

ENGINEERING SERVICES CONSULTANT TRAINING

Wednesday, April 28, 2021

9:00 am - 1:00 pm

Click here for link to recording of
the presentation:

[https://charlotte.webex.com/
recording-service/sites/charlotte/
recording/19cd600f8a511039bfb7
0050568189b8/playback](https://charlotte.webex.com/recording-service/sites/charlotte/recording/19cd600f8a511039bfb70050568189b8/playback)

AGENDA

| | | | |
|-----------------------------------|----------------------------------|---------------------------------|----------------------------------|
| Welcome | Contract Negotiations 101 | CBI Updates | Schedules |
| Scope | Independent Cost Estimates (ICE) | BREAK (5 minutes) | Plan Submittals & Cost Estimates |
| QA/ QC | BREAK (5 minutes) | In- House Design Best Practices | Construction |
| Utility Coordination & Relocation | Design- CDOT | BREAK (5 minutes) | Questions?/ Discussion |

Contract Negotiations 101

Contract Negotiations 101

Show process developed with Johnella

[Presentations\Contract Negotiation 4.23.2020.docx](#)

- ▶ PM to submit rates
- ▶ Recommend visiting project site before assigning hours
- ▶ Start with most current template
- ▶ Meet to discuss scope of work and project expectations
- ▶ Consultant assign hours and submit fees for City review
- ▶ Generally, expect process to take less than 2 months total

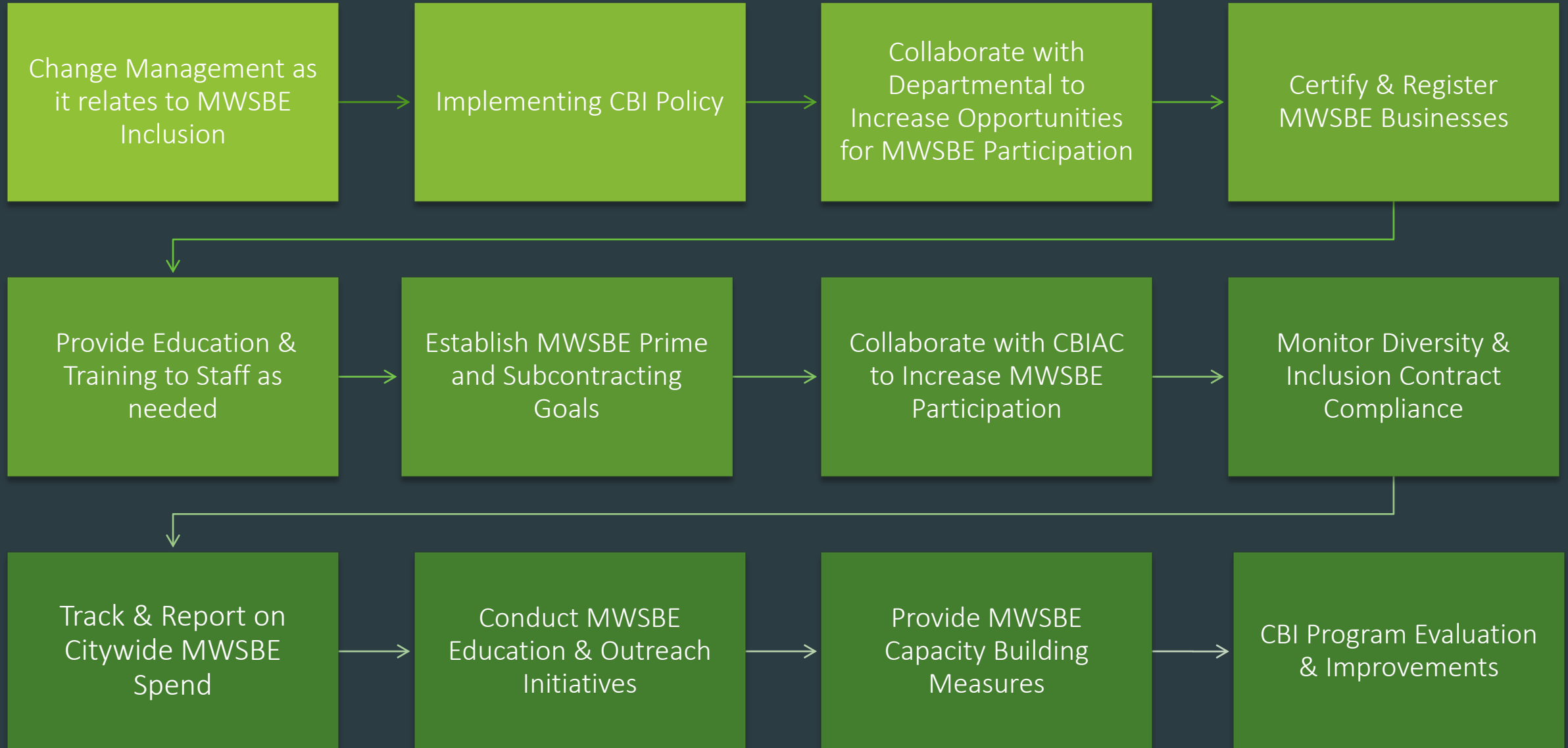
Charlotte Business INClusion

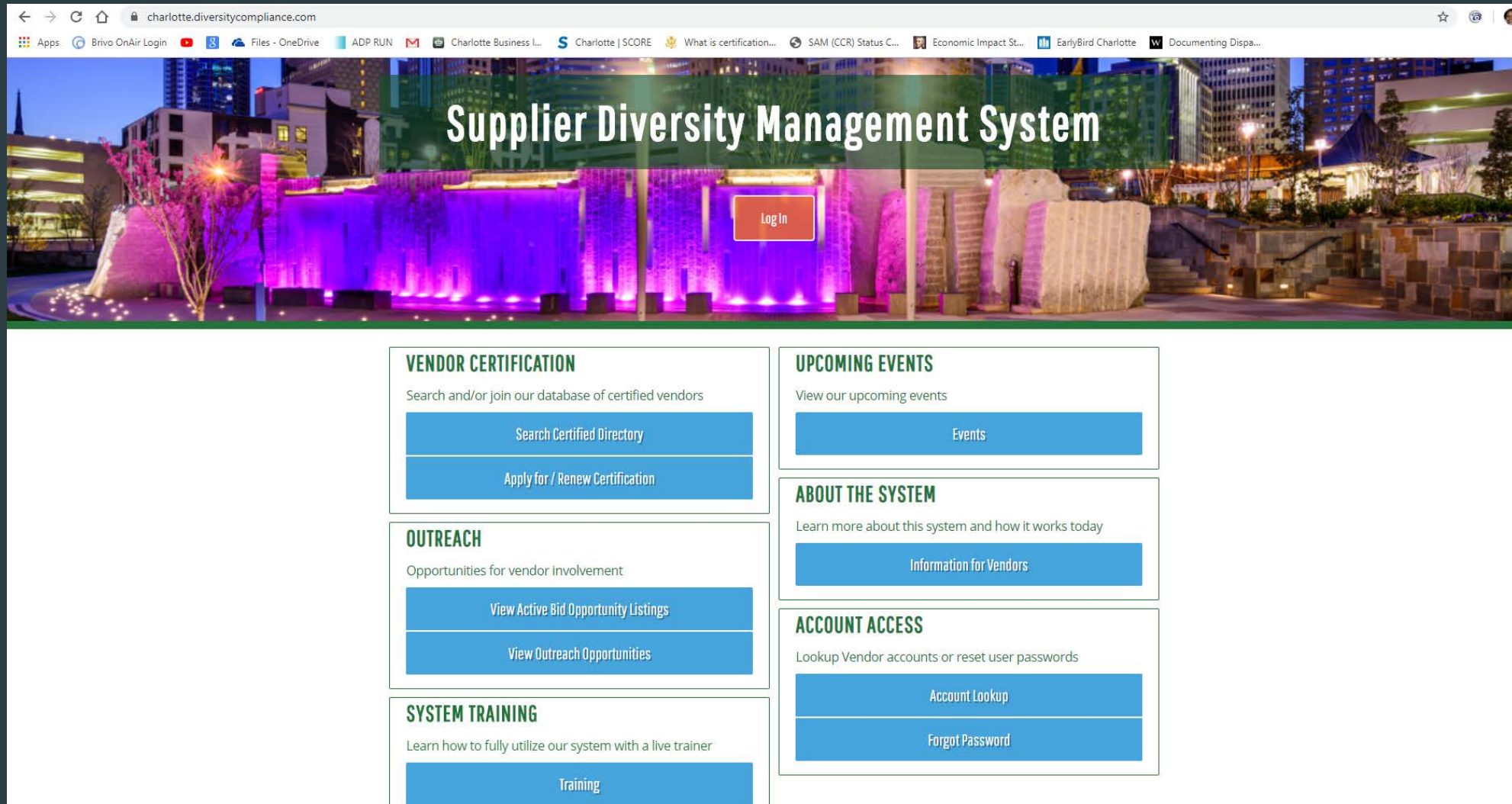
Eric Nelson, MBA

▶ Charlotte Business INClusion Program

- ▶ *CBI Responsibilities Overview*
- ▶ *CBI Diversity Compliance System*
 - ▶ *How to search for certified firms*
 - ▶ *Contract Compliance Audit Process*
- ▶ *What Needs to Happen Moving Forward*
- ▶ *Questions*

