Covered Bridge Park

Master Plan

South Whitehall Township, Lehigh County, PA

February 2014

South Whitehall Township

Covered Bridge Park Master Plan

Prepared for:

South Whitehall Township, Lehigh County, Pennsylvania

Study Committee:

Robert R. Ibach, South Whitehall Township Public Works Manager
Katrina Idleman, South Whitehall Township Parks and Recreation Board Secretary
Dennis Barr, North Whitehall Township Recreation Board

Consultants:

Yost Strodoski Mears, York, PA
LandStudies, Lititz, PA

This project was financed in part by a grant from the Community Conservation Park Partnership Program, Keystone Recreation, Park and Conservation Fund, under the administration of the Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation.

This project was funded in part by a grant from County of Lehigh, Department of Community and Economic Development.

February 2014

Covered Bridge Park Master Plan

Table of Contents

Chapter 6 – Covered Bridge Park Master Plan

Chapter 7 – Jordan Creek Greenway

Chapter 8 – Cost & Implementation Analysis

List of Maps

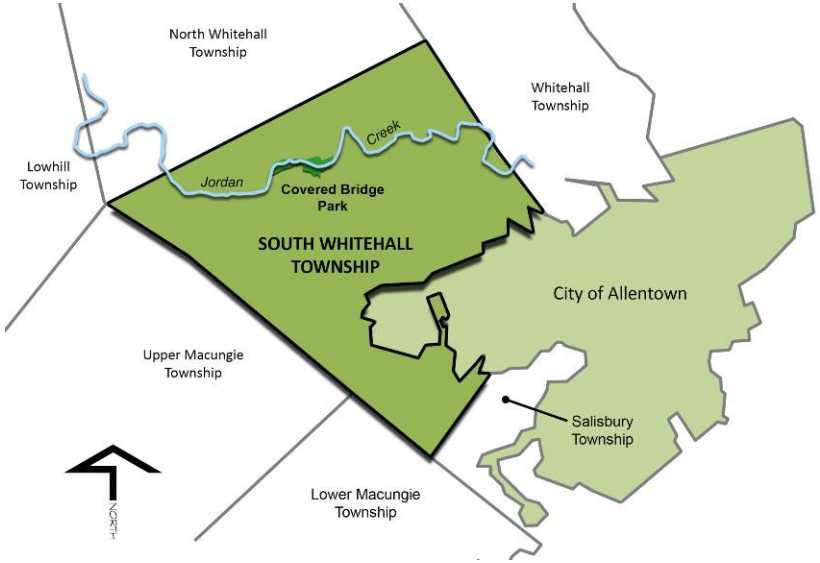
Executive Summary

Introduction

Covered Bridge Park Master Plan creates a vision for an enhanced and expanded community park. As the largest community park in South Whitehall Township, Lehigh County, Covered Bridge Park serves the residents of the municipality and visitors from nearby communities. The developed park encompasses 89.83 acres and includes facilities and resources for passive and active recreation. The master plan incorporates a 24.01 acre parcel acquired by the municipality in 1994 for park expansion, increasing the overall park to 113.92 acres. The master plan recommends facilities and site enhancements which reflect the recreation needs and interests of residents. Additionally, the master plan defined the route of the Jordan Creek Greenway Trail in the park and extension of the trail from Covered Bridge Park to Cedar Crest Boulevard to the east, and PA Route 309 to the west.

Covered Bridge Park and the Jordan Creek Greenway

Covered Bridge Park extends along Jordan Creek and gets its name from the two covered bridges that anchor the eastern and western portions of the park. The park's greatest asset is Jordan Creek and the mature trees that line its banks. The Jordan Creek Greenway connects the park to the Appalachian Trail on top of the Blue Mountain to the urban core of the City of Allentown. Covered Bridge Park's location and facilities make it an ideal trailhead along the greenway corridor.



Planning Process

The foundation of the planning process for the Covered Bridge Park Master Plan was community input through various public involvement strategies. The planning process included four parts:

1. Inventory and Assessment
2. Public Participation
3. Park Master Plan
4. Costs and Implementation

Public input to guide the planning process was gathered by working with a study committee, conducting key person interviews, and holding three public meetings. Project goals were defined based on the findings of the public participation process.

Covered Bridge Park Goals

- Maintain and enhance the park's beautiful setting.
- Meet the recreation needs of Township residents and provide a diverse variety of recreation opportunities to serve people of differing ages, interests, and abilities.
- Enhance and upgrade facilities, address accessibility, and improve park function and the convenience of using the park.
- Expand walking opportunities.
- Address opportunities and issues associated with Jordan Creek – flooding, dam removal, gabions, fishing access, and riparian buffer.

Covered Bridge Park Master Plan

Covered Bridge Park Master Plan defines the overall vision for the park, the extension of the Jordan Creek Greenway Trail through the park. The Master Plan illustrates the physical configuration of proposed improvements and strategies for resource enhancements. The design highlights the Jordan Creek riparian corridor and respects its associated floodplain. Covered Bridge Park Master Plan accomplishes the following objectives:

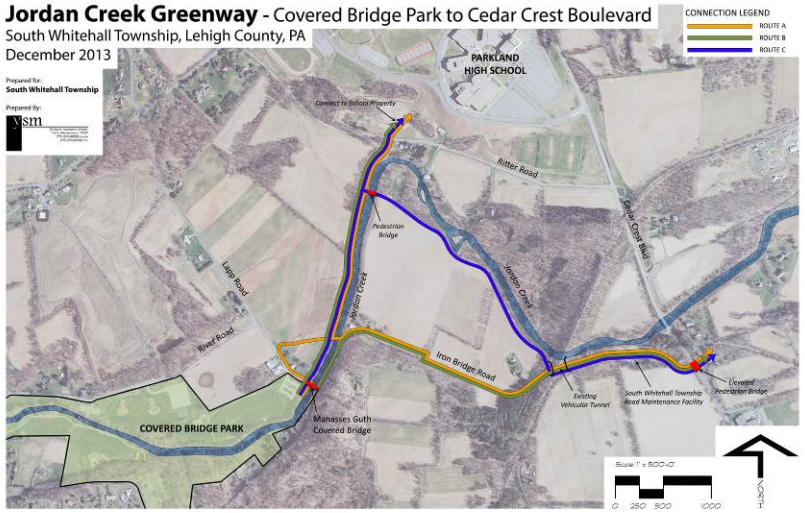
- Expands the trail network. Provides looping trails for a variety of trail experiences and lengths.
- Defines the trail alignment for the Jordan Creek Greenway Trail through the park and develops trailhead amenities.
- Assumes that Wehr's Dam will be removed and Jordan Creek will be realigned to its historic/natural alignment.
- Improves the riparian buffer corridor. Removes gabions and soften and stabilize creek banks. Expands the width of the riparian corridor and enhance it with native vegetation.

- Maximizes access to Jordan Creek. Adds accessible fishing and paddle craft launch/pull out facilities/areas.
- Improves park function and visitor convenience by increasing the number of restrooms and parking areas to achieve better service and shorter distances between these amenities and park facilities and activity areas.
- Improves athletic fields with consideration of flooding, wet areas, and convenient access.
- Increases picnic opportunities.
- Increases playground opportunities.
- Realigns the disc golf course to reduce impacts on the woodlands.
- Adds new facilities to include:
  - Basketball courts
  - Sand volleyball courts
  - Dog park
  - Event area

Jordan Creek Greenway Trail

The Jordan Creek Greenway is a 53.3-mile greenway following the Jordan Creek in Lehigh County. The potential of developing an active greenway with a public trail along the Jordan Creek corridor was explored in the 2009, *Jordan Creek Greenway Feasibility Study*. The greenway extends from Jordan Meadows Park in the City of Allentown to the Appalachian Trail at Blue Mountain in Lynn Township. Covered Bridge Park is one of several recreation amenities located along the greenway. This master plan defined the following elements of the Jordan Creek Greenway:

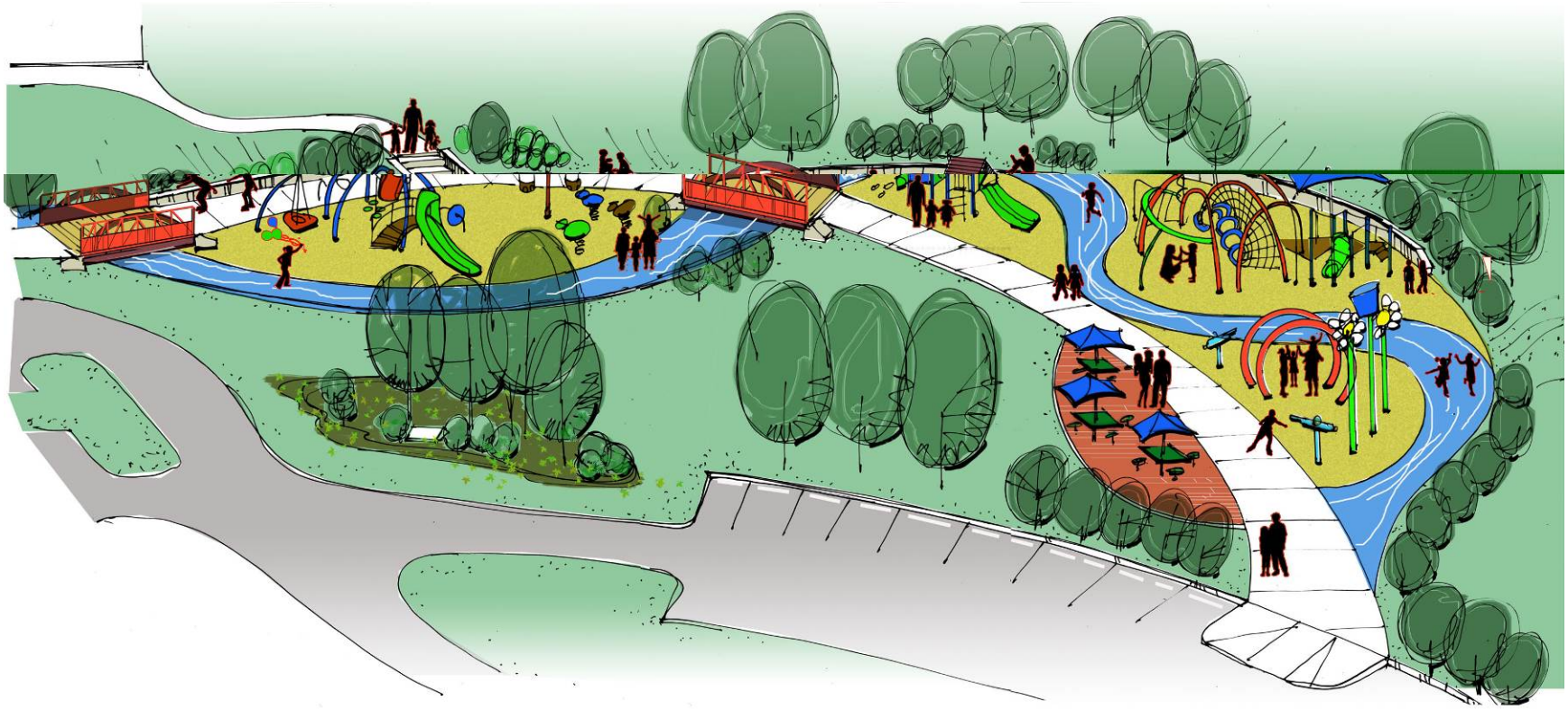
- Alignment within Covered Bridge Park.
- Trailhead locations and amenities.
- Alignment of the greenway trail from Covered Bridge Park west to PA Route 309 and east to Cedar Crest Boulevard.



Master Plan Implementation Strategies

Covered Bridge Park as envisioned by the master plan will not happen immediately. Municipal parks are typically developed in phases, over time, as grant funding becomes available. To sustain the excitement for park improvements that this planning process has generated, small projects could be undertaken to create momentum for the entire project. Improvements, such as a new destination playground, pavilions, and entry and interpretative signs will show progress and provide enhancements that will immediately benefit citizens.

The master plan defines eight separate development phases and provides detailed cost estimates for each phase. Development must be proceeded by detailed design and engineering and will require numerous agency reviews, approvals, and permits prior to construction.



Covered Bridge Park Master Plan

South Whitehall Township, Lehigh County, PA
December 2013

Chapter 1
Background Information

Introduction

This planning project provides a vision for an enhanced and expanded Covered Bridge Park. Covered Bridge Park is the largest community park in South Whitehall Township, Lehigh County and has served the residents of the municipality and surrounding municipalities for decades. The developed park encompasses 89.83 acres and includes facilities and resources for both passive and active recreation. The master plan also included a 24.01 acre parcel acquired by the municipality in 1994 for park expansion, increasing the overall park to 113.92 acres. The master plan illustrates the future vision for the park to respond to the recreation needs and interests of residents. Additionally, the master plan explored opportunities to locate the Jordan Creek Greenway Trail in the park and extend the trail from the Covered Bridge Park to Cedar Crest Boulevard to the east and PA Route 309 to the west.

Planning Process

The Covered Bridge Park Master Plan planning process included four parts:

1. Inventory and Assessment
2. Public Participation
3. Park Master Plan
4. Costs and Implementation

1. Inventory and Assessment

The natural resources and existing features of Covered Bridge Park were viewed and assessed throughout the summer and fall of 2013. Natural resources and manmade facilities were evaluated, visitor use patterns were observed, and site opportunities and constraints were explored. The municipal and regional setting was investigated to consider surrounding land uses, potential and existing linkages, and other influences on the park site.

2. Public Participation

Citizen and stakeholder input was sought throughout the planning process to broaden the consultant teams understanding of how the park is used, investigate citizen's recreation needs and interests, and explore opportunities and issues associated with the park and its use. Public input was gathered by working with a study committee, completing interviews with stakeholders, and conducting three public meetings.

3. Park Master Plan

Conceptual alternative designs were developed to illustrate different approaches to enhancing and further developing Covered Bridge Park to achieve the goals of the community. The study committee reviewed the conceptual alternatives and provided direction for the preparation of the pre-final design. The master plan for Covered Bridge Park was finalized based on the findings and conclusions of the planning process.

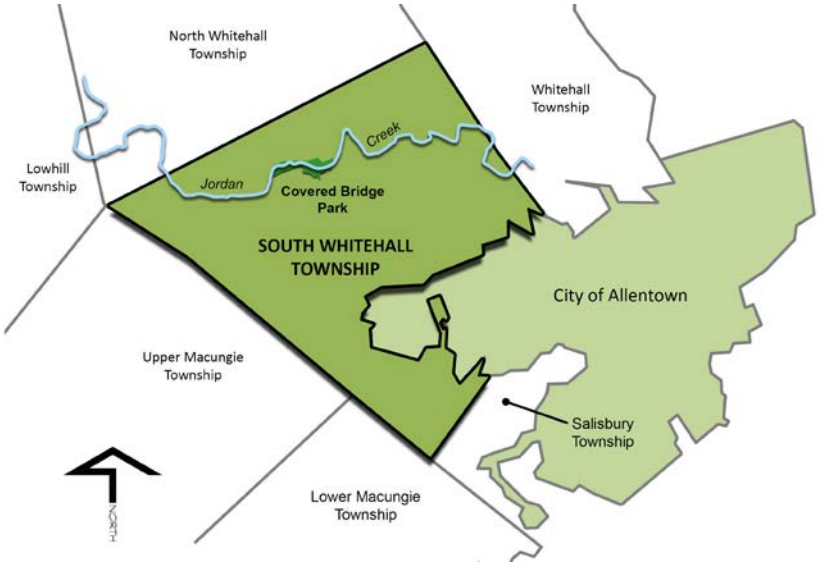
4. Costs and Implementation

Probable construction cost opinions and a phasing plan for implementing the master plan were completed. Implementation strategies and considerations were identified.

Covered Bridge Park

Covered Bridge Park is located in South Whitehall Township, Lehigh County, Pennsylvania. The Township is located west and north of

the City of Allentown and abuts North Whitehall, Whitehall, Upper Macungie, Lower Macungie, and Salisbury Townships. The park extends along the Jordan Creek and gets its name from the two covered bridges that anchor the eastern and western portions of the park. The park's greatest asset is Jordan Creek which is controlled by a dam within the park. Fishing and paddling the creek are popular seasonal activities.



Background and History

South Whitehall Township (Summarized from the South Whitehall Township website)

South Whitehall is part of the Lehigh Valley metropolitan area which includes Allentown, Bethlehem, and Easton. The Township is approximately 55 miles northeast of Philadelphia and 90 miles west of New York City. South Whitehall Township is a First Class Township.

The Lehigh Valley was first settled by Germans, Swiss and Huguenots beginning about 1732. Settlers were drawn to the fertile, limestone valley and rivers and streams of the Lehigh Valley. South Whitehall Township was originally part of Bucks County and then Northampton County after its establishment in 1752. South Whitehall was established in 1810 when the former Whitehall Township was divided into North Whitehall and South Whitehall. In 1812 Lehigh County was divided off from Northampton County and in 1864 Whitehall Township was formed from portions of North and South Whitehall Townships.

South Whitehall Township Park System

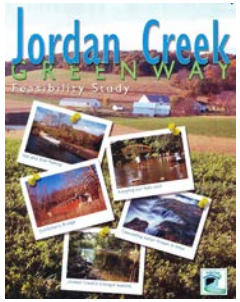
South Whitehall Township has 24 parks and open space parcels comprising 175.86 acres. Covered Bridge Park is the largest park and the only community park in the municipality. The other park and open space properties are significantly smaller and are all classified as neighborhood parks in the 2009 Joint Comprehensive Park, Recreation and Open Space Plan for North and South Whitehall Townships.

Local and Regional Planning Initiatives

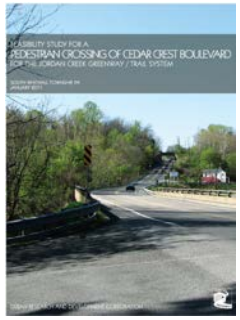
The following local and regional planning initiatives were referenced as part of the planning process for the Covered Bridge Park Master Plan.

North and South Whitehall Joint Comprehensive Park, Recreation and Open Space Plan, 2009 – This plan looked comprehensively at the park and recreation facilities of the two municipalities. This plan recommends acquisition of additional recreation land in South Whitehall Township, and targets lands along Jordan Creek and contiguous to Covered Bridge Park. A citizen questionnaire was sent to each household in the municipality to assess recreation needs and identified the top recreation priorities as hiking/biking trails, nature preserves and environmental protection, and public/community gardens.

Jordan Creek Greenway Feasibility Study – The Jordan Creek Greenway Feasibility Study explored the possibility of developing a 53.3-mile trail within the Jordan Creek watershed connecting along the Jordan Creek from the City of Allentown to the Appalachian Trail at the ridgeline of Blue Mountain.



Feasibility Study for a Pedestrian Crossing of Cedar Crest Boulevard for the Jordan Creek Greenway/Trail System – The purpose of this study was to identify three potential pedestrian crossings of Cedar Crest Boulevard in the vicinity of Jordan Creek that would serve as part of a future, non-motorized, greenway and trail system. The findings and determination of the most feasible crossings from this study were used to define the eastern extension of the Jordan Creek Greenway linkage from Covered Bridge Park to Cedar Crest Boulevard.



South Whitehall Township Comprehensive Plan: A Balanced Path Forward (2009) – The South Whitehall Township Comprehensive Plan references and supports the Joint Comprehensive Parks, Recreation and Open Space Plan for North Whitehall and South Whitehall Townships. The Comprehensive Plan notes that the Joint Plan emphasizes large parks and the development of the Jordan Creek Greenway.

Comprehensive Plan – The Lehigh Valley … 2030 (2005, updated 2010) – The Comprehensive Plan, The Lehigh Valley … 2030 includes the following recreation goals and policies that relate to Covered Bridge Park.

- Goal – To provide and maintain adequate space and facilities to meet the recreation needs of Lehigh Valley residents.
  - Current recreation activity trends and local demographics should be used when planning for new recreation facilities and programs.
  - Municipalities should be responsible for providing mini-parks, neighborhood parks and playgrounds, and community parks.
  - High priority should be given to acquiring parkland and open space along rivers and major streams.
  - The needs of the handicapped should be considered in any recreation and open space planning.
- Goal – To preserve open space and important natural areas.
  - Important natural areas should be preserved as part of parks and open space areas whenever possible.
- Goal – To protect rivers and streams so they can provide numerous recreational and environmental benefits to Lehigh Valley residents.
  - Encourage the restoration of riparian buffers on lands that border rivers and streams.
  - Recommend riparian buffers of 75 feet.
  - Encourage riparian buffers that contain a variety of native trees and plants. Discourage the development of riparian buffers with monocultures of exotic vegetation.
- Goal – To support bicycle and pedestrian activity and to provide safe access to the transportation system for cyclists and pedestrians in the Lehigh Valley.
  - Promote the construction of missing links in the bicycle and pedestrian networks.
  - Support future development patterns conducive to non-motorized travel.

The planning process for Covered Bridge Park Master Plan considered the goals and policies defined in the Comprehensive Plan – The Lehigh Valley … 2030 and proposed future facilities and enhancements that align with these objectives.

Lehigh Valleys Greenway Plan (2007) – The Greenway Plan describes the Jordan Creek Greenway which extends from the confluence of Jordan Creek with the Little Lehigh Creek in the City of Allentown, northwest through the heart of Lehigh County to the Appalachian Trail along the ridge of the Blue Mountain. Covered Bridge Park is noted as an important recreation resource along the greenway.

Jordan Creek Watershed Conservation Plan (2000) – This plan was completed by the Wildlands Conservancy and outlines goals and objectives to enhance Jordan Creek. The Plan goals include:

- Improve Water Quality in the Jordan Creek and its tributaries.
- Preserve and protect significant and valuable land resources.
- Document water quality and biological characteristics.
- Increase and enhance watershed recreational opportunities.
- Preserve historical resources.
- Increase environmental awareness, knowledge, skills and stewardship commitment among those living in the Jordan Creek watershed.

Demographics

The population data and projections for South Whitehall Township and Lehigh County are listed below and on the next page. The Township's population has increased over the previous decade, although at a smaller rate than the County. The population projections for South Whitehall Township suggest that population growth will continue at a greater rate than the last decade, with double digit growth projected between 2020 and 2040. This suggests an ongoing need for expanded recreation amenities and opportunities.

The Township is getting older with the median age increasing by 1.5 years between 2000 and 2010. This indicates the need for recreation opportunities for residents to enjoy throughout their lifetime, including older residents.

South Whitehall Township is a relatively homogenous community with 89.8 percent Caucasian in 2010. African Americans make up 2.8 percent of the population, and Latino population is 4.7 percent.

South Whitehall Township/Lehigh County Population Data

Township / County	2000 Population	2010 Population	Percent Change	2020 Projection	2030 Projection	2040 Projection
South Whitehall Township	18,028	19,180	+ 6.39	21.513	24,119	26,621
Lehigh County	312,090	349,497	+ 11.98	385,710	427,162	369,975

Source: Population – U.S. Census Bureau, Population Projection - Lehigh Valley Planning Commission

South Whitehall Township Age of Population 2000-2010		
Age Group	2000	2010
Under 5 yrs.	4.2%	4.3%
5 – 24 yrs.	21.9%	21.2
25 – 44 yrs.	22.4%	20.8
45 – 54 yrs.	16.7%	16.0
55 – 64 yrs.	10.4	15.8
65 – 74 yrs.	10.1	9.2
75 – 84 yrs.	8.6	8.2
85 yrs. +	5.8	4.6
Median Age	45.9 yrs.	47.4 yrs.

Source: U.S. Census Bureau

Chapter 2
Public Participation

Introduction

Public participation was a key component of the planning process for the Covered Bridge Park Master Plan and includes three components: a study committee, stakeholder interviews, and public meetings.

Study Committee

South Whitehall Township appointed a study committee that included the South Whitehall Township Public Works Manager, a representative of the South Whitehall Township Parks and Recreation Board, and a representative of the North Whitehall Township Recreation Board. The study committee was very familiar with Covered Bridge Park and was tasked with steering the development of the master plan and working with the project consultants. The study committee provided input throughout the planning process and attended committee and public meetings.

Key Person Interviews

The consulting team conducted key person interviews to obtain input regarding the current use of Covered Bridge Park, recreation programs, recreation needs in the community, and other information to inform the planning process. Input was gathered from representatives of Lehigh County, the Discover Lehigh Valley, the South Whitehall Township Recreation Director, Parkland School District Director of Visual and Performing Arts and Athletic Director, Wildlands Conservancy, the Pennsylvania Fish & Boat Commission, South Parkland Youth Association, Grandlawn Baseball Association, Parkland School Lacrosse, and others. Interviewees were provided a brief background on the project and asked questions relative to their expertise or program and knowledge of Covered Bridge Park.

Public Meetings

Three public meetings were held to present project findings to the public and solicit input at various stages of the design process. The first meeting was scheduled early in the planning process to gather general input from the public regarding their ideas and concerns about Covered Bridge Park. The meeting was held at the Township building as part of a South Whitehall Township Parks and Recreation meeting and was attended by approximately 15 representatives of the public and the Parks and Recreation Board. Public input from the meeting guided the development of the conceptual alternative plans.

A second public meeting was held mid-way through the planning process to present the pre-final master plans for comment. The consultants described the planning process, key findings of the needs assessment, and the pre-final master plan design. Approximately a dozen residents attended the meeting. Meeting discussion focused on explaination of the design, privacy concerns of nearby neighbors, and implications of the removal of Wehr's Dam.

The final public meeting to present the master plan for Covered Bridge Park was held on February 19, 2014 as part of a South Whitehall Township Board of Commissioners meeting. Comments from the public and Board of Commissioners were addressed following the presentation. The Board of Commissioners approved the Covered Bridge Park Master Plan by resolution.

The public meetings were promoted through the municipal web-site, outreach to park neighbors, and flyers posted in the park and public facilities encouraging the public to attend and voice their thoughts on the Covered Bridge Park Master Plan.

Findings of the Public Participation Process

The following summarizes the input and findings of the public participation process.

