THE STITCH

*IMAGE FROM JACOBS VISION PLAN DATED 2015

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Existing Conditions, Constraints and Opportunities Report

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JACOBS

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INTRODUCTION

BACKGROUND

Atlanta's I-75/I-85 Downtown Connector has long been viewed as an eyesore, dividing neighborhoods and creating blighted areas where there were once thriving communities. As the city continues to grow, creating new alternatives for redeveloping under-utilized areas is becoming more of a necessity. Proposed by Central Atlanta Progress, The Stitch project seeks to remedy the disconnection in the heart of the Midtown and Downtown urban core by capping the Downtown Connector. The proposed "cap" is created by utilizing air rights to build a platform above Interstate 75/85 between the existing Civic Center Marta Station at West Peachtree Street and the intersection of Baker Street and Piedmont Avenue. The cap will then create buildable real estate where there was previously none, add value to adjacent land and reconnect parts of the city that have long been disconnected.

In 2016, Central Atlanta Progress/Atlanta Downtown Improvement District (CAP/ADID) released an initial Vision Plan for the proposed ¾-mile platform that reclaims approximately 14 acres of new urban greenspace. The goals for the Vision Plan are to:

- **Repurpose** underutilized assets created by the construction of the interstate highway system. Since construction, buildings have turned their backs to the highway and land has remained vacant and underutilized. This project presents an opportunity to restore the street grid and create development opportunities that respond to the new blocks.
- **Leverage** access to transit by fostering transit-oriented development at the Civic Center MARTA rail station, thereby re-positioning the station as a major transit hub for this part of the City.
- **Create** urban greenspace and new development pad sites both atop and adjacent to the platform, leveraging air rights over the interstate to foster investment in this new neighborhood that increases real estate value.
- **Develop** a vibrant public realm with quality civic infrastructure, interconnected open spaces, best practices in sustainable living and people-centric built environments – everything that drives urban real estate investment today.

Now, ADID is furthering its evaluation of the proposed Stitch vision by testing its technical feasibility and creating an implementation strategy that balances the project's vision with the ability and feasibility to implement. To assist in the effort, CAP/ADID issued a Request for Qualifications for Predevelopment Management Services in March of 2017 to engage the support of a development team that will help to advance the project from its current conceptual stage.

ICP PROCESS

The development team that completed this report includes the DaVinci Development Collaborative (DaVinci) as development manager, Kimley Horn as civil engineer and Jacobs Engineering as structural engineer. HNTB is acting as NEPA consultant and HGOR was engaged to develop a 3D model of the project area. Bjerke Management Solutions, the development manager for the Klyde Warren cap park in Dallas, Texas, was also engaged as a subconsultant to DaVinci.

The Investment Check Point process (ICP), a project management discipline used by DaVinci, is being implemented to evaluate and consider project feasibility as the work develops. This Existing Conditions and Constraints and Opportunities Report, is the deliverable for ICP2; Technical Feasibility. The goal of this Existing Conditions Report is to understand and document the existing utilities and structures in the project area conditions that could impact the implementation of the 2016 Stitch Vision Plan. The goal of the Constraints and Opportunities Report is to understand and determine if any of these obstacles present challenges that could not be reasonably addressed and overcome.

The engineering team relied on information from several sources for this work, primarily as-built documents from the Metropolitan Atlanta Rapid Transit Authority (MARTA), Georgia Department of Transportation (GDOT) and the City of Atlanta. The information included topographic data, utility locations, structural conditions, and property and right of way boundaries. The Report that follows details the existing conditions in The Stitch project areas, makes recommendations for a conceptual engineering approach to further advance The Stitch vision and identifies potential impacts to environmental approvals.

CIVIL EXISTING CONDITIONS

BACKGROUND

The Civil Existing Conditions Report, looks at utility infrastructure within The Stitch project area, along with the vertical clearance for the proposed cap structure over Interstate 75/85; the "Downtown Connector."

Without the benefit of a field-run site survey, numerous resources were utilized to obtain and compile the existing utility information within The Stitch project limits. Data collection consisted of communication with individual utility providers and City of Atlanta Department of Watershed Management, review of GDOT and MARTA as-built plans, obtaining City of Atlanta GIS, and utilizing past surveys of adjacent properties, historical maps, and previous studies. The team was able to establish that the information collected was within a reasonable tolerance of accuracy for this level of analysis.

Once obtained, the multiple source data was assimilated, input into AutoCAD, and consolidated to create an existing utilities base map. The consolidated map is included in the Report as Appendix A.

EXISTING UTILITY ASSESSMENT

Based on Georgia Department of Transportation (GDOT) and Metro Atlanta Rapid Transit Authority (MARTA) plans dated from 1977-1984, as well as coordination with City of Atlanta Department of Watershed and franchised utilities, an assessment of the utilities in The Stitch project area was completed for the following utilities: combined sewer, water, stormwater, power, natural gas, and telecommunications. Her is a summary of what was discovered for each.

- **Combined Sewer (Sanitary and Storm):** There are significant combined sewers under the downtown connector in the project area: one just north of the proposed cap limits and one at Block 1 (between Ralph McGill Boulevard-Courtland Street and Piedmont Avenue-Baker Street bridges). The combined sewer system in the Stitch study area is a sewer line (Ivy Street Sewer) that is 42 inches in diameter, crossing the interstate north of the Baker-Highland connection and running parallel south before turning north and increasing to 84 inches. The Ivy Street Sewer connects to the Butler Trunk Sewer, which runs north to the 10th Street Combined Sewer Overflow (CSO) where it leaves the facility as Peachtree Interceptor and runs northwest to RM Clayton Treatment Plant. The combined sewer lines are property of the City of Atlanta with a typical 20-foot-wide minimum easement associated with the sewer trunk line.

- **Stormwater:** It is important to note that the majority of storm water in this area is managed by the combined sewer lines mentioned above. Within the project limits, the only discovered stormwater lines were roadway drainage on the Downtown Connector within the GDOT right of way. These shallower, smaller lines, are more easily relocated therefore were not considered constraints for the project or placement of structural supports.

- **Domestic Water:** Based on conducted research findings, there are no water services under the Downtown Connector; however, there are several water mains within the existing bridge sections that connect across the downtown connector.
- **Power:** Georgia Power has network facilities that cross the downtown connector in two locations: attached to the Peachtree Street bridge and in the 60 inch Georgia Power tunnel shown on the 1984 GDOT plans which traverses under the downtown connector.
- **Natural Gas:** AGL has steel mains located above the Downtown Connector in the Peachtree Street and Ted Turner Drive bridge structures, as well as connector pipes and retired mains in the other bridges within the project extents.
- **Telecommunications:** AT&T has some facilities that cross the connector on the overpasses. Crown Castle has facilities in the Peachtree Street Bridge. Fiberlight has facilities in the utility bridge south of the Piedmont Avenue-Baker Street bridge. Level 3 Communications confirmed facilities in the project area. Verizon has facilities above the connector at the Piedmont Avenue-Baker Street Bridge. There could be others that maybe in the project area that are often unidentified.

VERTICAL CLEARANCE ASSESSMENT

The existing base surface for The Stitch project area was generated utilizing AutoCAD Civil 3D 2018. The source information was from Fulton County GIS contour data, Peachtree Street Bridge and past project survey contour and 3D TIN (Triangular Irregular Networks) data, GDOT as-built documents and MARTA as-built plan information. The Civil team also conducted site walks to confirm the existing conditions.

CIVIL CONSTRAINTS & OPPORTUNITIES

VERTICAL CLEARANCE CONSTRAINTS

Assuming a cap structure that would connect the existing bridge elevations, the grades were evaluated to discover any clearance issues given existing grades, 7.5 foot depth of structure and GDOT vertical clearance requirements. GDOT clearance standards require a minimum clearance of 16.5 feet over interstates, while 17.5 feet is suggested at pedestrian bridges and not easily reconstructed bridge crossings. For the purposes of this analysis, the 17.5 foot minimum clearance is assumed.

For most of the project area, there is adequate clearance to conform to the 17.5 foot clearance requirement, but there were two locations where the assumed cap would encroach into the 17.5 foot suggested clearance. Both encroachments are due to the existing elevation of the Piedmont Avenue-Baker Highland Bridge and the assumed 7.5 feet structure depth of the cap section.

Discovered height encroachment issues are isolated and though further study of clearance requirements for tunnel ventilation fans, signs, fire protection equipment and lighting should be considered before drawing final conclusions, indications are that accommodations can be made to meet the 17.5 foot clearance requirement.

UTILITY CONSTRAINTS

Many of the utilities in the project area are located overhead. The major overhead utilities identified; water, gas, and communication, will likely remain as constructed. These utilities cross above the Downtown Connector attached to the underside of bridges at Piedmont Avenue, Courtland Avenue, Peachtree Street, and Ted Turner Drive or in the existing utility bridge south of Baker Street.

The constraining existing underground utilities in the study area include two 42 inch combined sewer lines and a 60 inch Georgia Power tunnel. These are constraints to the location of required structure to support the proposed cap as they will remain in place and are not to be disturbed.

- **Ivy Street Sewers** which connects to the Butler Trunk Sewer is viewed as a constraint for location and structural support for The Stitch cap. The combined sewer lines are the property of the City of Atlanta with a typical 20-foot-wide minimum easement. This line will remain in place and is not to be disturbed.
- **The Georgia Power distribution line** located beneath the interstate (between Ralph McGill Boulevard-Courtland Street and Piedmont Avenue-Baker Street bridges) in the 60 inch tunnel is viewed as a constraint for location of structural supports and it is recommended that it not be disturbed.

KEY OPPORTUNITIES

- The Stitch project **reduces the peak stormwater flow rate** by a range of 11% to 33% depending on the event. The reduction in flow rate will increase much needed capacity in the associated City combined sewer system with the potential to reduce the frequency of combined sewer overflows. The increase in the pervious cover because of The Stitch development will reduce and slow peak flow discharge to the Butler Street Trunk.
- The Stitch provides an **opportunity to potentially alleviate some bus staging and congestion at West Peachtree** by providing an alternative passenger loading location. Additional bus staging locations will be explored in future phases.

STRUCTURAL EXISTING CONDITIONS

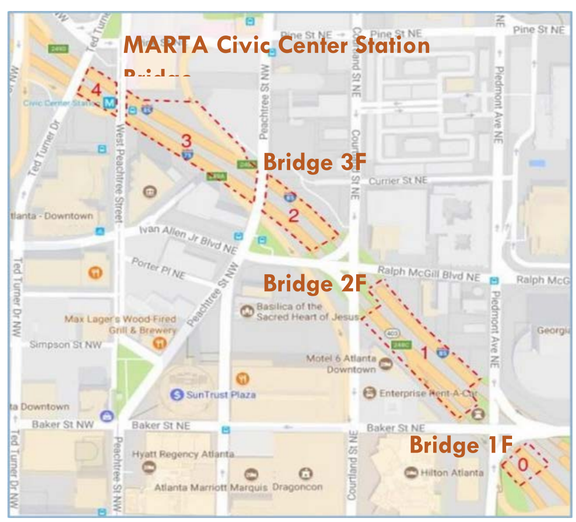
BACKGROUND

The Existing Structures Report provides a descriptive summary of the existing structural elements relevant to The Stitch Vision Plan. Jacobs performed a comprehensive review of as-built information, bridge inspection reports, and site inventory of existing conditions based on information provided by GDOT and MARTA and a site visit on December 5, 2017.

Existing structures within the corridor include four bridges, twenty retaining walls, and six buildings. The specific location of each structure can be found in the diagram below and also in full size in Appendix K.

BRIDGES

The MARTA Civic Center Station bridge was constructed in 1979. Bridges 1F, 2F, and 3F (see attached Structural Appendix for locations) were constructed in 1987. All of the bridges, with the exception of bridge 2F, are classified as functionally obsolete in the bridge inspection reports due to insufficient geometry. Despite being classified as functionally obsolete; the bridges have no known structural deficiencies. The structural elements of the bridges are reported to be in satisfactory to very good condition. Bridges 1F, 2F, and 3F are owned and maintained by GDOT, whereas the MARTA Civic Center Station bridge is owned and maintained by MARTA.



RETAINING WALLS

There are three types of retaining walls along The Stitch corridor: Georgia Stabilized Embankment (GASE), cast in-place, and tie-back walls. The walls are depicted in Chapter 4, the full Existing Structural Conditions Report.

Ten retaining walls are GASE, which retains soil using metallic reinforcement mesh. The reinforced fill zone extends 10 to 30 feet behind the walls. The GASE walls appear to be in good to very good condition based on visual observations. Eight retaining walls are cantilever, or counterfort type cast in-place (CIP) walls. The heel of the footings ranges from 2.0 to 28.4 feet. The CIP walls appear to be in fair to good condition based on visual observations. There is only one tie-back wall along the corridor, which appears to be in fair condition. All the retaining walls are owned and maintained by GDOT except for the MARTA Civic Center Station wall, which is owned by MARTA.

The as-built information related to the existing Alexander Street retaining wall and abutment was not available at the time of this study. Based on available documentation, the retaining wall and abutment were constructed in the mid to late 1950s; prior to the I-75/85 corridor widening.

EXISTING BUILDINGS

Six existing buildings along The Stitch corridor were identified as potential constraints due to their proximity and relative elevation to The Stitch Vision Plan. The structures were built between 1911 and 2000 and range in size and occupancy type. One of the structures, the Medical Arts building, is currently listed on the National Register of Historic Places. At the time of this report, the as-built plans for the private buildings were not available.

Multiple soil borings are included in the as-built plans at Bridge 1F and the MARTA Civic Center Station. The soils at these locations can generally be described as brown Micaceous Sandy Silt with density that increases with depth.

STRUCTURAL CONSTRAINTS AND OPPORTUNITIES

BACKGROUND

The Structural Constraints and Opportunities Report provides a basis of design for structural issues related to the implementation of The Stitch Vision Plan. This Report identifies structural design requirements, options, and associated constraints and opportunities. The existing conditions and structural design requirements are evaluated to develop multiple conceptual structural options for the proposed cap.

STRUCTURAL DESIGN REQUIREMENTS

The design of the proposed Stitch cap structure will follow criteria defined by GDOT practice as described in the GDOT Bridge and Structures Design Manual. Where GDOT practice is not applicable, the criteria will be supplemented with ASCE 7, IBC, and NFPA 502.

The proposed structural design loads are based on the conditions described as “Character Zones” in The Stitch Vision Study. The various permanent materials are given reasonable depth limits to establish a typical uniform dead load of 290 psf. This load includes fireproofing, waterproofing, landscaping, geofoam fill, hardscape and up to 4 feet of water depth for water features. The location and magnitude of heavy concentrated loads such as trees, jet fans, signs, or other fixed equipment require coordination in design. Live loads are prescribed according to the use of the various spaces and detailed in the full Report.

Low rise buildings (1-2 stories) are expected to apply slightly less total load than the typical uniform load of the cap structure if it is assumed that the building will replace other typical surface materials. High rise buildings (greater than 2 stories) can apply substantially more load (dead, live, and wind) than allowed for the typical cap structure design and will require dedicated foundations based on the anticipated building size and configuration. Blast loading should also be considered with the objective of preventing structure collapse. A study is recommended to determine criteria and conditions for blast loading.

The proposed Stitch structure will need to meet GDOT geometric requirements along the Downtown Connector for a minimum vertical clearance of 17.5 feet. The proposed structure is expected to meet this requirement and can be elevated higher as needed. Horizontal clearance requirements present one of the biggest constraints. GDOT has adopted a policy that requires 12 foot shoulders inside and outside the travel lanes. The existing conditions are already less than the required minimum. Any further reduction of shoulder widths requires a comprehensive study by an Engineer and prior approval of design exception from the GDOT Chief Engineer.

STRUCTURAL OPTIONS

The durability, constructability, and optimal system for the design conditions must be considered when selecting the type of structural elements. The design life of the proposed Stitch structure is expected to be greater than 75 years by following GDOT practice and by providing additional protection measures such as waterproofing, fireproofing, increased reinforcing cover, and a good inspection and maintenance program.

The structure type is also selected to minimize construction impacts on the traveling public and work around the existing structures, utilities, and property boundaries to the extent possible. Since long term closure of the Downtown Connector lanes is not feasible, prefabricated beam elements within standard guidelines for transporting fabricated materials are recommended.

The Stitch structural elements will include the substructure and superstructure. The substructure consists of the foundations, interior supports (bents) located between the northbound and southbound lanes, and end supports (abutments) located at the outside edges of the Downtown Connector. The superstructure includes the beams and deck surface that span over the Downtown Connector.

- Three options are considered for each primary structural element (bent, abutment, and superstructure). The following systems are recommended after considering the pros and cons of each option:
    - *An interior support bent* is recommended along the center of the Downtown Connector to permit feasible span lengths. The bent should use a single line of drilled shaft foundations with a narrow solid concrete wall on top (Option B1). This option minimizes reduction of the existing Downtown Connector shoulders. It also provides increased capacity and fire resistance.
    - The *abutments will require several configurations* based on specific constraints at various locations. In the majority of locations, abutment walls with drilled shafts are recommended to replace the existing walls (Option A1). *This option minimizes the superstructure span lengths and foundation loads.* It also minimizes the number of properties impacted, provides new walls for GDOT, and is expected to avoid the City of Atlanta 42 inch combined sewer along the northeast portion of Block 1.
    - *Precast/prestressed (PC/PS) concrete box beams with a concrete deck are recommended for the superstructure (Option S1).* This option has the versatility to accommodate the geometry and has excellent strength to carry the design loads. It is durable, low maintenance, and has mass to help dampen vibrations. The high torsional resistance also offers an opportunity to place low trench panels for tree roots like Klyde Warren Park.

KEY STRUCTURAL CONSTRAINTS

Because the new cap structure connects to four existing bridges, a natural implementation strategy for construction of The Stitch could be to complete the cap one section at a time from bridge to bridge. Development of potential phasing strategies is part of later planning activities, but structurally this approach would be easy to implement in discreet packages should this approach be the selected option.

The following analysis considers the constraints related to each section between the existing bridges.

- **General**: Interior support bent will require approximately 1.25 foot reduction of interior shoulders or restriping of the lane configurations to reduce lane widths. This will require a design exception approved by the GDOT Chief Engineer.
- **East of Bridge 1F (Energy Park)**: The proposed superstructure may be added to existing substructure with minor modifications. However, the existing substructure will need to be evaluated for adequate condition and capacity.

- **Block 1 (Energy Park):**
    - *As described in the Civil Engineering section of this report, The City of Atlanta 42 inch combined sewer* crosses nearly perpendicular to the Downtown Connector before going behind and turning parallel to Wall M toward Bridge 1F. Also mention in the Civil section, the Georgia Power utility crosses nearly perpendicular to the Downtown Connector. These utilities will need to be precisely located and the proposed abutments and bent foundations locations will need to avoid these utilities.
    - *The historic Old New York 19 Condo (The Ralph) and the Verizon Wireless Antenna Site* are in very close proximity to the Downtown Connector and may not allow the typical abutment wall configuration. This abutment will either need to be located within the existing shoulder or a detailed study will be required to determine how to temporarily support the historic building and existing tie-back anchor wall (Wall N) to build the typical abutment wall. This option will also require the Verizon Wireless Antenna Site to be relocated.
    - *Portions of the existing interior bents for Bridge 1F and Bridge 2F* may be modified to carry the proposed superstructure. However, the existing bents and foundations will need to be evaluated for adequate condition and capacity.

- **Block 2 (Peachtree Green):**
    - A small portion of the *existing interior bents for Bridge 2F* may be modified to carry the proposed superstructure. However, the existing bent and foundation will need to be evaluated for adequate condition and capacity.
    - A new *interior support* bent will be located between the southbound main lanes and the Courtland Street exit ramp to establish feasible superstructure span lengths. This will require reduced shoulder widths and a new crash attenuator.
    - The *existing storm drain inlets and pipes near Wall I* and the exit ramp will need to be shifted.
    - *The proposed superstructure beams* will need to have large flares to accommodate the wedge shape space between *Bridge 2F and Bridge 3F*.

- A proposed *high rise building over the existing Courtland Street exit ramp will required dedicated foundations* located within the available area south of the existing Bridge 2F abutment. The building support beams could straddle over the exit ramp while maintaining a minimum vertical clearance of 17.5 feet. The proposed high-rise building may cantilever over the existing Bridge 2F, but should not apply additional load to the existing bridge.

- **Block 3 (Emory Square):**
  - The *existing cast-in-place Wall F near the Medical Arts building parking lot will need to be replaced with a drilled shaft abutment wall*. This will likely require a small portion of the existing parking lot.
  - *Proposed drilled shaft abutment walls can be placed in front of the existing Alexander Street Wall and Abutment*. But, due to the limited clearances, the *existing wall and abutment will likely require retrofit and modification*. The retrofit may involve strengthening the wall face with soil nail anchors. This may allow removal of the exiting footing toe to make space for the proposed foundations. This option requires additional study and analysis of the existing abutment and wall.
  - *New abutment walls are proposed to form a corner at the Pine Street exit ramp*. This will require a reduced shoulder width for the exit ramp and a new crash attenuator. One abutment will follow the exit ramp, while the other will follow the northbound main lanes. *A new mechanically stabilized earth (MSE) wall is proposed directly in front of the existing USA Parking Garage* to serve as the third leg of a triangle that can be filled with embankment to level-up with the adjacent MARTA Bridge. Additional study is needed to determine if any ventilation or security requirements are applicable for the USA Parking Garage.
  - The *proposed retail liner on the outside of the USA Parking Garage can be supported* on top the new embankment with dedicated deep foundations if required.
  - A *new high-rise building is proposed in place of the Medical Arts b*uilding that extends out over the proposed cap structure. The Medical Arts Building and parking garage are listed in the National Register of Historic Places and will require an eminent domain process to replace.
  - *New high-rise buildings are also proposed on the cap structure and the MARTA Civic Center Station Bridge*. The building will require dedicated foundations located along the center of the Downtown Connector and will need to be kept to a minimum diameter to prevent shoulder reductions. Dedicated deep concrete support beams could span over the Downtown Connector within the footprint of the buildings. These buildings will not be allowed to apply load to the existing MARTA Bridge.

- **Block 4 (Emory Square):**
  - The existing MARTA Wall is partially integrated with the MARTA station structure with piers bearing on the wall footing. *Replacing existing wall with new abutment walls will require temporary shoring for the existing MARTA station structure and may also require relocating the existing exit stairs.*
  - The proposed *bus terminal under the proposed surface cap may extend over the Downtown Connector*. But, this *option will likely require the proposed surface cap to rise over 2 feet above the existing MARTA Bridge surface*. This accounts for the vertical clearances of the Downtown Connector and the bus terminal, plus the structure depths of both superstructure levels and supports. This option requires new substructures to replace the existing substructures along the Downtown Connector. The proposed lower

and upper superstructures will be similar. The upper superstructure will be supported on new columns and straddle beams that allow passage of busses underneath.

- *The proposed structural cap over the 1.04 acre vacant lot between the highway and the existing Twelve Centennial Park Building can be a structure similar to many commercial parking garages.* This area will include a grid of deep drilled shaft foundations and columns with a cast-in place concrete deck.

Future Study Recommendations

CIVIL AND STRUCTURAL

- **Vertical Clearances**: Preliminary study of The Stitch corridor and structural considerations concludes that the minimum vertical clearance (of 17.5 feet) can be met. However, additional studies are recommended to determine the location and dimensional requirements for ventilation, signs, fire protection, communications, and lighting.
- **Bents**: The specific size, length and spacing of foundations require geotechnical study and design to determine. In addition, further study is recommended accurately locate utilities. The structural integrity and capacity of the existing bent will have to be evaluated so that the additional span on the bent can be adequately supported.
- **Abutments**: The specific size, length and spacing of foundations require geotechnical investigation, study, and design to determine. Further study and field investigation is recommended to accurately locate utilities. The structural integrity and capacity of the existing abutment require further evaluation to determine if it has sufficient capacity to carry the proposed structure and loads.
- **Block 1 (Energy Park)**: It may be possible to build the proposed abutment in place of the existing wall without reducing the highway shoulder width. However, a detailed study would be needed to determine how to temporarily support The Ralph's foundation during the construction of the wall.
- **Block 2 (Peachtree Green)**: The structural integrity and capacity of the existing bent will have to be evaluated to determine if the additional beams and load can be adequately supported.
- **Block 3 (Emory Square)**: Strengthening of the existing Alexander Street Wall and Abutment wall will require additional study, analysis, and design. Additional study is needed to determine if any additional ventilation or security concerns are applicable for the USA Parking Garage. Further coordination and study is needed to determine the high-rise building foundation options. In addition, further study is recommended to determine existing elevations and exact structure depths to further understand the options for the lower level bus terminal.
- **Field-run survey** to refine infrastructure constraints.
- **Continued bus assessment** including evaluation of alternative bus staging areas outside of The Stitch project limits.
- **Further coordination with GDOT/FHWA/COA** regarding permitting process.

Conclusion/Next Steps

The Existing Conditions and Constraints and Opportunities Reports set the foundation for the next phase of predevelopment work to advance The Stitch. While the work completed to date has identified challenges to implementation, there were no fatal flaws discovered in the analysis. The work suggests the need for further study to understand the engineering concepts presented and how identified constraints will impact implementation.

The next phase of the technical analysis work will further develop the engineering concepts put forth in ICP2; focus being on refining and testing the alternatives. The goal is to develop a high level conceptual design for the engineering "infrastructure" components of the current Vision Plan that will allow for a more refined and detailed construction cost estimate.

Cost Implications

The Jacobs Vision Plan, which was done without the benefit of this level of analysis, assumed a capital cost extrapolated from the Klyde Warren cap project in Dallas. Based on the preliminary findings to date for The Stitch, this project will be significantly more complicated to execute. The detailed work of developing the engineering alternatives and gaining input on costs from the construction community will come later. However, based on the work to date, we are certain that the cost per acre will be significantly higher than the $52M indicated in the Jacobs plan. The key deliverables for the next phase will be sufficient for conceptual engineering to develop a more accurate Rough Order of Magnitude (ROM) cost.

Phasing

The existing bridges in The Stitch project area are natural breaks for a phased construction plan. Later phases of work will review phasing options in more depth in a matrix of considerations that will include costs, ease of construction, impacts to exiting property owners, value enhancement and other criteria. Out of this more detailed, more informed comprehensive phasing plan will be developed.

The elements of the next phase of planning work are:

- Civil Engineering – development of a conceptual grading plan and stormwater management plan
- Structural Engineering – development of structural alternatives for substructure and superstructure
- MEP Engineering – assessment of life safety requirements for tunnel ventilation and lighting with development of engineering narratives for mechanical, lighting and communications systems requirements
- Limited Architectural – to determine the potential for overbuild

Additional activities for next phase of planning will include:

- Completing cost estimating and financial modeling
- Developing a Park Operations model that supports its long-term sustainability
- Developing a conceptual approach to construction logistics and Management of Traffic (MOT)
- Evaluating phasing opportunities and preparing a schedule of staging recommendations
- selecting a Communications partner to help prepare a communications strategy for stakeholder, public and project champion engagement
- Selecting a partner to complete an economic impact study
- Selecting a partner to help investigate funding strategies
- Engaging a legal partner to begin looking at governance strategies

EXISTING CIVIL CONDITIONS

Existing Utility Assessment

Based on Georgia Department of Transportation (GDOT) and Metro Atlanta Rapid Transit Authority (MARTA) plans dated from 1977-1984, and coordination with City of Atlanta Department of Watershed Management and franchised utilities, the following utilities were assessed: combined sewer, water, stormwater, power, natural gas, and communications.

