Town of Pittsboro
Standard Specifications

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All construction shall conform to the requirements and dimensions on the approved construction plans, Town Specifications, Standard Details and the Unified Development Ordinance. Any conflicting requirements or lack of information shall be brought to the attention of the Town prior to construction.

9.01 GREENWAY DESIGN PLANS

1. GENERAL

Greenway designs shall be submitted for review with subdivision or site plans with a separate profile sheet. Plan view grading shall be at a maximum scale of 1 inch equals 60 feet with 1 foot proposed contours shown. Plan and profile for greenway trails shall be approved by the Town Parks and Recreation Director and Town Engineering Director and are required for final plat site approval. The total length of greenway trail to be constructed shall be listed on the plan sheet. All trail amenities, fences, storm drainage, proximate utilities, easements, details, notes, and any other requirements shall be shown on these plans.

2. RECORD DRAWINGS

Record drawings will be required prior to acceptance of routine maintenance/warranty of the greenway by the Town, if applicable.

3. EASEMENTS, ENCROACHMENTS, AND PERMITS

All easements, encroachments, and/or permits required for on-site and off-site facilities must be obtained by applicant prior to beginning work. Easements within which shoulders, swales, or appurtenances are not contained will require amendment via recorded plat. All required permitting, certifications, and geotechnical reports shall be submitted to the Town prior to the Town's acceptance of routine maintenance/warranty on greenway trails.

4. PLAN NOTES

The following notes shall be included on all greenway design plans:

1. Contractor shall confine construction activity within limits of disturbance.
2. Contractor shall retain a North Carolina Professional Land Surveyor to stake centerline of the trail as shown on the Layout Plan. The trail shall be staked at 50-foot intervals in the field.
3. Staked centerline of the trail shall be approved by the Town prior to construction.
4. Erect tree protection fence along limit of disturbance and obtain approval by the Town prior to construction.
5. Install required erosion control measures per Chatham County standards prior to construction.
6. Contractor shall call for utility locations prior to construction.
7. All disturbed areas shall be seeded per required Temporary and Permanent Seeding Specifications.

8. Grade side slopes and adjacent ground to drain. Ensure that there is no standing water on the uphill side of the trail. Install diversion ditches as needed to direct water to culverts.
9. Additional culverts shall be added as needed during construction to prevent erosion and standing water on the greenway trail.
10. All trails, regardless of width shall maintain a 2-foot wide grassed shoulder with a 2% cross slope. Trails that do not incorporate a 2-foot wide grassed shoulder capable of being maintained with a standard lawn mower will not be accepted by the Town.
11. The Town inspector shall inspect and approve proof-roll of greenway trails prior to placement of fabric and stone and prior to paving. A minimum of 95 percent compaction is required. All private greenway trails shall be proof-rolled by a NC-licensed Geotechnical Engineer who shall provide a report to the Town Engineering Director.
12. All trails that intersect with a curbed road shall have an accessible greenway curb ramp as specified on plans. Ramp widths shall be same width as trail and include a level landing at top of ramp. If intersecting a road with no curb and gutter, a detectable warning surface shall be installed. The centerline of all greenway curb ramps perpendicular to roadway shall align with centerline of trail.
13. The contractor shall ensure during construction that all access points leading to the trail are posted with signs that read 'Trail Closed for Construction'. Barriers shall be installed at the ends of any incomplete greenway segments that have a longitudinal slope greater than 3:1, or other hazardous conditions.
14. All trail intersections with roadways, sidewalks, or other trails shall include 4-foot minimum edge radii.
15. Minimum sight distance of 5-foot x 15-foot shall be provided for trail users at trail entrances and intersections.
16. Record drawings will be required by the Town prior to acceptance of routine maintenance/warranty of the greenway. Easements not providing the minimum shoulder width or not including swales or appurtenances shall be corrected via recorded plat.
17. Asphalt technicians on site receiving asphalt tickets, running densities or asphalt compaction, shall verify asphalt depth and provide certification in writing to Town staff.
18. All related retaining walls, structures, greenway bridges and boardwalks will require Chatham County building permits.
19. Trails along roadways shall meander but shall be minimum of 5 feet off back of curb or edge of pavement if curb is not present.