Parking – The location and quantity of parking is an issue for organized sports leagues. Concerns include:

- The distance from parking to Field #4. Umpires complain because they are often late for games and did not realize how far they had to walk to the field. The distance is almost prohibitive for seniors (grandparents). SPYA Baseball sent an e-mail requiring Field #1, 2, & 3 users to use the eastern two parking lots so that the lot at the pedestrian bridge is available for Field #4 users.
- Generally more parking is needed for sports field users.

Baseball/Softball – The biggest need in the region is another 90' baseline field. Field #4 is well used. Field #3 is only used for practice as it does not dry out after rain events and flooding is an issue. Field #4 dries out well after flooding.

Soccer – Covered Bridge Park is the "home" of Parkland Area Soccer Club (PASC) which serves 900- 1,000 kids. PASC likes the central location and easy access. They would like additional soccer fields of any size – full size fields are best because of the flexibility to use for any age group.

Tournaments/Special Events – Discover Lehigh Valley Sports (part of the Lehigh Valley Visitor's Bureau) promotes sports venues in the Lehigh Valley and works to bring tournaments and special events to the area. Covered Bridge Park is an attractive location for tournaments as a standalone venue or as a second site to augment the Lehigh County Sports Field Association facilities. Discover Lehigh Valley Sports would like to do more tournament programming in Covered Bridge Park. The park has potential for flag football/soccer/ultimate Frisbee/field hockey/lacrosse/ softball/etc. tournaments, if fields are seeded properly or synthetic turf fields developed. The main items needed to hold tournament activities in the park are:

- Adequate entry/exit control for traffic flow.
- Adequate restrooms.
- Pavilions scattered throughout the park (used for staging areas, medical personnel, concessionaires, etc.).
- Adequate spectator staging areas.
- Parking – OK now for existing facilities.

Amphitheater/Stage – There is no preforming arts use of the park by Parkland High School, but, if facilities were available they would be used. Seasonal limitations are an issue for student use. If you build it – they will come. An amphitheater would be used by the community for plays, fundraisers, church use, community groups, and movies. An amphitheater is a good idea. The park is underused now and is a beautiful setting.

Fishing – Pennsylvania Fish & Boat Commission (PAF&BC) stocks the stream three times/year by driving along the paved trail and dumping fish in at seven-eight spots within the park. They do not stock at the dam for safety reasons. The primary concern for viable fishing is warm and rising temperatures. Covered Bridge Park is popular for fishing because:

- It has great public access.
- It has convenient parking.
- There is a trail for access.
- There is a narrow or non-existent riparian buffer. The PAB&FC notes the inherent conflict with the riparian buffer

comment. They promote wider buffers for ecological reasons but acknowledge that wider buffers are a deterrent to anglers. There is a fear of ticks and mowed/maintained areas are used more frequently by anglers than non-maintained areas.

The closest handicap accessible fishing area is at Union Terrace Park pond in the City of Allentown and it may be restricted to use by children.

Dam/Gabion Removal – The PAF&BC and Wildlands Conservancy are in favor of removing the dam for the following reasons:

- It is a safety issue.
- It prevents fish passage.
- Removal will increase fish populations.
- Removal will lower the temperature of the stream.
- Removal will provide more habitat areas.

The Wildlands Conservancy has an initiative to remove the nine dams along the Jordan Creek, including Wehr's Dam. Wildlands Conservancy would also like to see the gabions removed, the riparian corridor enhanced and enlarged with forest buffer plantings, and meadows developed in Covered Bridge Park.

PAF&BC would also like to see the gabions removed for the following reasons:

- They are stacked in manner that is not stable and will be undercut by the stream overtime and fall into the stream.
- Removing the gabions would provide more habitat areas.

Trails – People in the Lehigh Valley love trails. Park visitors expressed a desire for additional trails and loop configurations in the park for casual walking and exercise routines.

Jordan Creek Greenway Trail – The Barry Isett & Associates trail development plans define the Jordan Creek Greenway Trail route from Covered Bridge Park to Route 309 to the west. East of the park the route of the Jordan Creek Greenway Trail is not defined. Landowners have knowledge of the Jordan Creek Greenway and trail initiative but easements have not been secured. The bridge crossing of the future trail over Cedar Crest Boulevard is preferred of the options outlined in the pedestrian crossing feasibility study. Norfolk-Southern has not been helpful to work with on other trails in the area.

Playground – Consider a "nature" playground and places for kids to play in nature. The existing playground is at the end of its life, is not ADA compliant, and should be replaced.

Programs in the Park – In the past, Wildlands Conservancy held nature-based programs in the park and would do so again. Wildlands Conservancy needs parking, a pavilion, and access to diverse natural settings for their programs. Participants usually drive to program sites, but parking for one bus is a good idea. Stream-based programs could be provided in the park.

Park Aesthetics and Maintenance – The park is well maintained and beautiful. The setting of the park with the two covered bridges, Jordan Creek, and mature trees is nice. The Township does a great job cleaning up the park after a flooding event. Make minor tweaks to the park – don't change it.

Project Goals

The following goals were defined for Covered Bridge Park based on the findings of the planning and public participation process.

- Maintain and enhance the park's beautiful setting.

- Meet the recreation needs of Township residents and provide a diverse variety of recreation opportunities to serve people of differing ages, interests, and abilities.
- Enhance and upgrade facilities, address accessibility, and improve park function and the convenience of using the park.
- Expand walking opportunities.
- Address opportunities and issues associated with Jordan Creek – flooding, dam removal, gabions, fishing access, and the riparian buffer.

Chapter 3
Resource Analysis

Introduction

Covered Bridge Park is an existing community park developed with a variety of facilities for active play, creek access, and self-directed and organized community recreation. Natural resources are associated with the Jordan Creek and its riparian corridor. An inventory and analysis of the park's natural and man-made resources was completed early in the planning process and subsequent field work was undertaken to view the park in different seasons. A detailed study of Jordan Creek within the park was completed to understand the creek dynamics and impact on the site. Additionally, consideration was given to the potential removal of the dam, immediately west of the Wehr's Covered Bridge, to determine the effects both upstream and downstream. This creek study is detailed in Chapter 4 of this report.

A comprehensive resource inventory and analysis is critical to guide park planning. Park inventory and analysis:

- Defines areas that contain sensitive resources that should be protected, buffered, and/or enhanced.
- Considers the ability of resources to sustain and thrive with the continuation, addition, or introduction of public use.
- Explores resources that contribute to the visitor's experience.
- Evaluates man-made features to determine their appropriateness and utility in the park setting and ability to continue to meet user needs in the future.
- Explores the context of the park site and surrounding area/ region.
- Investigates potential site characteristics or resources that pose development or use limitations, concerns for health and safety of park visitors, or other concerns.
- Explores existing user patterns, maintenance practices, and functional considerations.

Good park design and relevant park master plans are born of a comprehensive resource analysis. Exploration of Covered Bridge Park was the first critical step in creating a future vision for the park.

Regional Connections

South Whitehall Township and Covered Bridge Park are located along the Jordan Creek Greenway Trail. The Jordan Creek Greenway Trail is a vision spearheaded by the Wildlands Conservancy, traversing ten municipalities in Lehigh County. The proposed 53.3-mile greenway targets connecting the urban center of the City of Allentown to the Appalachian Trail on the ridge of the Blue Mountain. The greenway is defined in the *Jordan Creek Greenway Feasibility Study*, prepared by the Wildlands Conservancy in September 2009. The greenway includes off-road trail segments and shared roadways. The greenway has broad support from surrounding municipalities and agencies involved in the study.

South Whitehall Township is actively pursuing installation of the greenway trail. In 2012, construction drawings were developed for a segment of trail from Wehr Mill Road, west to the bridge that carries the Northeast Extension of the Pennsylvania Turnpike over Jordan Creek. The drawings propose a 10- wide bituminous trail and pedestrian bridge crossing of the Jordan Creek near the existing recreation building. In 2011, a study was completed to evaluate trail connections from Covered Bridge Park, east to Cedar Crest Boulevard. The study evaluated crossing options and made recommendations on ways to move the trail forward. These two

studies create a blueprint to navigate the Jordan Creek Greenway Trail through South Whitehall Township and have created momentum for the project. Trail connections are further described in Chapter 7 – Jordan Creek Greenway.

Covered Bridge Park Site Analysis

The Covered Bridge Park Site Analysis Map is provided at the end of this chapter.

General Site Data

Size / Location – Covered Bridge Park is approximately 113.84 acres in size. The majority of the parcel is well developed with recreation facilities and well maintained. An undeveloped parcel, acquired in 1994, is located west of the developed park. This 24 acre parcel is on the north side of Jordan Creek and maintained as agricultural fields.

Existing and Surrounding Land Use – The park has open lawn areas, vegetated riparian areas, and recreation and support amenities. Surrounding land use includes residential to the north, agricultural fields to the west, and rural residential to the south and east. Beyond the residential area in the southeast, a large woodlands owned and maintained as a rod and archery club.

Zoning – The park site and surrounding land use is zoned R-H Rural Holding. Public buildings and uses are a permitted uses within the district with a minimum 5 acre lot size. The majority of the park site is within the 100-year floodplain boundary and subject to the Township's Floodplain regulations (Chapter 12A).

Water Resources

Additional discussion of the resources and analysis of Jordan Creek is provided in Chapter 4.

Creek – Jordan Creek is the focal point of Covered Bridge Park. The creek is approximately 50 feet wide throughout the park. The park has approximately 7,200 feet (1.3 miles) of creek frontage. Chapter 93 of the Pennsylvania Code classifies Jordan Creek as Trout Stocking (TSF) and Migratory Fishes (MF). The TSF designation provides for maintenance of stocked trout and propagation of fish species indigenous to warm water habitat. The MF designation protects the passage, maintenance, and propagation of fishes which move to or from flowing water to complete their life cycle.

Throughout the course of a year, the creek corridor withstands heavy spring flows, low flow periods during the summer, and periodic and seasonal flooding. The 100-year floodplain encompasses much of the park area.

The creek is stocked by the Pennsylvania Fish Commission every spring. Residents enjoy fishing, birding, canoeing, kayaking, walking, picnicking, and viewing the creeks' scenic beauty.

Dam – A small low-head dam exists immediately west of the Wehr Mill Road crossing of the creek. The dam is a remnant of a former grist mill located on the north side of the creek. The dam pools water upstream and creates a six-foot waterfall from its breast.

Floodplain – The mapped 100-year floodplain encompasses a majority of the park. The observed seasonal flood levels generally align with the mapped floodplain.

Wetlands – The National Wetlands Inventory (NWI) map was reviewed. No wetlands were identified within the boundary of the park site. A wetland field delineation was not completed as part of this study.

Stormwater/Drainage – The park site and upland area drain to the Jordan Creek. Several drainage pipes convey stormwater under River Road and discharge directly into the creek. Stormwater in the park is conveyed to the creek via sheet flow and earthen swales.

Land Resources

Soils – Five soil classifications are present on the park site, which are characterized on the following chart. The soils are generally good for park development with the exception of the Holly soils, which occupy the banks along the creek and the steep Washington soils. The Holly soils contain hydric components and are shallow to the water table.

Soils of Covered Bridge Park					
Soils	**BmA – Birdsboro Silt Loam**	**Ho – Holly Silt Loam**	**Lv– Linden Loam**	**Me – Middlebury Silt Loam**	**WaB / WaD – Washington Silt Loam**
Slope	0-3%	0-3%	0-3%	0-3%	3-8%/ 15-25%
Depth to Bedrock	very deep	very deep	very deep	very deep	very deep
Seasonal Water Table	24-72 inches	0-12 inches	36-72 inches	6-24 inches	> 60 inches
Flooding Potential	none	frequent	rare	occasional	none
Hydric	no	yes	no	no	no
Prime Farmland	yes	yes	yes	yes	Yes (WaB) No (WaD)

Topography – The site is divided by the low point of the Jordan Creek. Generally, the site slopes to the creek and contains typical floodplain topography with shallow low-lying floodplain area, with steep side walls beyond. The floodplain/floodway occupies the lower elevations, to the toe of slope. The grade changes mark typical high water and floodplain elevations. The southeastern portion of the site contains the most significant elevation changes

with dramatic rock outcrops, punctuating the steep woodlands. Erosion is noted on the steep slopes.

Vegetation – The park has a variety of mixed mature deciduous trees, riparian vegetation, and maintained lawn areas. The vegetation is predominantly oriented along the waters edge and is primarily deciduous trees, with minimal understory. Numerous mature canopy trees are scattered throughout the lawn areas. The woodland cover increases in the eastern portion of the site, blanketing the steeper topography. The understory of the woodlands in the east are worn down from heavy pedestrian use associated with disc golf.

Riparian Buffer – The vegetation along the riparian corridor in the western end of the park is predominately mowed lawn with mature canopy trees dotting the water's edge. The eastern portion of the site is more rugged with a mature woodland corridor and steep eroded banks along the creek. Large trees in the riparian corridor are critical for creek bank stabilization.

Invasive Species – The site is well developed with a majority of the site maintained as mowed lawn. Few invasive species were noted within the park boundary. Riparian areas are difficult to protect from invasive species and weed seeds which are often transported by flood waters.

Wildlife Habitat – The riparian corridor's mature trees provide important nesting and roosting habitat. Small mammals such as squirrels, chipmunks, rabbits, and mice would typically occupy the site.

Views – The park site affords picturesque views. With the current vegetative cover, open views are provided to the two covered bridges and scenic points along the creek.

Man-Made Resources and Influences

Site Access / Vehicular Circulation – Five points of vehicular access are available for Covered Bridge Park. Wehr Mill Road provides access to a 30-car parking area at the recreation building and a 93-car parking area at the hub of the park. River Road contains two points of access to the site. A 42 car parking area is developed adjacent to the pedestrian bridge, and a second 134-car parking area is developed in proximity to the three baseball fields. A large 73-car parking area with access from Lapp Road serve the eastern multi-purpose field. Each parking area is paved and the three eastern most parking areas are developed with lights.

Vehicular access to the undeveloped agricultural fields in the west is available from Rachael Lane, a residential street terminating at the park site.

Trails – One main spine trial is developed through the park on the south side of the creek. The 10' wide paved trail begins in the hub parking area near Wehr Mill Road and terminates at the maintenance area on the upland portion of the park at Wehr Mill Road. Narrow paved trails provide access from the spine trail to the playground areas, pavilions, restroom, athletic fields and courts. Earthen trails traverse the woodlands. One main pedestrian crossing of the Jordan Creek is provided, central to the park site. The pedestrian bridge connects to the parking areas, restroom building, and fields on the north side of the creek. The south side of the bridge is developed with steps, making it inaccessible to persons with disabilities. Generally, the existing paved trails are accessible, however, steep slopes south of the hub parking area restrict accessibility to the nearby playgrounds, pavilion and restrooms.

Utilities / Infrastructure –

Electric – Electric service currently extends to the picnic pavilion and restroom in the western portion of the site. Electric service is developed for the athletic fields on the north side of the

creek. This service was installed in anticipation of providing sport field lighting at each field. Conduit is installed to each field, however, no sports lights are currently provided.

A large overhead electric transmission line crosses the site running north to south immediately west of the recreation building. The lines are contained within a 200 foot wide easement. A secondary, 100-foot wide electric easement bisects the western end of the site. Easement regulations prohibit structures and typically restrict grading activities.

Gas – An underground gas pipeline, runs north to south across the agricultural fields, west of Wehr Mill Road, in a 100-foot wide easement. No structures are permitted within the easement. A second 50-foot wide pipeline easement crosses the site, west of the existing pedestrian bridge.

Water – Public water is available in Wehr Mill Road and River Road and is provided to the two restroom structures on site. Hydrants for irrigation are also provided at the athletic fields on the north side of the creek.

Sanitary – Sanitary sewer is not available at the park site. The existing restrooms are served by on-lot septic systems. The septic field for the western pavilion is located immediately east of the building. The system for the eastern facility is on the eastern side of the parking area at the pedestrian bridge. Both septic systems are located outside of the 100 year floodplain.

Structures – There are numerous structures in the park: three pavilions, two restrooms, and a recreation building.

Pavilions – Three pavilions are provided, each located on the south side of Jordan Creek. The Mary Ann Bungerz Pavilion (Pavilion 5904), is located on the hill adjacent to the restroom building in the park hub. The pavilion serves up to 50 patrons with eight picnic tables. The William T. Derricot Pavilion (Pavilion 5905) is located near Jordan Creek, east of the hub parking area and contains 12 picnic tables, serving groups up to 75 people. The largest pavilion, known as Pavilion No. 3, (Pavilion 5906) accommodating up to 100 people, is located deep in the park site, near baseball field #4. This large pavilion contains 16 picnic tables but is distant from convenient parking and comfort facilities. Each pavilion is stick-built, with open rafters and a concrete pad. There is no accessible trail to Pavilion #3. Grills are provided at each structure. Each pavilion may be reserved for a fee.

Restroom Buildings – Two restroom buildings are provided for Covered Bridge Park. A small block restroom building is located near the Mary Ann Bungerz Pavilion, playground, and main parking area, convenient to the hub of the park. The restroom is separated from the main parking area by a steep slope, making it inaccessible. A second restroom building is provided near the existing baseball fields. Each restroom is served by

public water and onsite septic system. Each facility and septic system is outside of the 100 year floodplain.

Recreation Building – A 34' x 80' recreation building exists on the west side of Wehr Mill Road, adjacent to Wehr's Covered Bridge. The first floor of the block and stucco structure is elevated 3-4 feet above grade, with open space below, enclosed by block. The single floor structure includes a large open room with kitchen area and restrooms. The structure is prone to flooding and flood damage.

Recreation Facilities – Traditional recreation facilities are located within the developed portion of the park and include four baseball fields, four multi-purpose/soccer fields, a playground area, a handball court, and disc golf course.

Baseball Fields – Two youth baseball fields (Fields 1 and 2) are developed on the north side of the park. Field #1 is approximately 180' to center field. Field #2 is developed with a 215 foot foul line and is approximately 250 feet to the center field pocket. These fields are well developed with concrete block dugouts and fully skinned 60-foot baseline infields. The solar orientation of these fields is acceptable with the batter facing the southwest. These fields are located within the 100 year floodplain, but are well maintained and in excellent condition. A nearby field, known as Field #3, also has a 60-foot baseline but has a poor solar orientation with the batter facing west/southwest. The outfield length of this field is approximately 250 feet. Field #3 does not have dugouts, and is subject to periodic flooding and extended periods of damp soils. Field #4 is located on the south side of Jordan Creek, in close proximity to Pavilion #3. This is the largest field, with a 90-foot baseline and a minimum 300' outfield. The outfield is overlay with a soccer field, extending the available outfield area. The field is well developed with dugouts and an accessible trail. Solar orientation is acceptable. This field is also in the floodplain and subject to flood damage. The field location in the park is distant from convenient parking area and comfort facilities.

All fields are located in the 100-year floodplain and are seasonally flooded. Baseball and softball are traditional spring sports and use of the fields is often postponed while the fields are under water or drying out from flood events.

Handball Court – A 68' x 20' double handball court with a 20-foot tall, center concrete wall is located near the playground area. The wall provides two 34'x20' courts. The courts are enclosed in a 94'x36' fence, providing run out room on all sides. The courts are oriented east-west. The pavement surface and wall appear to be in good condition with minor, superficial, surface cracking noted. The courts sees limited use.

Multi-purpose Fields – Four multi-purpose fields are developed within the park. A well developed, 225x360-foot soccer field, is developed on the west side of Wehr Mill Road, adjacent to the recreation building. A 225x360-foot multi-purpose field is developed at the eastern end of the park, adjacent to the Manasses Guth Covered Bridge. A 195x360-foot field overlaps the outfield of baseball field #4 and a smaller (360x165'), informal field is located south of the existing pedestrian bridge.

All four fields are developed parallel with the Jordan Creek, running east to west. Desired solar orientation for multi-purpose and soccer fields has the length of the field located on a north/south axis. Each field is located in the 100 year floodplain and subject to seasonal flooding. The fields have been developed with adequate cross slope, appear to be well drained, and are well maintained.

Playground – Playground equipment is located in the hub area, convenient to the restrooms, picnic pavilion, and parking. Modular play equipment is located in four separate areas within mulch safety surfacing. The play areas are developed on a terraced slope, connected by a bituminous walk. The walk is narrow and traverses steep grades. There is no accessible route to the upper playground areas. While in good condition, each piece is of an age that raises concerns for non-compliance with safety and accessibility guidelines.

Disc Golf Course – An 18-hole disc golf course is provided in the eastern end of the park. The course is one of several courses in the Lehigh Valley area, and is well used. The course is an all par three course, ideal for beginners. The course begins on the south side of the pedestrian bridge and heads east into the woodlands on the south side of the creek. It traverses very steep slopes and rock outcroppings. These challenges make it a local attraction, however, heavy use is causing significant erosion on the hillside and degradation of the woodland understory.

Volleyball Courts – Two paved volleyball courts are developed near baseball fields # 1 and #2, south of the large parking area. Each court is 30' x 60' with a 20' separation between courts. Pavement surface extends 10' beyond each court end line and has approximately 5-feet of pavement on each side line. The courts are oriented along the desirable north-south axis. The pavement surface, color coat, and nets are in "like new" condition. The courts are not accessible, as they are not connected to the parking area by an accessible trail.

Historic and Cultural Resources

Covered Bridge Park is named for the two historic structures within the park. The park also has history associated with a former mill site along the Jordan Creek and is in an area rich with lime kiln furnaces.

Creek Crossings – The park is home to three crossings of the Jordan Creek. Two historic covered bridges anchor each end of the park. These bridges are two of the seven covered bridges that are linked together through a self-guided covered bridge tour covering 50 miles in Lehigh County. A custom, covered bridge themed, pedestrian bridge is provided central to the park providing a pedestrian crossing near the parks midpoint.

- **Wehr's Covered Bridge –** Covered wood and stone bridge built in 1841. The 128 foot long bridge is owned by Lehigh County. There are no pedestrian accommodations within the bridge.

- **Manasses Guth Covered Bridge –** This 108 foot long covered bridge was built in 1848, and rebuilt in 1882 after fire damaged part of the structure. This bridge is also owned by Lehigh County. There are no pedestrian accommodations within the bridge.

- **Pedestrian Bridge –** The custom stone, steel, and wood bridge offers a convenient pedestrian crossing near the center of the park site, linking the north and south side. The bridge structure mimics the architecture of the historic bridges. The bridge provides an at grade ramp on the north side and steps on the south side. The steps transition the 10'-6" vertical drop to the south side and is not accessible. The bridge includes 'bump-out' areas for fishing and viewing Jordan Creek.

Lime Kiln's and Furnace – Remnants of lime kilns remain along the north side of River Road, visible from Covered Bridge Park.

Dam, Gristmill and Mill Race – A grist mill was located on the north east side of Wehr's Covered Bridge. In 1904 the existing concrete dam and a mill race were constructed to supply power to the mill. The grist mill and race were removed in the early 1950's. The dam remains and is a favorite spot along the Jordan Creek for photographers taking advantage of the setting in relation to Wehr's Covered Bridge.

Resource Analysis Conclusions & Planning Implications

Ecological –

- The existing dam is a barrier within the Jordan Creek, disrupting the natural creek flow and restricting fish passage. Removal of the dam and its potential impacts on the park should be explored.

- The Jordan Creek is the main attraction for the park. Over time, the creek has carved a path through the park and will continue to migrate north and south. The sharp S-curve just east of Wehr Mill Road has steep banks that are eroding adjacent to River Road. Stone gabions have temporarily stabilized the steep banks but do not offer a long term solution. The creek should be studied to evaluate the potential to realign the creek to its natural, historic path.
- It is important to maintain a healthy vegetated riparian corridor with large, mature trees to hold the creek banks and prevent significant erosion. Minimize man-made disturbances along the riparian corridor that could negatively impact mature trees.

- The creek is a wildlife corridor. Enhance with riparian buffer vegetation that provides natural habitat, attracts diverse wildlife, and is inviting for migration waterfowl.
- Increase and enhance the vegetative buffer along the creek to protect the banks from erosion, filter pollutants before they reach the creek, and reduce the negative effects of seasonal flooding. Consider removal of the stone gabions to return the banks to a more natural state.
- Monitor and remove invasive species along the creek banks.
- The floodplain and prominent transition to upland topography dominate the site and dictate improvement locations.
- Limited area is available outside the 100 year floodplain for future improvements. Existing facilities developed in the floodplain are holding up well.
- The eastern woodlands are a nice complement to the park setting. Overuse is damaging the understory. Consider re-routing the trails and disc golf course to disperse users and minimize impact.

Functional –

- Formalize a dominant trail that can accommodate multi-use thru the site and accommodate the Jordan Creek Greenway Trail. Explore safe pedestrian connection between Covered Bridge Park and points east and west of the park site.
- Provide handicap accessible parking spaces and an accessible walkway/trail throughout the park site to connect parking areas and recreation facilities. ADA accessibility should be addressed to each facility and activity area.
- The two existing restroom buildings do not adequately serve the existing park facilities. Develop additional restrooms that meet the requirements of the ADA, are vandal resistant, conveniently located, and above the 100-year floodplain elevation.

- Provide adequate parking for each facility. Existing fields and facilities are distant from convenient parking facilities. Consider a parking area and trailhead along Iron Bridge Road, and at the existing maintenance area at the upland on Wehr Mill Road for additional points of access into the park.
- Highlight Jordan Creek in the park design. Provide accessible creek areas for fishing and paddle craft launch. Connect creek access areas to an accessible route.
- The elevation change from the parking area to the western playground, pavilion, and restroom facility is a challenge for ADA access.

- Provide additional accessible trails throughout the park.
- The existing pedestrian bridge is well developed, but is not accessible. Improvements to the bridge to provide accessibility should be considered. Additional creek crossings should be explored to expand the trail network and provide loops in the park.
- Consider repurposing the upland maintenance area for parking and recreation. The area is already disturbed, provides convenient access to a unique part of the site, and is outside the 100 year floodplain.
- Utilize open areas on the northwest side of the creek for park access.