CBI Responsibilities





Supplier Diversity Management System

Log In

VENDOR CERTIFICATION

Search and/or join our database of certified vendors

Search Certified Directory

Apply for / Renew Certification

OUTREACH

Opportunities for vendor involvement

View Active Bid Opportunity Listings

View Outreach Opportunities

SYSTEM TRAINING

Learn how to fully utilize our system with a live trainer

Training

UPCOMING EVENTS

View our upcoming events

Events

ABOUT THE SYSTEM

Learn more about this system and how it works today

Information for Vendors

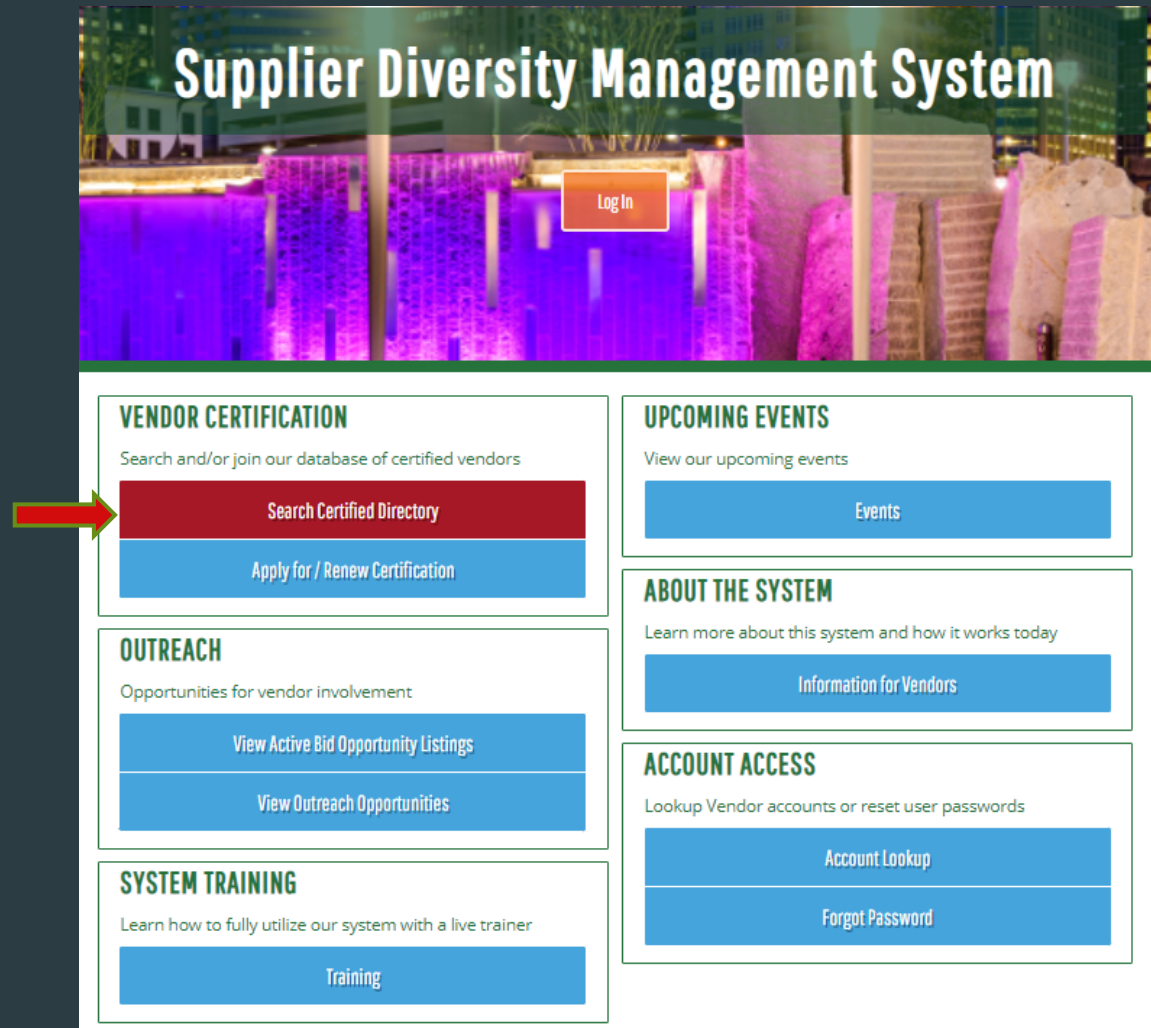
ACCOUNT ACCESS

Lookup Vendor accounts or reset user passwords

Account Lookup

Forgot Password

EXTERNAL & PUBLIC OPTIONS TO SEARCH FOR MWSBES



EXTERNAL & PUBLIC OPTIONS TO SEARCH FOR MWSBES

City of Charlotte Certified Directory


Search City of Charlotte Certified Directory by entering search terms and clicking **Search**. You must select at least one certification type.

Search by Certification Type

Certifications

- ☒ Minority Business Enterprise (MBE)
- ☒ Small Business Enterprise (SBE)
- ☒ Women Business Enterprise (WBE)
- ☒ Airport Concessionaire Disadvantaged Business Enterprise (ACDBE)
- ☐ Disadvantaged Business Enterprise (DBE)
- ☐ Historically Underutilized Business (HUB)

Search by Business Name or DBA

Business Name/DBA 
Tip: Try just a few letters of the firm's name.

Search by Business Description

Business Description
Tip: Try just a few letters of a keyword.

Search by Commodity Code

Commodity Codes

Search by Contact Person

Contact Person/Owner


First name Last name
Tip: Use the first letter. Tip: Try just the first few letters.

Search by Location

City
Zip Code
Tip: Search for multiple zip codes by separating with commas.
State
Phone Area Code

Search by Reference

Ethnicity
Gender



Supplier Diversity Management System

Log In

System Access Login

Enter a valid username and password combination. 10 login attempts left until account lockout.

Username

smontanez@charlottenc.gov

[FORGOT USERNAME / ACCOUNT LOOKUP](#)

Password

.....

[FORGOT PASSWORD](#)

