racks that incorporate advertising can be sponsored by local merchants.

Provision of shelter from rain greatly increases usefulness of this bicycle parking facility during inclement weather.

A single inverted “U” rack can accommodate two bicycles.

Left: Recommended guidelines for bicycle parking spacing dimensions.
Design Resources

NACTO Urban Bikeway Design Guide
The purpose of the NACTO Urban Bikeway Design Guide (part of the Cities for Cycling initiative) is to provide cities with state-of-the-practice solutions that can help create complete streets that are safe and enjoyable for bicyclists. http://nacto.org/cities-for-cycling/design-guide/

Pedestrian and Bicycle Information Center
Designers and engineers have a diverse array of design elements and ever-developing technologies at their disposal. Use this web site as a source for information on design and engineering tools that promote bikeability. http://www.bicyclinginfo.org/engineering/ http://www.bicyclinginfo.org/engineering/parking.cfm

NCDOT “Typical” Highway Cross Sections
The comprehensive planning and design “typical” highway cross sections have been updated to support the NCDOT’s “Complete Streets” policy that was adopted in 2009. The guidance in the updated cross sections establishes design elements that emphasize safety, mobility, and accessibility for multiple modes of travel. For more information, contact the State Roadway Design Engineer, or visit: http://www.nccompletestreets.org

Guide for the Development of Bicycle Facilities

Manual on Uniform Traffic Control Devices (MUTCD)

Policy on Geometric Design of Streets and Highways
American Association of State Highway Transportation Officials, 2004. This fifth edition of AASHTO’s “Green Book” contains the latest design practices in universal use as the standard for highway geometric design http://transportation.org