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Tar River Pedestrian Bridge Study

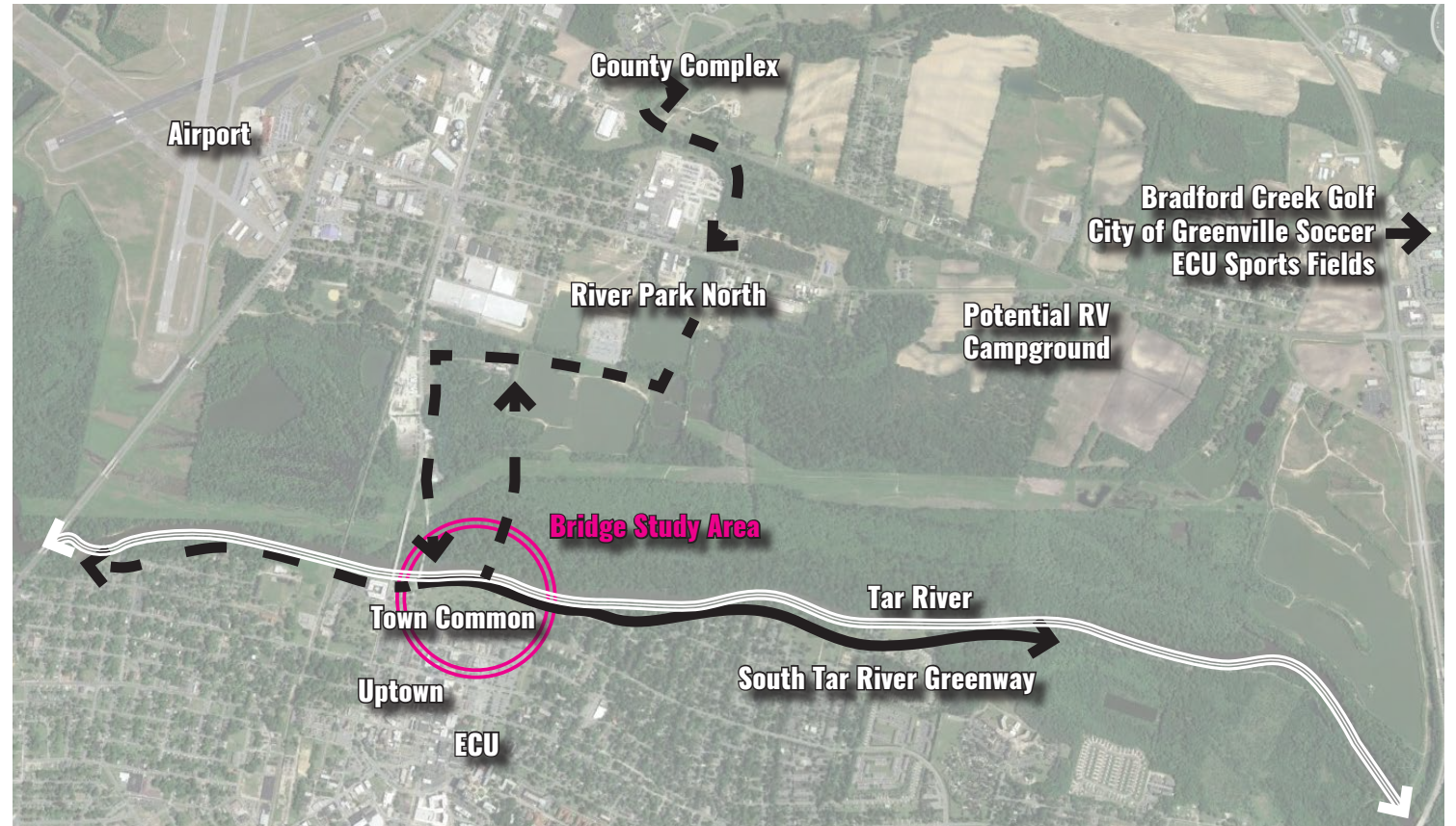


Introduction

The City of Greenville, with support from MPO funding, conducted a three-day charrette to examine alternatives for a bicycle/pedestrian crossing over the Tar River, connecting Town Common Park with River Park North. City leadership was interested in an iconic investment that would connect North and South Greenville, boost economic development and tourism, and bring environmental educational opportunities. The City brought on a consultant team of Alta Planning + Design, WSP/Parsons Brinckerhoff, and Woolpert to conduct the charrette.

The notion of improvements to Town Common Park and a better connection to River Park North have been discussed over the years and solidified in the recent Tar River Legacy Plan and Town Common Park Master Plan. The Tar River Legacy Plan identified river "revitalization" as an opportunity for enhanced quality of life, economic development, and attraction and retention. The plan principles were to connect the riverfront, enliven the urban core, expand river contact, preserve/enjoy the wilderness, activate recreation programs, attract people to the river, promote community wellness, and interpret history. The plan also put forward the recommendation for an iconic bicycle and pedestrian bridge across the Tar River. The recent Town Common Park Master Plan includes an illustrative plan that brings the space to life and removes the bulkhead, creating a "Living Shoreline." Establishing a living shoreline would have a significant impact on the development of the bicycle/pedestrian bridge.

The City of Greenville had already submitted, through the State SPOT process, a \$2 million bicycle/pedestrian project that would connect Downtown Greenville to River Park North by means of improvements to the existing Greene St. Bridge and a greenway that would follow a sewer easement into River Park North. With an interest in providing a more iconic, interesting bridge connection that would provide better separation from traffic, the City asked the State if that same



Proposed connection site circled in magenta, with potential regional connections and impacts.

dollar amount submitted to SPOT could be added to a possible bridge project. Because a standalone bridge would accomplish the same connectivity goal, NCDOT provided approval, thus leading to this study to analyze alternative river crossings.

Ultimately, for a project alternative to move forward, additional funding (likely private sources) will be needed. This study identifies all the possible additional studies and costs associated with moving these alternatives forward.

Previous Planning Efforts

Greenville Town Common | Illustrative Plan



- | | | | |
|--|---|---------------------------------|---|
| 1. Sycamore Hill Missionary Baptist Church Commemorative Tower + Plaza | 5. 1st Street Promenade | 12. Playground | 19. Town Creek Wetland Restoration Area |
| 2. Sycamore Tree Grove + Commemorative Gardens | 6. Interactive Water Feature / Ice Skating Rink | 13. Future Playground Expansion | 20. Parking + Access Drive |
| 3. Relocated Veterans Memorial | 7. Farmers Market Plaza | 14. Active Living Shoreline | 21. South Tar River Greenway |
| 4. Relocated Sundial | 8. Civic Building | 15. Beach | 22. Restrooms |
| | 9. Amphitheater + Event Lawn | 16. Kayak Launch + Fishing Pier | 23. On-Street Parking |
| | 10. Boardwalk | 17. Dock + Viewing Platform | 24. Planted Median |
| | 11. Multi-Purpose Field | 18. Kayak + Canoe Rental | |