☐ Remember Username

Login

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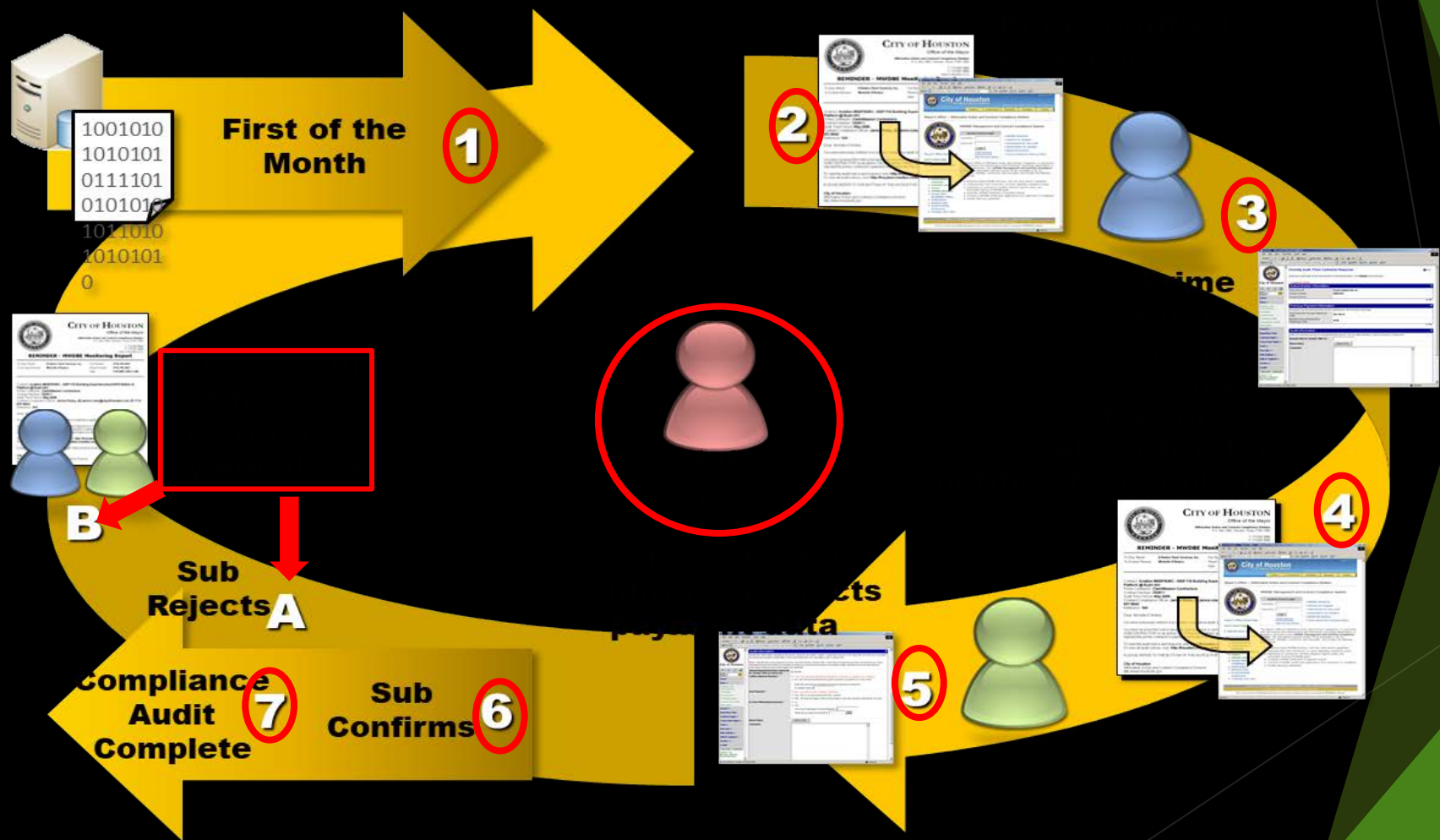
Contract Compliance Audit Process




Contract Compliance Reporting

- Prime reports payments made to All Subcontractors;
- All Subcontractors are expected review and confirm the accuracy of the payment amount;
 - Discrepancies are managed within the system
- CBI Policy States:
 - Part A: Section 7 (7.1 & 7.2) – Data Tracking and Reporting
 - Part D: Section D – Utilization Reports and Documentation of Payments

Contract Compliance Reporting



InclusionCLT Training Support



VENDOR CERTIFICATION

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[Search Certified Directory](#)

[Apply for / Renew Certification](#)

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Learn how to fully utilize our system with a live trainer

[Training](#)

 CITY of CHARLOTTE

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City Contract Compliance Reporting Contact List

- ▶ Learn More about Compliance Reporting and to obtain information on inclusionCLT:

www.CharlotteBusinessInclusion.com

Contacts:

- **Nyota Brown**-Compliance Manager

704-336-3634

- **Johnella Walker**- Assistant Contracts Manager (AES/ Construction)

704-432-5567

- **Arturo Reynoso**- CBI Program Compliance Specialist

704-577-5745

- **Sonia Bowes**-CBI Compliance Specialist

704-432-6366

What needs to happen moving forward

What is Your Role in supporting Diversity, Equity, and Inclusion?

- ◀ Cultural Shift in support of the City's Diversity, Equity, and Inclusion Initiative
- ◀ Intentional & Strategic use of Available Tools:
 - ▶ Policy
 - ▶ CBI Support Liaison & CBI Staff
 - ▶ Training & Guide on CBI Website
- ◀ Embrace CBI Program in the DNA of work by:
 - ▶ Engaging with CBI throughout the solicitation & contract phases
 - ▶ Managing contacts with participation ensuring Prime Compliance
- ◀ Support City's Call To Action in CBI's Strategic Plan

Schedules

Schedules

- ▶ Need to better define schedule at the start of project since tied to scope and fees
- ▶ Expectations- need to set deadline and action items for assignments and submittals
 - ▶ Dates and deadlines need to be honored
- ▶ Schedules cannot be altered without management approval
- ▶ Blue page submissions to Manager's office reduces opportunities for schedule changes; requires well documented reasons
- ▶ Managing risks to minimize impacts to schedule



Scope

Scope

- ▶ Project budgets are set based on the scope
- ▶ Scope is set in the consultant contract
- ▶ Consultant must have approval before doing any work outside of original scope
- ▶ Any new scope requested by CDOT or NCDOT must be approved by the Project Manager before proceeding
- ▶ Project Managers are in a position to question the need for changes (will seek consensus from management for any scope changes that effect the budget)

Field Visits

- ▶ Consultant is expected to visit the project site before setting scope and fees
- ▶ Consultant should visit project site with Project Manager
- ▶ Since there is a time lag between when the survey is done and when real estate starts, consultant should visit site with Project Manager to see if there any changes that are not on the plans (i.e. new development, driveways, utilities, etc.)

Independent Cost Estimates (ICE)

Independent Cost Estimate (ICE)

WHAT: Independent Cost Estimate (ICE) Review consists of the Consultant developing a cost estimate and comparing it with the Engineer's estimate. Significant differences are identified, and key assumptions are documented in a report.

The ICE review will generally take 4-5 weeks to complete depending on the complexity of the project. Please account for this time when submitting a request.

WHO: ICE Reviews shall be conducted on horizontal projects with >\$2.5M Construction Costs.

Consultants performing the ICE Reviews:

- ▶ MB Kahn Construction
- ▶ 35 North (Formerly PEG Contracting)

Independent Cost Estimate (ICE)

WHEN: ICE Reviews shall be conducted

- ▶ Key Milestones throughout the Project
- ▶ Before requesting funding from the City Council
- ▶ The Design Phase as needed from 30 - 90%
- ▶ Recommended for all projects at 90% Design

WHY: Provide confidence and validity in the project's cost estimates and ensure the project can stay within budget.

Independent Cost Estimate (ICE)

- Where:
- To initiate Cost Estimating Service:
- The PM completes the ICE Request Form
 - The ICE Request Form is located on the PM Central Homepage under Request Project Services
- The Consultant will develop a Task Order based on the ICE Request Form, Design Plans, and current cost estimate.



| Independent Cost Estimate (ICE) Request | | | |
|---|---|---|--|
| | | Request Date: | |
| Contact Information | | | |
| Project Manager: | | Phone Number: | |
| Email: | | | |
| Project Information | | | |
| Project Title: | | | |
| Project Number: | | Munis Number: | |
| Project Status: | <input type="checkbox"/> Planning <input type="checkbox"/> Design <input type="checkbox"/> Bid <input type="checkbox"/> Real Estate <input type="checkbox"/> Construction | | |
| Consultant (Include Sub-Consultants): | | | |
| Project Description: | | | |
| | | | |
| Cost Estimate Information | | | |
| Type of Service: | <input type="checkbox"/> ICE Review <input type="checkbox"/> Cursory Review <input type="checkbox"/> Complex Estimate <input type="checkbox"/> Other: <input type="text"/> | Must Complete Cost Estimating Service By: | |
| Special Provision/ Limitations/ Guidelines to Consider: | | | |
| | | | |

Please provide the completed request form to Carena Tate @ Carena.Tate@charlottenc.gov

The background features a dark blue-grey field on the left, transitioning into a series of overlapping, semi-transparent green and yellow-green geometric shapes on the right. These shapes are primarily triangles and polygons, creating a layered, abstract effect. The word "BREAK" is centered in the dark blue area.

BREAK

Plan Submittals & Cost Estimates

Cost Estimate Form Updates

April 28, 2021

1. Reminder be sure to use the latest forms anytime you update the cost estimate. Reminder that the latest forms for Engineering Services can be found here:

<https://charlottenc.gov/GS/procurement/GSBids/Pages/SPdetails.aspx>

Note: This is also where the Forum PDF is located. If you haven't already, sign up for email updates to this page (includes CAD Standards updates).