Recreational –

- The two northern baseball fields (Fields #1 & #2) are well used and properly developed. The larger field (Field #4) is well oriented and offers a 90’ diamond, however, its distance to convenient parking and restroom facilities make its use problematic. Field #3 is short and prone to flooding and poorly drained.

- The extensive creek access make the park a premier destination along the proposed Jordan Creek Greenway Trail. Promote the park as a destination for recreation, community events, and water based activities and a trailhead location. Provide user friendly amenities for accessing the site from the greenway.
- The open lawn east of the hub parking area is gently sloping and offers flexible space for special events.
- The multi-purpose fields are developed on an east-west axis, to aligning with the site's open area. Ideally, multi-purpose fields should be oriented on a north-south axis for proper solar orientation.
- The physical relationship of the existing playground near the main park entrance is good. Accessibility is an issue. Consider removing the outdated playground equipment and provide a premier playground that will become a destination within the community. A water-based theme is suggested to tie to the unique park setting. The design must meet the latest safety and accessibility standards.
- Consider an additional playground near the athletic fields north of the creek. A new playground would be a welcome amenity for use by young children who quickly loose interest in ballgames.
- The disc golf course is well used. The path through the woodlands traverses significant slopes. The course use has degraded the woodlands and slopes, causing erosion and trampling of the woodland understory. Consider rerouting the course to avoid the steep slopes and expand into meadow areas to relieve the burden on the woodlands.
- The agricultural fields to the west offer great opportunity for additional park development. The fields are open and contain gentle slopes. Overhead and underground utilities must be respected in the design. Access is from the existing neighborhood street network. Traffic impacts on the neighborhood should be considered.
- It is important to work with adjacent landowners to the east and west to extend the Jordan Creek Greenway Trail.
- Introduce additional recreational amenities desired by park visitors such as picnic areas, horseshoe pits, volleyball court, and trail loops.
- The future Jordan Creek Greenway Trail will pass through the park and introduce new visitors to Covered Bridge Park.

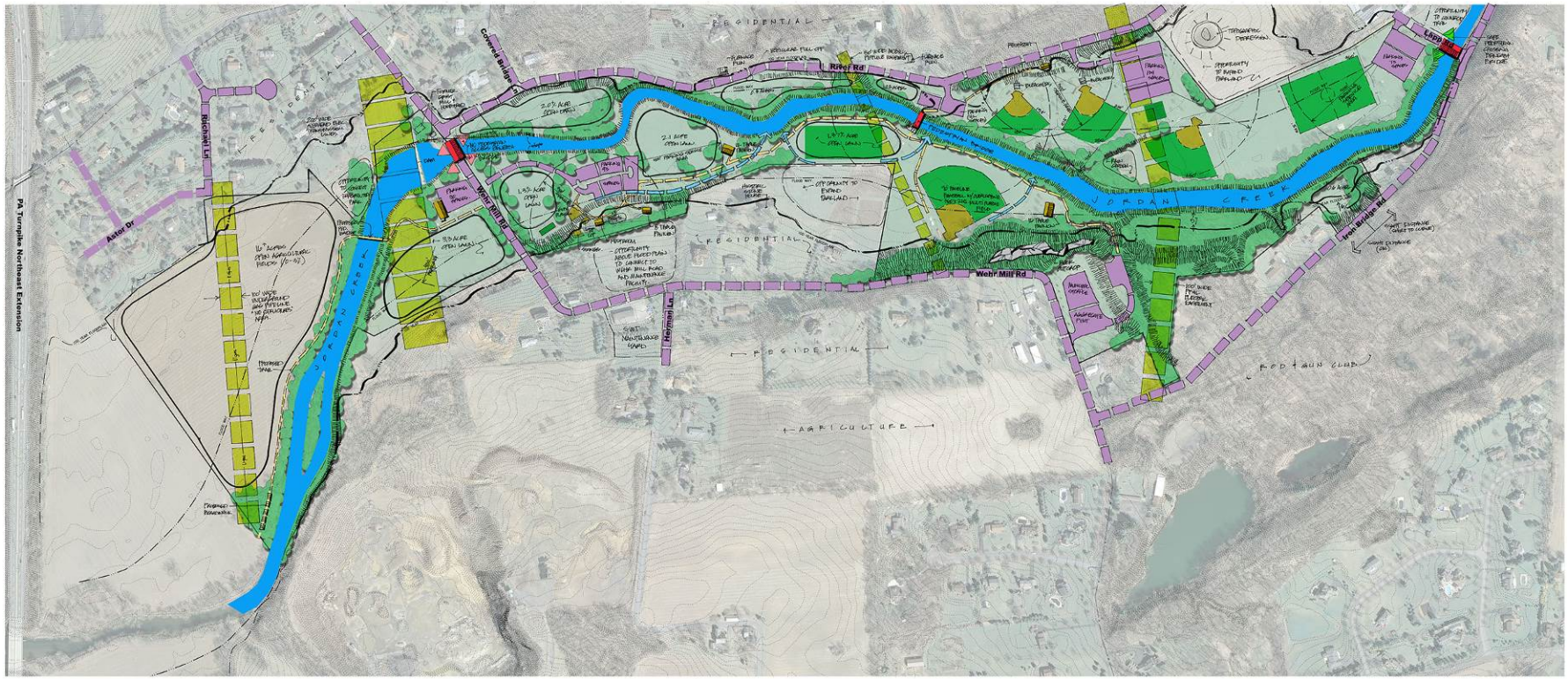
Cultural –

- The park site and surrounding area are rich in history which should be incorporated into the park through interpretative signs and site development features. The connection to the other covered bridges in the area, lime kilns, and dam and former mill site should be highlighted through signage.

Overall, Covered Bridge Park is the hub of recreation and community activities in South Whitehall Township. It has a prominent location between the urban hub of Allentown and the rural quiet of the Blue Mountains making it an important destination along the Jordan Creek Greenway. Environmental concerns regarding potential dam removal, flooding, and extensive floodplain area will influence the park master plan and ultimate development. Covered Bridge Park should be viewed as a local asset as well as a key component of the regional Jordan Creek Greenway.

Covered Bridge Park Master Plan - Site Analysis Map

South Whitehall Township, Lehigh County, PA
August 2013



Chapter 4

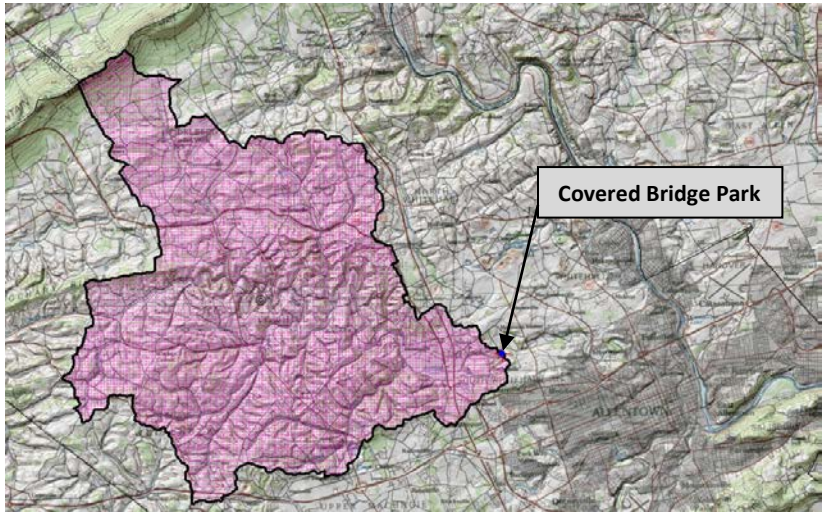
Jordan Creek Resource Analysis

Covered Bridge Park and Jordan Creek – Resource Analysis

Watershed Context

Covered Bridge Park is located in South Whitehall Township, Lehigh County, Pennsylvania. The park is anchored by two historic covered bridges, the Wehr's Covered Bridge and Manasses Guth Covered Bridge. Covered Bridge Park is bisected by the Jordan Creek. Jordan Creek is a 34.1 mile long tributary of the Little Lehigh Creek, which it joins in Allentown before it enters the Lehigh River. Jordan Creek's drainage area to Covered Bridge Park is approximately 70.56 acres.

Watershed and Drainage Area Map to Covered Bridge Park. U.S.G.S Stream Stats

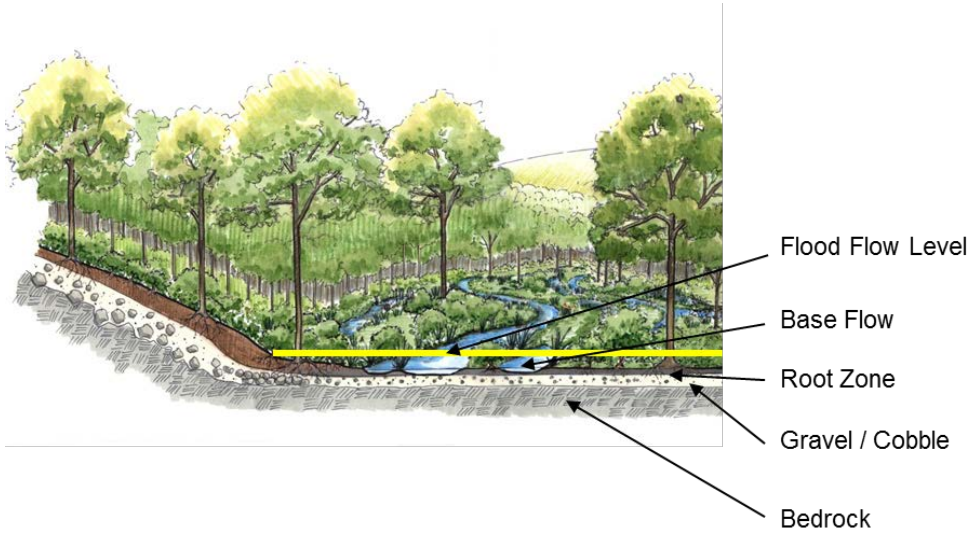


Historic Land Use

Historical mill dams and related activities have had one of the greatest influences on the current conditions of most streams and floodplains in this area, but there are other ways in which we've used the land that have led to water-resource problems.

Because stream valleys in their original condition, (see Figure 1), were extremely fertile, they were prime targets for farming and settlements. Farmers redirected streams, changing them from shallow, meandering, multi-stemmed channels in the lowest areas of the valleys to straight, ditch-like channels along the valley sides. We drained wetlands and removed vegetation. We built railroads, roads, and bridges, often following the paths of streams. Buildings and, more recently, parking lots have imposed on stream systems too. These activities have contributed to unnatural (and therefore unstable) streams in the wrong locations and often without their natural floodplains and wetlands.

Figure 1.



Dams and Legacy Sediment

Legacy sediment is deposition that built up behind the thousands of dams constructed during the early days of European settlement along the East Coast. These sediments eroded and filled in the stream valleys as a result of forest clearing and poor agricultural

practices beginning in the 18th and continuing into the early 20th centuries. The height of the sediment trapped behind the dams relates directly to the height of the dam breast, which relates to the height of stream banks where legacy sediments deposited.

Although most of the old dams deteriorated or were removed, the sediment behind them remained, covering the original porous, organic floodplain soils and the gravel and cobble beds of once-shallow stream channels. Over time, as the dams disappeared, the water behind them flowed faster, cut down through the legacy sediments in the channels, and left behind the high terraces we continue to call floodplains as well as straight, bare stream bank walls (see Figure 2). Evidence of these conditions are visible along the Jordan Creek (see Photos 1&2).

Figure 2.

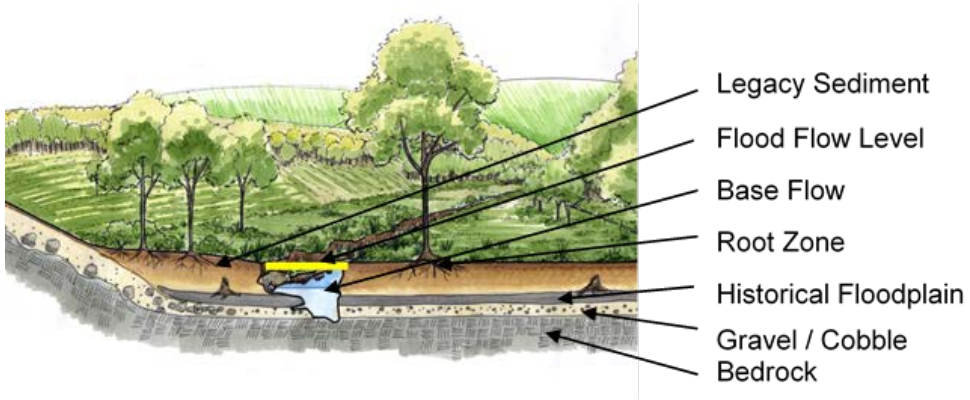


Photo 1 - Existing dam upstream of Wehr's Covered Bridge. Dam height is approximately 6-foot.

Photo 2 - Legacy sediment located behind dam. Sediment is approximately 4-feet deep.

Stream and Floodplain Assessment

A visual assessment was performed on the approximately 7,200 linear feet of the Jordan Creek which flows through Covered Bridge Park. The following describes some of the typical issues and their influence on the stream system.

Deposition and Bed Load Storage – When stream flow slows down because of man-made obstructions, bends in the channel, dams, debris jams, or a widening of the channel, the reduction in the force of the flow allows bed load and sediment to settle out of the flow (see Photo 3). This deposition of sediment is referred to as "aggradation," or a rising of the grade, or elevation, of the channel bed in that location. Deposition (gravel/sand bars) can cause the stream to flow around it, forcing the flow into the opposite bank, which erodes the bank. Deposition can also cause the flow (which is at a lower elevation) to back up behind it, slow down, create more deposition, cause flooding during high flows, and cause the backed up water to churn behind the obstruction of deposited sediment. This process essentially "scours" or removes the stream bed and creates even more of a difference in stream bed elevations.

Aggradation and depositional areas raises the stream bed elevation, decreasing the channel and floodplain capacity, and can increase the frequency of damaging flooding on roadways and property. Evidence of this perched stream condition is visible along Jordan Creek (see Photo 4). Environmentally, excessive deposition can bury aquatic habitat, change water temperature, and significantly alter the entire aquatic ecosystem.

Photo 3 - Large, vegetative deposition (gravel) bar located on the right.

Photo 4 - Clay along the bank indicates that the stream is "perched" or raised from its historic elevation.

Floodplain / Channel Constrictions – Constrictions – or "pinch points" – are encroachments into a stream channel or stream valley that create a narrowing of the channel or valley at that point. Bridge abutments, roadways, culverts, narrow stream-valley walls, man-made walls along stream banks, rock outcroppings, and even large debris jams can create a constriction that confines the flow, causes the flow to back up behind the constriction, and thereby raises the water surface elevation. This raised water surface elevation behind the constriction can extend upstream for thousands of feet. The increased water surface elevation behind the constriction can result in increased water velocity downstream of the constriction, causing scour and erosion. The constriction can also create a backwater or ponding condition upstream, which can allow larger sediments and debris to drop out of the flow and settle in the channel thereby further raising the elevation and causing increased flooding events. In some cases the constriction can reduce flooding downstream by reducing peak flows, but these benefits must be identified on a site-by-site basis with respect to downstream impacts and the overall valley configuration. In Covered Bridge Park a pinch point is located just downstream of the pedestrian bridge, where the floodplain is constricted by the valley wall and a man-made berm on the south side. This constriction results in ponding which increases flooding in the upstream areas of the park (see Photo 5).

Photo 5 - Man-made berm which creates a "pinch point" along the creek which causes park flooding.

Erosion and Direction of Flow – Erosion along streams is caused by unstable channels that are 1) moving downward through legacy sediments, 2) moving horizontally, or laterally, as they carve out new floodplains at lower elevations, 3) being forced through bridge abutments or constrictions to flow into stream banks at the wrong angle, and 4) flowing high and with excessive force during rain events or snow melt through channels that are too deep.

Erosion clogs our waterways with excessive sediment and nutrients and destroys aquatic habitat. This type of erosion is evident just downstream of the Wehr's Covered Bridge and through the s-curve where the direction of flow threatens the roadway and creates an unstable channel condition (see Photo 6).

When stream channel encroachments, such as bridges, obstruct stream flow, they can change the direction of the flow, which, especially during high flows, can cause erosion near the constriction and create a ponded or backwater condition upstream of the

encroachment. This condition can lead to bedload aggradation or bar formation, which can contribute to increase flooding. Misaligned bridges, especially in watersheds with a high bedload, can be a significant factor in the horizontal, or lateral, channel migration and in bridge scour, leading to structural damage and bridge and roadway closure. Many times bridges are misaligned with stream flow because an unstable stream, itself, has changed direction over time.

Photo 6 - Bank erosion and undermining of trees within Covered Bridge Park.

Dam Removal – The benefits of dam removal should be considered along with the impact of the increased bedload released into the stream and the significant change in gradient. As discussed under Dams and Legacy Sediment, damming for water power, after European settlement, dramatically altered the floodplain and stream system of the Jordan Creek. The crests of historic mill dams in conjunction with high erosion rates from the stripped landscape, raised the level of the floodplains and streambeds. The breaching and removal of dams resulted in deeply incised streams upstream of mill dams. This condition is a significant factor in determining the floodplain elevations and stream bed elevations throughout the length of the Jordan Creek.

It is also important to understand and consider both the consequences and benefits of removing or altering dams. For this reason, both the objectives and consequences of dam removal/ alteration at both a reach and watershed level must be anticipated. The key is to determine how best to sequence the removal to meet the objectives. The following factors should be considered with any dam removal or alteration:

- Peak flow reduction/flood flow storage
- Water levels or flood elevations upstream
- Release of fine sediment and nutrient loads
- Reduction in bed load storage
- Aesthetics/ecological function of the site
- Existing land use/property owner interest
- Release and increase of coarse grain sediments downstream
- Downstream competence and ability to handle significant change in size and magnitude of bedload. Upstream channel goes from E or D type stable stream (low bedload transport) classification to F or G (high bedload transport) type unstable stream classification

The following approaches could be considered as part of any removal/alteration of existing dams or construction of new dams, depending on the site conditions.

- Alteration or removal of dam crests and/or embankment
- Removal of sediments behind the dam and/or embankment

It is important to understand that the removal of the dams will significantly impact any creek. Currently the existing dams provide a base flow or water surface elevation for Jordan Creek through Covered Bridge Park. These dams are approximately 6-8 feet above the downstream water which store coarse and fine grain sediment upstream. Once the dams are removed, this sediment will most likely be carried downstream with temporary or permanent deposition in the channel. Without proper planning, sediment bars will form within Covered Bridge Park and most likely raise Jordan Creek. This in return will cause increased banks heights, channel migration, and more flooding events within the park. The changes in the sediment inputs downstream of the dam may take decades as the coarse grain or larger material which was previously stored upstream of backwater from the dam becomes remobilized due to the change in bed slope from the typical upstream migration of bed degradation.

Proactively planning for the impact of increased bedload moving through the system will help to mitigate consequences, such as damage to costly infrastructure and future park improvements. It is advantageous to plan sediment storage locations where it least influences stream dynamics and has the potential to be physically removed.

Resource Analysis Conclusions & Planning Implications

Stream Corridor Analysis

The following is a description of the general characteristics observed along the Jordan Creek corridor within Covered Bridge Park:

- The stream is perched both upstream and downstream of the dam. Both reaches are prone to degradation. The rate of degradation upstream of the dam will accelerate rapidly with the removal of the dam.
- The stream is frequently located along the hill slope where bedrock outcrops control the bed elevation. Bedrock appears to be significantly lower in elevation towards the center of the valley indicating that lateral migration will also occur in conjunction with the bed degradation.
- Pool depths reached 4-feet without bedrock resistance. This is indicative of Jordan Creek being “perched” or raised over time with Legacy Sediments.
- Stream slope and valley are very flat making it susceptible to aggradation. This results in higher base flows and more flooding events.
- Clay deposits are observed near the present water surface elevation which is typical of a perched system that was impacted by the presence of additional dams or slack water conditions.
- The supply of coarse grain sediment is minimal due to the upstream dams which reduce the rate and potential of in-stream gravel bars that promote lateral migration from occurring.
- Bank heights vary from 4-feet to much higher along hill slopes.
- Vegetation along the banks provide little to no bank stability.
- Tree fall and undermined trees occur within multiple locations.
- The rate of lateral migration will increase as the sinuosity of the stream increases or the magnitude of coarse grain bed load increases.
- Existing bar formations appear downstream due to stream encroachment along the hill slope.

- Removal of upstream dams will exponentially increase the magnitude of coarse grain sediment overtime. The time period may be relatively quick or take decades. However, recent dam removal projects indicates that lateral migration will occur quickly in the vicinity of the removed dam. The increase in magnitude of the bed load being conveyed downstream may occur quickly or extremely slowly while increasing the potential for lateral migration and bank erosion downstream.
- The next upstream dam at Kernsville is scheduled for removal. Wildlands Conservancy has started the permit process. Additional study will be necessary to determine the amount of bedload and sediment that could be released with the removal of this dam and how it will impact the Jordan Creek at Covered Bridge Park.
- Flooding is primarily caused by floodplain encroachments and the dam.
- The Manasses Guth Covered Bridge is a constriction and raises the water surface elevation.
- Upstream of the Manasses Guth Covered Bridge, the valley is constricted by the south valley slope (right bank) and a high man-made berm on the north (left bank). This reduces the available floodplain width to less than 20-25% of the valley width.
- The S-turn bend near the main parking area and another constriction just downstream, increases the water surface elevation and increases the frequency of flooding.
- The span of the Wehr's Covered Bridge constricts the floodplain and is also not aligned with the direction of flow. This configuration increases the water surface elevation during storm events and directs high energy flows toward the streambank on the downstream side of the bridge.
- The existing dam plays a significant role in the flooding upstream of Wehr's Covered Bridge due to the increased normal water surface elevation.

Conceptual Alternatives:

Floodplain restoration re-establishes a stream's floodplain and banks to stop streambank erosion, improves stream health, provides habitat for land animals and aquatic species, recreates wetland areas, increases riparian buffer areas and reduces flooding. Riparian buffers are permanent areas of trees and shrubs located adjacent to streams, lakes, ponds, and wetlands. Floodplain restoration and riparian buffers provide ecological and water quality benefits (see Figure 3, page 4-8).

Upstream Floodplain Restoration and Sediment Storage Areas – Floodplain restoration is proposed for the reach just downstream of the Wehr's Covered Bridge and extending to approximately 500 feet downstream of the tight 'S' type bend in the stream. This is the area presently protected with gabion baskets that appear to be in the early stages of failure at some locations. This will reduce erosion caused by the current alignment which directs the flow at the roadway embankment and thus threatening the roadway. The proposed floodplain restoration will direct the flows down valley, and not towards the roadway, removing the risk of embankment failure. This area will be constructed as a wetland and provide a location for sediment deposition or storage, wetland habitat, and also potentially reduce the frequency of flooding on the adjacent park facilities. Capturing the increased magnitude of coarse grain bed load from the dam removal in this location, will reduce the rate and frequency of lateral bar formation and related lateral migration further downstream.

Figure 3.

Photo
Santo Domingo,
Lancaster County

Photo
Santo Domingo,
Lancaster County

Photo
Santo Domingo,
Lancaster County

Photo 7 - Proposed upstream restoration area of Jordan Creek.

As bedload or sediments are carried downstream, it will frequently deposit in areas having lower velocities and shear stresses, or where the flow is ineffective, such as the inside of sharp bends in the channel or upstream of bridges or culverts that create backwater and are unable to move bed loads adequately – features commonly called “pinch points.” Over time, the areas of deposition can cause the channel to migrate laterally around the deposition or can change the alignment between a channel and a crossing. Both conditions can lead to infrastructure damage from bed and bank erosion and local flooding from tree fall and debris jams and/or excessive deposition. One solution is to identify locations that allow the coarse grain material to deposit without adverse effects. Floodplain restoration creates this condition by reducing the flow depth and velocities. This usually entails excavating and opening up the floodplain (making it wider). This type of restoration reduces boundary sheer stress and increases deposition instead of depositing further downstream.

The proposed restoration area will be approximately 1,500' by 200' wide, with approximately 6 to 7 feet' of sediment excavated. A portion of this material will be used to fill in the current stream bed. Note that the excavated material can be placed to raise adjacent areas reducing the frequency of flooding. This could be coordinated with park development objectives to create raised plateaus for park facilities that are above the 100-year floodplain elevation. Detailed hydraulics should be done to insure that the floodplain elevations are not increased. The restored floodplain and riparian buffer will be seeded and planted with native grasses, shrubs, and trees. (See example photos 8&9)

Photo 8 - Stream located at Saucon Valley Country Club before restoration.

Photo 9 - Saucon Valley Country Club stream after restoration.

Photo 10 - Proposed downstream restoration area of Jordan Creek.

Downstream Floodplain Restoration – The proposed restoration area will be approximately 1,000’ by 100’ wide, with approximately 4’ of sediment excavated. The excavation will help to reduce flooding and open the opportunity to raise other areas for park uses. The restored floodplain and riparian buffer will be seeded and planted with native grasses, shrubs, and trees. (See example photos 11&12)

Photo 11 - Restored floodplain at Bedford Springs Golf Course.

Photo 12 - Stream channel and eroded banks at Bedford Springs Golf Course.