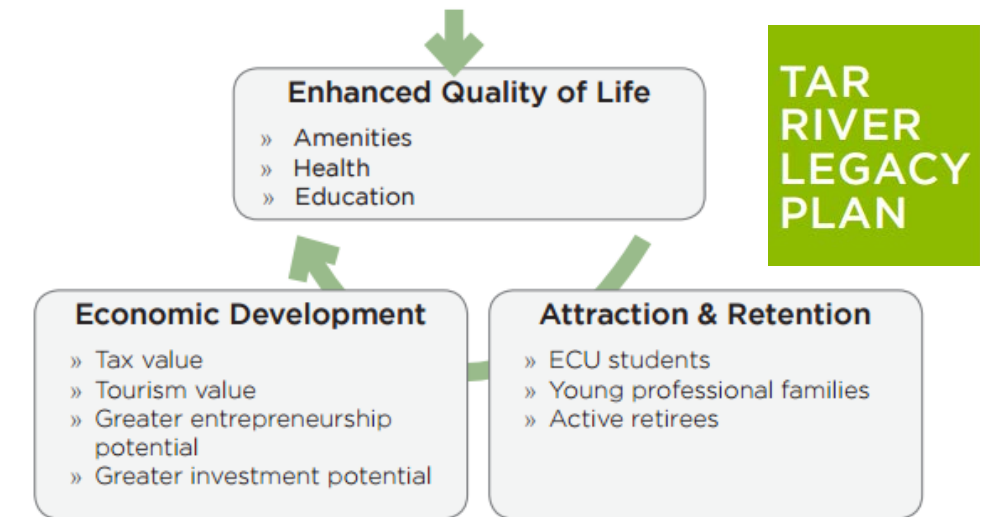
The proposed Town Common Park Master Plan envisions a living shoreline with increased access to the Tar River.

Graphics are illustrative only



Pedestrian bridge & interpretive trails

REVITALIZATION OF THE TAR RIVER



Enhanced Quality of Life

- » Amenities
- » Health
- » Education

Economic Development

- » Tax value
- » Tourism value
- » Greater entrepreneurship potential
- » Greater investment potential

Attraction & Retention

- » ECU students
- » Young professional families
- » Active retirees

TAR RIVER LEGACY PLAN

The Tar River Legacy Plan proposed the bridge connection as a means of enhancing quality of life, economic development, and attraction and retention of residents.

Three-Day Charrette Process

The three-day charrette consisted of the following:

Day One:

- Vision/goals discussion with stakeholder group of local officials, agencies (including Downtown group, ECU, NCDOT, Pitt County, City of Greenville staff)
- Fieldwork and analysis of sites
- Range of Alternatives Discussion

Day Two:

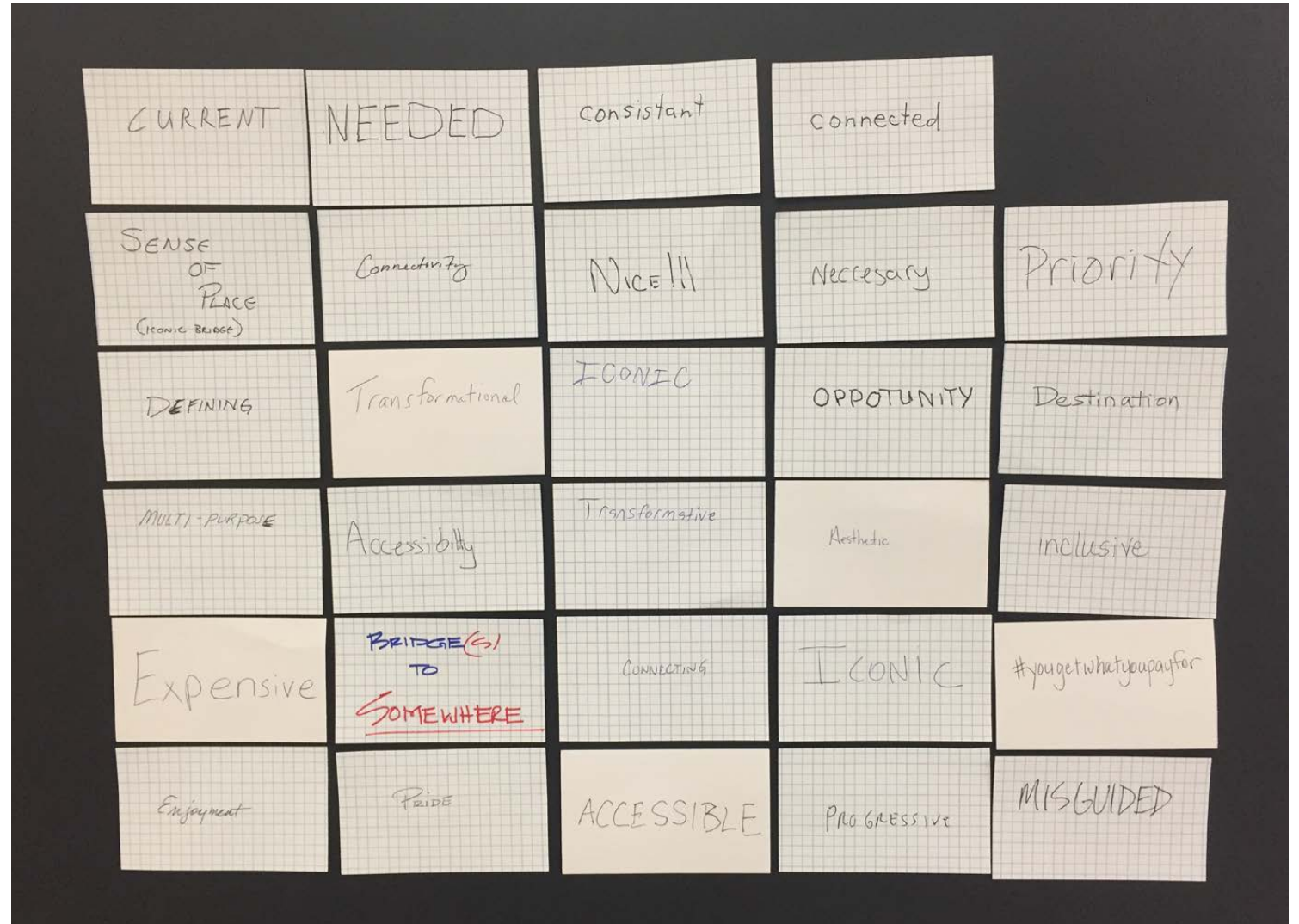
- Open Design Studio to develop concepts and cost estimates for each alternative
- Public meeting and presentation to receive feedback

Day Three:

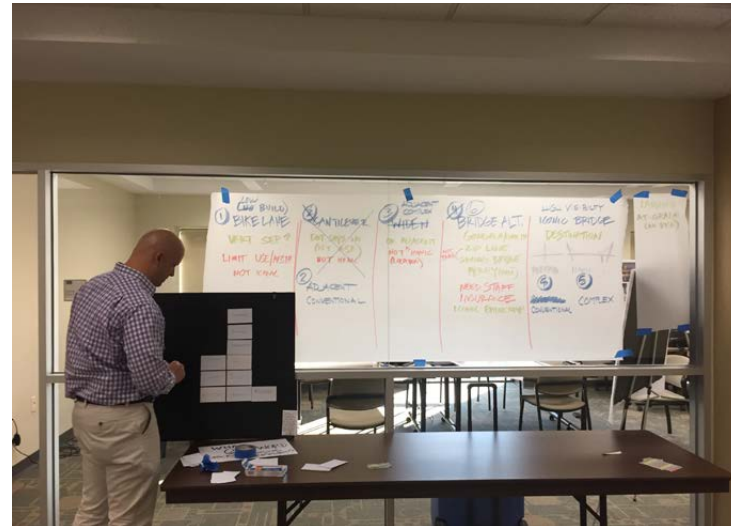
- Design Studio to make adjustments to alternative concepts and cost estimates
- Next steps discussion

During the Day One vision/goals discussion, the following key goals for the bicycle/pedestrian crossing were outlined by the stakeholders:

- Create a Sense of Place
- Enhance Economic Development (Become a regional tourist draw)
- Improve Quality of Life
- Connect North and South Greenville
- Inspire Healthy and Active Living
- Provide Recreational Opportunities
- Provide Environmental Education Opportunities
- Provide an Iconic and Accessible Connection



Public input exercise results: one word that describes the project.



