GUIDELINES FOR THE PREPARATION OF SIGNING and FINAL PAVEMENT MARKING PLANS FOR DESIGN-BUILD PROJECTS May 2016

I. Introduction

Use the following Guidelines in conjunction with the Signing and Final Pavement Markers and Signing Scope of Work and Pavement Markings Scope of Work provided in the Request for Proposals and Design-Build Submittal Guidelines to develop the Signing and Pavement Marking Plans. The Signing and Pavement Marking Plans shall be developed to accommodate all types of traffic as defined by the latest version of the *Manual of Uniform Traffic Control Devices*, including but not limited to over-sized vehicles.

As part of the submittal guidelines, the Design-Build Team shall ensure Signing and Markings project entities are coordinated to confirm continuity within and outside the project limits that may be impacted from the proposed construction.

The Design-Build Team shall develop Signing Plans that adhere to the following Guidelines, in conjunction with the Signing Scope of Work provided in the Request for Proposals and Design-Build Submittal Guidelines located on the Design-Build website.

II. Signing Plan Development Procedure

As a minimum, the Signing Plans shall show the following existing and proposed features:

Pavement
Paved Shoulders
Bridges
Culverts
Sound Walls / Retaining Walls
DMS Structures
Guardrail / Cable Guiderail
Drainage
Survey / Base Lines
Right-of-way
Sidewalks
Curb Ramps / Cross Walks
Raised Monolithic Islands

The Signing Plans shall incorporate stationing, including equalities, as labeled on the Roadway Plans; north orientation for each sheet; signalized intersection notations; and beginning and ending stations for the signing limits. Proposed traffic flow arrows shall be shown at the beginning and end of each sheet, at overhead sign locations and following any lane transitions.

The Design-Build Team shall develop Signing Plans in compliance with the latest version of the *MUTCD*, 2009 NC *Supplement to the MUTCD*, 2012 NCDOT *Standard Specifications for Roads and Structures*, and 2012 NCDOT *Roadway Standard Drawings, Structural Supports for Highway Signs, Luminaires, & Traffic Signals* 2013, and the *Standard Highway Sign Book.*

The Design-Build Team shall incorporate details found in the NCDOT's 2012 *Roadway Standard Drawings* – Section 900, as necessary.

Upon request, the NCDOT will provide the following information to the Design-Build Team:

- Information previously prepared by the NCDOT Signing and Delineation Unit
- Non-proprietary computer software for support design
- NCDOT Signing Cell Libraries, Seed Files, Typical Layout Sheets and Typical Signing Details

The Design-Build Team shall incorporate the Roadway Standard Drawings, Special Provisions and details found at the website below, as necessary:

https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx

The Design-Build Team shall adhere to the NCDOT's signing cell libraries, seed files, typical layout sheets and typical signing details found at the above website.

III. Plan Layout

The Design-Build Team shall submit Signing Plan Sheets that comply with the following:

- Overview sheets shall be developed with a maximum scale of 1" = 100' (for metric projects 1:1000) *
- Full-size sheets shall be 22" x 34"
- Half-size sheets shall be 11" x 17"
- All sheets shall be numbered as S-1, S-2, etc.
- On all full-size sheets, a 4 ½" x 4 ½" area, directly below the information block in the upper right corner, shall be reserved for construction revision notes.

* Scales are for full-size plans

The plan layout shall contain:

- **Title sheet,** with index of sheets, list of applicable 2012 *Roadway Standard Drawings*, and overview of project. The title sheet shall also contain the following NCDOT contact information:

  NCDOT CONTACT INFORMATION
  XXXXXX, Signing & Delineation Regional Engineer
  XXXXXX, Signing & Delineation Project Design Engineer
  T.T. McFadden, Design-Build Squad Leader

- **Summary of Quantities Sheet** is not required.

- **Signing Note Sheet** shall show only the notes that apply to the project. The note sheet shall contain the appropriate general notes and any project specific notes that may apply.

- **Overhead Sign and DMS Structure Line Drawing Sheets** shall include lane widths, pavement and ground slopes, location of supports, S-dimensions at support locations, positioning of signs relative to travel lanes, sign messages and / or future messages, future signs, minimum and maximum vertical clearances, existing and proposed guardrail, walkway detail for DMS (if required), labeling of facility and direction of travel, windload and deadload requirements to be used for existing and proposed structures and footing designs, and all applicable notes.

- **Type A & B Ground Mounted Support Chart Sheet(s)** shall contain the sign number, sign type, sign size, roadway station, number of supports, beam section size, type of sign support, offset from the edge of travel lane, sign attachment method (if applicable), sign support S dimensions, lengths, weight, and the amount of concrete needed for the support footings. The support chart sheet shall contain the typical elevation detail for ground mounted signs and the detail for exit gore sign offsets. Utilize the most recent support chart located at the following website:

  https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx

- **Type A, B & D Signs Sheets** shall contain the Type A, B, D and Overlay signs for the project. The sign designs shall be included on the sheets and contain the sign number, sign size, type of sign, quantity, total area of the sign, type of border, background color, copy color, material thickness, spacing factors, number of Z-bars, and the applicable notes for fabricating the sign.

- **Type E, F, and Milemarker Sheets** shall contain the sign size, the quantity of each sign, and the number of U-channel posts per sign. The Type E sheet shall contain only the Type E signs used on the project. Determination of required Type E and F signs shall be made by the Design-Build Team and included in the Signing Plans.