Combined Sewer

In its earliest days, Atlanta used open watercourses to capture stormwater and divert it into nearby streams and creeks. As the city population and popularity of sinks, bathtubs and flush toilets grew, stormwater conveyance channels became conduits for carrying household wastewater as well. These natural drains were covered and transformed into combined sewers for the collection of stormwater and sewage. Once the city outgrew this system, the design and construction of sewers was modernized. The improved sewer system was designed to carry both stormwater and household wastes. It was accepted that the combined sewer system had the advantage of providing dilution of the sewage. However, as Atlanta grew rapidly, the system was continually expanded, often unable to handle the load of the increase in household wastewater and stormwater runoff from increased development and impervious surfaces. Today, the combined sewer system serves the City's downtown core, in an area roughly 19 square miles. In this area, stormwater and wastewater sewage are conveyed together in a single underground pipe. The combined system was generally constructed between 1890 and 1920 and represents about 15% of the total City's wastewater system. Beyond the combined sewer area in the downtown core, Atlanta has a separated system.

Excessive overflows from the combined sewer system, coupled with sanitary sewer overflows and leaks, have negatively impacted water quality in the Atlanta region, specifically the Chattahoochee and South Rivers. In 1998, the City entered into a Federal Consent Decree outlining a program to end water quality violations associated with combined sewer overflows. This agreement was amended in 1999 to address water quality violations associated with sanitary sewer overflows. A municipal option penny sales tax in the City, which began in 2004 and was extended in 2008 and 2012, funds programs associated with sewer infrastructure to address the water quality concerns and implement the requirements of the Consent Decree. The City also identified sanitary sewer capacity limited areas and implemented a sewer capacity application process to manage proposed development.

The Stitch study area is located in the combined sewer area of downtown Atlanta. It is in the Peachtree Creek sewer shed with treatment provided by the RM Clayton Treatment Plant in Northwest Atlanta. The large sewer lines that convey flows from basin to basin across the city are referred to as "trunk" sewers. There are significant combined sewers under the downtown connector in the project area: one just north of the proposed cap extents and one at Block 1 (between Ralph McGill Boulevard-Courtland Street and Piedmont Ave-Baker Street bridges). It is understood that there are currently capacity issues in this segment and that there are documented overflows and flooding of the city system within GDOT right-of-way within The Stitch project area.

The combined sewer system in The Stitch study area is a sewer line that is 42 inches in diameter, crossing the interstate north of the Baker-Highland connection and running parallel south before turning north and increasing to 84 inches. Per City of Atlanta records, this sewer line is referred to as the Former Ivy Street Sewer. The Ivy Street Sewer connects to the Butler Trunk Sewer, which runs north to the 10th Street CSO where it leaves the facility as Peachtree Interceptor and runs northwest to RM Clayton Treatment Plant. Based on its size and function, the line is viewed as a constraint for location of structural supports. The combined sewer lines are property of the City of Atlanta with a typical 20-foot-wide minimum easement associated with the sewer trunk line. Larger easement widths are indicative of deeper sewers, which will be confirmed in a future study phase with a field-run survey.

Stormwater

As both water quality and capacity concerns arose with the city's combined sewer system, the city began installing stormwater only conveyances to collect and direct rain water. Although this part of the city maintains a combined sewer system, stormwater only infrastructure does exist. Roadway drainage conveyances on the Downtown Connector within the GDOT right of way were the only stormwater lines discovered within the project limits.

Domestic Water

City of Atlanta Department of Watershed Management provides domestic and fire water service for the city. These lines vary in size, material, and age. Based on conducted research findings, there are no water services under the Downtown Connector; however, there are several water mains within the existing bridge sections that connect across the downtown connector.

Power

The Atlanta based electric utility company, Georgia Power (GP), a subsidiary of Southern Company, delivers energy to its customers via transmission and distribution lines. High-voltage transmission lines carry large amounts of electricity to local substations where the electricity is converted to lower voltages that is carried to communities by smaller power distribution lines. The power distribution lines can be installed above or below ground and will reach a transformer that converts the voltage levels a final time prior to providing service to businesses or homes.

The network of transmission lines known as the Integrated Transmission System (ITS) is co-owned and operated by Georgia Power and includes voltage lines owned by Georgia Transmission Company (GTC), the Municipal Electric Authority of Georgia (MEAG), and the City of Dalton.

Georgia power distribution has network facilities that cross the downtown connector in two locations: attached to the Peachtree Street bridge and in the 60 inch Georgia Power tunnel shown on the 1984 GDOT plans which traverses under the downtown connector.

Natural Gas

Atlanta Gas Light (AGL), a part of Southern Company Gas (formerly AGL Resources), a subsidiary of Southern Company, is the largest natural gas distributor in the Southeast. AGL operates and maintains the pipeline infrastructure that delivers natural gas of certified marketers to customers.

AGL has steel mains located above the Downtown Connector in the Peachtree Street and Ted Turner Drive bridge structures, as well as connector pipes and retired mains in the other bridges within the project extents.

Telecommunications

Numerous communications providers service the Atlanta area. AT&T, Fiberlight, Crown Castle, Verizon (Legacy MCI), and Level 3 Communications all have facilities that cross the connector on the overpasses and facilities that are in the utility bridge south of the Piedmont Avenue-Baker Street bridge.

AT&T has some facilities that cross the connector on the overpasses. Crown Castle and Century Link (formerly fLevel3) have facilities in the Peachtree Street Bridge. Fiberlight has facilities in the utility bridge south of the Piedmont Avenue-Baker Street bridge. Verizon has facilities above the connector at the Piedmont Avenue-Baker Street Bridge.

Process

Without the benefit of a field-run site survey, numerous resources were utilized to obtain and compile the existing utility information within The Stitch project limits. Data collection consisted of communication with individual utility providers and City of Atlanta Department of Watershed Management, review of as-built plans obtained from the Georgia Department of Transportation (GDOT) and Metropolitan Atlanta Rapid Transit Authority (MARTA), and reference of City of Atlanta GIS, past surveys of adjacent properties, historical maps, and previous studies.

Once obtained, the multiple source data was assimilated, input into AutoCAD, and consolidated to create an existing utilities base map. For discrepancies, data selection precedence was determined through consideration of utility and relevancy of data origin.

Record of communication with individual franchised utility providers was kept via an excel file and is included as Appendix A.

Civil Existing Conditions Summary

Many of the utility service lines are anticipated to be relocated or removed and replaced as development progresses in the study area. Figures 1.1 to 1.4 illustrate the utilities within The Stitch project area. Figures 1.1 and 1.2 highlight existing overhead hanging utilities for the current and proposed developed conditions. Figures 1.3 and 1.4 highlight major existing underground utilities for the current and proposed developed conditions.

The major overhead utilities identified include water, gas, and communication. These utilities cross above the Downtown Connector and are located below the bridges at Piedmont Avenue, Courtland Avenue, Peachtree Street, and Ted Turner Drive or in the existing utility bridge south of Baker Street.

See Civil Appendix B for full page composite utility maps. Civil Appendix C contains utility maps provided by City of Atlanta for stormwater, water and sanitary sewer. Maps from the franchised utility are located in Appendix D.

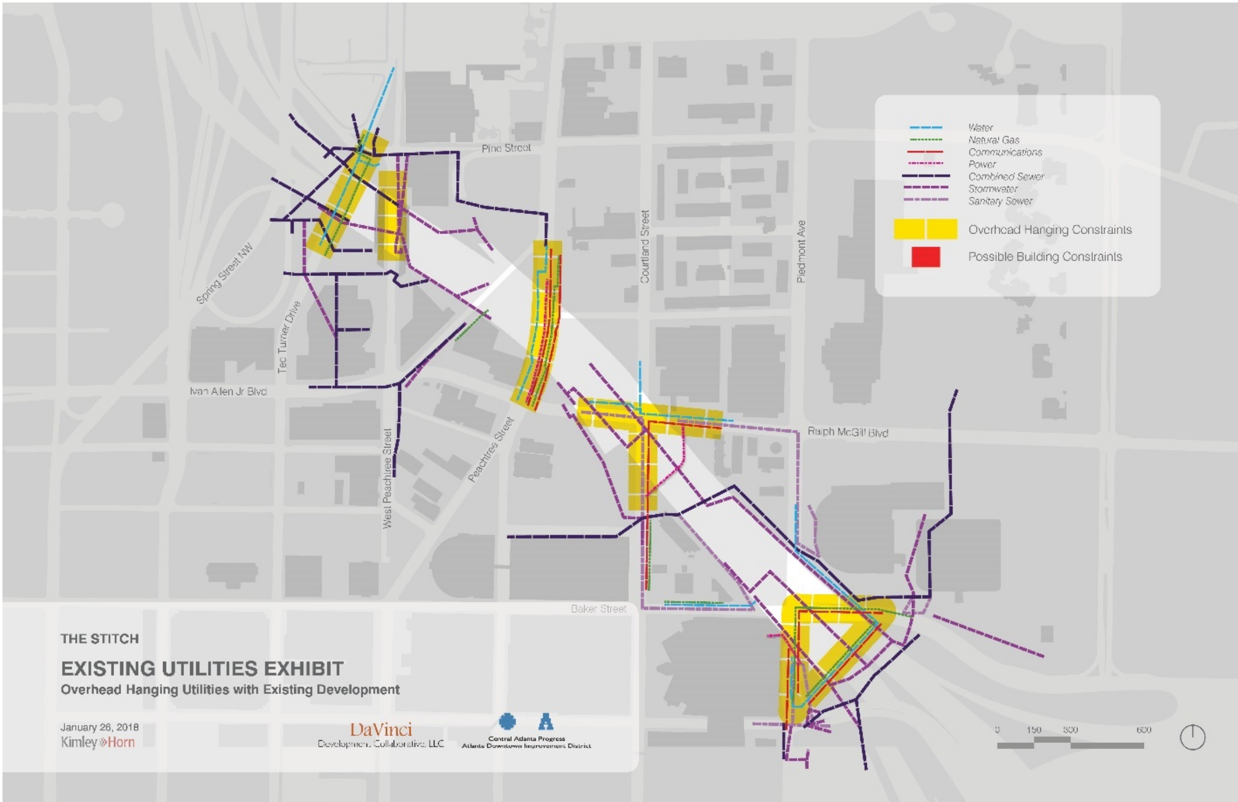


Figure 1.1: Existing Overhead Hanging Utilities with Existing Development

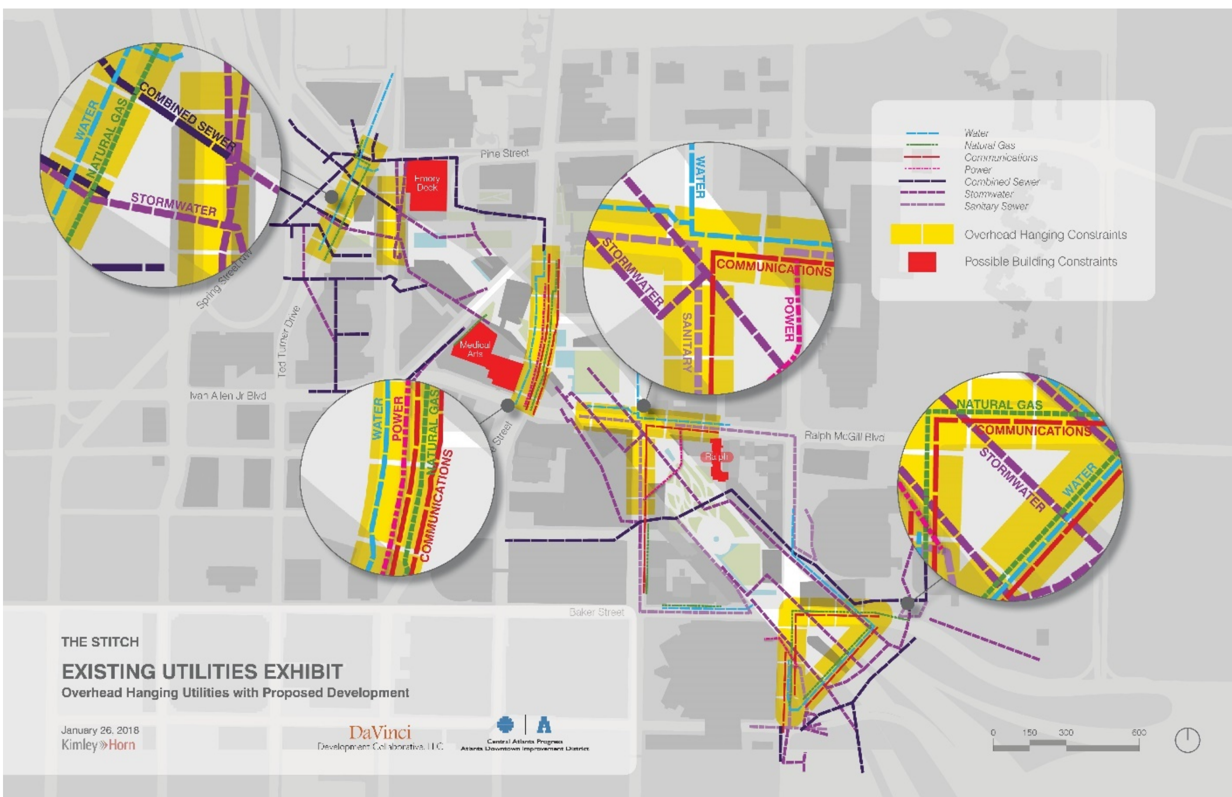


Figure 1.2: Existing Overhead Hanging Utilities with Proposed Development

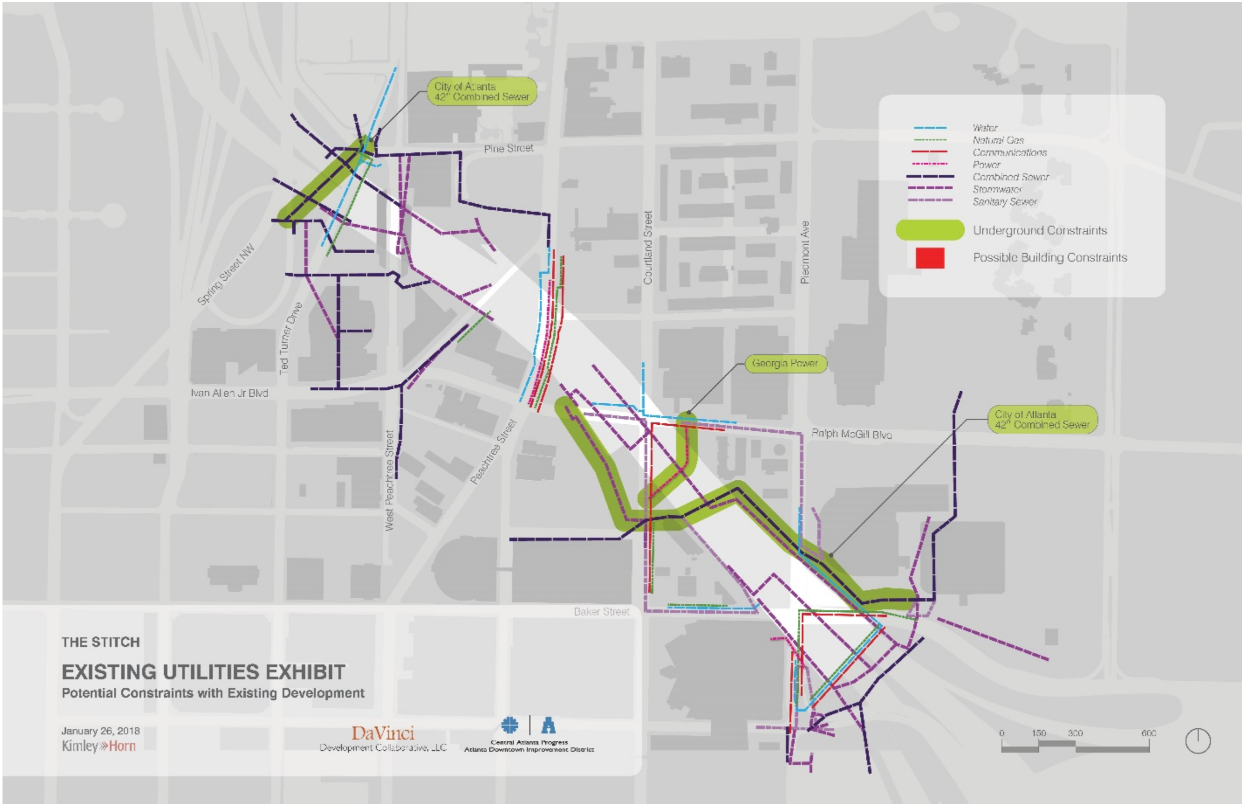


Figure 1.3: Existing Underground Utilities with Existing Development

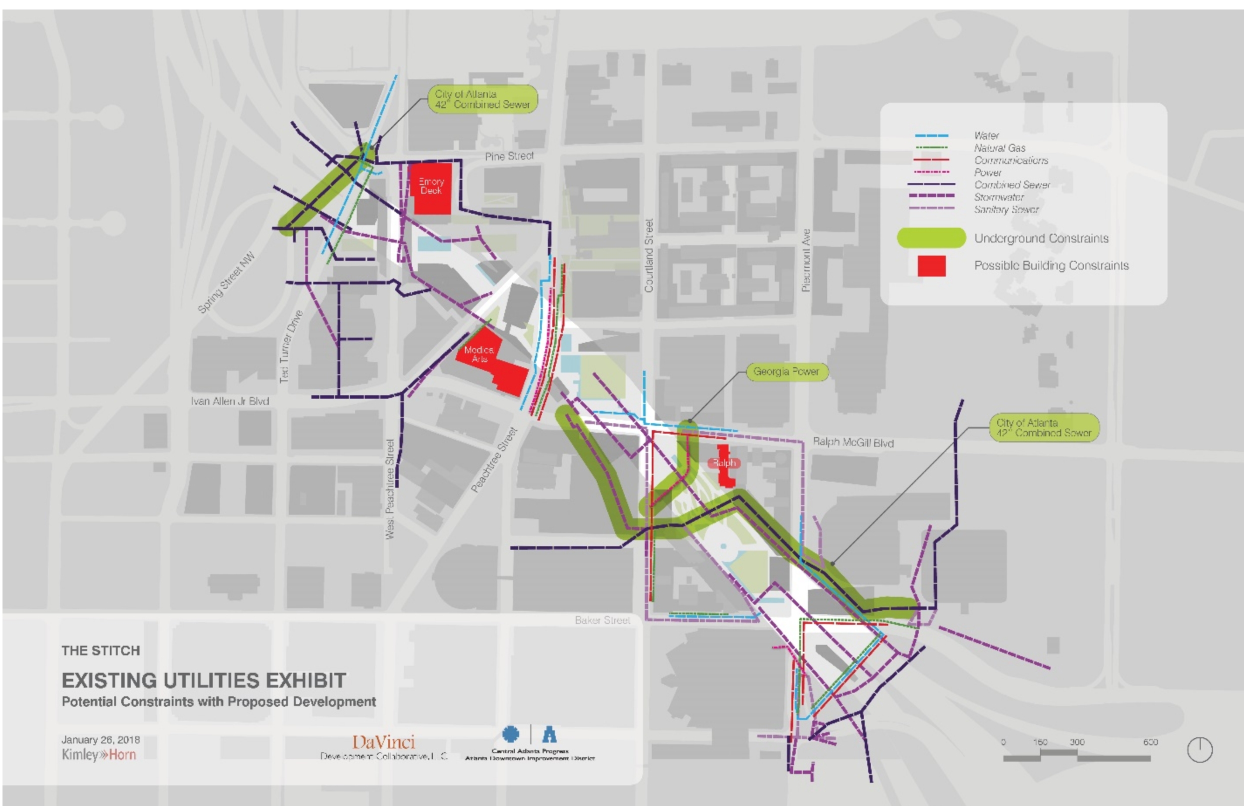


Figure 1.4: Existing Underground Utilities with Proposed Development

Vertical Clearance Assessment

Acceptable Clearances

Existing conditions of the project area were evaluated to determine the limitations of a cap structure given GDOT vertical clearance requirements, existing bridge elevations, and surrounding topography. Per GDOT standards, a minimum clearance of 16.5 feet must be maintained over interstates, while 17.5 feet is suggested at pedestrian bridges and not easily reconstructed bridge crossings.

The proposed cap is comprised of five blocks, noted as Block 0 – Block 4, shown in Figure 1.5, below. Block 0 is approximately 0.45 acres and is located at the southwestern extent of the project area in the southern void of the existing Piedmont Avenue-Baker Street Bridge. Block 0 is constrained by the existing utility bridge to its south. Block 1 is approximately 3.1 acres and spans from the Piedmont Avenue-Baker Street bridge northwest to the Courtland Street-Ralph McGill Boulevard bridge. Block 1 is constrained by the Ralph building to its East. Block 2 is approximately 1.7 acres, spans from the Courtland Street-Ralph McGill Boulevard bridge northwest to the Peachtree Street bridge. Block 3 is approximately 3.5 acres and spans from the Peachtree Street bridge northwest to the MARTA Civic Center Station. Block 3 is constrained by the Pine Street exit ramp to the northeast and GSA parking deck to the north. Block 4 is approximately 0.5 acres and spans between the MARTA Civic Center Station to the Spring Street Connector bridge.

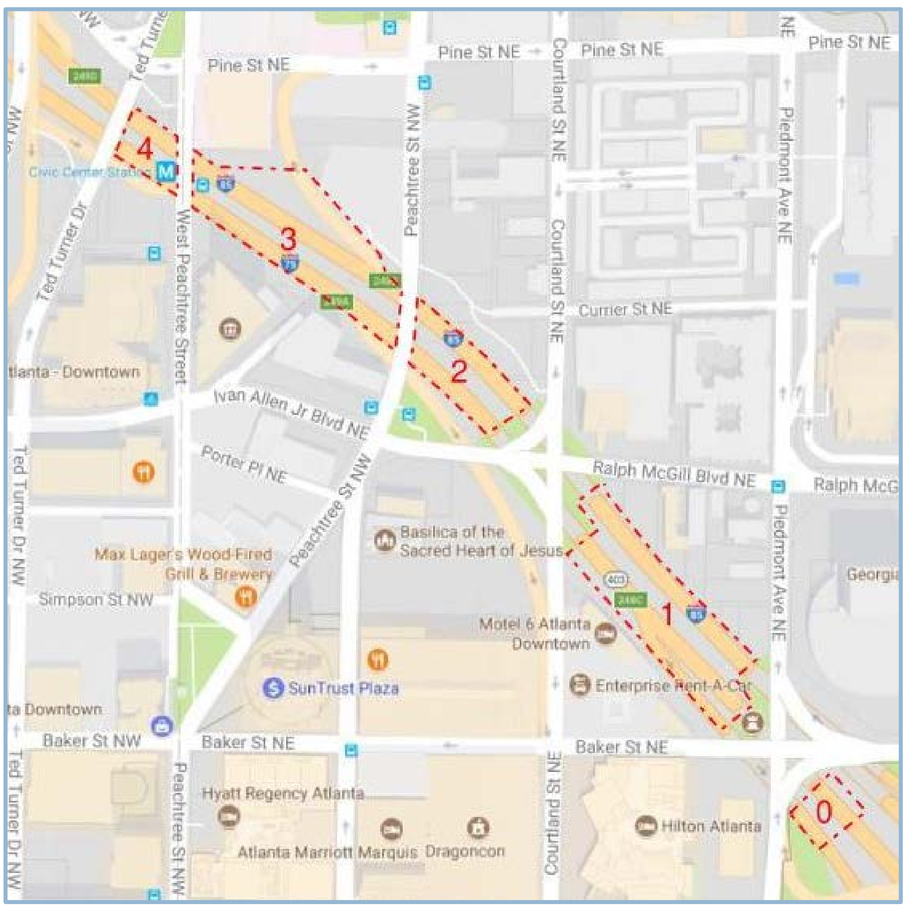


Figure 1.5: Proposed Cap Blocks

Process

The existing base surface was generated utilizing AutoCAD Civil 3D 2018 from Fulton County GIS contour data and supplemented with Peachtree Street Bridge and past project survey contours and 3D tin data, GDOT and MARTA as-built plan information, and December 14th site walk observations. Please see Appendix F for topography map and cross sections of the site.

GIS contour data typically carries a tolerance of two vertical feet of accuracy; however, due to the bridge crossings and bordering topography variances, the GIS data was found to be insufficient on its own. The 3D surface model relied on GIS information but also relied on the supplemental information to interpolate and generate an existing surface condition within bridge crossing sections.

Within The Stitch Project extents, Interstate 75/85 ranges in elevation from approximately 955 to 988 feet. Northbound Interstate 75/85 reaches an approximate highpoint of 985’ located just west of the overhead Peachtree Street bridge. From this highpoint, the Northbound Interstate slopes north to an approximate elevation of 961 feet, located just north of overhead Ted Turner Drive, and south to an approximate low point of 955 feet, located just south of overhead Baker-Highland connector. Southbound Interstate 75/85 reaches an approximate highpoint of 988 feet at the Courtland Street exit. From this highpoint, the Southbound Interstate slopes north and south to approximate low points of 955 feet, located just north of overhead Ted Turner Drive and just south of overhead Baker-Highland connector, accordingly.

To account for the varying grades between Northbound and Southbound Interstate 75/85, there exist four cast-in-place retaining walls in addition to the barriers separating Northbound from Southbound.

The edge conditions of Interstate 75/85 vary. Northbound is predominantly walled, apart from a landscaped slope at the Pine Street exit. Southbound edge conditions consist of landscaped and concrete slopes, walls, and a mixture thereof. Reference existing structures report by Jacobs for existing wall type, condition, and detail.

To understand the existing clearances, multiple surfaces were created. Each individual existing bridge structure comprised of two surfaces, top and bottom, with on-grade elevations and structure depths estimated from GDOT and MARTA as-built plans. Piedmont Avenue-Baker Street Bridge slopes approximately from 987’ to 979’, west to east, with a structure depth of 6.3 feet, yielding a minimum vertical clearance over Interstate 75/85 of 17.4 feet. Courtland Street-Ralph McGill Boulevard Bridge slopes approximately from 1019 to 1004 feet, west to southeast, with a structure depth of 6.4 feet, yielding a minimum vertical clearance over Interstate 75/85 of 18.1 feet. The Peachtree Street Bridge slopes approximately from 1020' to 1011' , south to north, with a structure depth of 6.9 feet, yielding a minimum vertical clearance over Interstate 75/85 of 17.4 feet. The Marta Civic Center Station Bridge slopes approximately from 1010' to 1008.5', south to north, with a structure depth of 25 feet, yielding a minimum vertical clearance of 15.2 feet, below the current GDOT requirement of 16.5 feet. As this clearance is less than expected, it was confirmed with the structural bridge analysis in the existing structures report by Jacobs, thus we do not believe it is a function of GIS data tolerances. Ted Turner Drive bridge slopes approximately from 1004' to 994', north to south, with an assumed structure depth of 6 feet, yielding a minimum vertical clearance of 29 feet.

To better understand vertical clearances in proposed cap areas, we modeled a hypothetical cap structure. Each block of the proposed cap was comprised of two surfaces, top and bottom. Except for Block 3 at Pine Street exit ramp and Block 4 at Ted Turner Drive, cap surface grades were interpolated across existing bridge span connections, assuming point to point grading and structure depths of 7.5 feet based on coordination with the Structural Consultant. As a function of the interpolation assumption, there are edge conditions where the cap does not necessarily meet existing adjacent grade. These conditions can be fine-tuned in future phases to provide a more detailed grade plane of the cap.