Fieldwork and analysis of the sites and the potential crossing were discussed by the consultant team and local officials who are experts in engineering and floodplain administration. During the site visit, the many opportunities and constraints were discussed along with the additional studies/cost needed to study the structure's potential impact to the floodway. The team of engineers began to conceive mitigating alternatives to address all the possible issues and regulations that would impact the project.

During Day Two of the Charrette, an open design studio allowed members of the general public to peer into the discussion and concept/cost estimate work of the design and engineering team. The design team prepared visualizations, cost estimates, and pros/cons of the following alternatives:

- Low-build – Current NCDOT submitted project using Greene St. bridge
- Adjacent conventional bridge
- Adjacent complex bridge
- High-visibility conventional bridge (more centered in Town Common Park)
- High-visibility complex bridge (also more centered in Town Common Park)
- Bridge alternatives (gondola, zip line, ferry)

The public was invited for a formal presentation and input session on the evening of Day Two. The public had an opportunity to ask questions, provide one-word expressions for what they wanted the bridge to be or accomplish, and vote on the alternative preference.

On Day Three of the Charrette, the design team wrapped up revisions and changes to the alternatives and cost estimates.

Charrette photos: Stakeholder meetings (upper left), field tour (lower left), public presentation (upper right), and open studio (lower right).

Greenways in Environmentally Sensitive Areas

In addition to the impacts of bridges that span the Tar River, several factors need to be taken into account when designing and constructing greenways in environmentally sensitive areas, as well as the permitting impacts. These areas generally contain streams and wetlands, a wide assortment of vegetation, and habitat for a wide array of insects, animals, and birds. Protecting this natural resource while still allowing users to experience it should be a keystone in the design process.

Avoidance is the best measure that can be taken to protect the area. While this is not always practical, care should be taken during design to locate the trail out of the wetland areas, and to limit the impacts to streams and any endangered species colonies. If avoidance is not an option, several research and design steps should be taken to minimize the impacts:

Step 1: Environmental and Natural Systems Investigation

An environmental and natural systems investigation begins with a field review of the site. The perimeters of wetlands are flagged, streams are located and classified, and the site is reviewed for any endangered species listed on register. Once these delineations have been made, the US Army Corps of Engineers (USACE), and NC Division of Environmental Quality (NCDEQ) will visit the site, and concur or revise the flagging. Once the location of environmentally sensitive areas are known, design decisions can be made regarding avoidance or impact.

Step 2: Limited Impact Design for Sensitive Areas

When a decision is made to route the trail through environmentally sensitive areas, the design should impact the area to the minimum extent practical. When environmental features are impacted, USACE and NCDEQ will require impact fees be paid or mitigation for the impact. The cost of these fees and mitigation will increase the project cost and should be factored into the client's design budget as they will need to be paid prior to obtaining federal permits. Additional fees and permitting will be required by the City and County.

Constructing trails on fill and piping streams should be avoided in environmentally sensitive areas. These construction techniques damage the streams and wetlands, and are considered permanent impacts in the eyes of the permitting agencies. The wetland area where fill is placed will no longer carry out its function and will never recover from the compacted soils, and the stream banks associated with pipe will no longer be able to support vegetative or aquatic life.

Limited impact design and construction can be used to bridge the streams and wetlands which will significantly reduce impacts. Constructing boardwalk over wetlands is widely used to limit impacts and permitting costs. Boardwalks can be "stick built" out of wood, or can be constructed from commercially available modular systems. If designed correctly, these structures can be designed and installed using a top down construction method that virtually eliminates wetland impacts.

Similarly, in lieu of placing streams in a culvert, the channel should be totally spanned with either boardwalk, an open bottom structure (3-sided arch), or if the channel is wider (>25') the stream should be bridged. Bridging of the stream results in zero impacts.

Step 3: Construction Access and Construction

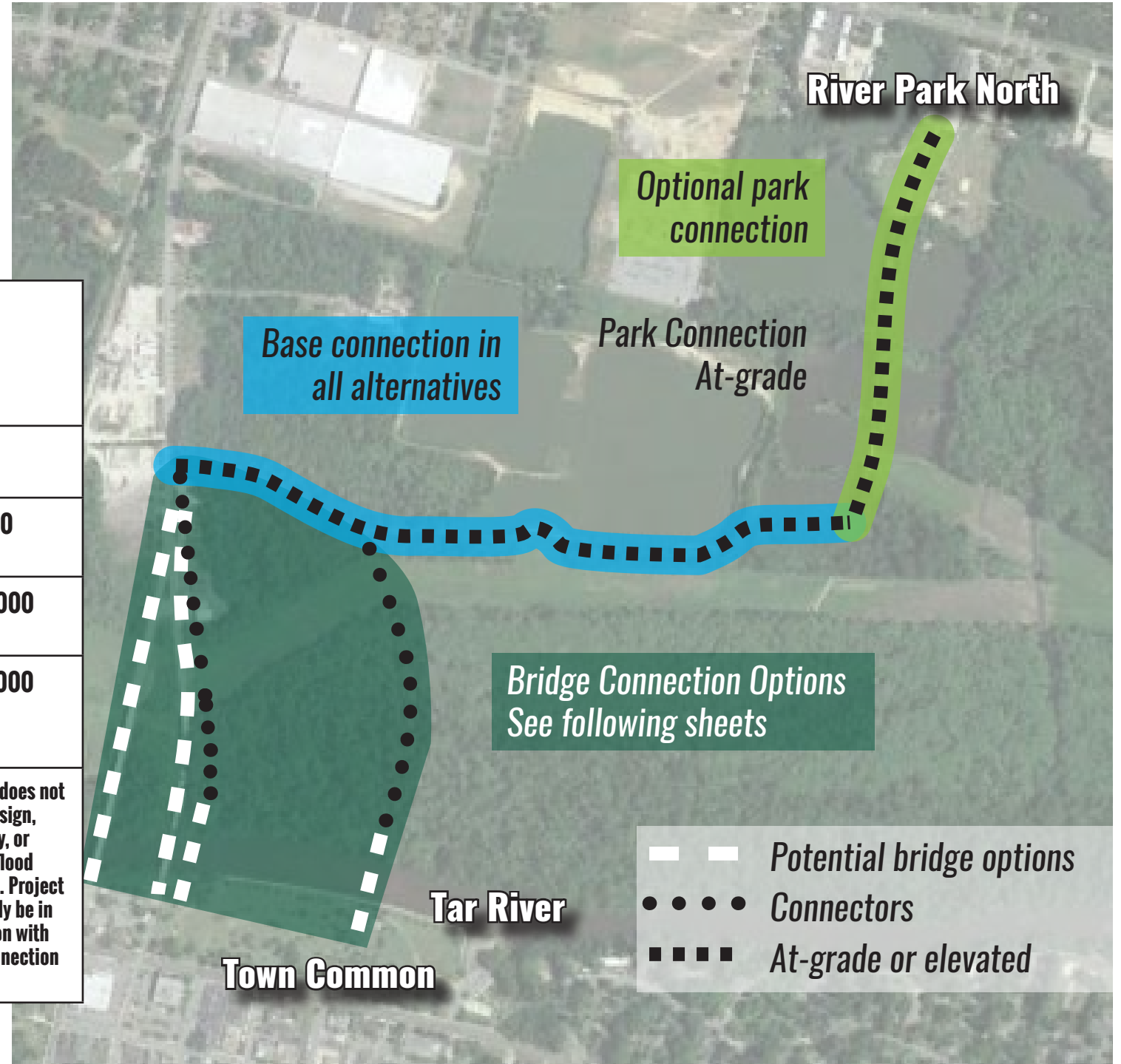
Construction access, and future access for repair plays a key role on what should be constructed in regards to the river crossing and associated trails. Construction access is considered a temporary impact in the eyes of jurisdictional agencies and mitigation is generally not required. Contractors can cross streams using temporary stream crossings with pump arounds, or through the use of a temporary bridge, and cross wetlands by using timber mats.

