

Radford

PATHWAYS

Network

Urban Trail
Extension



City of Radford



June 30, 2003

Radford Pathways Network
Urban Trail Extension

Appendix A – Master Plan Update

Master Plan Update

The Radford Pathways Network Master Plan consists of over 18,000 feet of trails that connects neighborhoods and parks to the New River and parts of Radford University. This multiple phase project is set to begin construction in the Winter of 2002.

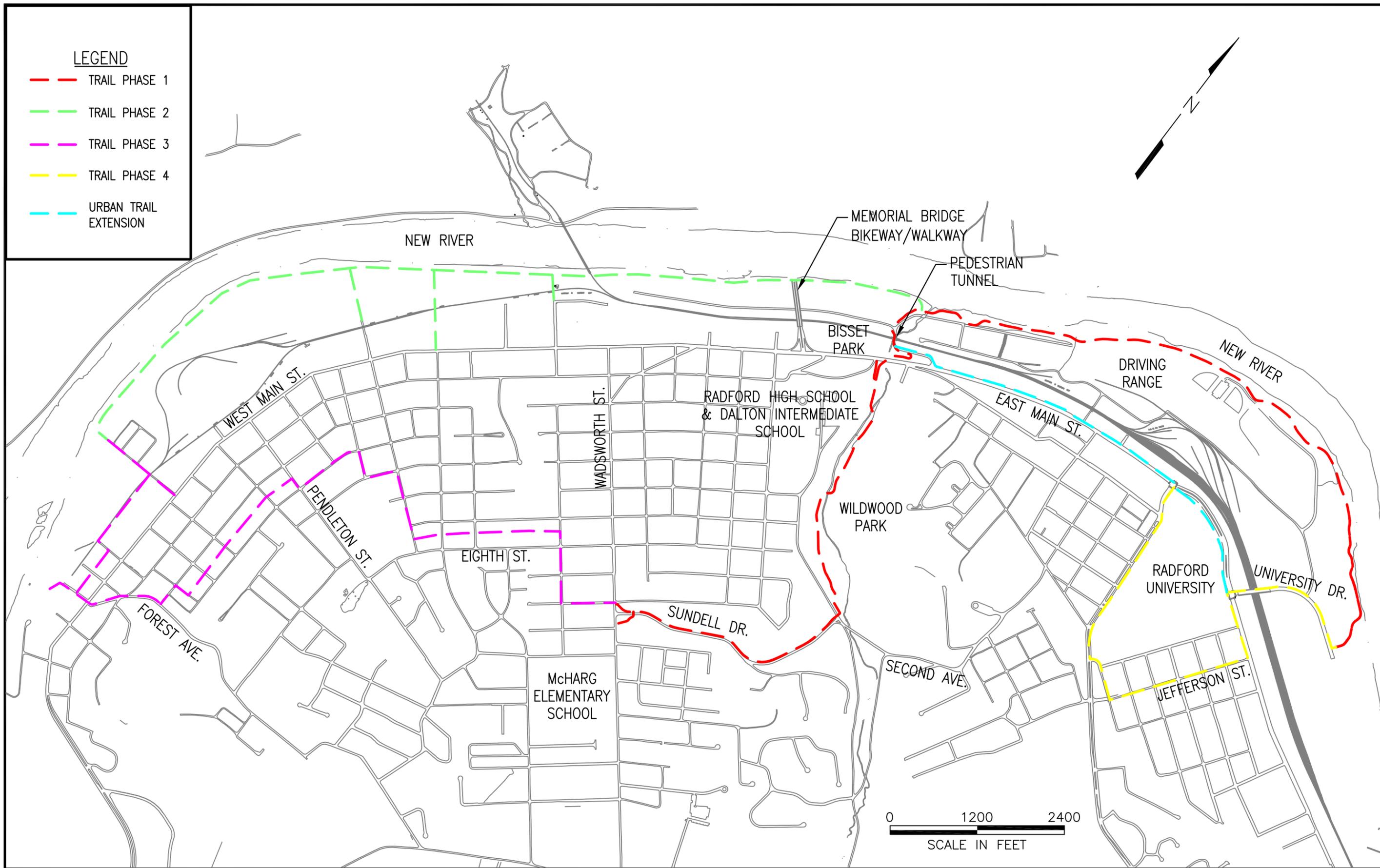
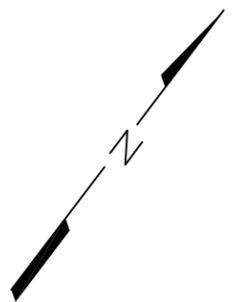
The proposal outlined herein proposes an urban trail that will improve the pedestrian and bicycle facilities along East Main Street between Radford University and the City parks. The goals of this Urban Trail are to strengthen the connection between the University and the Downtown as well as connect the Downtown to the trails to the north and west. This connection to the Downtown will help to spur economic growth. The Urban Trail will also provide an easily accessible path for bicyclists and pedestrians to commute to and from work or school on a daily basis. In the Downtown area, pedestrian improvements including new crosswalks, countdown crosswalk signals and medians will help to promote pedestrian uses while complimenting reasonable automobile uses.

The Master Plan has been updated to show the Urban Trail extension along East Main Street between the University and Bissett Park.

A second update to the Master Plan will be an urban trail consisting of bike lanes and improved pedestrian facilities along Jefferson Street and Tyler Avenue. Recent construction on Jefferson Street has provided for the bicycle and pedestrian facilities necessary, and a future phase will provide bike lanes on Tyler Avenue as needed. These improvements will create a loop around Radford University containing safe facilities for students and City residents to bike and walk.