The final model allows the clearances through The Stitch section to be evaluated. Exhibits A and B identify clearances and potential encroachments into the 17.5 feet threshold. Minimum and maximum clearances are summarized in Table 1.1 below.

Table 1.1: Cap Vertical Clearances

BLOCK	MINIMUM CLEARANCE	MAXIMUM CLEARANCE
0	17'	22'
1	16'	30'
2	19'	29'
3	18'	39'
4	35'	45'

Vertical Clearance Assessment Summary

The Stitch encroaches into the 17.5 feet suggested clearance in two locations: Block 0 and Block 1. In both instances the encroachment is due to the existing elevation of the Piedmont Avenue-Baker Highland Bridge and assumed structure depth of the cap section.

EXISTING CIVIL CONSTRAINTS

Existing Civil Constraints

The previous chapter Existing Conditions Report drawing from GDOT and MARTA plans and coordination with City of Atlanta Department of Watershed Management and franchised utilities, provides a detailed description of the existing utilities in The Stitch project area. This Chapter of the report provides more details regarding constraints that exist because of the existing utilities.

Combined Sewer

CONSTRAINTS VARY.

The 42 inch Combined Sewer crossing the Downtown Connector at Block 1 (between Ralph McGill Boulevard-Courtland Street and Piedmont Avenue-Baker Street bridges) is considered a constraint. This constraint can be viewed on Figures 1.1 and 1.2 in the previous chapter.

Though the exact location and depth of this utility is not known, there is enough information to understand that this line will constrain possible locations for Stitch substructure foundations. Proper care and due diligence will have to be provided to insure deep foundations for The Stitch substructure do not damage or hinder the use and operation of this 42 inch combined sewer line.

Stormwater

NOT CONSIDERED A CONSTRAINT.

Domestic Water

NOT CONSIDERED A CONSTRAINT.

Power

CONSTRAINTS VARY.

The network distribution line located beneath the interstate in the 60 inch Georgia Power tunnel shown on the 1984 GDOT plans is viewed as a constraint for location of structural supports as it is recommended that it not be disturbed. This line is located within Block 1 between (between Ralph McGill Boulevard-Courtland Street and Piedmont Avenue-Baker Street bridges). This constraint can be viewed on Figures 1.1 and 1.2.

Though the exact location and depth of this utility is to be determined, there is enough information to understand that this line will constrain possible locations for Stitch substructure foundations. Proper care and due diligence will have to be provided to insure deep foundations for The Stitch substructure do not damage or hinder the use and operation of this Georgia Power lines inside this tunnel.

Natural Gas

NOT CONSIDERED A CONSTRAINT.

Telecommunications

NOT CONSIDERED A CONSTRAINT.

Summary of Existing Civil Constraints

Table 2.1 summarizes known existing utilities and constraint status.

Utility	Constraint	Description
Combined sewer	Yes	42 inch diameter Ivy street sewer crosses interstate 75/85 north of baker-highland connector and runs south parallel to the interstate
Stormwater	No	N/A – roadway drainage may be relocated if required
Domestic water	No	N/A – all domestic water lines are hanging in overhead bridge structures or utility bridge south of baker-highland connector
Natural gas	No	N/A – all natural gas mains and service lines are hanging in overhead bridge structures or utility bridge south of baker-highland connector
Power	Yes	60 inch diameter Georgia power tunnel crosses interstate 75/85 in between Courtland street-ralph McGill boulevard bridge and baker-highland connector
Telecommunications	No	N/A – all telecommunication lines are hanging in overhead bridge structures or utility bridge south of baker-highland connector

The constraining existing underground utilities will impact the location of required structure to support the proposed cap as they will remain in place and are not to be disturbed. Enough is known about these utilities to determine that this can be reasonably accommodated with proper planning, design and utility location due diligence.

Vertical Clearance Assessment

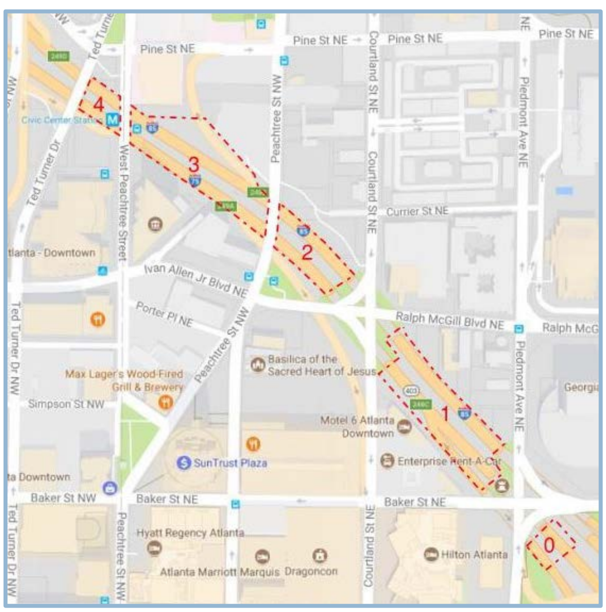


Figure 2.1: Project Area Block Designations

Acceptable Clearances

Existing conditions of the project area were evaluated to determine the limitations of a cap structure given GDOT vertical clearance requirements, existing bridge elevations, and existing topography. Per GDOT standards, a minimum clearance of 16.5 feet must be maintained over interstates, while 17.5 feet is suggested at pedestrian bridges and not easily reconstructed bridge crossings.

The proposed cap is comprised of 5 blocks, noted as Blocks 0 to 4, shown in Figure 2.1. Block 0 is approximately 0.45 acres and is located at the southwestern extent of the project area in the southern void of the existing Piedmont Avenue-Baker Street Bridge. Block 0 is constrained by the existing utility bridge to its south. Block 1 is approximately 3.1 acres and spans from the Piedmont Avenue-Baker Street bridge northwest to the Courtland Street-Ralph McGill Boulevard bridge. Block 1 is constrained by the Ralph building to its east. Block 2 is approximately 1.7 acres, spans from the Courtland Street-Ralph McGill Boulevard bridge northwest to the Peachtree Street bridge. Block 3 is approximately 3.5 acres and spans from the Peachtree Street bridge northwest to the MARTA Civic Center Station. Block 3 is constrained by the Pine Street exit ramp to the northeast and GSA parking deck to the north. Block 4 is approximately 0.5 acres and spans between the MARTA Civic Center Station to the Ted Turner Drive bridge.

Process

Reference Existing Conditions report for Interstate 75/85 existing grades, existing bridge elevations, and surface generation and utilized data detail. This section focuses specifically on vertical constraints based on the existing data and proposed structural section.

When grade was established based on interpolation between bridges, clearance over the Pine Street exit ramp was unable to be maintained. To maintain Emory Green per the Vision Plan, the northern edge of the proposed cap at Block 3 slopes from West Peachtree Street up to elevation 1010’ to provide minimum vertical clearance over Pine Street. As a function of the MARTA and regional bus opportunity evaluation, and the establishment of maximum slopes for the proposed cap, Block 4 was held at West Peachtree Street grades, resulting in its elevation being as much as 15 feet above the existing adjacent Ted Turner Drive bridge.

Courtland Street Exit Ramp

There is overbuild proposed in the area of the Courtland Street exit ramp. This overbuild would be limited based on the existing vertical clearances.

Figure 2.2 highlights in green the portion of overbuild that could meet existing street grade: west of the exit ramp, 40’ along the existing exit ramp, and east of the exit ramp. A full floor plate would only be available for the portion highlighted in red above 1023.5’, near existing grade at northwest corner.

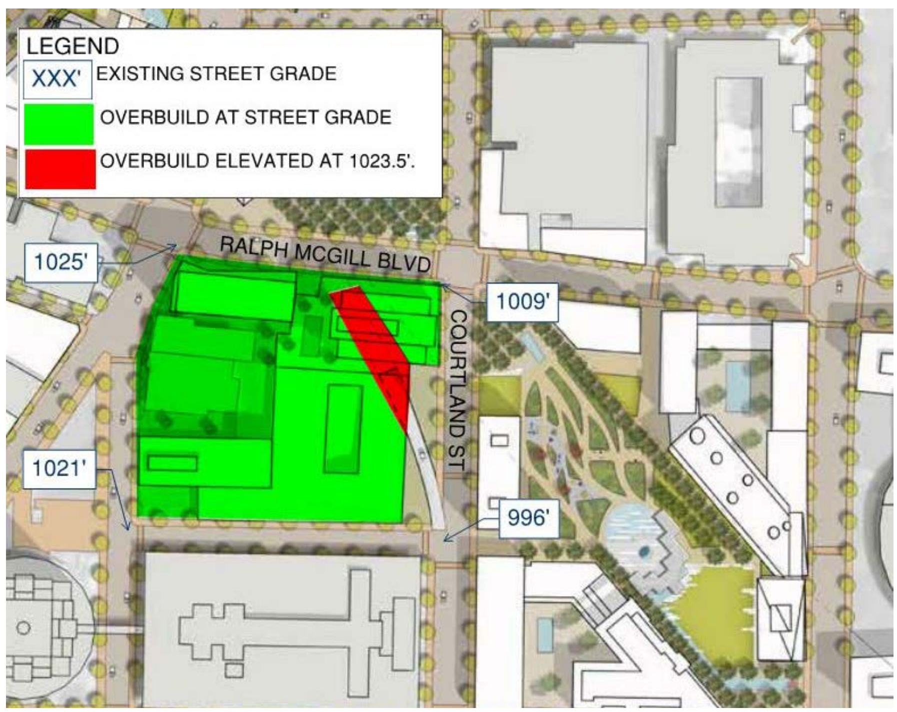


Figure 2.2: Proposed Courtland Street Overbuild

We evaluated the acceptable limits of overbuild assuming a 5 foot structural depth. Courtland Street exit ramp slopes from Southbound Interstate 75/85 up to Courtland Street at approximately 7%. Courtland Street-Ralph McGill Boulevard Bridge slopes west to southeast, at approximately 3% to meet Courtland Street grade. In order to achieve the limits of overbuild shown in the Vision Plan and maintain the 17.5 foot clearance, the bottom of structure of the overbuild at the location of the existing Courtland Street ramp would be at elevation1018.5'. With the 5 foot depth of structure, that puts the finished floor elevation at 1023.5'. The adjacent grade of the existing Courtland Street-Ralph McGill Boulevard Bridge is approximately 1005'. The extent of overbuild that could be constructed close the existing grade level on the east side of the exit ramp is approximately 4500 square feet, extending 44 LF along Courtland's centerline.

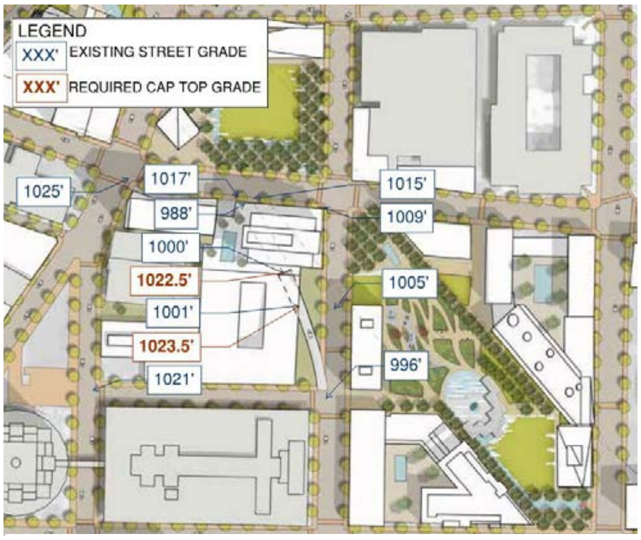


Figure 2.3: Proposed Courtland Street Overbuild

Figure 2.3 illustrates a plan view of the existing grades and the required top of structure overbuild elevation to clear the existing ramp. Figure 2.4 is a section cut showing the Courtland Street exit ramp profile and the developable extents of overbuild that maintain exit ramp clearances. Figure 2.5 indicates a cut section across the Courtland Street ramp and Interstate 75/85 at the proposed limits of overbuild per the Vision Plan.

In summary, overbuild would be possible here, but extensive modifications to the building would have to be made at grade level

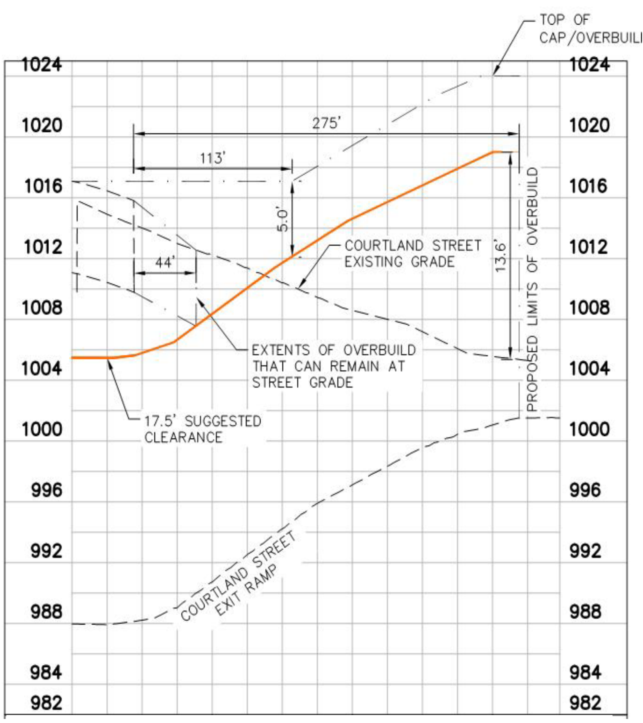


Figure 2.4: Exit Ramp

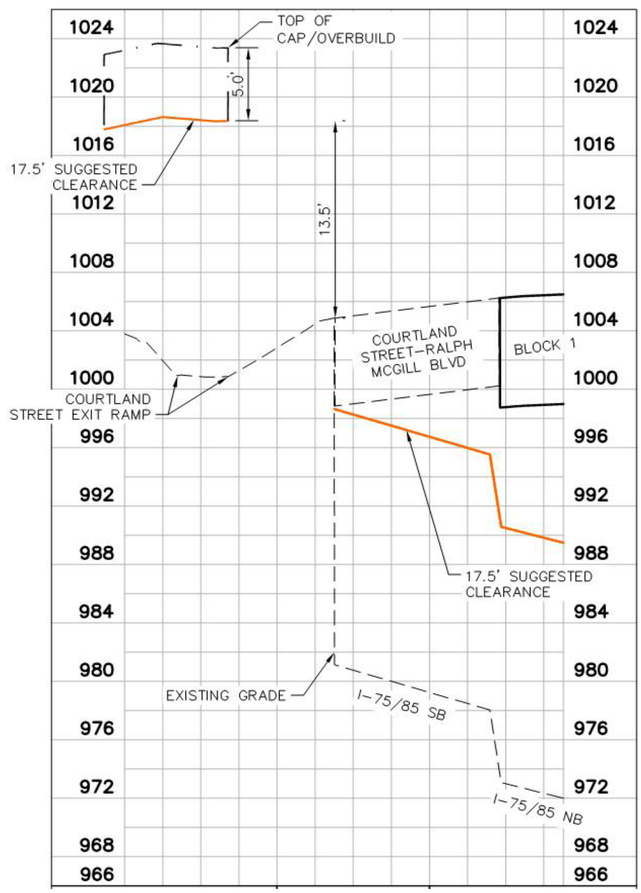


Figure 2.5: Development Cut Section

The final model allows the clearances through The Stitch section to be evaluated. Exhibits A and B identify clearances and potential encroachments into the 17.5 feet threshold. Minimum and maximum clearances, as well as locations of potential encroachments for each Block are summarized in Table 2.2, below.

Table 2.2: Cap Vertical Clearances

BLOCK	MINIMUM CLEARANCE	MAXIMUM CLEARANCE	LOCATION OF ENCROACHMENT
0	17’	22’	Northeast corner of Block 0 abutting the Piedmont Avenue-Baker Highland Bridge
1	16’	30’	Southwest Corner of Block 1 abutting the Piedmont Avenue-Baker Highland Bridge
2	19’	29’	N/A
3	18’	39’	N/A
4	35’	45’	N/A

Summary of Existing Civil Constraints

The Stitch encroaches into the 17.5 feet suggested clearance in two locations: Block 0 and Block 1. In both instances the encroachment is due to the existing elevation of the Piedmont Avenue-Baker Highland Bridge and assumed structure depth of the cap section. Field run topography and further development of cap structural depth required to confirm vertical clearances.

OPPORTUNITIES AND BENEFITS

Stormwater

A preliminary hydrology study was performed for the project area to gain a high-level understanding of the impact of The Stitch Vision Plan on City of Atlanta stormwater infrastructure, explicitly from land use change, without implementing stormwater management. The land-use change was based on assuming that the structural cross section of the cap would have a minimum of two feet of soil/gravel with an under-drain system that would discharge to the adjacent system. The cap would allow stormwater to be absorbed, stored and allow some evaporation before being conveyed. The preliminary hydrology study utilized Hydraflow Hydrographs 2015 to model the pre-developed and post-developed drainage conditions. The program uses the SCS Method to calculate the drainage flows for the 1 through 100-year storm events for each condition. The proposed cap surface area was conservatively modeled with 50% impervious cover in the post-developed condition, including asphalt, concrete, and building roofs. As shown in Table 2.3, The Stitch project reduces the peak flow rate by a range of 11% to 33% depending on the storm event. The reduction in flow rate will create much needed capacity in the associated City combined sewer system with the potential reduce the frequency of combined sewer overflows.

Table 2.3: Summary of Flows

	EXISTING		PROPOSED		
STORM EVENT	Volume (CuFt)	Peak Flow (cfs)	Volume (CuFt)	Peak Flow (cfs)	% reduction
2-YEAR	179,000	76	102,000	51	**33%**
10-YEAR	246,000	103	164,000	80	**22%**
25-YEAR	291,000	121	207,000	100	**17%**
100-YEAR	358,000	148	274,000	132	**11%**

Stormwater conveyance for direct surface runoff is anticipated to consist of shallow underdrains in the cap structure in a stone layer beneath the soil. While Stormwater management is not an anticipated requirement for the full project site, areas of land disturbance will be required to provide stormwater management per the COA storm ordinance, with the cap surface area behaving as a green roof for the Downtown Connector. The increase in pervious cover as a result of the Stich development will reduce and slow peak flow discharge to the Butler Street Trunk.

As discussed in the constraints section, the city's combined sewer system has currently recorded overflow within the Downtown Connector. The Stitch would provide a benefit in reducing peak flows to this known capacity limited section of infrastructure.

To further evaluate stormwater management requirements, a clearer understanding of the permitting requirements imposed by the City for this unique situation is required. The governing municipality will dictate specific requirements, but the civil engineering approach will remain as defined above.

MARTA and Regional Bus Opportunities

West Peachtree Street, abutting Blocks 4 and 5, is used by local and regional buses for passenger loading and bus staging which has created congestion at the street level. The Stitch provides an opportunity to potentially alleviate some of this congestion by providing an alternative passenger loading location with some bus staging potential. Additional bus staging locations will be explored in future phases.

Considered Options and Limitations

Three scenarios, shown in Figures 2.6 to 2.8 were evaluated per MARTA design criteria utilizing AutoCAD Civil 3D and Autoturn as options to incorporate into The Stitch project. See Appendix for larger scale drawings.

Option 1 in Figure 2.6 is a layby option, that provides a recessed bus bay parallel to Ted Turner Drive. This option would allow room for 5 buses to load and unload passengers. This bus bay would exist below and outside of the cap, encroaching into Block 4 approximately 13 feet along its western edge at the Ted Turner Drive elevation.

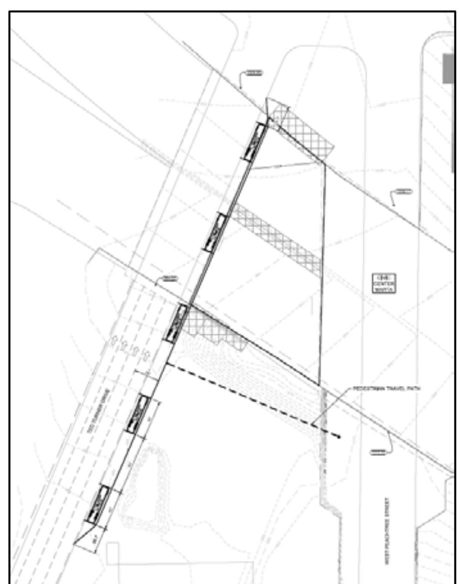


Figure 2.6: Bus Option 1

Option 2 in Figure 2.7 utilizes the private property north of the Twelve Centennial building, exclusively. This option provides off-street circulation and passenger loading for four buses, with access drives connecting to Spring Street. Head height clearance in Exhibit D is constrained by potential development air rights of adjacent property.

Option 3 in Figure 2.8 proposes a bus tray beneath the cap structure by utilizing the private property and the cap footprint above the southbound connector. This option provides off-street circulation and passenger loading for six buses.

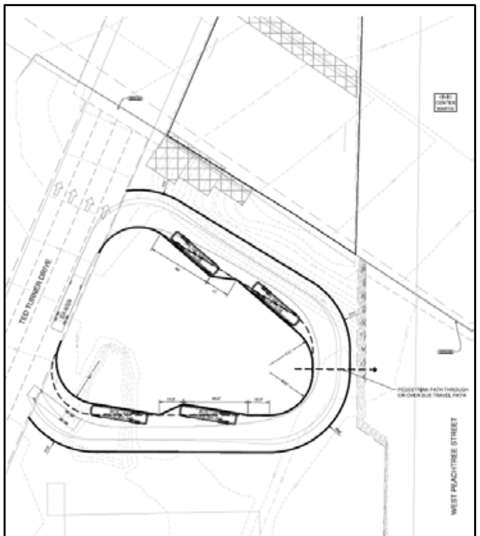


Figure 2.7: Bus Option 2

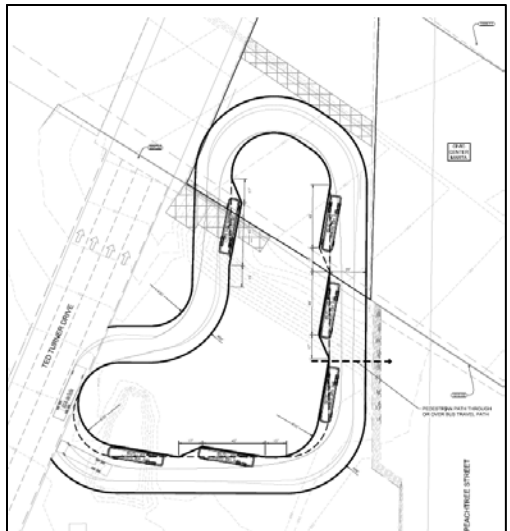


Figure 2.8: Bus Option 3

Table 2.4 below summarizes the three bus loading options.

Table 2.4: Bus Loading Options

OPTIONS	BENEFIT	CONSTRAINT
Option 1 “Lay By”	Five buses on existing ROW with minimal encroachment.	Shifts existing condition to end of cap rather than removing from street level.
Option 2 “Private Only”	Removes/reduces loading from street level and provides four bus spaces.	Only stages four buses and requires land acquisition
Option 3 “Private and Cap”	Largest bus area accommodating six spaces and removes from street level	Most expensive implementation and requires land acquisition

FUTURE STUDY RECOMMENDATIONS

- Field-run survey to refine infrastructure constraints
- Continued bus assessment including evaluation of alternative bus staging areas outside of The Stitch project limits
- Further coordination with GDOT/FHWA/COA regarding permitting process

EXISTING STRUCTURES

Bridges

Refer to Figure 3.1 for all bridge designation references. See Appendix K for large scale Existing Structures Exhibit.

Bridge 1F, Piedmont Avenue and Baker Street

Bridge 1F is the south most bridge structure along the I-75/85 Stitch corridor. The structure provides an intersection between Piedmont Avenue NE and Baker Street NE over I-75/85. Piedmont Avenue NE has five lanes of travel, whereas Baker Street NE has two lanes on the structure. The approximate center of the intersection is located at 33°45'44" N and 84°22'55" W. Bridge 1F is owned and maintained by GDOT.

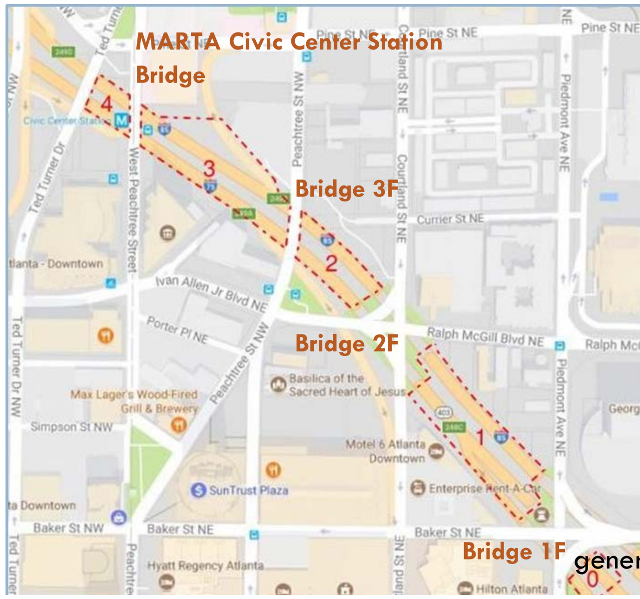


Figure 3.1

Built in 1987, Bridge 1F is a precast/prestressed (PC/PS) concrete I-girder structure with a cast-in-place (CIP) reinforced concrete (RC) deck. The deck surface is approximately 101,057 square feet and slopes down from west to east, generally along the Baker Street alignment. The high elevation at the west corner is approximately 987.0' and the low elevation at the east corner is approximately 978.9'. The bridge superstructure consists of three simple spans of Type III and V prestressed AASHTO girders. The typical structure depth is 6.3 feet including the slab and Type V girders.

The southwest abutment, denoted as Bent 1 in the as-built plans, is a CIP RC wall that is supported by a RC footing that extends 21.0 feet from the face of the abutment wall toward the S-Ellis ramp. The footing utilizes vertical and battered steel H piles that extend beyond the outline of the footing. In the vicinity of the parking garage, the abutment cap is supported by vertical RC caissons. The northeast abutment, denoted as Bent 4 in the as-built plans, is a CIP RC cap supported by vertical steel H piles. The earth behind and beneath the northeast abutment is retained by a stabilized embankment wall (Wall L) and the abutment cap and backwall. The intermediate Bents 2 and 3 are CIP RC caps and open panel wall columns supported by 9.0 feet wide RC footings with vertical and battered steel H piles.

Bridge 1F was designed for HS-20-44 and/or military loading. The bridge has a sufficiency rating of 75.4 and is classified as functionally obsolete based on the bridge inspection report dated May 15, 2017. The functionally obsolete classification was established for the bridge as a result of the insufficient bridge roadway width relative to the number of traffic lanes. Additionally, the minimum horizontal under clearance of 2.1 meters (6.9 feet) was found to marginally meet tolerable limits. The bridge has a sufficient minimum vertical clearance of 5.3 meters (17.4 feet). The bridge deck and substructure were evaluated to be in good condition with some minor cracking, whereas the superstructure was assessed to be in very good condition. The inventory rating of 32.4 metric tons was determined to be better than current minimum criteria.

See Appendix L for Bridge 1F (Piedmont Avenue and Baker Street) Inspection Report.

Bridge 2F, Courtland Street and Ralph McGill Boulevard

Bridge 2F is located northwest of Bridge 1F. The structure provides an intersection between Courtland Street NE and Ralph McGill Boulevard NE over I-75/85. Courtland Street NE has three lanes of travel, whereas Ralph McGill Boulevard NE has a total of four lanes of two-way traffic on the structure. The approximate center of the intersection is located at 33°45'51" N and 84°23'03" W. Bridge 2F is owned and maintained by GDOT.