Care should be taken to make sure that the project isn't building something that can't be maintained in the future. For example, isolated sections of asphalt pavement between two boardwalks are a bad idea. Due to load restrictions on the boardwalks, that section of asphalt pavement could never be repaired. A better option would be to either install concrete pavement which has a much longer life expectancy, or boardwalk the entire area.

River Park North Connection

The proposed greenway connection between Greene Street and River Park North is necessary for all proposed options across the Tar River. The costs for the connection shown to the right in blue and green vary greatly, as the cost for boardwalks and elevated trails surpasses at-grade concrete and asphalt trails. Final material selection should be determined based on the results of the hydraulic modeling and base flood elevation requirements.

	Greene Street to River Park North	Optional Proposed Trail to Nature Center	Total
Length	3,550LF	2,880 LF	
Potential Cost: All at-grade trails	\$370,000	\$300,000	\$670,000
Potential Cost: All boardwalk/elevated trails	\$2,130,000	\$1,730,000	\$3,860,000
Potential Cost: Combination of elevated and at-grade trails	\$2,130,000	\$300,000	\$2,430,000
Additional Considerations	A combination of boardwalk (high cost) and at-grade pathways (low cost) may be required to meet functional needs, flood regulations, and/or utility access.		Total cost does not include design, flood study, or potential flood mitigation. Project would likely be in conjunction with bridge connection project.



Structural Alternatives

During the three-day charrette, the team met with stakeholders, visited the project site, listened to comments from the public, and determined primary obstacles and considerations for building a structure over the Tar River. Some of the primary obstacles and considerations for the project are listed below:

- River Park North is in the 100-year flood plain and a proposed bridge (or any alternative structure type) will require construction in this area. To minimize impacts to the 100-year flood plain, proposed bridge structures will require the superstructure (or spans) be set above the 100-year flood elevation of 22.7 ft (as a minimum). Substructure (or piers) supporting the superstructure would be placed in 100-year flood plain. A detailed flood study is required to determine what impact this will have and what will be allowed for the bridge construction. Placement of the bridge alignment will affect the flood study results.
- To allow for the bridge construction, mitigation actions will most likely be required to offset the effects of constructing substructure units in the 100-year flood elevation. The proposed bridge could be placed in the shadow of (immediately adjacent to) the existing Greene Street vehicular bridge to minimize required mitigation actions.
- The existing bulkhead wall on the Town Common side of the crossing could be removed to offset the impacts to the 100-year flood plain due to building the bridge. Information obtained at the Charrette indicates there are already plans to remove this wall and recreate a living shoreline as the bulkhead wall is reaching (or has reached) the end of its serviceable life. It should be noted if this bulkhead wall is removed (instead of replaced/retrofitted) it will be very difficult to ever add it back in the future due the flood plain considerations.
- The water levels of the Tar River are seasonal. Depending on how the project is designed, River Park North could be inaccessible for months during the year. Boardwalk could be built to avoid this problem. However, it should be noted that boardwalk over 30" high above the existing ground requires handrail, which will factor into the hydraulic study.

- Many stakeholders and members of the community have expressed the desire for an iconic or very attractive bridge. Also, aesthetic lighting packages were mentioned by several people. A significant premium is often associated with these types of structures.
- The River Park North side of the crossing could have environmentally protected species which could impact what is allowed for the project (both for alignment and constructability).
- Many members of the community expressed concerns that a bridge that is constructed with direct access to River Park North would not be as accessible as a bridge that is constructed immediately adjacent to the existing Greene Street vehicular bridge.
- Stakeholders are interested in alternative solutions other than a new bridge to cross the Tar River.
- Total available funds for the project are currently unknown.

The following alternatives were investigated during the Charrette:

Low Build

The team investigated alternatives that would repurpose the existing Greene Street vehicular bridge to provide a safer facility to carry pedestrians across the Tar River. This is a low-cost option that does not impact the flood plain. However this route does not provide direct access to River Park North and does not provide an iconic bridge. Traffic count numbers (ADT of 6600) do indicate a lane or lanes could be repurposed for pedestrian use if NCDOT allows. The existing bridge sidewalk and traffic rails could also be retrofitted if NCDOT allows.

Cantilever off Existing Bridge

The existing Greene Street vehicular bridge appears to be in good structural condition based on the information obtained from the most recent bridge inspection report. It appears adequate structural capacity is available to cantilever a path off the side of the existing bridge. This would provide a barrier-separated path to significantly enhance safety for users. However this alternative was not evaluated in detail as early impressions from NCDOT indicated they were not in favor of this approach. A significant advantage of this alternative is that it would cause minor, if any, impacts to the flood plain (as no new substructure would be constructed in the Tar River).

Adjacent Bridge Options

The team evaluated new pedestrian bridge options that would run parallel to and directly beside the existing Greene Street vehicular bridge. Placement of a new bridge at this location allows proposed substructure to be placed in the shadow of the existing bridge substructure units. This improves hydraulics and minimizes impacts to the 100-year flood plain. However this alternative does not provide multiple

Low Build Greene Street Bridge Alternatives

vantage points for the proposed bridge and does not give a direct route to River Park North. Both conventional bridges (functional, low-cost options) and complex (design driven more by aesthetics and/or span lengths) were considered. A large cost variance in the construction cost of the bridge can be expected as it is unknown how much pure aesthetics and long-span requirements will drive the bridge type.

