

EAST STREET RAILS WITH TRAILS

FREDERICK, MD



PROJECT SUMMARY

City of Frederick, Maryland

East Street Rails with Trails

July 2, 2013

Rev. 1 – August 6, 2013

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	ANTHONY E. GAMMON 42724	DATE



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Executive Summary

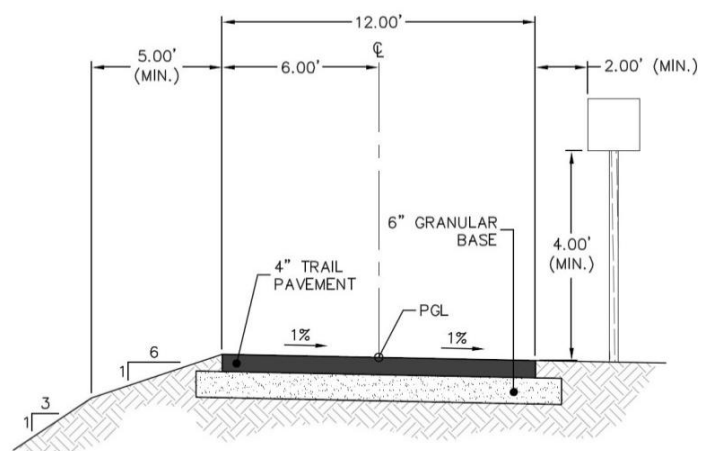
The purpose of this report is to summarize the work completed on the East Street Rails with Trails project for the City of Frederick and funded by the National Capital Region Transportation Planning Board of the Metropolitan Washington Council of Governments. The project intent was to develop a 30% (or preliminary) level of design for the East Street trail from the MARC station to the Monocacy River. Several alignment alternatives, treatment alternatives, and secondary alignments were considered in the development of the proposed trail design.

The project corridor was identified, and divided into five main segments for further analysis, based on the planned facility type, and rail line status. The segments are described in the table below:

Segment	Limits	Facility Type	Rail
1	East Street: MARC Station to E. 5 th Street	On-road (shared-lanes)	Dormant
1a	East Street Alternate: Carroll Creek Linear Park	Path/trail	N/A
2	East Street: E. 5 th Street to N. Market Street	Shared use path (sidepath)	Dormant
3	East Street: N. Market Street to Clemson Corner	Shared use path (trail)	Dormant and Active
3a	East Street Alternate: Market Street: East Street to Clemson Corner	Shared use path (sidepath)	N/A
4	East Street: Clemson Corner to Mill Island	Shared use path (sidepath and trail)	Active

The primary resource for facility design utilized was the “Guide for the Development of Bicycle Facilities, 2012,” by the American Associate of State Highway and Transportation Officials. The AASHTO guide provides information on geometric and design guidance for bicycle facilities to provide an acceptable level of safety and functionality based on the type of facility and user.

The two main facility types defined by AASHTO are “on-road” and “shared-use path” facilities. Both of these facility types were utilized in the East Street corridor design. The on-road segment included bicycle lanes, shared lanes, and priority shared lanes. The shared-use path facility design was based upon a 12' wide, two-way cross-section, as shown in the figure to the right.



A detailed opinion of probable construction costs was developed based on the improvements shown in the plans in Appendix F. The costs were grouped by the segments defined in the table above.

The conceptual design was based upon GIS and aerial photography base mapping in horizontal plan view only, with a very limited assessment of above ground utility impacts. The costs at this level of design are budgetary in nature and are typically accurate within +/- 30%. A fluctuation in bid items and quantities can be expected with a progression in the level of design detail. Actual construction costs will only be determined following the final design, tendering and construction process.

Segment	Limits	Length	Cost	\$/ft
1	East Street: MARC Station to E. 5 th Street	3,135 ft	\$ 286,184	\$ 92
2	East Street: E. 5 th St. to N. Market St.	5,750 ft	\$ 2,023,402	\$ 352
*3	East Street: N. Market St. to Clemson Corner	4,460 ft	\$ 5,937,498	\$ 1,331
4	East Street: Clemson Corner to Mill Island	6,105 ft	\$ 2,112,727	\$ 357
	Total	19,450 ft	\$ 10,360,810	\$ 533

*Includes bridge structure over Liberty Road.



The table below summarizes the major milestones and accomplishments throughout the project:

Date	Activity	Description
10/18/2012	Project award	TDG received notification of project award from MWCOG staff.
11/14/2012	Project kick-off meeting	Project kick-off meeting was held in City of Frederick offices, with City, MWCOG, TDG, and stakeholders' representatives in attendance.
12/20/2012	Site visit and field work	TDG staff performed on-site field corridor inspection with City of Frederick representatives.
01/30/2013	Design progress meeting	TDG hosted a progress meeting with City of Frederick representatives to review the design progress and deliverables.
03/08/2013	Stakeholders meeting	Stakeholders meeting was held in City of Frederick offices to review process completed to-date, present progress deliverables, and collect stakeholder input.
03/27/2013	Site visit	TDG staff performed on-site field corridor inspection with City of Frederick and Walkersville-Southern Railroad representatives.
04/09/2013	Public meeting	Open house and public information meeting was held at City of Frederick City Hall to present project information and collect public input.
05/22/2013	City of Frederick: Board of Aldermen Meeting	TDG staff presented project at City of Frederick Mayor and Board of Alderman work session.



City of Frederick

East Street Rails with Trails

1 Introduction

1.1 Background

In 2002 The City of Frederick adopted a *Shared Use Path Plan* which identified seven path corridors that could be implemented to create a comprehensive path network connecting areas within the City of Frederick to each other and the surrounding County. The plan's primary purpose was to help coordinate and focus the resources of the City in the planning, design and construction of the path system with the ultimate goal of linking citizens to recreational, cultural, employment and commercial areas throughout the City.

1.2 Location

The East Street Path corridor was identified as an opportunity to connect from the MARC station and historic downtown to the Monocacy River. The proposed East Street Path will connect to the Carroll Creek Path, Tuscarora Creek Path and ultimately Monocacy Boulevard Path. The path will also make key land use connections to mixed use and commercial developments, bike lanes that lead to Frederick Memorial Hospital and Hood College, future "pump track," hotel and convention center, County Visitor Center and Board of Education Headquarters.

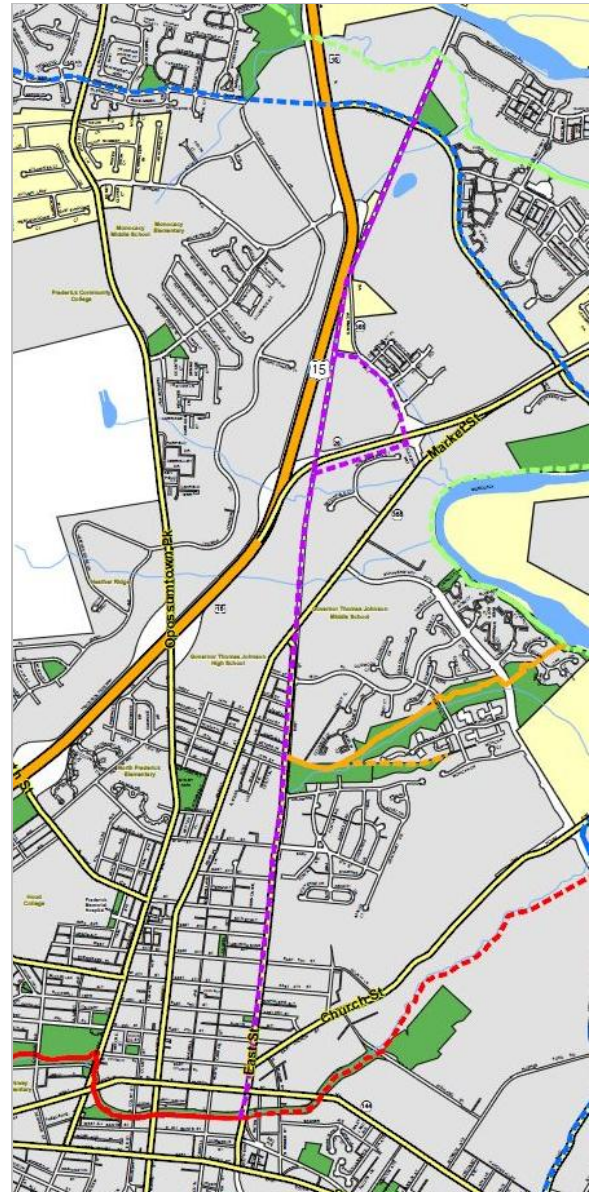


FIGURE 1-1: SHARED USE PATH PLAN (EXCERPT)



