

Tingen Road Bicycle and Pedestrian Crossing (BO-2416)

Feasibility Study

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1

Introduction

The purpose of this report is to summarize the findings of a feasibility study to maintain connectivity for cyclists and pedestrians across the CSX S-Line railroad tracks at or near the existing Tingen Rd. crossing of the CSX S-Line rail corridor in Apex, NC. The existing at-grade crossing will be permanently closed to all modes of transportation in order to eliminate conflicts with rail traffic pursuant to the Corridor Project Master Agreement between the North Carolina Department of Transportation, CSX Transportation, and Town of Apex which mandates the permanent crossing closure once the South Apex Peakway grade separation is open to traffic. The new Peakway bridge will provide vehicular access over the rail line, include a loop connector road to S Salem St., and includes sidewalk and side path facilities for pedestrians and cyclists. However, the additional distance a pedestrian or cyclist would need to travel to utilize the new bridge is more than an acceptable length for those travel modes currently crossing at Tingen Rd. The travel distance for someone wanting to connect from James St. to S Salem St. or vice-versa is about 0.15 miles along Tingen Rd., crossing the railroad at the existing at-grade crossing; a person would have to travel either an additional approximately 1 mile via E Williams St. to S Hughes St. or an additional approximately 1.4 miles via the new Apex Peakway bridge to make this same crossing. Thus, an investigation of an option closer to the original crossing location is warranted.

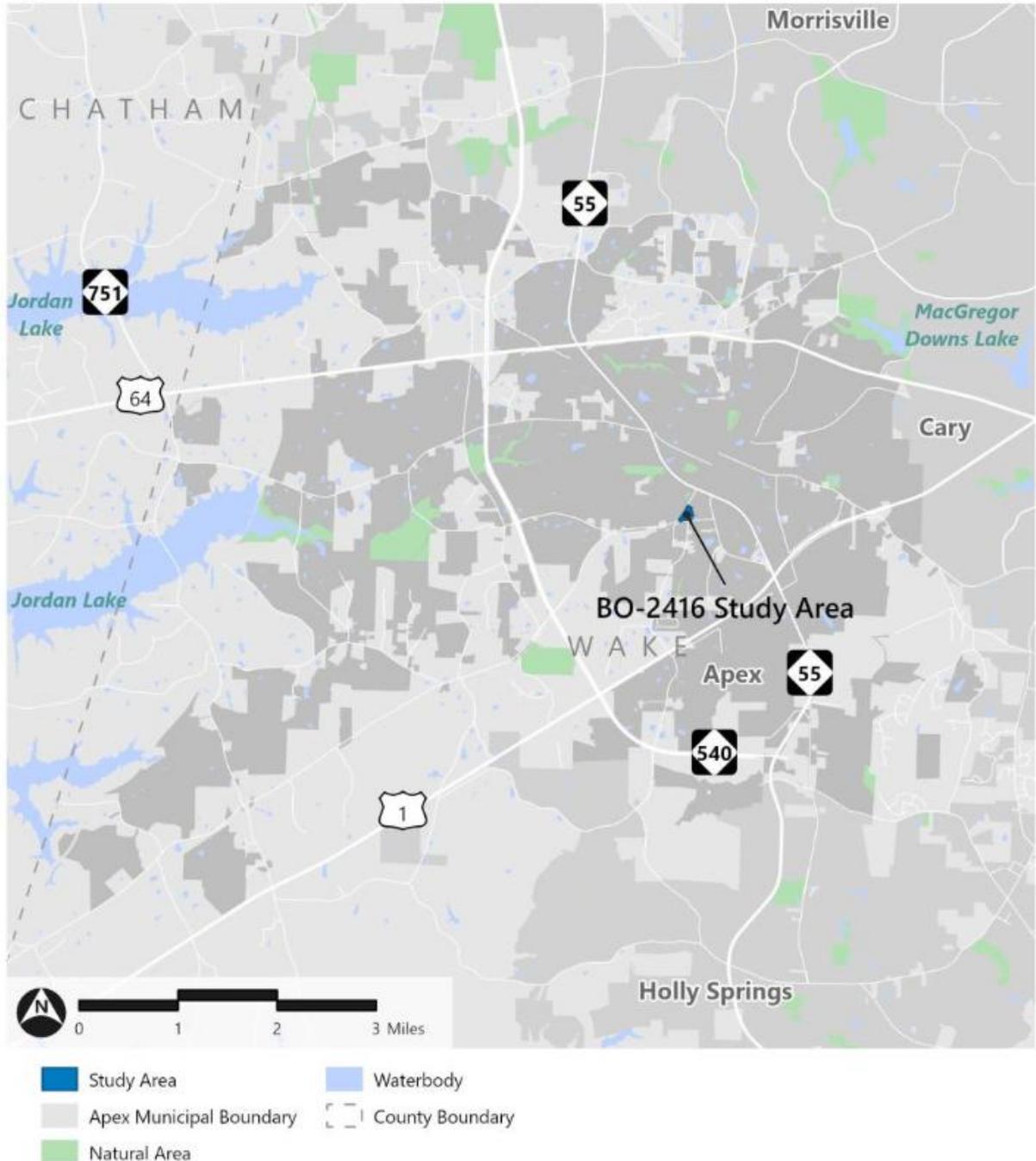
The Town of Apex Transportation Plan includes a bicycle and pedestrian grade-separated crossing of the railroad at Tingen Rd. This study evaluates potential grade-separated options for this crossing including bridging over the railroad as well as going under it. An at-grade option was not evaluated in this study because during project planning and design for the Peakway staff discovered that CSX will not approve an additional at-grade crossing for cyclists and pedestrians without the Town offering additional at-grade roadway closures in trade.

The proposed connection will provide a more direct crossing connecting neighborhoods, schools and parks on either side of the tracks. This will reduce exposure to additional potential vehicular conflicts encountered when walking longer distances and crossing additional driveways and intersections to access the Apex Peakway bridge. The connection integrates with the Town's pedestrian and bicycle facilities plans and would serve as a critical link in the overall area's connectivity.

1.1 Project Description

A grade-separated bicycle and pedestrian crossing is proposed to replace the existing Tingen Rd. at-grade vehicular crossing of the railroad. The proposed bicycle and pedestrian crossing would maintain north-south connectivity across the S-Line railroad, from S Salem St. to Tingen Rd. The project vicinity is shown in Figure 1. [Figure 1](#)

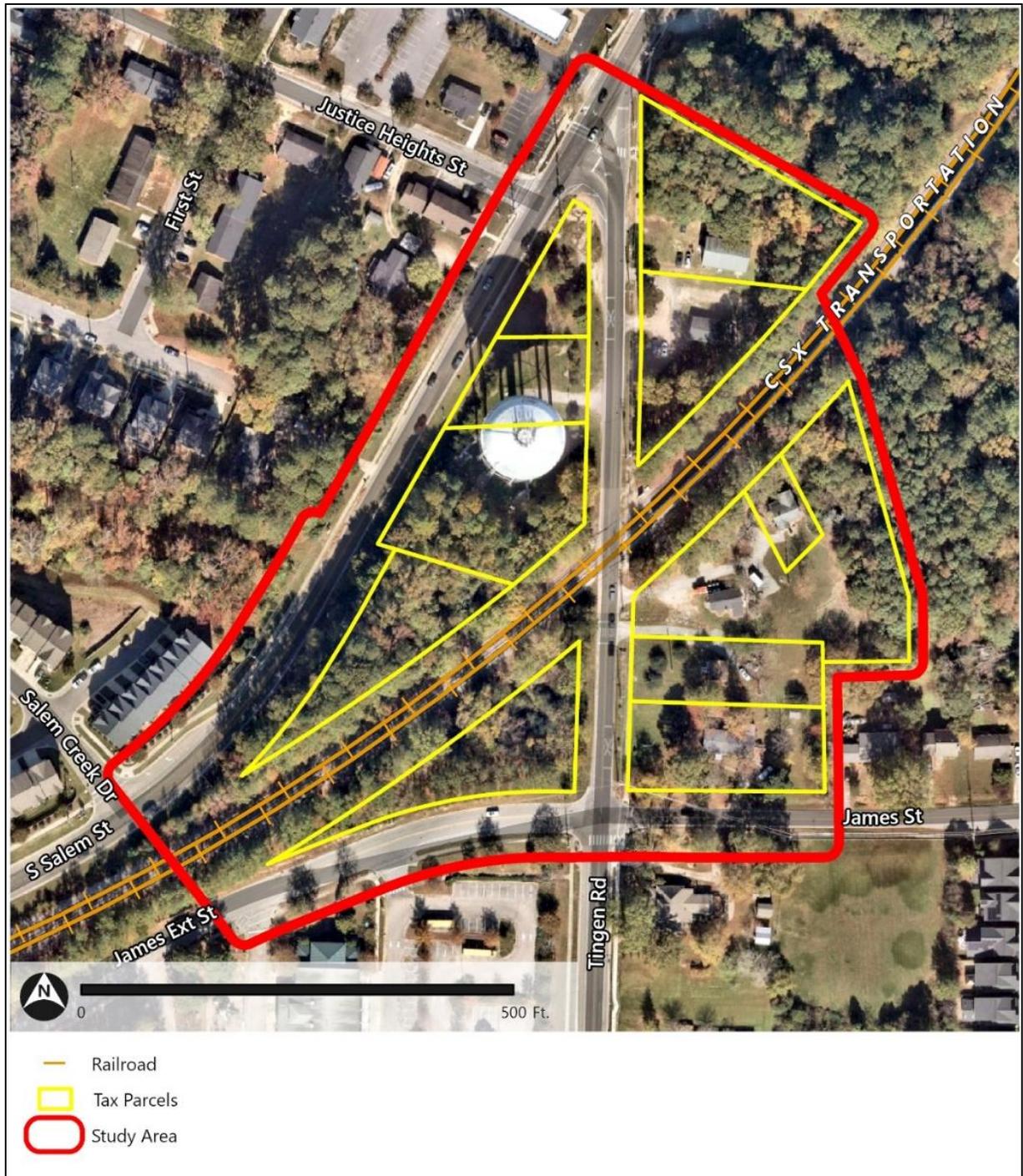
Figure 1. Project Vicinity



1.2 Study Area

The study area was derived from the boundaries of parcels adjacent to the segment of Tingen Rd. that crosses the railway tracks. Prominent design constraints include the CSX S-Line railroad and its bridge clearance requirements, residential properties along Tingen Rd., and a Town of Apex water tank site. Notable adjacent community destinations include Apex Elementary School, St. Mary African Methodist Episcopal Church, and Albright Funeral Home. The study area encompasses parcels adjacent to Tingen Rd. from S Salem St., to James St. as shown in Figure 2.

