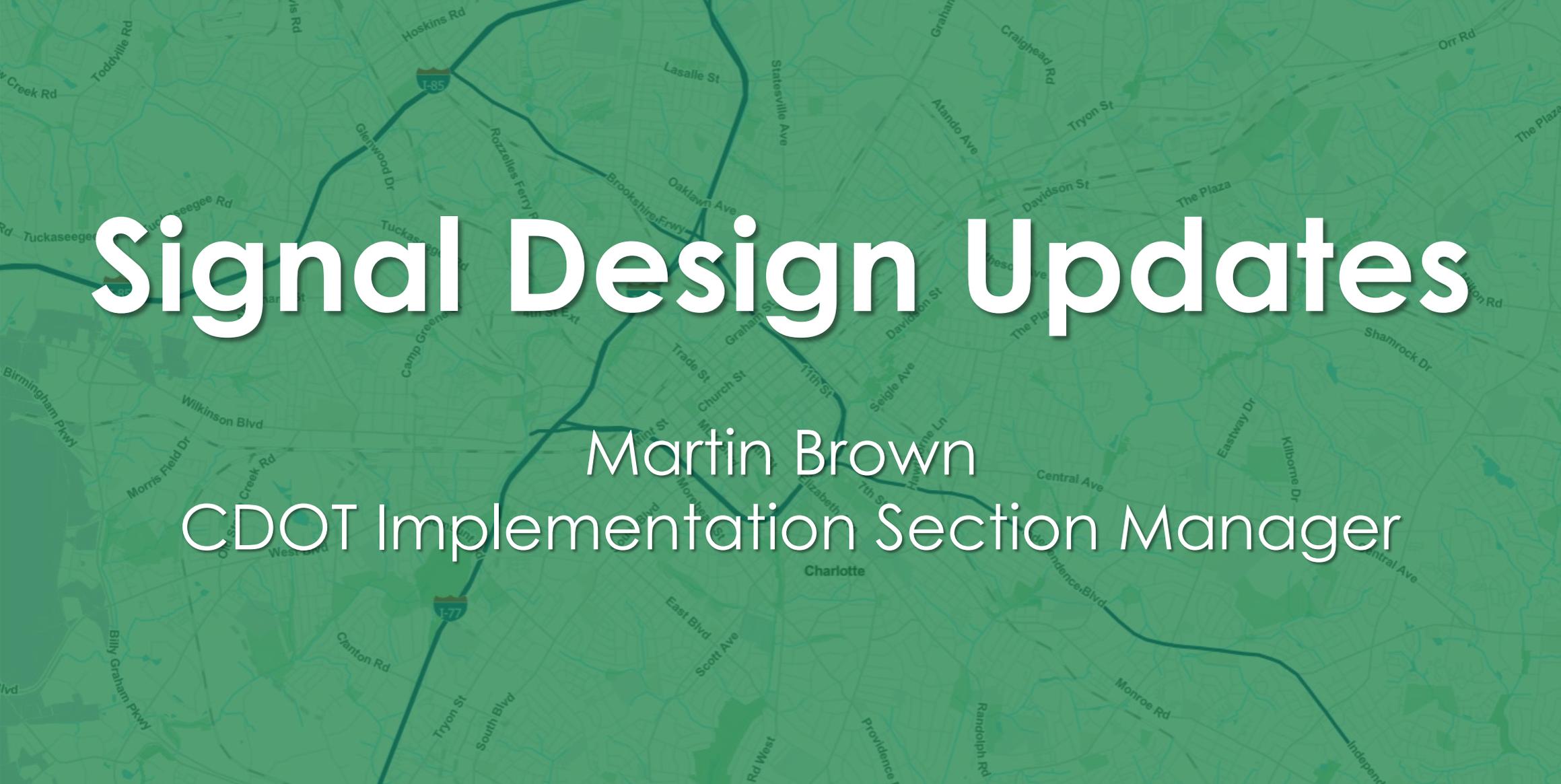


CDOT Updates

MARTIN S. BROWN, P.E. & ASHLEY BOENISCH

A map of Charlotte, North Carolina, with a green overlay. The map shows major roads and highways, including I-85 and I-77. The text "Signal Design Updates" is overlaid in large white font.