LEGEND

- TRAIL PHASE 1
- TRAIL PHASE 2
- TRAIL PHASE 3
- TRAIL PHASE 4
- URBAN TRAIL EXTENSION



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Radford Pathways Network
Urban Trail Extension

Appendix B – Project Narrative



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I. Executive Summary

The City of Radford is currently beginning construction of the Radford Pathways Network – an extensive trail system that connects the New River with the diverse residential and University-associated communities of the City. The trail system provides for a multi-use trail that will be used for recreation, daily transportation, and educational purposes.

The Urban Trail Extension to the present Transportation Enhancement Program project connects the trail segments at Bissett and Wildwood Parks with the Downtown area and Radford University via East Main Street. The purpose of the Urban Trail Extension project is to promote safe passage for pedestrians and bicyclists along Main Street for daily commuting use and recreational purposes. To further strengthen the idea of an urban trail through the City, Radford University is relocating East Main Street between Tyler Avenue and University Drive in the summer of 2003. The East Main Street Relocation, coupled with the successful funding and construction of the Urban Trail Extension project, will create a cohesive loop of bike lanes from University Drive to the trail segment at Bissett Park, thereby connecting Downtown to Radford University and recreational use areas. Pedestrian facilities will also be upgraded during the East Main Street Relocation project, which will effectively accentuate the pedestrian improvements outlined in this submittal.

The Urban Trail Extension project combined with the East Main Street Relocation Project will help to further create a safe loop for bicyclists in the City of Radford, allowing for greater access and interaction between the trail segments and the populated areas of Downtown and Radford University. The pedestrian improvements in the Downtown area, along with the greater interaction of recreational and everyday bicyclists and walkers on the trail network, will function as a vital economic incentive for the Downtown. The Downtown improvements will create a safer pedestrian environment where automobile users expect the predominance of pedestrians, allowing the high volume of pedestrian traffic from the University to shop and live comfortably.

The timing of present construction for the East Main Street Relocation project and the Urban Trail Extension is important since all construction must be completed and facilities made accessible for use by fall of 2003. Due to an allocation directive from the General Assembly, the Radford University initiated relocation of East Main Street must be completed by the opening of Fall Semester in 2003. This schedule is consistent with the Department's objective of finishing and delivering present Enhancement Projects.

Phase I of this project is designed to provide the strongest pedestrian safety within Downtown Radford. The traffic islands and crosswalks will delineate a pedestrian-based environment for the downtown by lowering traffic speeds, marking pedestrian crossings, and enhancing the overall streetscape. New bike

lanes through the downtown will create a safer riding environment for bikes, as well as clearly demarcating potential areas of conflict between bikes, pedestrians and automobiles. The first phase will also begin the connection between the East Main Street Relocation and the Radford Pathways Network.

II. Introduction



The relationship between the City of Radford and Radford University is precipitated by the adjacency of the Downtown area with the University. Students live, eat, and shop in the Downtown simply by crossing Tyler Avenue. East Main Street in Radford serves as a main thoroughfare for the City and Southwest Virginia. The volume of traffic has initiated the East Main Street Relocation project in front of (and funded by) the

University. The adjacency of this project, along with the earliest phases of the Radford Pathways Network, creates a need to improve the pedestrian and bicycle connections in the City and along East Main Street. The volume of traffic causes dangerous conditions for pedestrians in the Downtown area and for bicyclists along East Main Street near Bissett and Wildwood Parks.

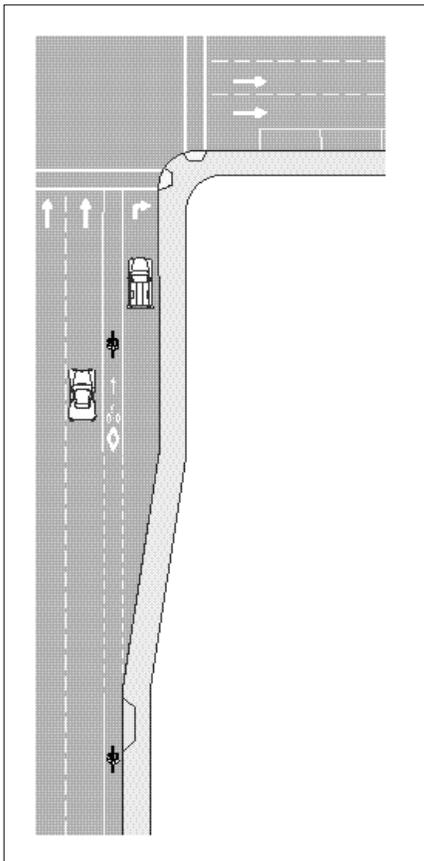
Necessary improvements in the Downtown area include methods to reduce the mean vehicular speed and ways to clearly define pedestrian crossing areas for pedestrians and motorists. Planned medians in the Downtown will provide heightened awareness for motorists and lower automobile speeds. Crosswalks will be clearly defined by brick stamped asphalt and white markings. Pedestrian islands provided in several locations will give walkers a safe area to stop if caught in traffic. Crosswalks will also have countdown pedestrian signals that will warn pedestrians of how much time is allotted for street crossing, minimizing interaction between pedestrians and vehicles. Sidewalks will need to be improved to meet ADA accessibility guidelines and to minimize tripping hazards in everyday use.