2. City staff should complete cover sheet (not consultants). Consultants can help fill out tabs that provide info to the cover sheet such as Utilities and RE.

| | |
|--|-----------------------|
| Project Name | |
| <u>Pre-Planning Level Cost Estimate</u> | |
| ESTIMATED BY: | Full name - City only |
| CHECKED BY: | Full name - City Only |

3. Added Survey Construction Staking item to Cover Sheet under Construction. This is for City staff to include survey costs for construction staking.

| Construction Phase |
|--|
| Construction Cost |
| Construction Inspection and Project Admin (Add % of construction cost) |
| Geotechnical (Borings, testing, exploration, design, etc.) |
| Utility Relocation, Underground Utility Relocations, Soft Digs |
| Pipe Video Cost |
| PCSO Construction and Mitigation Fees |
| Signal items by Duke/CDOT (Signal cabinet, mast arms) |
| Landscaping |
| Pedestrian Lighting |
| Decorative Street Lighting |
| Survey Construction Staking |

4. Updated RE tab to include Low/Med Risk Projects and High Risk (old tab format). Reminder to contact RE for any high risk project cost estimates and to provide the cost per SF.

Initial Real Estate Cost Estimate - Low or Medium Risk Projects

| Initial Project Estimate | | |
|--|------|------|
| # of Parcels | | |
| Cost per SF (from RE) | | |
| # of Relocations | | |
| | | |
| Section A - Land Costs | | |
| | Area | Cost |
| Total Cost of Fee Areas (100%) | | \$ - |
| Total Cost of Permanent Easement Areas (50%+) | | \$ - |
| Total Cost of TCE Areas (12%) | | \$ - |
| Subtotal Fee/Easement Cost | | \$ - |
| Landscaping/Improvements (30% of Subtotal) | 30% | \$ - |
| Total A | | \$ - |
| | | |
| Section B - Administrative Costs | | |
| Administrative Costs (See Table Below) | | \$ - |
| Total B | | \$ - |
| | | |
| Section C - Relocation Costs | | |
| Relocation Costs | | \$ - |
| Total C | | \$ - |
| | | |
| Total Real Estate Costs | | |
| Total RE Budget Estimate | | \$ - |
| Condemnation Contingency | 30% | \$ - |
| Inflation | | \$ - |
| Total | | \$ - |
| | | |
| <div> <div> ADMINISTRATIVE COST BREAKDOWN (ESTIMATE) </div> <div> <p><i>Low Risk:</i> \$ 4,000</p> <p><i>Medium Risk:</i> \$ 5,000</p> <p><i>High Risk (FAST TRACK):</i> \$ 7,000</p> </div> </div> | | |
| <div> <div> See Real Estate for Cost Estimates: Large/Complex Federal Fast Track (Tier 1) High Risk </div> </div> | | |

5. Updated Utilities tab with more recent costs and line items.

| Utilities Relocation Breakdown | | | |
|--------------------------------|----------|------|--------------|
| Item | Quantity | Unit | Unit Price |
| Pole type A | | EA | \$ 15,000.00 |
| Pole type B | | EA | \$ 10,000.00 |
| Pole type C | | EA | \$ 5,000.00 |
| Guy/anchor | | EA | \$ 1,000.00 |
| Vault to be relocated | | EA | \$ 10,000.00 |
| Box to be relocated (large) | | EA | \$ 5,000.00 |
| Box to be relocated (small) | | EA | \$ 2,000.00 |
| Box to be adjusted | | EA | \$ 500.00 |
| Transmission Towers | | EA | |
| Underground Electric | | LF | \$ 10.00 |
| Underground Telecomm/Fiber | | LF | \$ 12.00 |
| Underground Gas | | LF | \$ 20.00 |
| | | | |
| Soft Digs | | EA | \$ 800.00 |
| Soft Dig Traffic Control | | Day | \$ 3,000.00 |

6. Updated Signals tab with updated costs (consult with your CDOT Implementation rep for project specific costs) and separated into items for cover sheet vs. items for construction cost estimate. Again, consult with your CDOT Implementation rep to confirm who will do what work on your specific project.

| Traffic and/or Pedestrian Signal Cost for Construction Cost Estimate | | | | |
|--|----------|------|--------------|------------|
| Item | Quantity | Unit | Unit Price | Amount |
| Relocate Existing Pedestrian Signal | | EA | \$ 2,000 | \$0 |
| New Pedestrian Signal | | EA | \$ 4,000 | \$0 |
| Modified Existing Traffic Signal (per approach) | | EA | \$ 20,000 | \$0 |
| New Traffic Signal | | EA | \$ 110,000 | \$0 |
| Steel Strain Poles | | EA | \$ 25,000 | \$0 |
| | | | TOTAL | \$0 |
| Note: | | | | |
| These costs above should be added to the construction cost estimate unless CDOT has agreed to do the installation (not typical). One LS line item for planning. Include individual line items provided by CDOT for design. | | | | |
| | | | | |
| | | | | |
| Signal Cost for Cover Sheet (Traffic Signal Cabinet and Mast Arms) | | | | |
| Item | Quantity | Unit | Unit Price | Amount |
| New Traffic Signal Cabinet (1 per new signal) | | EA | \$ 15,000 | \$0 |
| Mast Arm Traffic Signal (per mast arm) | | EA | \$ 50,000 | \$0 |
| <i>Note: one intersection may have 2 - 4 mast arms</i> | | | | |
| | | | Subtotal | \$0 |
| | | 10% | Contingency | \$0 |
| | | | TOTAL | \$0 |
| Note: | | | | |
| This cost goes on the cover sheet as it is paid to Duke for mast arm/foundation and CDOT for traffic signal cabinet. | | | | |

Clip from Construction cost estimate tab with the LS signal line item for early construction cost estimates. At 90% and 100% design, these signal items should be itemized as provided by CDOT Implementation.

| | | | | | | | |
|----|-------|-----------|--|---|----|--------|--------|
| 49 | | | Traffic Signal items (from signal tab) | 1 | LS | \$ - | \$0.00 |
| 50 | SP-XX | 80001.000 | Traffic Control | 1 | LS | \$0.00 | \$0.00 |

7. Updated Construction contingency and added RE contingency.

| | | | | | | |
|---|--|-----------|-------------|--------|-------|--------------------|
| 10% inflation 2 years, 7% inflation 3 years, 5% inflation 2 years | | Inflation | 7 yr period | \$0.00 | 1.634 | Compound inflation |
|---|--|-----------|-------------|--------|-------|--------------------|

Formula for inflation (construction and RE) will need to be modified for each project submittal based on years until construction or RE. Typically 1-2 year difference depending on project schedule (could be longer for Federal projects).

compound inflation factor formula above = 1.634

$$=(1.1^2)*(1.07^3)*(1.05^2)$$

8. How to get help finding recent bid prices:

- Check the City's completed bid solicitation page for recent projects:
<https://charlottenc.gov/GS/procurement/GSBids/Pages/BidsContractsArchive.aspx>
- Ask your Project Manager to provide names of recent projects that would be similar in scope/size to review and look for on website above. Or Project Manager may be able to directly provide the applicable recent bid tabs.
- Ask your Project Manager to find rarely used pricing such as guardrail or fencing using the CI program (City access only).
- If Project Manager and consultant are struggling to find applicable pricing, the Project Manager can reach out to me for additional help.

April 28, 2021

1. Consultant or In-House Designer (IHD) will prepare digitally signed plans per NC PE Board requirements using a 3rd party digital signature software. (DocuSign or similar)
2. Consultant or IHD is responsible for keeping original digitally signed plans and all revisions.
3. Consultant or IHD will make a digital copy of the original by printing to PDF and adding the “digital signature” stamp to the cover sheet found in the CAD standards template. *Note: We originally had requested a separate sheet, but now want it as a stamp on the cover sheet. The full sheet does not need to be included, just the wording. Sample for reference:*

INDEX OF SHEETS

| | |
|-----------------------------------|-------------|
| Cover Sheet | ..1 |
| General Notes and Details | ..1-2A |
| Blank Details | ..2B-2D |
| Revised Crossing Details | ..3B |
| Typical Sections | ..4-7 |
| Drainage Summary | ..5A |
| Plan & Curve Tables | ..5B |
| Plan, Profile & Forecast Markings | ..6-20 |
| Storm Profile | ..21-26 |
| Traffic Control | ..27 |
| Construction Control | ..C1-C13 |
| Signal Plans | ..S001-S002 |
| Lighting by Object | ..L001-L004 |
| Cross Sections | ..X1-X13A |
| Materials Construction | ..M1-M13A |
| Delivery Improvement | ..D0-D0 |
| TOTAL SHEETS | 199 |

VICINITY MAP
NTS

Begin Project
Sta. 9+50 -L-

PLANS PREPARED BY:

BUILDING
FOR CHARLOTTE
CITY OF CHARLOTTE
ENGINEERING & PROPERTY MANAGEMENT
PLANNING & DESIGN GROUP

800 East Fourth Street
Charlotte, North Carolina 28202
Phone: (704) 330-2291
Fax: (704) 330-6600

Construction Plans of Proposed
WESTINGHOUSE BLVD MULTI-USE PATH PROJECT
Project No. 512-16-018

Project Features:

- Multi-Use Path
- Curb & Gutter
- Concrete Sidewalk
- Concrete
- Asphalt Base
- Asphalt Pavement
- Gravel
- Pedestrian Safety Islands

This electronic collection of documents is provided for the convenience of the user and is NOT A CERTIFIED DOCUMENT.