Figure 2. Study Area



1.3 Project History

Project BO-2416 is referred to in the Capital Area Metropolitan Planning Organization (CAMPO) 2055 Draft MTP and the North Carolina Department of Transportation (NCDOT) State Transportation Improvement Program (STIP) as “Tingen Road Bicycle and Pedestrian Bridge.” In the NCDOT 2026 – 2035 STIP, the proposed cyclist and pedestrian crossing was programmed for design funding under project number BO-2416.

Phase 1 of BO-2416 includes this feasibility study outlining the alternatives development for the proposed Tingen Road Bicycle and Pedestrian Crossing. Per the 2011 Corridor Project Master Agreement TIP # Y-4805G the existing at-grade crossing is required to close upon opening of the South Apex Peakway grade separation to traffic as an alternate route. That project (TIP # U-5928) is currently under construction and is expected to be open to traffic in mid to late 2027.

An at-grade option was not evaluated in this study because in prior project coordination CSX would not entertain an at-grade Z-gate crossing (like was previously constructed between Center St. and Hunter St.) without the Town offering additional at-grade closures in trade.

1.3.1 Summary of Local Plans

Local planning documents that apply to the study area are summarized in Table 1. This review supports the Town’s investment in pursuing a crossing alternative at this location as there is a history of pedestrian and bicycle recommendations in this area to develop a safe and connected multimodal network.

Table 1. Summary of Planning Documents

Year	Document Title	Recommendation
2019	Advance Apex: The 2045 Land Use Map Update	<ul style="list-style-type: none"> › The study area is included in the Town Center context area. › The study area contains future land classified as either "Commercial Services," "Office Employment," "Medium Density Residential", or "School."
2019	Advance Apex: The 2045 Transportation Plan (Apex Transportation Plan)	<ul style="list-style-type: none"> › Widen Tingen Rd. to three lanes between James St. and Sparta Ln. › Proposed grade-separated bike/ped crossing where Tingen Rd. intersects the CSX S-Line › Proposed greenway connecting Apex Peakway and S Salem St. › Proposed side path on James St. between Williams St. and Apex Peakway › Proposed side path on Tingen Rd. between James St. and Apex Peakway › Proposed bicycle lanes on James St. between Apex Peakway and Tingen Rd. › Proposed shared lane markings on S Salem St. within Apex Peakway › Existing local bus route along James St. and Tingen Rd. - GoApex Route 1 › Future local bus route on S Salem St. between Hunter St. and Kelly Rd.
2025	NCDOT 2026-2035 State Transportation Improvement Program (STIP)	<ul style="list-style-type: none"> › U-2901: Widen NC 55 (Williams St.) to multilane divided roadway; replace CSX railroad bridge over NC 55 › U-5928: Grade separated interchange for Apex Peakway at S Salem St. and the CSX railroad › BO-2422: Construct bicycle lanes and install shared lane markings along S Salem St. from Pleasant Plains Rd. to Chatham St. in Apex › BO-2416: Construct a pedestrian bridge over CSX railroad within the existing alignment of Tingen Rd.
2025	Apex Mobility Hub Study (NCDOT IMD)	<ul style="list-style-type: none"> › A mobility hub is recommended along the S-Line corridor between Williams St. and Moore St., north of the study area › Passenger rail is proposed to serve the mobility hub in the future › Grade-separated bicycle and pedestrian crossings connecting to the mobility hub are proposed over East Williams St. east of the S-Line and over the S-Line at East Moore St.

2

Existing Conditions

This study considered existing natural and human environmental conditions, identified through analysis of existing plans and policies, the transportation network, and growth trends that could constrain potential design alternatives for the proposed crossing. This section summarizes the existing conditions inventory and review; the full Existing Conditions report is included as Appendix A.

2.1 Human Environment

The human environment is the context in which people live, work, and play. This section overviews the study area's community context and the surrounding transportation network.

2.1.1 Existing and Planned Transportation Network

Tingen Rd. between James St. and Sparta Ln. is planned for widening from two lanes to three, per the Apex Transportation Plan. The intersection of S Salem St. and Tingen Rd./Justice Heights St. is the only signalized intersection within the study area. This signal includes push button pedestrian signals, marked crosswalks and high-visibility signage to alert drivers to pedestrian presence. It was installed as a temporary traffic signal to address traffic congestion to/from Tingen Rd. and is subject to removal by NCDOT once the railroad crossing is closed. However, the Town anticipates extending Justice Heights St. to Apex Peakway in 2026, currently funded in the Capital Improvement Program, which will generate more pedestrian and vehicular traffic to/from the north. Therefore, the Town prefers this signal to remain operational at least until those new traffic patterns can be studied following the street extension. S Salem St. will remain a busy thoroughfare and the nearest other signalized crosswalk across S Salem St. is at NC 55. Alternative pedestrian accommodations for crossing S Salem St. will need to be evaluated with NCDOT if this signal is ultimately removed.

Sidewalks are present on the north side of S Salem St., the south side of James St., and the east side of Tingen Rd. (except within the railroad right-of-way) and there are marked crosswalks across the south and east legs of the Tingen Rd. and James St. intersection near Apex Elementary School. In general, there are marked crosswalks along the north side of S Salem St. for pedestrians to cross minor intersections like Salem Creek Drive and Justice Heights St. Similarly,

Tingen Road Bicycle and Pedestrian Crossing Feasibility Study

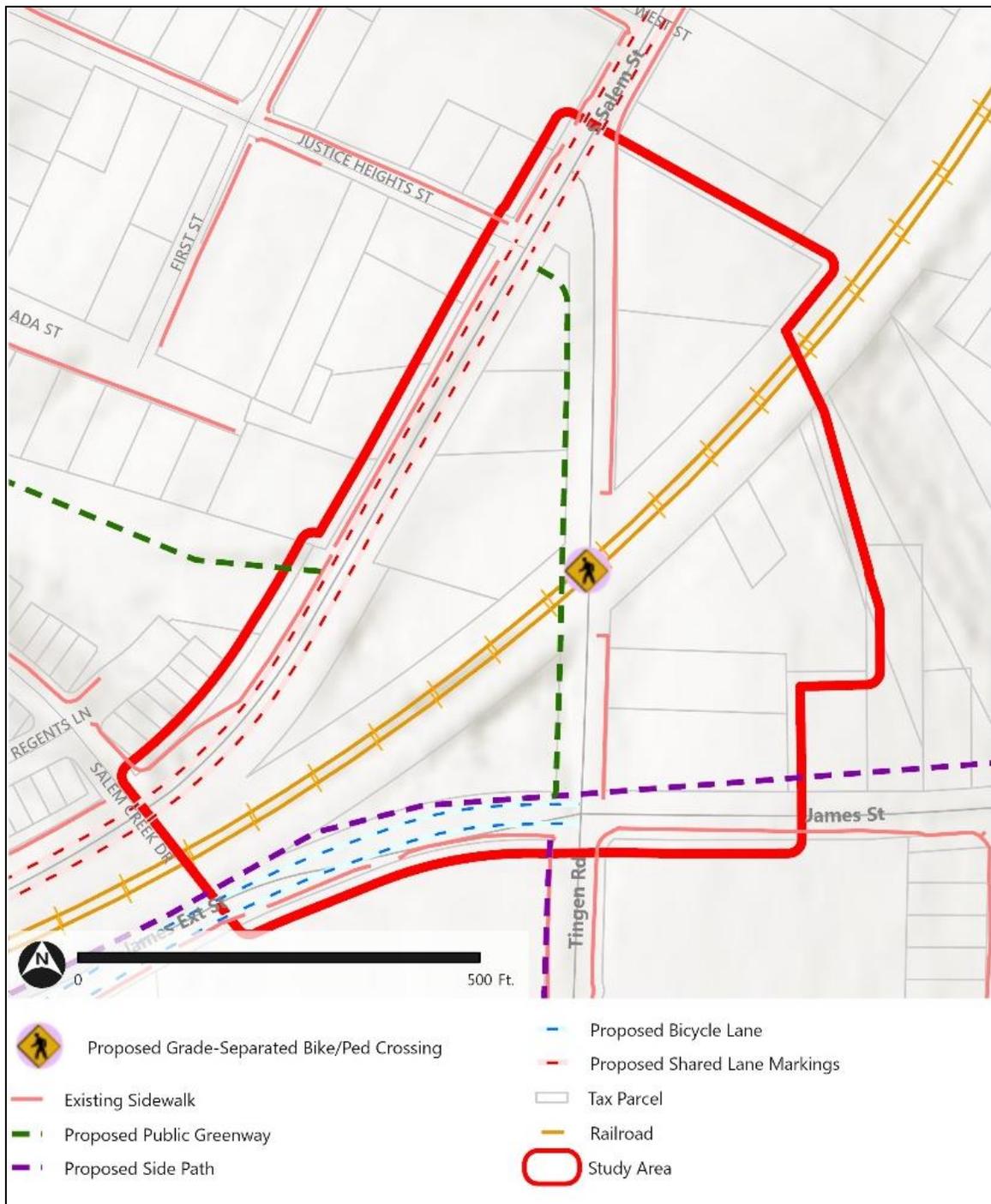
marked crosswalks are present across the driveways serving Apex Elementary School along James St.

The Town's Transportation Plan includes the subject proposed grade-separated bicycle and pedestrian crossing of the railroad tracks adjacent to Tingen Rd. with a connecting greenway. Additionally, a side path is proposed along the north side of James St., and bicycle lanes are proposed along James St., west of Tingen Rd. A side path is also planned along the west side of Tingen Rd. from James St. south, and an off-road greenway connection is planned to tie to S Salem St. between Salem Creek Dr. and Ada St.; shared lane markings are planned along S Salem St. through the study area. The Apex Mobility Hub Plan proposed two grade-separated bicycle and pedestrian crossings, one connecting over E Williams St. east of the S-Line and the second crossing over the S-Line at E Moore St.