Along East Main Street away from the Downtown area, the recommended bike lanes connect the Pathways Network at Bissett Park to the residential and commercial areas of Downtown and Radford University. The bike lanes will be five feet wide where possible, and four feet wide where limitations exist. Pedestrian improvements include lighting and street trees, both of which will help to unify East Main Street with the Downtown area and to create a safer pedestrian environment by decreasing average vehicular speeds.

III. Recommendations

Bicycle Lanes

Bike lanes create a safe place for cyclists to ride at the street level, where interaction with both vehicles and pedestrians can be restricted. This typically encourages safer traffic flow, as motorists do not need to decelerate or swerve for cyclists using a bike lane. Furthermore, since it is a violation to ride a bicycle on the downtown sidewalks, many people are less likely to use bicycles as a method of transportation through this area without bike lanes. Therefore, one bicycle lane should be installed along each side of Main Street between the outermost traffic lane and the parallel parking area. This will connect downtown and the Radford University campus to existing trails and other parts of town.



Bike lanes must be designed to minimize conflicts with traffic where space exists. Proposed bike lanes for downtown Radford fall into the classification of a Class II bike lane. This is where the bike lane shares the right-of-way with a roadway or walkway. It is indicated by a diamond shaped icon and a continuous stripe on the pavement, separating it from traffic lanes. The markings should stop at intersections, and where a non-continuous right turn lane is used for vehicular traffic, the bike lane should remain to the left of the turn lane. Continuous right turn lanes should not be created where bike lanes exist. (See drawing to the left.)

In Radford, bike lanes will meet a preferred width of five feet where possible. In limited areas, bike lanes are suggested at four-foot widths. Traffic lanes will be set at an eleven-foot width in preferred locations, with turning lanes and limited through lanes at approximately ten feet.

Sidewalks

There are three areas of concern in regards to sidewalks – clearly defining the boundary between pedestrian and vehicular areas, replacing sidewalks in poor condition, and increasing handicap accessibility. Sidewalks serve not only as a means of pedestrian transportation, but also as visual indicators of the condition of an urban area. Sidewalks in poor condition can create a physical and

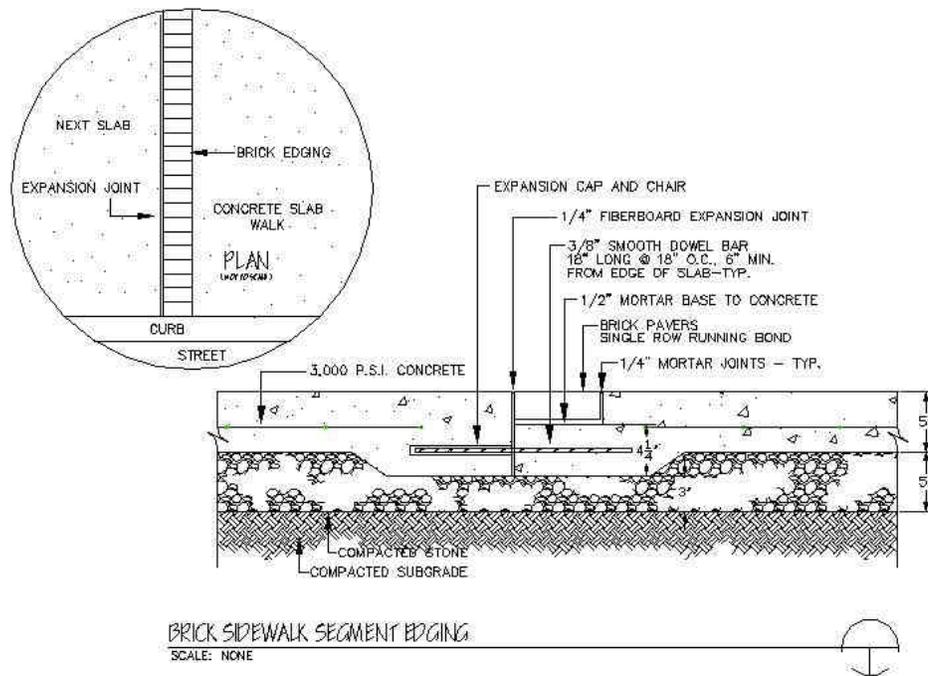
psychological barrier between areas of high pedestrian activity and areas of little to no activity.

Clear separation between pedestrian and vehicular zones is of utmost importance. The physical conditions in and around the street must enhance both the drivers' and pedestrians' ability to see the other user type and reduce interaction. This requires the use of consistent and visible transitions between sidewalk and street, including standard curbs, ramps, and crosswalks.

Some locations in Radford suffer from severe sidewalk deterioration that causes a variety of safety concerns. Other sidewalk areas are deficient in appropriate handicap accessibility standards, including faulty or non-existent curb ramps and unnecessarily steep grades. Included in this project is the reconstruction of sidewalks that fail to meet ADA requirements and deteriorated sidewalks that present trip hazards. In particular, the north side of East Main Street near the intersection with Harrison Street will need to be reconstructed.



In order to further enhance the pedestrian appeal of the downtown area, an inset of brick detailing should be installed. Similar to the brick insets in front of the Virginia Street public parking lot, this detail will help unify the downtown area. This long-term project should follow the construction detail below.