1.3 Scope of Work

The intent of this project was to develop 30% design plans and technical engineering feasibility analysis for the corridor. Path implementation in the southern portion of the corridor presents a significant challenge due to the constrained nature of the right of way and will require innovative design solutions. The southern end of the corridor also presents the challenge of modifying the use of the right of way space while maintaining the historic and aesthetic nature of the area. The northern portion of the East Street Path corridor appears to be a much simpler and less constrained implementation with much of the path following along the existing rail bed. Design challenges in the northern portion include difficult terrain along the rail bed and MD Route 26, and the trail crossing of Market Street.

The scope of work consisted of the following major tasks:

1. Project Kick-off Meeting
2. Field Assessment/Information Gathering
3. Stakeholder Involvement
4. Concept Alternative Development
5. Concept Alternative Review/Selection

2 Method

2.1 AASHTO Guidance

The primary resource for facility design utilized was the “Guide for the Development of Bicycle Facilities, 2012,” by the American Association of State Highway and Transportation Officials. The AASHTO guide provides information on geometric and design guidance to provide an acceptable level of safety and functionality based on the type of facility and user.

The two main facility types defined by AASHTO are “on-road” and “shared-use path” facilities. Both of these facility types were utilized in the East Street design; some of the pertinent AASHTO guidance is summarized below.

2.2 On-Road Facilities

On-road bicycle facilities are utilized to supplement sidewalks, providing a specific zone within the roadway for bicycle traffic. In conjunction with existing sidewalks these on road facilities will accommodate path users through areas of constrained rights-of-way. Four main types of on-road bicycle facilities utilized are: shared-lanes, priority shared-lanes, bicycle lanes, and buffered bicycle lanes.



2.2.1 Shared-lanes

Shared-lanes, identified by the standard symbol shown, are utilized when there is insufficient width within a corridor to provide a dedicated lane for bicycle traffic. The shared-lane marking symbol provides guidance to the cyclist as the suggested riding position within the lane, and additional indication to the motorist bicycles may be present.



FIGURE 2-1: SHARED-LANE

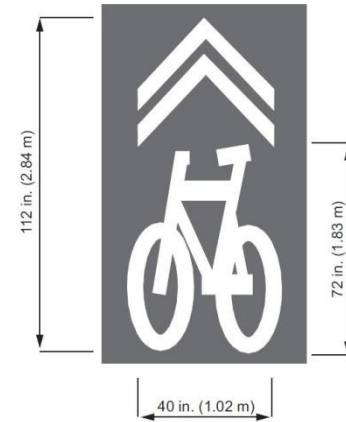


FIGURE 2-2: SHARED-LANE SYMBOL

2.2.2 Priority shared-lanes

Priority shared-lanes are a subset of the typical shared-lanes indicated by the standard shared-lane marking. Priority shared-lanes can be marked with green markings, indicating the suggested position of the cyclist, or higher visibility shared-lane markings, or a combination.



FIGURE 2-3: PRIORITY SHARED-LANES



FIGURE 2-4: PRIORITY SHARED-LANES

Priority shared lanes are not addressed by AASHTO, but are being used increasingly as the additional pavement markings provide an enhanced level of comfort and safety for the bicyclist in traffic.



2.2.3 Bicycle Lanes

Bicycle lanes are marked to provide a dedicated space for bicycles to travel in the roadway. They are typically marked with edge lines, and a standard bicycle lane symbol as shown in the image.

Appropriate signage can accompany the pavement markings to identify the facility.

Bicycle lanes can be marked at an absolute minimum width of four feet, but should be designed where possible at a minimum of five feet wide.



FIGURE 2-5: BICYCLE LANE

2.2.4 Buffered bicycle lanes

Buffered bicycle lanes are a subset of bicycle lanes. It is a facility with an additional buffer space, or offset, from an adjacent lane.

In areas of high parking turnover, the buffer should be located on the parking lane side of the bike lane. In areas with high through traffic volume or speed, the buffer should be located on the travel lane side. The buffer provides an enhanced level of comfort and safety for the bicyclist.

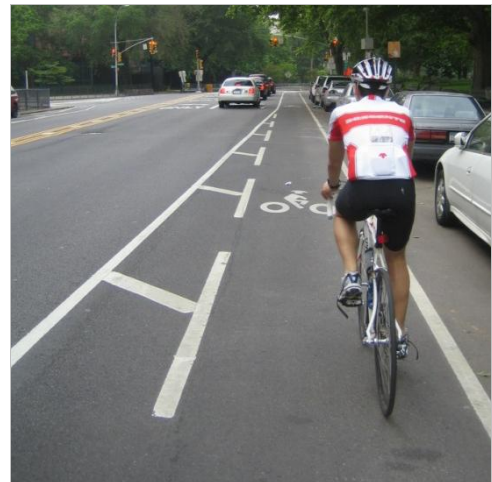


FIGURE 2-6: BUFFERED BICYCLE LANE

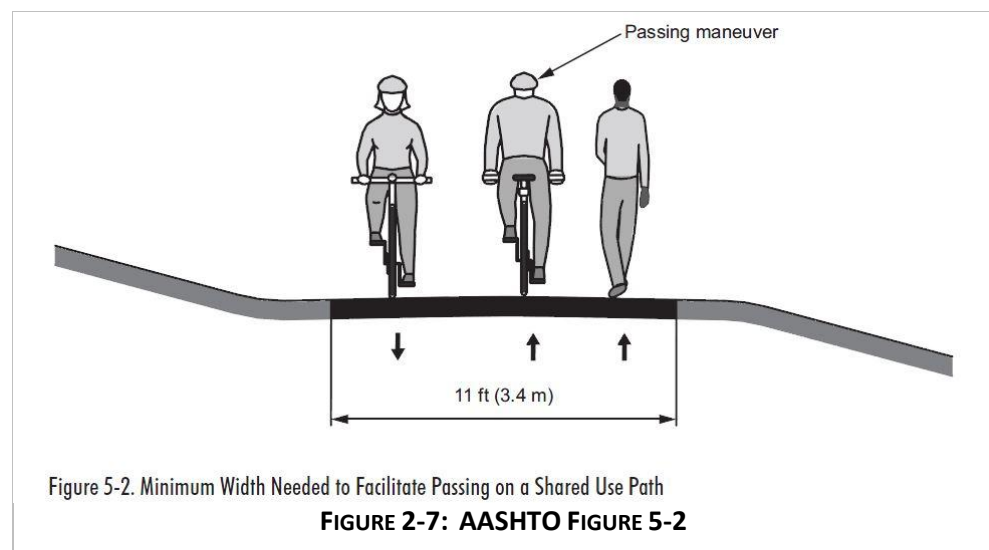


2.3 Shared-Use Path Facilities

Often referred to as “trails,” shared use paths provide a facility for bicyclists, pedestrians, and other non-motorized users, separated from vehicular traffic by a buffer. Shared use paths can supplement existing pedestrian facilities, or if designed with adequate width, be utilized in place of a sidewalk.

