Summary of NCDOT Responses to Greenway Design Standards Value Engineering Study
April 22, 2014

(Note: The following is organized with the original issue/topic listed first, a proposed change by the VE study, and a final NCDOT response to the recommendation per topic.)

1) **Original Design/Material:** ABC or base course will be used as a base.

   Proposed Change: Consider allowing slag or single-size expanded shale for base course. This material should allow tree roots to grow through without buckling the pavement.

   Recommendation/Explanation: M&T has concerns over stability of the proposed materials when used as a base. Additional edge confinement may be necessary by widening the base to one foot outside the pavement edge. Also, determination of target density would have to be made in the field with material delivered to the project. We recommend a trial project with involvement from Materials and Tests, Pavement Management and Geotechnical Units during the construction process.
   Due to limited suppliers, increased cost, and lack of documentation for reduced maintenance costs through controlled root growth, sponsor who made this recommendation should identify a test section on a pilot project and assume cost responsibility.

2) **Original Design/Material:** Greenways are tested to roadway standards.

   Proposed Change: Provide testing standards for greenways that are different than roadway testing standards.

   Recommendation/Explanation: In conjunction with the Construction Unit and the Director of Field Support, we have established a Minimum Sampling guide for Greenways and Multi-use Paths. This has been added to the Construction manual. Please see the section on Locally Administered Projects (Exceptions for Greenways and Multi-Use Paths starts on page R-244) at this link → https://connect.ncdot.gov/projects/construction/Construction%20Manual/Construction%20Manual%20RR4%20R122%20thru%20R246%202013.pdf for more information.

3) **Original Design/Material:** No minimum pavement options are provided.

   Proposed Change: Provide pavement options with a pros / cons list so that all LGA's understand the benefits and limitations associated with each pavement structure. This list would only be provided with the NCDOT provided minimum pavement options. LGA's could choose to exceed the minimum based on local experience.

   Recommendation/Explanation: See attached memo "Minimum Pavement Design Recommendations for Greenways"

4) **Original Design/Material:** Bridges wider than 10' designed with a H5 truck loading require permanent bollards.

   Proposed Change: Consider controlled access (i.e. collapsible bollards) for bridges wider than 10' designed with a H5 truck loading.

   Recommendation/Explanation: No change. Design will be in violation of AASHTO's LRFD Guide Specifications for the Design of Pedestrian Bridges. Collapsible bollards will not prevent access by overweight vehicles.

5) **Original Design/Material:** Alternate foundations are not permitted for boardwalks.

   Proposed Change: Consider allowing alternate foundations for boardwalks (i.e. Helical Piers).

   Recommendation/Explanation: Alternate foundation types will be considered on a case by case basis. One way to efficiently allow alternative foundation types would be to develop a list of approved alternative foundations through the product evaluation program similar to the way alternative sound barrier walls are handled.

   This approach allows use of alternative foundation treatments for boardwalks. It also suggests a way for an interested group to submit alternates well in advance of construction through the product evaluation program so that the potential for project delays is minimized.

6) **Original Design/Material:** The current seeding and mulching procedure does not provide any options.

   Proposed Change: Provide seeding options in environmentally sensitive areas.

   Recommendation/Explanation: NCDOT – Roadside Environmental Unit has designated eastern and western seed mixes for highway construction purposes. A native mix for both east and west is available at the REU Soil and Water website. http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/soil_water/special_provisions/ . If the mix is not suitable then it is possible to develop optional seed mixes based on the availability of seed. The Engineer would need to contact Roadside with a request for an alternative seed mix.

   Many of the seed species that would satisfy the recommendation are very expensive and are often difficult to establish. It may be prudent to limit use of alternative seed mixes of this sort unless specifically required by environmental commitments to resource agencies.

7) **Original Design/Material:** No information regarding the exceptions under the Buy America Act are given to the LGA's.

Proposed Change: Include information about the Buy America Act and the exemptions that are covered. Provide the information as a link so any changes will be automatically reflected.

Recommendation/Explanation: A comprehensive Q and A from FHWA on interpretation of Buy America policies can be found at:
http://www.fhwa.dot.gov/construction/contracts/buyam_qa.cfm

A memo from FHWA on manufactured products which is not included in the above Q&A can be found at:
http://www.fhwa.dot.gov/construction/contracts/121221.cfm

North Carolina Law requires the DOT to enforce Buy America on state funded projects consistent with the Federal CFR. NC Statute can be found at:
http://www.ncga.state.nc.us/EnactedLegislation/Statutes/PDF/BySection/Chapter_136/GS_136-28.7.pdf

8) **Original Design/Material:** Only standard concrete strength options are provided.

Proposed Change: Provide a menu of options for concrete strengths. Include information on what to do if LGA's use a different mix design that a standard NCDOT mix. Provide a link to the NCDOT approved producer / supplier list on NCDOT's website.

Recommendation/Explanation: On page R-244 of the link below, exceptions to the requirements for Greenways and Multi-Use Paths are provided. Concrete used on these types of projects must come from an NCDOT Approved Supplier and the mix must be a mix that has been previously used on a NCDOT project. This applies to Class B mixes (typically used for sidewalk and curb and gutter) only. All other concrete mixes must meet the requirements of the Standard Specifications. See the link below for Table 1000-1 on page 10-5 of the Standard Specifications for "menus of options".