The GoApex Route 1 circulator bus runs along Williams St. and Salem St. near downtown. It also travels north on Tingen Rd. and east on James St., stopping at the Wake Acres Apartments on James St and several other locations. An additional local bus route is proposed to run along S Salem St. GoCary Route 9 serves downtown Apex along Salem St., Center St., and N Mason St. GoTriangle Route 305 runs east of the study area along S Hughes St. Additional regional routes are proposed to serve this area in the ongoing Wake Transit Plan update. It is expected that transfers between these routes would mostly occur at the proposed mobility hub along the S-Line at E Moore St.

Figure 3 illustrates the existing and planned transportation network in the study area.

Figure 3. Existing and Planned Transportation Network



2.1.2 Historic Preservation

Within the study area, the Wisdom Masonic Lodge and WPDT-TV 497 News television station (as “Commercial Building”) were surveyed, but deemed ineligible, for the National Register of Historic Places. The South Salem Street Historic District, which is adjacent to the study area, extending along S Salem St., was also surveyed.

Adjacent to the study area, St. Mary’s African Methodist Episcopal Church, which while not yet a recognized Historic Place, is designated as a study list location by the NC State Historic Preservation Office (NCSHPO). Any development towards the north of the study area could be constrained by preservation regulations.

2.1.3 Adjacent Development and Infrastructure Projects

The NCDOT 2025-2036 State Transportation Improvement Program (STIP) has scheduled three infrastructure projects for delivery in the study area’s vicinity. Project U-5928, underway, is the construction of a grade separated interchange for Apex Peakway at S Salem St. and the CSX railroad, while another will widen NC 55 between Olive Chapel Rd. and US 1 (U-2901B) and replace the CSX railroad bridge (U-2901BA).

Project BO-2422 will implement shared lane markings and bicycle lanes along S Salem St. between Chatham St. and Pleasant Plains Rd. NCDOT’s Highway Maintenance Improvement Program includes resurfacing S Salem St. in 2026. NCDOT funded a study to determine the feasibility of a mobility hub along the S-Line within downtown Apex. The study proposes locating the mobility hub off E Moore St., adjacent to the railroad tracks. Construction of the project is not currently funded. There is a Town-funded project to extend Justice Heights St. to Apex Peakway.

2.2 Natural Environment

The site’s environmental characteristics have implications for the viability of bridge and tunnel design alternatives. This section overviews the study area’s natural features. A review of geoenvironmental concerns (such as underground storage tank (UST) facilities, brownfield locations, and hazardous waste sites) in the study area yielded no results of concern.

2.2.1 Hazardous Materials

One closed UST incident site, #21798, was found to be in the study area, located at 610 Tingen Rd., the site of the Town-owned water tower, see Figure 4. Four USTs previously used on site when it was a service station were contracted for closure during the acquisition of that property by the Town in 2000, as the site for the water tower. During closure it was determined that one tank had leaked gasoline at one time; and corrective action was recommended. Figure 4 indicates the approximate location of the tank that was determined to have leaked. On July 19, 2019, the North Carolina Department of Environmental Quality (NCDEQ) submitted a Notice of No Further Action (“Notice”) to the Town of Apex, noting that all required actions have been completed. However, the Notice also explained that the Town of Apex has a continuing obligation to notify NCDEQ of any changes that might affect the risk or land use classifications that have been assigned. Therefore, NCDEQ should be notified during final design of the project pursuant to the terms of the Notice for review and comment.

While the tunnel itself is not expected to impact the location of the closed incident site, the side path and/or Tingen Rd. realignment likely would. Confirmation of remediation should be obtained during future phases of planning and design to ensure construction will not disrupt contaminated soils.

2.2.2 Resource Conservation Areas

The Town of Apex's Unified Development Ordinance requires developments to dedicate an amount of land as Resource Conservation Area (RCA) as part of the site plan submittal process. These RCAs are intended to protect the Town's existing natural and cultural resources and to preserve the visual and aesthetic qualities of the Town; to encourage site design techniques that preserve the natural and cultural environment and enhance the developed environment; to control erosion, slippage, and sediment run-off into streams and waterways; to increase slope stability; and to protect wildlife habitat and migration corridors.

The portion of 700 Tingen Rd. on the northwest corner of James St. and Tingen Rd. includes RCA associated with Apex Elementary School; the 610 Tingen Rd. parcel, owned by the Town, also includes RCA associated with the water tower site. These parcels are shown in Figure 4. Impacts to these parcels and likely mitigation efforts are discussed further in Section 3.2.3.

2.2.3 Topography

From the at-grade crossing of Tingen Rd. and the CSX railroad, the study area slopes down to S Salem St., dropping approximately 12 feet over approximately 350 feet, making the site conducive to a tunnel. If a bridge option were pursued, the bridge would be required to meet a minimum clearance of 23 feet above the rail line; this would result in bridge heights of up to 40 feet above existing terrain, due to the steep drop in elevation on either side of the tracks.

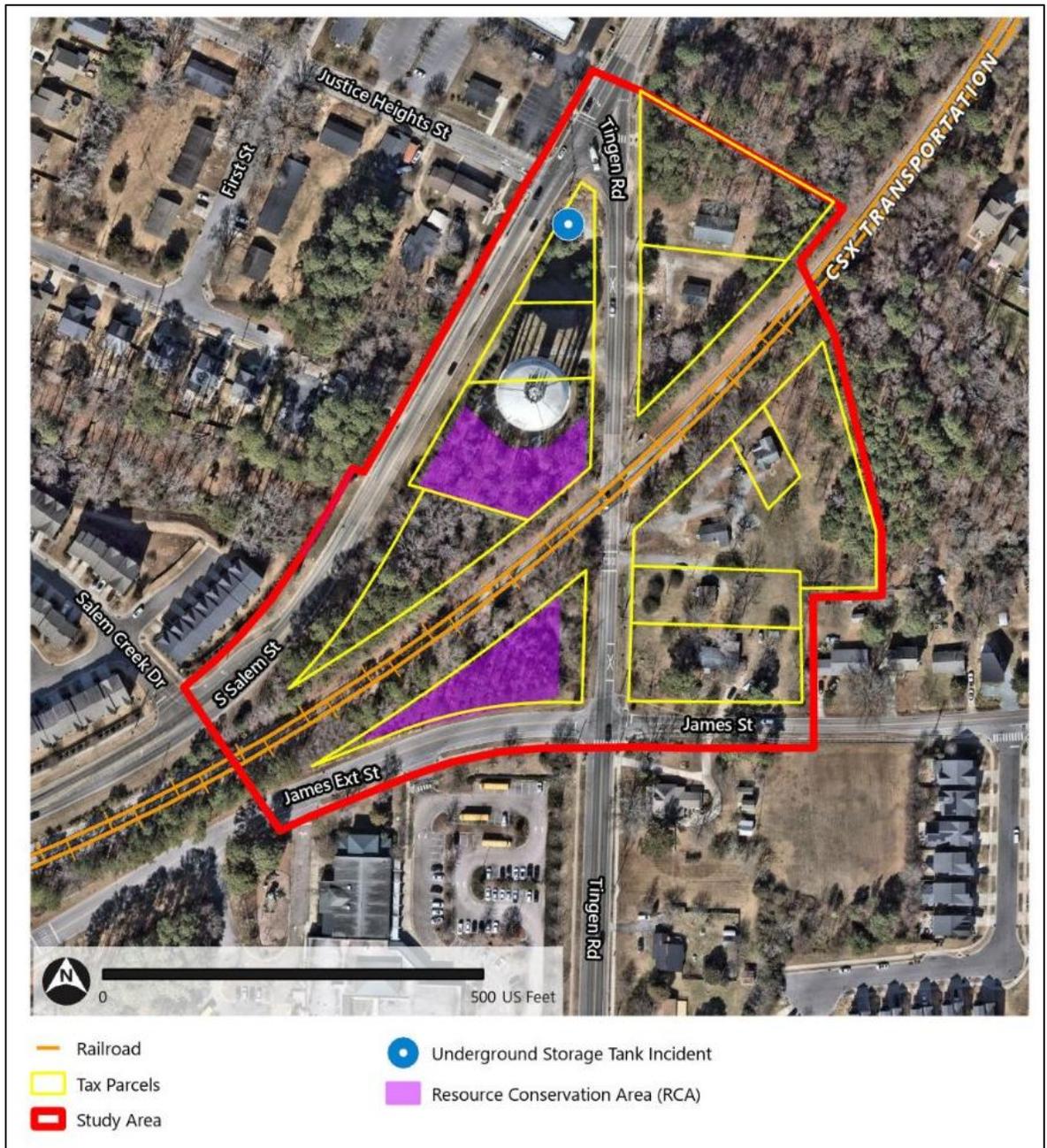
2.2.4 Hydrology

No identified water resources or floodplains exist in the study area; however, during later stages of planning and design, a delineation must be conducted to determine the status of streams and other surface waters in the study area and to determine which Neuse riparian buffer rules may be applicable. Additionally, NC Water Quality Standards require identifying mitigation measures to offset determined impacts on any hydrological features. These measures could include creating an on-site mitigation area, creating an off-site mitigation area, or paying an in-lieu fee to a private mitigation bank or the North Carolina Division of Mitigation Services (NCDMS).

2.2.5 Threatened and Endangered Species

Per a March 24, 2025, Information for Planning and Consultation (IPaC) screening through USFWS, no critical habits for threatened or endangered species exist within the project study area. However, during later stages of planning and design, a more thorough investigation of these species would be undertaken to confirm this preliminary finding.