9.02 GREENWAY TRAILS

1. GENERAL

All proposed greenways shall conform to the Town Bicycle and Pedestrian Plan and the Town Parks and Recreation System Master Plan. Town greenway trails are intended to accommodate multiple user types including pedestrians, bicyclists, non-motorized scooters, and skaters among others and can be 6 ft, 8 ft or 10 ft wide with minimum 2 ft wide grassed shoulders on both sides of the trail. Greenways shown on the Town Parks and Recreation System Master Plan shall be 10 ft wide.

2. EASEMENTS

Public Greenway Easements (PGE) shall be 20 feet minimum width with the trail centered within the easement and encompass swales and culverts for maintenance. Trail connections to neighborhoods shall be publicly owned and maintained. PGEs may not be located within residential lots. Shared public

greenway and water or sanitary sewer easements shall be 30 feet minimum width but could be greater depending on the utility line size and depth. No shrub or tree plantings, or private fences are allowed within the greenway easement.

3. DESIGN SPEED

In establishing horizontal and vertical curvature for paved greenway trails, a design speed of 18 mph shall be used. For greenway connector trails (short lengths of publicly maintained paved trail from a neighborhood to the main greenway trail), street-side greenways, and private trails, a design speed of 12 mph may be used.

4. HORIZONTAL ALIGNMENT

All public greenway and private trails shall be designed with a centerline alignment and stationing every 100 feet. All tangent sections of public greenways shall be connected with horizontal curves. Greenway trail alignments shall have a minimum horizontal curve radius of 60 feet. Greenway connector trails and street-side greenways shall have a minimum horizontal curve radius of 27 feet. Minimum lateral clearances shall be met on all horizontal curves to provide adequate stopping sight distance.

5. CROSS SLOPE

All public greenway and private trails shall have 1 percent minimum and 2 percent maximum cross slope with slope towards the downstream side. On vertical slopes with grades in excess of 5 percent, cross slopes shall be sloped to the inside of downhill curves.

6. VERTICAL ALIGNMENT

Greenways shall comply with ADA and NC Building Code standards. All vertical tangent sections shall be connected with vertical curves. Vertical curves shall be designed to provide adequate stopping sight distance on the trail. Unless necessitated by exceptional topography, greenway trail grades shall not be less than ½ percent. Maximum grades on greenways shall be 5 percent. Where topography necessitates grades to be in excess of 5 percent, Shared Use Path Accessibility Guidelines shall be applied to determine maximum length of grade and spacing of flat landings:

- Grades greater than 5 percent and up to a maximum of 8.33 percent shall be allowed for a maximum of 200 feet before requiring a landing 10 feet long with maximum slope of 2 percent in all directions
- Grades greater than 8.33 percent and up to a maximum of 10 percent shall be allowed for a maximum of 30 feet before requiring a 10-foot landing
- Grades greater than 10 percent and up to 12 percent shall be allowed for a maximum of 10 feet before requiring a 10-foot landing
- No more than 30 percent of a greenway may exceed 8.33 percent
- Grades that approach roadway or greenway crossings shall be limited to 5 percent maximum at least 10 feet ahead of the intersection or back of landings associated with curb ramps

  In all instances where grades exceed 8.33 percent, a metal handrail shall be installed on both sides, offset 1 foot from the edge of the trail.

7. SIDE SLOPES

Side slopes shall be 3:1 or flatter, unless otherwise approved by the Town Engineering Director. Where fill slopes are steeper than 3:1, or where the trail is adjacent to a body of water, provide 5 feet graded shoulder width adjacent to the edge of paved trail for recovery, graded at 6:1 or flatter. Where a recovery area of 5 feet cannot be provided, a physical barrier such as safety rail shall be provided in the following circumstances:

- Slopes 3:1 or steeper, with a drop of 6 feet or more
- Slopes 3:1 or steeper, adjacent to a parallel body of water
- Slopes 2:1 or steeper, with a drop of 4 feet or more
- Slopes 1:1 or steeper, with a drop of 1 foot or more

Fill slopes steeper than 3:1 shall be engineered and approved by the Town Engineering Director. Safety rail shall be located 1-foot minimum offset from trail edge where required.