2.3.1 Design Criteria

The minimum width of a shared use path accommodating traffic in two directions is 10'. In some cases (obstruction clearance, low bicycle or pedestrian volume) an eight foot minimum width can be utilized. The ideal minimum width of a shared use path providing room for passing is 11', based on Figure 5-2 from AASHTO.



Other elements of the geometric design of the shared use path are based on design speed of the average bicyclist. Elements such as sight distance, vertical curve length, and grade should be designed to adequately accommodate a user operating at the design speed.

A design speed of 18 mph is adequate for most paths, but special consideration should be given to the terrain, as hilly conditions can yield bicyclists regularly operating at higher speeds, up to 30 mph. The table illustrates the minimum centerline radius of a horizontal curve based on the design speed.

TABLE 2-1: AASHTO TABLE 5-2 (EXCERPT)

U.S. Customary	
Design Speed (mph)	Minimum Radius (ft)
12	27
14	36
16	47
18	60
20	74
25	115
30	166



2.4 Intersections

Intersection locations introduce potential conflicts between vehicles and path users. A variety of intersection treatments can be used to increase visibility, awareness and help to define the priority of the path users in the intersection.

2.4.1 Enhanced Crosswalks

Standard crosswalk locations may be enhanced to provide additional visibility within the roadway context. Enhancements can include high visibility crosswalk markings, typically consisting of 12" to 24" wide retro-reflective pavement markings in a variety of configurations. The pavement can also be modified to provide additional contrast, by utilizing colored and textured pavements, along with high visibility crosswalk markings.



FIGURE 2-8: HIGH VISIBILITY MARKINGS



FIGURE 2-9: TEXTURED PAVEMENT

2.4.2 Raised Crossings

Raised crossings incorporate a vertical deflection in the crossing, elevating the crosswalk 4"-8" above the roadway. They are typically used in combination with the crosswalk enhancements of colored and textured pavements and high visibility crosswalk markings.



FIGURE 2-10: RAISED CROSSING



FIGURE 2-11: RAISED CROSSING



2.4.3 Median Refuge

A median refuge is a curb protected waiting area in the middle of the roadway, providing space for crossing path users. The refuge allows the user crossing to focus on vehicles coming from a single direction, instead of finding a gap in traffic from both directions. The median refuge can also be used to force a two stage crossing with the inclusion of fencing or railings.



FIGURE 2-12: MEDIAN REFUGE

2.4.4 Curb Extensions

Curb extensions are utilized to shorten the crossing distance and enhance visibility typically around on-street parking. Bringing the pedestrian zone closer to the edge of the travel lanes improves sight distance and awareness for the motorist and the path user. Curb extensions also provide an opportunity to incorporate additional landscaping or storm water management techniques.



FIGURE 2-13: CURB EXTENSION



FIGURE 2-14: CURB EXTENSION



3 Preliminary Design

3.1 Design Process

The following outlines the process to develop the preliminary design documents and this project summary.

3.1.1 Information gathering

Existing City of Frederick GIS base mapping, aerial photography, and supplemental designs for adjacent projects were gathered and reviewed. 20 scale plan sheets were developed for the project corridor.

3.1.2 Field visit

An existing conditions field review was conducted to collect measurements, site photographs, and review the corridor for applicable design treatments.

3.1.3 Corridor segments

The corridor was divided into segments based on the existing conditions and best facility design treatment. The ideal path section is shown in Figure 3-1 below, but on-road facilities were necessary due to constrained portions of the corridor.

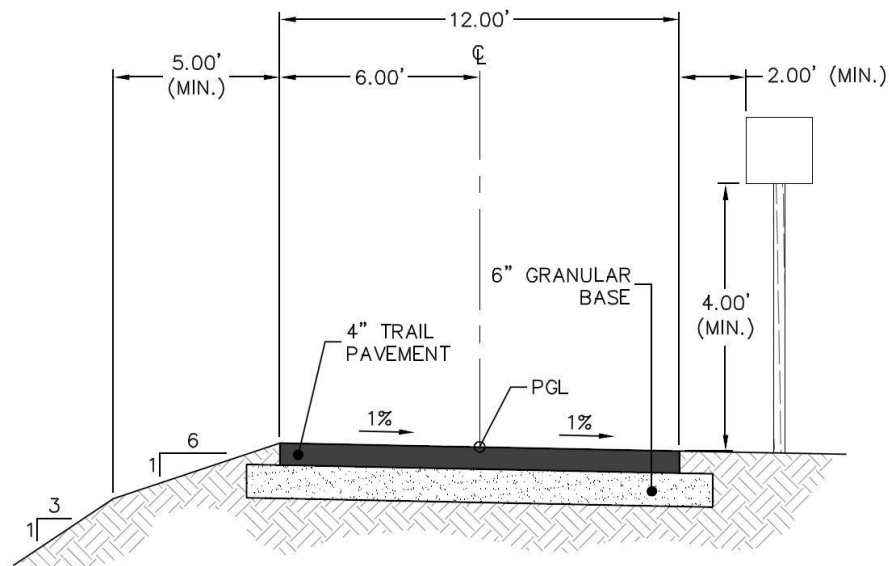


FIGURE 3-1: TYPICAL CROSS SECTION

3.1.4 Preliminary design

Proposed on-road and shared use path pavement markings, alignments, typical cross sections, path pavement design, curb and gutter, sidewalk connections, and intersection details were developed for each segment of the East Street corridor, and secondary alignment on Market Street (see Section 3.2 for descriptions of corridor segments).



The designs were “best fit” based primarily upon GIS information, aerial photography, and periodic field measurements. Anecdotal or estimated conditions related to vertical profiles and grading were based on site visits.

3.1.5 Design progress review

Following development of the draft preliminary design documents, a design progress review meeting was held and subsequent preliminary design modifications were made for presentation to the stakeholders group.

3.1.6 Stakeholder and public input

The preliminary design information was presented at a stakeholders group meeting and a public input meeting to summarize work effort and gather input. Subsequent modifications were made to the preliminary design.

3.1.7 Preliminary design summary

Preliminary design plans were compiled, opinions of probable costs developed for each East Street corridor segment, and a design report was prepared to summarize the project effort.



3.2 Corridor Segments

The East Street corridor was divided into four segments based on the existing roadway or corridor geometry and the location of the rail (active and inactive) within the corridor. The facility type is generally consistent within each segment. A fifth segment (Market Street), outside the scope of this project, is discussed below and included in the trail plans conceptually as an optional alternate or secondary alignment.

TABLE 3-1: PROJECT SEGMENTS

Segment	Limits	Facility Type	Rail
1	East Street: MARC Station to E. 5 th Street	On-road (shared-lanes)	Dormant
1a	East Street Alternate: Carroll Creek Linear Park	Path/trail	N/A
2	East Street: E. 5 th Street to N. Market Street	Shared use path (sidepath)	Dormant
3	East Street: N. Market Street to Clemson Corner	Shared use path (trail)	Dormant and Active
3a	East Street Alternate: Market Street: East Street to Clemson Corner	Shared use path (sidepath)	N/A
4	East Street: Clemson Corner to Mill Island	Shared use path (sidepath and trail)	Active

3.2.1 Segment 1: MARC Station to E. 5th Street

3.2.1.1 Existing Conditions

Segment 1 generally consists of two, three, or four lane roadway sections with occasional on-street parking. The existing rails are in the center of the roadway, and sidewalks exist on both sides of the street.



FIGURE 3-2: EAST STREET, SOUTH OF E. 2ND ST., LOOKING NORTH



3.2.1.2 Proposed Design

The proposed design consists of restriping lanes, adding shared-lane markings and priority shared-lane markings, upgrading crosswalks and sidewalk ramps.