Figure 4. Natural Environment Features



3

Project Alternatives

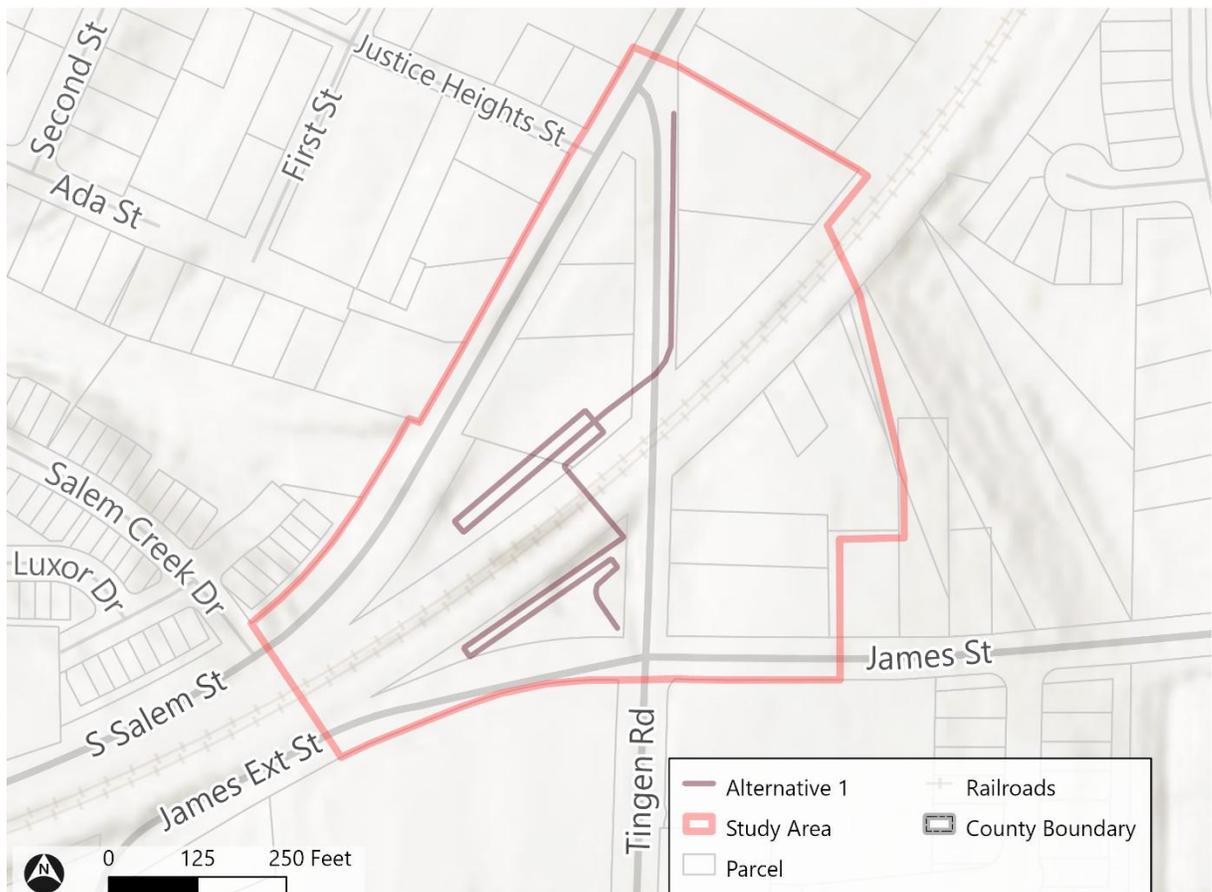
Four preliminary railroad crossing options were evaluated. Each alternative crosses the railroad in the same general area, west of Tingen Rd. and south of S Salem St. While the bridge options are all similar, each alternative offers a unique characteristic that would impact the user experience and/or cost in some way. The tunnel option was developed as the existing terrain in the study area west of Tingen Rd. is sloped from James St. downward to S Salem St., and positive drainage could be achieved along with acceptable cover under the railroad, making it conducive to a tunnel. Alternatively, a bridge required greater clearance over the railroad and worked against natural grade.

3.1 Considered Alternatives

3.1.1 Alternative 1 – North Overpass Loop

This alternative includes bridging over the railroad and would tie to the existing sidewalk along Tingen Rd. This alternative would involve approximately 1,285 feet of pathway on structure and four (4) switchbacks. This alternative includes an inclined structure with a switchback between James St. and the railroad, a bridge over the railroad, and then a looped switchback, which crosses under itself, between the railroad and S Salem St. This alternative maintains an incline of no more than 5%, which is considered moderate, requiring no flat landings along the path. This ADA compliant crossing option would be approximately 1,880 feet in total from James St. to S Salem St. There would also be staircases meeting the structure on either side of the railroad, tying to Tingen Rd., resulting in an approximately 850-foot walk from James St. to S Salem St. Figure 5 illustrates this crossing option. An estimated 1.9 acres of tree clearing can be expected for this alternative. At its highest point, the bridge would be approximately 28 feet above the railroad. This alternative is likely to be the most expensive due to the length of elevated structure required. See Appendix B for more details on the design of this alternative.

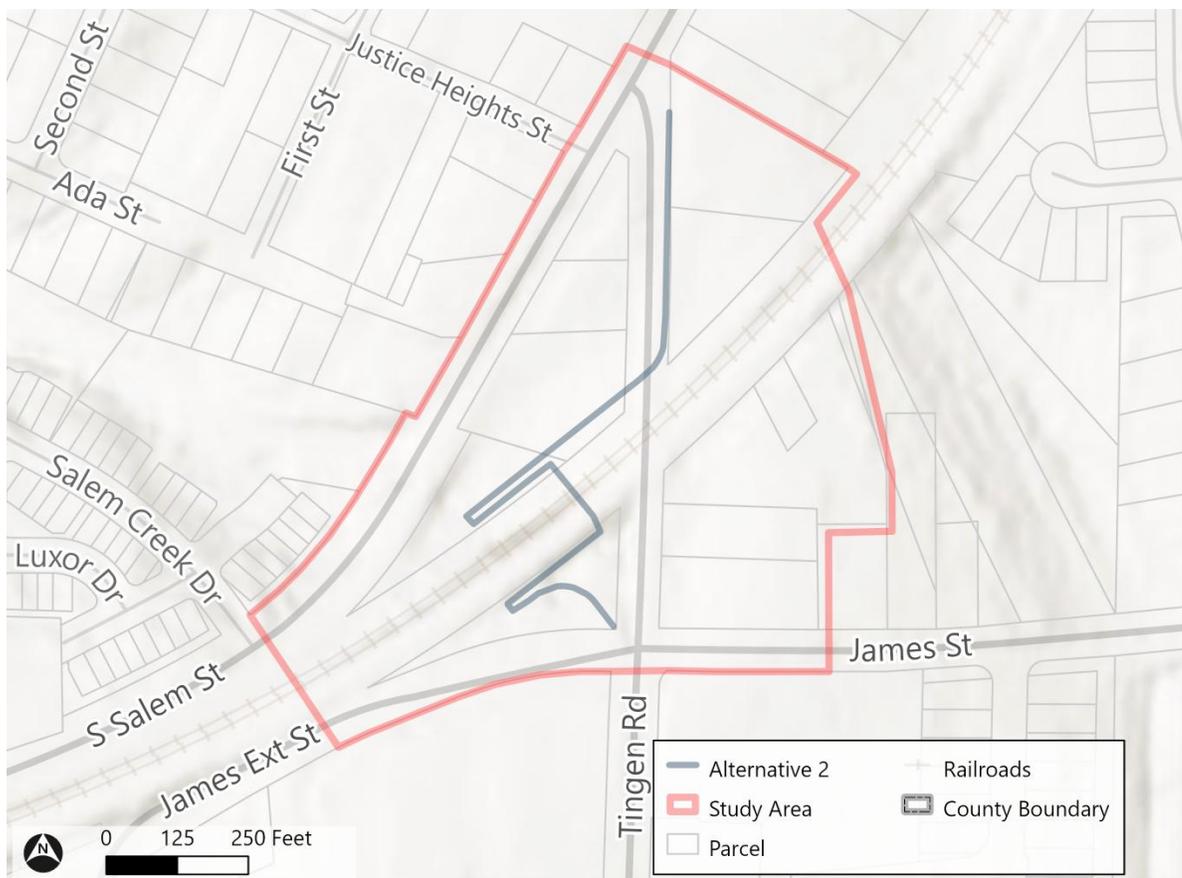
Figure 5. Alt 1 – North Overpass Loop Concept



3.1.2 Alternative 2 – Bridge Without Loops

This alternative also includes bridging over the railroad and would also tie to the existing sidewalk along Tingen Rd. This alternative would involve approximately 660 feet of pathway on structure and two (2) switchbacks. It includes an inclined structure with a switchback between James St. and the railroad, a bridge over the rail, and then another switchback between the railroad and S Salem St. The incline of the structure would reach 8%, which is considered steep and requires a flat landing along the structure every 30 feet to maintain ADA compliance. The ADA compliant crossing option would be approximately 1,355 feet in total from James St. to S Salem St. There would also be staircases meeting the structure on either side of the railroad, tying to the proposed pathway, not directly to Tingen Rd., resulting in an approximately 880-foot walk from James St. to S Salem St. Figure 6 illustrates this crossing option. An estimated 1.3 acres of tree clearing can be expected for this alternative. At its highest point, the bridge would be approximately 28 feet above the railroad. This alternative would be moderately expensive compared to the other developed alternatives. See Appendix B for more details on the design of this alternative.