8. PAVEMENT STRUCTURE

Public greenway trails shall be constructed from either hot-mix asphalt (HMA) material or Portland cement concrete (PCC). Pavement material shall comply with NCDOT Standard Specifications and Town of Pittsboro specifications and standard details. For asphalt greenway construction, a woven geotextile fabric shall be used below the aggregate base course, with the following properties:

TABLE 9.1: Woven Geotextile Fabric Properties

	TYPICAL	TEST
Tensile Strength	200 lbs	ASTM D4632-86
Elongation at Break	15%	ASTM D4632
Puncture Strength	100 lbs	ASTM D0751
Mullen Burst	400 psi	ASTM D0751/3786
Trapezoid Tear	75 lbs	ASTM D4533

9. DRAINAGE

Site drainage should be collected on the uphill side of the trail in a grassed swale sized appropriately with minimum 1 foot depth and piped to direct water under the trail to a creek or storm drain culvert, to eliminate flow across the trail. A Class B rip-rap dissipater with filter fabric shall be installed at upstream and downstream ends of all culverts. When cross drainage requires pipe 15 inches or larger, stormwater calculations are to be included in plans. When culverts are located within Riparian Buffer area, properly sized culverts will be permitted upon review and approval to address natural swale and drainage draws. SCM outlets/culverts shall be extended under greenways located at toe of slope of SCMs with a yard inlet or catch basin installed on the upstream side of the greenway.

10. CLEARANCES

A minimum lateral clearance of 5 feet shall be maintained from the edge of the trail and vertical clearance of 10 feet from the trail surface, whenever possible. In shared greenway and utility corridors, the edge of pavement should be a minimum of 2 feet from the edge of any utility surface covers/plates

(e.g. water valve covers, blow-offs, manholes), and boardwalk and bridge footings should be no closer than 4 feet from any utility.

Trees shall be limbed up a vertical distance of 10 feet from the forest floor, within 5 feet from the outside edge of the trail. Tree limbs and dead trees that present a danger to pedestrians utilizing the trail shall be removed during construction, as directed by the Parks Planner or other Town staff. Minimum vertical clearance from trail surface to the lowest horizontal structural member of bridges shall be 10 feet.

11. PROOF-ROLLING OF SUBGRADES FOR GREENWAYS

The Town Inspector shall oversee the proof-roll of public greenway trails. Private trails shall be proof-rolled under supervision of a NC-licensed Geotechnical Engineer and a report shall be submitted to the Town Engineering Director or designee for acceptance. Public greenway and private trail proof-rolls shall be performed on the exposed subgrade soils along the full length of the proposed paved trail after clearing, grubbing, and topsoil removal are complete.

Proof-rolling shall be performed using a fully-loaded tandem-axle dump truck or equipment with minimum 10 ton static weight approved by Geotechnical Engineer. The Town inspector for public trails, or Geotechnical Technician for private trails, shall assess problems including rutting, deflection, or pumping of subgrade soils and shall determine if the subgrade soils are suitable to allow placement of geotextile fabric and stone base. The Geotechnical Technician may require an NC-Licensed Geotechnical Engineer to evaluate and determine the need for remedial measures. The aggregate base course shall also be proof-rolled prior to asphalt or concrete placement. A minimum of 95 percent compaction is required.

9.03 TRAIL AMENITIES AND SIGNAGE

1. TRAIL AMENITIES

All trailhead/trail access points shall have one trash receptacle and one dog station which shall be shown on the approved plans or at the discretion of the Town. Bike racks are permitted at greenway access points and specifications must be approved by the Town Parks and Recreation Director. Benches are permitted along trails in approved areas. Benches shall be manufactured by Superior Recreational Products, Model # B6WBMODCLASSPRM in installed accordance with Town standards. Alternative benches must be reviewed and approved by the Town Parks and Recreation Director prior to installation.