LandStudies

Covered Bridge Park
Cost-Benefit Analysis-DRAFT

		UOM	ALL PROPOSED PHASES & SECTIONS				NOTES
			UNITS	VALUE	TOTAL	PV	
DIRECT COSTS	Professional Services/Consultants	LS	1	$ 125,000.00	$ 125,000.00	$ 125,000.00	Design development, construction documents, and consulting; includes engineering, construction oversight, and permit(s) submission - high level estimate
	Dam Removal	LS	1	$ -	$ -	$ -	Wildlands
	Bridges	EA	2	$ 125,000.00	$ 250,000.00	$ 250,000.00	Placeholder value
	FPR Construction-upstream	LS	1	$ 647,202.00	$ 647,202.00	$ 647,202.00	LSI Const Cost Opinion-avg
	FPR Construction-downstream	LS	1	$ 650,729.00	$ 650,729.00	$ 650,729.00	LSI Const Cost Opinion-avg
	Park Improvements-Construction	LS	1	$ -	$ -	$ -	
	Maintenance-park area	AC/YR	104	$ 1,861.00	$ 193,544.00	$2,723,546.81	Based on Lititz Borough data, 2013; $4800/10 acres; extrapolated and weighted (10% reduction per 10 acre inc.) due to park size
	Maintenance-naturalized areas (yrs 1-5)	AC/YR	9	$ 1,500.00	$ 13,500.00	$60,763.78	LSI data, 2013, assumes "average" permit conditions
	Maintenance-naturalized areas (yrs 6-20)	AC/YR	9	$ 625.00	$ 5,625.00	$64,281.54	LSI data, 2013
	Other (outreach, contingency, etc.)	LS	1	$ 50,000.00	$ 50,000.00	$ 50,000.00	Assume ~2.5% of all approximated direct costs
	TOTAL COSTS				$ 1,935,600.00	$ 4,571,523.13	

DIRECT BENEFITS	Trail Use	EA/YR	100	$ 564.00	$ 56,400.00	$793,659.53	Per capita annual direct benefit (American Trails.org, 2013); assumes 100 repeat users per year
	Pavilion Use	EA/YR	72	$ 3,150.00	$ 226,800.00	$3,191,524.50	3 pavilions; Assumes 75% of reservations are residents; 3 reservations per week over 24 weeks (1 rental per pavilion per week)-$25 for residents, $100 for non-res. (S. Whitehall Township website)
	General park use	EA/YR	13300	$ 1.91	$ 25,403.00	$357,470.44	Per visit, per day (Trust for Public Land, 2009); 50 per day over 38 weeks
	Sports facility use	EA/YR	5632	$ 3.05	$ 17,177.60	$241,722.80	Per visit per day (Trust for Public Land, 2009); 140 per week over 32 weeks (fields), 36 per week over 32 weeks (courts)
	Special uses in parks	EA/YR	1600	$ 9.33	$ 14,928.00	$210,066.48	(Trust for Public Land, 2009); "Canoe/kayak access points, event lawn, etc." - assumes 50 visitors/week over 32 weeks
	TOTAL DIRECT BENEFITS				$ 340,708.60	$ 4,794,443.75	

LandStudies

Covered Bridge Park
Cost-Benefit Analysis-DRAFT

INDIRECT BENEFITS	Clean-up in watershed	EA/YR	2	$ 3,000.00	$ 6,000.00	$84,431.86	Assumes clean-up for 2 events per year, Lititz Borough data, 2013
	Flood reduction mitigation	EA/YR	34	$ 597.00	$ 20,298.00	$285,633.00	PDA method (Protocol 2 per on ACOE, City of Roanoke study); $597/property
	Increased home values (naturalized areas) as net increase in value	EA	6	$ 27,272.00	$ 163,632.00	$ 163,632.00	Assumes 14% increase in home value (Univ. of Washington: 8%-20%, avg. 14%); average home value of $194,800 as baseline (Zillow, Dec 2013)
	Increased property values (adjacent to improved parks)	EA	23	$ 9,740.00	$ 224,020.00	$224,020.00	Assumes 5% increase from baseline (Trust for Public Land, 2009)
	MS4 Permit compliance	EA/5-YR	4	$ 72,000.00	$ 288,000.00	$ 1,055,090.25	Assumes annual compliance, uses non-compliance fines in Lancaster County as basis-$72,000/EA (Manor Township) over 5-yr permit term
	Wildlife Value-Trout	MI/YR	1.42	$ 29.77	$ 42.27	$594.87	$29.77/mile annually
	TOTAL INDIRECT BENEFITS				$ 701,992.27	$ 1,813,401.98	
THEORETICAL	Nitrogen	LBS/YR	216.3	$ 3.19	$ 690.00	$9,709.62	$3.19/lb (PADEP, 2012)
	Phosphorus	LBS/YR	35.9	$ 3.37	$ 120.98	$1,702.47	$3.37/lb (PADEP, 2012)
	Sediment	TNS/YR	33.1	$ 13.85	$ 458.44	$6,451.09	$13.85/ton (PADEP, 2012)
	SW Volume Offset Value	CF	2500	$ 2.59	$ 6,475.00	$ 6,475.00	$2.59/cf
	Healthcare cost savings	EA/YR	276	$ 250	$ 69,000.00	$970,966.45	Assumes avg difference of $250 between active and inactive persons (Trust for Public Land, 2009)-assumes repeat visitors on park use class.
	TOTAL THEORETICAL BENEFITS				$ 76,744.42	$ 995,304.63	

	TOTAL	PV	
TOTAL COSTS	$ 1,935,600	$ 4,571,523.13	
TOTAL BENEFITS (DIRECT+INDIRECT+THEORETICAL)	$ 1,119,445	$ 7,603,150.36	

BCR (DIRECT+INDIRECT+THEORETICAL)		1.6632	
NPV - DIRECT ONLY / ROI		$ 76,605.02	4.9%
NPV - ALL COSTS AND BENEFITS / ROI		$ 1,674,932.17	66.3%

REFERENCES	CALCULATIONS	NOTES
	$PV=P_t/(1+r)^t$	1. 20 year timeframe only applies to items provided as unit per year under UOM
	For PV/NPV: TIMEFRAME, t = 20.0 YR DISCOUNT RATE, r = 3.61% $NPV=\sum[(B_t-C_t)/(1+r)^t]$	2. Sum of PV values in each table represents the NPV of the individual table 3. Discount rate: 20-yr T-bill rate per 12/9/13 advertised rates 4. Theoretical values are "high-level" with assumptions; values cannot be determined until engineering completed (values based on concept improvement dimensions)
	$BCR=NPV_b/NPV_c$	

Chapter 5
Conceptual Alternatives

Conceptual alternative designs were completed for Covered Bridge Park with consideration of the goals established by the master planning process, the analysis of the park site and surrounding area, and public input. The Conceptual Alternative designs explored different options for park development and enhancement and illustrate potential facility configurations and relationships. The study committee reviewed the Conceptual Alternatives and provided input and direction for development of the Pre-Final Master Plan.

Covered Bridge Park is South Whitehall Township's largest park site and offers a diverse array of recreation facilities and amenities. It's location along Jordan Creek provide a scenic setting, bookmarked by Wehr's Covered Bridge and Manasses Guth Bridge. Visitors to the park include participants and spectators of the many youth programs that use the park's athletic fields, anglers that fish for trout in Jordan Creek, families, youth that attend the South Whitehall Township playground program, disc golf players, and many others. Jordan Creek floods within the park annually and nearly all of the park site falls within the 100-year floodplain. A dam remains on the creek from the time when Wehr's Mill was located on lands of the park.

The conceptual alternatives explored the opportunity of removing the dam and mitigating, as possible, seasonal flooding effects within the park site.

The Conceptual Alternative designs for Covered Bridge Park address the following park development objectives:

- Expand the trail network. Provide looping trails for a variety of trail experiences and lengths. Define a major trail spur for the Jordan Creek Greenway Trail through the site. Add additional pedestrian crossings of Jordan Creek.
- Assume that Wehr's Dam will be removed and Jordan Creek will be realigned to its historic/natural alignment.
- Maximize access to Jordan Creek. Add fishing and paddle craft launch/pull out facilities/areas. Add accessible fishing accommodations.
- Improve the riparian buffer corridor. Expand the width of the corridor and plant with native vegetation. Remove gabions and soften and stabilize creek banks.
- Improve park function and visitor convenience by increasing the number of restrooms and parking areas to achieve better service and shorter distances to these amenities from park facilities.
- Retain the number of athletic fields and expand as possible.
- Increase picnic opportunities.
- Increase play/playground opportunities.
- Realign/position the disc golf course to reduce the impact on the woodlands.
- Remove the Recreation Center.
- Explore park visitor access opportunities at the upper Wehr Mill Road frontage.
- Add new facilities to include:
  - Basketball courts
  - Sand volleyball courts
  - Dog park
  - Event area

The Conceptual Alternatives were evaluated for the overall convenience of parking and restroom locations within the park. A service radius of 300' was assigned to restrooms and 400' assigned

to parking areas. These service radius have been applied to the Conceptual Alternative design to evaluate the distribution of these support facilities and identify the gaps or areas beyond the applied service radius.

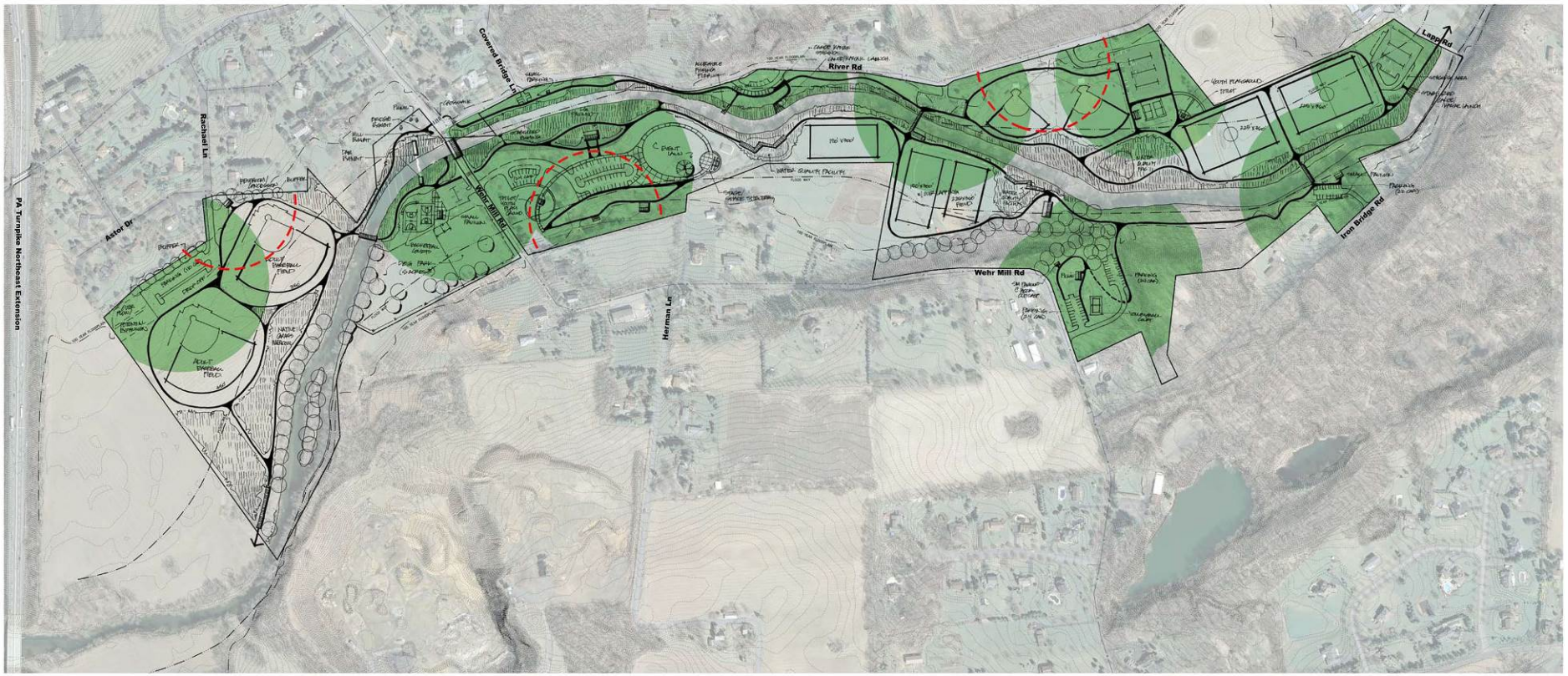
Conceptual Alternative A

Conceptual Alternative A prioritizes enhancement of natural areas and expand the width of the riparian buffer corridor. New trails are introduced that extend through the natural areas and loop throughout the park. Two new pedestrian bridges cross Jordan Creek. New amenities include:

- An event lawn located adjacent to the east side of the main parking area. The event lawn is defined by a sidewalk that encircles the lawn, a stage, and shade structures.
- A dog park is developed on the west side of Wehr Mill Road with two areas for small and large dogs.
- Two basketball courts are located in the area of the former Recreation Center. A pavilion is located adjacent to the basketball courts to provide shade.
- Baseball fields #3 and #4 are eliminated and new 90' baseball fields are located on the western tract with access from Rachael Lane.
- A new restroom and parking area are located to serve the new ball fields on the western tract.
- A picnic area is developed on the upland portion of the park. A pavilion, restroom, and sand volleyball court are located in the picnic area and two new parking areas are added.
- A second multi-purpose field is located adjacent to the eastern multi-purpose field. Two additional multi-purpose fields are located in the area where baseball field #4 had been located.
- Two new playground areas are introduced. The existing playground is replaced with a new playground downslope of the handball courts, which are eliminated. Parking is added to accommodate visitors to the playground. A second playground is located near the existing paved volleyball courts and new multi-purpose field to complement the athletic fields.
- Parking and trail access routes are added on the north side of the park in the area near River Road for fishing and stream access.
- Two new pedestrian bridges are located to create trail loops. One is located in the eastern portion of the park near the existing multi-purpose field and the second is located west of the proposed basketball courts. The outer trail loop within the park measures approximately 2.85-miles.
- A new parking area is located off of Iron Bridge Road. A picnic pavilion is located at the parking area and trails lead to the pedestrian bridge.

Covered Bridge Park Master Plan - Conceptual Alternative A

South Whitehall Township, Lehigh County, PA
September 2013



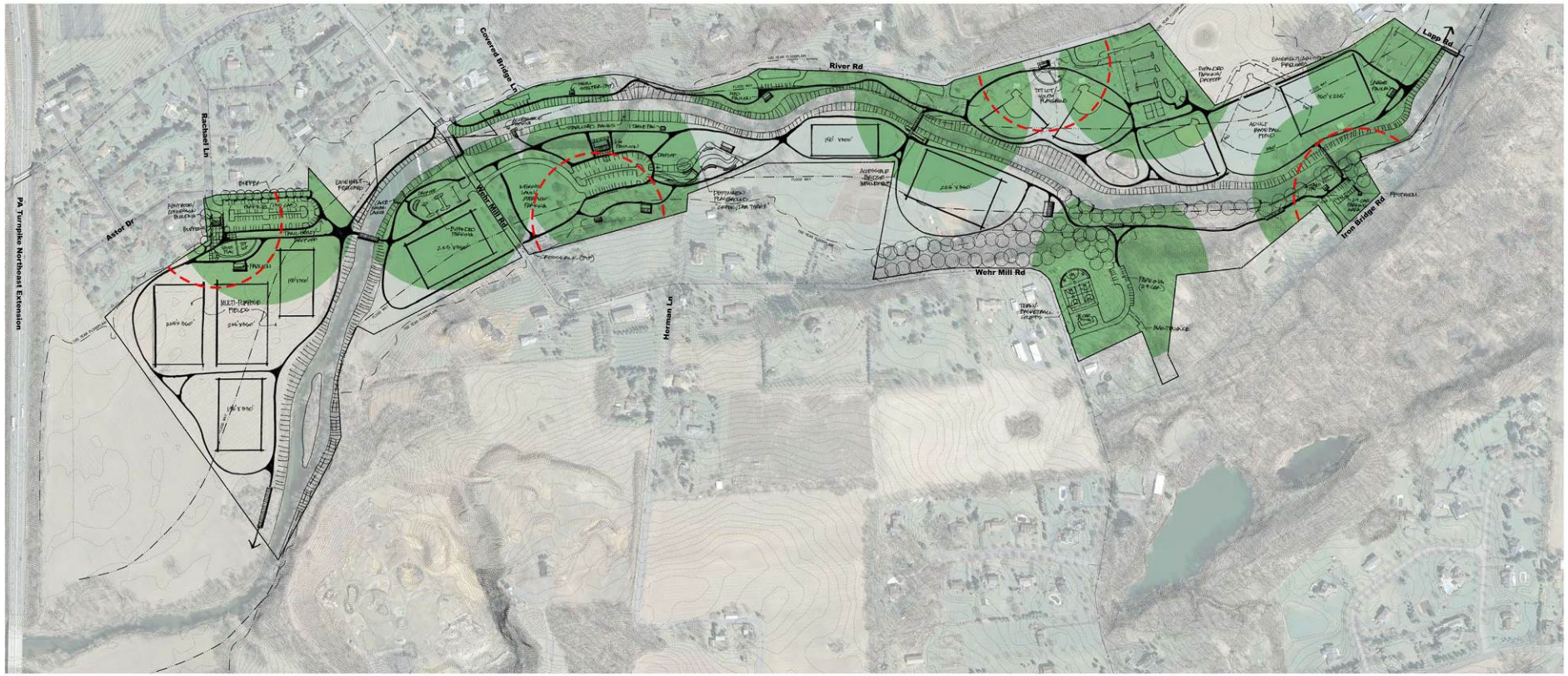
Conceptual Alternative B

Conceptual Alternative B prioritizes multi-purpose fields and creates an activity hub on the western tract. The riparian corridor is enhanced and convenience amenities are added. New amenities include:

- A destination playground developed with a stream and dam theme.
- Two new pedestrian bridges are located to create trail loops. One is located in the eastern portion of the park near the existing multi-purpose field and the second is located west of Wehr's Covered Bridge. The outer trail loop within the park measures approximately 2.80-miles.
- Parking and trail access routes are added on the north side of the park in the area near River Road for fishing and stream access.
- Two full basketball courts and one half-court are located at the upland area along Wehr Mill Road. Parking is added near the courts.
- Baseball field #4 is eliminated.
- Four multi-purpose fields are located on the western tract with access from Rachael Lane. Parking, a pavilion, age segregated playground, and restroom/concession building complement the area.
- A picnic area is developed on the north side of the main parking area.
- A second small age segregated playground is located near baseball fields #1 and #2 to complement the athletic fields.
- A new parking area is located off of Iron Bridge Road. A picnic pavilion and new restroom are located at the parking area and trails lead to the pedestrian bridge.
- Parking is expanded at the site of the former Recreation Center for park use and as a trailhead for the Jordan Creek Greenway Trail.

Covered Bridge Park Master Plan - Conceptual Alternative B

South Whitehall Township, Lehigh County, PA
September 2013



The Study Committee reviewed the two conceptual alternative designs for Covered Bridge Park and offered the following guidance for the development of the Pre-Final Master Plan design.

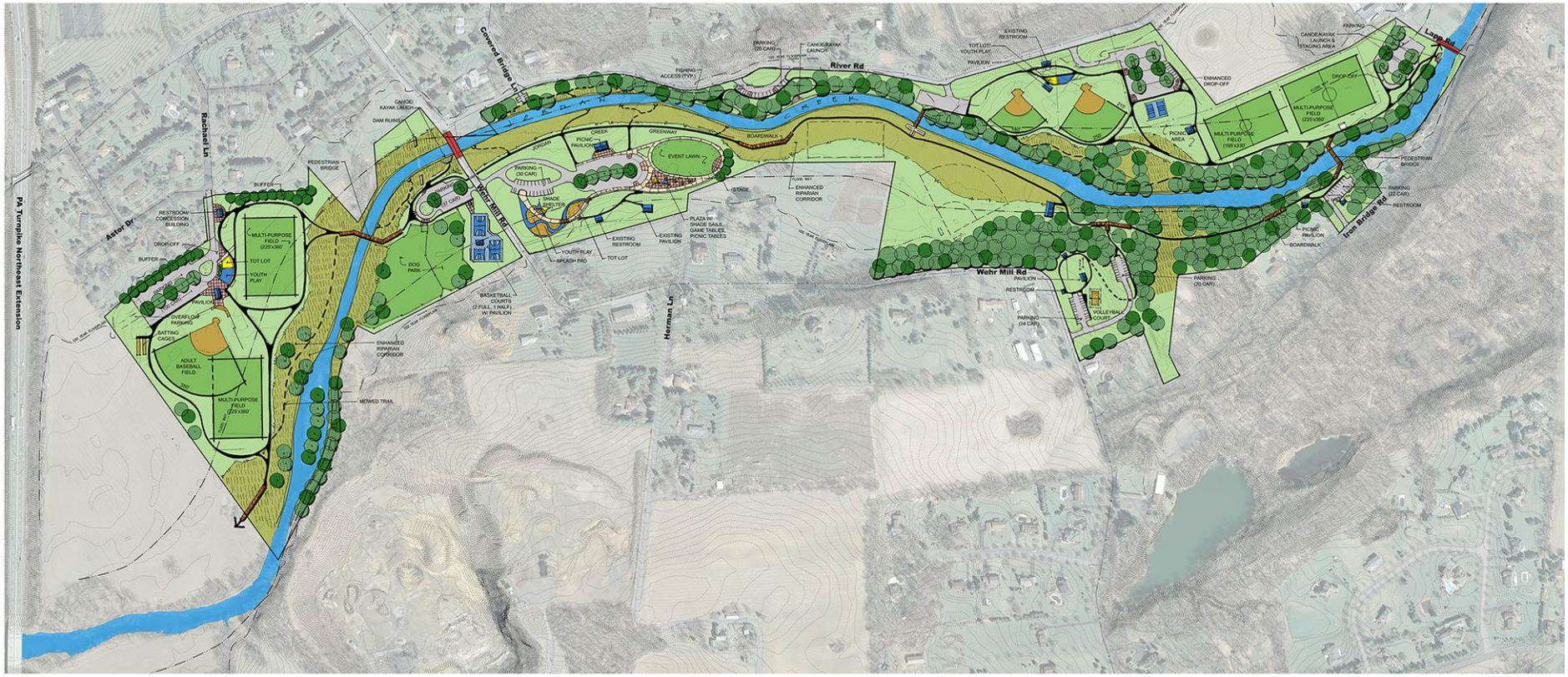
- Include the event lawn, basketball courts, dog park, and upland picnic area off of Wehr Mill Road as configured on Conceptual Alternative A.
- Introduce a destination playground west of the event lawn.
- Develop the western tract to include both multi-purpose fields and one 90'baseball field.
- Add the second eastern multi-purpose field as shown on Conceptual Alternative A.
- Add new restrooms at the Iron Bridge Road parking area, upland picnic area, and on the western tract.
- Include an age segregated playground near the River Road restroom building and in the hub area on the western tract.

Conceptual Alternative A	
Positive	**Negative**
The riparian corridor is enhanced and expanded.	Baseball field #3 and #4 are eliminated and not replaced.
The event lawn provides opportunities for special events and small performances.	The multi-purpose fields near the existing pedestrian bridge are not in a convenient location.
90' baseball fields are introduced.	The eastern portion of the park is not served by restrooms.
Basketball is introduced in a visible active portion of the park.	
A dog park is introduced to the park.	
The new upland picnic area expands picnic opportunities in the park and the associated parking will be somewhat more convenient to visitors to the southeast portion of the park.	
Conceptual Alternative B	
Positive	**Negative**
The destination playground provides an exciting play area for children.	The basketball courts are in a somewhat isolated location.
The Iron Bridge Road parking area restroom serves the eastern portion of the park.	There is no dog park.
The age segregated playground at the restrooms on River Road complement ball fields #1 and #2.	Baseball field #4 is eliminated and not replaced.
	No 90' baseball fields are added.
	The multi-purpose field located near the existing pedestrian bridge is not a convenient location for access.
	The riparian corridor is enhanced but not expanded.
	Special events have not been accommodated in the design.

Pre-Final Master Plan

The Pre-Final Master Plan was developed for Covered Bridge Park to reflect input from the Study Committee and general public. The pre-final design is a consolidation of the ideas and input from review of the Conceptual Alternatives into one cohesive master plan for the park site. The Pre-Final Master Plan was presented to the Study Committee at a project meeting and no substantive changes were recommended. A public meeting was held at the municipal building to present the Pre-Final Master Plan to the general public. The meeting was attended by residents, municipal representatives, and the Study Committee. The Pre-Final Master Plan is illustrated on the next page.

Covered Bridge Park Master Plan - Pre-Final
South Whitehall Township, Lehigh County, PA
November 2013



Chapter 6

Covered Bridge Park Master Plan

Introduction

The Covered Bridge Park Master Plan defines the overall vision for the park, the extension of the Jordan Creek Greenway Trail through the park, and opportunities to link the trail east and west of the park. The Master Plan illustrates the physical configuration of proposed improvements and strategies for resource enhancements. The Master Plan was developed after thoughtful consideration of input from citizens, the Study Committee, park users, and municipal representatives.

Recreation Opportunities

Covered Bridge Park, as envisioned by the master plan, will offer a diverse array of recreation opportunities, from natural resource-based recreation associated with Jordan Creek, to competitive youth programs, to self-directed leisure activities. The range of public recreation opportunities provided at Covered Bridge Park is listed below.

Resource Based Recreation – Jordan Creek flows though Covered Bridge Park extending 1.4-miles. The creek is popular for trout fishing, and when seasonal creek flows are sufficient, outdoor enthusiasts enjoy paddling the creek. The riparian buffer and creek offer opportunities for bird watching and nature study.

Historic Education – Wehr Mill Dam is the remaining remnant of Wehr Mill located on the small park parcel located on the west side of Wehr Mill Road, north of Wehr's Covered Bridge. Wehr's Covered Bridge and Manassas Guth Covered Bridge are historic structures in the park and the Guth House, one of the oldest structure in South Whitehall Township, can be viewed from the park. Lime kiln remnants on the north side of River Road can be viewed from the park. The setting and these historic resources present opportunities for learning about local history. Historic information about the mill, dam, and historic structures could be shared with park visitors with interpretative signage.

Traditional Recreation – Riverfront Park provides a unique natural setting for spending time with family and friends. Picnic areas, a playground, fishing areas and facilities, trails, the event lawn, and open space for games and activities are the backdrops for lifetime memories.

Group Outings and Programs – The picnic areas, pavilions, and open lawn areas provide space for families and community organizations such as the scout groups, school ecology clubs, service clubs, and others to gather at the parks for their programs. The amphitheater provides a venue to group presentations.