The signing plan sheets shall contain the following:

- **Sign Locations** shall be determined and noted by stationing on -L- Lines, -Y- Lines, ramps, service roads and cul-de-sacs for re-erected existing signs, existing signs remaining in place, proposed signs, and future signs. No stations are required for Type E and F signs erected at intersections and on -Y-lines. When stationing is not available, such as outside of the project limits, sign locations shall be dimensioned from a fixed point or sign spacing shall otherwise be indicated on the plans. Graphic representation of all existing, proposed, and future signs on the -L- Line, -Y- Lines, ramps, service roads and cul-de-sacs are to be positioned on the plans, as traffic would view them.

- **Ground Mounted Support Design for Type A and B Signs,** determined by S dimensions from cross-sections (or from field survey when cross-sections are not available), shall be required for Type A and B ground mounted signs. Design of supports shall be required using these S dimensions. Utilize the most recent support design program located on Signing and Delineation Unit's webpage. (Spreadsheets are available electronically upon request.)

Other plan requirements include:

- **Sign Designs** shall be prepared by the Design-Build Team for Type A, B, D, Overlays and Exit Gore signs using the latest version of GuideSign software. The individual sign designs shall be included in the Signing Plans in numerical / alphabetical order. The latest update to the GuideSign software is located at the following website:

  https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx

- **Crane Safety:** The Design-Build Team shall refer to the Crane Safety project special provision for structures and bridges when erecting Type A and B guide signs, and overhead sign structures. The Crane Safety Special Provision is located on the following website:

  https://connect.ncdot.gov/resources/Structures/Pages/Project-Special-Provisions.aspx

- **Project Special Provisions,** for special signing items, shall be written by the Design-Build Team and sealed by a professional engineer registered in the state of North Carolina representing the Design-Build Team.

- **Coordination with Other Traffic Engineering Plan Requirements:** When locating and designing overhead signs and sign assemblies, lane drop signing, and "All Traffic Exit" signing, the Design-Build Team shall coordinate with the Work Zone Traffic Control Plans, Final Pavement Marking & Delineation Plans and Intelligent Transportation System Plans to ensure that they adhere to the signing requirements. The Design-Build Team shall label locations of traffic signal elements on the Signing Plans.

IV. Pavement Marking Plan Development Procedure

Unless prior approval is obtained from the Design-Build Unit, use the procedure below to develop Pavement Marking Plans.

The Design-Build Team shall incorporate the Roadway Standard Drawings, Special Provisions and details found at the website below, as necessary:

https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx

V. General requirements for developing Pavement Marking Plans:

The Pavement Marking Plans shall show the pavement design for final pavement markings / markers on all roads and shoulders.

Ensure the development of the Pavement Marking Plan is in compliance with the NCDOT 2012 *Roadway Standard Drawings*, NCDOT 2012 *Standard Specifications for Roads and Structures*, and the 2009 *Manual on Uniform Traffic Control Devices (M.U.T.C.D.).*

NCDOT's 2012 *Roadway Standard Drawings* – Section 1200 - contain pavement marking standard details. These will need to be incorporated into the plans for most work activities. The Pavement Marking Plans shall provide details where pavement marking layouts cannot be entirely covered by these standard drawings.

VI. Plan Layout:

a. Final Pavement Marking Plan Scale and Format

Pavement Marking Plans shall comply with the following:

- Overview sheets shall be developed with a maximum scale of 1" = 500' *
- Detail sheets shall be developed with a maximum scale of 1"=50' *
- Half-size sheets shall be 11" x 17".
- All Final Pavement Marking Plan sheets shall be numbered PM-1, PM-2, etc.

*Scales are for full-size plans.

b. Final Pavement Marking Plan Layout

The plan layout shall contain:

- **Title sheet**, with Index of Sheets, list of 2012 *Roadway Standard Drawings* and Legend. See the Signing and Delineation Unit's website for microstation cell library that contains the standard cell to be used for the Title Sheet. Title Sheet shall also contain the following NCDOT contact information:

  NCDOT CONTACT INFORMATION
  XXXXXX, Signing & Delineation Regional Engineer
  XXXXXX, Signing & Delineation Project Design Engineer
  T.T. McFadden, Design-Build Squad Leader

- **General Notes Sheet(s)** shall contain all appropriate notes.
- **Summary of Pavement Markings and Marker Materials**
- **Final Pavement Marking Plans** shall include details for all areas that roadway standard drawings do not apply. For all symbols and line patterns, a legend of the type, width, color and material thickness shall be provided.

VII. Preliminary Final Pavement Marking Plans

The first submittal shall consist of an unsealed Preliminary Pavement Marking Plans.

- **Preliminary Pavement Marking Plans requirements:**

Submit Preliminary Pavement Marking Plans that show the pavement markings for the final alignment. Show how proposed markings will connect to existing markings and include any markings required outside of the construction limits due to temporary and final traffic patterns. Include a general statement pertaining to the type of material used for pavement markings on the final wearing surface throughout the project.

VIII Final Pavement Marking Plans

- **Final Pavement Marking Plans requirements:**

Prepare Final Pavement Marking Plans at a scale of 1"=50' unless prior approval is obtained from the Design-Build Unit. The plans shall show lane widths, transition tapers, lane lines, edge lines, gore markings, symbols, word messages and other appropriate markings and markers. Include curb ramps types and station locations for crosswalks. See RFP for required type of markings and markers.

IX. Revisions to RFC Plans

If changes to the RFC Final Pavement Marking Plans are required, a revised plan and / or sheets shall be submitted for review and follow the requirements of the Design-Build Submittal Guidelines before the revised RFC Plans are issued.

A note that details the revision and its need shall be provided on each sheet that is revised. The original seal date and the name and license number of the professional engineer of record shall also be included on all revised sheets.

If revisions are extensive, a reprint of the entire Pavement Marking Plans shall be provided at the Department’s request. Plan sheets that are not revised shall not be resealed and dated; but shall include the original seal and date.