Crosswalks

Basic White-Striping

In assessing the existing crosswalks in Radford, the most important issues are the locations of the crosswalks and the ability for drivers and pedestrians to identify where those crosswalks are located. The standard white stripe crosswalks are to provide a physical boundary for crossing the street for pedestrians as well as to warn drivers of potential pedestrian interaction. When located at intersections, the crosswalks are visible to serve their purpose for both pedestrians and drivers, but have limited effectiveness for either party when located between intersections. White paint crosswalks will be used on those crosswalks running parallel to Main Street across the intersecting streets of Third Street, Virginia Street, and Tyler Avenue, as well as all drive entrances and exits along Main Street where concrete sidewalk is discontinuous.

In-Pavement Lights

In-pavement warning light systems should be used on the first crosswalk at Harrison Street and the west crosswalk at Tyler Avenue (see drawing sheets 3 and 5). Extensive before and after studies of two intersections equipped with in-pavement warning light systems by the City of Kirkland, Washington found a tremendous decrease in pedestrian/vehicle conflict after installation. On average, the number of drivers yielding to pedestrians increased from slightly under 50% before the system was installed, to approximately 94% after installation. Furthermore, drivers initiated their brakes an average of 63 feet farther away from the intersection with use of flashing light systems. Notably, the nighttime yielding percentage at one of these crossings increased from 16% to 100% in one direction. The full details of this study can be found at <http://www.ci.kirkland.wa.us/depart/pw/transportation/flscrswk.htm>. A March 2002 study by NJDOT supports the Kirkland findings, confirming that in-pavement crosswalk lights effectively slow vehicular traffic and decrease the number of vehicles that pass over a crosswalk while pedestrians are waiting.

The warning system's lights are highly durable, as they were originally designed for airport runways. Furthermore, because the lights protrude no more than ½" above grade, snowplow damage is very rare. The lights can be activated by a motion sensor or by a push button. This study suggests the push button activation system for Radford due to the NJDOT study finding that false-positives caused by the motion sensor reduce the effectiveness of the lights.

As the City of Radford investigates other intersections and pedestrian crossings for future warning-light system installation, a method of prioritizing potential locations will be necessary. While numerous methods may be used, the City of Kirkland provides a useful model. Kirkland utilizes a system in which increasing point values are assigned to a set of criteria within a general category. Each location is then evaluated using the criteria, whereby it receives a cumulative

point value. When several locations are evaluated in this manner and compared to each other, those with the highest cumulative point values become priorities for warning-light system installation. See appendix A for Kirkland’s set of criteria and point value.

Brick Stamped Pavement

In addition to identifiable white striping for crosswalks, it is recommended to construct crosswalks of brick-stamped pavement that will create a visual contrast to better identify crosswalks while providing a tactile warning strip for motorists. Brick-stamped pavement informs the motorist of the possibility of pedestrian crossing by providing a clear contrast to the white stripe outlining the crosswalk. Another attribute of brick-stamped pavement is the textural connection with the architecture of the Downtown. This will alert motorists that the Downtown area is cohesive and is a pedestrian predominated area. The pavement will be seen as brick by motorists, which will lower mean automobile speeds and increase pedestrian and bicycle safety.

Countdown Crosswalk Signals



Communities nationwide are beginning to implement highly effective devices referred to as countdown crosswalk signals as part of their pedestrian network. Countdown signals are used in conjunction with conventional pedestrian signals, such as the DON’T WALK/hand and the WALK/walking-figure lighted images, to inform the pedestrian of the amount of time remaining to safely cross the street. Pedestrians frequently express frustration at conventional crosswalk signals, where the “DON’T WALK” display begins to flash only seconds after they have entered the intersection. The pedestrian wonders if there is enough time to continue across the busy intersection before traffic-flow resumes, or if he should turn around and wait for the next light. Countdown crosswalk signals eliminate this confusion by displaying a timer counting off seconds down to zero – when the light changes and pedestrians are no longer allowed in the intersection. When the hand or DON’T WALK display begins to flash, the timer continues, so pedestrians know exactly how long they have to cross the road. This allows pedestrians to make better decisions about when to enter the crosswalk.

These new signals have been on the market for the last few years, and consistently receive high marks from the jurisdictions that utilize them. Today, several companies manufacture two general types of countdown crosswalk signals. One unit consists of 2 display heads – one displaying the walking person and hand signals, while the other displays the timer. The other unit is a single display head with both the timer, and the walking person and hand

displayed in the same view. Both types have been installed and utilized effectively in many cities such as Sacramento, CA; Hampton, VA; and Salt Lake City, UT where they proved their value during the 2002 Winter Olympics.

Countdown crosswalk signals should be utilized at the Main Street crossings at Harrison and Third Streets, as well as across Third Street; across Main and Virginia Streets at Virginia Street; and across Main and Tyler Streets at Tyler Street.

Signage Clutter



In certain locations, an abundance of traffic related signs fills the roadway. This creates confusing situations for both motorists and pedestrians by requiring them to read multiple signs very quickly, while at the same time distracting their attention from driving or walking. Ultimately, over-signage is indicative of poorly designed transportation corridors and is a hazard to the various interacting users of such corridors. In addition

to other design improvements within the Main Street corridor, Anderson & Associates will work with VDOT to further reduce the need for signage clutter, creating a safer and more aesthetically pleasing roadway.