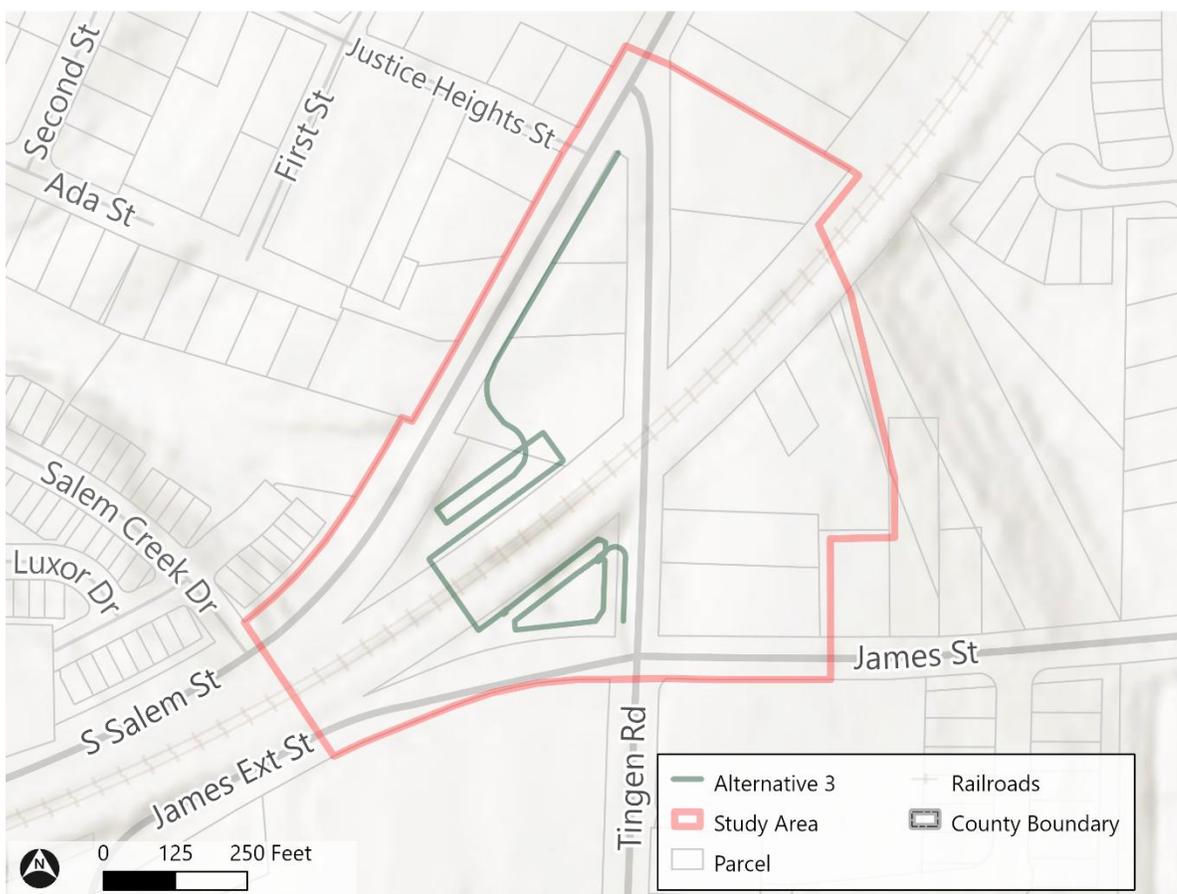
Figure 6. Alt 2 – Bridge Without Loops Concept



3.1.3 Alternative 3 – North and South Overpass Loops

This alternative includes bridging over the railroad but would not tie to the existing sidewalk on Tingen Rd. Instead, the proposed path would parallel S Salem St. and tie to the existing pedestrian infrastructure at the intersection with Tingen Rd. This alternative would involve approximately 930 feet of pathway on structure. It would have a longer length of at-grade greenway on both sides of the rail that each go under the proposed structure, resulting in a total of two (2) switchbacks. The incline of the structure would maintain 5%, which is considered moderate, requiring no flat landings along the path. The ADA compliant crossing option would be approximately 2,020 feet in total from James St. to S Salem St. This alternative only incorporates stairs on the S Salem St. side of the rail, resulting in an approximately 1,520-foot walk from James St. to S Salem St. Figure 7 illustrates this crossing option. An estimated 1.9 acres of tree clearing can be expected for this alternative. At its highest point, the bridge would be approximately 40 feet above the existing ground. It is considered to be moderately expensive compared to the other developed alternatives. See Appendix B for more details on the design of this alternative.

Figure 7. Alt 3 – North and South Overpass Loops Concept



3.1.4 Alternative 4 – Tunnel

This alternative includes tunneling under the railroad, taking off from the James St. and Tingen Rd. intersection, and winding downward to the tunnel, resulting in two (2) switchbacks between James St. and the rail. Once through the tunnel, the proposed path would run parallel to S Salem St., tying to the existing infrastructure at the intersection with Tingen Rd. This alternative would include a 105' tunnel length, but no other part of the path on structure. The incline of pathway would maintain 5%, which is considered moderate, requiring no flat landings along the path. The ADA compliant crossing option would be approximately 1,090 feet in total from James St. to S Salem St. This alternative incorporates stairs on the James St. side of the rail resulting in an approximately 735-foot walk from James St. to S Salem St. Figure 8 illustrates this crossing option. An estimated 1.6 acres of tree clearing can be expected for this alternative. It would be the least expensive to construct when compared to the other developed alternatives. See Appendix B for more details on the design of this alternative.

Figure 8. Alt 4 – Tunnel Concept

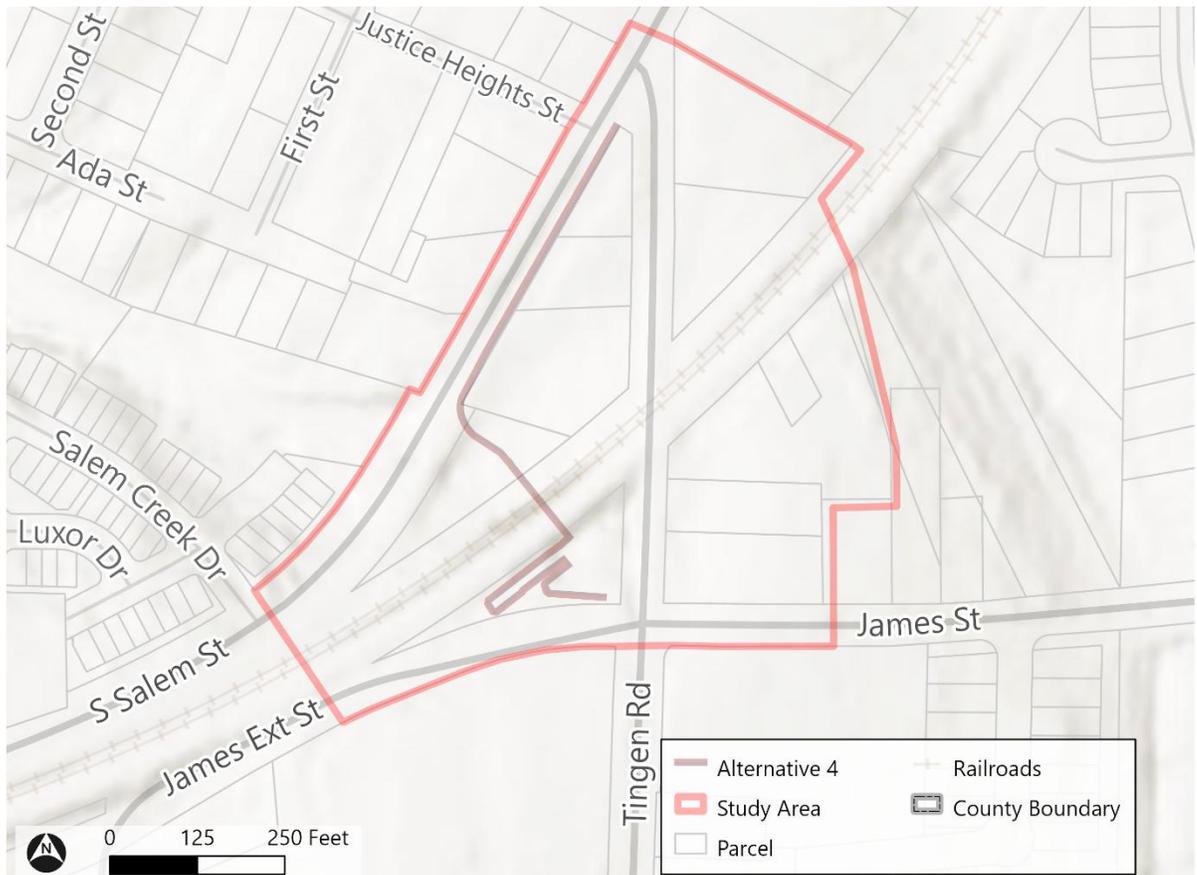


Table 2 summarizes each alternative and the evaluation criteria that were used to determine the Preferred Alternative.

3.2 Preferred Alternative

Table 2. Analysis of Alternatives

Evaluation Factor	Alt 1. North Overpass Loop	Alt 2. Bridge Without Loops	Alt 3. North and South Loops	Alt 4. Tunnel
Structure Type	Bridge	Bridge	Bridge	Tunnel
Structure Length	1,285 ft	660 ft	930 ft	105 ft
Distance from James St. to S Salem St.	ADA & Bicycle (Ramps)	1,880 ft	1,355 ft	2,020 ft
	Walk (Staircase)	850 ft	880 ft	1,520 ft
Maximum Grade	5% (Moderate)	8% (Steep)	5% (Moderate)	5% (Moderate)
Number of Switchbacks	4	2	2	2
Landings Required	0	1	0	0
Northern Approach Along	Tingen Rd.	Tingen Rd.	S Salem St.	S Salem St.
Tree Clearing Required	1.9 acres	1.3 acres	1.9 acres	1.6 acres

The project team reviewed the developed alternatives and considered the impacts and design parameters of each. Additionally, input from the first public meeting was considered; see Chapter 4 for additional information about the public engagement process. Based on key factors such as walking distances, cost, constructability, and existing conditions in the study area, Alternative 4 – Tunnel was recommended by staff and approved by Town Council as the preferred alternative to be carried forward for further evaluation, see Figure 9. Following selection of Alternative 4, further refinements were made to the design concept prior to the second public engagement opportunity including the proposed realignment of Tingen Rd. at S Salem St. as shown below and explained in more detail later in the report. See Appendix C for a full-sized plan design. Figure 10 and Appendix D show renderings of what the preferred alternative could look like once constructed.