High Visibility Bridge Options

Highly visible bridge options that directly connect to River Park North were also studied. As with the adjacent bridge options both conventional and complex bridge types were considered, and a wide cost variance in the construction costs of these bridge types can be expected. The alternative gives much better vantage points and connection to River Park North than the adjacent bridge options. However the benefit of the shadow effect of the existing Greene Street vehicular bridge can no longer be used. Significant impacts are anticipated for the proposed substructure units that would be built in the 100-year flood plain. Removal of the existing bulkhead wall may offset these impacts; however, this must be confirmed with a detailed flood study.

Bridge Alternatives

The team also considered other alternatives to bridges, such as gondolas and river boats. Non-ADA compliant swinging bridges were also discussed. There are considerable complicating factors with many of these alternatives. For safety, two full-time workers would be required at each end of a gondola. That together with insurance requirements, power use, and maintenance requirements would amount to significant annual operating costs. Often these types of systems charge fares for use to offset these costs. A public private partnership with a 3rd party who designs, constructs and operates the system could be an option if a bridge alternative is found desirable. Alternatives that are not ADA compliant would not be eligible for federal funds.

Existing



Potential Lane Narrowing: Bike Lane



Potential Lane Reallocation: Protected Bike Lane



Potential Bridge Reallocation: Protected Bike Lane + Wide Walkway



Potential reuse of existing bridge facility. Further traffic and engineering study will be required to determine feasibility of lane reallocation. Cross section graphics provided by Streetmix.

Low Build

	Bridge	River Park North Approach	No-Rise (Flood Study)	Potential Design + Permitting	Total
Potential Cost: Low	\$4,000 (Bike Lane)	\$300,000	\$60,000	\$38,000	\$402,000
Potential Cost: High	\$150,000 (Potential Lane Reallocation: Protected Bike Lane)	\$500,000	\$100,000	\$181,000	\$931,000
Length	1,000 LF	1,800 LF			
Additional Considerations	Low Cost option: Use existing Greene Street + Pitt Street bridges by adding a dedicated bike lane. High Cost Option: Reallocate one travel lane on the Greene Street bridge for protected two-way bicycle lane that connects Town Common to a shared use path to the north.	The proposed connection could include at-grade concrete paths and/or boardwalks. This includes sidepath along Greene St. to the proposed greenway connection to River Park North.	Flood study will be required for no-rise certification of proposed structures within the floodplain/floodway. Additional study may be required. The first step (low cost) would determine what is feasible to obtain a no-rise.		Total cost does not include potential flood mitigation or the connection between Greene Street and River Park North.

Pros

- Lowest cost
- Limits floodplain/floodway impact
- Protected bike lane options does serve all ages + abilities on bikes

Cons

- Lacks iconic feature(s)
- Not a direct bicycle + pedestrian route
- Bike lane option does not serve all ages + abilities on bikes



At-grade shared use path to River Park North Connection

Bike lane + existing sidewalk

At-grade connection to park

Proposed Park Masterplan

Low Build



Existing



Proposed Low Cost



Proposed High Cost

Cantilever

	Bridge	River Park North Approach	No-Rise (Flood Study)	Potential Design + Permitting	Total
Potential Cost: Low	\$1,500,000	\$300,000	\$60,000	\$700,000	\$2,560,000
Potential Cost: High	\$2,000,000	\$500,000	\$100,000	\$1,000,000	\$3,600,000
Length	450 LF + 500 LF (ramp)	1,800 LF			
Additional Considerations	Use existing Greene Street bridge by attached an adjacent shared use path to the existing bridge structure. The high cost includes aesthetic enhancements and increased lighting.	The proposed connection could include at-grade concrete paths and/or boardwalks. This includes sidepath along Greene St. to the proposed greenway connection to River Park North.	Flood study will be required for no-rise certification of proposed structures within the floodplain/floodway. Additional study may be required. The first step (low cost) would determine what is feasible to obtain a no-rise.		Total cost does not include potential flood mitigation or the connection between Greene Street and River Park North.

Pros

- Attaches to existing bridge
- Dedicated pedestrian + bicycle path
- Limits floodplain/floodway impact
- Serve all ages + abilities on bikes

Cons

- Lacks visibility from multiple vantage points
- Not a direct bicycle + pedestrian route between parks
- Requires NCDOT coordination/approval
- Lacks iconic features

At-grade shared use path to River Park North Connection

Elevated connection through wetland

Cantilever bridge attached to Greene Street bridge

At-grade connection to park

Proposed Park Masterplan



Cantilever

Adjacent Conventional (Pre-fab 3 Span)

	Bridge	River Park North Approach	No-Rise (Flood Study)	Potential Design + Permitting	Total
Potential Cost: Low	\$2,500,000	\$300,000	\$60,000	\$700,000	\$3,560,000
Potential Cost: High	\$3,500,000	\$500,000	\$100,000	\$1,000,000	\$5,100,000
Length	450 LF + 500 LF (ramp)	1,800 LF			
Additional Considerations	Use the shadow of the existing Greene Street bridge to reduce the hydraulic impacts of an adjacent bridge structure. The high cost includes aesthetic enhancements.	The proposed connection could include at-grade concrete paths and/or boardwalks. This includes sidepath along Greene St. to the proposed greenway connection to River Park North.	Flood study will be required for no-rise certification of proposed structures within the floodplain/floodway. Additional study may be required. The first step (low cost) would determine what is feasible to obtain a no-rise.		Total cost does not include potential flood mitigation or the connection between Greene Street and River Park North.

Pros

- Lowest cost bridge
- Dedicated pedestrian + bicycle path
- Limits floodplain/floodway impact
- Serve all ages + abilities on bikes

Cons

- Lacks visibility from multiple vantage points
- Not a direct bicycle + pedestrian route



Adjacent Complex (Cable Stayed)

	Bridge	River Park North Approach	No-Rise (Flood Study)	Potential Design + Permitting	Total
Potential Cost: Low	\$8,000,000	\$300,000	\$60,000	\$1,000,000	\$9,360,000
Potential Cost: High	\$12,000,000	\$500,000	\$100,000	\$1,400,000	\$14,000,000
Length	450 LF + 500 LF (ramp)	1,800 LF			
Additional Considerations	Use the shadow of the existing Greene Street bridge to reduce the hydraulic impacts of an adjacent bridge structure.	The proposed connection could include at-grade concrete paths and/or boardwalks. This includes sidepath along Greene St. to the proposed greenway connection to River Park North.	Flood study will be required for no-rise certification of proposed structures within the floodplain/floodway. Additional study may be required. The first step (low cost) would determine what is feasible to obtain a no-rise.		Total cost does not include potential flood mitigation or the connection between Greene Street and River Park North.

Pros

- Iconic features
- Dedicated pedestrian + bicycle path
- Low/moderate flood impact
- Serve all ages + abilities on bikes

Cons

- Lacks visibility from multiple vantage points
- Not a direct bicycle + pedestrian route



High Visibility Conventional (Pre-fab 3 Span)

	Bridge	River Park North Approach	No-Rise (Flood Study)	Potential Design + Permitting	Potential Mitigation	Total
Potential Cost: Low	\$3,000,000	\$510,000	\$60,000	\$700,000	\$3,000,000	\$7,270,000
Potential Cost: High	\$4,000,000	\$1,020,000	\$100,000	\$1,000,000	\$5,000,000	\$11,120,000
Length	450 LF + 500 LF (ramp)	1,700 LF				
Additional Considerations	Proposed bridge would likely require flood mitigation, which could include the proposed living shoreline to Town Common. The low and high cost include aesthetic enhancements, while more aesthetic enhancements are budgeted for within the high estimate.	The proposed connection could include at-grade concrete paths and/or boardwalks.	Flood study will be required for no-rise certification of proposed structures within the floodplain/floodway. Additional study may be required. The first step (low cost) would determine what is feasible to obtain a no-rise.		Proposed living shoreline at Town Common is estimated between \$1.5-2 million. Additional mitigation may be required.	Total cost does not include the connection between Greene Street and River Park North.