See sheets 8.1 to 8.7 of the plans in Appendix F for more information.

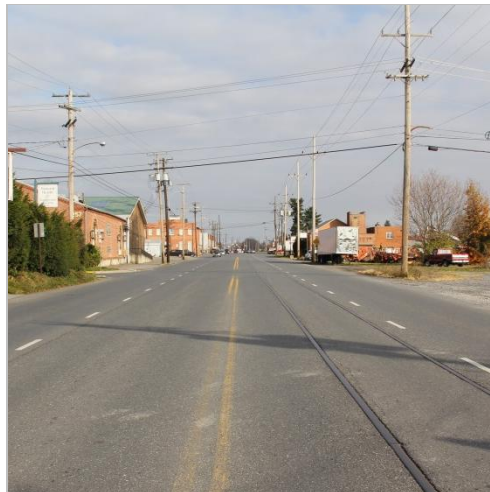
3.2.2 Segment 1a: Carroll Creek Linear Park

Segment 1a is shown as an alternate alignment to primarily accommodate recreational bicyclists and those bicyclists not comfortable utilizing the on-street facilities provided in Segment 1. The City of Frederick is currently developing portions of this segment, and it is recommended a path or trail alignment be incorporated into future development plans to provide an off-street connection to E. 5th or E. 7th Street.

3.2.3 Segment 2: E. 5th Street to N. Market Street

3.2.3.1 Existing Conditions

Segment 2 generally consists of a four lane roadway, with through lanes becoming left or right turn lanes at several intersections. The roadway width is variable, as the curb and gutter is intermittent and the edge of roadway is undefined. The existing rails are in the roadway south of East 8th Street and transition to the east side of East Street north of 9th Street.



**FIGURE 3-3: EAST ST., NORTH OF E. 5TH ST.,
LOOKING NORTH**



**FIGURE 3-4: RAIL TRANSITION LOCATION,
NORTH OF E. 8TH ST., LOOKING NORTH**

3.2.3.2 Proposed Design

The proposed design consists of adding curb and gutter to the east side of East Street, restriping lanes where necessary, and adding a 12' wide shared use path, or sidepath, with a minimum five foot buffer from the edge of the nearest travel lane. Also included in the design is upgrading crosswalks and sidewalk ramps.



See sheets 8.7 to 8.19 of the plans in Appendix F for more information.

3.2.4 Segment 3: N. Market Street to Clemson Corner

3.2.4.1 Existing Conditions

Segment 3 is the portion of the path corridor located within the rail corridor not adjacent to any roadways. The rail corridor is inactive for the portion from Market Street to Liberty Road (Md 26), and actively used by the Walkersville-Southern Railroad north of Liberty Road.



FIGURE 3-5: INACTIVE RAIL, SOUTH OF LIBERTY ROAD, LOOKING NORTH



FIGURE 3-6: ACTIVE RAIL, NORTH OF LIBERTY ROAD, LOOKING NORTH

3.2.4.2 Proposed Design

The proposed design consists of removing the existing rails, ties, and ballast and constructing the shared use path centered on the rail right-of-way to Liberty Road. A bridge crossing of Liberty Road is proposed, and with the trail alignment shifting to an easement west of the existing power poles on the west side of the rail right of way, north of Liberty Road.

See sheets 8.19 to 8.28 of the plans in Appendix F for more information.

3.2.5 Segment 3a: Market Street: East Street to Clemson Corner

Segment 3a is shown as an optional alternate alignment to complete the East Street corridor, prior to construction of the Liberty Road bridge crossing. This segment can be constructed in the interim condition, but will also make an important additional link connecting existing and planned trail infrastructure and recreation areas to the East.



3.2.6 Segment 4: Clemson Corner to Mill Island

3.2.6.1 Existing Conditions

Segment 4 is the section of the path corridor along the active rail line, from the north end of Clemson Corner to the project limit at Mill Island, north of the Tuscarora Creek.



FIGURE 3-7: TUSCARORA CREEK BRIDGE

3.2.6.2 Proposed Design

The proposed design consists of locating the trail alignment outside the zone of influence of the active rail lines, within the rail right-of-way, within roadway right-of-way, or outside the right-of-way in a proposed trail easement. Portions of this segment are anticipated to be located on private property. Final location within these parcels is flexible and should be determined based on the ultimate land use.

See sheets 8.29 to 8.40 of the plans in Appendix F for more information.



3.3 Intersection Details

The design treatments of several intersections are included to highlight the specific challenges and recommended solutions, or optional solutions. Refer to the plans in Appendix F for additional information and context. Plan view excerpts are included, with East Street horizontally in the image, and north to the right.

The recommended treatments are those included in the preliminary design and opinion of probable costs. Optional treatments are those that merit consideration and further analysis in the next stage of project development.

Highlighted intersections: E. 5th Street, E. 7th Street, E. 9th Street, Delaware Road, Market Street, Monocacy Boulevard, and Routzahn Way.



3.3.1 E. 5th Street

The intersection of East 5th Street and East Street is the location of the transition from on-road bicycle facilities to the side path on the east side of East Street.

Transition areas need special design attention since many different movements can be occurring in a limited area. A bike box was included on the north leg of East Street to assist trail users transitioning to southbound shared-lanes.



FIGURE 3-8: SHEET 8.7 EXCERPT

Another feature that can improve the functionality of the trail at this location is installation of a wayside in the southeast or northeast corner of the intersection. The wayside will provide more space for bicycles and other path users to maneuver and pass.

Recommended improvements:

- Bike box on East Street on the north leg of the intersection
- High visibility crosswalk markings
- Spot widening of the path to accommodate turning and merging traffic

Optional improvements:

- Wayside feature on the northeast or southeast quadrant



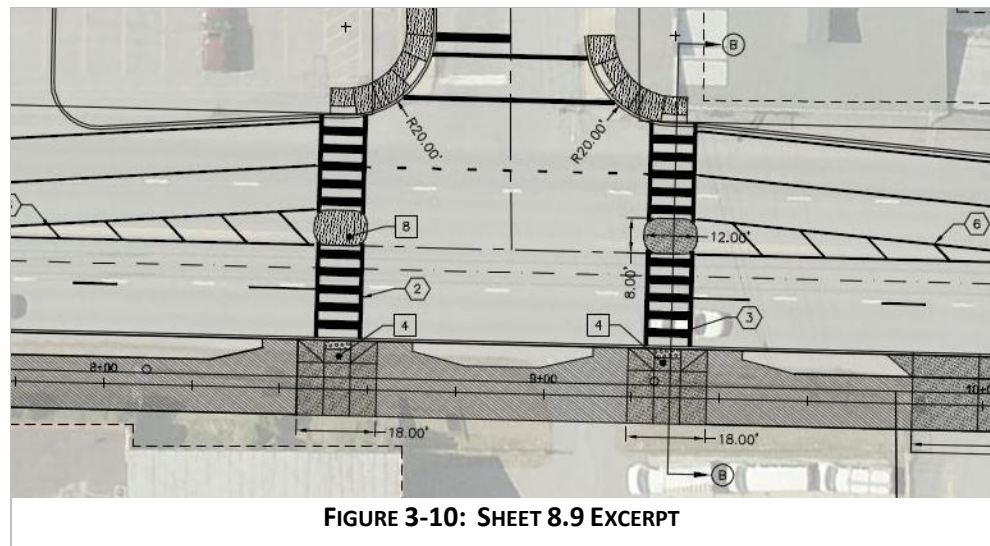
FIGURE 3-9: E. 5TH ST. WAYSIDE



3.3.2 E. 7th Street

The intersection of East 7th Street and East Street is the confluence of the shared use path with the existing bicycle route on E. 7th Street. Additional measures to accommodate bicycle and pedestrian traffic crossing East Street are recommended.