Figure 9. Preferred Alternative Design Concept

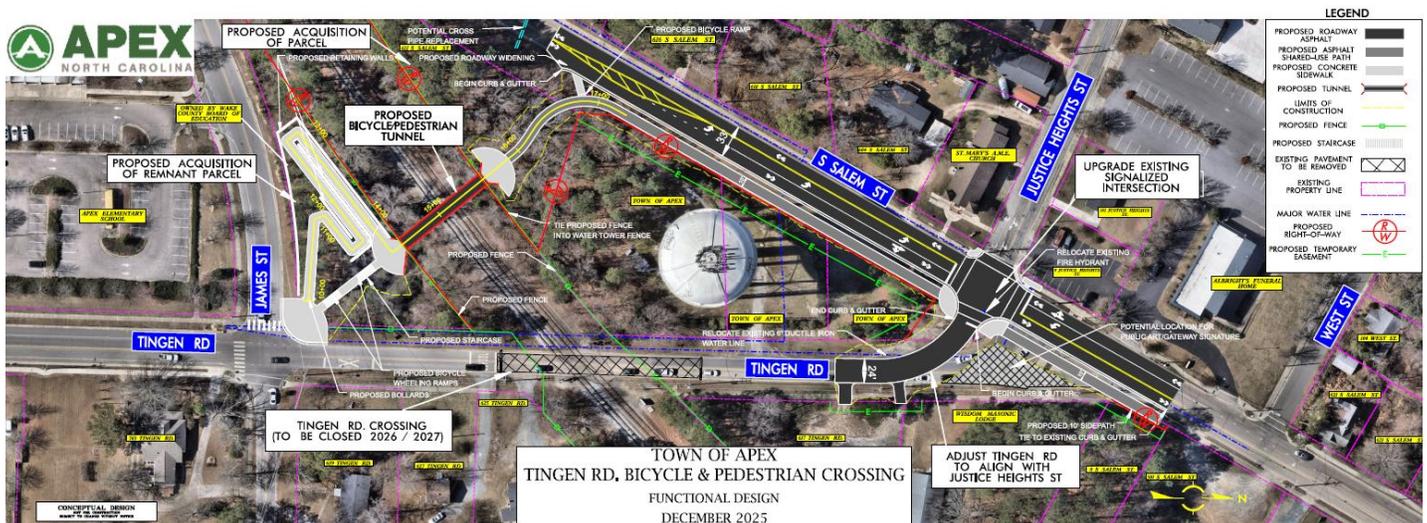


Figure 10. Preferred Alternative Renderings



3.2.1 Construction Phasing

When evaluating whether a tunnel alternative was feasible to advance as an option for the Tingen Road Bicycle and Pedestrian Crossing, a key consideration was the constructability of a tunnel beneath the active CSX railroad. Unlike a bridge constructed over the existing railroad, a tunnel constructed beneath the railroad has the potential to disrupt rail traffic and impact existing railroad infrastructure.

The existing railroad includes a mainline track and a siding track in the project area. During the alternatives analysis phase, the project team coordinated with the NCDOT Rail Division to discuss potential options for constructing both the bridge alternatives and the tunnel alternative while maintaining rail traffic along the CSX railroad. As part of this coordination, two potential construction methods were identified for installing a tunnel beneath the existing railroad.

The first method considered was to bore beneath the existing railroad to install the tunnel without disturbing or reconstructing the existing CSX line. While this method would simplify construction phasing and minimize direct impacts to the tracks during construction, it is currently unknown whether the existing subsurface conditions are suitable to support both the boring operation and ongoing rail traffic. In addition, the vertical clearance required to bore beneath the railroad could reduce the likelihood of achieving positive drainage from the tunnel without the use of pumps.

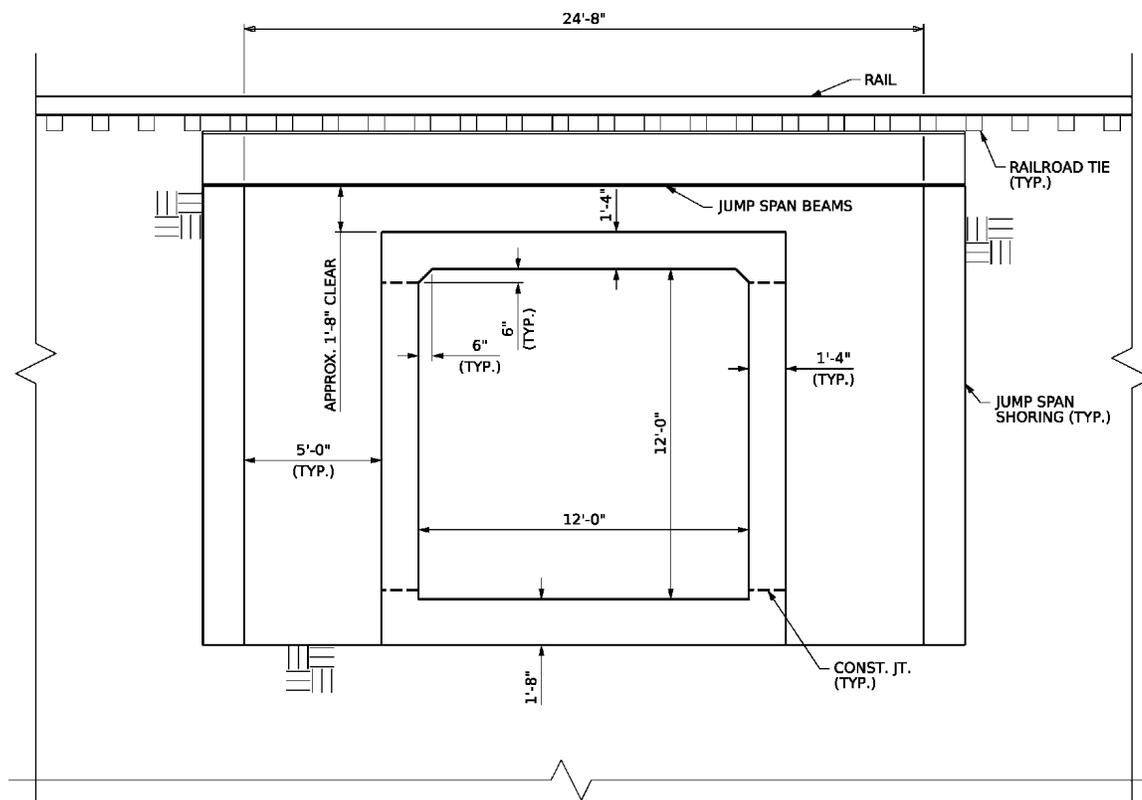
The second construction method considered was to install a temporary jump span for the existing railroad and construct the tunnel in phases beneath the tracks. Under this approach, rail traffic could be shifted as construction progresses, and the temporary jump span would be removed once the tunnel is complete. The intent is for both the mainline track and the siding tracks to remain active throughout construction of the tunnel. Although this method would require additional temporary infrastructure, it could allow for a shallower vertical clearance between the tunnel and the railroad because the railroad subgrade would be reconstructed as part of the tunnel construction.

Based on these considerations, the project team determined that the most reasonable path forward during the feasibility study phase was to develop the tunnel concept assuming the use of a temporary jump span and phased construction under live rail traffic. This approach reduces the risk associated with relying on geotechnical information that is not yet available and provides at least one clearly feasible construction method for the tunnel. The temporary jump span

construction method has been incorporated into the cost estimate, and the project team has included the jump span in the structural drawings prepared as part of the functional design, see Figure 11.

During final design phase and once geotechnical investigations are completed, the project team will coordinate with CSX to determine whether a bored tunnel or the temporary jump span method is the most appropriate construction approach. Ultimately, CSX has final approval on the design and construction methods for crossing the tracks.

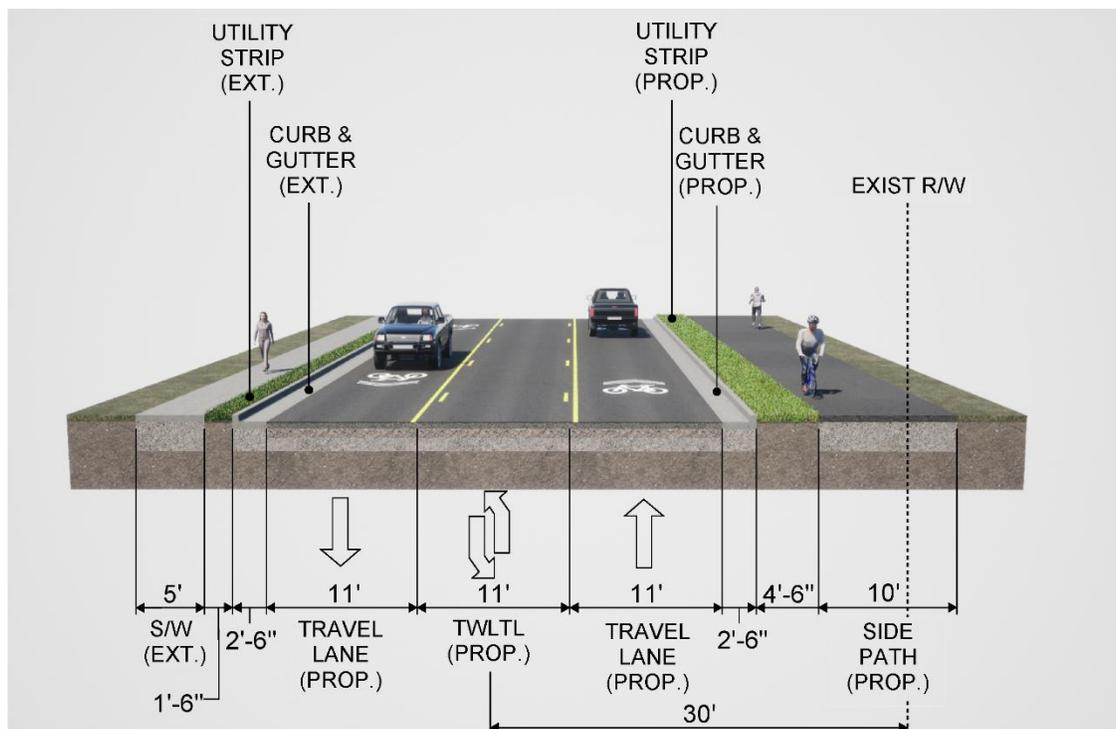
Figure 11. Tunnel Typical Section



3.2.2 Intersection Realignment

Once the project team began to progress from the alternatives analysis to functional design, one of the key design elements considered was how the greenway connector would tie back into the existing bicycle and pedestrian network on either side of the railroad. Since the greenway connector on the north side of the tunnel will transition to a side path along S Salem St., it was determined that a curb and gutter would be required along S Salem St. to separate the roadway from the side path. It was determined to move forward with a three-lane typical section along S Salem St. to ensure that the newly installed curb would not preclude any future storage needs for the proposed left turn lane onto Justice Heights St., see Figure 12. Additionally, this cross section provides homeowners along S Salem St. a turn lane to access their driveways. A traffic analysis may be considered as part of the next phase of planning and design to determine the storage length needed for the left turn lane onto Justice Heights St.