Pros

- Tourist destination
- High flood impact
- Dedicated pedestrian + bicycle path
- Serve all ages + abilities on bikes

Cons

- High cost
- Likely required flood mitigation (living shoreline and/or increased capacity elsewhere)

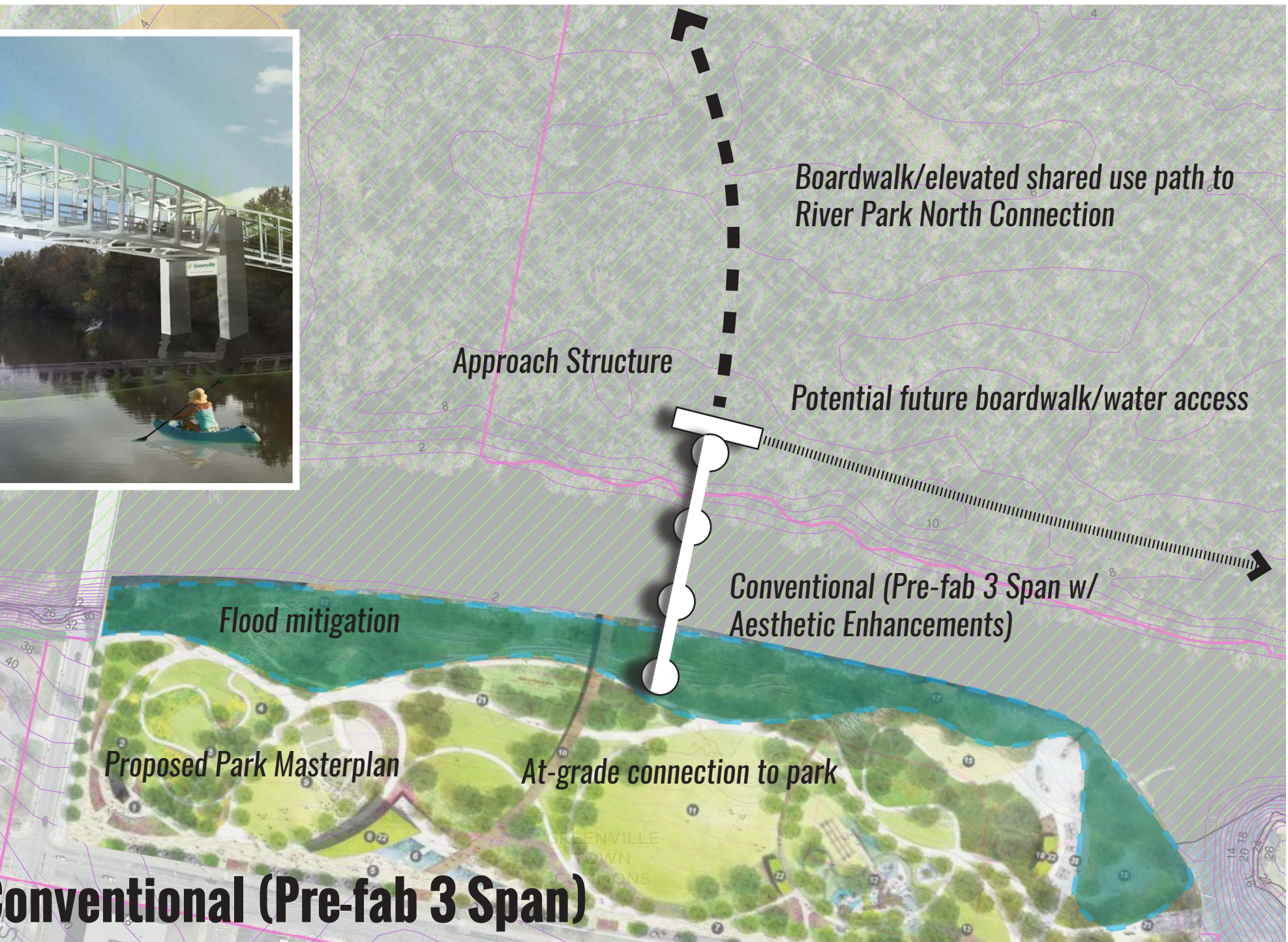
Proposed



Existing



High Visibility Conventional (Pre-fab 3 Span)



High Visibility Complex (Cable Stayed)