Self-Directed Activities – Non-scheduled time is a premium for many as we get caught up in the hectic pace of our day to day lives. Covered Bridge Park provides a place to visit where many activities are not scheduled, where visitors can enjoy the park setting and facilities at their own pace and on their own terms. Walking, jogging, fishing, playing disc golf, spending time in the dog park, picnicking, and enjoying the playground are activities that visitors enjoy in the park on their own schedule.

Fitness and Wellness – Fitness extends lives, improves self-image, reduces health care costs, reduces isolation, and makes people happier. The park provides areas for people to walk and jog and spend time being active in the outdoors.

Competitive Sports – The baseball fields and multi-purpose fields offer opportunities for area youth to participate in sports activities. The basketball courts and sand volleyball court will support competitive and pick-up use.

Special Events Space – The event lawn can be programmed for special events and community activities. The lawn is located convenient to restrooms, parking, and drop-off area to support large gatherings.

Covered Bridge Park Master Plan

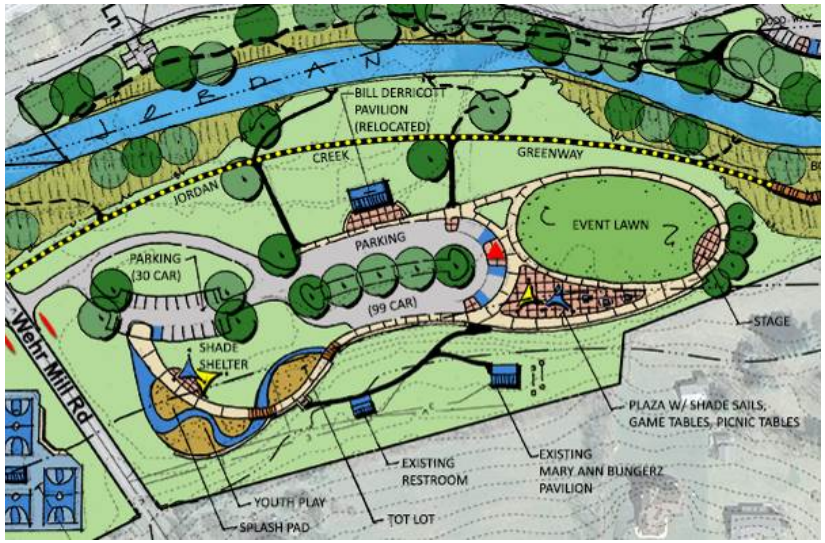
Covered Bridge Park Master Plan proposes improvement to the park that expand recreational and leisure offerings; protect and enhance Jordan Creek and its riparian corridor, and introduce facilities that enhance the convenience of visiting the park.

The importance of the park as a destination along the Jordan Creek Greenway has been recognized with trailhead improvements and creek access areas.

Recreation and Leisure Facilities

The Master Plan proposes a complete renovation of the park facilities. Although some of the facilities are retained, they are enhanced to provide accessibility improvements to meet the requirements of the Americans with Disabilities Act (ADA). New facilities are proposed to target recreation interests of residents.

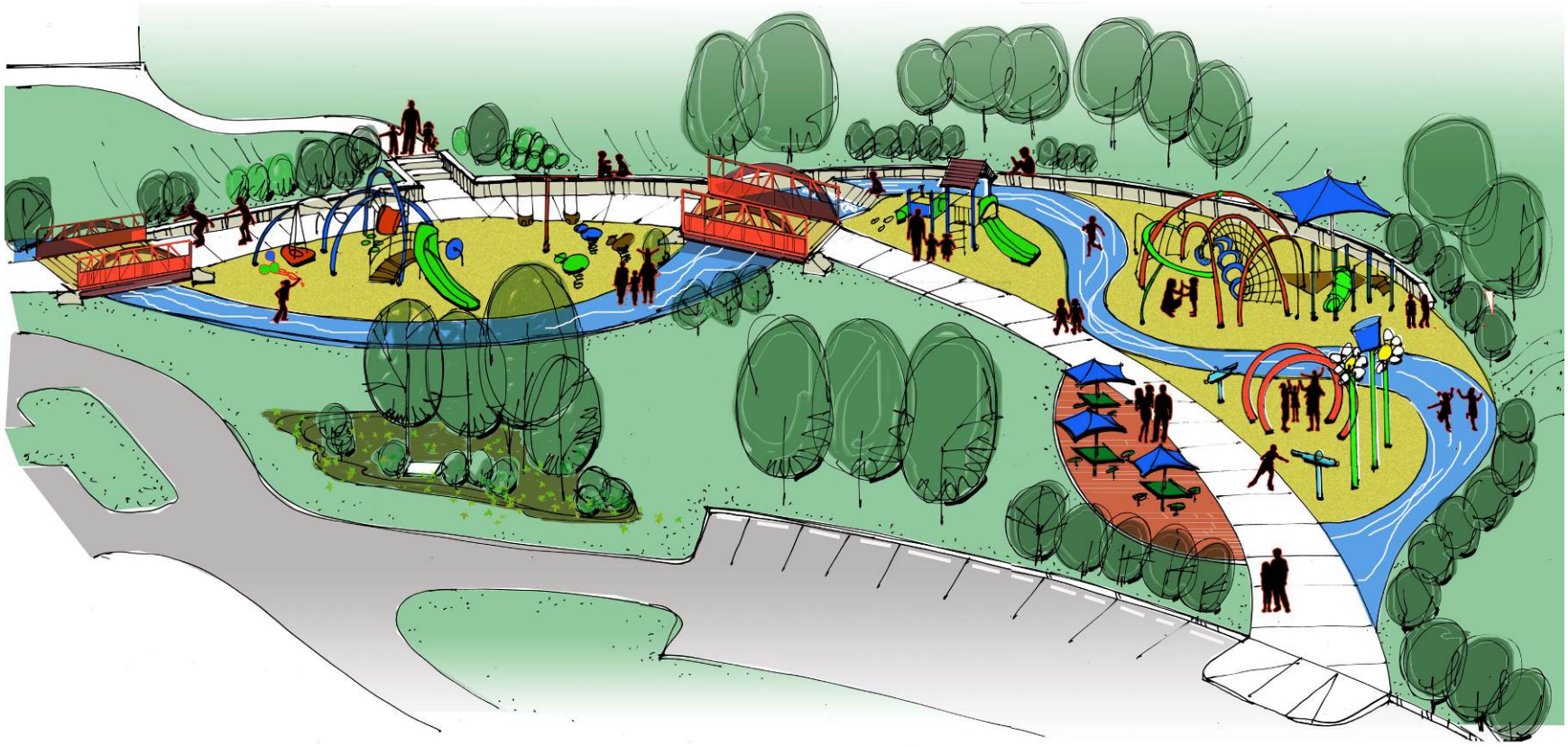
Event Lawn – An area on the east side of the main parking lot is designed as an event lawn with an oval walkway encircling the area and a stage at the eastern end. A trellis is located at the stage which has evergreen trees planted as a backdrop. The stage location in the east provides the preferred orientation for viewing performances. Spectators can bring lawn chairs and blankets to sit and view performances. Walkways connect the oval to the drop-off at the parking area. A plaza area is located on the south side of the event lawn, which is outfitted with picnic and game tables and shade sails for shade. The plaza could be used to orient spectators to performances and as a staging area for intermission/pre-show activities. When no events are scheduled the plaza will provide an inviting area to rest or meet with friends before exploring the park and trails.



Destination Playground – An age-segregated playground is located near the main park entry off of Wehr Mill Road. The playground includes a tot lot for children ages two to five years old, a youth playground for ages six to twelve years old, and a water spray ground for water play. A "creek – water" theme is suggested to celebrate the Jordan Creek. Pavement and safety surface configuration and color create and separate the three areas. Benches, picnic tables, and shade sails complement the area and make it comfortable for caregivers.

Tot lots and youth playgrounds must be developed within areas of safety surfacing and located as recommended for safe play. When developing playground areas, the following general guidelines should be incorporated into the design:

- The playground layout, equipment, and safety zone should comply with the Consumer Product Safety Commission (CPSC) Guidelines for Playground Safety.



- Playgrounds must meet the requirements of the Americans with Disabilities Act (ADA) which requires that an accessible route be provided from walkways/parking areas to the playground equipment and that a portion of the equipment offer activities that can be utilized by physically challenged children.
- Playgrounds should be age-segregated to accommodate children of different ages and abilities. The playgrounds should have signs identifying the age appropriate areas of play.
- American Society for Testing and Materials references for public playground safety:
  - F1487 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use.
  - F2373 Standard Consumer Safety Performance specification for Public Use Play Equipment for Children 6 Months through 23 Months.
  - F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.

Playgrounds should be designed to stimulate imaginative play as well as physical activity. Playgrounds should be interesting environments that engage children while providing convenience facilities for adults such as benches and shaded areas. Two additional playgrounds are located to complement park activity areas:

- An age segregated playground is located in the activity hub on the western tract. This playground complements the picnic pavilion and will serve children accompanying spectators to athletic events.
- An age segregated playground is located near the two baseball fields along River Road. The playground is located down-grade of the existing restroom and is complemented by a small pavilion.

Dog Park – A fenced dog park is developed on the west side of Wehr Mill Road at the site of the former Recreation Center. The dog park is divided into two areas; 2.7+/- acres for large dogs and 1.2+/- acres for small dogs. The large dog area is open to the creek side to allow dog's access to the creek and to allow the free flow of flood waters during flooding events. A double-gate entry is provided to enter the two areas and control access. Shade trees are suggested for areas outside of the overhead wire right-of-way. Benches or large rock boulders for sitting and water fountains for people and dogs should complement the facility.

Basketball Courts – Two full and one half-court basketball courts are proposed for the park in the area of the former Recreation Center. The full-courts are developed at 50' x 84', which is the standard PIAA (Pennsylvania Interscholastic Athletic Association) dimensions for a high school basketball court. The half-court is developed at 50' wide by 42' long, which is one half of the PIAA standard size of for high school basketball courts.

A ten-foot unobstructed area is provided on all sides of the court area, as recommended. The courts should be developed with 1.25-1.5 percent slope for proper surface drainage with a north-south orientation. Lighting is proposed for the courts. A small pavilion is proposed in the court area for resting and gathering in a shaded area between games.

Sand Volleyball Court – A sand volleyball court is proposed at the upland picnic area along Wehr Mill Road. The court is developed with the preferred north-south orientation and standard size of 30' x 60', with clear area extending 10' beyond the limits of play on all sides.

Horseshoe Pits – Horseshoe pits are proposed in three locations in association with picnic pavilions. The horseshoe pits are located with the preferred north-south orientation with the stakes 40-feet apart and adequate safety zone surrounding the playing area. The pits should be developed to the standards of the National Horseshoe Pitchers Association.

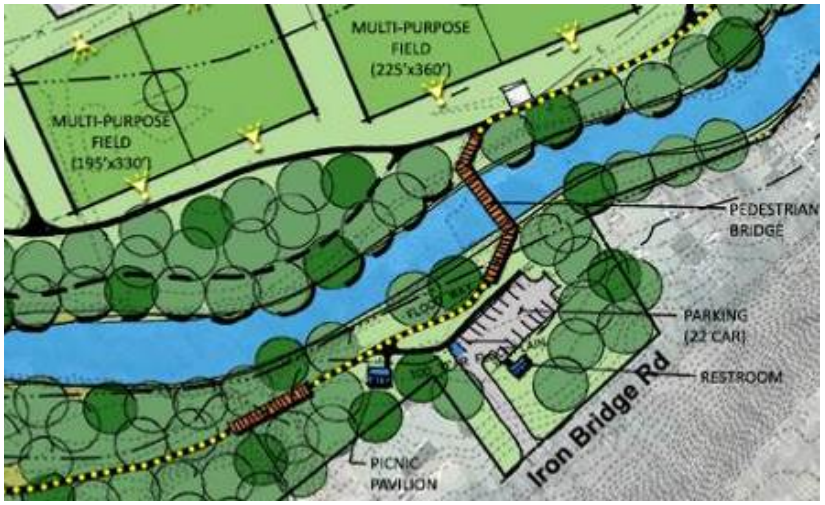
Picnic Areas – Six picnic areas are suggested for the park as follows:

- Playground Picnic Area – This picnic area includes the existing Mary Ann Bungerz Pavilion, a medium pavilion located south

of the hub parking area. This pavilion is convenient to the new destination playground and the event lawn and could be rented for birthday parties and other uses.

- Large Pavilion Picnic Area – The large pavilion located to the east of existing baseball field #4 remains in the master plan design. Access to this pavilion is more convenient with the new parking area located off of Wehr Mill Road. The parking in this upland area is developed in two lots; one close to Wehr Mill Road and one down-slope and adjacent to the existing wood edge. A new trail connects the parking and pavilion but the natural slope in this area prohibits development of an accessible route.
- Main Park Hub – A large picnic pavilion is located between the hub parking area and Jordan Creek in the open lawn area. This pavilion replaces the William T. Derricot Pavilion and should be rededicated as the William T. Derricot Pavilion. This pavilion should be sized to hold 12 picnic tables.

- Upper Wehr Mill Road Picnic Area – Two new pavilions are located in the upland along Wehr Mill Road. This area is open and currently developed with gravel parking. The parking is formalized and a medium and a small pavilion are located for informal picnics. Complementary facilities include horseshoe pits and a restroom.



- Iron Bridge Road Picnic Area – This picnic area is removed from activity areas, convenient to the new eastern bridge across Jordan Creek, and adjacent to the small parking area on Iron Bridge Road. The small pavilion should be sized to accommodate two – four picnic tables. A restroom is located adjacent to the parking area.
- Athletic Field Picnic Area – A medium pavilion is located on the north side of Jordan Creek between the existing baseball fields and the eastern multi-purpose fields. This pavilion is convenient to the existing paved volleyball courts and parking with access from River Road.

In addition to the six picnic areas, three pavilions are located to complement activity areas.

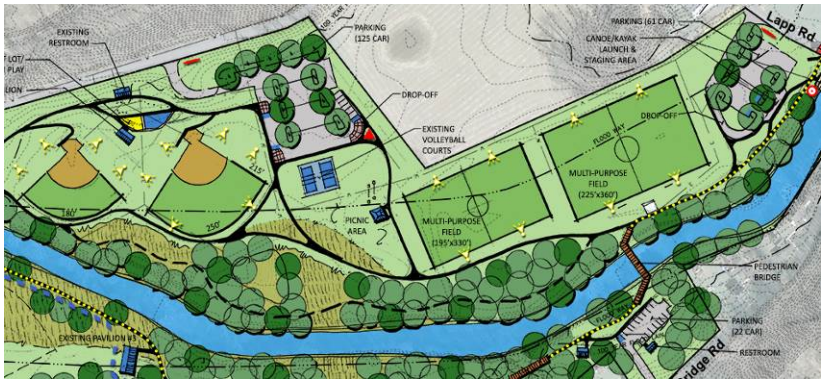
- Basketball Court Pavilion – A small (2-4 table) pavilion is located in the basketball court area. This structure is important to provide shade and as a place for teens to hang out in a safe visible location.
- River Road Playground Pavilion – A second small pavilion (2-4 tables) is located in the playground adjacent to the baseball fields along River Road. The pavilion will provide shade and a gathering area for children and caregivers.
- Western Pavilion – A medium pavilion (4-8 tables) is located in the activity hub on the western tract between the baseball field and two multi-purpose fields. The pavilion provides a shaded location for traditional picnics and team gatherings.

Multi-Purpose Fields – At the time of the master plan there are four multi-purpose fields in the park and only one is slated to remain in its current location. At full build-out the park will have three fields. Removal of existing fields should be staged to eliminate existing fields only after new fields are established.

Three multi-purpose fields are proposed in the Covered Bridge Park Master Plan as follows:

- The existing field (225’ x 3670’) adjacent to the eastern parking area is retained in the design. This field currently has football goal posts which can be removed as the football program is now accommodated elsewhere.
- A new field (195’ x 330’) is located adjacent to the eastern field in the area of the former Baseball Field #3.
- One new multi-purpose field (225’ x 360’) is located on the western tract. This field is positioned with the preferred north-south orientation.

The recommended thirty-foot minimum clearance on all sides has been provided for each field. The two eastern fields are skewed from the preferred north-south orientation to align with the parcel configuration and stream alignment. The eastern fields could be developed with lights as the electrical infrastructure is in place in this area. The fields should be developed with 1.5-2 percent slopes for positive surface drainage.



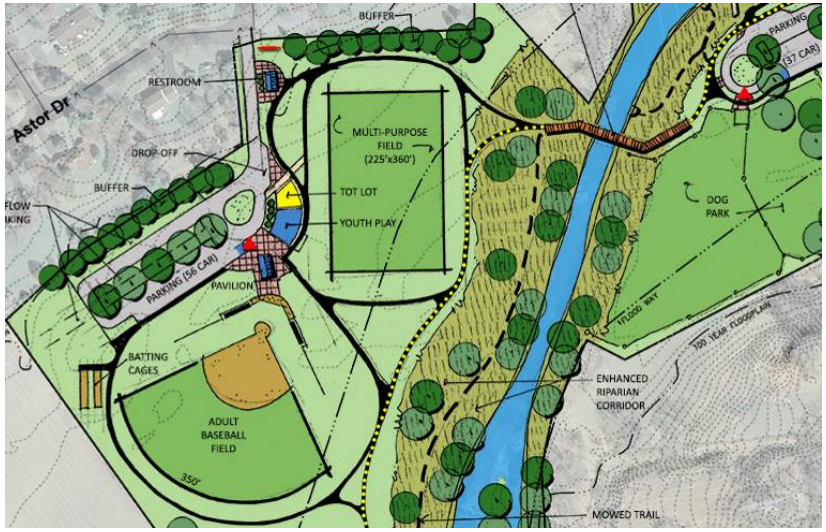
Soil tests should be performed to determine the soil amendment requirements for turf grass development and proper field drainage for the multi-purpose fields and all other athletic fields. Developed as flat fields, the multi-purpose field can accommodate a variety of sports as noted in the table below. All field sizes are in accordance with the layout requirements and standards of the National Federation of State High School Association.

Multi-Purpose Field Dimensions		
Field Type	**Field Size**	**Minimum Sideline Clearances**
Field Hockey	180’ x 300’	15’, 30’ on player’s side
Soccer	165-240’ x 300-360’	10’
Football	160’ x 360’	25’
Lacrosse	180’ x 330’	18’

Baseball: The master plan retains two existing 60-foot baseline baseball fields and recommends the removal of two fields. Field #3 is eliminated due to it undesirable location and the seasonal effects of flooding on the field. Field #3 was often unplayable and seldom

utilized by the baseball groups. Field #4 is also eliminated due to the location which is difficult to access and remove from convenient parking and restrooms. Field #4 is well developed and should continue to be used until a new field is developed on the park's western tract. The baseball amenities in Covered Bridge Park Master Plan include:

- Two existing youth baseball/softball fields (60' baselines) which are improved with accessible routes to the dugouts. The nearby playground and pavilion complement the fields and the grading to terrace in these facilities could be used to develop a spectator seating hill between the two fields.
- A new 90-foot baseline adult baseball field is developed with optimum field orientation. The outfield pocket measures 350' and the field is developed with sideline fencing, dugouts, and a backstop. The field is located convenient to parking, restrooms, pavilion, and a playground.



- Two netted batting cages are located adjacent to the adult baseball field and parking on the western tract.

Disc Golf Course – An 18-hold disc golf course is located on the southeastern portion of the park. The course is primarily in the woods, including the area of the scenic rock outcrops and elevation change near Pavilion #3. The first hole is located near the existing pedestrian bridge and existing baseball field #4 and many users park on the north side of the creek and cross the bridge to access the course. On-line reviews of the course characterize it as a course with "a mix of short range skill shots with various elevation changes, an all par 3 course, and a great beginner course as well as a great practice course for higher skill levels".

The woodlands show evidence of extensive use of the disc golf course with little understory vegetation remaining in the course area and compacted earthen areas near the baskets and tees. The master plan suggests that the course be realigned to expand into the area of baseball field #4, after is it removed, to lessen some of the wear and tear on the woodlands and move away from the rock outcrop. Additionally, the disc golf course will need to be realigned to allow the Jordan Creek Greenway trail to safely carry users in the area of the existing course. The area of baseball field #4 is designated to have riparian buffer plantings which could be established with consideration of disc golf hole realignment. Realignment of the course should be completed in consultation with disc golfers who frequently play the Covered Bridge Park course.

Creek Access Improvements – Jordan Creek extends 1.3+/- miles through Covered Bridge Park and is one of the main attributes of the park. Improved access to the stream for fishing and paddling is desired by residents and accommodated in the Master Plan with three canoe/kayak launch areas, staging/drop-off areas for paddle craft, and multiple trails connecting to the creek for fishing.

- Canoe/Kayak launch areas are developed at the eastern parking area near the Manasses Guth Covered Bridge, on the north side of the creek with access from River Road, and on the west side of the Wehr Covered Bridge near the location of the former Recreation Center.

- Stabilized creek access is suggested at multiple locations. These areas are relatively level along the creek edge that are stabilized with subsurface plastic grid system and compacted aggregate. The areas are connected to an accessible trail and should be located in the field to protect existing mature vegetation and minimize grading.
- Staging and drop-off areas for car-top paddle craft removal are provided in the eastern parking area and in the parking area west of Wehr Covered Bridge.

Trails – Trails extend throughout the park to provide accessible routes to facilities and activity areas and provide opportunities for walking, jogging, and exploring the park. Bituminous pavement is suggested with consideration of accessibility requirements and seasonal flooding. The Jordan Creek Greenway trail traverses the full length of the park and is described in Chapter 6. The Jordan Creek Greenway Trail is proposed at 10-foot wide, west of the park in the area engineered by Barry Isett & Associates. This main trail should be developed at 10-foot wide in Covered Bridge Park. Other trails should be developed at a minimum eight-foot width with the exception of small link trails to access Jordan Creek which could be developed at a minimum five-foot width.

Trail mile markers should be added along the Jordan Creek Greenway Trail and on main loop trails. Kiosks at trailheads should have site maps, which show the trail layout and identify loop lengths. Site furnishings to include benches, trash receptacles, and picnic tables should be conveniently located along trails in the park.

Two new pedestrian/bicycle bridges span Jordan Creek to create loop trails and carry the Jordan Creek Greenway Trail through the park. The existing pedestrian bridge is retained and modified for accessibility.

- The eastern bridge is located approximately 650 linear feet west of Lapp Road. The Iron Bridge Road parking area provides convenient access to the new pedestrian bridge and the multi-purpose fields located on the northern portion of the park.
- The western pedestrian bridge is located approximately 600 linear feet west of Wehr's Covered Bridge. This is the location shown on the Barry Isett & Associates engineering drawings for the Jordan Creek Greenway trail between PA Route 309 and Wehr Mill Road. This pedestrian bridge will provide an alternative connection from the parking area on the west side of Wehr Mill Road to the western tract athletic fields. The bridge in this location will require additional length to span the re-graded and stabilized floodplain following removal of the dam.
- The existing pedestrian bridge located mid-way between Wehr Mill Road and Lapp Road is configured with an at-grade approach on the north side and steps on the south side. The bridge is not accessible and the steps prohibit use by strollers and bicycles and present a challenge to people with mobility issues. The master plan suggests renovation to the bridge approach on the south side to add a switch-back ramp to provide full accessibility in the center of the park.

Support Facilities

Restrooms – Restrooms are proposed at five locations to serve park visitors. The restrooms and their associated on-site disposal systems are located above the 100-year floodplain.

- The existing restroom in the main hub area is retained and will serve visitors to the destination playground and the event lawn.
- The existing restroom along River Road near the two youth baseball fields is retained. This restroom will also serve the proposed playground and pavilion located in this area.

- A new restroom is located on the western tract near the park entrance at Rachael Lane. This location is above the 100-year floodplain although it is somewhat removed from the hub area. This restroom will serve all activities on the western tract.
- A new restroom is located at the Iron Bridge Road parking area. This restroom will serve visitors using the trails and the multi-purpose fields.
- A new restroom is located in the upland picnic area off of Wehr Mill Road. This restroom will serve visitors to the picnic area, trail users, and disc golfers.

The restrooms should be connected to public water and will have on-lot disposal systems. Vandal resistant materials and fixtures are suggested.

Utilities – Infrastructure improvements are necessary at Covered Bridge Park for the proposed uses and facilities as defined by the master plan.

Electrical service will be required for the restrooms and for lights at athletic fields and courts. If evening programming is anticipated for the event lawn for concerts, plays, or movies, then the accessible routes and adjacent parking area should have lights so that patrons can safely exit the facility. Electrical service with locking outlets should be provided at the large pavilion in the park hub and other pavilions that may be rented. The Township may want to consider adding flush locking outlets periodically along the walkway encircling the event lawn for use during special events.

Public water should be extended to the restrooms. Water could also be extended to the basketball courts for a water fountain, if desired. Water fountains with attached dog bowls should be included in each of the two dog park areas.

Entrance/Access and Parking – There are multiple access areas to Covered Bridge Park and the master plan introduces five new access points and six new parking areas.

- The existing hub parking area (99 vehicles) south of Wehr's Covered Bridge is maintained in the master plan and expanded with a drop-off area. A new 30 vehicle parking area is located along the existing access drive to the hub parking area to serve the new destination playground.
- The parking lot on the west side of Wehr Mill Road is reconfigured and expanded into the area of the former Recreation Center. This 37 vehicle parking area serves as a trailhead for the Jordan Creek Greenway trail, includes a canoe/kayak staging area, and has a drop-off. The parking area will also serve visitors to the dog park and basketball courts.
- A new parking area is access from Rachael Lane to serve the western tract facilities. This parking area is sized for 56 vehicles with room for overflow turf parking. A drop-off is provided.
- Two new parking areas are located off of Wehr Mill Road just north of the intersection with Iron Bridge Road. The upland lot is sized for 24 vehicles and will serve the new picnic area established in this area. The lower lot is sized for 20 vehicles

and will provide more convenient parking to access pavilion #3 and the disc golf course.