Built in 1987, Bridge 2F is a PC/PS concrete I-girder structure with a CIP RC deck. The deck surface is approximately 78,939 square feet and slopes down from west to south-east, generally along the I-75 NBL alignment. The high elevation at the west corner is approximately 1019.2 feet and the low elevation at the south-east corner is approximately 1002.9 feet. The bridge superstructure consists of three simple spans of Type IV and V prestressed AASHTO girders. The typical structure depth is 6.4 feet including the slab and type V girders. The southwest abutment, denoted as Bent 1 in the as-built plans, is a CIP RC cap supported by vertical steel H piles. The earth behind and beneath the abutment is retained by a stabilized embankment wall (Wall D) and the abutment cap. The northeast abutment, denoted as Bent 4 in the as-built plans, is a CIP RC wall with a variable thickness that is supported by a RC footing that extends up to 3.8 feet from the abutment face toward I-75/85 and up to 26.7 feet behind the abutment face. The footing utilizes vertical and battered steel H piles that extend beyond the outline of the footing. The intermediate bents 2 and 3 are CIP RC caps and recessed and open panel wall columns supported by 9.0 to 18.0 feet wide RC footings with vertical and battered steel H piles.

Bridge 2F was designed for HS-20-44 and/or military loading. The bridge has a sufficiency rating of 97.4 and meets acceptable standards based on the bridge inspection report dated May 15, 2017. The bridge has a minimum vertical clearance of 5.5 meters (18.1 feet). The bridge deck and substructure were evaluated to be in good condition with some minor cracking and spalling, whereas the superstructure was assessed to be in very good condition. The inventory rating of 32.4 metric tons was determined to be better than current minimum criteria.

See Appendix M for Bridge 2F (Courtland Street & Ralph McGill Boulevard) Inspection Report.

Bridge 3F, Peachtree Street

Bridge 3F is located northwest of Bridge 2F. The structure connects Peachtree Street NE by spanning over I-75/85. Peachtree Street NE has a total of four lanes of two-way traffic on the structure. The approximate center of the bridge is located at 33°45'56" N and 84°23'08" W. Bridge 3F is owned and maintained by GDOT.

Built in 1987, Bridge 3F is a composite steel plate girder structure with a CIP RC deck. The deck surface is approximately 25,357 square feet and slopes down from south to north along the Peachtree Street alignment.

The high elevation at the south end is approximately 1020.1 feet and the low elevation at the north end is approximately 1011.2 feet. The bridge superstructure consists of two continuous spans of curved plate girders that act compositely with the deck. The typical structure depth is approximately 6.9 feet including the slab and girders. The structure has an approximate skew of 32-degrees. The southwest abutment, denoted as Bent 1 in the as-built plans, is a CIP RC wall with a variable thickness that is supported by a RC spread footing that extends 21.3 feet from the abutment face toward I-75/85. The northeast abutment, denoted as Bent 3 in the as-built plans, is a CIP RC cap supported by vertical steel H piles. The earth behind and beneath the abutment is retained by a stabilized embankment wall (Wall R) and the abutment cap and backwall. The intermediate Bent 2 is a CIP RC cap supported by columns and a wall on a 16.0 feet wide RC spread footing.

Bridge 3F was designed for HS-20-44 and/or military loading. The bridge has a sufficiency rating of 76.6 and is classified as functionally obsolete based on the bridge inspection report dated May 15, 2017. The functionally obsolete classification was established for the bridge as a result of the insufficient bridge roadway width relative to the number of traffic lanes. However, upon closer inspection of aerial images, Jacobs observed that the bridge has only four traffic lanes rather than the six lanes indicated by the bridge inspection report. Consequently, the bridge may not currently be classified as functionally obsolete. Furthermore, the bridge has a minimum vertical clearance of 5.3 meters (17.4 feet). The bridge deck was evaluated to be in satisfactory condition with some minor cracking and deterioration to the structural elements, whereas the superstructure and substructure were assessed to be in good condition with some minor paint deterioration and cracking of RC elements. The inventory rating of 29.7 metric tons was determined to be better than current minimum criteria.

See Appendix N for Bridge 3F (Peachtree Street) Inspection Report.

MARTA Civic Center Station Bridge

The MARTA Civic Center Station Bridge is located west-northwest of Bridge 3F. The structure connects MARTA and W. Peachtree Street NW by spanning over I-75/85. The lower level has two MARTA tracks. The surface level for West Peachtree Street NW has a total of three lanes of two-way traffic, as well as two bus only pick-up and drop-off lanes on the structure. The approximate center of the bridge is located at 33°45’59” N and 84°23’15” W. The MARTA Civic Center Station Bridge is owned and maintained by MARTA.

Built in 1979, The MARTA Civic Center Station Bridge is a multi-level, steel vierendeel truss structure with a CIP RC deck. The deck surface is approximately 32,764 square feet and slopes down from south to north along the West Peachtree Street alignment. The high elevation at the south end is approximately 1010.4 feet and the low elevation at the north end is approximately 1008.5 feet. The bridge superstructure consists of two continuous spans of steel trusses that extend the height of the track level floor. Steel stringer beams are connected to the trusses at the bottom chord for the track level and at the top chord for the street level to support the floor and roadway, respectively. The typical structure depth is approximately 25.0 feet from the deck to the soffit. The structure has an approximate skew of 30-degrees. The south and north abutments are CIP RC counterfort walls that are supported by RC footings that extend 5 feet from the abutment face toward I-75/85 and up to 25.3 feet behind the abutment face. The footings utilize vertical and battered steel H piles that extend beyond the outline of the footings. The intermediate Bent 2 is a CIP RC pier that has steel columns that extend through the 10.0 feet wide RC footing and into the core of RC caissons.

The MARTA Civic Center Station Bridge was designed for HS-20-44 and/or military loading. The bridge has a sufficiency rating of 73.9 and is classified as functionally obsolete based on the bridge inspection report received from GDOT and dated December 6, 2016. The functionally obsolete classification was established for the bridge as a result of the insufficient bridge roadway width relative to the number of traffic lanes when the bus lanes are included. Additionally, the minimum horizontal under clearance of 1.6 meter (5.2 feet) was found to marginally meet tolerable limits. The bridge has a minimum vertical clearance of 4.6 meters (15.2 feet), which is below the current standard of 16.5 feet. The bridge deck was evaluated to be in satisfactory condition with some minor cracking of the asphalt at the interior joints, whereas the superstructure and substructure were assessed to be in good condition with some minor cracking and spalling of RC elements and steel corrosion. The inventory rating of 32.4 metric tons was determined to be better than current minimum criteria. *See Appendix O for MARTA Civic Center Bridge Inspection Report Inspection Report.*

Retaining Walls

The existing retaining walls described in this section are grouped by the type of wall. Three wall types have been identified within The Stitch Corridor: Georgia Stabilized Embankment (GASE), cast-in-place and tie-back. The description and indicated condition of the various retaining walls are based on as-built plans, aerial images, Google Street View, and visual assessment from a site visit. Select images from the site visit can be found in Appendix R. The structural integrity of the walls is neither stated nor implied.

Georgia Stabilized Embankment (GASE) Walls

The Georgia Stabilized Embankment (GASE) walls are owned and maintained by GDOT. The specific location of each GASE wall can be found in The Stitch – Existing Structures Exhibit located in Appendix K.

GASE walls rely on metallic mesh reinforcement to mechanically stabilize and retain soils. The two-foot-wide welded wire fabric reinforcement used in the reinforced zone was generally spaced at 2.0 feet on center vertically and at 5.3 feet on center horizontally along the length of the walls. A GASE wall typical section is shown in Figure 3.2.

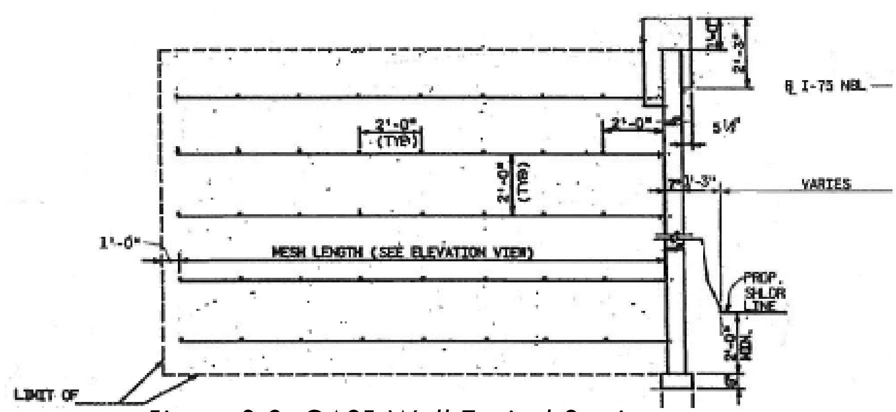


Figure 3.2: GASE Wall Typical Section

The mesh reinforcement is mechanically attached to precast concrete wall panels that are typically four feet tall by six feet wide when measured at the widest section. The overall dimensions of each GASE wall are provided Table 3.1, along with the length of the mesh reinforcement. The heights of the walls were measured from the top of the coping to the bottom of the leveling pad. The bottom of the leveling pad is typically 2.5 feet minimum below the finish grade. Table 1 also provides the condition of each wall based on visual observations.

Table 3.1: GASE Wall Dimensions and Conditions

Wall Name	Length (ft)	Height (ft) Min – Max	Mesh Length (ft) Min – Max	Barrier Type	Condition
Wall A*	170.5'	8.1' – 38.0'	10.0' – 28.0'	7W	Very Good
Wall B-1	65.0'	8.2' – 28.9'	14.0' – 20.0'	6	Very Good
Wall B-2	71.5'	8.5' – 29.9'	10.0' – 16.0	6	Very Good
Wall C	210.7'	9.0' – 37.6'	10.0' – 24.0'	7W	Very Good
Wall D	97.1'	26.1' – 41.7'	28.0'	7W	Good – Minor Cracking
Wall E	169.2'	39.9' – 44.3'	28.0'	7W	Good – Minor Cracking
Wall M	342.0'	30.3' – 39.4'	24.0' – 26.0'	7W	Good – Minor Spalling
Wall O	130.1'	42.5' – 49.9'	30.0'	7W	Good – Minor spalling
Wall Q	439.5'	17.2' – 32.2'	18.0' – 22.0'	7W	Very Good
Wall R	113.3'	15.9' – 31.2'	14.0'	7W	Good – Minor Spalling
Wall S	351.0'	8.5' – 35.2'	20.0' – 22.0'	7W	Very Good

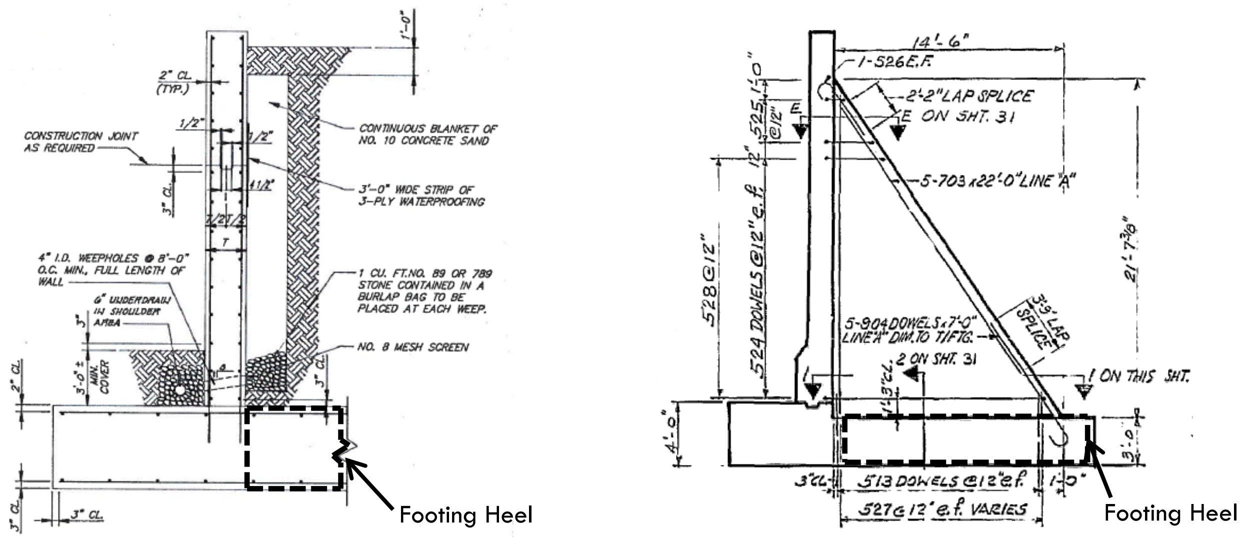
*The length of the GASE portion of Wall A within The Stitch corridor is approximately 35 feet. Spalling – The loss of concrete on the surface of the retaining wall

Cast in-place Walls

The cast in-place (CIP) walls along The Stich corridor are owned and maintained by GDOT with the exception of the MARTA Civic Center Station wall, which is owned by MARTA. The specific location of each CIP wall can be found in The Stitch – Existing Structures Exhibit located in Appendix K.

CIP walls are constructed at the final wall location with steel reinforced concrete. Figure 2 illustrates typical wall sections for the cantilever and counterfort CIP wall types. The cantilever CIP walls rely on the stem (or vertical) portion of the wall and the spread footing to restrain the soil. The spread footing also resists movement of the wall. The counterfort CIP walls rely on inclined reinforced concrete struts that are integrally connected to the stem and footing to restrain the soil. Vertical and battered piles are utilized in conjunction with the footing to resist movement of the wall.

The overall dimensions of each CIP wall are provided in Table 3.2. The heights of the walls were measured from the top of the wall to the bottom of the footing while neglecting the height of glare screens or shear lugs. The portion of the footing referred to as the heel is outlined in Figure 3.2. The heel width is measured from the back face of the stem toward the portion of the footing that extends into the retained soil. Generally, the stem thickness is uniform throughout the height of the wall. However, Wall F has a non-uniform stem thickness with the thickest portion of the stem at the top elevation of the footing.



(a) Cantilever wall with spread footing (b) Counterfort wall (piles not shown)

Figure 3.3: CIP Wall Typical Sections

Table 3.2: CIP Wall Dimensions and Conditions

Wall Name	Length (ft)	Height (ft) Min – Max	Footing Width (ft) Min – Max	Heel Width (ft) Min – Max	Barrier Type	Condition
Wall A	88.7’	43.5’ – 44.6’	25.0’	0.0’	7W	Good: Minor Cracks and Debris Staining
Wall F	118.9’	42.8’ – 46.9’	24.0’	2.0’	6	Good: Minor Cracks and Debris Staining
Wall H	27.1’	12.4’ – 12.5’	10.5’	2.5’ – 3.6’	22	Good
Wall I	337.9’	13.7’ – 16.9’	13.5’	4.0’ – 5.5’	N/A	Fair: Spalling, Cracks and Staining
Wall J	68.0’	11.8’ – 13.4’	11.5’	3.0’	N/A	Good: Minor Spalling
Wall T/U	454.5’	10.7’ – 21.7’	14.0’	4.5’	N/A	Good
Alexander St.* Wall & Abutment	317.6’	6.0’ – 33.7’	3.9’ – 17.8’	1.6’ – 10.4’	Mod 6	Fair: Spalling, Cracks and Staining
MARTA Civic† Center Station Wall	60.0’	32.4’ – 33.9’	27.3' – 31.0’	24.7’ – 28.4’	N/A	Fair: Spalling and Cracks with Efflorescence
Spring St. Wall† (Wall A-1)	71.7’	7.7’ – 45.1’	13.0’ – 29.0’	8.5’ – 22.5’	7R	Fair – Spalling and Cracking

*Alexander Street Wall and Abutment information is estimated from available GDOT plans. The original as-built plans were not available during this study. The abutment segment of this wall includes piles.
†Counterfort walls with vertical and battered piles

Tie-back Walls

Wall N is the only tie-back wall. The wall is owned and maintained by GDOT. It is located below the Old New York 19 Condo building. The specific location of Wall N can be found in The Stitch – Existing Structures Exhibit located in Appendix K.

The tie-back wall is composed of vertical steel piles (soldier piles) placed in a line with lagging between. The stability of the wall is achieved through the use of tie-back anchors that pass through the piles and embed into the soil behind the wall. A subsurface construction and maintenance easement exists to allow the tie-back anchors to extend down and under the Old New York 19 Condo. A CIP concrete fascia is attached to the soldier piles. Specific details for the pile size, spacing, and length as well as the tie-back anchor location and length were not available at the time of this study. The fascia of Wall N matches the panel design of the adjacent GASE Wall M and O. Figure 3.3 illustrates the tie-back wall typical section.

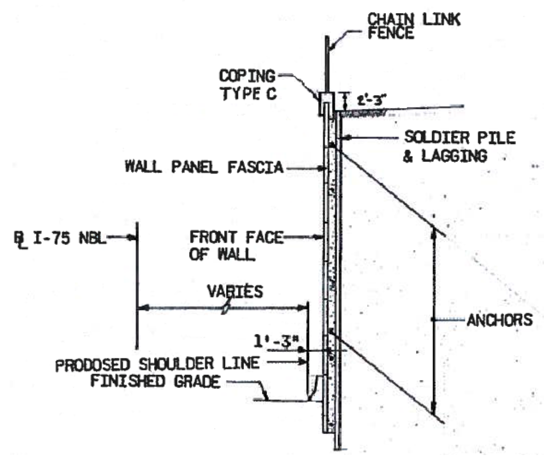


Figure 3.3: Tie-back Wall Typical Section

The length of Wall N is approximately 151.9 feet. The height ranges from 36.9 to 49.4 feet. The barrier in front of the wall is a type 7W. Based on visual observations, the fascia of Wall N is in fair condition based on cracking, spalling, and backfill seepage through a horizontal crack at mid-height of the wall. The crack appears to be a horizontal construction joint along the full length of wall. However, the seepage is only apparent in the end panel adjacent to Wall O. At the top of the wall, at approximately the same horizontal location, the backfill has eroded down.

Buildings

While there are numerous buildings within the vicinity of The Stitch corridor, only six buildings present potential constrains. The buildings indicated in Table 3.3 were identified due to their proximity and relative elevation to The Stitch Vision Plan.

While information related to the buildings is currently limited, the information provided in Table 3 is based on publicly available Fulton County property records that are current as of November 28th, 2017. The specific location of these buildings can be found in The Stitch – Existing Structures Exhibit located in Appendix K.

A review of the National Register of Historic Places indicates that out of the six buildings that present potential constraints, only the Medical Arts building is currently registered as a historic place. The Medical Arts building was registered with the National Register of Historic Places on December 6th, 2016 and is intended to be redeveloped into a hotel by Global X Properties as discussed during a December 6th, 2017 meeting.

Built in 1911, the Old New York 19 Condo (The Ralph) may currently be eligible for the National Register of Historic Places.

TABLE 3.1: INFORMATION SUMMARY OF BUILDINGS

Building Name	Address	Owner	Owner Address	Year Built	Building Area (SQFT)
Motel 6	311 Courtland St. NE	Chandni Hospitality Inc.	311 Courtland St. NE	1963	52,426
Old New York 19 Condo (The Ralph)	131 Ralph McGill Blvd. NE	Taj Atlanta LLC	925 B Peachtree St. NE Unit 396	1911	26,899
Medical Arts Bldg. & Parking Garage	384 Peachtree St. NE	Three Eight Four Peachtree LLC	1303 Prospect Ave. E, Cleveland, OH	1927 & 1954	165,416
Peachtree Summit Bldg. & Cooling Tower	401 W Peachtree St. NW	United States of America	75 Spring St. SW Floor 16TH	1976	667,687
USA Parking Garage	25 Pine St.	United States of America	75 Spring St. SW Floor 16TH	2000	397,100
Verizon Wireless* Antenna Site Site # 173320	131 Ralph McGill Blvd. NE	Verizon Wireless 1-800-852-2671	One Verizon Place Alpharetta, GA	N/A	260

*Information from site visit observation

GEOTECHNICAL

Multiple soil borings are included in the GDOT and MARTA as-built plans that were available for this study. However, the information is limited to two general locations: the South abutment of Bridge 1F (Piedmont Avenue and Baker Street) and along West Peachtree Street at the MARTA Civic Center Station. While this is not a comprehensive sampling of soil conditions along the full Stitch corridor, the provided information is a starting point for understanding the conditions.

The soil conditions are fairly consistent among the various boring logs and can be generally described as brown Micaceous Sandy Silt. The soil properties in the top 40 to 50 feet range from loose to dense; whereas, the soil properties in the layers deeper than 40 to 50 feet range from dense to very dense.

UNKNOWN/MISSING INFORMATION

The following information was not available at the time of this study. However, the information is important in order to determine the type, location, and size of proposed substructure that can be used for The Stitch Vision Plan. Additionally, the information will help determine how to address elevation differences between existing and proposed structures.

Retaining Walls

The existing Alexander Street Wall and Abutment, shown in The Stitch – Existing Structures Exhibit, predates the expansion of the I-75/85 corridor (Project Number I-75-2(137)). The as-built plans for the existing wall and abutment were not available at the time of this study. However, the general notes for the CIP modified Type 6 wall that is in front of the existing wall and abutment indicates that dimensions were taken from plans titled "ATLANTA EXPRESSWAY SYSTEM" prepared by Robert & Company Associates in 1954. The general notes also indicate that structural details are available in the report "Investigations and Recommendations for Stability of Retaining Walls in the Vicinity of Medical Arts Center and Alexander Street Bridge" prepared by Law/Geoconsult International Inc. in 1983. After coordinating with GDOT, these reports have not been located to date.

At Wall N, the details related to the pile size, spacing and length; and the tie-back anchor type, spacing, angle, and length were not available at the time of this study. However, the general notes on the Wall N details reference the special provision for details of the anchored wall.

Buildings

The as-built plans for the private buildings identified in Table 3 were not available to Jacobs. Of particular concern are the type, location, and size of foundation each structure utilizes.

EXISTING STRUCTURAL CONSTRAINTS

Structural Design Requirements

Criteria

Since the proposed Stitch structure will span over and adjacent to the I-75/85 Downtown Connector, the design of the proposed Stitch structure will generally follow Georgia Department of Transportation (GDOT) practice as described in GDOT's Bridge and Structures Design Manual. The current versions of the following codes and specifications apply:

-AASHTO LRFD Bridge Design Specification
-AASHTO LRFD Guide Specification for the Design of Pedestrian Bridges
-AASHTO LRFD Guide Specification for the Structural Design of Sound Barriers

While The Stitch structure will generally be designed as a transportation structure following GDOT practices, the structure will also require criteria not typically included in transportation projects. The supplemental structural design criteria include the following:

-ASCE 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures
-International Building Code with Georgia Amendments
-NFPA 502, Standard for Road Tunnels, Bridges, and other Limited Access Highways

Loading Conditions

The Stitch Vision Study describes three "Character Zones" to be programmed with a variety of uses. The programming of these zones determines the load conditions. The various loads can be grouped appropriately for the required structural design.

Energy Park (Block 1) includes the space from Piedmont Avenue to Courtland Street This zone includes a dog park, playground, garden walkway, splash pad, trellis, water feature, lawn, pavilions, and promenade with trees. While most of these features are located on proposed new structure, some are located on existing structures. The Vision Plan includes a pavilion and landscaping with trees on portions of Bridge 1F (Piedmont Avenue and Baker Street). Landscaping with trees is also located on portions of Bridge 2F (Courtland Street and Ralph McGill Boulevard)

Peachtree Green (Block 2) includes the space from Courtland Street to Peachtree Street This zone includes a lawn, pavilion, water feature, restaurant, and walkway with trees (Mayor's Walk). A tall office building is located at the southeast corner of Courtland Street and Ralph McGill Boulevard The Vision Study shows this office building extending over the existing SB exit ramp with a corner over the existing Bridge 2F. A portion of the Mayor's Walk is also located on the existing Bridge 2F.

Emory Square (Blocks 3 & 4) includes the space from Peachtree Street to Spring Street. This zone includes a plaza with trees, residential/retail buildings, pavilion, splash pad, lawn, and the Alexander Street crossing. The existing USA parking garage is expanded upon to create retail space. The Vision Plan includes modifications to the MARTA Bridge to remove the existing canopy structures and replace them with smaller portal structures. Additionally, the space between the MARTA and Spring St bridges includes a bus terminal below the top cap surface that extends over the highway and south on the vacant land between the highway and the Twelve Centennial Park building.

Dead Loads

The dead loads consist of the weight of all materials and fixed equipment. Dead loads can typically be estimated with higher accuracy than live loads and are in fixed positions. The Stitch dead loads include the structure self-weight, fire proofing, water proofing, fill/soil, landscape, anticipated mature trees, hardscape, water features, jet fans, signs, light fixtures, buildings, or any other fixed equipment. The load from trees is a special condition not defined in typical criteria. In such case, the design load can be established with approval of the Authority Having Jurisdiction.

Based on the "Character Zones" described in The Stitch Vision Study, many of the dead loads can be grouped into typical uniform dead loads by establishing reasonable limitations of material depths as shown in Table 4.1.

Table 4.1: Typical Uniform Dead Loads

Material	Depth	Load
*Fire Proofing	6-in	5 psf
*Waterproofing	1-in	10 psf
*Geofoam	8-ft max	20 psf
*Soil (Saturated)	2-ft max	240 psf
*Landscape	n/a	10 psf
**Water	4-ft	250 psf
**Paver/Concrete/Sand	6-in max	75 psf

*Contributes to combined Typical Uniform Dead Load

**Typical Uniform Dead Load that replaces Soil and Landscape.

The assumed typical depth of materials on top the deck surface is 2 feet. This depth allows small plants and grass roots to grow where desired along with an irrigation system. The surface material depth can be eliminated if not needed. Addition depth can be established as needed for grade changes or to provide mounds or small hills with minimal additional load by using geofoam as a fill material. With the low density of geofoam (approx. 2.5 pcf), the design loading could assume up to 8 feet of fill depth in addition to the typical 2 feet (total of 10 feet) as needed. Figure 4.1 shows the assumed material conditions to establish typical uniform dead load for structural design.