2. SIGNAGE

A. Regulatory and Warning

Greenway signage shall be established in accordance with applicable standards. Greenway signage shall be located where necessary in accordance with approved plans. Coordination with the Town staff is required to determine vehicular sign needs for all greenway crossings of roadways.

B. Wayfinding

All trail access points, intersections, and trailheads shall utilize the appropriate Wayfinding signs per T own requirements. Wording on the sign and exact placement will be determined by the Town Parks and Recreation Director. A proof of the proposed signage shall be submitted to the Town for approval prior to ordering materials.

9.04 STREET CROSSINGS

1. AT-GRADE CROSSINGS

When greenway trails cross a major collector road or higher order facility it is preferred that the crossing occurs at a signalized intersection with a crosswalk or via grade-separated crossing. This may require that the trail be extended a longer distance than would typically be required. Greenway trail crossings at mid-block or at unsignalized intersections shall be evaluated on a case-by-case basis per the North Carolina Pedestrian Crossing Guidance. Final greenway trail mid-block and unsignalized crossing designs shall be approved by Transportation and Engineering staff. Where roadway crossings are approved, a 10 feet wide high-visibility crosswalk with fluorescent yellow-green pedestrian crossing warning signs and downward arrow plaques shall be used. Site-specific supplemental signage and markings may be required.

Where a pedestrian crossing island is deemed necessary per Town engineering review, the island shall be raised, 4 feet minimum width, and 6 feet across to meet Public Right-of-Way Accessibility Guidelines. Angled crosswalks in the median that orient a pedestrian's attention toward oncoming traffic are preferred.

Crosswalk lighting needs shall be evaluated on a case-by-case basis. Where crosswalk lighting is deemed necessary, luminaires should provide 20 vertical lux at the crosswalk. Luminaries should be placed 10 feet in front of the crosswalk. On two directional roadways without the presence of a refuge median, 2 luminaries (1 on either side of the crossing) shall be provided.

2. GRADE-SEPARATED CROSSINGS

Grade-separated crossings such as pedestrian tunnels and bridges are required when crossing controlled access facilities such as interstates, highways, and railroads. Consideration for grade separated crossings shall also be given when all of the following conditions prevail:

- A significant greenway corridor with high user volumes
- Crossing of a facility with speed limit of 45 mph or higher
- Crossing of a facility with 4 or more travel lanes
- Absence of a signalized crossing within 1,000 feet

9.04 GREENWAY STRUCTURES

1. GENERAL

Greenway structures are required to be certified by a North Carolina Professional Engineer and shall include all necessary plan documents with the final Construction Plan set for approval. Working drawings shall be submitted to the Town for review prior to manufacturing of any pre-fabricated structure.

As required by NC Building Code, Chatham County building permit must be obtained and approved Construction Plans must be submitted with the building permit application for all greenway structures.

Site soil properties are assumed to support foundation loads. Prior to construction or as requested by the Town, the contractor shall submit a geotechnical report to the Town and building permit authorities, indicating that the soil properties can support the foundation loads.

All required geotechnical reports and a sealed certification from a Structural Engineer (stating that boardwalk and/or bridge structures, including to outside ends of boardwalk approach ramps, were constructed in accordance with sealed designs) shall be submitted to the Town prior to Town's acceptance of the structure for maintenance.

All pedestrian structures, underpasses, and tunnels crossing roads owned and maintained by the NC Department of Transportation must receive NCDOT approval prior to beginning any work within the right of way. All trail overpasses (over roadways and railways) shall meet current AASHTO and ADA standards for slopes.