These documents contained herein were originally issued, sealed and/or signed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.

This file or an individual page shall not be considered a certified document.

The City of Charlotte reserves all rights tied to ownership of work product as contemplated under the parties contract as applicable.

DATE CREATED: JANUARY 7, 2021

LOCATION MAP
NTS

PROJECT LENGTH = 3.28 MILES

2018 NCDOT STANDARD SPECIFICATIONS

RECOMMENDED FOR CONSTRUCTION

| | |
|--------------------------------|------------------------------------|
| CDOT - Design | PAUL GENTON - 12/19/2020 |
| CDOT - Implementation | STEVE THOMPSON - 01/07/2021 |
| CLT Water | FRED HUNTER - 11/19/2020 |
| Construction Administration | DO NIEL - 11/19/2020 |
| Contract Administration | FRANK HUNTER - 11/19/2020 |
| Engineering Services | THOMAS HALL - 11/19/2020 |
| Landscape Management | PAUL LUTHER - 11/19/2020 |
| Planning, Design & Development | ANDREW BARNES - 11/19/2020 |
| Storm Water Services | DAVIDSON - 01/07/2021 |
| Utility Coordination | DAVIDSON - 12/17/2020 |

GRAPHIC SCALES

Plan View: 0' 20' 40' 60'

Bar Profile: 0' 20' 40' 60'

Vert. Profile: 0' 2' 4' 6'

Cross Section: 0' 10' 20'

811
Know what's below.
Call before you dig.

FOOT SEAL

Record Drawings

Bid Set No.

APPROVED: *[Signature]* **1/15/2021**

FOR THE CITY ENGINEER

[illegible]

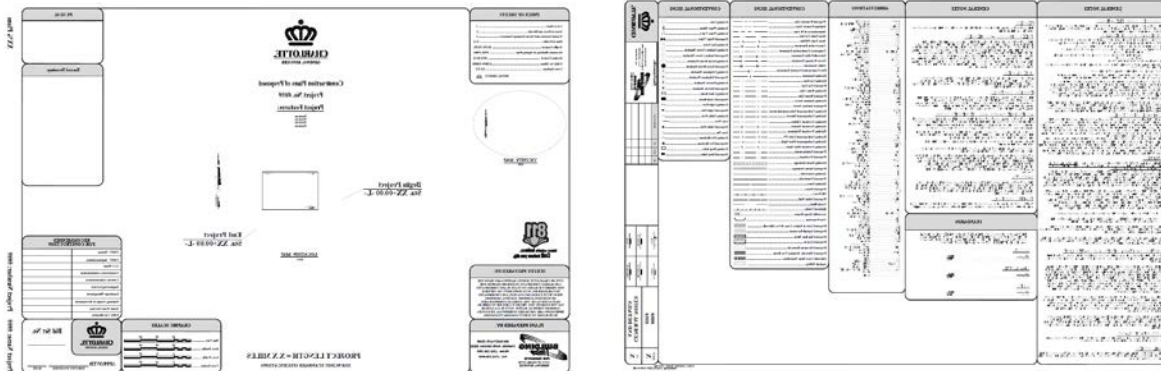
E35-11

4. Cover sheet sign-offs can now be handled digitally by the City of Charlotte. Consultant or IHD will submit the signed/sealed “copy” of cover sheet only to the City Project Manager for team sign-off. City Project Manager will upload digital “copy” of cover sheet into DocuSign and distribute to team members and Division Manager (Veronica Wallace) for sign-off. Once cover sheet sign-off is completed, City Project Manager will return to Consultant or IHD to package with plan set.
5. Consultant will submit a digital copy (using process in 3. above) of the final plans with the digital signature cover sheet and all plan revisions to the City for the Digital Map Room as one plan set. *Note: Date on cover sheet disclaimer may need to be updated if plan revisions were made during the sign-off process.*
6. Project Manager will submit files the City’s Digital Map Room by saving the file here: <K:\GIS Projects\Maproom\Engineering Services> and emailing Fal Watters.

Plan Template Updates and Sample Plans

April 28, 2021

1. City made changes to the layout of the Cover Sheet and General Notes Sheet last year in the CAD Standards located here: <https://charlottenc.gov/GS/procurement/GSBids/Pages/CADstandards.aspx>
See samples below. All project submittals should include these latest sheet templates.



2. Be sure to follow the sheet naming and order as included in the checklist:

| | |
|------------------------------------|---|
| -- Sheet 1 | Title Sheet |
| -- Sheet 2, 2A, 2B, etc (2 Series) | General Notes, Standard Abbreviations & Various Details (including ramp details) |
| -- Sheet 3, 3A, 3B, etc (3 Series) | Typical Sections, Drainage Summary, other summary tables as needed and directed by the City |
| -- Sheets 4 thru XX | Plan & Profile Sheets |
| -- Sheets TCP1 thru TCPxx | Traffic Control Plans |
| -- Sheets PM1 Thru PMxx | Pavement Marking & Signing Plans |
| -- Sheets EC1 thru ECxx | Erosion Control Plans |
| -- Sheets SP1 thru SPxx | Construction Staking Plans |
| -- Sheets SIG1 thru SIGxx | Signal Plans |
| -- Sheets UC1 thru UCxx | Utility Construction Plans |
| -- Sheets UBO1 thru UBOxx | Utilities By Others Plans |
| -- Sheets X1 thru Xxx | Cross-Sections Sheets |

3. Updated sample plan sets have been added to the CAD Standards this month. Be sure to review and reference these sample plans. Samples include sidewalk, multi-use path, and roadway improvements.

QA/ QC

QA/ QC

General Items

- ▶ Field review before assigning hours – NEW REQUIREMENT
- ▶ Consultant and Subconsultant responsibilities
- ▶ QA/QC overall

QA/ QC

Utilities

- ▶ Ensure utility layers are on when designing (and submitting)
- ▶ Pole impacts, underground crossings
- ▶ Schedule vs. cost impacts
- ▶ ES Utility Task Force