Medians, Islands and Curb Bump-outs



Currently, a median turn lane takes up a large section of the road-width through downtown Radford. This turn lane is not necessary for efficient traffic flow within this area. Removing this turn lane will not only free up the space required for bicycle lanes; it will also provide space for vegetated medians and islands through most stretches of Main Street downtown. The primary role of these medians will be to delineate the area as a high-pedestrian

use zone, alerting drivers to the change in both user type and density. The medians will also restrict the ability of vehicles to mistakenly turn into exit drives along Main Street. This promotes additional safety for both other vehicles and pedestrians. The physical barrier of the median will eliminate mid-street U-turns, and prevent bi-directional traffic interaction. A short island median will run along Main Street from Harrison toward Third Street, stopping at the First Virginia Bank building. No median or island will be present from Third Street to Virginia Street.

A continuous median will run from Virginia Street to the old Hardee's building entrance, break, and be followed by a short island median in front of the Wachovia Bank building. Another continuous median will resume in front of the Norfolk and Southern Office and continue to the Tyler Avenue intersection, with only one break at the Old Post Office. The proposed route of Main Street east of Tyler Avenue will also accommodate a continuous median. Trees are not proposed for this section of median.

Four curb bump-outs along Main Street downtown should provide safe transitions between zones of high-speed traffic flow and areas designated for parallel parking. These are located on the north side of Main Street east of the intersection with Harrison (one bump-out), the south side of Main Street between Third and Virginia Streets (two bump-outs), and on the south side of Main Street directly in front of the Old Post Office (one bump-out).

Landscaping

The four curb bump-outs along Main Street downtown combined with the medians and islands will provide additional space for street tree planting and landscaping. Landscaping increases the effectiveness of these spaces to create separation of bi-directional traffic flow and prevent pedestrian/vehicle interaction. Without trees and landscaping, the curb bump-outs, medians, and islands only have a ground-level presence. Trees give these structures a vertical element, turning them into a perceptual wall. This makes drivers and pedestrians keenly aware of their surroundings, and prevents them from inadvertently crossing into conflicting uses. A bonus benefit of landscaping in these areas is its contribution to Radford's downtown aesthetics. (See landscape detail drawing in Appendix.)

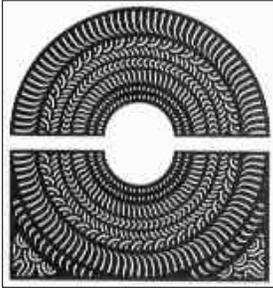
Suggested street trees should respond to the following set of concerns:

- ability to thrive in urban conditions (i.e. dry, limited space, contamination)
- proximity to power lines
- nearby tree species
- low maintenance

In specific areas, trees should be selected that continue a pattern of plantings. That is, if certain trees along the sidewalk are to be replaced, they should follow the species type of trees on either side. New trees planted in the curb bump-out areas should be consistent with each other, but not necessarily with existing trees. These trees should also have either a vertical clearance from street level to overhanging branches of at least 8'-6" (10' recommended), or else not protrude into the bike lane in order to accommodate bike lane users. Based on the characteristics and climate of the site, the following trees have been recommended: Curb bump-outs, Hedge Maple (*Acer campestre*); Median strips, Ginkgo (*Ginkgo biloba* 'Princeton Sentry'), or Japanese Zelkova (*Zelkova serrata*). All Branches on median strip trees should be pruned high enough up on the trunk to provide a clear field of vision for drivers and pedestrians across

the street section. Any ground level landscaping should likewise be kept low enough so as not to obstruct one's view. Specifically, the vertical space from two to six feet above the ground at the median should be clear of visually obstructing vegetation.

Tree grates are staples of many Downtown landscapes. They protect the roots of trees, create a consistent pedestrian surface, and offer an opportunity for traditional ornamentation for urban areas. Grates that are 48" square should be installed in the planter boxes of trees in curb bump-outs. Tree grates will not be needed in median plantings. The tree grate design should be consistent with existing tree grate patterns, and all grate patterns should be consistent throughout the downtown.



Lighting



Existing lighting conditions along Main Street do not facilitate adequate safety. Currently, light is uneven, creating bright spots and shadows. This impairs nighttime driving visibility, increasing the potential for vehicle/pedestrian conflicts. New lamps and lenses should be installed in existing fixtures to disperse more consistent and even light along the Main Street corridor downtown. There are also insufficient numbers of light fixtures in the Downtown area. If only the existing features were updated with bright enough lenses and lamps to create sufficient light coverage Downtown, then the fixtures would present too much concentrated light. More fixtures are needed to provide a more uniform light dispersal through the Downtown area. New fixtures of the same style as those existing downtown should be installed along Main Street from downtown to Bissett Park. These should also contain quality lamps and lenses that distribute light effectively and evenly.

IV. Master Plan Update

The Radford Pathways Network Master Plan consists of over 18,000 feet of trails that connects neighborhoods and parks to the New River and parts of Radford University. This multiple phase project is set to begin construction in the winter of 2002.

The proposal outlined herein proposes an urban trail that will improve the pedestrian and bicycle facilities along East Main Street between Radford University and the City parks. The goals of this Urban Trail are to strengthen the connection between the University and the Downtown as well as connect the Downtown to the trails to the north and west. This connection to the Downtown will help to spur economic growth. The Urban Trail will also provide an easily accessible path for bicyclists and pedestrians to commute to and from work or school on a daily basis. In the Downtown area, pedestrian improvements including new crosswalks, countdown crosswalk signals, and medians will help to promote pedestrian uses while complimenting reasonable automobile uses.