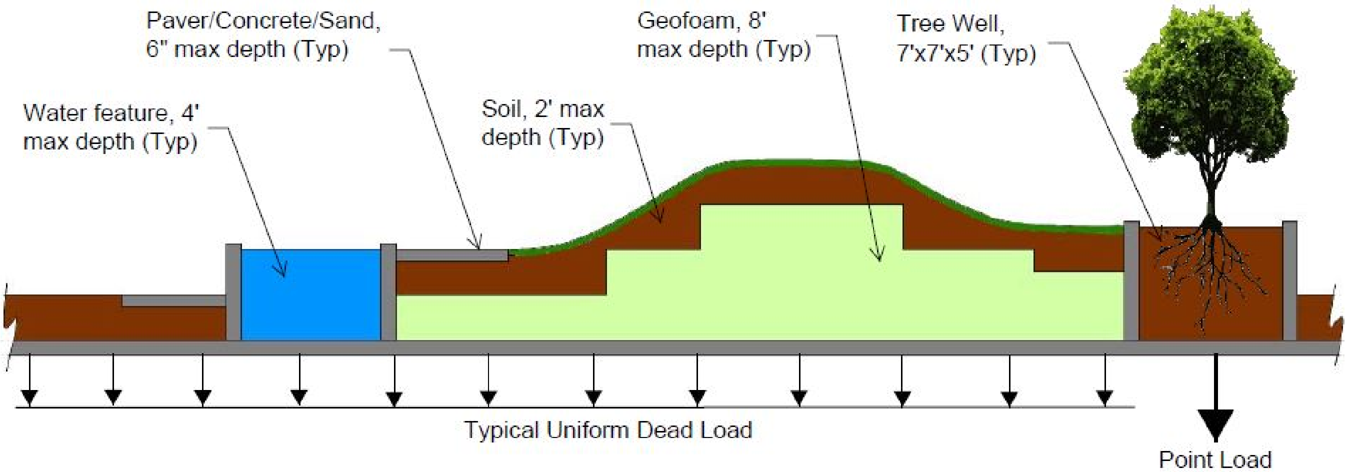


Figure 4.1: Assumed Dead Load Material Conditions

The fire proofing, water proofing, geofoam (8 feet max.), soil (2 feet max.), and landscape can be combined for a total uniform dead load of 285 psf. A water feature with 4 feet of water depth would apply approximately the same uniform load as 2 feet of saturated soil and landscape. To establish design uniformity, water features should be placed directly on the deck structure with waterproofing or geofoam, but, not on top of soil. At locations where masonry pavers, concrete, and/or sand surfaces are desired, the depth is limited to 6 inches, which replaces 6 inches of soil. The fire proofing, water proofing, geofoam (8 feet max.), soil (1.5 feet max.), and paver/concrete (6-in) can be combined for a total uniform dead load of 290 psf. This condition is the controlling combined typical uniform dead load that accounts for the materials listed in Table 4.1.

Other dead loads such as buildings, trees (and associated tree well soil), jet fans, signs, or other fixed equipment can be substantial and are not reasonable to include with the typical uniform dead load. Figure 1 shows a point load from a tree as an example. The location and magnitude of these dead loads must be coordinated and established in design.

Dead loads from buildings are a function of the material, floor area, and number of floors. A uniform dead load of each floor is estimated in the range of 100-200 psf. A wood framed building is at the low end of this range, whereas a concrete framed building is at the high end of this range. A steel framed building is within this range.

The dead load of a low rise building (1-2 stories) such as a pavilion, restaurant or retail space is less than the typical uniform dead load associated with 2 feet of material depth (soil, landscaping, water features, concrete/pavers). Since the typical 2 feet material depth is not needed at the same location as a building, the load can be considered nearly a trade-off for the cap structural design. Therefore, it can be assumed that the typical cap structural design can carry a low rise building (1-2 stories) in most locations.

Tall buildings (greater than 2 stories) could have a significant influence on the required structural cap design. In addition to increased dead load, taller buildings with multiple floors also include increased live load and wind load. Building loads are typically concentrated to column supports. The spacing and location of building columns influence the magnitude of load and contribution to the cap structure. Dedicated foundations could be provided at strategic locations with a design capacity based on the anticipated building size and configuration. Alternatively, tall buildings and supports can be moved off the footprint of The Stitch structural cap. These concepts are discussed in greater detail in the "Structural Options" and "Structural Constraints & Opportunities" sections of this report.

Trees can also apply substantial concentrated loads. A mature hardwood tree with a trunk diameter approaching 30 inches can have an above ground weight of approximately 11,000 pounds[1] . Soil in a 7'x7'x5' tree well adds another 24,500 lbs. Therefore, the total point load from a mature tree and associated soil is approximately 35,500 lbs. This is equivalent to 725 psf within the area of the tree well. To reduce the effects of the concentrated tree loads on the structural cap design, the species can be chosen to limit the size and/or the trees can be strategically located near the structural cap supports.

Concentrated dead loads on the cap structure from jet fans, signs, or other fixed equipment are expected to within reasonable limits of minor design adjustments. The cap structural design can account for these as needed based on the specific magnitude and location during design.

Live Loads

The live loads are produced by the use and occupancy of the spaces on the structural cap. Live loads are typically estimated with less accuracy than dead loads and are transient. Live loads do not include materials in fixed positions or environmental loads such wind, snow, rain, or earthquakes. The Stitch live loads include pedestrians, vehicles, and building occupants. These loads are prescribed by the applicable governing criteria. The anticipated live loads and application are summarized in Table 4.2 based on the "Character Zones" described in The Stitch Vision Study.

Table 4.2: Summary of Live Loads

Description	Load	Application
Pedestrians	90 psf	Open Spaces
Maintenance Vehicle	H-10 (10 tons)	Open Spaces
Roadway Vehicle	HL-93 (36 tons)	Designated Roadways
Restaurant	100 psf	Area of Each Floor
Stage Floors	150 psf	Area of Each Stage Floors
Retail	100 psf 75 psf	Area of 1st Floor* Area of Additional Floors*
Residential	40 psf 100 psf	Area of Private Floors* Area of Public Floors
Roofs (Ordinary)	20 psf	Area of Ordinary Roofs*

*Reduction of uniform live load is applicable based on *ASCE 7*, Section 4.7

Pedestrian and maintenance vehicle live loads are prescribed by the *AASHTO LRFD Guide Specification for the Design of Pedestrian Bridges*. These live loads are applicable to all opens spaced on the structural cap. However, they are not to be applied at the same location simultaneously. Also, application of the maintenance vehicle is limited to spaces where access is not prevented by permanent physical barriers.

1 Patterson and Doruska, Landowners Guide to Determining Weight of Standing Hardwood Trees, University of Arkansas Division of Agriculture, retrieved from https://www.uaex.edu/publications/PDF/FSA-5021.pdf

The portions of the cap structure that will support designated roadways will be designed with the HL-93 loading according to the *AASHTO LRFD Bridge Design Specification*. Based on The Stitch Vision Plan, the cap structure at the proposed Alexander Street crossing (portion of Block 3) and the sub-cap structure between the MARTA Bridge and the Spring Street Bridge (Block 4) will be designed for HL-93 live load.

Live load in restaurants, stages, retail stores, residents and associated roofs are prescribed by *ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. For single story buildings, the sum of both live load (60 psf to 120 psf) and dead load (100 psf to 200 psf) is in the range of 160 psf to 320 psf, which is a function of the building materials and use. Typical open spaces will be designed for 2 feet of material dead load (290 psf) plus pedestrian live load (90 psf), which sums to 380 psf. This comparison reiterates the assumption that the typical cap structural design can carry a low rise building (1-2 stories) in most locations when considering both live and dead loads. Application of heavier live loads for facilities such as libraries of specialized storage areas would need to be coordinated and established in design as needed.

Consideration of live load in tall buildings (greater than 2 stories) is similar to the previous section of this report for dead load. Taller buildings contribute more live load based on the area of each floor and could have a significant influence on the required structural cap design. Building loads are typically concentrated to column supports. The spacing and location of building columns influence the magnitude of load and contribution to the cap structure. Dedicated foundations could be provided at strategic locations with a design capacity based on the anticipated building size and configuration. Alternatively, tall buildings and supports can be moved off the footprint of The Stitch structural cap. These concepts are discussed in greater detail in the "Structural Constraints & Opportunities" section of this report.

Rain Loads

The Stitch cap structure will be designed to account for rain loads according to *ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. Determination of the appropriate load will require drainage analysis that accounts for the cap surface area, grade, and materials. To facilitate surface drainage runoff, the structural cap will be placed on a 2% minimum grade down from south to north. Significant surface accumulations are not anticipated. However, the dead load of the surface materials is to account for saturated conditions. Also, there may be regions susceptible to ponding as a function of the finish grade topography. While drain inlets should provide relief, the cap structural design is to assume the drains become clogged. Determination of loading from ponding will need to be refined in design through coordination of the finish grade topography. Buoyancy forces will also be considered for materials such as geofoam that may "float" in saturated conditions. Such materials will need to be securely fastened to the structure.

Seismic Load

According to USGS, the mapped Peak Ground Acceleration for The Stitch location (33.76594 N, 84.38653 W) is 0.061g. The soil profile is assumed as Site Class D as a default without having additional soil data. These conditions result in Seismic Design Category A and Seismic Performance Zone 1. Therefore, The Stitch structure is not expected to require seismic analysis.

Blast Load

The large area and restricted space under the proposed Stitch cap leads to a higher probability that an event may occur under the cap within the design life that results in a fire or explosion. Also, being a city center that forms part of the City identity and attracts many people, The Stitch structure could be a target for terrorism. Furthermore, the I-85 bridge collapse in Atlanta on March 30, 2017 has lead GDOT officials to be particularly sensitive to fire and blast considerations. Evaluation of Blast Loading should be considered with the objective of preventing structural collapse. The AASHTO LRFD specification defines Blast Loading as an Extreme Event and provides basic guidance, but does not prescribe specific loading. <u>Further study is recommended to determine criteria and conditions for Blast Loading.</u>

Load Combinations

This report outlines the primary load consideration for the structural design of The Stitch cap and supports. Other loading conditions are applicable, but are not expected to be as significant. The Stitch structural components are to be designed with sufficient capacity to resist all applicable loads and combinations as defined by AASHTO LRFD Bridge Design Specification, Table 3.4.1-1.

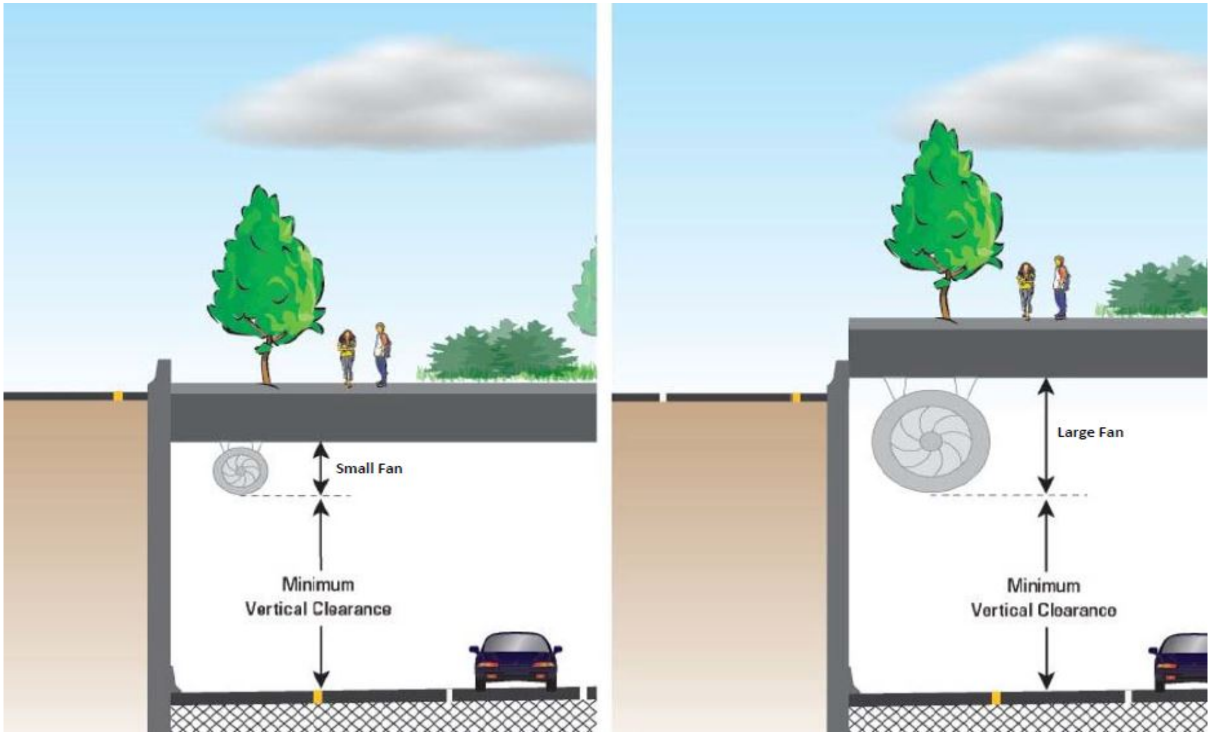
Geometry

Safety of the traveling public is the primary consideration for establishing geometry of The Stitch structure. The I-75/85 Downtown Connector is a major transportation corridor with requirements for vertical and horizontal clearances. Conditions that do not meet minimum requirements may require comprehensive studies by an Engineer and prior approval of design exceptions from the GDOT Chief Engineer.

The structural investigation associated with this report assumes that The Stitch proposed finish grade transitions between the surface elevations of the existing bridges. An exception to this concept is in Block 4 at the northwest limit of the project adjacent to the Spring Street Bridge. The Spring Street Bridge has a steep grade and is in close proximity to the MARTA Bridge. It is not feasible to transition the proposed cap structure between the existing structures. The proposed finished grade in Block 4 is assumed to maintain that of the MARTA Bridge and West Peachtree Street This allows opportunity to establish vertical clearance for a proposed bus terminal below cap surface. Additional information about the specific structure geometry is described in the "Structural Constraints & Opportunities" section of this report.

Vertical Clearances

The minimum vertical clearance above the I-75/85 Downtown Connector are to meet the requirements described in GDOT's Bridge and Structures Design Manual, Table 2.3.3.1-1. Since The Stitch structure could not be easily raised after construction, the required clearance for the entire width of travel way under the structural cap is 17'.5 feet. The structure, fireproofing, signs, lights, and ventilation fans need to be above this clearance. <u>Preliminary study of The Stitch corridor and structural considerations conclude that the minimum vertical clearance can be met. However, additional studies are recommended to determine the location and dimensional requirements for ventilation, signs, fire protection, communications, and lighting.</u> There are particular locations where extra clearance provides opportunity to place ventilation fans, signs, and lighting as described in the "Constraint & Opportunities" section of this report. If additional clearance is needed, the cap surface may need to be built higher than the existing adjacent terrain as shown in Figure 4.2. This condition may be mitigated if the adjacent terrain could also be built higher.



Cap structure flush with adjacent terrain   Cap structure higher than adjacent terrain

Figure 4.2: Minimum Vertical Clearance

Horizontal Clearances

Horizontal clearances between the I-75/85 Downtown Connector travel lanes and proposed structure are to meet the requirements of the AASHTO Roadside Design Guide. Since both the existing and proposed structures are within a 30 foot clear zone, approved barriers are required.

The Downtown Connector shoulders widths present a substantial constraint to the design of The Stitch cap structural supports. Shoulders are the portion of the roadway contiguous with the traveled way that accommodates stopped vehicles and emergency use. The GDOT Design Policy Manual, Section 6.5, include the following statement:

"Shoulder width has been identified as controlling criteria that has substantial importance to the operation and safety performance of a roadway such that special attention should be given to the design decision."

GDOT has adopted a policy for high speed freeways with more than six travel lanes in each direction to provide 12 foot shoulders on both the inside and outside. This is applicable to the Downtown Connector through The Stitch corridor. However, the existing conditions already violate this policy. Measurements of the existing shoulders from aerial images indicate the inside shoulders vary approximately 6 to 8 feet. The outside shoulders are approximately 10 feet. Any further reduction of either the inside or outside shoulders is expected to require a comprehensive study by an Engineer and prior approval of design exceptions from the GDOT Chief Engineer.

In a meeting with GDOT on 1/2/2018, the Commissioner (Mr. Russell McMurry), and Chief Engineer (Ms. Meg Pirkle) indicated GDOT is currently looking at solutions for congestions on the Downtown Connector. One of the options is to double deck the corridor. They also expressed concern for a proposed middle bent that would reduce the inside shoulder widths. They indicated that the existing shoulder widths are a major constraint. This item will require further discussion and negotiation with GDOT.

Structural Options

There are many structure options that could be used for The Stitch structural supports (substructure) and cap (superstructure). Determining the most appropriate structure requires consideration of durability, constructability, geometry, cost, strength and serviceability.

Durability

It is difficult to estimate the life cycle of a structural cap over a highway that supports landscaping and other amenities since there are few similar structures in existence. However, typical bridges designed and built according to the AASHTO LRFD Design Specification have a design life of 75 years.

Fertilizers and other soil amendments used in the landscaping could have a corrosive effect on steel, concrete, and reinforcing. Fire underneath the structure could also compromise the structure. A longer design life could be achieved by evaluating each structural component and taking measures to extend the life of each component. This could include waterproofing on top, fireproofing on bottom, additional cover for concrete reinforcing, and/or the implementation of a good inspection and maintenance program.

Given the typical bridge design life combined additional measures to protect individual components for specific conditions the proposed structure should achieve a design life greater than 75 years.

Constructability

Construction of The Stitch structure presents multiple challenges with its urban setting and relation to the I-75/85 Downtown Connector. The structure type should be selected to minimize construction impacts on the traveling public as well as residents and business owners in the area. Selection of the proposed structure must also consider how it will be built among the many existing structures, utilities, and property boundaries.

The I-75/85 Downtown Connector is a primary transportation corridor with up to 437,000 cars a day. It includes six lanes in each direction plus auxiliary lanes with two exit ramps within The Stitch project limits. Long term closures of traffic lanes on the Downtown Connector are not acceptable. Therefore, it is not feasible to provide any kind of cast-in-place (CIP) concrete structure to span the highway, which would require falsework for concrete forms underneath. Prefabricated girders should be used. Any required CIP concrete should use stay-in-place forms wherever practical.

Prefabricated structural elements are constrained by shipping geometry. As a rule of thumb, the typical maximum shipping length is 150 feet. This limitation is a function of the shipping route and required turning radii. The height and width are also limitations due to overpass clearances and lane widths. The height and width of prefabricated elements should be kept within 8.5 feet.

Substructure

The substructure consists of the interior supports, end supports, and associated foundations. The interior supports are known as "bents", while the end supports are known as "abutments". The substructure locations and configurations are the most critical structural considerations since this will determine the superstructure span lengths and depths. The substructure sizes and locations may also impact GDOT and/or property owners.

As described in *The Stitch Existing Structures Report*, the I-75/85 Downtown Connector corridor width ranges from 180 to 240 feet when measured between the retaining walls. Most of the existing retaining walls also have reinforcing that extends 20 to 30 feet behind the face of wall. While it would be ideal to span the whole Downtown Connector and existing retaining walls, this is not a feasible option. A proposed interior bent along the center of the Downtown Connector is necessary to permit feasible superstructure span lengths and depths. Abutment placement requires consideration of the existing retaining walls and reinforcing along with the resulting superstructure span length.

Bents

Three bent options are considered for placement along the center of the Downtown Connector, between the northbound and southbound lanes. For fire safety, the proposed bent will need to include a solid wall capable of isolating each side of the tunnel. The wall will also need to include regularly spaced access doors for emergency use. The proposed bent requires adequate strength to transmit the superstructure loads down to deep foundation elements. Based on the existing bridges and known soil data, deep foundations such as drilled shafts or driven piles are expected to transmit the load and minimized settlement. The specific size, length and spacing of foundations require geotechnical study and design to determine. The bents foundations are anticipated to use 3 foot diameter drilled shafts approximately 50 feet long and spaced 10 feet apart.

The existing conditions along the center include paved shoulders with a double sided barrier and storm drains. As the highway curves, the roadway grades separate and the center barrier also includes a retaining wall. Georgia Power and City of Atlanta have utilities that cross perpendicular to the proposed bent in Block 1. It is anticipated that the proposed foundations can spaced to avoid these utilities. However, further study is recommended accurately locate these utilities. Construction of any of the three bent options will require temporary barriers with the interior HOV lane closed in at least one direction. This will allow access to remove the existing barrier, wall, and storm drains and construct the proposed bent.

Option B1, Solid Wall with Drilled Shafts

This option uses multiple drilled shaft foundations placed in a single line along the bent alignment. A concrete cap is placed on top the drilled shafts to support a solid concrete wall. The wall is anticipated to be approximately 2.5 feet thick for sufficient capacity. The top of the wall spreads into a capital to provide the girder bearing surface. Roadway barriers are placed at the faces of the wall. This option may require reducing the existing inside shoulder width up to 1.25 feet to each side as a function of the wall thickness.

However, there may be opportunity to integrate the barrier with the wall to mitigate reduction of shoulder width.

Option B2, Multi-Columns with Drilled Shafts and Concrete Wall Panels

This option uses multiple drilled shaft foundations placed in a single line along the bent alignment. CIP concrete columns are placed on top the drilled shafts (estimated 4 foot diameter, but is a function of foundation spacing). Concrete panels are then attached or cast to the columns to serve as fire barriers by filling the openings between columns. A CIP concrete cap is added to the top of the columns to support the girders. Roadway barriers are placed at the face of the columns. This option may require reducing the existing inside shoulder width up to 2 feet to each side as a function of the column diameter.

Option B3, Spread Footing Wall with Driven Piles

This option is similar to the bents for the existing bridges. It uses multiple driven pile foundations along multiple lines. A wide CIP concrete footing is placed on top the piles. A wall, similar to Option B1 is placed on top of the footing. Roadway barriers are placed at the faces of the wall. Similar to Option B1, the existing inside shoulder width may need to be reduced up to 1.25 feet to each side as a function of the wall thickness. However, there may be opportunity to integrate the barrier with the wall to mitigate reduction of shoulder width.

A matrix of the three bent options along with pros and cons are summarized in Table 4.3. Option B1 is recommended.

Table 4.3: Matrix of Interior Bent Options

Opt	Interior Bents	Pros	Cons
B1	Solid Wall w/ Drilled Shafts	1. High vertical load capacity 2. Minimal impact on horiz. clr. 3. Minimal construction width 4. Good blast/fire resistance	1. Higher cost 2. Longer construction time
B2	Multi-Columns w/ Drilled Shafts & Conc. Wall Panels	1. Lowest cost 2. Shortest construction time	1. Most impact on horiz. clearance 2. Lower vertical load capacity 3. Reduced blast/fire resistance
B3	Spread Footing Wall w/ Driven Piles	1. High vertical load capacity 2. Minimal impact on horiz. clr. 3. Good blast/fire resistance	1. Highest cost 2. Largest construction width 3. Noise & vibration of pile driving 4. Potential conflict w/ storm drains

Abutments

Three abutment options are considered to support the superstructure outside the existing Downtown Connector corridor. Each option places the abutments in different locations relative to the existing walls resulting in different superstructure span length and depth requirements. In general, all three options do not require long term reduction of the existing shoulders. However, there may be an exception in Block 1 as described in the "Constraints & Opportunities" section of this report.

The proposed abutments require adequate strength to transmit the superstructure loads down to deep foundation elements. Based on the existing bridges and known soil data, deep foundations such as drilled shafts or micropiles are expected to transmit the load and minimized settlement. The specific size, length and spacing of foundations require geotechnical investigation, study, and design to determine. The abutment foundations are anticipated to use drilled shafts that range in size from 4 to 8 feet diameter with an embedment length of approximately 50 feet and spaced approximately 8 to 12 feet apart.

The existing conditions along the edges of the Downtown Connector primarily include paved shoulders with storm drains, barrier, and Georgia Stabilized Embankment (GASE) retaining walls. The GASE retaining walls have reinforcing that extends 20 to 30 feet behind the face of wall. There are also spread footing walls in Blocks 3 & 4, a tie-back anchor wall in Block 1, and several open spaces without walls. Three buildings (Old New York 19 Condo, Medical Arts parking garage, and MARTA station) are in close proximity to the proposed abutments. Additionally, Georgia Power and City of Atlanta have utilities that cross perpendicular to the abutments in Block 1. The City of Atlanta utility is a 42" combined sewer that also turns parallel to the proposed abutment along the northeast portion of Block 1. This utility location is expected to be just behind the Wall "M" reinforced zone. Further study and field investigation is recommended to accurately locate these utilities.

Construction of any of the three abutment options will require temporary barriers with the shoulder and outside travel lane closed. This will allow access to remove portions of the existing walls and build the proposed abutments as needed. Access space for construction above the existing walls is expected as well. Since many of the proposed abutment locations are near existing buildings and retaining walls, driven piles are not recommended due to vibration and noise during construction.

Option A1, Abutment Wall with Drilled Shafts, Replaces Existing Walls

This option provides the shortest superstructure lengths (approx. 90 - 143 feet) and depths (approx. 4.2 - 5.7 feet) by locating the abutments in place of the existing wall faces as shown in Figure 4.3.

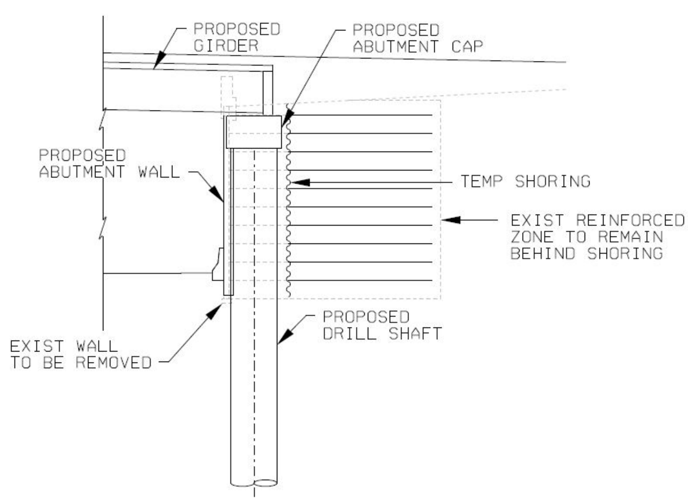


Figure 4.3: Abutment Option A1 (Not To Scale)

Temporary shoring is located approximately 8 feet behind the existing face of wall to allow demolition of the front portion of wall. A single row of drilled shaft foundations and columns are located along the abutment alignment within the footprint of the portion of wall removed. A cap with backwall is added to the top of the columns to serve as a bearing surface for the superstructure. Concrete fascia panels are added to the front face of the columns along with a barrier at the same location as the original wall face and barrier. Flowable backfill is provided around the columns in the void space between the new wall face and temporary shoring.

Option A2, Pile Cap Abutment with Micropiles, Above Existing Walls

This option provides mid-range superstructure lengths (approx. 96 - 149 feet) and depths (approx. 4.2 - 6.2 feet) by locating the abutments within the existing wall reinforced zone as shown in Figure 4.4.

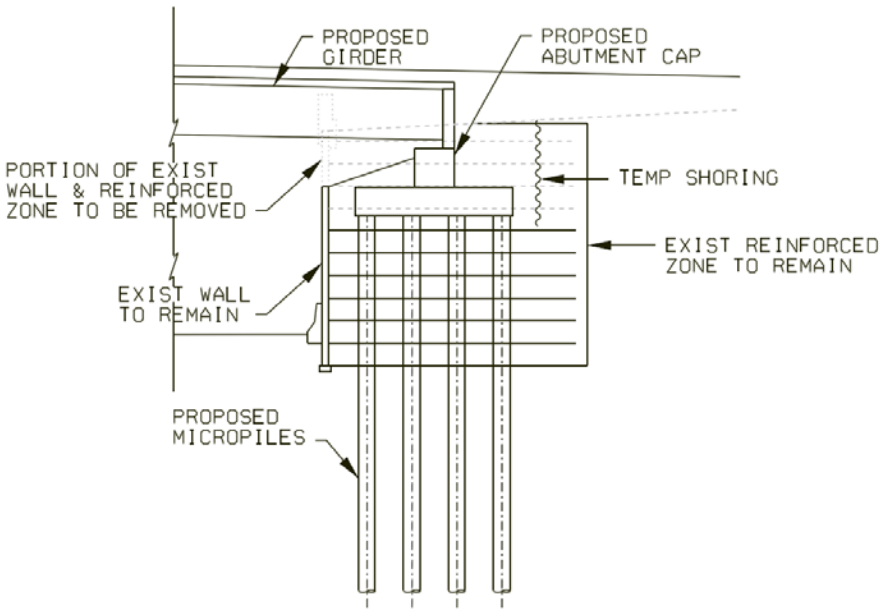


Figure 4.4: Abutment Option 2 (Not To Scale)

This option is estimated to add 6 foot more superstructure length for each span. The as-built plans for the existing GASE walls show 2 feet wide strips of reinforcing spaced horizontally every 5.3 feet. This leaves approximately 3.3 feet clear space between each strip. Small, (<12”) drilled shaft foundations known as micropiles can potentially fit within the spaces between the existing GASE wall reinforcing and extend down to the stiff subgrade. Multiple lines of micropiles can be located along the abutment alignment with a wide concrete cap cast on top. A narrow concrete abutment cap is located over the center of the pile cap to serve as a bearing surface for the superstructure. This option is risky due to the potential surcharge that may be applied to the existing wall and assumes actual clear space exists between the strips of wall reinforcing. Geotechnical analysis is needed to determine the feasibility of this option.