Minimum Sampling Guide Exceptions for Greenways and Multi-use Paths → https://connect.ncdot.gov/projects/construction/Construction%20Manual/Construction%20Manual%20RR4%20R122%20thru%20R246%202013.pdf

Table 1000-1 of NCDOT Standard Specifications showing concrete classes and required strengths →
https://connect.ncdot.gov/resources/Specifications/Specification%20Resources/2012%20Standard%20Specifications.pdf

If an LGA's design specifies a different concrete strength than any of the mix types listed in the Standard Specifications, Section 1004-4 on page 10-3 and 10-4 of the Standard Specification as linked above details the process for submitting concrete mix designs for approval.

9) **Original Design/Material:** Instances where the distance from the top of the deck to the bottom of the creek is less than or equal to 30" currently requires handrail.

   Proposed Change: Consider allowing the use of the current North Carolina Building Code which doesn't require hand rails in instances where the distance from the top of the deck to the bottom of the creek is less than or equal to 30".

   Recommendation/Explanation: Change accepted as proposed with toe rail and scuppers for drainage.

10) **Original Design/Material:** ADA Access Route standards are currently being used.

   Proposed Change: Consider tailoring ADA requirements towards "ADA for Recreational Trails" and not "ADA Access Route" standard requirements (i.e. less stringent grade requirements).

   Recommendation/Explanation: Refer to option per US Access Board Guidelines & Standards under Streets & Sidewalks – Shared Use Paths (Chapter R3: Technical Requirements, R302.5 Grade). It states that "….compliance is required to the extent practicable."

11) **Original Design/Material:** The minimum allowable design radius is 90'.

   Proposed Change: Consider allowing a tighter design radius than the standard minimum of 90'.

   Recommendation/Explanation: Refer to option per AASHTO "Guide for the Development of Bicycle Facilities, 2012 – Forth Edition" Table 5-2 "Minimum Radii for Horizontal Curves on Paved, Shared Use Paths at 20-Degree Lean Angle" (Page 5-14).

12) **Original Design/Material:** No information is provided to LGA's regarding FEMA flood study requirements.

   Proposed Change: Clearly communicate that if a greenway crosses a FEMA jurisdictional flood channel, Federal Regulations mandate that it must have a flood study.

   Recommendation/Explanation: If a greenway crosses or encroaches into a designated Flood Hazard Zone regulated under the National Flood Insurance Program, the design must be approved by the responsible local governing agency for its consistency with local flood zoning ordinances. A Hydraulic Analysis of the crossing/encroachment will be required to determine its impact to the 100 year Flood Elevation and/or 100 year Floodway Boundary. Information concerning Floodplain Requirements in North Carolina can be found at the following links:

   "Guide to Floodplain Management Requirements in North Carolina"

http://www.ncfloodmaps.com/pubdocs/nc_floodplain_mgmt_requirements.pdf

"North Carolina Floodplain Management 2008 Quick Guide"
http://www.ncfloodmaps.com/pubdocs/nc_quick_guide_2008.pdf

13) **Original Design/Material:** Foundations are designed for the 500 year scour.

Proposed Change: Design foundations for historical scour instead of the 500 year scour. Use sub-regional tier bridge design guidelines. Do a risk assessment on evaluating scour.

Recommendation/Explanation: Use *Division of Highways NCDOT Sub-Regional Tier Design Guidelines for Bridge Projects (February 2008)* to evaluate scour. This requires the Hydraulic Engineer to analyze scour for the 100 year flood or the Overtopping flood, whichever is less. A risk assessment should be performed and documented if a lesser design standard than this is used when evaluating scour.

14) **Original Design/Material:** No guidance is provided regarding signalization of bicycle and pedestrian crossings.

Proposed Change: Develop warrants that would allow for development of signalization for bicycle and pedestrian crossings.

Recommendation/Explanation: NCDOT is conducting Research and Development project "2014-15 Synthesis of Contemporary Guidance and Recommendations for (A) Pedestrian Signal Provisions and (B) Marked Crosswalks at Uncontrolled Approaches." The project is scheduled to be completed by August 15, 2014. NCDOT will evaluate the results from this project and provide recommendations.

15) **Original Design/Material:** LGA's are required to search and find the Structures Policy for pedestrian bridges.

Proposed Change: Provide a link to the Structures Policy for pedestrian bridges.

Recommendation/Explanation: AASHTO's LRFD Guide Specifications for the Design of Pedestrian Bridges is protected by copyright laws and therefore cannot be posted for free download on NCDOT's website. Municipalities and other interested parties can purchase the guidelines as needed for review in conjunction with their greenway projects.

16) **Original Design/Material:** Hydraulic tunnels and box culverts may be considered for pedestrian use.

Proposed Change: Consider using hydraulic tunnels or box culverts for pedestrian use.

Recommendation/Explanation: A hydraulic analysis must be performed to evaluate effect on upstream properties before using hydraulic tunnels or culverts for pedestrian use.