Figure 12. S. Salem Street Typical Section



With this cross section in mind, the project team evaluated how bicyclists and pedestrians would reenter the surrounding network at the S Salem St./Justice Heights St./Tingen Rd. intersection.

This intersection is currently signalized and includes a large island and a marked pedestrian crossing on the north side of S Salem St. However, Justice Heights St. and Tingen Rd. are offset, and Tingen Rd. approaches the intersection at a significant skew. In addition, Tingen Rd. will be closed to through traffic when the existing at-grade railroad crossing is removed, and Justice Heights St. is planned to be extended to connect directly to Apex Peakway. As a result, traffic patterns at this intersection are expected to change significantly in the coming years.

The construction of a side path along S Salem St. represents an investment in the future roadway vision for this corridor. As part of this effort, the project team considered the long-term vision for the S Salem St./Justice Heights St./Tingen Rd. intersection and whether there was an opportunity to optimize the layout as part of this project. A concept was developed to realign Tingen Rd. to meet S Salem St. at the existing Justice Heights St. intersection. This realignment would simplify the overall intersection geometry, provide a safer and more conventional angle of entry for motorists to Tingen Rd., and shorten pedestrian crossing distances on all legs of the intersection for users continuing along S Salem St. from the side path.

The functional design of the Tingen Rd. Bicycle and Pedestrian Crossing includes a side path along the east side of S Salem St. that ties into the existing sidewalk north of Tingen Rd. To further enhance the off-road bicycle and pedestrian network in this area, this study recommends an amendment to the Town's Bicycle and Pedestrian System Plan Map to include a side path along the east side of S Salem St. from south of the Justice Heights St./Tingen Rd. intersection to NC 55.

The existing section of Tingen Rd. that will be removed due to the realignment in the northeast quadrant of the intersection should be considered as a potential location for public art, open space, or other community amenities.

It is anticipated that no roadways will need to be closed for construction of the preferred alternative. Detailed traffic management plans will be developed during the final design phase.

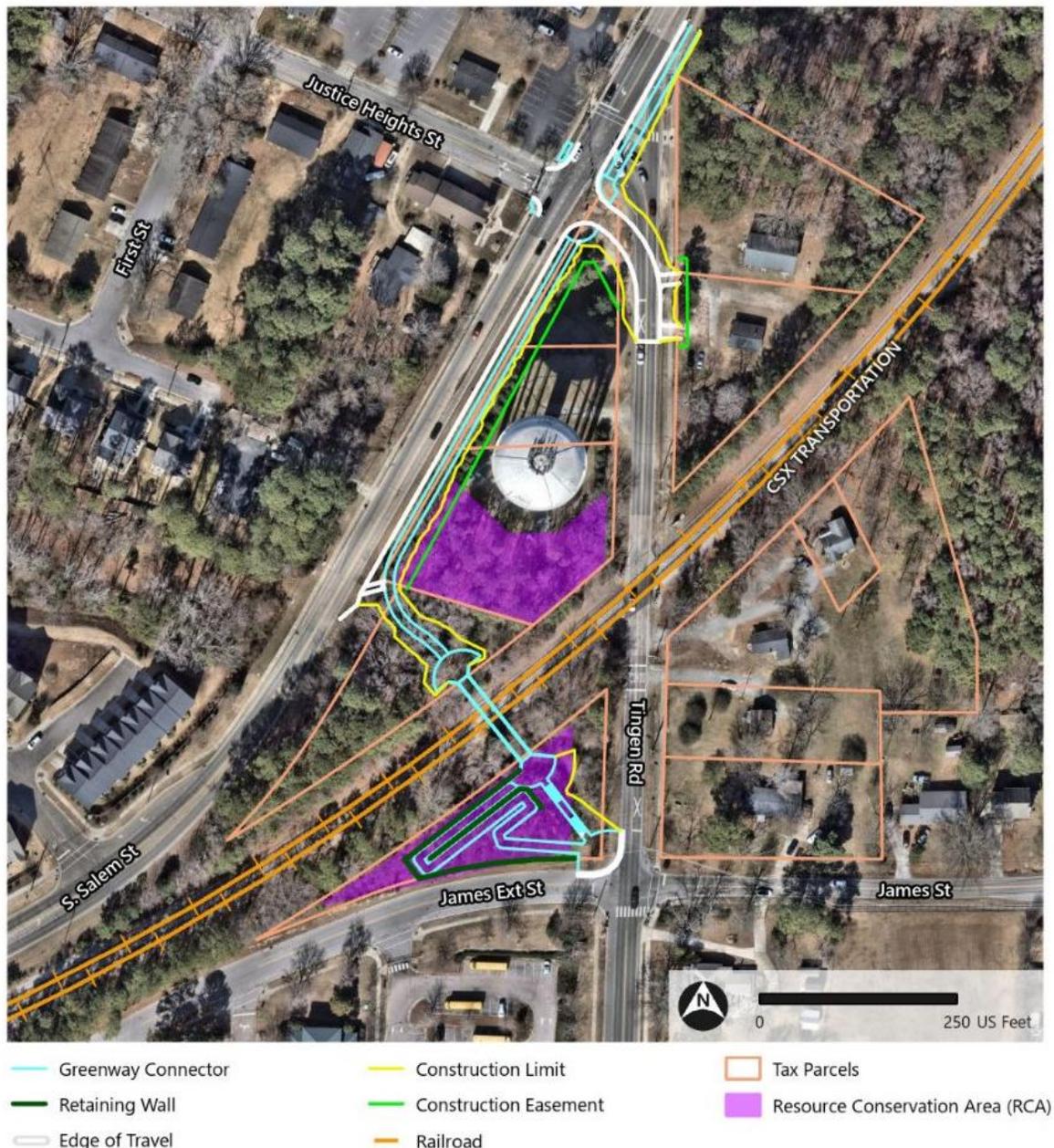
3.2.3 Resource Conservation Area Mitigation

There are two parcels in the study area that contain designated Resource Conservation Area (RCA), see Figure 13. The Town requires that development plans dedicate at least 10% of the gross site acreage as RCA for properties inside the Apex Peakway. RCA dedication is not required for development within the Small Town Character Overlay District.

The parcel at 700 Tingen Rd., on the northwest corner of James St. and Tingen Rd., is owned by the Wake County Public School System (WCPSS). 700 Tingen Rd. is located inside the Apex Peakway and outside the Small Town Character Overlay District. The portion of the WCPSS parcel on the north side of James St. needs to be acquired for construction of the project. The Town will need to coordinate with WCPSS to provide an updated site plan for Apex Elementary School that indicates the Town's current RCA requirement can still be met with the loss of the RCA on that parcel. Based on the Town's initial calculations, the existing RCA south of James St. on 700 Tingen Rd. appears to meet the 10% RCA requirement for the school site, but this should be confirmed in a future stage of planning and design.

The RCA area within the parcel at 610 Tingen Rd., owned by the Town, is also likely to be impacted by the project, although only minimally and specifically to the frontage of the parcel along S Salem St. 610 Tingen Rd. is located inside the Small Town Character Overlay District. Therefore, no mitigation is required at 610 Tingen Rd.

Figure 13. Potential RCA Impacts



3.2.4 Opinion of Probable Cost

An Opinion of Probable Cost (OPC) has been prepared to estimate the anticipated capital cost of the proposed tunnel. The OPC is based on the current level of design development, conceptual layouts, and available project information.

The estimate was developed using a combination of unit costs from recent comparable projects, published cost databases, and professional judgment. Major cost categories include mobilization, greenway/roadway construction, structures and utilities, and the CSX Rail Construction Agreement.

Because the project is at an early stage of development, the OPC is subject to some uncertainty related to future design refinement and market conditions. A 35% contingency has been applied

to account for these unknowns, consistent with the level of design and industry best practices. Additionally, a 4% annual escalation rate has been applied to reflect an FY 2030 construction year. Table 3 summarizes this cost estimate; Appendix E includes additional detail on this estimate.

Table 3. Opinion of Probable Cost

Cost Category	Cost
Mobilization	\$283,000
Greenway and Roadway	\$1,840,000
Structures and Utilities	\$3,823,000
CSX Rail Construction Agreement	\$400,000
Contract Cost	\$6,346,000
Engineering Contingencies (35%)	\$2,222,000
Total Project Cost (FY26)	\$8,568,000
Total Project Cost (FY30)*	\$10,023,000

*FY30 dollars; includes 4% annual escalation

This Opinion of Probable Cost is intended for planning and comparative purposes only and should not be interpreted as a bid price or final construction cost. As the project advances and additional information becomes available, the cost estimate should be refined and updated accordingly.

4

Public Engagement

Public engagement for this project included outreach to key stakeholders for targeted input and as well as two public meetings and a project website. The first round of engagement solicited feedback on high-level design concepts for the four initial crossing alternatives. A second public meeting was held to present the preferred alternative, Alternative 4 – Tunnel, and to seek additional feedback on the design along with visualizations for the tunnel option.

4.1 Website

The Town's [Sidewalk, Bike, and Transit Projects](#) website includes a project overview and notification of the public meeting, along with a link to the [project specific information website](#). The project website informed the public about the feasibility study, provided illustrations of the feasibility design alternatives, and included information about public engagement opportunities. The website was advertised by postcards mailed to nearby property owners and current residents prior to the first public meeting. The site also included project staff contact information. The "Get Involved" page includes all materials that were used at the design charrette and public meetings, including an option to provide comments online. Additionally, six (6) yard signs with a public meeting announcement and QR code linking to the project website were posted in the project study area around the S Salem St. and James St. intersections a week prior to the second public meeting.