Option A3, Common Abutment with Drilled Shafts Behind Existing Walls

This option requires the longest superstructure lengths (approx. 114 – 177 feet) and depths (approx. 4.7 – 7.2 feet) by locating the abutments behind the existing wall reinforced zone as shown in Figure 4.5.

This option is estimated to add 24 to 34 feet more superstructure length beyond what Option A1 requires. That is approximately 25% more superstructure, which will not be feasible in most locations. However, in locations where this option is feasible, it allows used of a common abutment type with minimal impact on the existing walls. A single row of drilled shaft foundations are located along the abutment alignment. A concrete cap with backwall is added to the top of the drilled shafts to serve as a bearing surface for the superstructure.

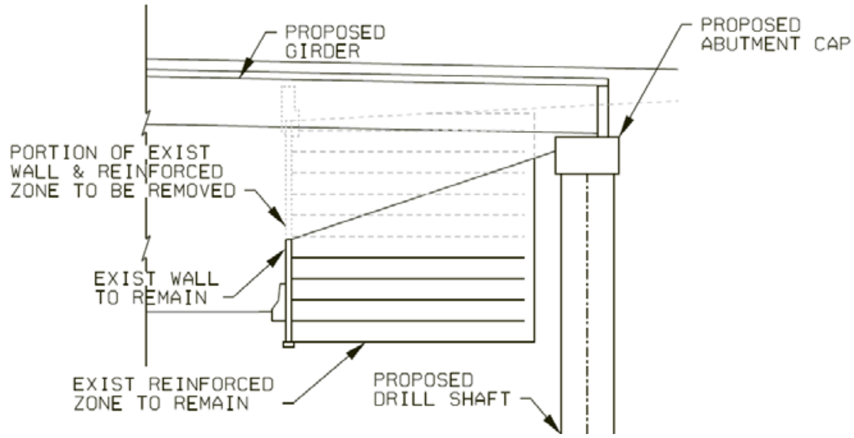


Figure 4.5: Abutment Option 3 (Not To Scale)

A matrix of the three abutment options along with pros and cons are summarized in Table 4.4. Option A1 is recommended.

Table 4.4: Matrix of Abutment Options

Opt	Abutments	Pros	Cons
A1	Abutment Wall w/ Drilled Shafts Replaces Exiting Walls	1. Minimum structure length 2. Minimum structure depth 3. Minimum vertical load at abut. 4. Fewest property acquisition 5. Provides new walls for GDOT 6. Smallest footprint	1. Shoring behind existing wall 2. Demolition of exiting wall face 3. More constr. space on I-75/85 4. Requires larger drilled shafts
A2	Pile Cap Abutment w/ Micropiles Above Existing Wall	1. Existing walls remain 2. Less constr. space on I-75/85 3. Fewer property easements 4. Reduced shoring	1. Longer structure length (Approx. 5%) 2. Increased structure depth (Approx. 5%) 3. Potential conflict with exist. walls 4. Potential surcharge on exist. walls 5. Requires many micropiles 6. GDOT does not get new walls 7. Largest footprint
A3	Common Abutment w/ Drilled Shafts Behind Existing Walls	1. Existing walls remain 2. Less constr. space on I-75/85 3. Smallest footprint 4. Minimal impact to exist. walls	1. Longest structure length (Approx. 25%) 2. Largest structure depth (Approx. 25%) 3. Largest Vertical loads at abutment 4. Most utility conflicts 5. Most property acquisitions 6. GDOT does not get new walls

Superstructure

The superstructure consists of the girders and deck that will span over the Downtown Connector. The superstructure must have strength to carry the design loads and also meet serviceability limits for cracking, live load deflection and vibration.

Three superstructure options are considered for the proposed Stitch cap. These options assume that the existing bridges remain in place and the proposed superstructure uses prefabricated girders and concrete deck to cover the open space between the existing bridges. For all three options, the superstructure depths are estimated based on span lengths and criteria described in AASHTO LRFD Section. The span lengths are a function of where the supports are located. Consideration of the superstructure options assumes there will be an interior bent along the center of the Downtown Connector. The three proposed abutment options establish approximate superstructure span and depth ranges and shown in Table 4.5. The approximate depth includes both the girder and deck.

Table 4.5: Approximate Range of Span Lengths and Depths

Abutment Option	Approx. Span (ft)*	Approx. Depth (ft)*
A1	90 - 143	4.2 - 5.7
A2	96 - 149	4.2 - 6.2
A3	114 - 177	4.7 - 7.2

*Excludes shorter spans over exit ramps

The existing conditions present a geometric constraint that influences the structure options. There are four blocks of space to be capped as shown in the Existing Structures Exhibit in Appendix K. The ideal condition is to orient the proposed girders parallel to each other and in a direction of the shortest span. However, since the Downton Connector includes horizontal curves and the existing bridges have various orientations, it is not possible to place all girders parallel. The girder spacing will need to "flare" as needed to accommodate the non-parallel spaces. The proposed girders directly adjacent to the existing bridges will be generally oriented in the same direction as the existing bridges. The orientation the proposed girders between the edges will gradually transition the space. Additional information about the specific structure geometry is described in the "Constraints & Opportunities" section of this report.

For all three superstructure options, an 8 inch concrete deck is proposed on top the girders. Concrete decks are typical to bridge structures since they provide the desired strength and durability. A concrete deck is also capable of spanning the flared spaces between girders. The space a concrete deck is capable of spanning is a function of the deck thickness. An 8 inch concrete deck is expected to span up to approximately 8 foot max between girders with the typical assumed 2 foot uniform loading. If larger deck spans or heavier loads are needed, a thicker deck may be necessary.

At the interfaces between the proposed girders and existing bridges, the concrete deck can overhang as needed to align with the existing bridge edge. A concrete parapet can be built on top the proposed slab to level-up with the surface of the existing bridge. The barriers or walls on the existing bridge can be removed and a joint cast between the proposed parapet and existing bridge deck.

Waterproofing is recommended on the top of the superstructure to prevent water or other corrosive elements from accessing the structure or leaking down to the highway below. Fireproofing will be needed on the bottom of the superstructure to meet requirement for fire resistance.

Construction of the superstructure using prefabricated girders and concrete deck will require short term closures of the Downtown Connector. A crane is expected to occupy the highway to place girders. The closure duration could be limited to daily-non peak traffic times and re-opened daily. A center bent allows girder placement on one side of the highway at a time, limiting closure to one side of the Downtown Connector at a time. The concrete deck can be constructed using permanent forms to expedite construction and minimize impacts to traffic. Permanent forms may be corrugated steel or precast concrete panels at the contractor's option. Short term highway closures are also expected while concrete is cast on top the permanent forms due to risk that a form could dislodge resulting in concrete falling through.

The following sections describe each of the superstructure options.

Option S1: Precast/Prestressed (PC/PS) Concrete Box Beams with Concrete Deck

PC/PS concrete box beams are rectangular in shape with a hollow core. They are prefabricated off-site and are pretension with steel reinforcing to provide the required design strength. The depth and width of box beams are established in design with the objective of using a range of standard shapes readily available to fabricators. A concrete deck is cast on top the box beams to add strength, establish the desired grade, and provide a good surface for waterproofing. Box beams can be placed adjacent to each other to achieve higher load capacity or spaced apart and flared as needed with the slab spanning in between as shown in Figure 4.6.

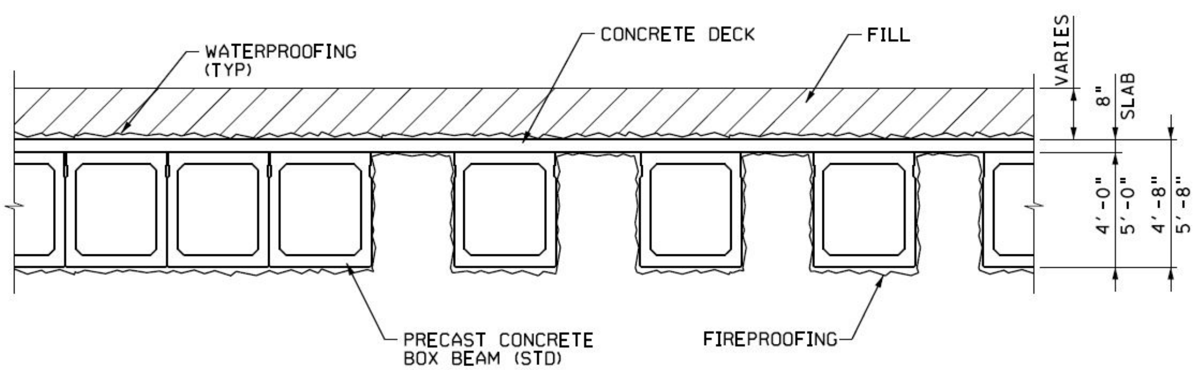


Figure 4.6: Superstructure Option S1, PC/PS Concrete Box Beams w/ Conc. Deck (Not To Scale)

The hollow core of box beams reduces dead load without negatively impacting capacity. Box beams also have high torsional resistance that can be made even higher by grouping multiple beams together. This offers opportunity to provide a low trench panel between beam groups if additional depth is desired for tree roots as shown in Figure 4.7. However, this option is likely raise the cost of beams since fabricators may not have forms readily available to form a beam with a side ledge. However, the number of beams for this project will diminish the added cost of a custom form. The Klyde Warren Park structure in Dallas, TX uses this type of superstructure.

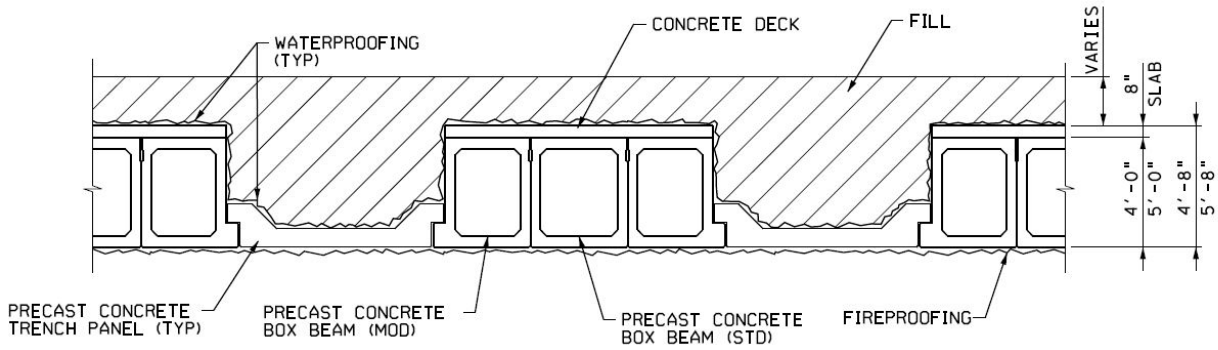


Figure 4.7: Superstructure Option S1, PC/PS Conc. Box Beams w/ Low Trench Panel (Not To Scale)

Option S2: Precast/Prestressed (PC/PS) Concrete Bulb Tee Beams with Concrete Deck

PC/PS concrete bulb tee beams are I-shaped with a vertical web and top and bottom flanges. They are prefabricated off-site and are pretensioned with steel reinforcing to provide the required design strength. The depths of bulb tee beams are established in design with the objective of using a range of standard shapes readily available to fabricators. A concrete deck is cast on top and between the bulb tee beams to add strength and establish the desired grade. Bulb tee beams require minimum spacing to allow room to inspect of the webs for cracking. Bulb tee beams can easily accommodate flared spacing. This option is shown in Figure 4.8.

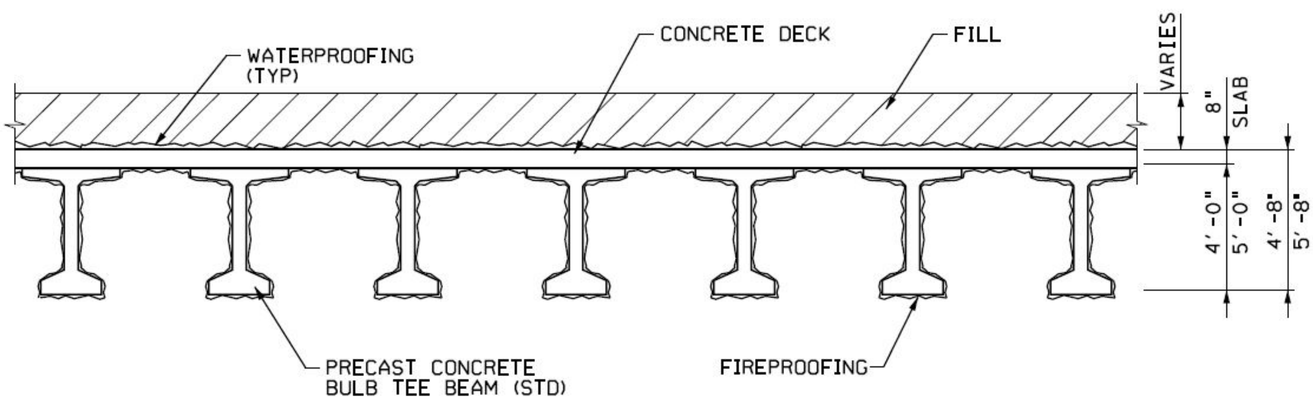


Figure 4.8: Superstructure Option S2, PC/PS Conc. Bulb Tee Beams w/ Conc. Deck (Not To Scale)

Option S3: Steel I-Girders with Concrete Deck

Steel I-girders have vertical webs and top and bottom flanges. They are prefabricated off-site to custom dimensions for the required design strength. Steel I-girders lengths can be limited off-site for easy shipping and spliced together on site if needed. A concrete deck is cast on top the box beams to add strength and establish the desired grade. Steel I-girders require minimum spacing to allow room for inspection. They can be placed with flared spacing or be fabricated with horizontal or vertical curves.

Steel I-girders have low torsional resistance and require cross frames for strength and stability. They are relatively light and offer versatility with framing options. However, connections can be prone to fatigue damage and require regular inspection.

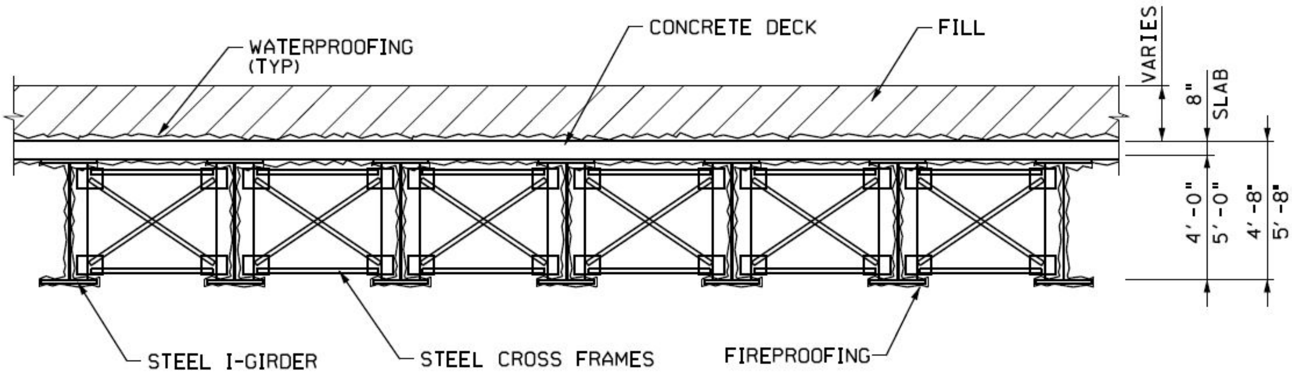


Figure 4.9: Superstructure Option S3, Steel I-Girders with Concrete Deck (Not To Scale)

A matrix of the three superstructure options along with pros and cons are summarized in Table 4.6. Option S1 is recommended.

Table 4.6: Matrix of Superstructure Options

Opt	Superstructure	Pros	Cons
S1	PC/PS Conc. Box Beams w/ Conc. Deck	1. Low Maintenance 2. Most Durable 3. High shear capacity 4. Good vibration dampening 5. Can be grouped adjacent 6. Good blast/fire resistance 7. Good torsional strength 8. Option for low trench panel 9. Less area to fireproof	1. Increased lifting weight 2. Increased foundation load 3. Higher cost than Conc. I-Girders 4. Must remain straight
S2	PC/PS Conc. Bulb Tee Beam w/ Conc. Deck	1. Low Maintenance 2. Durable 3. Versatile in flared conditions 4. Common 5. Low cost	1. Medium construction weight 2. Low shear capacity 3. Must remain straight 4. No option for low trench panel 5. Low torsional strength 6. Medium vibration dampening 7. More area to fireproof
S3	Steel I-Girders w/ Conc. Deck	1. Can be curved (Horiz. & Vert.) 2. Most versatile in flared cond. 3. Low lifting weight 4. Low foundation load 5. Longer length with field splice	1. High Maintenance 2. Low shear capacity 3. Prone to fatigue cracking 4. No option for low trench panel 5. Highest cost 6. Low torsional strength 7. Low vibration dampening 8. More area to fireproof

Summary of Structural Recommendation

An interior support bent is recommended along the center of the Downtown Connector to permit feasible span lengths. The bent should use a single line of drilled shaft foundations with a narrow solid concrete wall on top (Option B1). This option minimizes reduction of the existing shoulders of the Downtown Connector. It also provides high strength and fire resistance.

The abutments will require several configurations based on specific constraints described in the "Structural Constraints and Opportunities" section. However, in the majority of locations abutment walls with drilled shafts are recommended to replace the existing walls (Option A1). This option minimizes the superstructure span lengths and foundation loads. It also minimizes the number of properties impacted, provides new walls for GDOT, and is expected to avoid the City of Atlanta 42 inch combined sewer along the northeast portion of Block 1.

PC/PS concrete box beams with a concrete deck are recommended for the superstructure (Option S1). This option has the versatility to accommodate the geometry and excellent strength to carry the design loads. It is durable, low maintenance, and has mass to help dampen vibrations. The high torsional resistance also offers opportunity to place low trench panels for tree roots similar to Klyde Warren Park.

Structural Constraints and Opportunities

General

The existing retaining walls along The Stitch corridor are composed of Georgia Stabilized Embankment (GASE), cast in-place concrete and tie-back walls that have reinforced zones or footing heel widths that extend 2 to 30 feet beyond the back of the walls. To minimize the maximum cap beam span length and structure depth in each block, it is assumed that the existing walls will be replaced with drilled shaft abutment walls and that the intermediate walls and barriers will be replaced with intermediate bents as recommended in Section 3.5.

Spanning from the centerline of the abutment walls to the intermediate bents will result in an average northbound and southbound span length of approximately 118 feet. The maximum northbound span length will be 136 feet whereas the southbound span length will be 143 feet. The required structure depth will be 4.7 feet on average with localized areas having a structure depth of approximately 5.7 feet.

The following sections discuss the feasibility of using the recommended structural options and discuss the unique constraints and opportunities of each block shown in Appendix K.

East of Bridge 1F (Energy Park)

The Vision Plan includes a small area, approximately 0.48 acres, of proposed cap structure over the Freedom Parkway ramp exit and the southbound lanes between the existing Bridge 1F and the existing Utility Bridge. The location of the existing structures in this area can be seen in The Stitch – Existing Structures Exhibit in Appendix K. The proposed lawn with landscaping and the Gateway Pavilion on the proposed cap structure will be supported by an abutment wall, a bent wall, an existing bent, and PC/PS concrete beams.

This area includes the existing Wall A, which is a cast in-place concrete wall and GASE wall. The cast in-place portion of the wall was originally designed as a temporary abutment for a detour bridge during the construction of Bridge 1F in the 1980s. After the detour bridge was removed, concrete was placed within the beam bearing area of the abutment. The cast in-place portion of the wall may be able to be modified to support the proposed cap structure. The structural integrity and capacity of the existing abutment require further evaluation to determine if it has sufficient capacity to carry the proposed structure and loads. The small portion of the GASE wall between the Utility Bridge and the cast in-place portion of the wall will need to be replaced with a new abutment wall.

An interior support bent can be placed within the median between the Freedom Parkway exit ramp and the southbound lanes to minimize the span lengths. The proposed bent will extend from the existing Bent 2 of Bridge 1F to the Utility Bridge. The roadway shoulder widths adjacent to the proposed bent wall will not need to be reduced since the median has a minimum width of approximately 21 feet.

The existing Bent 3 of Bridge 1F, between the northbound and southbound lanes, may be modified to support the span over the southbound lanes. Specifically, portions of the concrete will have to be broken back and bearing seats will need to be placed on the existing bent cap. The structural integrity and capacity of the existing bent will have to be evaluated so that the additional span on the bent can be adequately supported.

The span lengths between the supports range from approximately 48 to 55 feet at the Freedom Parkway exit ramp and 114 to 127 feet at the southbound lanes. Based on the span lengths, the structure is expected to have a maximum concrete slab and beam depth of approximately 5.2 feet.

The proposed beams will be placed so that the orientation, elevation, and grade of the Bridge 1F beams and deck are matched. In doing so, the vertical clearance along this portion of Energy Park will exceed the GDOT minimum vertical clearance of 17.5 feet. However, additional vertical clearance for signage, ventilation, and fire suppression systems will not be available based on vertical clearance measurements from the Bridge 1F inspection report dated May 15, 2017.

Block 1 (Energy Park)

The Vision Plan shows the proposed cap structure over the Downtown Connector between the existing Bridge 1F and the existing Bridge 2F. Block 1 encompasses 3.23 acres. The location of Block 1 and the existing structures can be seen in The Stitch – Existing Structures Exhibit in Appendix K. The proposed lawns with landscaping, splash pad and trellis, pavilion, and buildings on the proposed cap structure will be supported by abutment walls, a bent wall, existing bents, and PC/PS concrete beams.

Figure 4.10: The Old New York 19 Condo (The Ralph) and Verizon Buildings at Wall "N"

Generally, the proposed abutment walls will entirely replace the existing walls with the exception of Wall N. Based on a site visit on December 5, 2017, Wall N was found to be within approximately 5 feet of The Old New York 19 Condo (The Ralph) foundation and a Verizon Wireless structure as shown in Figure 4.10. These structures can remain undisturbed by placing the proposed abutment wall in front of the existing wall. However, this requires the shoulder width to reduce to approximately 3 feet over the 60 foot wall length. The proposed width of the shoulder would require special GDOT approval since the minimum shoulder width of 12 feet will be violated. The length of shoulder reduction and proposed transition could be reduced to approximately 40 feet by relocating the Verizon Wireless structure further away from the proposed abutment wall. Conversely, it may be possible to build the proposed abutment in place of the existing wall without reducing the highway shoulder width. However, a detailed study would be needed to determine how to temporarily support The Ralph's foundation during the construction of the wall.

Constructing the proposed abutment walls in place of the existing walls may preclude the need to relocate existing utilities. However, the location and elevation of the City of Atlanta 42 inch combined sewer will need to be verified prior to constructing the temporary shoring at Wall M so that the tie-back anchors are placed where they do not conflict with the utility.

An interior support bent will replace the existing Wall H and the barriers along the center of the highway. The proposed bent and barriers will have a width of approximately 5 feet, whereas the width of the existing wall and barriers range from 2.5 to 4 feet. Consequently, the northbound and southbound shoulder widths will be reduced up to approximately 1.25 feet. The width reduction of the shoulders may be recovered by reducing the width of the lanes to 11 feet. Even by recovering the lost shoulder width, the GDOT minimum shoulder width of 12 feet will not be satisfied.

The width of the proposed bent will require portions of the GDOT storm pipe that runs parallel to the existing barriers near Bridge 2F to be relocated several feet southwest to provide adequate horizontal clearance. The bent will also need to straddle a City of Atlanta 42 inch combined sewer and a Georgia power utility that run approximately perpendicular to the roadway.

The existing bent caps at Bridge 1F and 2F that only support a single span will have to be modified so that another span can be supported. Specifically, portions of the concrete will have to be broken back and bearing seats will need to be placed on the bent caps. The structural integrity and capacity of the existing bents will have to be evaluated to determine if an additional span and loads can be supported.

The span lengths between the supports range from approximately 104 to 114 feet at the northbound lanes and 108 to 136 feet at the southbound lanes as shown in the Block 1 Typical Section in Appendix P. Based on the span lengths, the structure is expected to have a maximum concrete slab and beam depth of approximately 5.7 feet.

The beams that span between the supports will be placed along the horizontal curve of the northbound and southbound lanes, approximately perpendicular to the roadway. The transverse spacing of the beams will be dependent on the radius of the horizontal curve. The concrete deck or trench panels that span between the beams will have to accommodate for the difference in transverse spacing along the length of the beams.

The elevation of the proposed beams will be selected such that the concrete deck of the proposed cap structure matches the deck elevation of the adjacent existing bridges and so that the existing ground at the north abutment wall will tie into the proposed finished grade. In doing so, the existing grade will have to be backfilled to match the finished grade at the south abutment wall. The Motel 6 at the south abutment will need to be removed to allow a smooth transition from the proposed splash pad and district playground to the surrounding area as shown in The Stitch Vision Plan. The general slope of the proposed cap structure will be from the south to north abutment walls.

Based on the assumed finished grade elevation, assumed structure depth, and existing roadway elevations, the vertical clearance along Block 1 will satisfy the GDOT minimum vertical clearance of 17.5 feet. The majority of the northbound lanes from Bridge 2F toward 1F are expected to have sufficient vertical clearance to allow signage, ventilation, and fire suppression systems. However, the southbound lanes are not expected to have adequate vertical clearance for additional signage or systems depths.

The Stitch Vision Plan shows a pavilion and portions of two high-rise structures being supported over the Downtown Connector. Generally, single or two-story buildings can be supported by the proposed cap structure. However, high-rise buildings cannot bear directly on the typical cap structure. Dedicated foundations and support beams are required for high rise builds. By utilizing deep foundation and beams that cantilever over the southbound lanes and Bridge 1F, the buildings can be made to appear as if they are being supported by the proposed and existing structures.

Block 2 (Peachtree Green)

The Vision Plan shows the proposed cap structure over the Downtown Connector and portions of the Courtland Street exit between the existing Bridge 2F and the existing Bridge 3F. Block 2 encompasses 1.75 acres. The location of Block 2 and the existing structures can be seen in The Stitch – Existing Structures Exhibit in Appendix K. The proposed lawn with landscaping, pavilion, and buildings on the proposed cap structure will be supported by abutment walls, bent walls, and PC/PS concrete beams.

The proposed abutment walls will replace the existing Wall Q and existing Wall E. The existing storm water pipe in front of Wall E will not likely need to be relocated since the proposed abutment walls will not encroach into the existing shoulders.

An interior support bent will replace the existing Wall I. The proposed bent and barriers will have a width of approximately 5 feet whereas the width of Wall I range from 2.5 to 5.5 feet. Consequently, the northbound and southbound shoulder widths will be reduced up to approximately 1.25 feet. The width reduction of the shoulders may be recovered by reducing the width of the lanes to 11 feet. Even by recovering the lost shoulder width, the GDOT minimum shoulder width of 12 feet will not be satisfied.