2. Boardwalks & Bridges

All sealed boardwalk and bridge designs shall be included with the approved site/subdivision plan sets. Boardwalks and bridges shall be designed in accordance with the AASHTO Standard Specifications for Highway Bridges, current edition. Design Live Load shall be for an AASHTO H5 vehicle with an evenly distributed load of 85 pounds per square foot or a concentrated load of 10,000 pounds at mid-span. Typical maximum longitudinal slope in any direction should not exceed 4 percent. Metal plaques shall be permanently affixed to both ends of structures indicating maximum weight capacity of structure and inside clear width.

Greenway bridges can either be constructed with a pre-engineered laminated beam construction or with structural steel with wooden decking and handrails. Typically, pre-engineered laminated beam bridges shall be utilized at locations that have adequate crane access for installation. Both styles of bridge shall be designed to meet or surpass the design requirements listed below.

Boardwalks and bridges that encroach FEMA floodway or non-encroachment area require a Conditional Letter of Map Revision prior to construction.

A. Clearance

Abutments shall not be located within the FEMA floodway and shall be located a minimum of 5 feet from the top of the stream bank. Boardwalks/bridges and abutments shall not be located within a sanitary sewer easement where crossing a waterway. In shared utility and greenway corridors boardwalk structures shall be located a minimum of 10 feet from the center of all existing sewer lines, and bridges and abutments shall be located a minimum of 20 feet from the center of all sewer lines. There shall be a minimum clearance of 4 feet from the lowest portion of all bridges to the normal water level. Bridge abutments cannot be located within the floodway and shall be located a minimum of 5 feet from the top of the stream bank. The lowest horizontal component of structures shall be above the 100-year storm elevation. Minimum pile penetration for piers shall be 10 feet or a depth recommended by a North Carolina Professional Engineer. Illustrate how high-water levels will pass without damaging bridge. Provide a section of the proposed bridge with the construction documents.

B. Footings and Wing Walls

Footings and wing walls shall be constructed with reinforced concrete as designed and sealed by a North Carolina Professional Engineer. A representative of the Geotechnical Engineer's staff shall approve the footing excavation bottoms prior to constructing bridge footings and placement of rebar and concrete. Tops of footings shall be 2 feet below adjacent creek bed elevation. Rip-rap stone shall be used to armor slopes and protect wing walls for bridge crossings.

C. Concrete Approach

Approach slabs and everything between slabs shall be included in all required bridge and boardwalk certifications and shall be considered part of bridge/ boardwalk structure. Bridge and boardwalk railings shall extend 8 feet minimum beyond the ends of bridge/ boardwalk. Rip-rap stone shall be used to armor slopes for bridge/ boardwalk crossings, including areas around wing walls and end bents to reduce erosion at structures.

D. Handrails

A handrail shall be installed on the railing of both sides of bridges and boardwalks that exceed a 5 percent running slope (approved only on a case-by-case basis). Handrails shall be designed and located in accordance with ADA and AASHTO requirements. Handrails must be of uniform height, 34 to 38 inches from the finished surface.

E. Materials

All structural members shall have a minimum nominal thickness of material of at least 2 inches. All hardware and fabricated connections shall be hot-dipped galvanized after fabrication in accordance with ASTM A153. Small members shall have pre-drilled holes to prevent splitting during construction. All members shall be screwed or bolted together. Joist hangers shall be galvanized. Treated lumber shall be used and be in accordance with the most current NCDOT Standard Specifications for Roads and Structures. For boardwalks, Southern Yellow Pine, Grade No. 2, shall be used except for top rail and routed handrail which shall be Southern Yellow Pine, Grade No. 1. For bridges Southern Yellow Pine, Grade No. 1, shall be used. Structural bridge components shall be fabricated from laminating lumber. Laminating lumber shall be Southern Pine Kiln Dried and graded to meet the requirements of Standard Specifications for Structural Glued Laminated Timber (AITC 117). Lumber combination shall be used for identification. Laminated components shall be per AITC architectural appearance grade. Solid sawn decking shall be pressure treated in accordance with C2 for above ground use. Laminated lumber handrail posts shall be fastened to the exterior beam with galvanized steel carriage bolts. Handrails must be metal and meet current requirements as stated in the ADA Accessibility Guidelines (ADAAG). Adhesives shall be wet-use (waterproof) complying with ANSI/AITC A190.1 – latest edition. Each bearing and template shall be fabricated to accommodate 1¾-inch diameter anchor bolt. Anchor bolts shall be aligned longitudinally with the bridge. All steel for bearing connection plates shall be ASTM A36. The manufacturer shall furnish all connecting steel and hardware. Decking shall be secured using stainless steel deck screws. Pre-engineered bridge manufacturer is not responsible for the template, setting plates, or anchor bolts.