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V. Phasing Recommendations

The phasing schedule for the recommendations outlined in this report will be closely tied to funding opportunities successfully applied for and acquired by the City of Radford. Funding opportunities in the State of Virginia are currently in a state of flux due to budget cuts and the reorganization of VDOT. This may complicate the phasing of the recommended improvements. If enough VDOT funding is made available, all recommendations within this report should be carried out in one construction phase. However, if this ideal situation is not the case, the implementation schedule for the recommendations of this report is as follows:

- Phase I. Traffic Islands
 Re-striping (Including Bike Lanes)
 Landscaping
 Crosswalks

- Phase II. All Lighting Improvements
 Countdown Pedestrian Signals

- Phase III. Street Trees West of Harrison Street
 Signage
 Brick Inset Sidewalks (as funding is available)

VII. Appendices

Appendix A

(The following is an excerpt taken directly from the article *Kirkland's Experience with In-Pavement Flashing Lights at Crosswalks*, David Godfrey, P.E. & Tony Mazzella.
<http://www.ci.kirkland.wa.us/depart/pw/transportation/flscswk.htm>.)

Installation Criteria

When the City Council contemplated construction of an additional set of flashing crosswalks, it became obvious that a system was needed to select and prioritize locations. Since the City had recently completed a system of ranking other Capital Improvement Projects, a similar process was envisioned for flashing crosswalk prioritization. A committee of citizens that had worked on the earlier priority ranking was reconvened to develop ranking criteria. City Staff prepared an initial set of criteria and then ranked a set of test locations to get an idea of how the criteria work.

A major point of discussion that is a sample of the types of discussion that took place was whether to give more points to locations that already have protective devices. One theory held that if a location has improvements such as medians and overhead signing, it is a good candidate for flashing crosswalks since the level of improvement reflects its validity as a location into which more improvements should go. The other philosophy said that flashing crosswalks at locations already benefiting from improvements should be delayed with improvements coming at less developed locations first. This second approach was adopted. Similar discussions took place around other issues with the criteria ultimately being approved as shown in Table 2.

TABLE 2. Criteria for Locating Flashing Crosswalks in Kirkland, Washington

I. Threshold criteria:

Location must have a marked crosswalk and stopping sight distance must be adequate for approach speed.

II. Engineering (30 points max)

Approach speed 85th percentile (MPH)

Speed	Points
<20 or >45	0
20-29 or 41-45	4
30-35	8
36-40	12

ADT (000)

Volume	Points
<5 or >30	0
>5-<15 or >25-<30	8
>15-<25	16

Cost

(Above standard costs)

Cost	Points
Other	0
Small or no additional cost	2

III. Connections (35 points max)

00 of feet to nearest crosswalk

Distance	Points
<5	0
>5-<10	4
>10-<15	6
>15	9

What type of facilities does the crosswalk cross and/or continue?

(Priority 1 and 2 Pedestrian facilities are defined in the Non-Motorized Plan.)

Continues/Crosses	P1	P2	Other
P1	8	6	4
P2	6	4	2
Other	4	2	0

Is the crosswalk on school Walk Route?

Yes	6
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Is the crosswalk near schools, community facilities, etc.?

Activity Ctr.	Distance to Center	
	< 1/4 mi	<1/2 mi
School	3 pts	2 pts
Com. Facility	2 pts	1 pt
Business Dist	2 pts	1 pt
Transit/HOV	2 pts	0.5-1
Regional Ctr	1-2 pts	pt
Connect w/in Business	1 pt	0.5 pt
Dist		1 pt

IV. Safety (35 points maximum)

Does the crosswalk serve a vulnerable population?

Yes	13
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What is the accident history at the crosswalk?