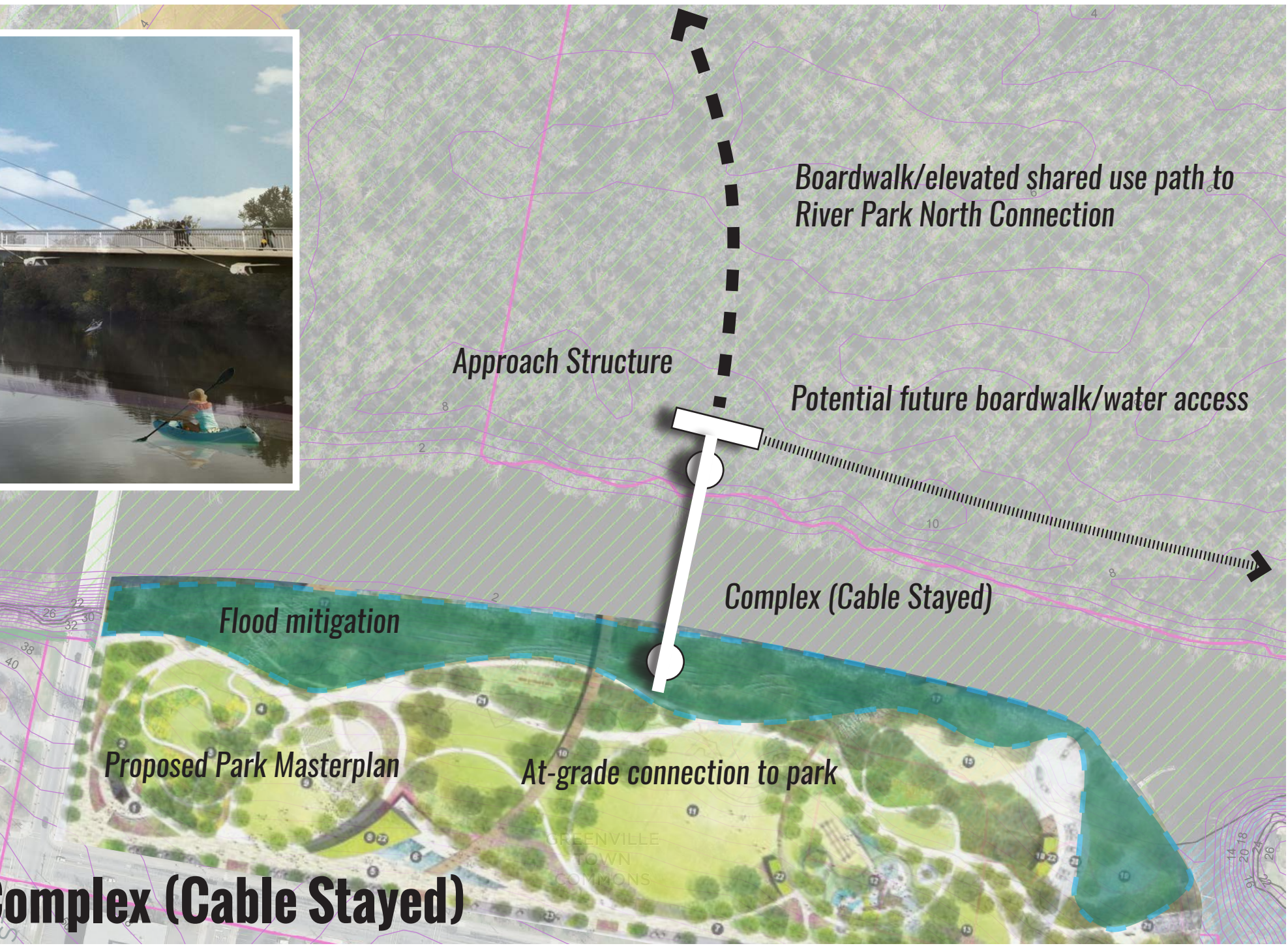
	Bridge	River Park North Approach	No-Rise (Flood Study)	Potential Design + Permitting	Potential Mitigation	Total
Potential Cost: Low	\$8,000,000	\$510,000	\$60,000	\$1,000,000	\$3,000,000	\$12,570,000
Potential Cost: High	\$12,000,000	\$1,020,000	\$100,000	\$1,400,000	\$5,000,000	\$19,520,000
Length	450 LF + 500 LF (ramp)	1,700 LF				
Additional Considerations	Proposed bridge would likely require flood mitigation, which could include the proposed living shoreline to town Common. The low and high cost includes aesthetic enhancements, while more aesthetic enhancements are budgeted for within the high estimate.	The proposed connection could include at-grade concrete paths and/or boardwalks.	Flood study will be required for no-rise certification of proposed structures within the floodplain/floodway. Additional study may be required. The first step (low cost) would determine what is feasible to obtain a no-rise.		Proposed living shoreline at Town Common is estimated between \$1.5-2 million. Additional mitigation may be required.	Total cost does not include the connection between Greene Street and River Park North.

Pros

- Iconic
- Tourist destination
- Moderate flood impact
- Dedicated pedestrian + bicycle path
- Serve all ages + abilities on bikes

Cons

- High cost
- Likely required flood mitigation (living shoreline and/or increased capacity elsewhere)



High Visibility Complex (Cable Stayed)

Bridge Alternative (Elevated Gondola)

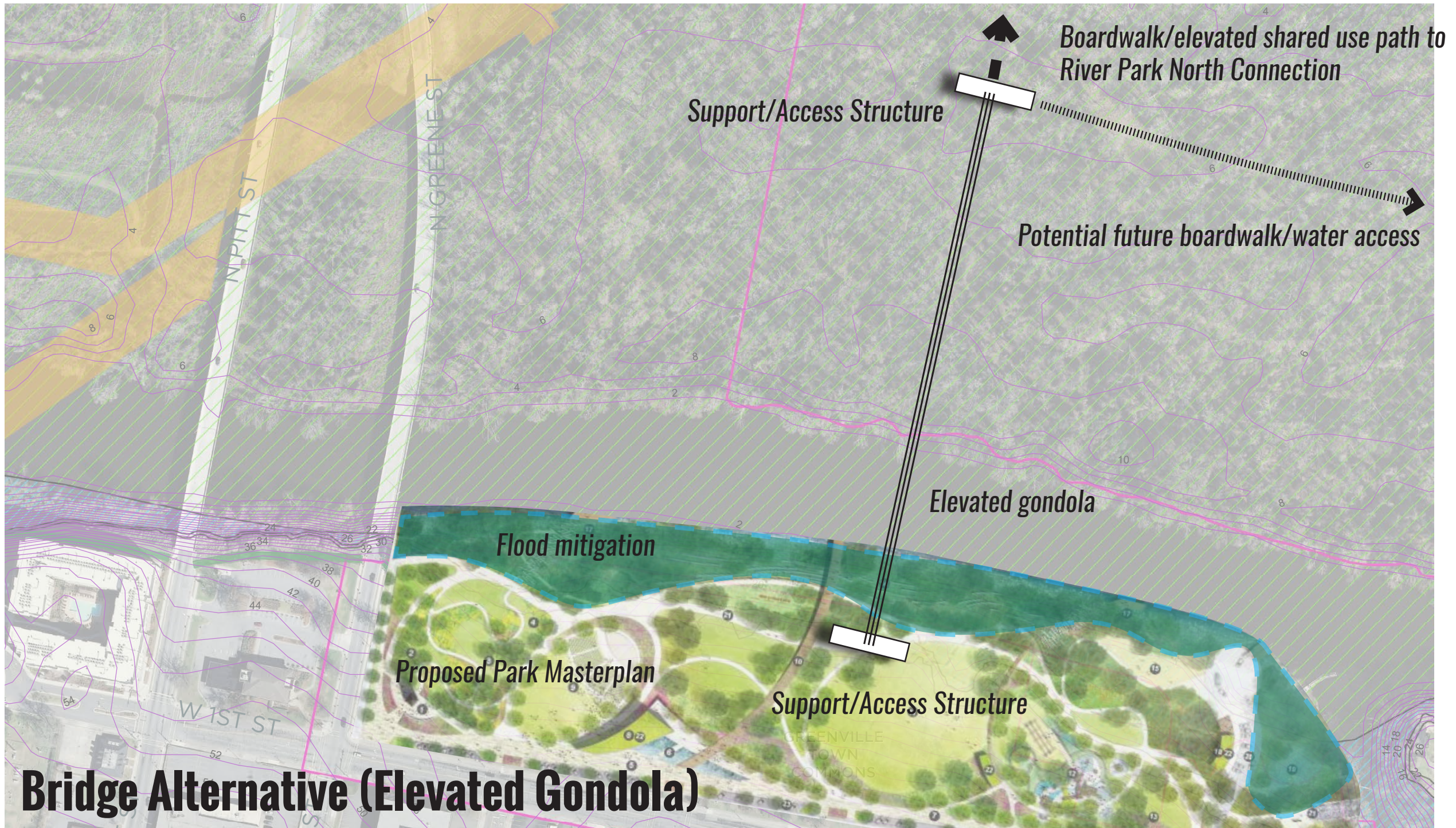
	Elevated Gondola	River Park North Approach	No-Rise (Flood Study)	Potential Design + Permitting	Potential Mitigation	Total
Potential Cost: Low	\$7,000,000*	\$510,000	\$60,000	\$1,500,000	\$3,000,000	\$12,070,000
Potential Cost: High	\$12,000,000*	\$1,020,000	\$100,000	\$2,000,000	\$5,000,000	\$20,120,000
Length	2,500 LF	1,700 LF				
Additional Considerations	<p>4 staff required at all hours of operation.</p> <p>*Maintenance, operation, and insurance costs are not included.</p>	The proposed connection could include at-grade concrete paths and/or boardwalks.	Flood study will be required for no-rise certification of proposed structures within the floodplain/floodway. Additional study may be required. The first step (low cost) would determine what is feasible to obtain a no-rise.		Proposed living shoreline at Town Common is estimated between \$1.5-2 million. Additional mitigation may be required.	Total cost does not include the connection between Greene Street and River Park North, maintenance, operation, or insurance costs .