- A new parking area is located on the upland area on the south side of the park with access from Iron Bridge Road. This parking area is convenient to the new eastern pedestrian bridge and sized to accommodate 22 vehicles.

- The existing eastern parking area off of Lapp Road is maintained and reconfigured with a drop-off and canoe/kayak staging area. The lot has been expanded to accommodate 61 vehicles.
- The eastern parking area off of River Road has been slightly reconfigured to provide a drop off and additional spaces for a total of 125 vehicle spaces.
- The parking area on the north side of the existing pedestrian bridge is maintained in its current configuration. It accommodates 34 vehicles.
- Two new parking areas are established along River Road to provide expanded creek access. A small six-vehicle parking area is located east of Wehr's Covered Bridge and a 20 vehicle area is located in the meadow at the creek bend.

The park drives should be paved and painted with markings to designate two-way travel. Paved handicap parking spaces with appropriate signage and pavement markings should be provided in each parking area.

Natural Areas

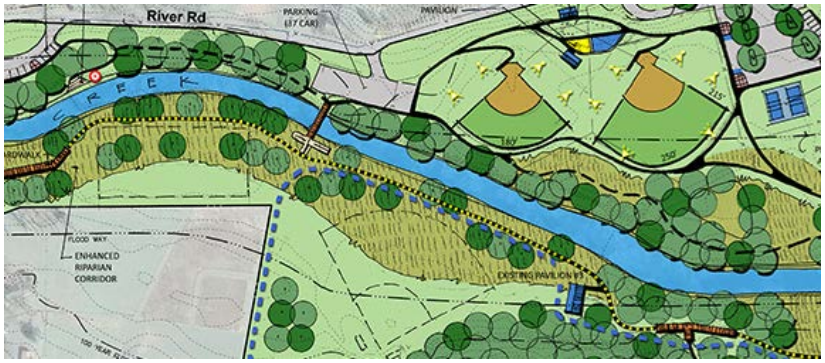
Natural areas of Covered Bridge Park include Jordan Creek and its riparian corridor and the wooded area on the southeastern portion of the park.

Riparian Corridor – Large mature trees and low meadow and shrub vegetation exist throughout the riparian corridor. This vegetation helps to stabilize the river banks and prevent excessive erosion. Trees in the riparian corridor also serve as nesting and roosting habitat for birds and shade the stream. Riverfront improvements should be field located to minimize removal of large trees and negative ecological impacts on riparian vegetation.

Vegetated riparian corridors are critical to healthy streams and rivers. These vegetated lands contiguous to streams and river banks protect watercourses and promote water quality. Riparian corridors provide ecological benefits which include:

- Stabilize Stream/River Banks – Deep-rooted vegetation binds the soil along water courses, stabilizing the banks, and preventing erosion during periods of high runoff and flooding.
- Improve Water Quality – Vegetation along streams traps and treats sediment, nutrients, and pollutants before they enter the water course or groundwater.

- Enhance Wildlife Habitats – Trees, shrubs, and grasses along water courses provide habitat, shelter, and travel corridors for many aquatic and land species.
- Reduce Flooding and Sedimentation – Vegetation retains stormwater runoff longer, improves infiltration, and filters sediment from flowing downstream during floods.
- Keep Streams Cooler and Healthier – Shade from riparian buffers cools the stream waters and increases food, oxygen, and habitat for aquatic life.
- Enhance Scenery – Vegetation along water courses adds beauty and diversity to the landscape.



The riparian corridor of Covered Bridge Park should be enhanced with riparian buffer plantings of native vegetation to expand the benefits listed above and reduce maintenance. Plantings should be composed to maintain scenic views to the creek and allow for stream access.

Invasive Species – The riparian corridor and other areas of the park should be monitored for invasive species. Any invasive species that currently inhabit the corridor should be removed and native vegetation planted in its place. Riparian areas are difficult to protect from invasive species and monitoring and removal efforts should be ongoing.

General Park Design Considerations

Recreation and Support Facilities

Americans with Disabilities Act – ADA – The US Department of Justice and the Access Board has developed new guidelines covering access to trails, beaches, picnic areas, camping areas, and viewing areas. The guidelines supplement those the Board has issued for the built environment and address unique constraints specific to outdoor developed areas. The Accessibility Guidelines for Outdoor Developed Areas apply to all public projects. The following guidelines are outlined in the Accessibility Guidelines for Outdoor Developed Areas and summarized here, in part. Refer to the Access Board website for complete guidelines, www.access-board.gov/guidelines-and-standards/recreation-facilities/outdoor-developed-areas.

Picnic Facilities – Newly constructed picnic facilities shall provide accessible picnic units (outdoor space used for picnicking). Where picnic facilities contain two or fewer picnic units, each picnic unit shall be accessible. Where picnic facilities contain more than two picnic units, at least 20 percent but not less than two of the picnic units shall be accessible. Where picnic units are altered or added, the requirements above shall apply only to the picnic units that are altered or added until the number of accessible picnic units complies with the minimum number required for new construction.

Trails – Trail shall be accessible where the trail directly connects to a trailhead or another accessible trail. Newly constructed trails shall be accessible and altered trails that change the original design, function, or purpose of the trail shall be accessible. Where a condition (listed below) does not permit full compliance with a specific requirement on a portion of a trail, that portion shall comply with the specific requirement to the maximum extent feasible. Where it is impracticable for an entire trail to comply, the trail shall not be required to comply.

Conditions for exception to trail accessibility criteria:

1. Compliance is not feasible due to terrain.
2. Compliance cannot be accomplished with the prevailing construction practices.
3. Compliance would fundamentally alter the function or purpose of the facility or the setting.
4. Compliance is precluded by the:
   - Endangered Species Act (16 U.S.C. §§ 1531 et seq.);
   - National Environmental Policy Act (42 U.S.C. §§ 4321 et seq.);
   - National Historic Preservation Act (16 U.S.C. §§ 470 et seq.);
   - Wilderness Act (16 U.S.C. §§ 1131 et seq.); or
   - Other Federal, State, or local law the purpose of which is to preserve threatened or endangered species; the environment; or archaeological, cultural, historical, or other significant natural features

Trail surface shall be firm and stable and shall have a clear tread width of 36-inches minimum and no more than 30-percent of the total length of a trail shall have a running slope steeper than 1:12.

Parking – Parking areas should be developed to provide an appropriate stabilized surface for vehicle parking, and handicapped parking stalls should be paved and appropriately designated. Bituminous pavement is preferred for Covered Bridge Park as it is accessible and can withstand most flooding events. Minor unraveling may occur along the edges and there may be erosion of the lawn adjacent to pavement edges, but well-constructed bituminous surfaces will typically remain intact during typical flood events. The initial cost of bituminous pavement is greater than coarse aggregate, but the ongoing maintenance associated with coarse aggregate pavement is avoided.

Site Furnishings – The park should have facilities that enhance the convenience of visiting the park and create a welcoming environment. Picnic tables should be provided at pavilions, and informally in clearings near activity areas. Benches should be provided at gathering places, and periodically along trails. Park furnishings that provide for the leisurely enjoyment of the park are suggested. Furnishings should consider the needs of seniors and persons with disabilities and includes picnic tables that accommodate wheel chairs and benches in shaded locations. Trash receptacles should be located in activity areas.

Park Architecture – Implementing the recommendations of the master plan will require development of new park structures. Park buildings with similar architectural style can be a unifying factor of a park and park system. The proposed buildings should respond to the park site and building location and elements of the buildings such as the materials, proportions and massing, roof lines, colors, and other factors should be similar. In addition to unifying the park, if pavilions, restrooms, and other buildings are developed with similar design and complementary qualities, repairs and upgrades will be more standardized.

An architectural style that has natural qualities and is compatible with the settings of the park is suggested. Consider using native stone, wood, and natural colors. Pavilions could be pre-engineered and chosen from one of many pavilion manufacturers or specifically designed for the park. All structures must comply with various local, State, and Federal codes and guidelines, including the American's with Disabilities Act (ADA). Park architecture guidelines noted below are recommendations to guide the park structure design.

Park Architecture Guidelines

Unifying Design – Buildings throughout the park should be similar in design and detail, while responding to context, function, and site characteristics. Building materials should be incorporated in other park elements, i.e. stone used for site walls or sign bases.

Building Style – The historic or vernacular style of existing or local traditional buildings and structures should be observed and highlighted in new building design if appropriate. Building materials and an earth tone color pallet that blends with the surrounding landscape should be used.

Complement the Park Setting – The buildings should relate to the topography and character of the setting, becoming an integral part of the park site and not forced upon the landscape.

Human Scale – The buildings should be human scale with wide roof overhangs to provide protection from the elements.

Vandal Resistant – Interior and exterior materials should be vandal resistant. Restrooms should have stainless steel fixtures, pavilion trusses should be closed, security lighting should be installed, exterior outlets should have locking covers, etc.

Expandable – The park structures should be built with expansion opportunities preserved as future needs arise as appropriate.

ADA Compliance – Public buildings must comply with the Americans with Disabilities Act requirements.

Green Design – Green materials and energy savings strategies should be incorporated into building designs. Consider developing LEED certified buildings.

South Whitehall Township should consider developing buildings that are LEED certified to promote "green" sustainable development within the park. LEED is an internationally recognized green building certification system, providing third-party verification that a building was designed and built using strategies aimed at improving performance in energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts. LEED was developed by the U.S. Green Building Council to provide building owners and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operation, and maintenance solutions.

Signage System Considerations – A comprehensive signage system is important to guide visitors to the park and inform and direct visitors once they are at the park site. A comprehensive signage system should include a park entrance sign(s), park rules sign, direction signs, trail mile markers, and interpretative signs. Currently there are no sign design standards for South Whitehall Township parks or the Jordan Creek Greenway Trail. The logo to the right has been used informally for the Jordan Creek Greenway.

A covered bridge theme and motif is suggested for the signs throughout Covered Bridge Park. The sign design highlights the unique covered bridge truss design, typical of Pennsylvania covered bridges.

Entrance Sign

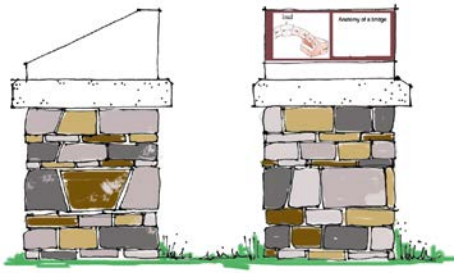
Entrance signs should include the park name and Township name and logo. Entrance signs should be located at the main entrances to the park. Entrance signs are suggested at the five main entrances to include both sides of Wehr Mill Road at the entry drives south of the covered bridge, at the eastern parking area off of Lapp Road, at the eastern parking area on River Road, and at the park entrance from Rachael Lane. A small, scaled down version of the entrance sign should be developed at other park entry points.

Information Kiosk

Six information kiosk are suggested for Covered Bridge Park in parking drop-off area and trailheads. Kiosk orient visitors and provide information about the park and typically include a park and trail map, park rules and policies, and park announcements. The kiosk could be developed as a two, three, or four sided sign structure to accommodate desired information.

Interpretative Signs

Interpretative signs are suggested to provide information about historical, cultural, and/or natural features of the park. Interpretative signs are suggested to describe and illustrate the following features:



- Wehr's Mill and Dam
- Wehr's Covered Bridge
- Manasses Guth Covered Bridge
- Lime kilns on the north side of River Road
- Jordan Creek and the riparian buffer corridor

Directional Sign

Directional signs direct visitors to key features in the park such as the dog park, baseball fields, event lawn, etc. Directional signs are typically located in park hubs and at trail intersections.

Mile Marker

Mile markers should be located along trails to identify name and length. Coordinate marking the length of the Jordan Creek Greenway trail with adjacent municipalities and the Wildlands Conservancy.

Park Signage System Guidelines		
Sign Type	**Sign Purpose**	**Sign Locations**
Park Entrance Signs	Identify park and park entrances.	Each public entrance to the park.
Information Kiosks	Provide information about the parks such as park policies, park and trail maps, special events and program calendar, etc.	At activity area hubs and major trailheads.
Directional Signs	Identify direction and distance to destinations.	At trailheads and activity area hubs.
Trail Signs	Identify trails of the park, provide length of trail.	At trailheads and trail intersections to guide users and identify cross trails.
Mile Markers	Identify location on a trail (mile indication visible from both sides of the marker).	At one-quarter mile intervals along trails.
Interpretative Signs	Provide environmental education, historic, cultural, and general interest information about the park site, its resources, or surrounding area.	At points of interest in the park and along the trails.
Traffic Signs	Traffic control and warn motorists of park activity areas.	Along the entrance drives and vehicular ways within the parks.
Safety Signs	Warn visitors of safety issues.	Strategically located as necessary.

Park Sign Development Guidelines	
Vandal Resistant	Utilize materials such as phenolic resin panels (no frame required) or fiberglass embedded panels (frame required) which resist abrasions, graffiti, solvents, etc.
Weather Resistant	Utilize materials that will not fade or otherwise degrade from sunlight, moisture, or the freeze/thaw cycle.
Meet PennDOT Regulations	Along PennDOT roadways use standard signs.
Promote Consistent Image	Develop a "family" of graphics (logo, font, colors, etc.) that will be used on signs throughout the park to unify the park. Work with professional graphic artists to create a layout template for each sign type and park logo.
Graphics	Utilize maps, graphic illustrations and photographs, and text to communicate the intended message.
Positive Message	Research indicates that positive messages are far more effective in reducing depreciative activities (littering) than negatively worded messages.[1]
Sign Illumination	Park identification signs located at the main entrances should be illuminated, where practical, so they are visible at night, fostering awareness of the parks.

[1] Recreation Research Update, Pacific Southwest Research Station – Wildland Recreation and Urban Cultures, October 1999 No. 31 (USDA Forest Service).

Natural Resources and Infrastructure

Stormwater Management – Stormwater facilities will be required to accommodate the stormwater runoff generated from improvements and facilities introduced into the park. Stormwater collection and conveyance facilities should be designed to comply with the Township's stormwater management code. Stormwater management facilities, such as detention, retention, or infiltration facilities, to reduce peak flows are not accommodated on the park master plan at this time. Further study to determine the type of stormwater management facility, the size, and location should be performed as part of the design and engineering for construction. Best Management Practice (BMP) principles should be used to manage stormwater where applicable. BMP's such as rain gardens, filter strips, subsurface infiltration beds, and other low impact controls should be considered to control stormwater runoff.

Covered Bridge Park is within the Jordan Creek Watershed and the Jordan Creek Watershed Conservation Plan should be referenced as stormwater management strategies are defined.

Best Management Practices – Covered Bridge Park's natural resources are valuable assets and should be protected. Development and rehabilitation of the park, as conceived in this master plan, will involve earthwork and construction activities. Best Management Practices are encouraged throughout the construction process to protect and stabilize resources. Examples of Best Management Practices are noted on the next page.

Landscaping – Landscaping should be introduced to solve problems and enhance the visual image and function of Covered Bridge Park. Landscaping should be located and maintained to buffer adjacent uses, nearby neighbors, and functional areas such as refuse areas. Additionally, landscaping should be planted to transition from high use areas to natural areas, and to aesthetically enhance the park settings.

Landscaping should be used as a strategy to minimize maintenance. Elements such as signs should be placed within landscaped areas to minimize hand mowing. Mow lines should be established which reduce mowing, especially outside of activity areas. The main entrances to the park should be attractively landscaped with a signature design highlighting the facility. Consider low maintenance plantings for these areas that include native flowering shrubs, perennials, and warm season grasses to add color to the park.

Where planting is introduced into the park, native plant material should be used. Plant material native to Lehigh County is adapted to the geographic location and, as a result, will require less maintenance, withstand the extremes in climate change, be less susceptible to disease and pests, and propagate naturally. Native plant material will provide needed habitat and food for small mammals and birds. The introduction of native plants and enhancement of native plant areas will help reduce the opportunity for exotic species to establish a foothold on the site. Additionally, consideration should be given to choosing plant material that will withstand flooding for planting areas within the floodplain, as well as, withstand occasional wet conditions.

Best Management Practices		
BMP	**Purpose**	**Application**
Subsurface Infiltration Bed	Subsurface infiltration beds provide temporary storage and infiltration of stormwater runoff by placing storage media of varying types beneath the proposed surface grade.	Subsurface Infiltration beds are ideally suited for expansive, generally flat open spaces, such as lawns, meadows, and playfields, which are located downhill from nearby impervious areas.
Riparian Buffer Restoration	Stabilize slope, improve wildlife habitat, slow stormwater run-off	Areas of erodable soils and/or steep slope and at the edge of a stream and perimeter of pond.
Filter Strip	To trap sediment and convey run-off from paved surfaces to storm water channels and reduce run-off velocity	Adjacent to impervious surfaces and on gentle slopes. Adjacent to springs, streams, and ponds to filter sediment.
Grass Swales	Run-off conveyance, pollution, and sediment filtering device and increased ground water infiltration.	Where natural drainage ways can be incorporated into the storm water design in lieu of piped conveyance.
Rain Gardens / Bioretention	Shallow surface depression planted with native vegetation to capture and treat stormwater run-off, promoting infiltration and groundwater recharge.	Flexible in terms of size and infiltration. Great for treating direct source of run-off on an on-lot basis, such the run-off from a paved parking lot or building roof.
Flood Plain Restoration	Re-established a stream's floodplain and banks to stop stream bank erosion, improve stream health, provide species habitat for land animals and aquatic species, recreate wetland areas, increase riparian areas and reduce flooding overflow.	Can be easily integrated into the initial site planning process to prevent riparian problems from getting worse or can fix problems caused by historical practices.
Reduce Impervious Cover	Reduce stormwater run-off and promote infiltration.	Where development is proposed. Reduce driveway width, parking area dimensions, and paved areas to minimum dimensions. Utilize coarse aggregate porous surface in lieu of impervious pavement. Utilize stabilized turf for overflow parking.
Best Management Plan for Construction Activities	To prevent soil erosion, sediment, and other pollutants from entering springs, streams, ponds, etc.	Where development is proposed. Utilize during construction and post- construction period.

Sustainability & Green Design Considerations

Sustainability is a widely accepted concept that is often integrated into park development. Sustainability recognizes the impact of human actions on the natural world and promotes actions that align with conservation principles. Parks present opportunities to demonstrate and share environmental concepts and educate the general public about their role in the environment. Many park sites have embraced the concept of sustainability and have been developed with a sustainable site design approach that incorporates strategies that are ecologically based and compatible with the natural systems of the site. Sustainable park development additionally strives to repair and restore site systems and respect the function and process of the natural world. Andropogon Associates, Ltd developed the "Valdez Principles for Site Design" which promote a sustainable ecological model for site development.[2] The principles include:

- Recognition of Context.
- Treatment of Landscapes as Interdependent and Interconnected.
- Integration of the Native Landscape with Development.
- Promotion of Biodiversity.
- Reuse of Already Disturbed Areas.
- Making a Habit of Restoration.

Park development and rehabilitation provides an opportunity to incorporate green design techniques and features. Integration of green design principals and products for construction and rehabilitation of park sites is encouraged to minimize the impact on natural resources and promote sustainable development.

Guidelines for sustainable site development have been developed through an effort call The Sustainable Sites Initiative. The Sustainable Sites Initiatives is a voluntary national guidelines and performance benchmarks for sustainable land design, construction, and maintenance practices. It is anticipated that these guidelines and performance benchmarks will be incorporated into the LEED Green Building Rating System.

Sustainable Design

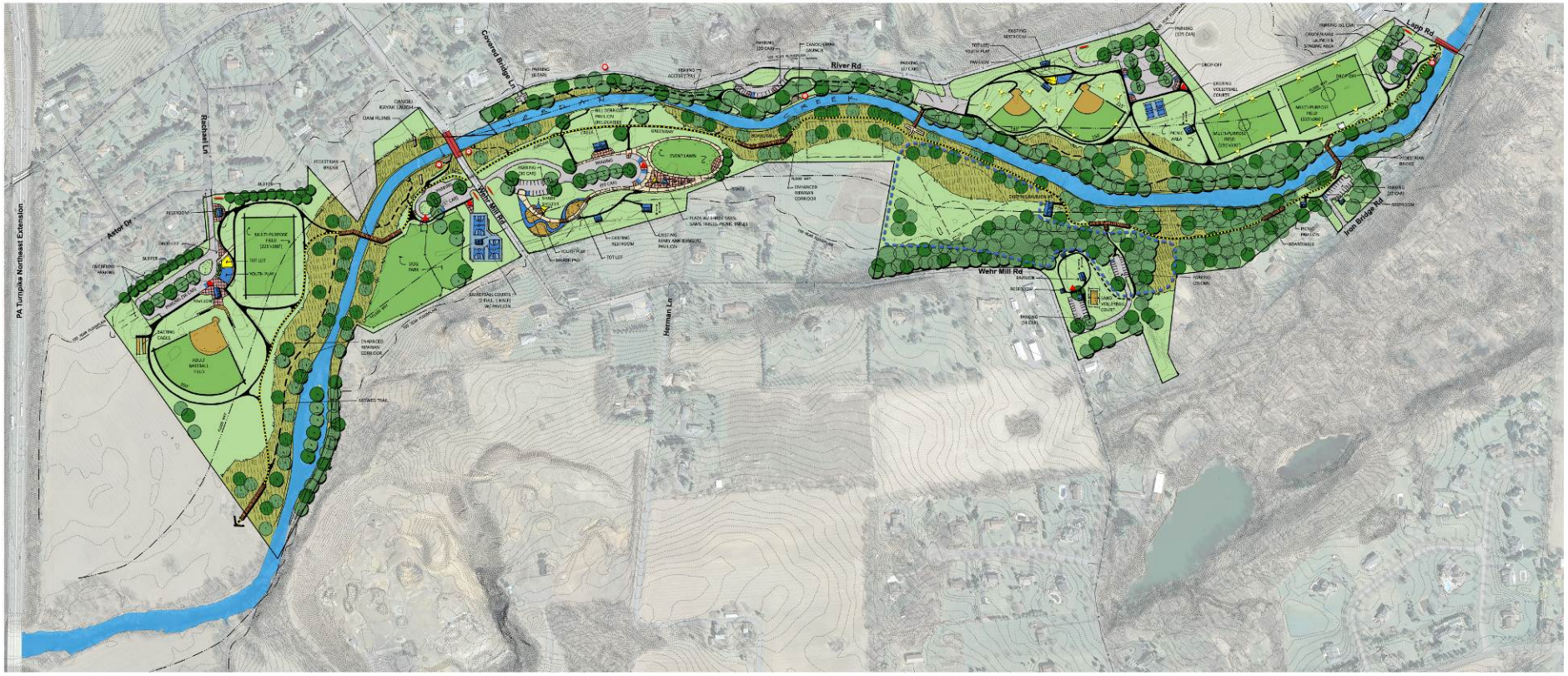
Sustainable design is a concept that recognizes human civilization is an integral part of the natural world and nature must be preserved and perpetuated if the human community is to sustain itself indefinitely. Sustainable design is the philosophy that human development should exemplify the principles of conservation, and encourage the application of those principles in our daily lives.

[2] Guiding Principles of Sustainable Design (Denver Services Center: United States Department of the Interior, National Park Service, 1993), p. 41.

Green Design Considerations		
Consideration	**Intent**	**Application**
Erosion and sedimentation control	Reduce negative impact on air and water quality	Provide erosion control measures and best management practices (BMP's) during new construction activities. Eliminate or minimize impacts to steep slope areas.
Reduce site disturbance	Limit development to appropriate sites to reduce the impact on the landscape and habitat.	Construct improvements within existing clearings or developed areas.
Reduce heat islands	Minimize impact of microclimate.	Provide plantings in the large, expansive parking areas to break up the hard surface and promote stormwater runoff infiltration.
Stormwater management	Limit disruption and pollution of natural water courses, reduce increased runoff, and promote infiltration.	Promote infiltration of runoff with grass swales, rain gardens, etc. Utilize porous pavement to promote infiltration of stormwater runoff. Size parking areas to meet park need and provide turf overflow parking for high use occurrences and special events.
Reduce light pollution	Improve night sky visibility and reduce impact on nocturnal environments.	Limit lighting within parks. Where night lighting is necessary for safety and security, specify full cut-off fixtures and only the necessary lumens.
Innovative wastewater treatment	Reduce the generation of wastewater and potable water demand	Provide self mulching, compost, or other environmentally friendly treatment alternatives.
Recycled building materials	Limit the use of consumptive building materials	Utilize recycled building materials in new construction.
Local materials and suppliers	Support the local economy and reduce the environmental impact resulting from transportation	Purchase products locally produced or manufactured.
Maximize solar orientation	Reduce electric needs through proper building orientation.	Orient buildings to take advantage of natural light and heat and cooling summer breezes. Plant deciduous trees to cool buildings in the summer and allow solar access in winter.
Promote water conservation	Reduce water use to lower burden on supply.	Select native and drought tolerant plants to reduce watering and maintenance demands. Mulch landscape areas to retain moisture and minimize the need to water plants.

Consideration	Intent	Application
Energy consumption	Minimize use of fossil fuels.	Install a ground source geothermal heat pump system for heating and cooling of buildings. Connect park sites to regional trail systems so that non-motorized transportation modes can be used to access the site. Install solar powered amenities/features (lights, electric outlets, well power. Use of solar power also eliminates the need for electric trenches and distribution system.
Use water efficiently	Maximize water collection to reduce burden on supply.	Collect rainwater and runoff in rain barrels for watering landscaping and maintenance needs. Direct rainwater to rain gardens to promote groundwater recharge. Use high efficiency fixtures and composting toilets to reduce demand. Use re-circulating and water treatment systems for splash pads and spray features.
Emphasize and promote recycling	Reduce the amount of new materials required and lower the demand for new materials to be produced.	Reuse existing buildings, materials, and infrastructure. Build with salvaged materials whenever available,
Participate in LEED and Sustainable Sites Initiative	Maximize the use of green solutions, strategies, and materials.	Use the LEED and Sustainable Sites Initiative project checklists for all aspects of design.