F. Fabrication

Workmanship, fabrication, and shop connections shall be in accordance with the latest version of American Institute of Timber Construction and all related Interim Specifications. Bridges may be assembled at the site or at the manufacturer. At the end bents, the bridge shall be fabricated to produce a 6-inch longitudinal distance from centerline of anchor bolts to end of beam. A 1-inch open joint shall exist between the end of the bridge and the end bent backwall.

G. Railings and Accessories

Structural bridge railings fabricated from laminated lumber shall have a smooth inside surface with no protrusions or depressions and all members, railings, corners, and ends of lumber shall be sanded smooth and edges eased. Finished railing height shall be 42 inches or higher in high hazard situations. Maximum spacing of railings shall be such that a 3½-inch sphere shall not pass between the members.

H. Finishes

All glulam materials shall receive one factory applied coat of clear penetrating sealer.

I. Delivery and Erection

Bridges or bridge components will be delivered by truck to a location nearest to the site accessible by roads. The contractor shall provide for the installation of anchor bolts to be installed. The information required to develop the template shall include the size, configuration, and spacing of the bolts as they shall be installed in the footing.

J. Quality

The bridge manufacturer shall maintain records assuring that all lumber, bolts, and materials used are in accordance with the material specified and certified by a North Carolina Professional Engineer. A copy of the records shall be provided to the owner. The bridge shall be identified and marked (on both ends) with a permanent metal nameplate showing the manufacturer's name, location, date of manufacture, maximum load carrying capacity, and inside clearance width.

K. Pre-Engineered Bridges

The manufacturer shall have 5 years minimum experience in design and fabrication of pre-engineered pedestrian bridges. The design shall be in accordance with the American Institute of Timber Construction, AITC 117-2001, or latest edition, the total bridge dead load applied to the End Bent shall not exceed 37,000 pounds and shall be designed for a minimum wind load of 30 pounds (approximately 120 mph). The wind is calculated on the entire vertical surface of the bridge as is fully enclosed. All bridges shall be designed for seismic loads of the intensity required by local codes. Bridge camber at center of the bridge span shall be a maximum of 2.5 percent of the total bridge span. This should produce a localized deck slope of 12:1. Bridge shall be cambered to offset full dead load deflections. Bridge span shall be defined as the distance from center to center of the bearings. The bridge being designed shall have bearing elevations that are equal. Manufacturer shall provide for one deck plank at each end of the bridge to span the 1-inch gap as described below to prevent debris from falling through the gap. This deck plank shall match the decking of the bridge and shall be installed at the site after the backwall is installed.

3. Underpasses, Tunnels, and Culverts

All sealed designs for underpasses and tunnels shall be included with the approved site/subdivision plan sets. Greenway tunnels shall be 12 feet x 12 feet reinforced cast-in-place concrete structures as specified by NCDOT. Tunnels shall exhibit a 1 percent minimum longitudinal slope; 2 percent maximum cross slope. Headwalls with wing-walls are required at both ends of the tunnel. Special consideration shall be placed on the drainage design at the entrance to the tunnel. Where necessary trench drains should be incorporated at the tunnel entrance to intercept water from pooling within the tunnel.

Contractor/applicant shall be responsible for coordinating review and approval by NCDOT (where crossing NCDOT roadways) and for obtaining any required encroachment permits prior to beginning any work. All tunnels shall be lighted. Power meter for tunnel lighting shall be located above the 100-year flood elevation and minimum 10 feet above trail surface.

END OF SECTION 9.