The southbound lanes of East Street were shifted to the west to provide space in the roadway for median refuge islands. Spot widening on the shared use path provided additional room for turning and merging path users to interact with through path users.



Future development east of East Street will prompt the extension of 7th Street, and may require addition of a traffic signal. The addition of a signal may negate the need for the median refuge islands, and the design should be reconsidered with 7th Street extension.

Recommended improvements:

- Median refuge islands (both sides of E. 7th Street)
- High visibility crosswalk markings
- Spot widening of the path to accommodate turning and merging traffic

Optional improvements:

- Bike lanes on the future extension of E. 7th Street
- Traffic signal with pedestrian signals and push buttons



3.3.3 E. 9th Street

The intersection of East 9th Street and East Street is a signalized intersection, and the beginning of the frontage road east of East Street. The existing signal and the close proximity of the frontage road intersection can cause confusion.

A chicane, or horizontal deflection, in the path alignment was introduced to slow traffic and heighten awareness of the upcoming crossing for users on the shared use path. Bike lanes and a bike box were added to E. 9th Street to prioritize bicyclists and transition users to the adjacent commercial and residential destinations.

The southern leg of the frontage road has already been closed off to through traffic by installation of a fence, but additional infrastructure, including curb and gutter, sidewalk, and landscaping can enhance the path transitions.

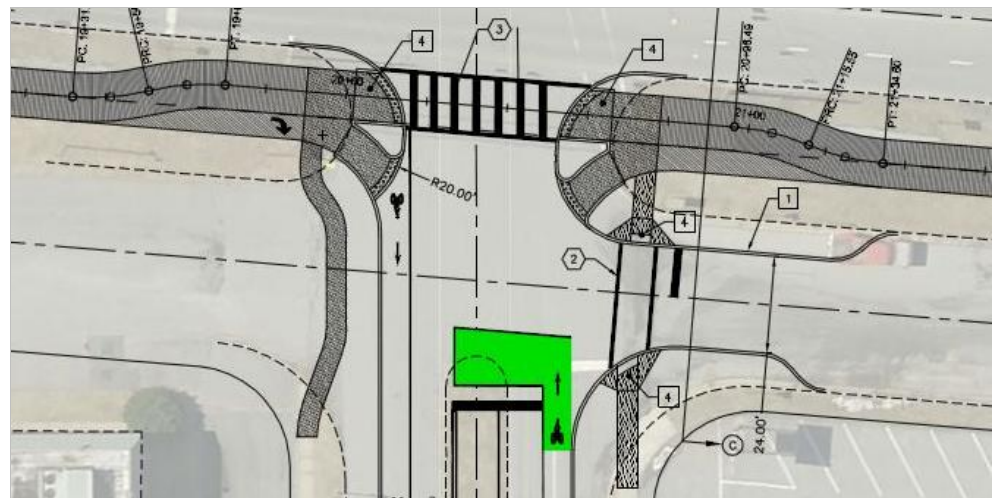


FIGURE 3-11: SHEET 8.11 EXCERPT

Recommended improvements:

- Path alignment chicane
- High visibility crosswalk markings
- Path to bike lanes transition widening
- Bike lanes on E. 9th Street
- Bike box on E. 9th Street
- Permanent closure of the frontage road south of E. 9th Street
- Curb extensions on the frontage road

Optional improvements:

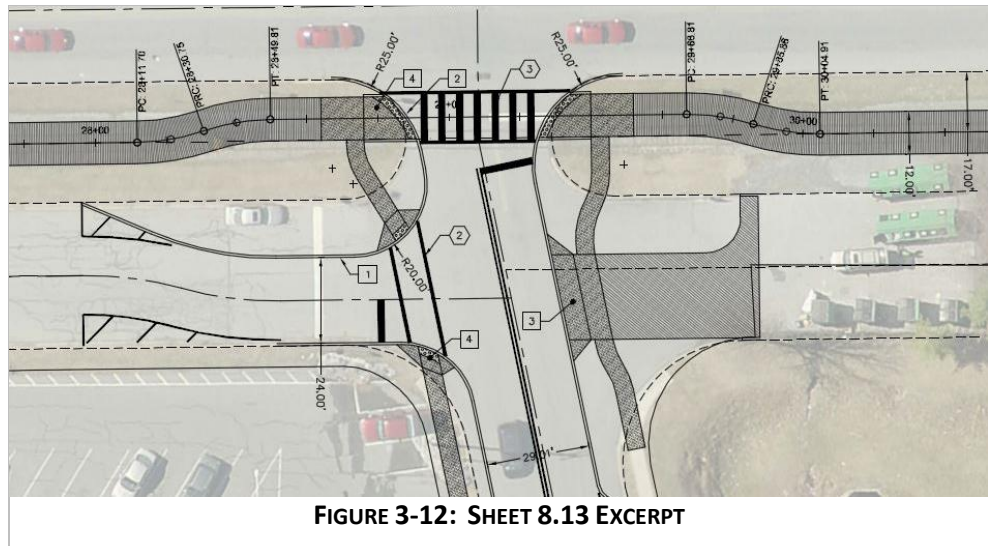
- Raised crossing for trail crossing E. 9th Street



3.3.4 Delaware Road

The intersection of Delaware Road and East Street is the termination of the frontage road east of East Street.

A chicane, or horizontal deflection, in the path alignment was introduced to slow traffic and heighten awareness of the upcoming crossing for users on the shared use path. Curb extensions were added to the frontage road and Delaware Road to provide more separation and slow “S” turning vehicles. Permanent closure of the frontage road north of Delaware, and modification to a traditional driveway entrance was designed to accommodate City maintenance uses.



Recommended improvements:

- Trail alignment chicane
- High visibility crosswalk markings
- Permanent closure of the frontage road north of Delaware Road
- Curb extensions on the frontage road and on Delaware Road

Optional improvements:

- Raised crossing for trail crossing Delaware Road



3.3.5 N. Market Street

The trail crossing at Market Street is considered a midblock crossing, as it is most likely outside the functional area of the intersection of Market Street and East Street. Maintaining the rail corridor alignment, as opposed to directing trail traffic to the signalized intersection, provides a more direct and desirable route. Midblock crossings introduce conflicts between motorists and trail users, as the trail user must exercise judgment in making the decision to cross.

A chicane was designed to align the trail crossing closer to a 90 degree angle, increase path user awareness, and provide traffic calming on the path. The intersection of the secondary path alignment on Market Street was set back from the intersection to identify trail priority and minimize conflicts at the intersection. A raised crossing with curb extensions was designed to provide additional visibility of the crossing and traffic calming on Market Street.

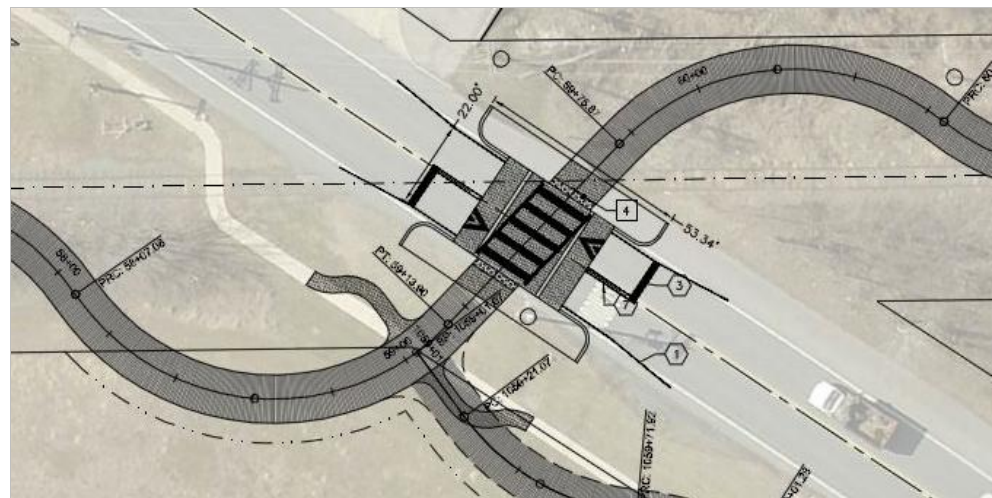


FIGURE 3-13: SHEET 8.19 EXCERPT

Recommended improvements:

- Path alignment chicane
- Raised crossing for path crossing Market Street
- High visibility crosswalk markings
- Curb extensions on Market Street with lane diet

Optional improvements:

- Median refuge in Market Street
- Pedestrian actuated warning lights or beacons

The raised crossing provides additional visibility of the crosswalk and trail user. Along with appropriate signage, this treatment will help to prioritize crossing traffic. Incorporating a lane diet (reduction in lane width) by installing curb



extensions, decreases the crossing distance and exposure time, and can reduce vehicle speeds.