Signal Design Updates

Martin Brown
CDOT Implementation Section Manager

CIP Projects: Signal Design

- **Signal & ITS Design should be scoped with new projects**
 - New signals, PHBs and RRFBs
 - Existing signal modifications
 - Temporary signal plans matching TCPs

- **Updated signal scope to match project submittal phases**

- **NCDOT Prequalification requirements**

- **CDOT standard to install fiber-optic cable with all new signals & PHBs**

- **Utility design for CDOT signals**

Signal Design: General

- **NCDOT Prequalifications (as applicable)**
 - 00207 – Signal Design
 - 00208 – Signal Equipment Design/Application
 - 00209 – Signal Communications Design
 - 00210 – Signal System Timing Development & Implementation
 - 00123 – Intelligent Transportation System (ITS) Design

- **CDOT Templates & Standards**
 - Available online

- **Temporary signal plans**
 - Consider need in initial scope; dial in with TCP creation.
 - Signal plans should match TCP phasing and address lane use changes / alignment etc.

Signal Design: Preliminary Phase

- Used to determine early R/W and relocation needs, and **utility conflicts**
- Traffic Signal Cover sheet per location
- Signal Layout Sheet showing:
 - Preliminary proposed roadway geometry
 - Preliminary pole and equipment locations
 - *Signal poles*
 - *Down guys (as applicable)*
 - *Signal cabinet*
 - *Meter base*
 - *Pull boxes*
 - *Conduit runs*
 - *Pedestrian signal poles & buttons*
 - Existing and proposed R/W and easements
 - Signal heads and numbering per CDOT phasing
 - Proposed span attachment heights (as applicable)
- Mast arm or steel pole detail sheets (as applicable)

Signal Design: ROW Plan

- **Should include:**
 - Traffic Signal Cover sheet per location
 - Plan sheet
 - Plan details sheet, including additional detail or programming sheets as required
 - Signal Wiring diagram sheet
 - Low-voltage Wiring diagram sheet
 - Fiber-optic splice detail sheet
 - Mast arm or steel pole sheet(s) (as applicable)