The existing Bent 3 of Bridge 2F has a small segment that is only supporting a single span. That portion of the bent will have to be modified to support the span over the southbound lanes. Specifically, portions of the concrete will have to be broken back and bearing seats will need to be placed on the existing bent cap. <u>The structural integrity and capacity of the existing bent will have to be evaluated to determine if the additional beams and load can be adequately supported.</u>

An interior support bent will also be placed within the Courtland Street exit ramp gore in line with the existing Bridge 2F support. The proposed bent will extend from Bridge 2F to Bridge 3F. The 5 foot width of the proposed bent and barriers will result in the gore having shoulder widths that range from approximately 1 to 12 feet. The end of which will be protected with a crash attenuator. The proposed width of the shoulders will require special GDOT approval since the minimum shoulder width of 12 feet will be violated.

The GDOT storm pipes that run parallel to Wall I and the gore will need to be relocated to provide adequate horizontal clearance from the proposed interior support bents.

The span lengths between the supports range from approximately 103 to 131 feet at the northbound lanes, 91 to 106 feet at the southbound lanes, and 40 to 71 feet at the Courtland Street exit ramp as shown in the Block 2 Typical Section in Appendix P. Based on the span lengths, the structure is expected to have a maximum concrete slab and beam depth of approximately 5.2 feet.

The beams that span between the supports will generally be placed along the horizontal curve of the northbound and southbound lanes, approximately perpendicular to the roadway. However, the beams will have to be flared to match the orientation of the Bridge 2F span over the Courtland Street exit ramp and Bridge 3F. The transverse spacing of the beams will be dependent on the radius of the horizontal curve and the relative orientation of the existing bridge spans. Since the relative beam angles change rapidly in certain areas, the trench panels that may span between the beams may have to be cast in-place.

The elevation of the proposed beams will be selected such that the concrete deck of the proposed cap structure matches the deck elevation of the adjacent existing bridges and such that the existing ground at the south abutment wall will tie into the proposed finished grade. In doing so, the existing grade will have to be backfilled to match the finished grade at the north abutment wall. The general slope of the proposed cap structure will be from the south to north abutment walls.

Based on the assumed finished grade elevation, assumed structure depth, and existing roadway elevations, the vertical clearance along Block 2 are expected to satisfy the GDOT minimum vertical clearance of 17.5 feet. The northbound and southbound lanes are expected to have sufficient vertical clearance to allow signage, ventilation, and fire suppression systems.

Based on The Stitch Vision Plan, the parking lot adjacent to the existing Wall C will be replaced with a high-rise building that extends over Bridge 2F. The high rise building will not be allowed to apply any load on the existing Bridge 2F, but may cantilever over the existing bridge. Dedicated foundations for the high-rise building could be located within the available area south of the existing Bridge 2F abutment with beams that straddle over the Courtland Street exit ramp while maintaining a minimum vertical clearance of 17.5 feet. The beams could rise above the cap surface within the footprint of the building as needed to support the building loads. The single or two-story Café/Restaurant and pavilion that extend onto the proposed structure may be adequately supported with the typical cap structure.

Block 3 (Emory Square)

The Vision Plan shows the proposed cap structure over the Downtown Connector and portions of the Pine Street exit between the existing Bridge 3F and the existing MARTA Civic Center Station Bridge. Block 3 encompasses 3.47 acres. The location of Block 3 and the existing structures can be seen in The Stitch – Existing Structures Exhibit in Appendix K. The proposed lawn with landscaping, splash pad, pavilion, and buildings on the proposed cap structure will be supported by abutment walls, bent walls, and PC/PS concrete beams.

Along the southbound lanes, a drilled shaft abutment wall will be constructed in place of the existing Wall F. A small segment of the Medical Arts Building parking lot will have to be closed to allow placement of shoring to remove existing Wall F and build the proposed abutment. The proposed abutment wall will continue toward the MARTA Civic Center Station Bridge by staying in front of the existing Alexander Street Wall and abutment, which will remain in place. Adequate horizontal clearance between the existing and proposed structures may be provided during construction by removing the toe and piles of the existing wall and abutment foundations. The stability of the existing wall and abutment is expected to require strengthening by using soil nail anchors. Strengthening of the existing Alexander Street Wall and Abutment wall will require additional study, analysis, and design.

Along the northbound lanes, an abutment wall will be constructed in place of the existing Wall S. A small segment of the parking lot behind Wall S will also have to be closed and removed during the construction of the abutment. However, the impact of closing the parking lot will be mitigated since this area is expected to be converted into a lawn with landscaping. The abutment wall will stop at approximately the same location as the end of Wall S so that the Pine Street exit ramp maintains a minimum vertical clearance of 17.5 feet. Consequently, the proposed structure is expected to cover less of the Pine Street exit ramp than what is shown in The Stitch Vision Plan unless the roadway profile of the ramp is adjusted down or the proposed cap is elevated higher than the existing adjacent terrain.

An abutment/bent wall will also be placed within the gore between the Pine Street exit ramp and the northbound mainlanes. The interior support bent portion of the wall will start within the existing roadway portion of the gore, resulting in shoulder widths that range from approximately 1 to 9 feet. The end of which will be protected with a crash attenuator. The proposed width of the shoulders will require special GDOT approval since the minimum shoulder width of 12 feet will be violated. Within the existing lawn portion of the gore, the bent will transition into abutment walls that split and run along the Pine Street exit ramp and the northbound mainlanes. The area behind the abutment walls will need to be backfilled to raise the existing ground elevation to the proposed finished elevation of Block 3. A mechanically stabilized wall could be placed in front of the USA Parking Garage to retain the backfill from applying any load to the garage. Additional study is needed to determine if any additional ventilation or security concerns are applicable for the USA Parking Garage. The proposed retail liner on the outside of the USA Parking Garage can be supported on top the new embankment with dedicated deep foundations if required.

The proposed abutment walls can be located such that the existing GDOT storm pipes will not need to be relocated. However, the drilled shafts of two abutment walls may need to straddle a GDOT storm pipe that runs from the northbound lanes to the Pine Street exit ramp. There is also a gas pipe that runs parallel to Alexander Street. The gas pipe may be abandoned since it may abruptly end within the southbound lanes.

An interior support bent will replace the existing Wall J and the barriers. The proposed bent and barriers will have a width of approximately 5 feet whereas the width of the existing wall and barriers range from 2.5 to 5.5 feet. Consequently, the northbound and southbound shoulder widths will be reduced up to approximately 1.25 feet. The width reduction of the shoulders may be recovered by reducing the width of the lanes to 11 feet. Even by recovering the lost shoulder width, the GDOT minimum shoulder width of 12 feet will not be satisfied.

The span lengths between the supports range from approximately 42 to 52 feet at the Pine Street exit ramp, 90 to 136 feet at the northbound lanes, and 101 to 143 feet at the southbound lanes as shown in the Block 3 Typical Section in Appendix P. Based on the span lengths, the structure is expected to have a maximum concrete slab and beam depth of approximately 5.7 feet.

The beams that span between the supports can be placed either perpendicular to the roadway or parallel to the adjacent bridges. If the beams are placed perpendicular to the roadway, they will have to be flared near Bridge 3F and the MARTA Civic Center Station Bridge to match the orientation of the existing bridges. The beams may not need to be flared if they are placed parallel to the bridges. However, this option is less feasible since the maximum beam length will increase to approximately 156 feet, which exceeds the assumed 150 foot maximum permissible beam length.

The elevation of the proposed beams will be selected such that the concrete deck of the proposed cap structure matches the deck elevation of the adjacent existing bridges and so that the existing ground at the north abutment wall will tie into the proposed finished grade. In doing so, the existing grade will have to be backfilled to match the finished grade at the south abutment wall. Additionally, the parking lots at the Medical Arts Building and at the Peachtree Summit Building will have to be regraded. The general slope of the proposed cap structure will be from the south to north abutment walls.

Based on the assumed finished grade elevation, assumed structure depth, and existing roadway elevations, the vertical clearance along Block 3 is expected to satisfy the GDOT minimum vertical clearance of 17.5 feet. The highest vertical clearance occurs at the MARTA Civic Center Station Bridge whereas the lowest vertical clearance occurs at Bridge 3F. Small segments of several northbound and southbound lanes near Bridge 3F will are not expected to have adequate vertical clearance to allow signage, ventilation, and fire suppression systems due to the roadway super elevation. However, the majority of the northbound and southbound lanes are expected to have sufficient vertical clearance for additional signage and systems depths.

Based on The Stitch Vision Plan, the Medical Arts Building and parking garage will be replaced with a high-rise structure that will extend onto the proposed cap structure. However, since these building are listed with the National Register of Historic Places, their removal is expected to require an eminent domain process, which may not be feasible.

The Vision Plan also shows high-rise residential and retail buildings over the proposed cap structure and the MARTA Civic Center Station Bridge. These high-rise buildings will require dedicated foundations and deep beams to support the building loads. Dedicated building foundations along the center of the Downtown Connector should be kept to a minimum diameter to prevent reduction of the highway shoulders. This may require a series of small diameter columns in a line that support a deep, cast-in-place concrete beam that rises above the cap surface within the building footprint. Deep beams within the building footprint could also be used to span the Downtown Connector. However, any cast-in-place concrete over the highway will require long-span permanent forms and temporary falsework that are expected to restrict the number of highway lanes during construction. <u>Further coordination and study is needed to determine the high-rise building foundation options.</u>

Block 4 (Emory Square)

The Vision Plan shows the proposed cap structure over the Downtown Connector between the existing MARTA Civic Center Station Bridge and the existing Spring Street NW Bridge; an area designated as Block 4 in Appendix K Existing Structures Exhibit. Block 4 encompasses two distinct areas: 0.52 acres over the Downtown Connector and another 1.04 acres to the south over the vacant lot between the highway and the existing Twelve Centennial Park Building. This area is proposed to serve as a bus terminal under the cap structure. The proposed bus terminal entrance and exist is located on Spring Street near the Twelve Centennial Park building. The bus terminal surface may also extend over the Downtown Connector requiring two cap structure levels in this area. The proposed lawn with landscaping and building on the proposed top cap structure will be supported by an abutment wall, bent walls, PC/PS concrete beams, and a cast-in-place deck with columns.

For the 0.52 acre portion of proposed structure over the Downtown Connector, the MARTA Wall presents a significant number of challenges due to its large foundation and proximity to the MARTA Civic Center Station. Based on the MARTA Civic Center Station as-built plans, three piers from the MARTA Civic Center Station bear on the MARTA Wall footing. Placing a proposed abutment at the current location of the MARTA wall will require the existing wall and, at minimum, portions of the footing and piles to be removed. The piers that are supported by the wall footing will need to be temporarily shored until smaller footings with drilled shafts can be placed under the piers. An abutment wall can then be constructed in place of the existing 71 foot long MARTA Wall. During the construction of the proposed abutment wall, the emergency stairwell between the MARTA Wall and the MARTA Civic Center Station may need to be closed and possibly relocated.

The City of Atlanta 42 inch combined sewer in front of the MARTA Wall will not likely be adversely impacted by the replacement of the existing MARTA Wall with the proposed abutment wall.

An interior support bent will replace the existing Wall T/U at the center of the Downtown Connector. The widths of the northbound and southbound shoulders will not likely need to be reduced since the width of the proposed bent and barriers is approximately equal to the width of Wall T/U. The proposed bent may provide two levels of support. The lower level will be similar to other locations with a solid wall and capital at the top to support the beams and slab of the lower structural cap. Columns may extend up to support a second/top cap structure near the same elevation as the MARTA Bridge surface.

At the south edge of the southbound lanes, the Spring Street Wall will be replaced with an abutment wall that extends from the MARTA Civic Center Station Bridge to the Spring Street NW Bridge; a length of approximately 159 feet. Similar to the interior support bent, the abutment wall may provide two levels of support. The existing Spring Street Wall could be removed along with any existing embankment as needed to construct the proposed abutment drilled shaft foundations. This will require temporary shoring adjacent to Spring Street The proposed wall could be built around the proposed abutment drilled shafts using a mechanically stabilized earth (MSE) system up to the proposed lower level abutment cap that would support the beams and slab of the lower level structural cap.

Columns could extend above the lower cap abutment to create a straddle bent that support the second/top cap structure near the same elevation as the MARTA Bridge surface. The proposed straddle bent columns could be spaced up to 40 feet apart to allow adequate horizontal clearance for busses to pass through. The columns would support a deep concrete beam that includes bottom flanges approximately 2 feet deep that support the superstructure for the top surface.

The superstructure span lengths over the Downtown Connector range from approximately 93 to 111 feet at the northbound lanes and 104 to 124 feet at the southbound lanes as shown in the Block 4 Typical Section in Appendix P. Based on the span lengths, the structure is expected to have a maximum concrete slab and beam depth of approximately 5.2 feet. This depth is applicable to both the top level and lower level cap structures. The wedge shaped space between the existing MARTA Bridge and Spring Street Bridge will require the beams to have flared spacing. Special consideration will be given to the relative minimum and maximum beam spacing to mitigate the width variation along the length of the beams.

The feasibility of implementing the lower bus level over the Downtown Connector depends on the turn radius of the busses and vertical clearances of the southbound highway lanes and bus level. The busses will have at least 115 feet of horizontal clearance over the southbound lanes, which is expected to be sufficient for busses to perform U-turns. The southbound lanes and the lower bus level will both require a minimum vertical clearance of 17.5 feet. The combined required height from the roadway surface of the Downtown Connector to the top structural cap surface is approximately 47.4 feet (2 x 17.5 feet vertical clearance + 2 x 5.2 foot superstructure depth + 2 foot straddle bent support flange). However, based on preliminary surface elevation data, the available height is approximately 45 feet at the southeast corner of Block 4.

This study indicates that the lower level bus access over the Downtown Connector may require the proposed upper cap surface to be more than 2 feet higher than the existing MARTA Bridge surface. <u>However, further study is recommended to determine existing elevations and exact structure depths to further understand the options for the lower level bus terminal.</u>

Without the lower bus level, the northbound and southbound lanes will satisfy the GDOT minimum vertical clearance of 17.5 feet. The Downtown Connector will also have sufficient vertical clearance to allow signage, ventilation, and fire suppression systems.

The Stitch Vision Plan places a residential/retail building over the northbound lanes of the Downtown Connector and portions of the MARTA Civic Center Station. While the proposed structure may be able to support a low-rise building, the existing MARTA Civic Center Station building and foundation will need to be evaluated to determine if the existing structure is capable of supporting the additional load.

The proposed structural cap over the 1.04 acre vacant lot between the highway and the existing Twelve Centennial Park Building can be a structure similar to many commercial parking garages. This area will include a grid of deep drilled shaft foundations with columns space approximately 35 feet apart. The proposed cap structure could be cast-in place, post tensioned concrete deck up to 2 feet thick. The bus terminal under this portion the cap will be on an improved graded with pavement surface.

Other Building Considerations

Buildings on the cap structure need to account for deflections, vibrations and utilities. Buildings need to be designed and built to accommodate the total cap structure dead load deflection and detailed so the building is plumb and level in the final condition. This will require careful planning and close coordination between the cap structure design and building design. The building contractor should be made aware of the anticipated deflections in the construction documents and compensate accordingly during construction. Placing the building loads symmetric about the cap structure supports would reduce challenges associated with variable deflections. Live load deflections are not expected to be substantial, but should be considered along with vibrations that may be perceived by the occupants of buildings on the cap structure. It is likely that the mass of the cap superstructure will dampen the vibrations sufficiently that they are not perceivable. If necessary, vibration isolators could be used.

Challenges could occur with a building placed on both the cap structure and the ground adjacent to the cap structure or across the middle support of the cap structure due to differential settlement, deflections, or live load rotations. Buildings should have a clear separation between the cap structure and the adjacent ground or about the middle support. Otherwise, careful consideration would be needed to develop compatible building foundations. Expansion joints would also be needed in the building at the interface between the cap structure and adjacent ground or at the middle support to account for live load rotations of the cap structure along with differential deflections or thermal movement.

A building will require electrical, sewage, water, and other utilities. Typically, these items are routed into the building from the subgrade. For buildings placed on the cap structure the utilities should not penetrate through the deck and waterproofing system. Utilities may be located in the space between the building floor and the top of deck (pier and beam foundation system).

NEPA ENVIRONMENTAL SCAN

Introduction

This report provides an account of existing environmental conditions in The Stitch project area and discusses the environmental documentation required if federal or state funding is pursued for the proposed project. Additionally, this report outlines potential risks stemming from known environmental conditions and offers general recommendations to assist the project managers and participants in moving forward.

Planning and Environment Linkages[1]

Planning and Environment Linkages (PEL) represents a collaborative and integrated approach to transportation decision-making that 1) considers environmental, community, and economic goals early in the transportation planning process, and 2) uses the information, analysis, and products developed during planning to inform the environmental review process.

State and local agencies can achieve significant benefits by incorporating environmental and community values into transportation decisions early in planning and carrying these considerations through project development and delivery. Benefits include:

- *Relationship-building benefits:* The PEL approach enables agencies to be more effective players in the transportation decision-making process through its focus on building interagency relationships. By encouraging resource and regulatory agencies to get involved in the early stages of planning, agencies have an opportunity to help shape transportation projects.
- *Improved project delivery timeframes:* The PEL approach improves process efficiencies by minimizing potential duplication of planning and NEPA processes, creating one cohesive flow of information. In addition, improvements to inter-agency relationships may help to resolve differences on key issues as transportation programs and projects move from planning to design and implementation.
- *On-the-ground outcome benefits:* When transportation agencies conduct planning activities equipped with information about resource considerations and in coordination with resource agencies and the public, they are better able to design transportation programs and projects that serve the community's transportation needs more effectively. The PEL approach provides agencies with tools to design better projects while avoiding and minimizing impacts on natural resources.

Study Area

The study area for the environmental screening was determined to include areas where new traffic patterns may be as well as areas where development pressures from the project may result in changes in land use. The study area is bound by Linden Avenue NW to the north starting at the intersection of Spring Street, heading east to Piedmont Avenue, then south to Pine Street, then east a half a block to capture the Civic Center, then south to Baker-Highland Connector, heading southwest across the interstate to the corner of Harris Street and Piedmont, then following a diagonal line northwest to the intersection of Ivan Allen Boulevard. From there, the study area boundary heads west along Ivan Allen Boulevard to Williams Street where it turns north northeast to Linden Avenue at Spring Street. However, to analyze Environmental Justice (EJ), a slightly larger area was studied.

[1] https://www.environment.fhwa.dot.gov/env_initiatives/PEL.aspx

Figure 1: Project Location and Study Area Map

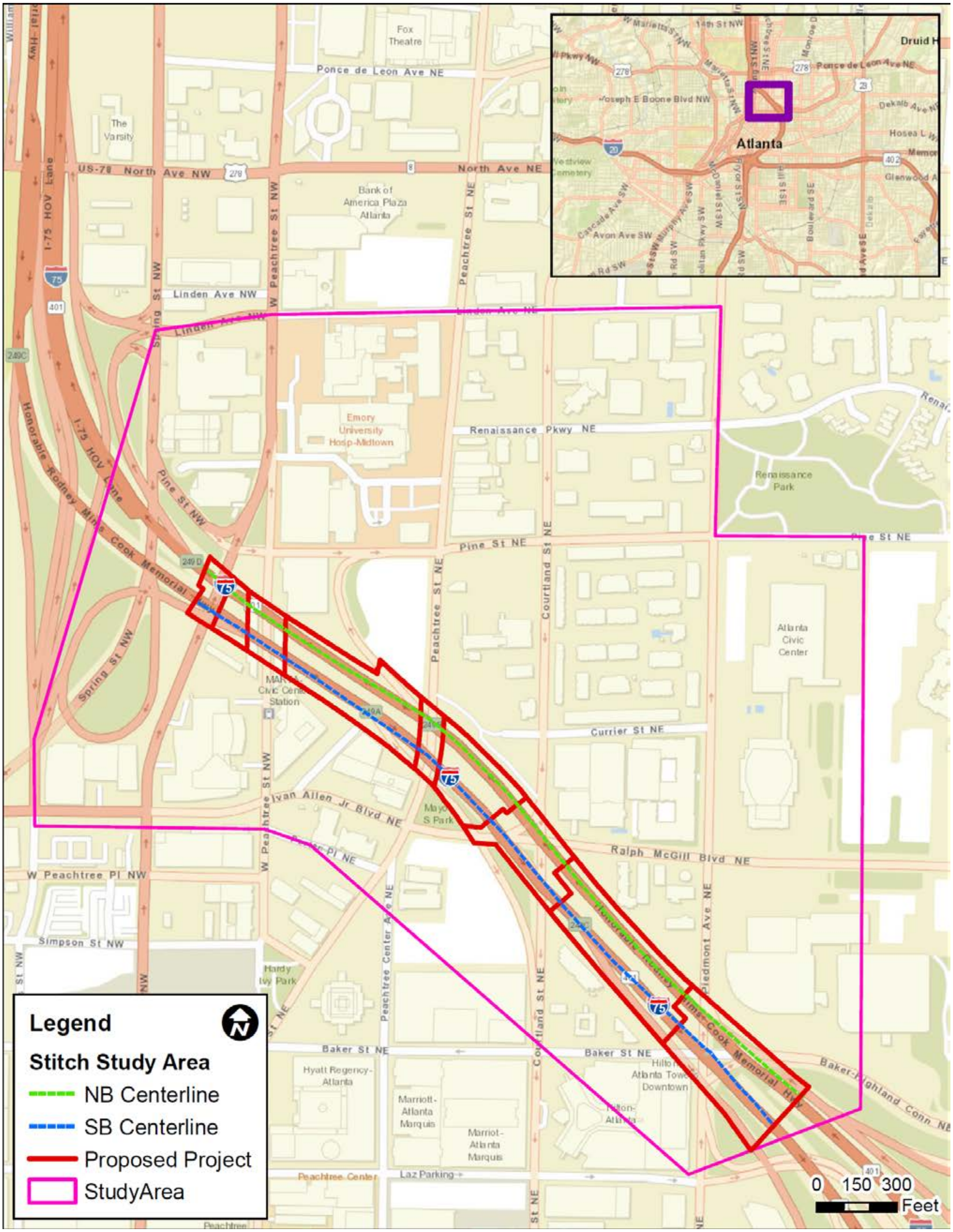


Figure 2: Existing Land Use Map

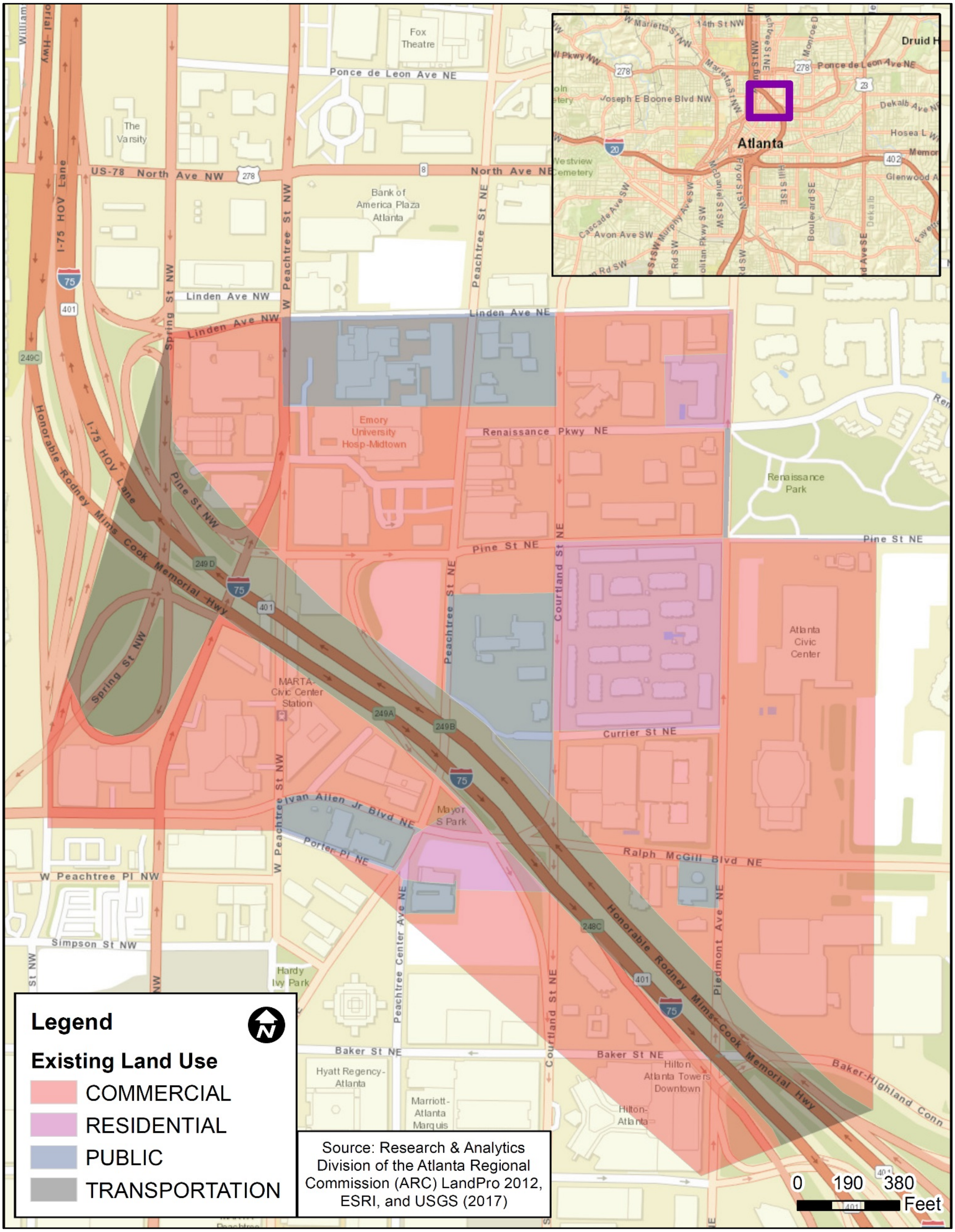
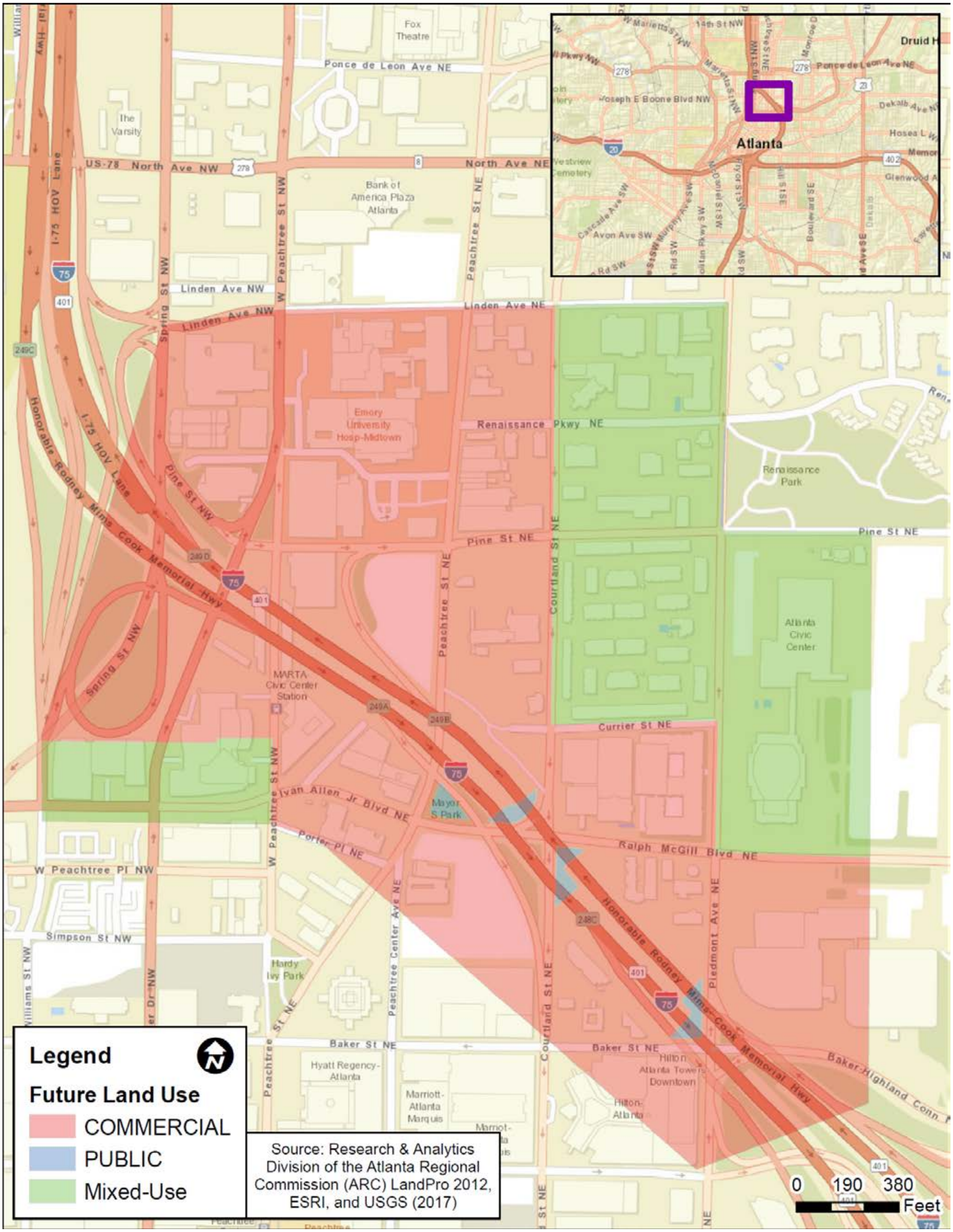


Figure 3: Future Land Use Map



Screening Methodology

Sources for this white paper evaluation include:

- Google Earth
- Georgia Natural Archaeological, Historic Resources Geographic Information Systems (GNAHRGIS)
- United States Environmental Protection Agency (EPA) Environmental Justice Screening and Mapping Tool (EJSCREEN) www.ejscreen.epa.gov/mapper/
- United States Fish and Wildlife Service Information for Planning and Consultation (USFWS IPAC) www.ecos.fws.gov/ipac
- National Register of Historic Places (NRHP)
- National Historic Landmarks
- The Georgia Historic Bridge Survey
- Fulton County tax parcel data
- Atlanta Department of Park and Recreation www.atlantaga.gov/government/departments/parks-recreation/office-of-parks
- Federal Highway Administration (FHWA)
- USDOT FHWA. "Air Rights," Center for Innovative Finance Support. 2017.
- Section 4(f) (23 CFR 774.3(a)(1-2))
- "Stitch Atlanta 2015," Jacobs Engineering Group. 2015
- Presidential Executive Order 13807
- Presidential Executive Order 12898
- FHWA Traffic Noise Model (TNM)
- *GDOT Environmental Procedures Manual*

A desktop analysis was used predominately for this environmental screening.