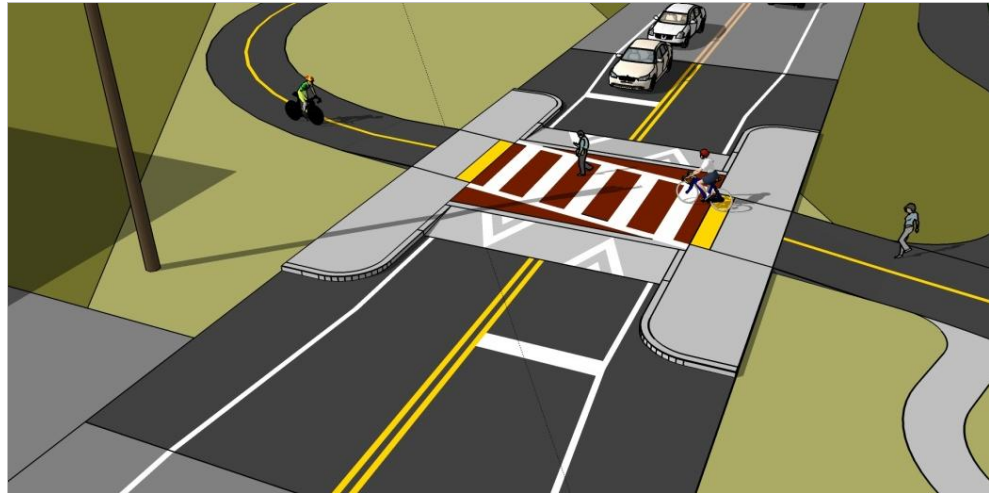


FIGURE 3-14: MARKET STREET – RAISED CROSSING

A median refuge can be a good alternate for the raised crossing. The median provides a waiting area for trail users, limiting the decision-making required to find a good time to cross. Incorporating the refuge island with curb extensions and a lane diet can reduce vehicle speeds.



FIGURE 3-15: MARKET STREET – MEDIAN REFUGE

Determining the best solution for this crossing requires a traffic analysis to measure existing vehicle speeds along Market Street, volume of traffic, length of queue in the “stop” phase, and potential gaps in the traffic flow.

3.3.6 Monocacy Boulevard

The path crossing of Monocacy Boulevard is adjacent to the active portion of the existing rail.

The chicane was added to the alignment to calm path traffic and shift the path alignment closer to the rail crossing. Curb and gutter was added to Monocacy Boulevard to redefine the transitions, and provide space for a median refuge. A new gated crossing is also shown.

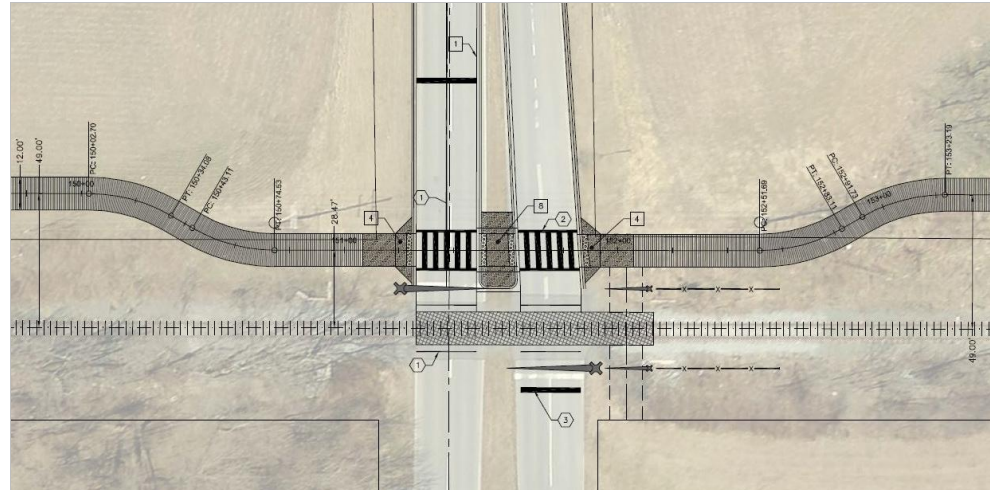


FIGURE 3-16: SHEET 8.37 EXCERPT

Maryland State Highway Administration is currently proposing a redesign of this crossing location. The path design at this location should be coordinated with SHA and reevaluated in future stages of project development.

Recommended improvements:

- Path alignment chicane
- High visibility crosswalk markings
- Median refuge island

Optional improvements:

- Gated rail crossing
- Sidewalk or path connection to Clerestory Park



FIGURE 3-17: MONOCACY BLVD. CROSSING



3.3.7 Routzahn Way

The intersection of Market Street and Routzahn Way is a crossing location for the Market Street secondary path alignment. The existing intersection configuration is generally uncontrolled with long crossing distances, and promotes high speed vehicular turns.

The chicane was added to the alignment to calm path traffic and realign the path closer to a 90 degree crossing. Market Street striping was reconfigured to provide a median refuge west of Routzahn Way, and the south to westbound right turn slip lane was removed.

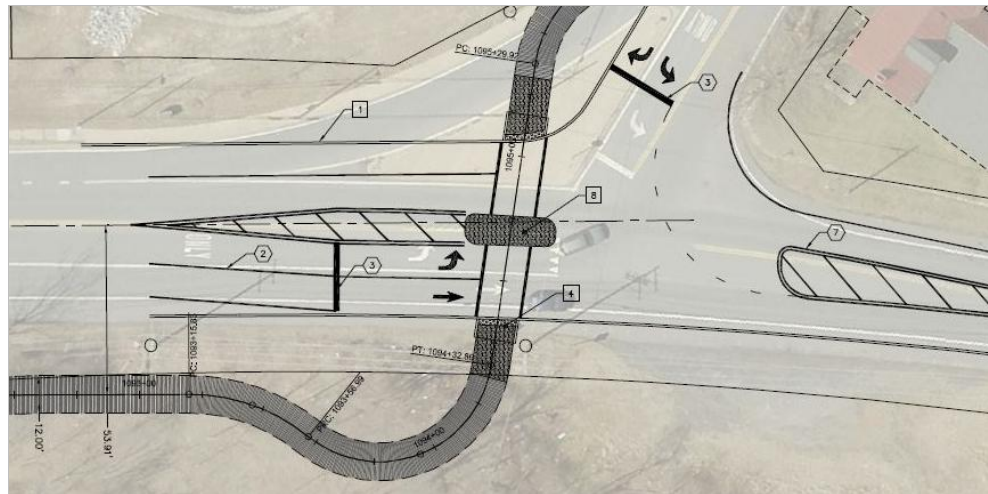


FIGURE 3-18: SHEET 8.19H EXCERPT

Development in the vicinity of this intersection is prompting design and improvements. The path crossing concepts should be incorporated into the future intersection design where possible, and design reevaluated in future stages of project development.