- **CDOT Traffic Signal Design Checklist**
 - New – To be provided with ROW Plan

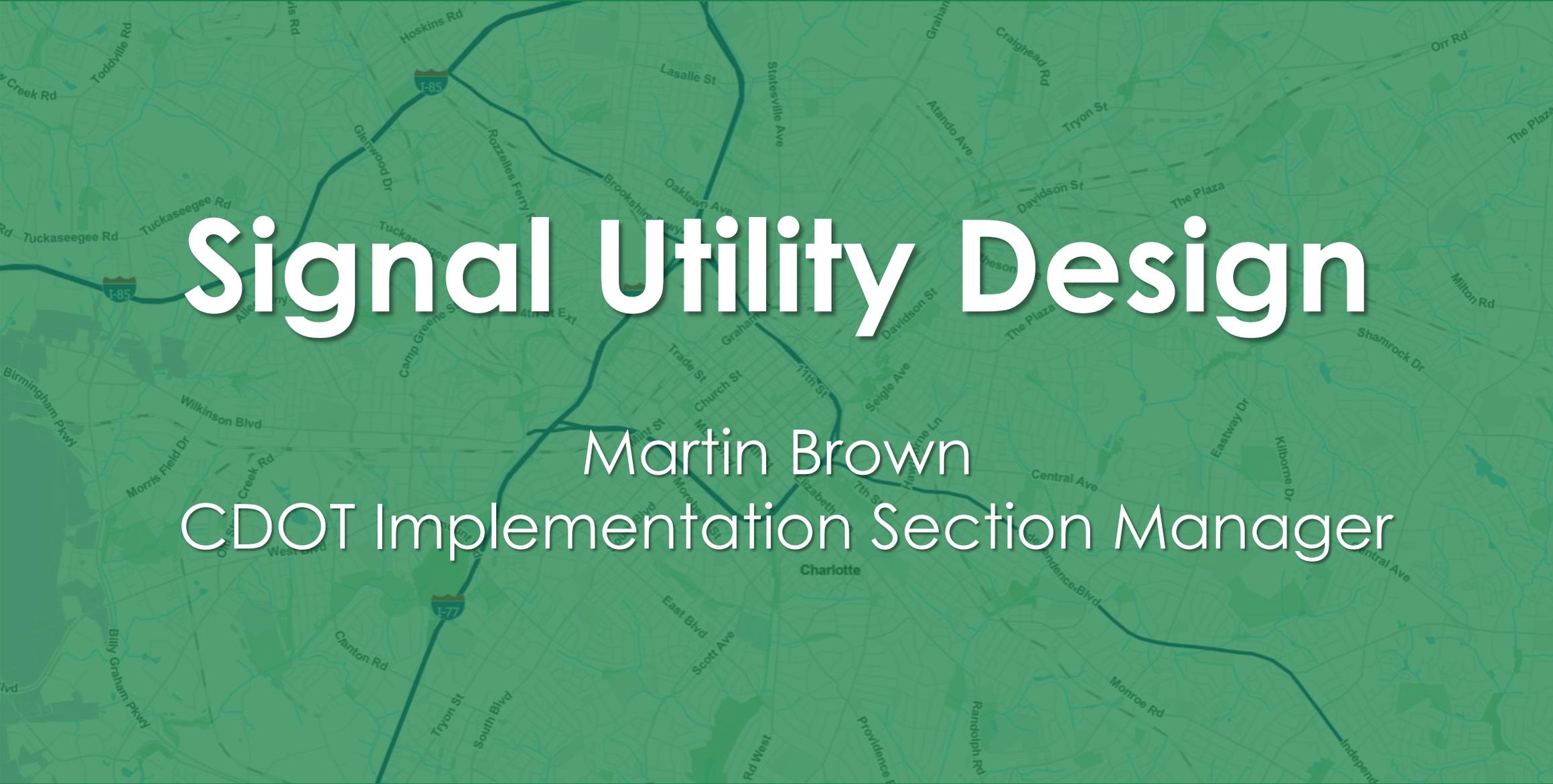
Signal Design: Construction Plan

- Shall contain all sheets from Preliminary & ROW, updated, and include final roadway geometry.
- CDOT Traffic Signal Design Checklist with this set also
- Everything to let a contract:
 - Takeoffs
 - SPs
 - Signed & Sealed plans
 - Matching ITS plan set

Signal Design: Record Plan

- **Signed & Sealed as-built PDF & DWGs**

- **Signal Record Plans shall:**
 - Feature all pages from the Construction Plan Submittal
 - Be updated to reflect as-constructed roadway geometry, signal and ITS infrastructure, pavement markings and signs.
 - Feature all “existing” layers using CDOT standard drawing layers
 - Be signed & sealed by a Professional Engineer licensed in North Carolina
 - Be provided in reproducible PDF format and modifiable AutoCAD DWG format

A map of Charlotte, North Carolina, with a green overlay. Major roads like I-85 and I-77 are visible. The text 'Signal Utility Design' is centered over the map in a large, white, sans-serif font.

Signal Utility Design

Martin Brown
CDOT Implementation Section Manager

Signal Utility Design

- **CDOT-operated Traffic Signals often use joint-use poles**

- **Duke Energy sets:**
 - Standalone wood poles & down guys
 - Mast arms
 - Make-ready circuit poles

- **Overheard vertical clearance, NEC & Duke Requirements**

- **AT&T poles – Attach signals only when there is an existing grandfathered attachment**

Pole attachments

- **Calculate attachment height using standard formula considering:**
 - Signal head height including hanger hardware
 - Span length
 - 3% sag

- **Vertical separation requirements for attachments:**
 - Min. 40" below neutral
 - Min. 40" below secondary power
 - Min. 12" apart from other *communication* type utilities
 - CDOT attachments should be min. 6", preferably 12" apart
 - Attach signal down guy **at the back** of the eye bolt

- **Can't attach at the same height in two directions on the same pole**

Utility crossing (not attached)

□ When crossing mid-span, Duke Energy requires:

- 2-ft below neutral
- 2-ft above next communication line
- Other requirements (coordinate with Duke)

□ This space usually does not exist

□ Either

- Make-ready adjacent poles and raise Duke's neutral
- And/or make-ready adjacent poles and attach a span to them