Pros

- Unique feature for the region
- Potential tourist destination
- Potential public/private partnership
- Low/moderate flood impact

Cons

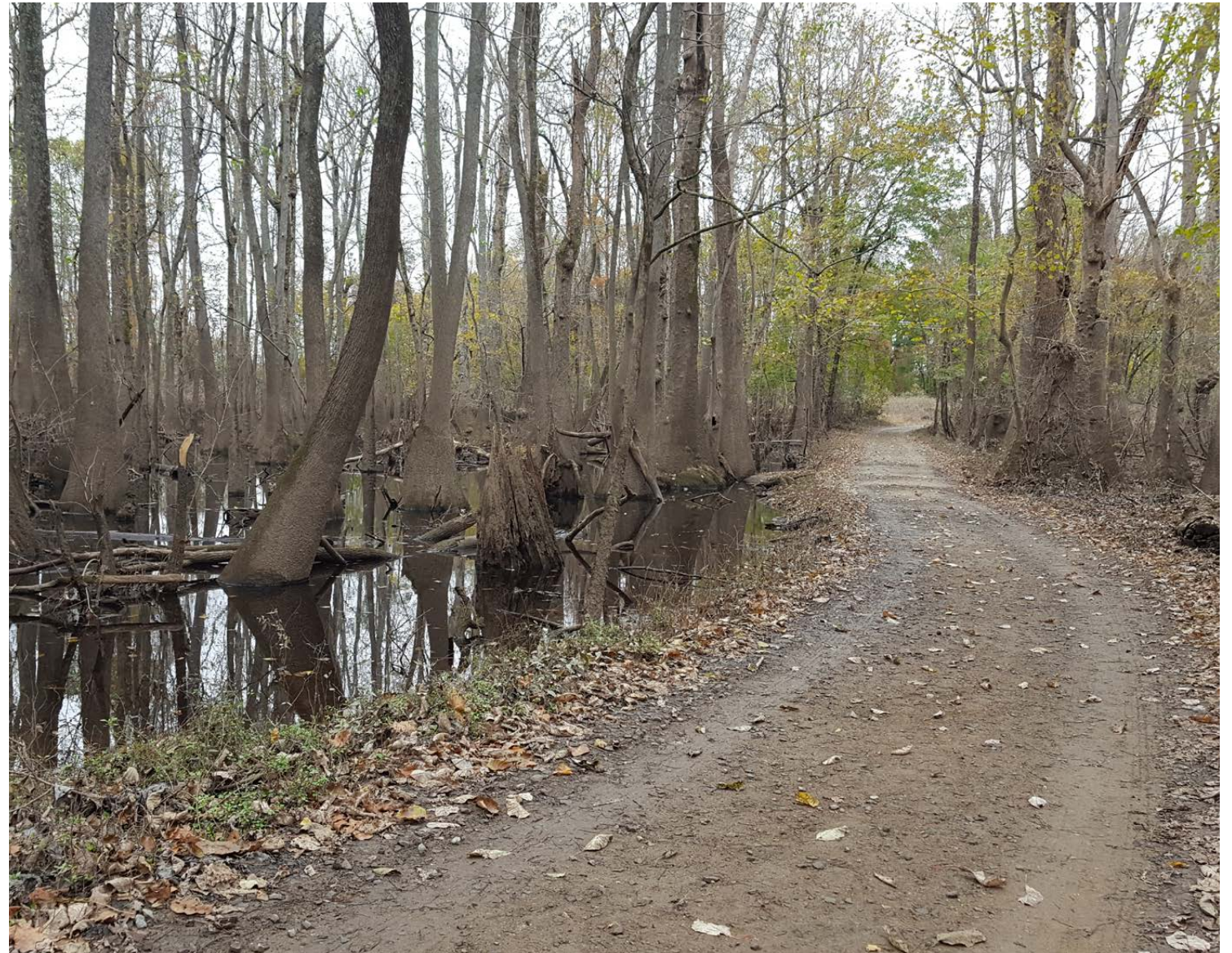
- High maintenance/operation costs
- Dedicated staff required
- More economic risk



Next Steps

The Tar River at the proposed pedestrian bridge location is a FEMA regulated stream with a very wide Flood Hazard Area (FHA), and a mapped floodway. Work in the FHA is allowed. However, encroachments in the floodway including fill, new construction, or other obstructions to flow are prohibited unless it can be demonstrated through hydrologic and hydraulic analyses that the proposed encroachment would not result in any increase in the 100-year Base Flood Elevations (BFEs). There are typically two possible approaches to construction of new bridge crossings across regulatory floodways:

1. Obtain a Conditional Letter of Map Revision (CLOMR) prior to construction, and a Letter of Map Revision (LOMR) after construction. This process would revise the FHA and floodway boundaries and account for the increased 100-year BFEs resulting from the new crossing. However, it is not permitted to increase the BFEs if they will impact an existing structure. Since there are a large number of existing structures in the FHA, using the CLOMR/LOMR process is not an option for this project.
2. Construct the bridge so that it does not result in any increase to the 100-year BFEs. This is referred to as a “No-Rise” application. The floodway is up to 3000' wide in this location, so spanning the entire floodway is not a practical option. However, there are two potential approaches that may be feasible to enable this project to meet the “No-Rise” requirement:
 - a. Constructing the new bridge in the hydraulic shadow of the existing N. Greene St. bridge. If the two bridges are parallel and very close to each other, it may be possible to demonstrate no increase in BFEs. In addition, it would be necessary to align the new interior bents directly behind the existing bents, and the low steel elevation of the new bridge would need to be higher than the 100-year BFE. It should be noted that the main span of the existing bridge over the Tar River is 200' wide, and the new pedestrian bridge would therefore also need to



Existing trail within River Park North which may be paved or replaced with boardwalk, pending permitting and funding.



Proposed high visibility iconic bridge and living shoreline, pending hydraulic study, permitting and funding.

- b. include a span of 200 feet. Offset the impact of the new bridge crossing by removing the existing bulkhead on the south bank and laying back the slope to provide more area for conveying flood flows.

Neither of the above two options is guaranteed to obtain a No-Rise approval. Hydraulic modeling of the proposed crossing would be required to make this determination. Use of the State's hydraulic model for the Tar River can reduce the cost of this modeling. A survey will be required in the vicinity of the new crossing. Specifically, the survey will need to identify elevations of the top and bottom of the bulkhead wall along the river. The rest of the topographic information would be obtained from available LiDAR data.

The required analysis can be accomplished with a two-step approach. The first step would be to perform the field survey of the bulkhead wall, complete the preliminary hydraulic analysis, and review the environmental permitting requirements for the project. The findings should be used to assess the feasibility of the project, and which options if any, can be accomplished to advance to design. The second step would involve moving forward with design and permitting of the selected alternative.



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