4.2 Stakeholder Design Charrette

A Stakeholder Design Charrette was conducted on May 22, 2025 at the Apex Senior Center. The Town hosted a Design Charrette from 1-3 PM, inviting a group of key stakeholders to meet with the project team and provide input on the project and conceptual design options from the perspective of their role in the community. 17 people attended the meeting, including representatives from the Town, Apex Elementary School, NCDOT Rail Division, CAMPO and the Justice Heights neighborhood. The project team presented project background, conducted a virtual site visit, and held interactive discussions regarding project vision and design concept reviews. Attendees were also asked to complete a project input survey at the end of the formal meeting.

During an open discussion about the need and vision for the project from the standpoint of the key stakeholders, attendees discussed valuable benefits and potential impacts or burdens, as summarized below.

Valuable Benefits

- › Maintenance of multimodal connectivity, both in the immediate project vicinity and as part of the regional greenway network
- › Provision of a safe crossing of the railroad
- › Act as a gateway to Downtown Apex, supporting local businesses
- › Serve the local community that depends on multimodal travel options, not vehicles only
- › Keep pedestrian/bicycle travel routes to Downtown Apex shorter, avoiding Apex Peakway or NC 55 options

Potential Impacts or Burdens

- › A need to protect and secure the water supply infrastructure, given the proximity to the water tower
- › Project cost implications, including construction and maintenance costs, as well as competing for priority with other projects for funding
- › Design constraints in the area that could affect/dictate grade and accessibility
- › Potential visual and property impacts affecting local neighborhood
- › Need for safety and security considerations for future users
- › Complexity of construction

Finally, stakeholders defined user experience, cost and safety as the primary evaluation criteria to be considered in selecting a preferred alternative.

A full summary of the Stakeholder Design Charrette can be found in Appendix F.

4.3 Public Meetings

Two meetings open to the public were held throughout the project process, the first immediately following the Stakeholder Design Charrette on May 22, 2025 and the second on November 17, 2025. Both meetings were held at the Apex Senior Center, presented project information and allowed for comment. Town and VHB staff facilitated these meetings.

4.3.1 Design Charette Public Meeting

Forty-six (46) people attended this public meeting, where there were stations for project background, a virtual site visit, an interactive activity on project vision, and design concepts. 30 people completed comment forms at the meeting, which included a brief survey and 26 provided an open-ended comment in their response. The survey and open-ended comment form was also available online from June 3 – June 17, 2025. 17 individuals submitted online responses.

Respondents were asked to give their overall impression and support of the project; of which, 81% responded with having “very positive” or “somewhat positive” support for the project. Respondents were also asked to rank their preference for the presented alternatives. In person meeting respondents ranked only their top preference, while those submitting via the website had the option to rank some or all alternatives in preference order. Overall, Alternative 4 – Tunnel was the preferred option among respondents, having approximately 64% choosing this option.

Below is a summary of the comments received.

- › Provide adequate lighting/visibility
- › Incorporate public art
- › Question of cost/investment given number of users
- › Provide a safe route to Apex Elementary School
- › Prefer the shortest path
- › Minimize steep grades
- › Provide connections to existing sidewalks and planned greenway
- › Maintain pedestrian crossings of S Salem St. to Justice Heights St.
- › Minimize impacts to the natural landscape and trees

Comments from this meeting led directly to the addition of some design elements, such as a bike ramp integrated into the staircase and increased attention to lighting design. In summary, there was general support and appreciation for the project by most that attended. A full summary of the public comments and responses from this meeting can be found in Appendix F.

4.3.2 Preferred Alternative Public Meeting

Twenty-six (26) people attended this public meeting where there were stations for information previously presented (project overview and design evaluations), renderings of the preferred alternative, and a station with a refined design concept for the tunnel option. Five (5) people completed open-ended comment forms at the meeting; twelve (12) comments were also submitted via the online comment form. Comments were grouped into themes, which generally aligned with those from the first public meeting. Below is a summary of the comments received.

- › Question of cost/investment given number of users
- › Provide adequate lighting/visibility
- › Incorporate art into the project
- › Provide a safe route to Apex Elementary School
- › Explain pedestrian access during construction
- › Desire for more landscaping elements, tree protection
- › Concern about water pooling in the tunnel

One comment from this meeting led directly to a design change, specifically regarding the angle of entry from S Salem St. to the side path via the bicycle ramp. The initial design had a steep angle of entry from the roadway to the side path. This angle of entry onto the side path would serve cyclists continuing to travel northbound toward Downtown Apex well, but it would provide a challenge for cyclists using the tunnel to travel toward Salem Village or Apex Elementary School. As a result, the bicycle ramp shown in the final version of the functional design has a perpendicular entry from the roadway to the side path, which can equally serve cyclists continuing north along S Salem St. and cyclists accessing the tunnel via the greenway connector. Additionally, a landscaping line-item was added to the cost estimate to account for adequate landscaping and plantings.

In summary, there was continued general support and appreciation for the project by most that attended, with most opposition focused on the project cost and funding. A full summary of the public comments and responses from this meeting can be found in Appendix F.

5

Funding Opportunities

5.1.1 Federal Funding Options

5.1.1.1 Better Utilizing Investments to Leverage Development (BUILD) Grant Program, formerly Rebuilding American Infrastructure with Sustainability and Equity (RAISE)

The U.S. Department of Transportation's (USDOT) Better Utilizing Investments to Leverage Development (BUILD) grant program provides grants for surface transportation infrastructure projects with significant local or regional impact. The eligibility requirements of BUILD allow project sponsors, including state and local governments, to pursue multi-modal projects that are more difficult to fund through other grant programs.

The BUILD grant cycle is such that grant applications are generally due in February, with award announcements in June. Historically, a total of \$1.5 billion has been available for award to projects that will improve safety, environmental sustainability, quality of life, mobility and community connectivity, and economic competitiveness and opportunity. Additional considerations in the application information include demonstrated project readiness and cost effectiveness.

The BUILD Grant program is a suitable funding source for the planning, design and construction of the Tingen Road Pedestrian and Bicycle Connection. This project has been shown to support local and regional greenway plans, has only minor potential environmental impacts, and is generally supported by the public. When those elements are combined with the Town's successful management of other federal grant awards, this project would be competitive in the BUILD grant selection process. The Town should consider applying for this grant program as long as it is available.

5.1.1.2 CAMPO's Locally Administered Projects Program (LAPP)

The Locally Administered Projects Program (LAPP) was first adopted by the NC Capital Area MPO on October 20, 2010. This competitive funding program is used by the MPO to prioritize and program local transportation projects in the region that utilize federal funding and are the responsibility of the MPO (such as Surface Transportation Block Grant Program – Direct Allocation (STBGP-DA), Congestion Mitigation for Air Quality (CMAQ), etc.). These projects are

funded using federal funding sources directly attributed to the region with a minimum 20% local match.

5.1.2 State/Local Funding Options

5.1.2.1 NCDOT's State Transportation Improvement Program (STIP) Funding

NCDOT's State Transportation Improvement Program selects projects to be funded through the State Prioritization Process (SPOT). The process involves scoring all roadway, public transportation, bicycle, pedestrian, rail, and aviation projects on several criteria, which are all weighted differently, as follows:

- Local Input Points from the MPO and Division Engineers (50%)
- Safety (20%)
- Connectivity / Accessibility (15%)
- Demand / Density (10%)
- Cost Effectiveness (5%)

If seeking STIP funding, CAMPO and NCDOT Division 5 will be key in contributing to the final project score by assigning local priority points to this project. Since this project is already identified in the STIP (BO-2416), the Town could pursue Federal grant options described above to help accelerate the project implementation timeline. This acceleration would occur because any secured grant funding or increased contribution from the Town would lower the NCDOT project cost portion while maintaining all the benefits; thus, the project would score higher if submitted for STIP funding in subsequent rounds of prioritization.

5.1.2.2 Bond Referendum

The Town could implement a bond referendum that would allow Apex voters to weigh in on the funding of this crossing. A bond can be introduced to cover specific project types, and if passed, the Town could use bond money to implement projects, such as this one, that are included in the comprehensive plan. Additionally, the dollars from the bond referendum can be leveraged to secure additional funding for complementary projects within the Town.

6

Study Findings and Recommendations

The purpose of this study was to evaluate the opportunity to maintain connectivity for cyclists and pedestrians across the CSX S-Line railroad tracks at or near the existing Tingen Rd. crossing once the at-grade crossing is permanently closed to all modes of transportation.

This crossing is important to not only the neighborhoods and community resources in the project's immediate vicinity but also to the larger planned pedestrian infrastructure network for Apex. It will provide direct, safe access to Apex Elementary School as well as to the side path into Downtown Apex. This crossing point will be used in the path connecting Big Branch Greenway to the south and Beaver Creek Greenway to the northeast.

Of the four alternatives considered, the tunnel option was found to be the most feasible option. This alternative works well with the existing topography and surrounding context, is constructable, and is the most cost effective. As part of this design, the study produced a design to optimize pedestrian access and safety by realigning Tingen Rd. to align across from Justice Heights St.

This study also recommends amendments to the Town's Bicycle and Pedestrian System Plan Map to: (1) add proposed side path along the east side of S Salem St. from the proposed bike ramp off S Salem St to the side path proposed along NC 55, (2) shift the location of the grade-separated bicycle and pedestrian crossing to align with the tunnel in the functional design, and (3) shift the alignment of the greenway connector to align with the ADA route in the functional design.

It is recommended that the Town Council endorse this alternative and pursue funding options for continued design and implementation, with strong consideration given to federal grant opportunities such as the BUILD FY27 grant cycle.

Recommended project elements:

- Provide a bicycle and pedestrian tunnel under the CSX S-Line, west of Tingen Rd.
- Provide a greenway connector between James St. and S Salem St.
- Provide side path along east side of S Salem St.
- Widen S Salem St. to 3 lanes with curb and gutter within the project extent.
- Realign the intersection of S Salem St./Tingen Rd./Justice Heights St. and provide signalized pedestrian crossings.