Recommended improvements:

- Path alignment chicane
- High visibility crosswalk markings
- Median refuge island
- Intersection realignment and reconfiguration

Optional improvements:

- Traffic signal with pedestrian signals and push buttons



3.4 Bridge Crossing

Providing a bridge crossing of Liberty Road (26) is an important link to the functionality of the East Street trail alignment for both transportation connections and recreational use.

3.4.1 Signature Bridge

A “signature” bridge crossing, or a bridge with special design consideration to unique or artistic elements, can be an opportunity for the City of Frederick to add to its identity. A signature bridge, like the bridges shown in the figures below, can be a draw for tourism and additional trail users.



FIGURE 3-19: HIGH TRESTLE TRAIL – MADRID, IA

The lighting and design of the High Trestle Trail Bridge outside of Madrid, Iowa creates a unique experience for users of the crossing at night.



FIGURE 3-20: UNIVERSITY AVE – TEMPE, AZ

The clear span arch in Tempe, Arizona creates a distinct gateway to the Arizona State University Campus.



3.4.2 “Econtainer” Bridge

The bridge concept shown in Figure 3-21 below utilizes recycled shipping containers for the primary building material. This concept was the winning proposal to provide bicycle and pedestrian access to a recreational area.



FIGURE 3-21: ECONTAINER BRIDGE CONCEPT

Hundreds of thousands of containers are taken out of service annually, and their reuse can make a unique, sustainable, and visually striking bridge structure. The abundance of containers worldwide and their inherent structural integrity can reduce the cost and construction time compared to a more traditional structure. (For more information, refer to <http://www.archdaily.com/323154/econtainer-bridge-competition-winning-proposal-yoav-messer-architects/>).



3.4.3 Temporary Bridge

In lieu of constructing a permanent bridge initially, a temporary crossing can provide a lower cost option to make the trail connection and provide full functionality of the alignment. The temporary crossing can provide time to identify the most appropriate permanent structure, and build funds for its design and construction.

The trail plan illustrates bridge span lengths which would accommodate the temporary bridge currently being used on Motter Avenue, shown in Figure 3-22 below.



FIGURE 3-22: MOTTER AVE TEMPORARY BRIDGE



3.5 Trailside Amenities

Providing an exceptional trail experience is more than creating a transportation link, it includes many items adding to the functionality, comfort, usability and aesthetics of the trail system.

These additional amenities include trailheads, waysides, wayfinding and trail information, and trail branding.

3.5.1 Trailheads

Trailheads are locations along the trail providing an opportunity to change modes of transportation. Most commonly a trailhead provides a parking area at a minimum, but typically provides seating areas, bathroom facilities, and wayfinding or informational kiosks for overall trail information.

Several trailheads were conceptually sited along the East Street corridor. Careful consideration was given to the surrounding area, opportunity for transitioning modes of transportation, and logical connectivity with the existing street network to determine the conceptual locations.

The renderings below illustrate the following proposed trailhead locations:

3.5.1.1 MARC Station

Located just north of the MARC station and south of the Carroll Creek Linear Park, this trailhead provides a connection to the MARC train, parking, and access to the existing park (see Figure 3-23 below).



FIGURE 3-23: MARC STATION TRAILHEAD



3.5.1.2 Monocacy Village Park

Located on the north side of the park, this trailhead provides parking and an access point to the existing park facilities and proposed pump track (see Figure 3-24 below).



FIGURE 3-24: MONOCACY VILLAGE PARK TRAILHEAD

3.5.1.3 Mill Island

Located in the existing outlet in the southwest corner of Mill Island and north of the Tuscarora Creek, this trailhead provides parking, seating, and has room for other recreational amenities at the northern terminus of this project corridor (see Figure 3-25 below).



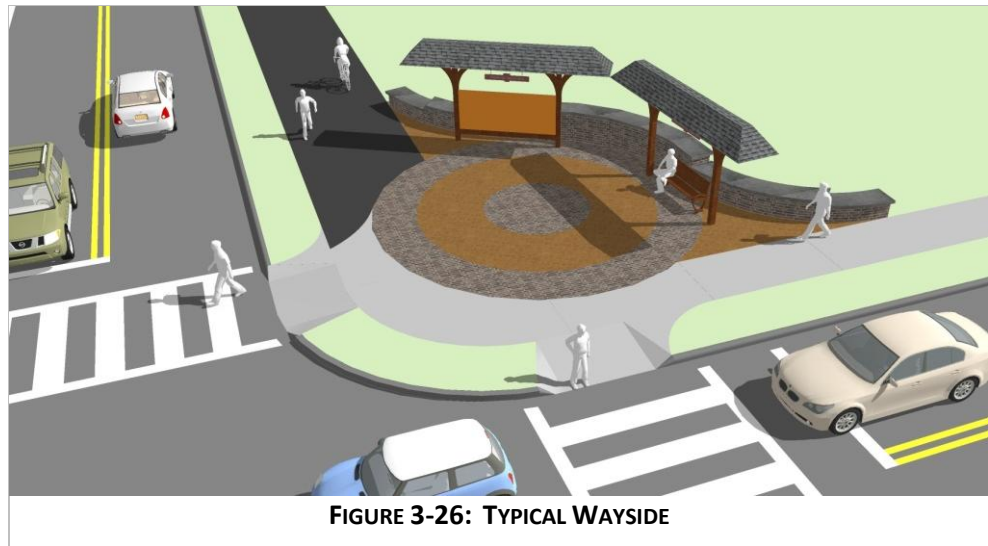
FIGURE 3-25: MILL ISLAND TRAILHEAD



3.5.2 Waysides

Waysides are locations along the trail generally providing an opportunity to rest or wait outside the active trail traffic, more space to accommodate trail intersections or transitions, and location or wayfinding information specific to that place on the trail.

Waysides can be located more frequently along the trail alignment, and siting is based less on the surroundings than trailheads, but more upon the specific trail conditions at that location. A typical corner treatment wayside is shown in Figure 3-26 below.



Waysides can also be used in sequence, placed linearly along the corridor alignment providing amenities like a fitness circuit or historical and cultural information.

3.5.2.1 Market Street

One wayside identified in this concept is at the intersection of Market Street (see Figure 3-27 below). The location can be a natural meeting place for trail users, is close to the midpoint of this initial project corridor, and represents a major trail intersection, if the secondary alignment along Market Street is constructed.





FIGURE 3-27: MARKET STREET WAYSIDE

Other waysides should be considered at East 5th street to accommodate the transition of from sidepath to on-street bicycle facilities, and near Clemson Corner considering interaction with the Walkersville-Southern railroad terminus.

3.5.3 Branding and Signage

Branding the trail with a name and logo, and using that brand repeatedly in many forms is an excellent way to reinforce the sense of place and identify the trail as a main link in the transportation network.



FIGURE 3-28: TRAIL LOGOS

The logos developed and illustrated in Figure 3-28 above call upon the historic Pennsylvania Railroad ownership of the rail, and its name, the “Frederick Secondary.” These logos are conceptual, but provide an example of how branding can emphasize the trail identity.

The logo and style of this brand can be repeated throughout many of the other typical trail amenities, including mileage markers, bike racks, and informational kiosks (see Figure 3-29, Figure 3-30, and Figure 3-31 below).