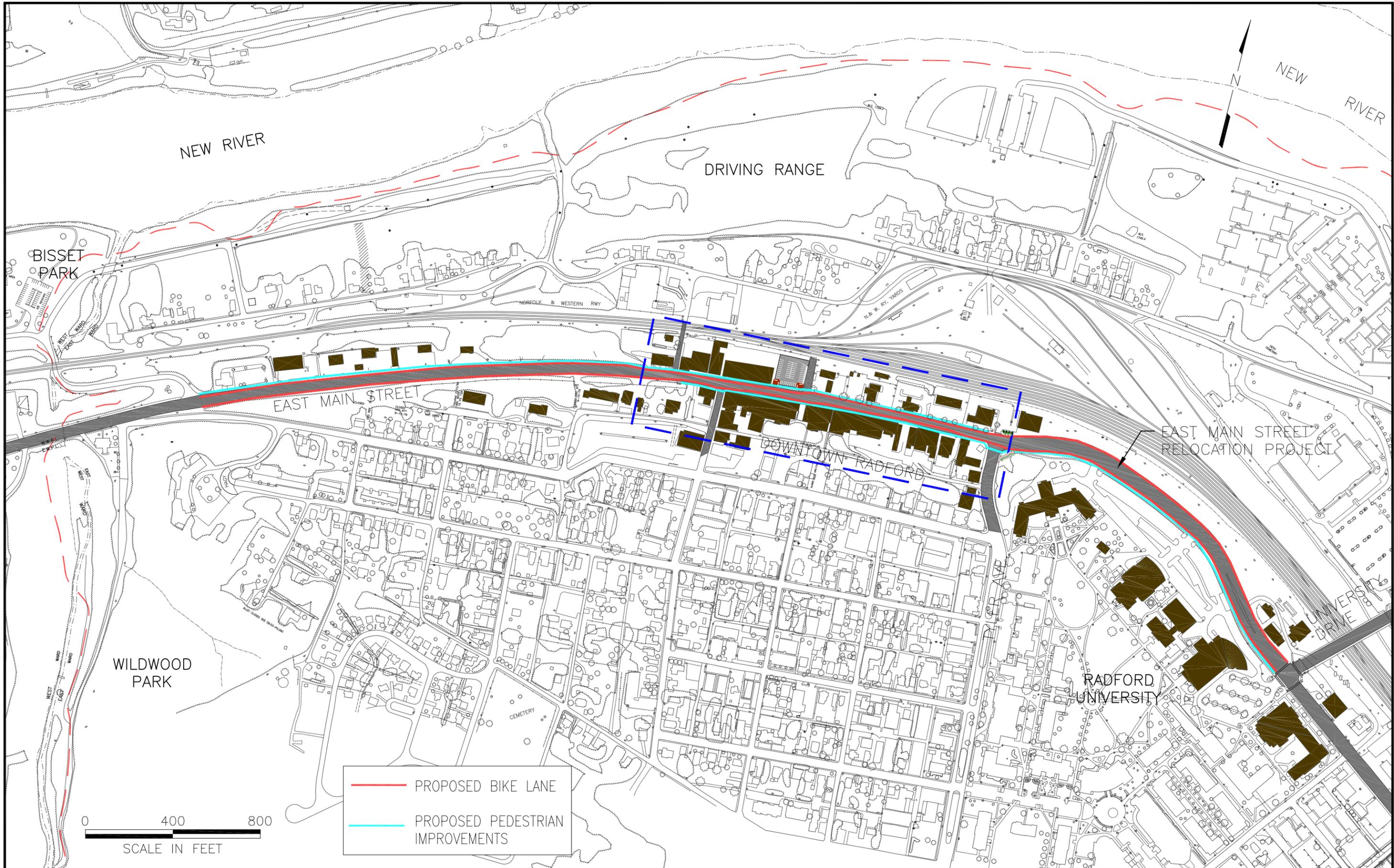
Experience	Points
Less than Average	0
Average	6
More than Average	12

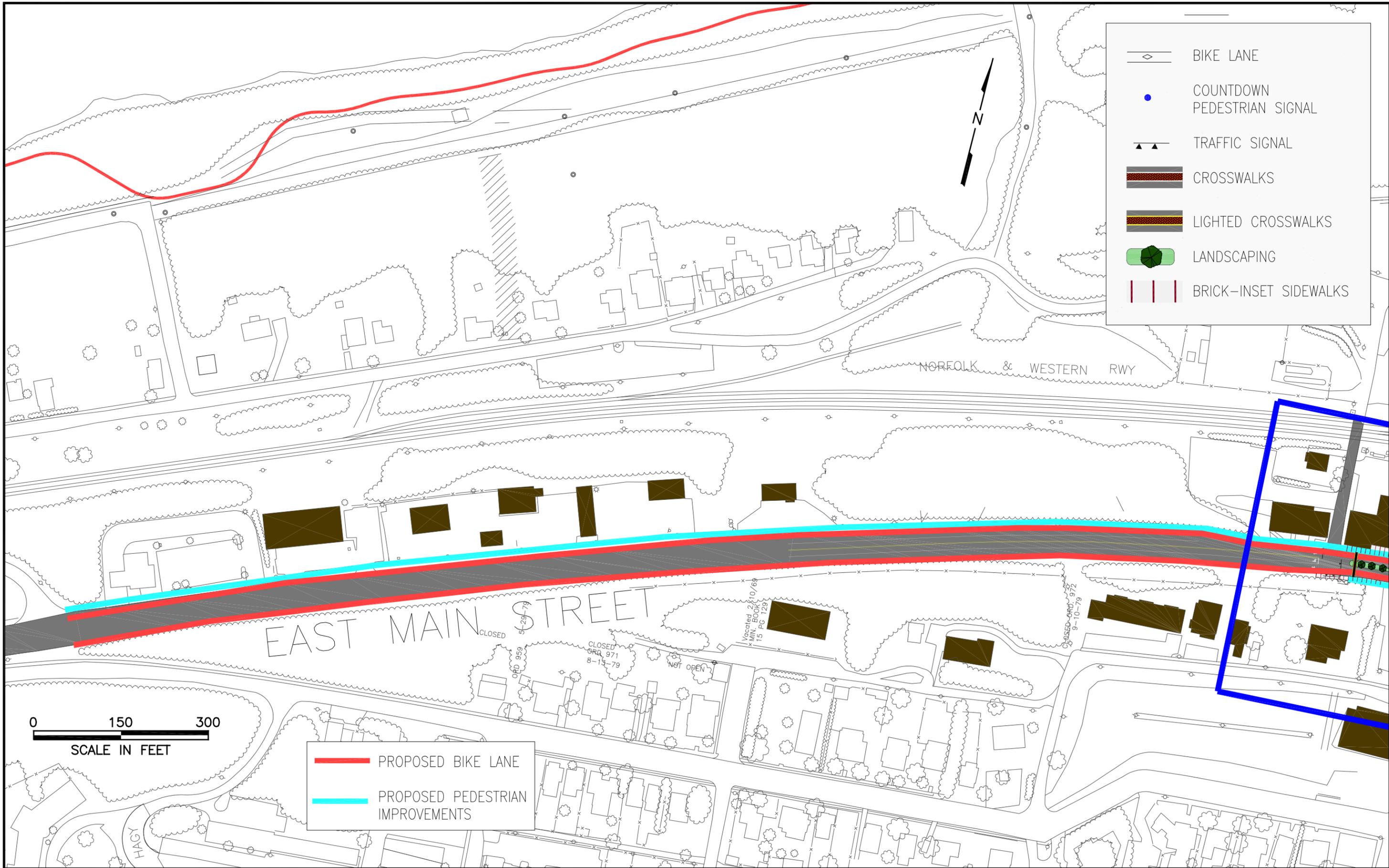
What improvements exist?