Covered Bridge Park Master Plan
South Whitehall Township, Lehigh County, PA
December 2013



Chapter 7

Jordan Creek Greenway

The Jordan Creek Greenway is a 53.3-mile greenway following the Jordan Creek in Lehigh County. The potential of developing an active greenway with a public trail along the Jordan Creek corridor was explored in the 2009, *Jordan Creek Greenway Feasibility Study*. The proposed greenway extends from Jordan Meadows Park in the City of Allentown to the Appalachian Trail at Blue Mountain in Lynn Township. Covered Bridge Park is one of several recreation amenities located along the greenway.

This master plan explored the following elements of the Jordan Creek Greenway:

- Alignment of the greenway trail from Covered Bridge Park west to PA Route 309.
- Alignment of the greenway trail from Covered Bridge Park east to Cedar Crest Boulevard.
- Alignment and amenities for the Jordan Creek Greenway within Covered Bridge Park.

Covered Bridge Park to PA Route 309

The 0.7-mile extension of the Jordan Creek Greenway from Covered Bridge Park to PA Route 309 was defined prior to the initiation of this planning study. The trail location and site engineering for implementation was completed by Barry Isett & Associates, Inc. in 2012 and funding for construction was awarded in late 2013. Engineering drawings were provided for review and the trail as shown on the Covered Bridge Park Master Plan generally aligns with the Isett plans as follows:

- The proposed pedestrian bridge located west of the existing Recreation Center crosses Jordan Creek in the same location as shown on the Isett plans. The bridge span has been lengthened to accommodate the grading associated with the excavated floodplain and stabilized streambank resulting from the dam removal and upstream floodplain restoration.
- The proposed Jordan Creek Greenway (paved trail) alignment is pushed upslope from the stream bank to the area outside of the excavated floodplain. Earthen trails are shown traversing the riparian corridor closer to Jordan Creek.
- A boardwalk is depicted at the western boundary of the Covered Bridge Park property to extend the Jordan Creek Greenway west beyond the park property.

Covered Bridge Park to Cedar Crest Boulevard

Jordan Creek flow approximately 1.2-miles from the eastern boundary of Covered Bridge Park to Cedar Crest Boulevard. The route for the Jordan Creek Greenway has not been defined but a detailed feasibility study was completed to define the best location(s) to cross Cedar Crest Boulevard. The *Feasibility Study for a Pedestrian Crossing of Cedar Crest Boulevard for the Jordan Creek Greenway/Trail System* completed by URDC identified three potential pedestrian/bicycle crossing. Interviews with stakeholders and additional site work narrowed the potential crossing scenarios to a preferred crossing identified as Pedestrian Crossing #2 in the report, which crosses Cedar Crest Boulevard with a pedestrian bridge south of the Iron Bridge Road Intersection.

Field work explored the best options to link Covered Bridge Park to Cedar Crest Boulevard. Each option crosses Cedar Crest Boulevard with an elevated pedestrian bridge located south of the Iron Bridge Road/Cedar Crest Boulevard intersection. Three potential Jordan Creek Greenway routes were identified and illustrated on the map on page 6-4:

- Route A – Cross Lapp Road under the Manasses Guth Covered Bridge and turn northwest along the eastern side of Lapp Road to the intersection of the former trolley line and Lapp Road. Turn east and follow the former trolley line, crossing the creek with a new pedestrian bridge at the former trolley bridge abutments. Stay on the north side and parallel to Iron Bridge Road and cross the road midway between the curves in Iron Bridge Road. Continue east along the south side of Iron Bridge Road and pass through the existing vehicular tunnel that carries the Norfolk-Southern railroad over the creek and road. Continue to the east and enter the former quarry site (South Whitehall Township road maintenance facility) and extend the trail up slope to the proposed elevated crossing location.
- Route B – Cross Jordan Creek on the Manasses Guth Covered Bridge and follow Iron Bridge Road on the west/north side of the road. Connect with Route A and continue east. A pedestrian/bicyclist light activation control and modified decking may be necessary to safely cross on the Manasses Guth Covered Bridge.
- Route C - Cross Lapp Road under the Manasses Guth Covered Bridge and follow Jordan Creek north toward Ritter Road. At the southern limit of the wooded vegetation along the creek cross the creek with a pedestrian/bicycle bridge and follow the wood edge/creek to the southeast. Connect with Route A and continue to the east to the Cedar Crest Boulevard crossing.
- Parkland High School Link – A trail link to Parkland High School property is suggest for each of the three routes above. The link extends along Jordan Creek to its northern bend in the vicinity of the school property then extends across Ritter Road to the school property. This area of the school property at Ritter Road is at the toe of a steep embankment and the Parkland School District will need to undertake a study to determine the best options for extending the trail to the upland use areas of the school property.

Jordan Creek Greenway in Covered Bridge Park

The Jordan Creek Greenway enters Covered Bridge Park at Lapp Road and extends 1.4-miles through the park to the western boundary of the park where it continues on private lands to PA Route 309. The trail route for the Jordan Creek Greenway is generally parallel to the stream within the riparian corridor. The trail should be developed at a minimum of 8-foot wide with 10-foot wide preferred. Anticipated users include pedestrians, joggers, bicyclists, persons with disabilities, and parents with strollers. The trail should be constructed to carry maintenance, emergency, and security vehicles. The trail route is illustrated on the Covered Bridge Park Master Plan on Page 6-22.

Trail Route – The proposed route for the Jordan Creek Greenway from east to west through Covered Bridge Park includes:

- Enter the park from the east, pass beneath the Manasses Guth Covered Bridge which carries Lapp Road across Jordan Creek.
- Continue to the west on the north side of the creek for approximately 650 feet to the location of a new pedestrian bridge. Cross to the south side of Jordan Creek.
- Continue west on the south side of the creek along the main trail that is located somewhat parallel to the creek and primarily within the enhanced riparian buffer area. There are sections of boardwalk to carry the trail across drainage

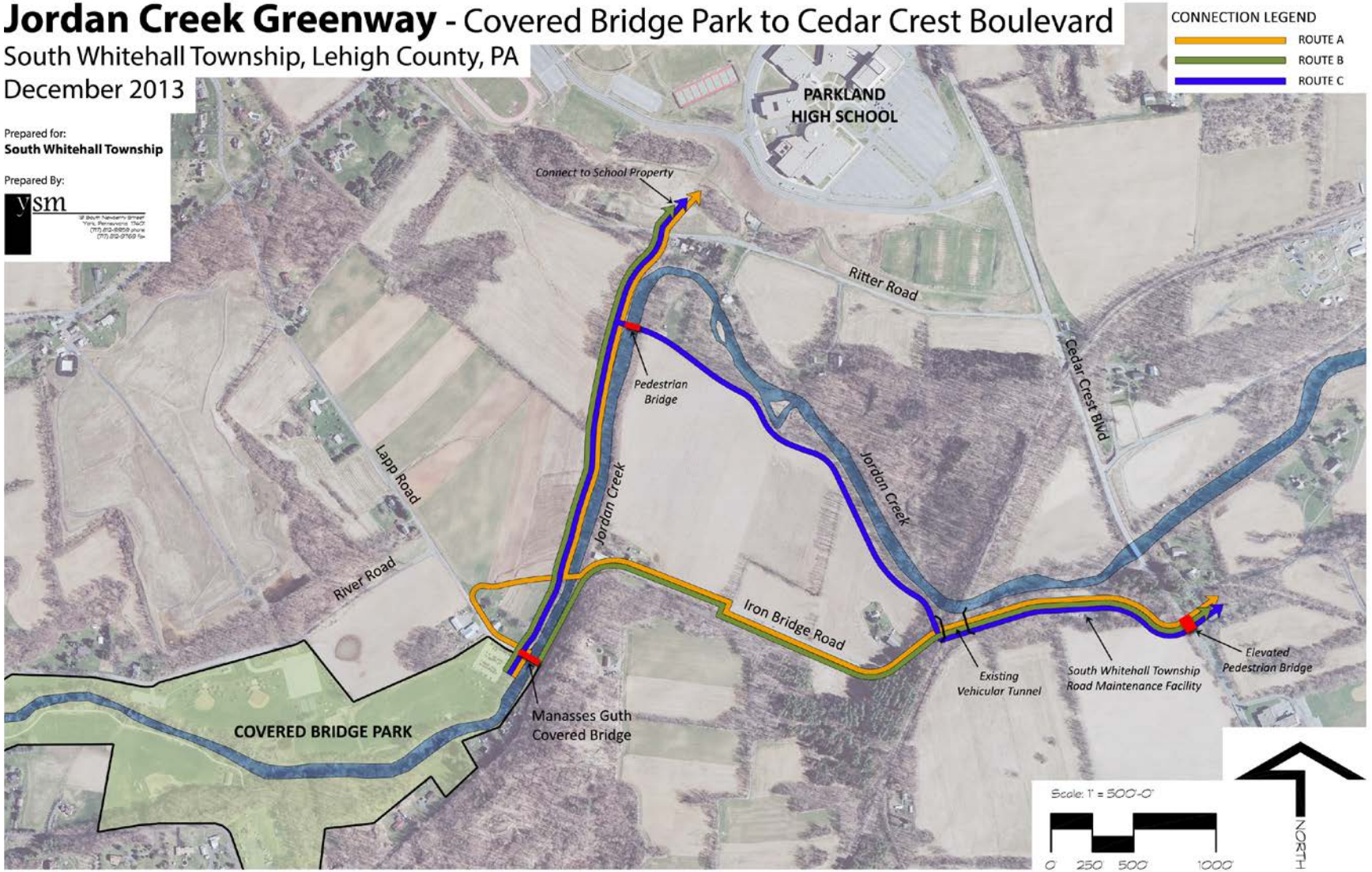
swales and wet areas. The trail intersects with Wehr Mill Road between the main park access drive on the east side of the road and Wehr's Covered Bridge.

- Cross Wehr Mill Road on a proposed crosswalk and continue on the south side of the creek approximately 600 feet to a new pedestrian bridge. Cross to the north side of the creek.
- Continue along the north side of the creek to the west along the edge of the riparian buffer. A boardwalk is proposed at the western boundary of the park to cross wet areas.

The Jordan Creek Greenway Trail is the main trail spine within the park. Numerous trail spurs and links intersect with this trail to provide access to facilities and to the creek for fishing.

Trailheads and Trail Amenities – The Jordan Creek Greenway Feasibility Study refers to Covered Bridge Park as a "central hub for the proposed greenway". As the primary municipal recreation destination in South Whitehall Township, Covered Bridge Park is an ideal location to develop access points to the Jordan Creek Greenway Trail. Two primary access areas or trailheads are proposed for Covered Bridge Park.

- The eastern trailhead is located at the existing parking area accessed from Lapp Road. This parking area is reconfigured to add a drop-off area and a pull-off/staging area for unloading car-top and trailered paddle craft. Accessible trails extend to the Jordan Creek Greenway Trail. Trails also extend from the pull-off/staging area to a stabilized creek access area. A kiosk is provided at the drop-off which will provide information about the Jordan Creek Greenway and Covered Bridge Park.
- The western trailhead is located at the area of the former Recreation Center, just west of Wehr Mill Road. A parking area is developed that includes a drop-off and a pull-off/staging area for paddle craft. A kiosk is provided to provide information about the Jordan Creek Greenway and park.
- The Jordan Creek Greenway trail should be developed with amenities that enhance the enjoyment of using the facility. Mile markers should be placed at a standard interval (0.25-mile, 0.5-mile) and should be coordinated with the overall Jordan Creek Greenway Trail. Benches and picnic tables should be placed at convenient intervals along the trail. Kiosks and signs should be provided at trailheads and other locations as appropriate. Bike racks should be located at facilities.


Jordan Creek Greenway - Covered Bridge Park to Cedar Crest Boulevard
South Whitehall Township, Lehigh County, PA
December 2013
Prepared for:
South Whitehall Township
Prepared By:
ysm
CONNECTION LEGEND
ROUTE A
ROUTE B
ROUTE C
PARKLAND HIGH SCHOOL
Connect to School Property
Ritter Road
Cedar Crest Blvd
Pedestrian Bridge
Jordan Creek
Jordan Creek
Lapp Road
River Road
Iron Bridge Road
Existing Vehicular Tunnel
South Whitehall Township Road Maintenance Facility
Elevated Pedestrian Bridge
COVERED BRIDGE PARK
Manasses Guth Covered Bridge
Scale: 1" = 500'-0"
0 250 500 1000
NORTH

Chapter 8

Cost & Implementation Analysis

Park Improvement Phasing

Achieving the vision presented in the master plan for Covered Bridge Park will require significant capital expenditures and dedication of Township staff. As with most government investment in recreation facilities, it is anticipated that the investment will occur in phases over several years. To guide the rehabilitation and improvements to Covered Bridge Park, cost estimates have been prepared to correspond to the various phases of development as determined by the Study Committee. The phases are not in priority order but rather identify geographic areas of the park that could be develop as a single phase. The Phasing Plan on page 8-5 illustrates the eight proposed phases. The following defines the suggested park improvement areas for the phased development of Covered Bridge Park:

- Phase A – The existing hub of the park to be improved with expanded parking, a destination playground, event lawn, event lawn plaza, and picnic pavilion. The existing playground and handball courts will be removed in this phase of development. The small 30 vehicle parking area and the playground could be developed as a stand-alone sub-phase of Phase A and precede the other improvements.
- Phase B – The narrow area between River Road and Jordan Creek on the north side of the creek is designated as a separate phase targeting stream access improvements. Improvements include a small six car parking area, a 20 car parking area, stabilized stream access areas, and a canoe/kayak launch.
- Phase C – The existing athletic field area on the north side of Jordan Creek extends from baseball field #1 to Lapp Road. Improvements in this phase include a small pavilion and playground near the existing restroom building to complement baseball fields #1 and #2, a second multi-purpose field in the lower floodplain west of Lapp Road, expanded parking and drop-off at the two parking areas, canoe/kayak launch, and a picnic pavilion.
- Phase D – The Iron Bridge Road parking area (22 vehicles), restrooms, and small pavilion are combined into a single phase.
- Phase E – The upland development along Wehr Mill Road to include parking area, sand volleyball court, restroom, and two pavilions are included in this phase. Additional improvements include the lower parking area, trail connections, and reconfiguration of the disc golf course. The material storage bins will be removed in this phase.
- Phase F – The area of the former Recreation Center is improved with expanded parking, basketball courts, and a dog park.
- Phase G – The riparian corridor from the western pedestrian bridge to Lapp Road is grouped into a single phase which includes the dam removal, gabion removal, floodplain restoration, stream bank stabilization, trails, eastern pedestrian bridge across Jordan Creek, steam access areas, and amenities. The western pedestrian bridge is excluded as it is part of the funded and pending improvements to the Jordan Creek Greenway Trail.
- Phase H – The western tract with access from Rachael Lane is combined into a single phase that includes an adult baseball field, a multi-purpose field, batting cages, parking, restroom, pavilion, and a playground. The hub area of this phase to include the restroom, playground, and pavilion could be implemented separate and later than the other facilities in this area.

These phased areas generally stand alone and can be implemented as desired by South Whitehall Township.

Early Implementation Projects

The vision created by the master plan will not happen immediately. Most often parks are developed in phases over time as grant funding becomes available. To sustain the excitement for park improvements that this planning process has generated, small project could be undertaken to create momentum for the entire project. These small improvements will show progress and provide enhancements that will immediately benefit citizens. Potential early implementation projects that can occur immediately, without significant investment or the need for extensive design and engineering include:

- The destination playground and adjacent 30 car parking area.
- The small pavilion and age segregated playground near River Road.
- Main entry signs and interpretative signs, and other park signs in stand-alone locations.

Probable Construction Cost Opinions

All costs provided in this plan are estimated based on the findings of this master plan and knowledge of similar park development. The proposed phases are based on logical sequence of construction and park function. The phases are not listed in priority order. As funding becomes available or needs change in the Township, the sequence of development may change. Not included in the cost estimates is an escalation cost between phases so that each phase can be compared and evaluated on an equal basis. As the park is developed, consideration should be given to escalation costs over the base cost provided herein. Design and engineering fees are presented as a percentage of construction costs and will vary based on actual phase of construction, required permits, and proposed features.

The following opinions of probable construction costs have been completed using DCNR format for use in future grant-funding applications. Costs are based on Pennsylvania prevailing wages for year 2013 construction. A fifteen-percent contingency is included in each cost opinion. No increase or adjustments for inflation has been accounted for between phases. A phasing plan is provided on page 8-5, followed by the detailed construction cost opinions.

Covered Bridge Park Probable Construction Cost Opinions	
Phase A	$1,841,079
Phase B	$188,915
Phase C	$1,441,912
Phase D	$413,964
Phase E	$760,227
Phase F	$745,524
Phase G	$2,440,834
Phase H	$1,943,488
TOTAL	**$9,775,943**

Probable Construction Cost Opinion Assumptions and Exclusions

The Probable Construction Cost Opinions on the following pages exclude the following items:

- Utility service connection fees.
- Electric service upgrades or distribution.
- Utility relocation.
- Excavation or removal of rock or unsuitable materials.
- Remediation of soils and sinkholes.

- Soil amendments.
- Import of topsoil.
- Improvements to Wehr Mill, Iron Bridge, River, and Lapp Roads.
- Improvements to the existing bridges.
- Construction management.
- Construction inspections fees.
- Dumping/hauling fees.
- Interpretive signage message and graphic design.
- Off-site improvements and off-site engineering.

YSM is not a construction contractor and therefore probable constructions cost opinions are based solely upon our experience with construction. This requires YSM to make a number of assumptions as to actual conditions which will be encountered on the site; the specific decisions of other design professionals engaged; the means and methods of construction the contractor will employ; contractors' techniques in determining prices and market conditions at the time, and other factors over which YSM has no control. Additionally, the master plan was prepared using GIS mapping information and topographic and boundary line survey information was not available. GIS information is generalized and suitable for planning purposes but does not provide mapping that can be accurately measured for quantity take-offs. Assumptions were made based on our visits to the site and the review of available information. Stormwater management and erosion and sedimentation control costs are provided on a percent of construction cost and specific strategies for this work can not be defined until the design and engineering phase.

Implementation Tasks

The development of Covered Bridge Park as depicted on the final master plan will require additional planning, design, and approvals. The following list outlines the implementation tasks that may be required for renovation and development of Covered Bridge Park. This list is provided for planning purposes and should not be considered all inclusive as additional tasks, approvals, and permits may be required.

- Apply for park development funding grants.
- Complete property line and topographic survey.
- Complete wetlands delineation.
- Complete Phase 1 archeological studies, as appropriate, to determine if there are archeological or historic artifacts of significance in the project area.
- Develop construction documents. Construction documents will design in detail and engineer the proposed improvements and associated amenities. Prepare a project manual including technical and bidding specifications.
- Prior to bidding and construction, obtain approvals from the various governing agencies. The following is a listing of typical approvals but may not be all-inclusive.
    - Municipal and County approval for land development plans, if required.
    - Lehigh County Conservation District approval for erosion and sedimentation control plans and NPDES Permit.
    - Pennsylvania Department of Environmental Protection approval for any work within the waters of the Commonwealth including delineated wetlands

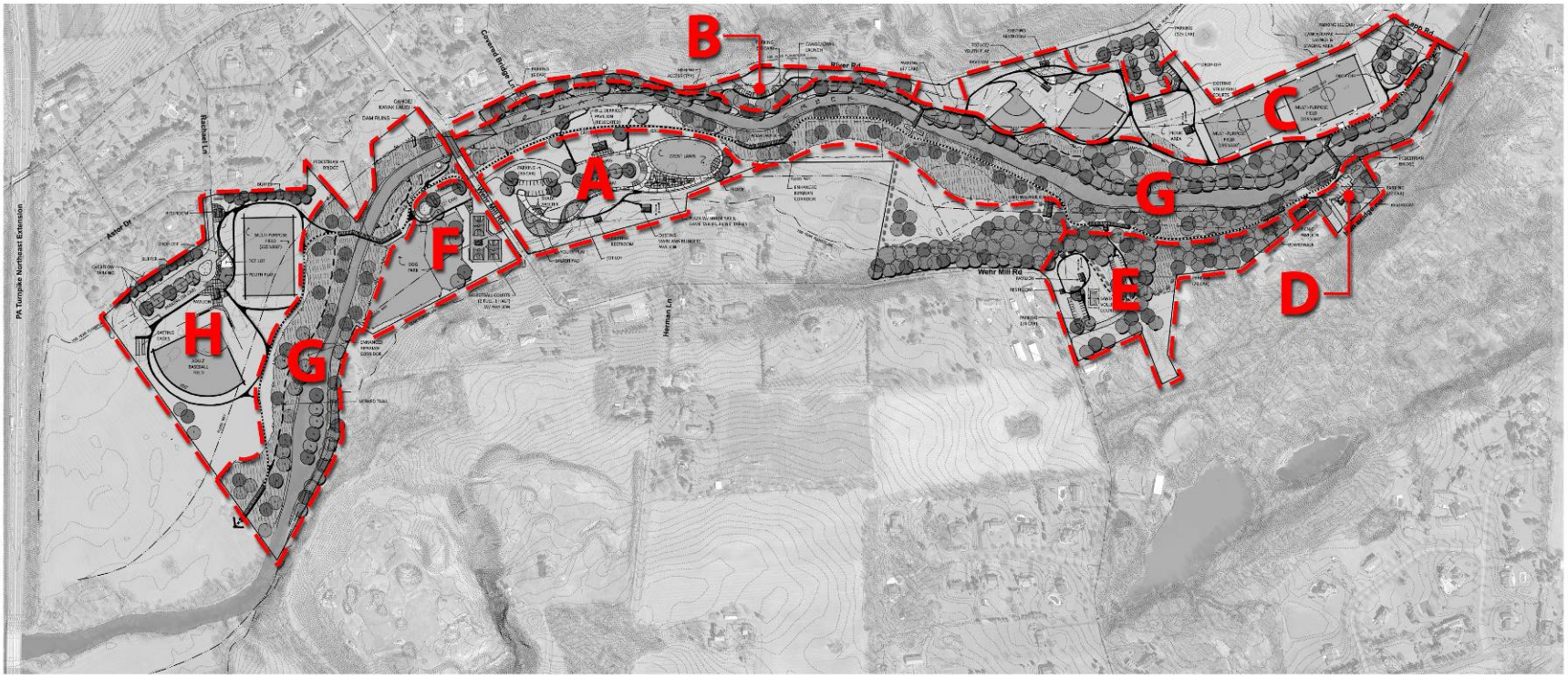
and river and stream encroachments.

- Pennsylvania Department of Environmental Protection for sewage planning module approval.
- Pennsylvania One Call. Pennsylvania law requires three working days notice for construction phase and ten working days in design stage.
- Approval from public utilities required for development such as electric service extensions or work within the rights-of-way.

- Easements for access and trail development for extension of the Jordan Creek Greenway Trail on private lands.

The above grants, permits, approval, and easements typically require advance planning, engineering, and coordination. Adequate preparation and review time should be allotted. Upon securing of all required approvals and permits and completion of the construction documents, the project should be publicly bid for construction.

Covered Bridge Park Phasing Plan
South Whitehall Township, Lehigh County, PA
December 2013



Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Recreation and Conservation
PROBABLE CONSTRUCTION COST OPINION

Grantee: South Whitehall Township
Project Title: Covered Bridge Park - Phase A
Date Prepared 1/29/2014
DCNR Project No.