QA/ QC

Units in estimates

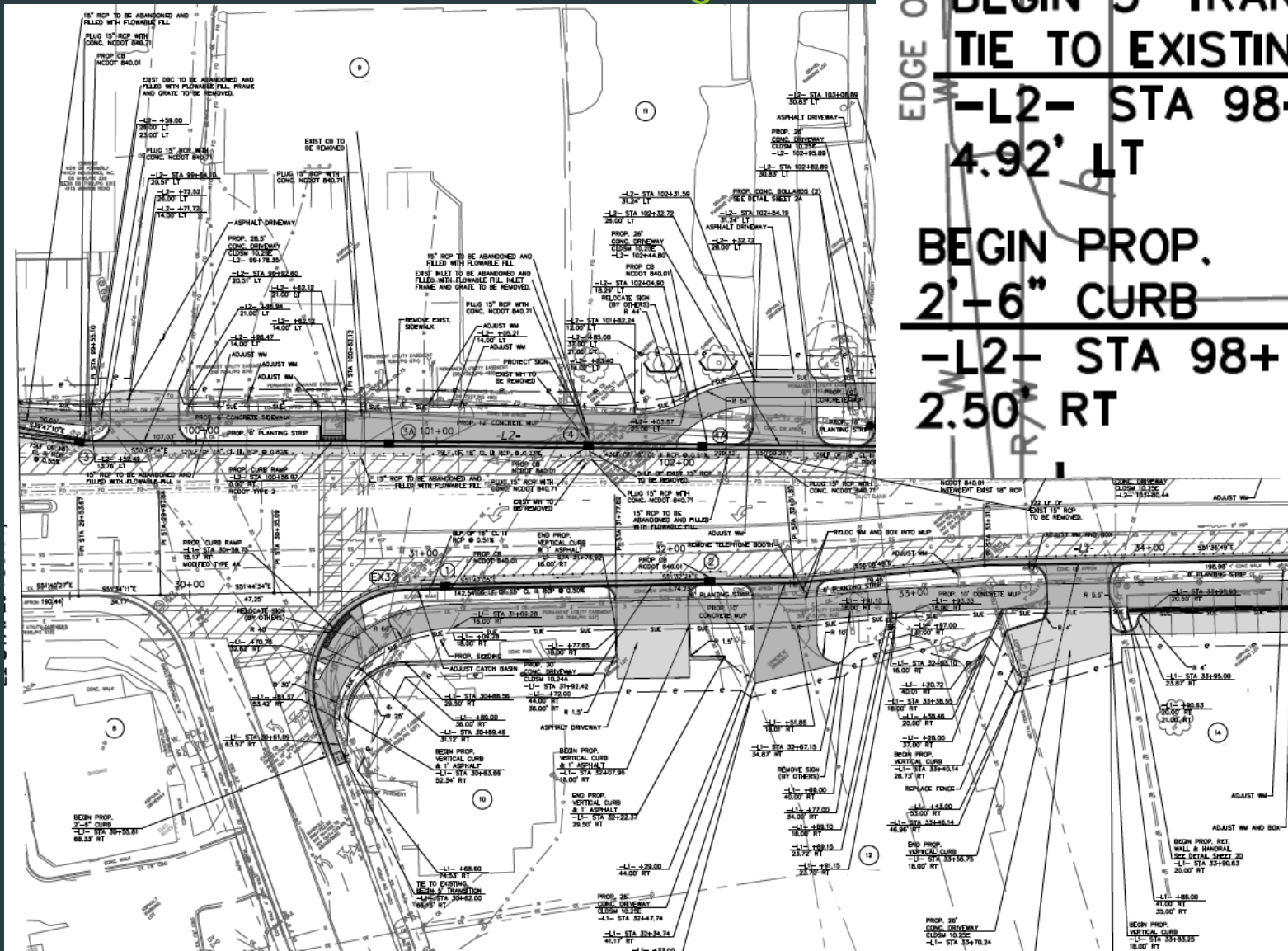
- ▶ Use the latest cost estimate form (website, notify me)
- ▶ Items we consistently see incorrect
 - ▶ Ramps – SY not EA
 - ▶ Domes – included if new ramp, don't need an extra item
 - ▶ Milling – use 0" -3"
 - ▶ Comprehensive Grading – we don't use percentages
- ▶ Plans vs. Specs
- ▶ Checklist – keep using!

QA/ QC

Labeling

- ▶ Can have too much
 - ▶ Don't need Sta./Offset on RE
 - ▶ Don't need RE Summary Sheet(s)
 - ▶ Don't need Sta./Offset on multiple items in the same location
 - ▶ Do want important items still labeled (tapers, drainage structures, tie-ins, correctly sized PPES etc.)
 - ▶ Where labels are located
- ▶ Examples...

QA/ QC Labeling

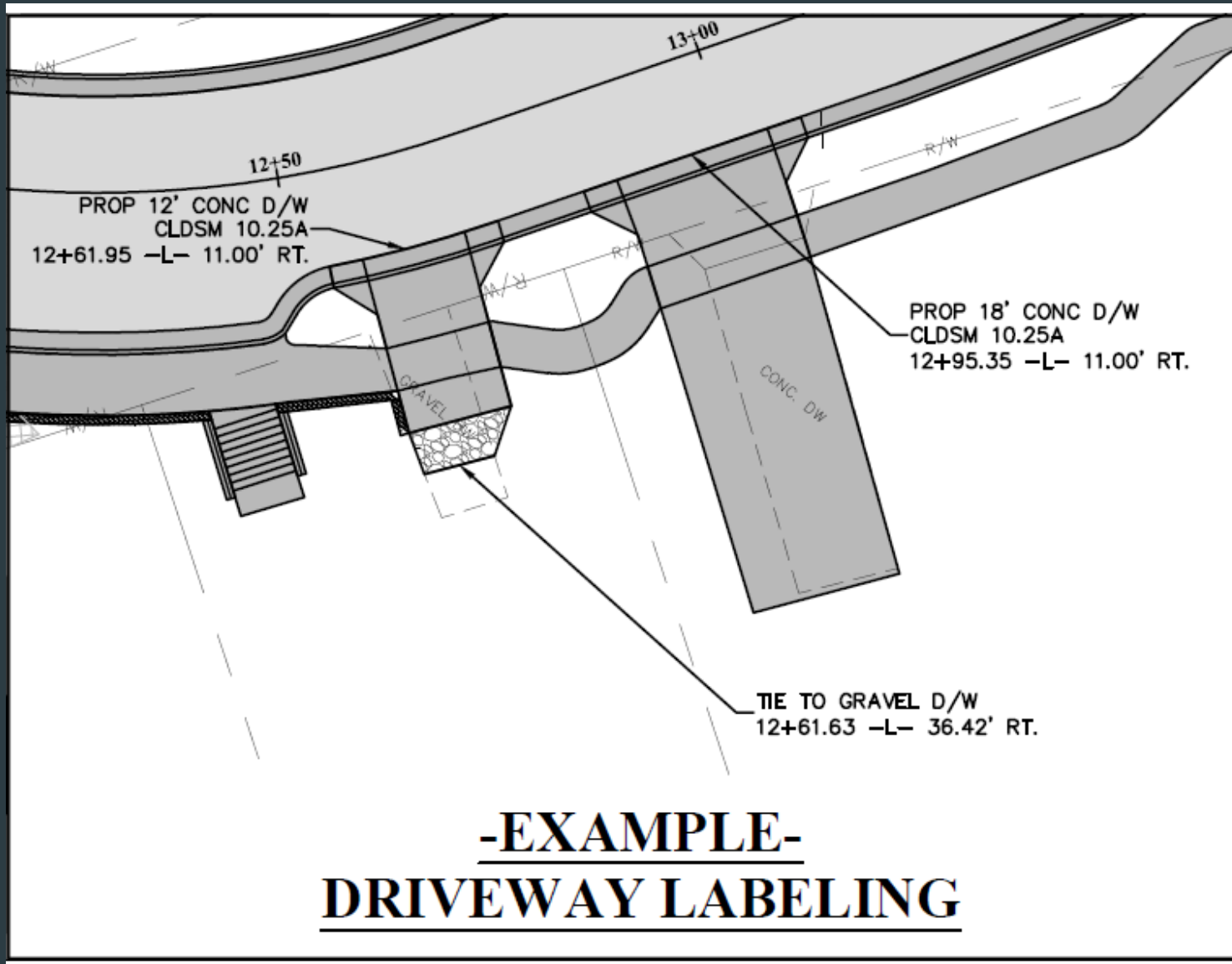


BEGIN 5' TRANSITION
TIE TO EXISTING
-L2- STA 98+78.06
4.92' LT

BEGIN PROP.
2'-6" CURB
-L2- STA 98+78.06
2.50' RT

Dan Leaver, PE &
Veronica Wallace, PE

QA/ QC Labeling



QA/ QC

Typical Sections

- ▶ Typical should be 'typical' not change when minor changes occur
- ▶ Ok to have Varies X' to Y' - don't label 'as shown'
- ▶ Think about the number - if you have a lot may be too many
- ▶ Check stationing - ensure it matches plans

BREAK

In- House Design Best Practices

Design Best Practices

April 28, 2021

Design Tips

- Max break over from roadway to shoulder is 6% with max shoulder slope of 8%.
- Max break over for driveways is 8%.
- Utility poles don't have to be reset if cut or fill is less than 1'.
- Complete thorough field reviews to make sure plans match existing field conditions.
- Review survey basemap in 3D Orbit and make sure you can see walls, curbs, etc. There should be no holes in the surface. Return to survey to fix as needed.
- Leaders should be 45 degrees to the right if possible, with no overlapping text
- Dimension lane widths/curb radii for 30% & 50% plans
- TCE - should be located min 5ft from grading limits and then reduce vertices as much as possible for each property. Avoid parking spaces when possible.
- Use MTEXT for labeling on plans unless station/offset needed.