- Historic resources were evaluated using GNAHRGIS, NRHP, Fulton County Tax Assessor Database, and a windshield survey.
- Archaeology used GNAHRGIS with a 0.5 mile radius to the proposed project.
- Ecology used IPAC information and topographic maps.
- Environmental Justice populations were analyzed using the online EJSCREEN tool through the Environmental Protection Agency.

Existing Conditions

1. Seven NRHP-listed buildings
2. Forty-seven buildings 50 years or older
3. One potential endangered species
4. Six previously identified archaeological resources
5. EJ populations
6. Two Parks

Figure 4: Basilica of the Sacred Heart (1898)

Historic Resources

A review of resources 50 years or older was conducted for the proposed Stitch study area. The survey included an examination of the NRHP, National Historic Landmarks, the Georgia Historic Bridge Survey, existing county tax parcel data, and GNAHRGIS. Initial survey results revealed 47 structures within the project study area that are 50 years or older. Of these 47 structures, seven are currently listed in the NRHP: The Imperial Hotel (1911), the Basilica of the Sacred Heart (1898), the Medical Arts Building (1927), and the First Methodist Church (1903), Baltimore Place Apartments (1885), Crawford W. Long Memorial Hospital/Part of Emory University Hospital Midtown (1911), and Rufus M. Rose House (1901). Of the 47 buildings, approximately 15 are potential eligible. Refer to Figure 5 for historic resources. The windshield and desktop survey results are summarized in Table A-1 in Appendix A. The NRHP nomination forms for listed resources in the project area are included in Appendix A.

Ecology

A brief overview of existing data indicated that there are no wetlands or streams located within the proposed project area for The Stitch. According to the USFWS IPAC website[2], one endangered species (*Michaux's Sumac*) may occur in the project vicinity.

Archaeology

The Georgia Archaeological Site Files and GNAHRGIS were referenced for known archaeology sites in the proposed project area. Within a 0.5- mile radius of The Stitch project area, six previously identified sites were found. More research will be required to determine if these sites are eligible for the NRHP, and a field survey will be required to determine if any new sites exist.

Environmental Justice

Executive Order (EO) 12898 mandates that federal actions address impacts to minority and low-income populations. A cursory EJ review of the proposed project area was performed using EPA's EJSCREEN mapping tool.[3] The results of this initial screening indicate that there are low-income and minority populations present in and around the area proposed for The Stitch. These results are found in Appendix B.

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[2] https://ecos.fws.gov/ipac

[3] https://ejscreen.epa.gov/mapper/

Figure 5: Historic Resources Map

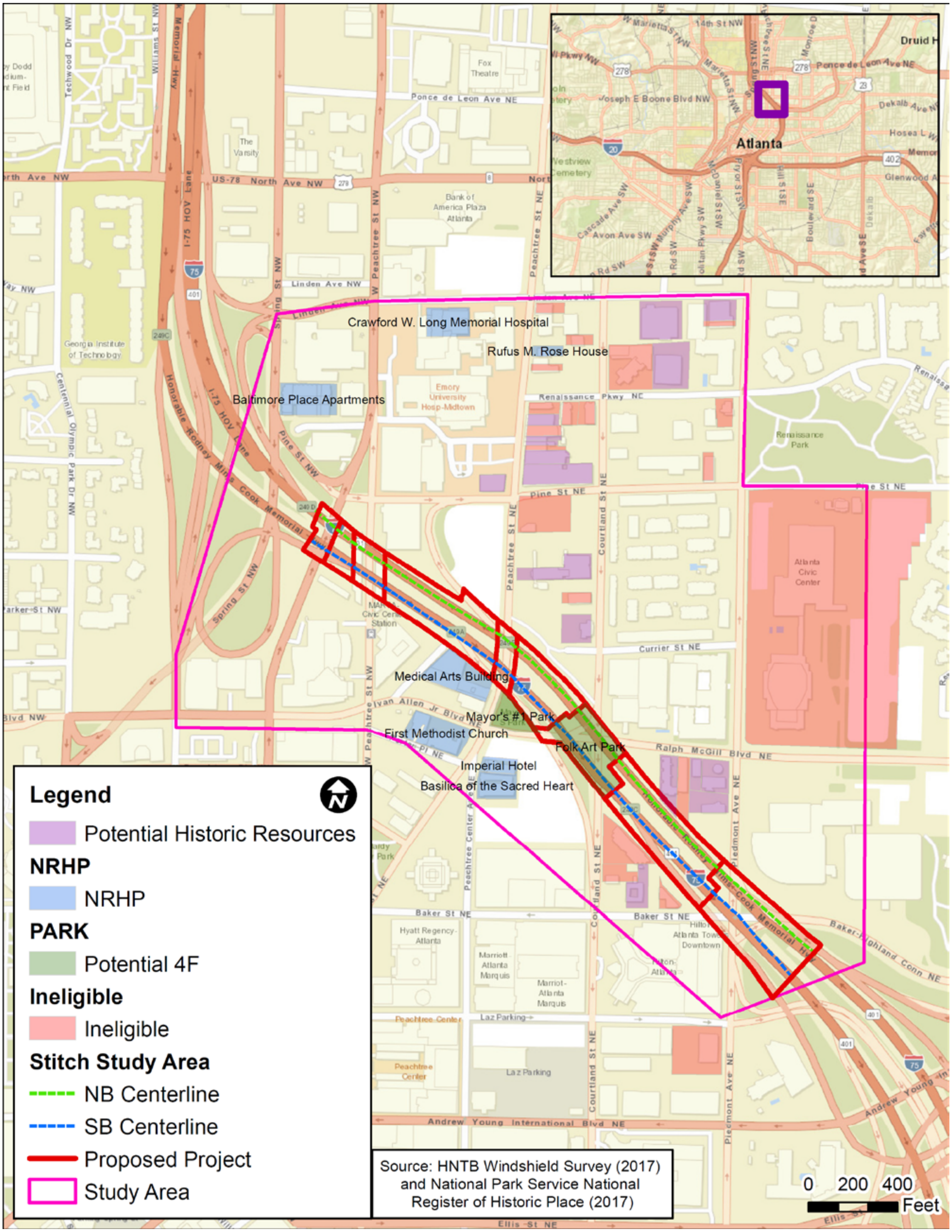
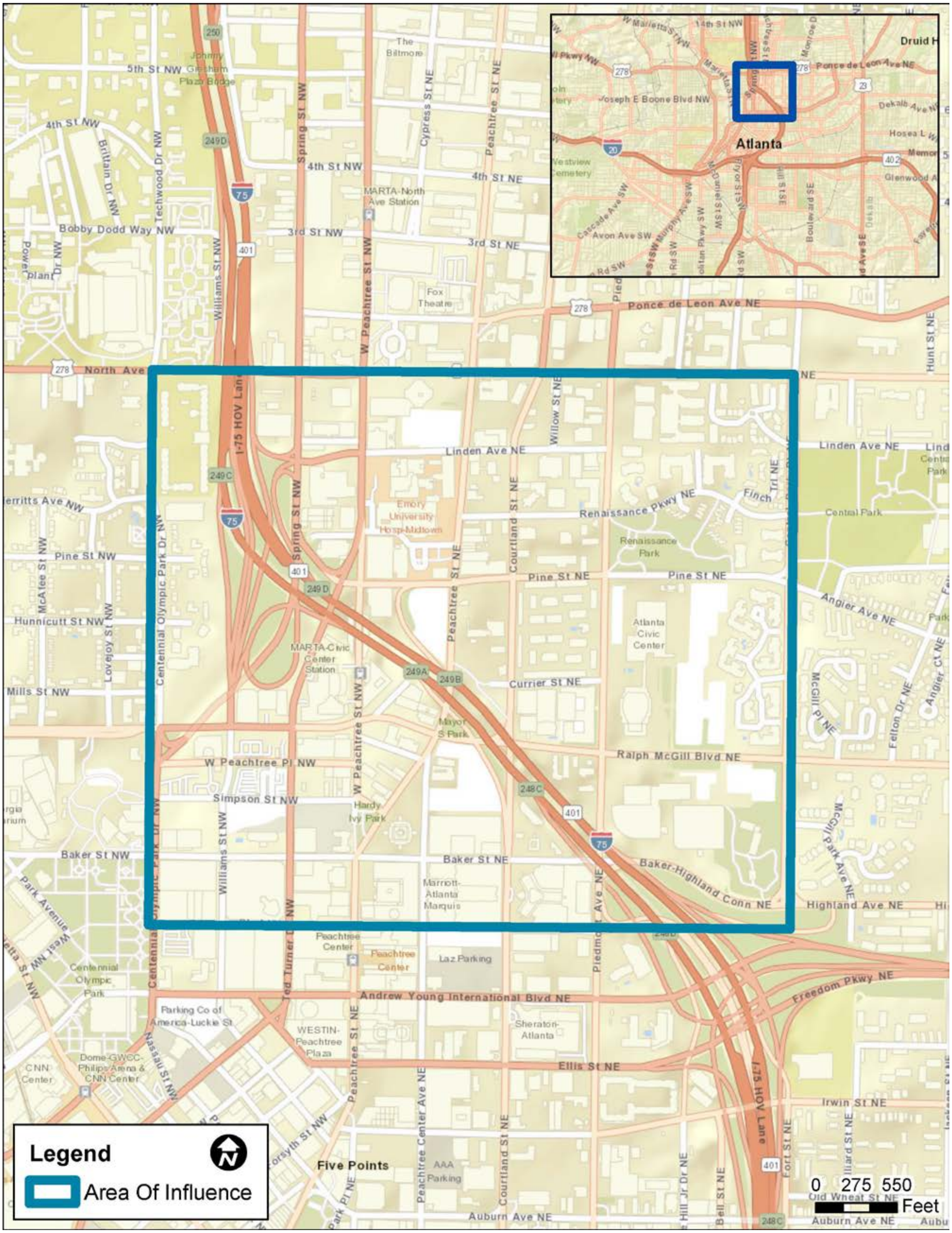


Figure 6: Environmental Justice Area of Influence Map



Parks and Recreation Areas

1. **Mayors #1 Park**
   Mayor's #1 Park is located at 120 Ralph McGill Boulevard and is owned by the City of Atlanta. The park is approximately 0.22 acres and features a small brick walking path and large shade trees. As a park, Section 4(f) considerations will be made whether the impacts result in a no effect a *de minimis* effect or will require a full Section 4(f) evaluation.
2. **Folk Art Park**
   Folk Art Park was constructed as a public art project to improve streetscapes in preparation for the 1996 Olympics and primarily features the artwork of southern folk artists. The park is located at the intersections of Courtland Street and Ralph McGill Boulevard, and Piedmont Avenue and Baker Street. Notable artists featured at the park include Eddie Owens Martin, R.A. Miller, James Harold Jennings, Vollis Simpson, Archie Byron, and Howard Finster.[4] Mitigation would be required as part of Section 4(f) for this park. Coordination would be recommended with officials with jurisdiction, the Office of Cultural Affairs, and other stakeholders to appropriately mitigate the park, as it would be impacted as part of the proposed project.

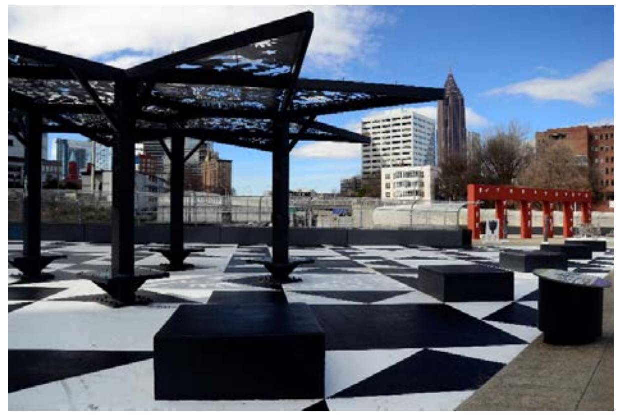


Figure 7: Folk Art Park

Environmental Documentation

If federal funding or the purchase of air rights through FHWA is pursued for The Stitch, documentation for the National Environmental Policy Act (NEPA) will be required. For this type of project, either an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) document will likely be required. The type of documentation will depend on the level of anticipated adverse environmental impacts, including potential indirect and cumulative impacts, determined from an alternatives analysis and scoping process. In past interstate capping projects, the FHWA has taken the position of lead Federal Agency and would likely be the lead agency for The Stitch project. For this project, regardless of the federal class of action, a scoping phase with alternatives analyzed would be recommended. See recommendations below.

A typical EA or EIS for FHWA will consist of documenting project alternatives and existing environmental conditions, an assessment of effects, indirect and cumulative impacts, as well as proposed mitigation and public involvement. An EA document is approved with a Finding of No Significant Impact (FONSI) and an EIS is approved with a Record of Decision (ROD). To achieve approval for both documents, public review and comment is required. Failure to adequately address environmental issues, public concerns, or comply with the EA/EIS process could result in extended review time, lack of approval, or lawsuit.

If state funding is pursued for The Stitch, environmental documentation will still be required as part of the Georgia Environmental Protection Act (GEPA). If significant adverse effects are anticipated, a completed and

[4] Atlantadowntown.com/initiatives/folk-art-park

approved Environmental Effects Report (EER) will also be required. An EER is similar to an EA or EIS as it includes addressing alternatives to the proposed action to avoidable adverse environmental impacts, and it proposes mitigation measures. For The Stitch project, adverse impacts to cultural resources would likely result in an EER.

Section 4(f)

For this type of transportation-related project, Section 4(f) of the U.S. Department of Transportation Act must be considered as part of the environmental documentation process. Section 4(f) is triggered when rights-of-way are purchased from parks, recreation areas, wildlife and waterfowl refuges, and/or historic sites. To comply with Section 4(f) regulations, an agency must be able to show that there are no "feasible or prudent avoidance alternatives to the use of land from the property, and the action includes all possible planning to minimize harm to the property resulting from such use" (23 CFR 774.3(a)(1-2)).

Potential Section 4(f) properties for The Stitch project include historic resources eligible for or listed on the NRHP, and Mayor's #1 Park and Folk Art Park. The type of Section 4(f) determination will depend upon the amount of impact to the subject property. It is likely a full Section 4(f) evaluation would be required for Folk Art Park, and early coordination on potential mitigation strategies would be recommended. If a minimal amount of property is taken, a *de minimis* 4(f) determination is likely. If a resource is significantly or adversely affected by the project, an individual Section 4(f) document will be required for each affected property. Due to the high number of resources that could be considered for Section 4(f) in The Stitch project area, it is likely that there will be some Section 4(f) discussions. To reach the desirable "no adverse effect" finding or obtain a *de minimis* determination for The Stitch, coordination between FHWA, State Historic Preservation Officer
(SHPO), consulting parties, the public, and the official with jurisdiction over the parks will be necessary.

Direct, Indirect, and Cumulative Impacts

A NEPA document will require an evaluation of direct, indirect, and cumulative effects as a result of project work. Direct Impacts are typically defined as those that will occur at the same point in time as the project. Indirect effects are those that could occur later in time, and cumulative effects are those that build upon past and present conditions.

A full analysis of both negative and positive direct, indirect, and cumulative impacts will be required as part of the environmental documentation for The Stitch. These impacts will then require evaluation for any potential adverse effects. Changes in traffic patterns, the density of potential development, and other factors will be analyzed. Early coordination with agencies and the public is recommended to help develop alternatives that can avoid or minimize impacts and mitigate unavoidable situations.

Stakeholders

A key part of making The Stitch project a reality will be identifying potential stakeholders and interest groups and involving them in the planning process. The parties selected should include federal and state agencies, government/public sector administrators and service providers (city, county, regional, and state), political interest groups, business and property owners, residents, the development community, and other local interest groups. Stakeholders should be involved early in decision-making, and a Public and Agency Coordination Plan is recommended to ensure the public is engaged in a meaningful way throughout the planning process. A list of suggested stakeholders for The Stitch can be found in Appendix C.

Executive Order 13807

EO 13807 was signed in August 2017 and was intended to accelerate environmental review on "new major infrastructure" projects by mandating decision-making time be "reduced to not more than an average of approximately two years." The EO defines major infrastructure projects as ones for which "multiple authorizations by federal agencies will be required to proceed with construction, the lead Federal Agency has determined that it will prepare an EIS under NEPA, and the project sponsor has identified the reasonable availability of funds sufficient to complete the project."

Should an EIS be required for The Stitch, multiple federal agencies may become involved, and the stipulations of EO 13807 could apply. Although a mandated reduction in review time by federal agencies appears attractive, EO 13807 only applies to EIS documents. EIS documents are typically much more involved than EA documents and can require a significant amount of time and resources to produce. EA documents are generally smaller, require less documentation, and are typically approved in well under two years.

Air Rights

For The Stitch project to proceed, acquisition of air rights is required for the project area along the Interstate 75/85 corridor. According to the FHWA, "Air rights are a form of value capture that involves the sale or lease of development rights in urban centers. Air rights are often transferred from historic properties to nearby development parcels but may also involve development above highway rights-of-way or transit facilities." The amount of air rights available is determined by the site's zoning designation. In some cases, zoning may not exist for transportation rights-of-way and the site will need to be zoned before the development can take place.

Research of similar interstate decking projects indicates that acquisition of air rights will likely be negotiated through FHWA. As part of the conditional approval to grant air rights, FHWA will likely require preparation of an environmental document. In a recent example, an EA was prepared for the Capitol Crossing project over I-395 in Washington, D.C. Similar to The Stitch, the Capitol Crossing project involves the construction of a platform over a recessed section of the interstate. Once completed, the project site will extend over three city blocks and will include four office buildings, retail space, parking, and one residential building. The EA for this project was prepared by the District Department of Transportation (DDOT) in 2011 and was approved by FHWA in 2012. The FONSI for the Capitol Crossing project is included in Appendix D of this report to serve as an example of the criteria and requirements FHWA expects an environmental document to consider for projects requiring air rights.

Air, Noise, and Vibration

Air, noise, and vibration studies will be required as part of the NEPA documentation for The Stitch project and evaluated for potential adverse impacts. Noise studies should be conducted in accordance with the FHWA's Procedures for Abatement of Highway Traffic and Construction Noise and GDOT's Highway Noise Abatement Policy for Federal-Aid Projects. Potential vibration levels from construction will require evaluation and consideration for impacts to nearby historic resources. Current GDOT standards state that any resource 50 years or older that meets an increase of 15 dB(a) over existing levels will have an adverse effect. The FHWA criteria stipulates an adverse effect occurs with an increase of 5 dB(a) over 67 dB(a) residential or 72 dB(a) commercial.

Since the project area is in a non-attainment zone, air quality studies will be required. These studies will likely include a carbon monoxide (CO) analysis, ozone analysis, and a Mobile Source Air Toxic (MSAT) analysis. These studies should be completed in compliance with current GDOT and FHWA policies.

Construction Impacts

A Transportation Management Plan as well as coordination with adjacent property owners would be undertaken as part of minimization and mitigation efforts associated with construction impacts.

Potential Risks

An increased level of effort will be required for scoping, reporting, public involvement, and document approval.

Potential risks include:

- Possible adverse effects to historic resources from noise and vibration due to construction
- 4(f) evaluations for use of historic properties, Folk Art Park and/or Mayor's Park
- Potential adverse effects to low income or minority populations
  Note: Benefits to low income or minority populations would be documented
- Hazardous materials on adjacent properties
- Geo-technical challenges
- Access improvements tied to a Federal Action

Additional environmental analysis on transportation, utilities, visual resources, energy, socioeconomics, land use, zoning, plans, and community facilities and urban services will be included in either an EA or EIS evaluation.

Recommendations

The following are recommendations for the ADID for The Stitch project moving forward:

- Develop and deploy of a Fast Start NEPA Plan in the first 90 days to enhance the efficiency and effectiveness of the overall Stitch project. This plan will incorporate strategic NEPA elements that will quickly engage the Team, GDOT, and FHWA to align around project goals and objectives, and foster collaboration. This approach will define organizational relationships for all parties and document role expectations, outline authorities, and foster accountability to deliver the program.
  Fast Start NEPA Plan elements could include:

  - Begin agency consultation with GDOT and FHWA to determine Class of Action and steps for acquiring air rights
  - Develop project alternatives, including a no-build alternative
  - Build an overall Project Schedule that allows time for meaningful public and agency involvement and meet EO 13807
  - Draft a NEPA Schedule for the project
  - Draft and Final Public and Agency Coordination Plan for the project to include:

  - o Development of interagency coordination, including FHWA, GDOT, and other key agencies
  - o Public involvement and outreach approach and key stakeholders

- Draft of the project Purpose and Need Statement that will be incorporated into the Notice of Intent (if an EIS is determined necessary by FHWA) or as part of the early deliverables of the EA
- Establishment of Traffic Forecasting Analysis Requirements to meet the identified schedule;
  - o Develop a communication protocol between NEPA Team and Travel Forecasting Team
- Identify current environmental and planning-level analysis to inform the preparation of the NEPA documents under FHWA's PEL process
- Performance-based preliminary mitigation recommendations including early discussion with agencies around resource impact mitigation, especially in areas where impacts are known such as Folk Art Park
- Preparation of a Litigation Management Plan including project-level Administrative Record Methodology for NEPA

Other recommendations include:

- Evaluate existing environmental conditions and determine potential adverse impacts (environmental conditions include, but are not limited to, impacts to cultural resources, ecological resources, potential 4(f) properties, and environmental justice)
- Develop a Mitigation Plan for potential adverse impacts to the environment
- Identify potential direct, indirect, and cumulative impacts
- Create a Transportation Management Plan

ADDITIONAL RESOURCES

For more information about this white paper topic, consult the following:

"Finding of No Significant Impact for I-395 Air Rights Project Washington D.C." FHWA. March 26, 2012.

The Existing Conditions and Constraints and Opportunities Reports set the foundation for the next phase of predevelopment work to advance The Stitch. While the work completed to date has identified challenges to implementation, there were no fatal flaws discovered in the analysis. The work suggests the need for further study to understand the engineering concepts presented and how identified constraints will impact implementation.

The next phase of the technical analysis work, will further develop the engineering concepts put forth in ICP2; focus being on refining and testing the alternatives. The goal is to develop a high level conceptual design for the engineering "infrastructure" components of the current Vision Plan that will allow for a more refined and detailed construction cost estimate.

Cost Implications

The Jacobs Vision Plan, which was done without the benefit of this level of analysis, assumed a capital cost extrapolated from the Klyde Warren cap project in Dallas. Based on the preliminary findings to date for The Stitch, this project will be significantly more complicated to execute. The detailed work of developing the engineering alternatives and gaining input on costs from the construction community will come later. However, based on the work to date, we are certain that the cost per acre will be significantly higher than the $52M indicated in the Jacobs plan. The key deliverables for the next phase will be sufficient for conceptual engineering to develop a more accurate Rough Order of Magnitude (ROM) cost.

Phasing

The existing bridges in The Stitch project area are natural breaks for a phased construction plan. Later phases of work will review phasing options in more depth in a matrix of considerations that will include costs, ease of construction, impacts to exiting property owners, value enhancement and other criteria. Out of this more detailed, more informed comprehensive phasing plan will be developed.

The elements of the next phase of planning work are:

- Civil Engineering – Development of a conceptual grading plan and stormwater management plan
- Structural Engineering – Development of structural alternatives for substructure and superstructure
- MEP Engineering – Assessment of life safety requirements for tunnel ventilation and lighting with development of engineering narratives for mechanical, lighting and communications systems requirements
- Limited Architectural – To determine the potential for overbuild

Additional activities for next phase of planning will include:

- Completing cost estimating and financial modeling
- Developing a Park Operations model that supports its long-term sustainability
- Developing a conceptual approach to construction logistics and Management of Traffic (MOT)
- Evaluating phasing opportunities and preparing a schedule of staging recommendations
- Selecting a Communications partner to help prepare a communications strategy for stakeholder, public and project champion engagement
- Selecting a partner to complete an economic impact study
- Selecting a partner to help investigate funding strategies
- Engaging a legal partner to begin looking at governance strategies
- Continuing to advance the NEPA Environmental Screening process and recommendations