Item No.	Work Item	No. of Units	Unit Cost	Total Cost
1	**Demolition/Site Preperation**			**$25,200**
	A. Misc. Site Preperation	1 LS	$3,000	$3,000
	B. Pavement Removal	1,200 SY	$6	$7,200
	C. Playground Equipment Removal	1 LS	$6,000	$6,000
	D. Pavilion Removal	1 LS	$4,000	$4,000
	E. Handball Court Removal	1 LS	$5,000	$5,000
2	**Earthwork**			**$20,000**
	A. Strip/Stockpile/Replace Topsoil	2,000 CY	$4	$7,000
	B. Grading Operations	4,000 CY	$3	$13,000
3	**Access Drive and Parking**			**$58,650**
	A. Excavation	1,200 CY	$4	$4,800
	B. 8" 2A Coarse Aggregate	2,100 SY	$10	$21,000
	C. 2.5" Binder Course	2,100 SY	$8	$16,800
	D. 1.5" Wearing Course	2,100 SY	$7	$14,700
	E. Handicap Pavement Striping and Signage	3 SP	$450	$1,350
4	**Bridges and Boardwalks**			**$16,000.00**
	A. Wood Bridge at Destination Playground	2 EA	$8,000	$16,000.00
5	**8' Wide Bituminous Trail (900 lf)**			**$19,200**
	A. Excavation	400 CY	$4	$1,600
	B. 6" 2A Coarse Aggregate	800 SY	$9	$7,200
	C. 2" Binder Course	800 SY	$7	$5,600
	D. 1" Wearing Course	800 SY	$6	$4,800
6	**Splash Pad**			**$145,476**
	A. Excavation	85 CY	$3.3	$276
	B. Concrete Pavement	1,200 SF	$6	$7,200
	C. Splash Pad Aquatic Surfacing	1,200 SF	$15	$18,000
	D. Splash Pad Equipment and Installation Allowance	1 LS	$120,000	$120,000
7	**Tot Lot (Ages 2-5)**			**$133,155**
	A. Play Equipment	1 LS	$40,000	$40,000
	B. Play Equipment Shipping & Installation	1 LS	$16,000	$16,000
	C. Excavation Fine Grade and Compaction	140 CY	$4	$560
	D. Concrete Curb Edging	265 LF	$25	$6,625
	E. Underdrain	60 LF	$12	$720
	F. Safety Surface Safety Surface (PIP Rubber)	3,800 SF	$15	$57,000
	G. Stone Base and Filter Fabric	425 SY	$10	$4,250
	H. Custom Feature Allowance	1 LS	$8,000	$8,000
8	**Youth Playground (Ages 5-12)**			**$188,290**
	A. Play Equipment	1 LS	$60,000	$60,000
	B. Play Equipment Shipping & Installation	1 LS	$24,000	$24,000
	C. Excavation Fine Grade and Compaction	185 CY	$4	$740
	D. Concrete Curb Edging	470 LF	$25	$11,750
	E. Underdrain	100 LF	$12	$1,200
	F. Safety Surface Safety Surface (PIP Rubber)	5,000 SF	$15	$75,000
	G. Stone Base and Filter Fabric	560 SY	$10	$5,600
	H. Custom Feature Allowance	1 LS	$10,000	$10,000
9	**Concrete (20,000 SF)**			**$128,000**
	A. Standard Concrete	16,000 SF	$6	$96,000
	B. Decorative Concrete (20% of total)	4,000 SF	$8	$32,000
10	**Signage**			**$10,500**
	A. Park Entrance Signage (primary)	1 LS	$6,000	$6,000
	B. Park Signage (directional)	1 LS	$2,000	$2,000
	C. Information Kiosk	1 EA	$2,500	$2,500
11	**Site Amenities**			**$141,900**
	A. Picnic Tables	4 EA	$1,000	$4,000
	B. Benches	8 EA	$1,500	$12,000
	C. Trash Receptacle	4 EA	$1,000	$4,000
	D. Bicycle Rack	1 EA	$700	$700
	E. Vehicular Gate/Bollards	1 EA	$4,000	$4,000
	F. Grills	2 EA	$500	$1,000
	G. Game Tables & Chairs	3 EA	$2,200	$6,600
	H. Horseshoe Pit	2 EA	$800	$1,600
	I. Seat Walls at Playground	600 LF	$180	$108,000
12	**Pavilions**			**$144,000**
	A. Large Pavilion w/concrete pad	1 EA	$48,000	$48,000
	B. Shade Sails	4 EA	$24,000	$96,000
13	**Landscaping**			**$41,150**
	A. Lawn Seeding	22,000 SY	1.20	$26,400
	B. Evergreen Trees	3 EA	250.00	$750
	C. Shade Trees	12 EA	450.00	$5,400
	D. Flowering Trees	12 EA	300.00	$3,600
	E. Shrub Allowance	1 LS	5,000.00	$5,000
14	**Stormwater Mgt and Erosion Control**			**$171,443**
	A. Stormwater manangement (8%)	1 LS	$85,722	$85,722
	B. Erosion Control Measures (8%)	1 LS	$85,722	$85,722
15	**Bond Mobilization and Layout**			**$149,156**
	A. Bond Mobilization and Layout (12%)	1 LS	$149,156	$149,156
16	**Contingency**			**$208,818**
	A. 15% Contingency	1 LS	$208,818	$208,818
17	**Professional Fees**			**$240,141**
	A. Design and Engineering Fees (15%)	1 LS	$240,141	$240,141
	Total			**$1,841,079**

Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Recreation and Conservation
PROBABLE CONSTRUCTION COST OPINION

Grantee: South Whitehall Township
Project Title: Covered Bridge Park -Phase B
Date Prepared 1/29/2014
DCNR Project No.

Item No.	Work Item	No. of Units	Unit Cost	Total Cost
1	**Demolition/Site Preperation**			**$2,000**
	A. Misc. Site Preperation	1 LS	$2,000	$2,000
2	**Earthwork**			**$9,300**
	A. Strip/Stockpile/Replace Topsoil	800 CY	$4	$2,800
	B. Grading Operations	2,000 CY	$3	$6,500
3	**Access Drive and Parking Area Improvements**			**$40,000**
	A. Excavation	400 CY	$4	$1,600
	B. 8" 2A Coarse Aggregate	1,500 SY	$10	$15,000
	C. 2.5" Binder Course	1,500 SY	$8	$12,000
	D. 1.5" Wearing Course	1,500 SY	$7	$10,500
	E. Handicap Pavement Striping and Signage	2 SP	$450	$900
4	**6' Wide Bituminous Trail (1,000 lf)**			**$16,200**
	A. Excavation	200 CY	$4	$800
	B. 6" 2A Coarse Aggregate	700 SY	$9	$6,300
	C. 2" Binder Course	700 SY	$7	$4,900
	D. 1" Wearing Course	700 SY	$6	$4,200
5	**Signage**			**$4,000**
	A. Park Signage (interpretive)	2 EA	$2,000	$4,000
6	**Site Amenities**			**$26,400**
	A. Picnic Tables	4 EA	$1,000	$4,000
	B. Benches	6 EA	$1,500	$9,000
	C. Trash Receptacle	2 EA	$1,000	$2,000
	D. Grills	2 EA	$500	$1,000
	E. Pet Waste Disposal	2 EA	$200	$400
	F. Canoe/Kayak Launch	1 EA	$4,000	$4,000
	G. Stabilized Creek Access	4 EA	$1,500	$6,000
7	**Landscaping**			**$12,050**
	A. Lawn Seeding	4,000 SY	1.20	$4,800
	B. Evergreen Trees	3 EA	250.00	$750
	C. Shade Trees	6 EA	450.00	$2,700
	D. Flowering Trees	6 EA	300.00	$1,800
	E. Shrub Allowance	1 LS	2,000.00	$2,000
8	**Stormwater Mgt and Erosion Control**			**$17,592**
	A. Stormwater manangement (8%)	1 LS	$8,796	$8,796
	B. Erosion Control Measures (8%)	1 LS	$8,796	$8,796
9	**Bond Mobilization and Layout**			**$15,305**
	A. Bond Mobilization and Layout (12%)	1 LS	$15,305	$15,305
10	**Contingency**			**$21,427**
	A. 15% Contingency	1 LS	$21,427	$21,427
11	**Professional Fees**			**$24,641**
	A. Design and Engineering Fees (15%)	1 LS	$24,641	$24,641
	Total			**$188,915**

Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Recreation and Conservation
PROBABLE CONSTRUCTION COST OPINION

Grantee: South Whitehall Township
Project Title: Covered Bridge Park - Phase C
Date Prepared 1/29/2014
DCNR Project No.

Item No.	Work Item	No. of Units	Unit Cost	Total Cost
1	**Demolition/Site Preperation**			**$5,800**
	A. Misc. Site Preperation	1 LS	$5,000	$5,000
	B. Softball Field Removal	1 LS	$800	$800
2	**Earthwork**			**$19,300**
	A. Strip/Stockpile/Replace Topsoil	1,800 CY	$4	$6,300
	B. Grading Operations	4,000 CY	$3	$13,000
3	**Access Drive and Parking Area Improvements**			**$32,050**
	A. Excavation	400 CY	$4	$1,600
	B. 8" 2A Coarse Aggregate	1,200 SY	$10	$12,000
	C. 2.5" Binder Course	1,200 SY	$8	$9,600
	D. 1.5" Wearing Course	1,200 SY	$7	$8,400
	E. Handicap Pavement Striping and Signage	1 SP	$450	$450
4	**8' Wide Bituminous Trail (2,400 lf)**			**$50,400**
	A. Excavation	500 CY	$4	$2,000
	B. 6" 2A Coarse Aggregate	2,200 SY	$9	$19,800
	C. 2" Binder Course	2,200 SY	$7	$15,400
	D. 1" Wearing Course	2,200 SY	$6	$13,200
5	**Youth Multi-Purpose Field (195' x 330')**			**$5,200**
	A. Excavation Fine Grade and Compaction	1,600 CY	$3	$5,200
6	**Tot Lot (Ages 2-5)**			**$48,905**
	A. Play Equipment	1 LS	$15,000	$15,000
	B. Play Equipment Shipping & Installation	1 LS	$6,000	$6,000
	C. Excavation Fine Grade and Compaction	55 CY	$4	$220
	D. Concrete Curb Edging	165 LF	$25	$4,125
	E. Underdrain	80 LF	$12	$960
	F. Safety Surface (PIP Rubber)	1,400 SF	$15	$21,000
	G. Stone Base and Filter Fabric	160 SY	$10	$1,600
7	**Youth Playground (Ages 5-12)**			**$96,998**
	A. Play Equipment	1 LS	$30,000	$30,000
	B. Play Equipment Shipping & Installation	1 LS	$12,000	$12,000
	C. Excavation Fine Grade and Compaction	112 CY	$4	$448
	D. Concrete Curb Edging	200 LF	$25	$5,000
	E. Underdrain	100 LF	$12	$1,200
	F. Safety Surface Safety Surface (PIP Rubber)	3,000 SF	$15	$45,000
	G. Stone Base and Filter Fabric	335 SY	$10	$3,350
8	**Concrete (2,000 SF)**			**$12,800**
	A. Standard Concrete	1,600 SF	$6	$9,600
	B. Decorative Concrete (20% of total)	400 SF	$8	$3,200
9	**Signage**			**$14,000**
	A. Park Entrance Signage (primary)	2 LS	$6,000	$12,000
	B. Park Signage (interpretive)	1 EA	$2,000	$2,000
10	**Site Amenities**			**$39,700**
	A. Picnic Tables	12 EA	$1,000	$12,000
	B. Benches	6 EA	$1,500	$9,000
	C. Trash Receptacle	3 EA	$1,000	$3,000
	D. Bicycle Rack	2 EA	$700	$1,400
	E. Vehicular Gate/ bollards	2 EA	$4,000	$8,000
	F. Grills	3 EA	$500	$1,500
	G. Pet Waste Disposal	4 EA	$200	$800
	H. Canoe/Kayak Launch	1 EA	$4,000	$4,000
11	**Pavilions**			**$70,000**
	A. Medium Pavilion w/concrete pad	2 EA	$35,000	$70,000
12	**Althletic Field Lighting**			**$400,000**
	A. Baseball Field Lights	2 Field	$100,000	$200,000
	B. Soccer Field Lights	2 Field	$100,000	$200,000
13	**Landscaping**			**$44,050**
	A. Lawn Seeding	24,000 SY	1.20	$28,800
	B. Evergreen Trees	9 EA	250.00	$2,250
	C. Shade Trees	12 EA	450.00	$5,400
	D. Flowering Trees	12 EA	300.00	$3,600
	E. Shrub Allowance	1 LS	4,000.00	$4,000
14	**Stormwater Mgt and Erosion Control**			**$134,272**
	A. Stormwater manangement (8%)	1 LS	$67,136	$67,136
	B. Erosion Control Measures (8%)	1 LS	$67,136	$67,136
15	**Bond Mobilization and Layout**			**$116,817**
	A. Bond Mobilization and Layout (12%)	1 LS	$116,817	$116,817
16	**Contingency**			**$163,544**
	A. 15% Contingency	1 LS	$163,544	$163,544
17	**Professional Fees**			**$188,075**
	A. Design and Engineering Fees (15%)	1 LS	$188,075	$188,075
	Total			**$1,441,912**

Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Recreation and Conservation
PROBABLE CONSTRUCTION COST OPINION

Grantee: South Whitehall Township
Project Title: Covered Bridge Park - Phase D
Date Prepared 1/29/2014
DCNR Project No.

Item No.	Work Item	No. of Units	Unit Cost	Total Cost
1	**Demolition/Site Preperation**			**$3,420**
	A. Misc. Site Preperation	1 LS	$3,000	$3,000
	B. Pavement Removal	70 SY	$6	$420
2	**Earthwork**			**$6,600**
	A. Strip/Stockpile/Replace Topsoil	400 CY	$4	$1,400
	B. Grading Operations	1,600 CY	$3	$5,200
3	**Access Drive and Parking**			**$34,550**
	A. Excavation	400 CY	$4	$1,600
	B. 8" 2A Coarse Aggregate	1,300 SY	$10	$13,000
	C. 2.5" Binder Course	1,300 SY	$8	$10,400
	D. 1.5" Wearing Course	1,300 SY	$7	$9,100
	E. Handicap Pavement Striping and Signage	1 SP	$450	$450
4	**8' Wide Bituminous Trail (300 lf)**			**$6,460**
	A. Excavation	130 CY	$4	$520
	B. 6" 2A Coarse Aggregate	270 SY	$9	$2,430
	C. 2" Binder Course	270 SY	$7	$1,890
	D. 1" Wearing Course	270 SY	$6	$1,620
5	**Signage**			**$3,500**
	A. Park Entrance Signage (secondary)	1 LS	$2,500	$2,500
	B. Park Signage (directional)	1 LS	$1,000	$1,000
6	**Site Amenities**			**$12,500**
	A. Picnic Tables	3 EA	$1,000	$3,000
	B. Benches	2 EA	$1,500	$3,000
	C. Trash Receptacle	2 EA	$1,000	$2,000
	D. Vehicular Gate/Bollards	1 EA	$4,000	$4,000
	E. Grills	1 EA	$500	$500
7	**Pavilions**			**$158,000**
	A. Small Pavilion w/concrete pad	1 EA	$28,000	$28,000
	B. Restroom Building	1 EA	$130,000	$130,000
8	**Landscaping**			**$15,900**
	A. Lawn Seeding	4,000 SY	1.20	$4,800
	B. Evergreen Trees	9 EA	250.00	$2,250
	C. Shade Trees	9 EA	450.00	$4,050
	D. Flowering Trees	6 EA	300.00	$1,800
	E. Shrub Allowance	1 LS	3,000.00	$3,000
9	**Stormwater Mgt and Erosion Control**			**$38,549**
	A. Stormwater manangement (8%)	1 LS	$19,274	$19,274
	B. Erosion Control Measures (8%)	1 LS	$19,274	$19,274
10	**Bond Mobilization and Layout**			**$33,537**
	A. Bond Mobilization and Layout (12%)	1 LS	$33,537	$33,537
11	**Contingency**			**$46,952**
	A. 15% Contingency	1 LS	$46,952	$46,952
12	**Professional Fees**			**$53,995**
	A. Design and Engineering Fees (15%)	1 LS	$53,995	$53,995
	Total			**$413,964**

Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Recreation and Conservation
PROBABLE CONSTRUCTION COST OPINION

Grantee: South Whitehall Township
Project Title: Covered Bridge Park - Phase E
Date Prepared 1/29/2014
DCNR Project No.

Item No.	Work Item	No. of Units	Unit Cost	Total Cost
1	**Demolition/Site Preperation**			**$11,000**
	A. Misc. Site Preperation	1 LS	$5,000	$5,000
	B. Pavement Removal	1,000 SY	$6	$6,000
2	**Earthwork**			**$10,925**
	A. Strip/Stockpile/Replace Topsoil	800 CY	$4	$2,800
	B. Grading Operations	2,500 CY	$3	$8,125
3	**Access Drive and Parking**			**$72,400**
	A. Excavation	1,000 CY	$4	$4,000
	B. Coarse Aggregate prep	2,700 SY	$10	$27,000
	C. 2.5" Binder Course	2,700 SY	$8	$21,600
	D. 1.5" Wearing Course	2,700 SY	$7	$18,900
	E. Handicap Pavement Striping and Signage	2 SP	$450	$900
4	**Bridges and Boardwalks**			**$69,300**
	A. Elevated Boardwalk	1,260 SF	$55	$69,300
6	**8' Wide Bituminous Trail (1,000 lf)**			**$21,000**
	A. Excavation	300 CY	$4	$1,200
	B. 6" 2A Coarse Aggregate	900 SY	$9	$8,100
	C. 2" Binder Course	900 SY	$7	$6,300
	D. 1" Wearing Course	900 SY	$6	$5,400
7	**Sand Volleyball Court**			**$10,033**
	A. Sand	450 SY	$8.50	$3,825
	B. Timber Edging	260 LF	$7	$1,820
	C. Excavation Backfill and Compaction	150 CY	$3.25	$488
	D. Net and Posts	1 SET	$1,800	$1,800
	E. Geotextile Material	450 SY	$2	$900
	F. Underdrain	100 LF	$12	$1,200
8	**Signage**			**$10,000**
	A. Park Entrance Signage (secondary)	1 LS	$2,500	$2,500
	B. Park Signage (directional)	1 LS	$5,000	$5,000
	C. Information Kiosk	1 LS	$2,500	$2,500
9	**Site Amenities**			**$20,300**
	A. Picnic Tables	5 EA	$1,000	$5,000
	B. Benches	4 EA	$1,500	$6,000
	C. Trash Receptacle	2 EA	$1,000	$2,000
	D. Bicycle Rack	1 EA	$700	$700
	E. Vehicular Gate/Bollards	1 EA	$4,000	$4,000
	F. Grills	2 EA	$500	$1,000
	G. Horseshoe Pit	2 EA	$800	$1,600
10	**Pavilions**			**$193,000**
	A. Small Pavilion w/concrete pad	1 EA	$28,000	$28,000
	B. Medium Pavilion w/concrete pad	1 EA	$35,000	$35,000
	C. Restroom Building	1 EA	$130,000	$130,000
11	**Landscaping**			**$24,500**
	A. Lawn Seeding	10,000 SY	1.20	$12,000
	B. Evergreen Trees	6 EA	250.00	$1,500
	C. Shade Trees	12 EA	450.00	$5,400
	D. Flowering Trees	12 EA	300.00	$3,600
	E. Shrub Allowance	1 LS	2,000.00	$2,000
12	**Stormwater Mgt and Erosion Control**			**$70,793**
	A. Stormwater manangement (8%)	1 LS	$35,397	$35,397
	B. Erosion Control Measures (8%)	1 LS	$35,397	$35,397
13	**Bond Mobilization and Layout**			**$61,590**
	A. Bond Mobilization and Layout (12%)	1 LS	$61,590	$61,590
14	**Contingency**			**$86,226**
	A. 15% Contingency	1 LS	$86,226	$86,226
15	**Professional Fees**			**$99,160**
	A. Design and Engineering Fees (15%)	1 LS	$99,160	$99,160
	Total			**$760,227**

Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Recreation and Conservation
PROBABLE CONSTRUCTION COST OPINION

Grantee: South Whitehall Township
Project Title: Covered Bridge Park - Phase F
Date Prepared 1/29/2014
DCNR Project No.

Item No.	Work Item	No. of Units	Unit Cost	Total Cost
1	**Demolition/Site Preperation**			**$13,000**
	A. Misc. Site Preperation	1 LS	$3,000	$3,000
	B. Recreation Center Demolition	1 LS	$10,000	$10,000
2	**Earthwork**			**$26,500**
	A. Strip/Stockpile/Replace Topsoil	2,000 CY	$4	$7,000
	B. Grading Operations	6,000 CY	$3	$19,500
3	**Access Drive and Parking**			**$59,100**
	A. Excavation	800 CY	$4	$3,200
	B. 8" 2A Coarse Aggregate	2,200 SY	$10	$22,000
	C. 2.5" Binder Course	2,200 SY	$8	$17,600
	D. 1.5" Wearing Course	2,200 SY	$7	$15,400
	E. Handicap Pavement Striping and Signage	2 SP	$450	$900
4	**8' Wide Bituminous Trail (700 lf)**			**$14,640**
	A. Excavation	250 CY	$4	$1,000
	B. 6" 2A Coarse Aggregate	620 SY	$9	$5,580
	C. 2" Binder Course	620 SY	$7	$4,340
	D. 1" Wearing Course	620 SY	$6	$3,720
5	**Basketball Courts**			**$135,505**
	A. Fine Grading and Compaction	920 CY	$4	$3,680
	B. 8" 2A Coarse Aggregate	2,755 SY	$10	$27,550
	C. 2.5" Binder Course	2,755 SY	$8	$22,040
	D. 1.5" Wearing Course	2,755 SY	$7	$19,285
	E. Color Coat	2,755 SY	$10	$27,550
	F. Line Striping	1 LS	$2,400	$2,400
	G. Chain Link Fence	320 LF	$50	$16,000
	H. Posts/Goals and Nets	5 EA	$2,000	$10,000
	I. Seat Wall (Pre engineered block)	200 SF	$35	$7,000
6	**Off Leash Dog Area 'A'**			**$51,550**
	A. 5' Ht Fence	1,110 LF	$45	$49,950
	B. 3' W Gate	2 EA	$400	$800
	C. 8' W Double Swinging Service Gate	1 EA	$800	$800
7	**Off Leash Dog Area 'B'**			**$30,175**
	A. 5' Ht Fence	635 LF	$45	$28,575
	B. 3' W Gate	2 EA	$400	$800
	C. 8' W Double Swinging Service Gate	1 EA	$800	$800
8	**Concrete (1,200 SF)**			**$7,680**
	A. Standard Concrete	960 SF	$6	$5,760
	B. Decorative Concrete (20% of total)	240 SF	$8	$1,920
9	**Signage**			**$12,500**
	A. Park Entrance Signage (primary)	1 LS	$6,000	$6,000
	B. Park Signage (interpretive)	2 EA	$2,000	$4,000
	C. Information Kiosk	1 LS	$2,500	$2,500
10	**Site Amenities**			**$25,500**
	A. Picnic Tables	4 EA	$1,000	$4,000
	B. Benches	4 EA	$1,500	$6,000
	C. Trash Receptacle	3 EA	$1,000	$3,000
	D. Bicycle Rack	1 EA	$700	$700
	E. Vehicular Gate/ bollards	1 EA	$4,000	$4,000
	F. Pet Waste Disposal	4 EA	$200	$800
	G. Canoe/Kayak Launch	1 EA	$4,000	$4,000
	H. Stabilized Creek Access	2 EA	$1,500	$3,000
11	**Pavilions**			**$35,000**
	A. Medium Pavilion w/concrete pad	1 EA	$35,000	$35,000
12	**Landscaping**			**$22,750**
	A. Lawn Seeding	10,000 SY	1.20	$12,000
	B. Evergreen Trees	3 EA	250.00	$750
	C. Shade Trees	12 EA	450.00	$5,400
	D. Flowering Trees	12 EA	300.00	$3,600
	E. Shrub Allowance	1 LS	1,000.00	$1,000
13	**Stormwater Mgt and Erosion Control**			**$69,424**
	A. Stormwater menangement (8%)	1 LS	$34,712	$34,712
	B. Erosion Control Measures (8%)	1 LS	$34,712	$34,712
14	**Bond Mobilization and Layout**			**$60,399**
	A. Bond Mobilization and Layout (12%)	1 LS	$60,399	$60,399
15	**Contingency**			**$84,558**
	A. 15% Contingency	1 LS	$84,558	$84,558
16	**Professional Fees**			**$97,242**
	A. Design and Engineering Fees (15%)	1 LS	$97,242	$97,242
	Total			**$745,524**

Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Recreation and Conservation
PROBABLE CONSTRUCTION COST OPINION

Grantee: South Whitehall Township
Project Title: Covered Bridge Park - Phase G

Date Prepared 1/29/2014
DCNR Project No.

Item No.	Work Item	No. of Units	Unit Cost	Total Cost
1	**Demolition/Site Preperation**			**$150,000**
	A. Dam and Dam Sediment Removal	1 LS	$150,000	$150,000
2	**Floodplain Restoration (Wehr's Bridge to S-curve)**			**$640,000**
	A. Clear, Excavate, Stabilize and Re-vegetate Floodplain	1 LS	$640,000	$640,000
3	**Floodplain Restoration (Pinch point to transformer)**			**$340,000**
	A. Clear, Excavate, Stabilize and Re-vegetate Floodplain	1 LS	$340,000	$340,000
4	**10' Wide Bituminous Trail (5,400 lf/1.02 miles)**			**$156,000**
	A. Excavation	1,500 CY	$4	$6,000
	B. 8" 2A Coarse Aggregate	6,000 SY	$10	$60,000
	C. 2.5" Binder Course	6,000 SY	$8	$48,000
	D. 1.5" Wearing Course	6,000 SY	$7	$42,000
5	**Bridges and Boardwalks**			**$255,600**
	A. Elevated Boardwalks	1,920 SF	$55	$105,600
	B. Eastern Pedestrian Bridge Crossing	1 LS	$150,000	$150,000
6	**Signage**			**$13,000**
	A. Park Signage (directional)	1 LS	$5,000	$5,000
	B. Park Signage (interpretive)	4 EA	$2,000	$8,000
7	**Stormwater Mgt and Erosion Control (trail only)**			**$93,276**
	A. Stormwater manangement (3%)	1 LS	$46,638	$46,638
	B. Erosion Control Measures (3%)	1 LS	$46,638	$46,638
8	**Bond Mobilization and Layout**			**$197,745**
	A. Bond Mobilization and Layout (12%)	1 LS	$197,745	$197,745
9	**Contingency**			**$276,843**
	A. 15% Contingency	1 LS	$276,843	$276,843
10	**Professional Fees**			**$318,370**
	A. Design and Engineering Fees (15%)	1 LS	$318,370	$318,370
	Total			**$2,440,834**

11	**Site Amenities**			**$31,000**
	A. Picnic Tables	8 EA	$1,000	$8,000
	B. Benches	8 EA	$1,500	$12,000
	C. Trash Receptacle	5 EA	$1,000	$5,000
	D. Bicycle Rack	1 EA	$700	$700
	E. Vehicular Gate/ bollards	1 EA	$4,000	$4,000
	F. Grills	1 EA	$500	$500
	G. Pet Waste Disposal	4 EA	$200	$800
12	**Pavilions**			**$208,000**
	A. Large Pavilion w/concrete pad	1 EA	$48,000	$48,000
	B. Restroom/Storage Building	1 LS	$160,000	$160,000
13	**Landscaping**			**$134,000**
	A. Lawn Seeding	87,000 SY	1.20	$104,400
	B. Evergreen Trees	24 EA	250.00	$6,000
	C. Shade Trees	24 EA	450.00	$10,800
	D. Flowering Trees	16 EA	300.00	$4,800
	E. Shrub Allowance	1 LS	8,000.00	$8,000
14	**Stormwater Mgt and Erosion Control**			**$180,980**
	A. Stormwater manangement (8%)	1 LS	$90,490	$90,490
	B. Erosion Control Measures (8%)	1 LS	$90,490	$90,490
15	**Bond Mobilization and Layout**			**$157,452**
	A. Bond Mobilization and Layout (12%)	1 LS	$157,452	$157,452
16	**Contingency**			**$220,433**
	A. 15% Contingency	1 LS	$220,433	$220,433
17	**Professional Fees**			**$253,498**
	A. Design and Engineering Fees (15%)	1 LS	$253,498	$253,498
	Total			**$1,943,488**