Ramp Tips

- Truncated dome widths must extend full width of ramp
- Ramp width should equal sidewalk width
- No directional ramps with vertical curbs on NCDOT roads when posted speed limit is greater than 35 mph. Can use directional ramps with 2' flares

Alignment Tips

- Minimum roadway centerline slope is 0.5% except in vertical curve.
- Max break over from roadway to shoulder is 6% with max shoulder slope of 8%.
- Minimum K value for curves is 20 per CDOT for low speed/low volume roads. Should use ASHTO/CLDSM where feasible
- Lane offsets through intersections should be no more than half a lane width.
- Roadway cross slope transitions are a maximum of 0.5% every 25'.
- Algebraic grade break for profiles on NCDOT streets is 0.5% without using vertical curves.
- Place alignments at front of sidewalk for ditch sections on sidewalk projects
- Place alignments at center line of roadway for proposed curb work
- Alignments should run south to north or west to east.

Pavement Marking Tips

- Ped Refuge Islands are a minimum of 25' long and 6' wide.
- Stop bars are placed 4' from crosswalks unless pedestrian hybrid beacon.
- At ped beacons, stop bars are placed a minimum of 40' from the signal head (distance to crosswalk does not matter). (CDOT Implementation prefers 60')
- Pavement markings should be placed 1' offset (preferred) from monolithic islands so extra 1' of pavement width needs to be added to lane width for this offset.
- Lane offsets through intersections should be no more than half a lane width.
- Standard/Default Design Parameters (Start here, then adjust case by case) =

**11' lanes (+1' for medians) 12' for NCDOT / 8' Planting Strip/ 6' Sidewalk
(B-40 Design Vehicle & WB-67 for NCDOT)**

Storm Design Tips

- Landscaped medians require median drainage and connection to roadway drainage system (CB/DI/JB)
- Per Storm Water, pipe cover is measured from the top of pipe to base of asphalt.
- RCP Class III shall have 2' of fill from the top of pipe to the bottom of asphalt section. If you have an asphalt section of 3" surface, 4" intermediate and 8" base you will need 3.25' of cover from the top of pipe to the road grade elevation. RCP Class IV and V only require 1' of fill if you cannot meet cover requirements.
- Minimum pipe slope is 0.5%.
- Minimum curb line slope is 0.3%.

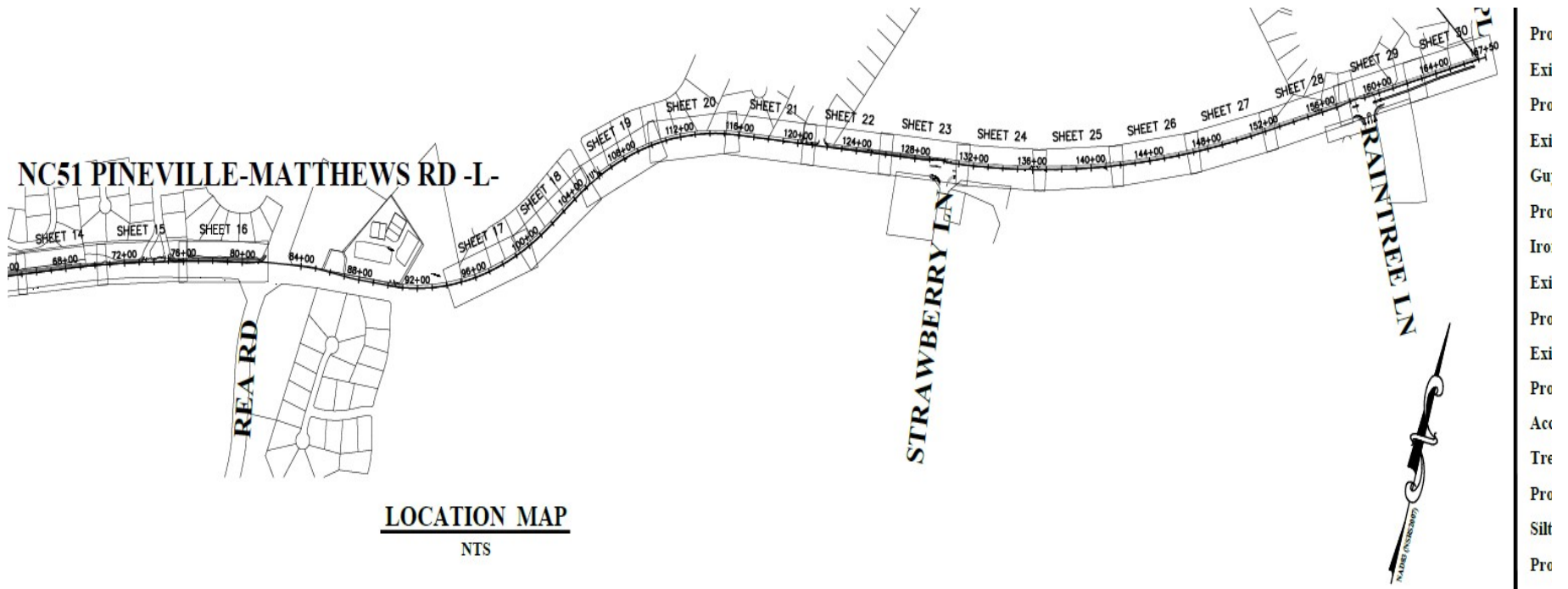
COVER SHEET

- **Vicinity Map-** Import from GIS and identify major roads that are near the project site. **North Arrow inside vicinity map border.**
- **Project Length-** Miles or Linear Feet if small project (less than 0.1 mile)
- **Scale-** Varies depending on project size. Edit as needed.
- **Legend/Signatures-** Verify linetypes on legend are the correct scale and now present on sheet 2. (new update) Be sure to use updated Cover Sheet where signature location has been relocated and survey prepared by coordinates needs editing.
- **Project Features-** Update per project scope. For NCDOT projects add State/US Rd Number
- **Index of Sheets/ Percent Plans-** Update for specific project and percent complete. First Plan Sheet should always start with #4.

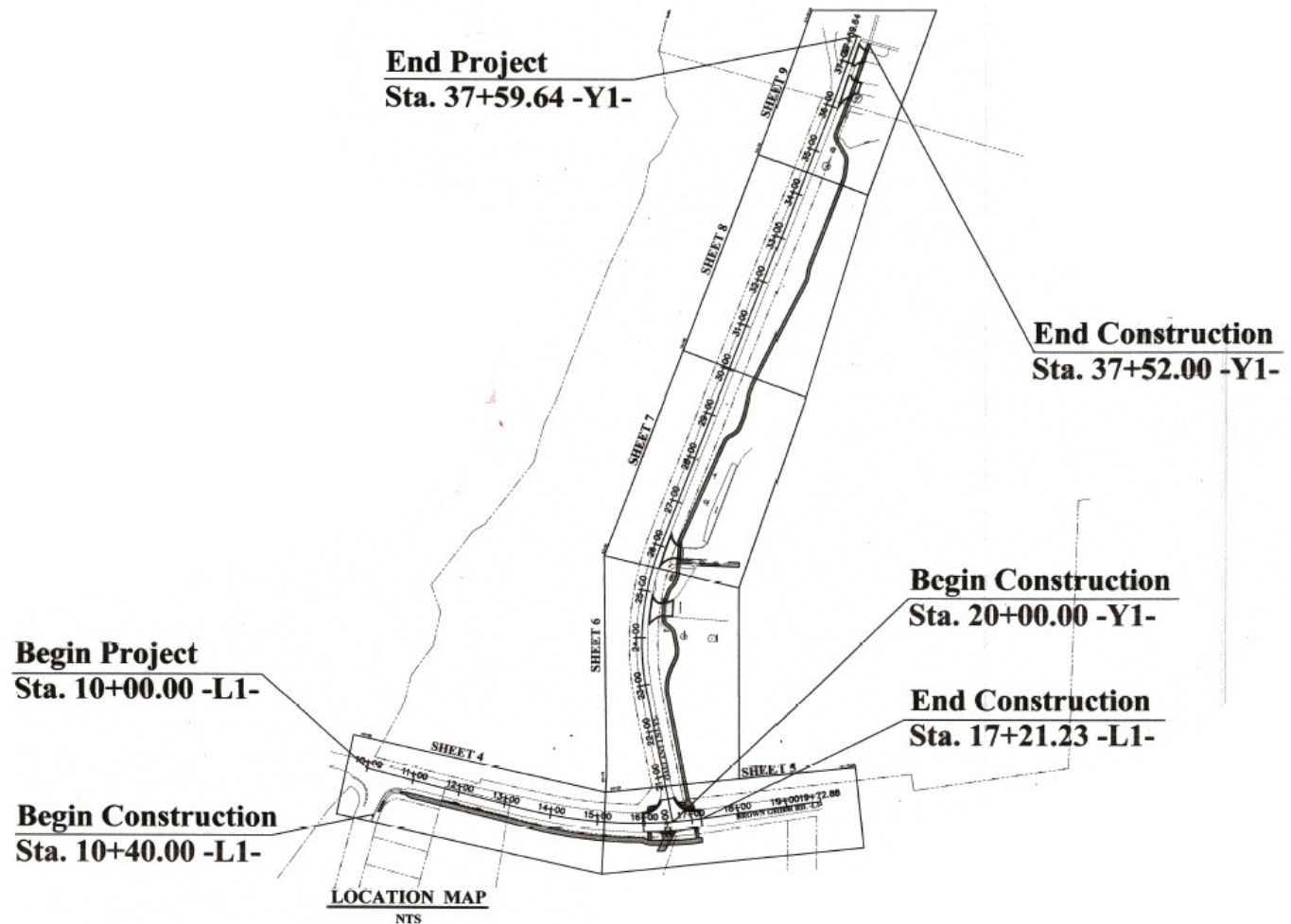
COVER SHEET CONTINUED

- **Begin Project and Begin Construction Labels-** Update accordingly and be sure Stationing starts at 10+00.
- **Station Labels-** Be sure these are legible, no matter the scale. Another option is label view frame boxes. (See examples next slides)