FIGURE 3-29: MILEAGE MARKERS

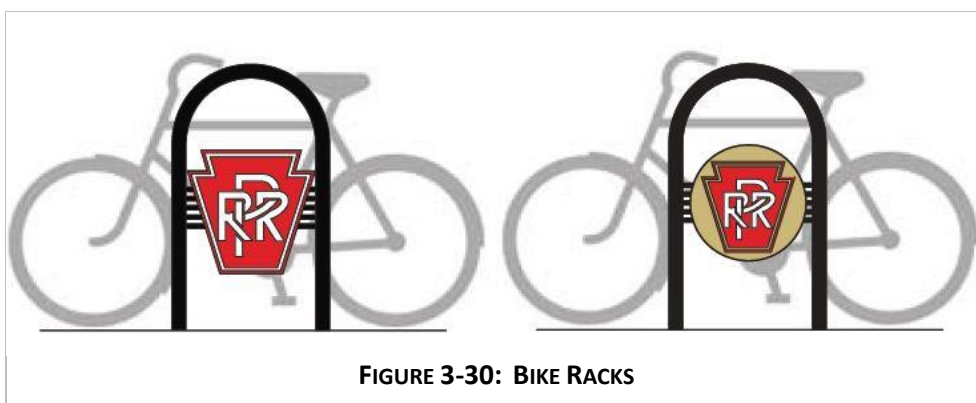


FIGURE 3-30: BIKE RACKS

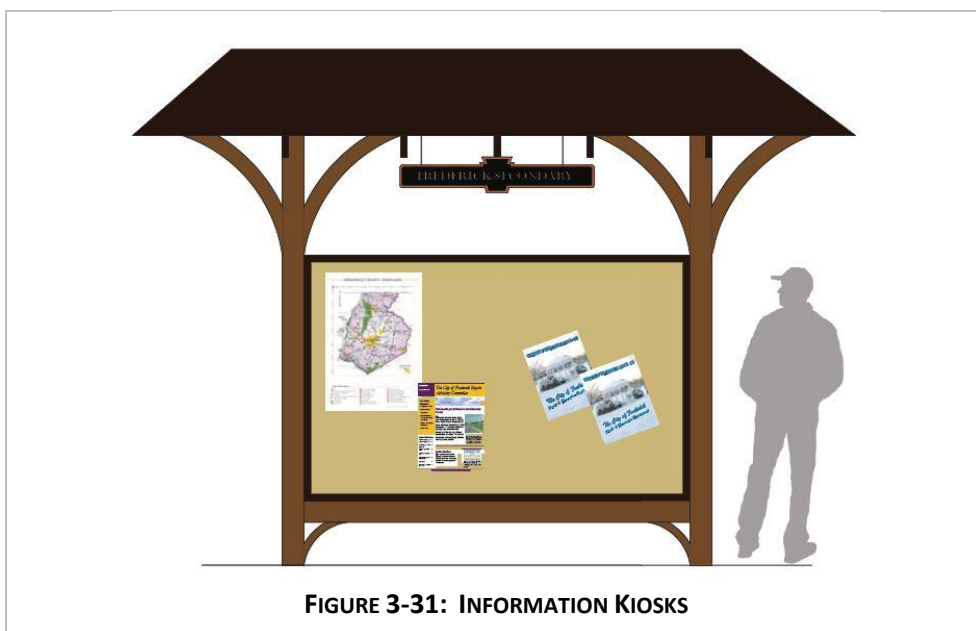


FIGURE 3-31: INFORMATION KIOSKS



3.6 Construction

3.6.1 Phasing

The project segments defined in Section 3.2 above generally represent logical construction phases. The segments can be constructed independently in any order, but primary consideration should be given to segments providing access to the highest number of users, which will generate additional trail demand.

Construction of this conceptual design in phases will require additional planning, design, and “interim” construction to transition and terminate the facilities at the end of each phase.

The alternate alignment, Segment 3a (shown in the plans in Appendix F) can be implemented in lieu of constructing the Liberty Road bridge. Upon completion of the bridge crossing, this segment would be a secondary route across Liberty Road and would provide connectivity to other existing or planned bicycle and trail infrastructure.

3.6.2 Opinion of Probable Cost

A detailed opinion of probable construction costs was developed based on the improvements shown in the plans in Appendix F, for the trail segments along the East Street corridor. The costs were grouped by the segments defined in Section 3.2 above.

The conceptual design was based upon GIS and aerial photography based mapping in horizontal plan view only, with a very limited assessment of above ground utility impacts. The costs at this level of design are budgetary in nature and are typically accurate within +/- 30%. A fluctuation in bid items and quantities can be expected with a progression in the level of design detail. Actual construction costs will only be determined following the final design, tendering and construction process.

Table 3-2 summarizes the opinion of probable construction costs for each trail segment.

TABLE 3-2: SUMMARY OF COSTS

Segment	Limits	Length	Cost	\$/ft
1	East Street: MARC Station to E. 5 th Street	3,135 ft	\$ 286,184	\$ 92
2	East Street: E. 5 th St. to N. Market St.	5,750 ft	\$ 2,023,402	\$ 352
*3	East Street: N. Market St. to Clemson Corner	4,460 ft	\$ 5,937,498	\$ 1,331
4	East Street: Clemson Corner to Mill Island	6,105 ft	\$ 2,112,727	\$ 357
	Total	19,450 ft	\$ 10,360,810	\$ 533

*Includes bridge structure over Liberty Road.



4 Conclusion

4.1 Project Timeline

The table below summarizes the major milestones and accomplishments throughout the project lifecycle.

TABLE 4-1: PROJECT TIMELINE

Date	Activity	Description
10/18/2012	Project award	TDG received notification of project award from MWCOG.
11/14/2012	Project kick-off meeting	Project kick-off meeting was held in City of Frederick offices, with City, MWCOG, TDG, and stakeholders' representatives in attendance.
12/20/2012	Site visit and field work	TDG staff performed on-site field corridor inspection with City of Frederick representatives.
01/30/2013	Design progress meeting	TDG hosted a progress meeting with City of Frederick representatives to review the design progress and deliverables.
03/08/2013	Stakeholders meeting	Stakeholders meeting was held in City of Frederick offices to review process completed to-date, present progress deliverables, and collect stakeholder input.
03/27/2013	Site visit	TDG staff performed on-site field corridor inspection with City of Frederick and Walkersville-Southern Railroad representatives.
04/09/2013	Public meeting	Open house and public information meeting was held at City of Frederick City Hall to present project information and collect public input.
05/22/2013	City of Frederick: Board of Aldermen Meeting	TDG staff presented project at City of Frederick Mayor and Board of Alderman work session.



4.2 Public Input

4.2.1 Stakeholders Meeting

Stakeholder participation and input was integrated into the process throughout the study. Project presentations and facilitated discussions allowed stakeholders an opportunity to weigh in on design concepts, trail amenities and branding concepts. The presentation slide show can be found in Appendix E.

4.2.2 Public Meeting

A public presentation and open house was held at the City of Frederick on April 9, 2013, to present the preliminary project information and gather feedback from attendees. A summary of the design method and preliminary design was presented, along with the amenity and branding concepts. The presentation graphics can be found in Appendix C, along with the presentation slide show Appendix E.

The open house attracted more than 50 participants including City Aldermen, representatives from Walkersville Southern Railroad, a Maryland delegate, and a representative from the county commission. The attendees interacted with project staff from the city and the design consultants while viewing exhibits of the preliminary design including intersection treatments and various conceptual trail amenities.

A questionnaire was provided to gather formal feedback on the information presented. A total of 20 responses were collected, and a summary of the responses is included in Appendix D. Survey responses were largely supportive of the trail design concept and provided useful information on frequency and type of use expected for this trail.

4.3 Next Steps

Following acceptance of the work completed as part of this project, the City of Frederick should prioritize the segments of the East Street trail corridor. Using this work as supporting documentation, the City can pursue State and Federal grant funding, and appropriate necessary local matching funds.

When funds have been identified for all or part of the corridor, a design consultant can be selected to assist the City and provide preliminary and final design services, detailed final cost opinions, and bid and construction phase support.

The design process should be expected to take eight to ten months for the entire corridor, with a 10 to 12 month construction schedule, not including any necessary right-of-way negotiations.