Improvements	Points
Striped crosswalk	10
Striped+Median or +O'head sign	6
Striped+O'head+Median	2

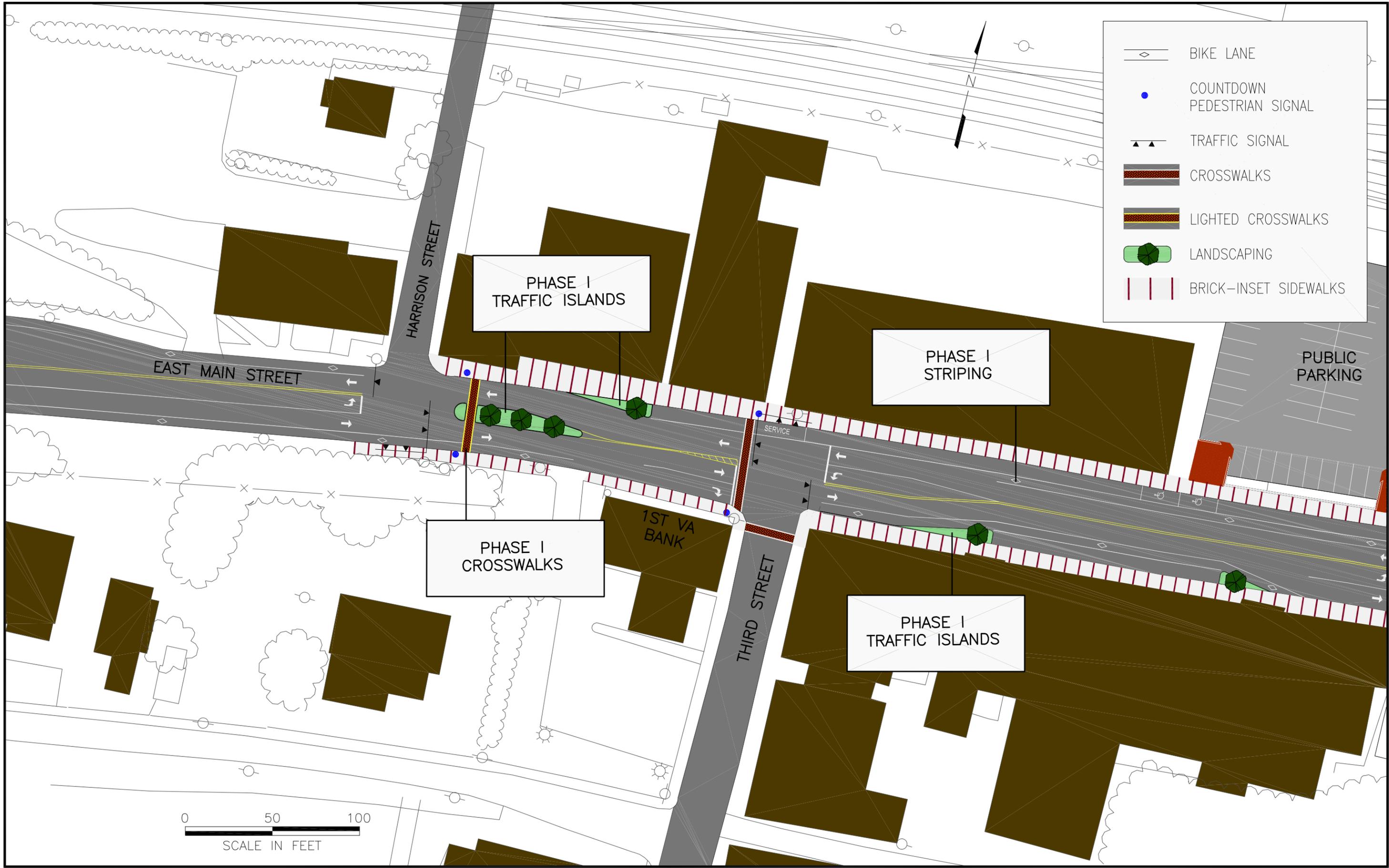
Radford Pathways Network
Urban Trail Extension

Appendix C – Radford Pathways Network Maps





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-  BIKE LANE
-  COUNTDOWN PEDESTRIAN SIGNAL
-  TRAFFIC SIGNAL
-  CROSSWALKS
-  LIGHTED CROSSWALKS
-  LANDSCAPING
-  BRICK-INSET SIDEWALKS

0 50 100
SCALE IN FEET



-  BIKE LANE
-  COUNTDOWN PEDESTRIAN SIGNAL
-  TRAFFIC SIGNAL
-  CROSSWALKS
-  LIGHTED CROSSWALKS
-  LANDSCAPING
-  BRICK-INSET SIDEWALKS

PHASE I
CROSSWALKS

PHASE I
TRAFFIC ISLANDS

PHASE I
STRIPING

PHASE I
TRAFFIC ISLANDS