Thank you

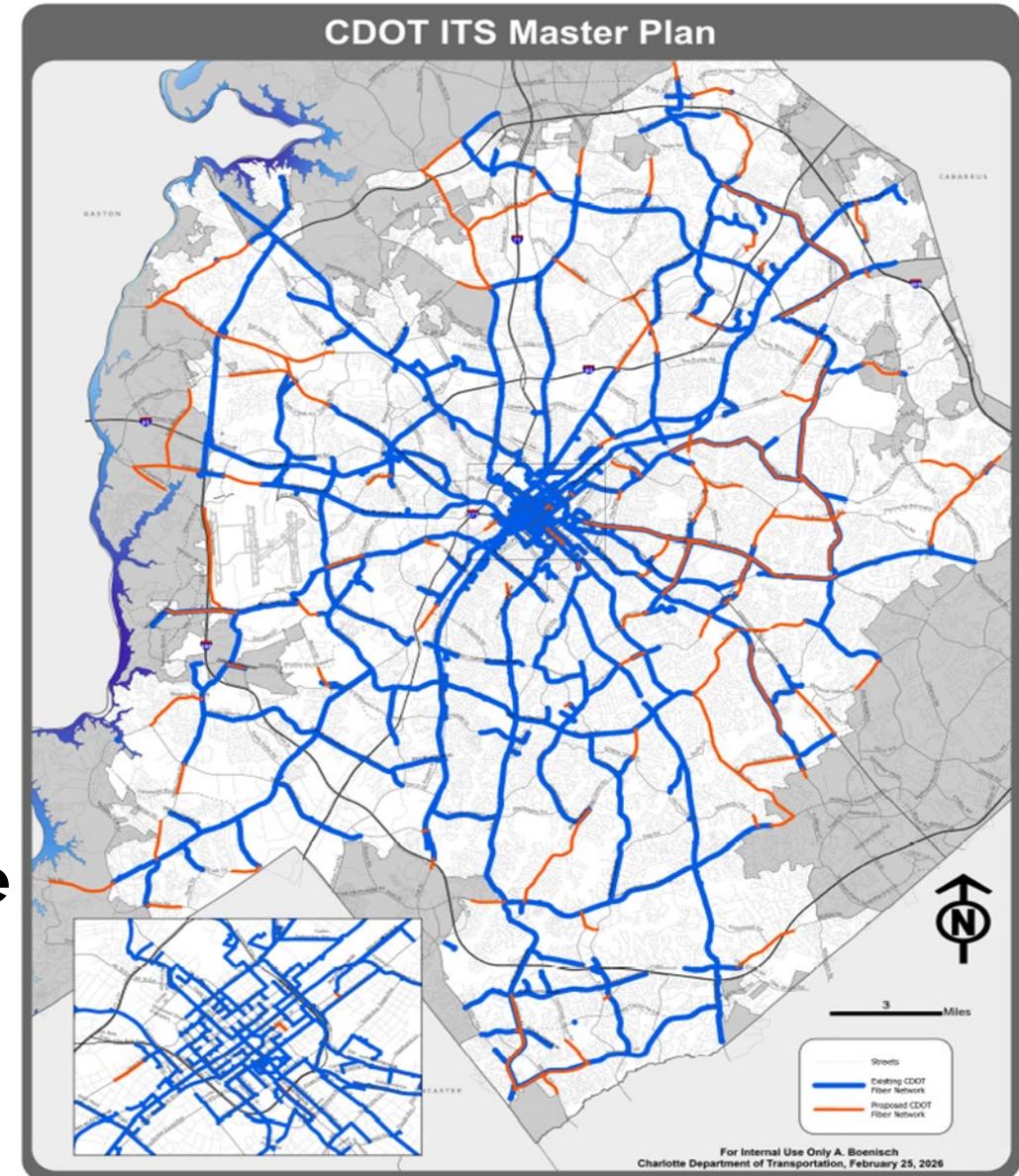


ITS Design Updates

Ashley Boenisch
Senior Project Manager

CDOT ITS Program

- **Program provides infrastructure for traffic signal communications.**
 - Conduit
 - Fiber optic cable
 - Traffic management cameras
 - Ethernet Switches
- **ITS Master Plan**
 - Developed in 2004 and updated in 2024
 - Strategic roadmap for ITS facilities
- **CDOT requires that all new traffic signals are on a coordinated system.**



CDOT ITS Program

- Fiber work may still be required even if existing fiber is at new the traffic signal location.
- ITS Standards & Templates
 - Specifications- 21 sections
 - Covers aerial & underground
 - *Will be available online soon*

ITS Design: Preliminary Phase (60%)

□ **Used to determine preliminary cable routing layout**

□ **Title sheet**

□ **Typical details**

□ **Individual splice details**

□ **Cable Routing Plan sheets**

- Pull boxes
- Conduit routes
- Poles
- Fiber cable size and route
- Traffic management cameras
- Ethernet switches

ITS Design: ROW Phase (90%)

- Title sheet
- Layout sheet with project location overview and Index of Sheet
- General Notes and Standards Sheet
- Traffic Control Notes Sheet
- Typical details
- Individual splice details
- Summary of quantities
- Fiber Optic Cable Testing Documentation
- Cable Routing Plan sheets

- **CDOT ITS Design Checklist**
 - In Development

ITS Design: Construction Plan (Final)

- Includes all sheets from Prelim & ROW with revisions
- Plus- Schematic of fiber cable routing, splicing, and testing

In addition to the Signed & Sealed plans, the Consultant shall provide:

- Engineer's Probable Cost of Construction
- ITS Specifications and Special Provisions

ITS Design: Record Plan

- **Signed & Sealed as-built PDF**

- **TBD if ITS Record Plans required**
- **If needed they shall include:**
 - All pages from the Construction Plan Submittal
 - Include all constructed ITS infrastructure.
 - Feature all “existing” layers using CDOT standard drawing layers
 - Be signed & sealed by a Professional Engineer licensed in North Carolina
 - Be provided in PDF format