COVER SHEET EXAMPLES



COVER SHEET EXAMPLES



PROJECT LENGTH = 0.5 MILE
POSTED SPEED LIMIT 45MPH

PLAN SHEETS

- Start stationing at 10+00
- Alignments should run south to north or west to east.
- Label pavement widths on each sheet and do not override dimensions.
- Label important transition areas
- Pull text labels outside of road width as much as possible
- Do not show pavement arrows on plan sheets; show on pavement marking sheets (unless at concept, or early design prior to creating PM sheets)
- Keep labeling consistent through all plan sheets
- Include road names on each sheet
- Show all curve data and k values;
- **YOU ARE REQUIRED TO USE THE UPDATED MILESTONE CHECKLIST FOR ALL PLAN SUBMITTALS TO CITY STAFF.**

Construction

Construction

► Specifications

- Special Provisions are at the top of the plan hierarchy
- Make sure specifications match the plans and bid tabs

► Quantities

- Select Material
- Milling
- Asphalt
- Retaining Walls - MSE vs Architectural

► Plans

- All materials in the plans must be accounted for in the bid tabs
- Contractors can't build as precisely as AutoCAD can draw
- [Presentations\Construction.docx](#)

Utility Coordination & Relocation

Utility Coordination & Relocation

Utility coordination tasks in consultant contract

- ▶ Following the City's UC/UR Process
- ▶ Keeping the City's UC in sync
- ▶ Completing the Initial Utility Relocation Plan

Sub-contracted utility coordinators

- ▶ City's Consultant remains responsible for City contracted tasks regardless
- ▶ Some repeat concerns - missing scope, funds, etc.

Utility Coordination & Relocation

UBO Plans

- ▶ Must use and complete applicable CAD Standards
- ▶ Must mirror horizontal plan sheet progression - Are not stand-alone plan sheets
- ▶ Must incorporate “significant and relevant” infrastructure including CLT Water
- ▶ Must incorporate utilities’ mark-ups as provided / Acquired Test Data / Etc.

The background features a dark blue-grey field on the left, transitioning into a series of overlapping, semi-transparent green and yellow-green geometric shapes on the right. These shapes are primarily triangles and polygons, creating a layered, abstract effect. The text 'Design- CDOT' is centered in the dark blue area.

Design- CDOT

Design- CDOT

- ▶ Signal Utility Plan and Signal Plan- Martin Brown
- ▶ Utilities On Bridges- Geoff Sloop
- ▶ Protected Intersections- Keith Bryant
- ▶ ITS Infrastructure- Ashley Boenisch

Design- CDOT

► Signal Utility Plan

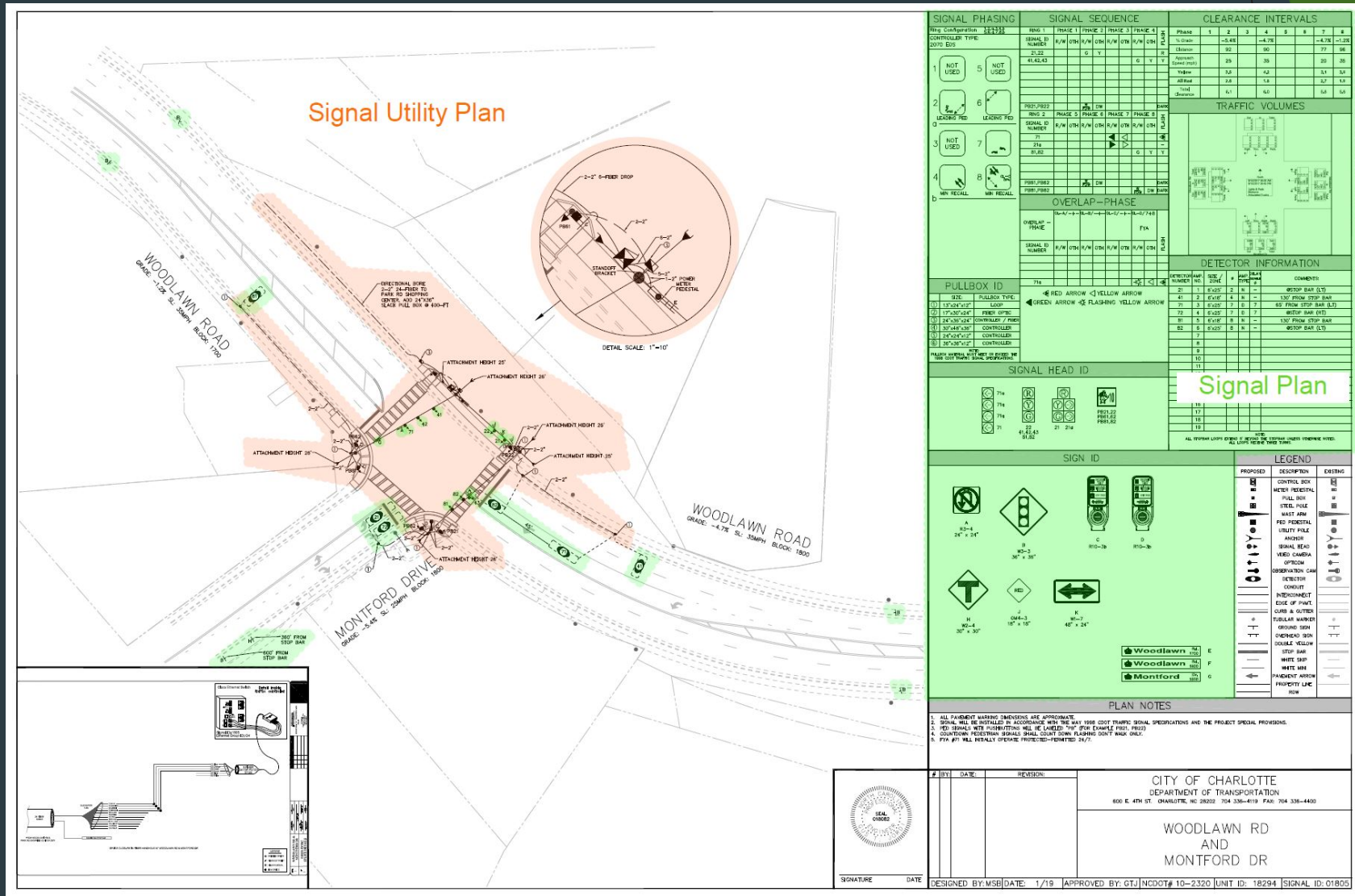
- A Signal Utility Plan is developed ahead of the complete signal plan and contains the following information:
 - Pole type & location
 - Down guy type & location (if applicable)
 - Span attachment height
 - Underground conduit & pull boxes
 - Pedestal & cabinet foundations
 - Easements required for construction and maintenance
- Horizontal construction items should be accounted for in construction the plan set and bid items.
- Attention should be paid to easements required to construct and permanently maintain all signal utilities. The signal utility plan easements must be included in the Real Estate phase of roadway projects.

Design- CDOT

► Signal Plan

- A Signal Plan contains all of the information included with the Signal Utility Plan plus:
 - Signal heads & arrangement
 - Overhead and ground-mounted signs
 - Vehicle, pedestrian and bicycle detection – loops, cameras, pushbuttons etc.
 - Signal phasing
 - Electrical details
 - Fiber splice detail
 - Observation camera & mounting location
 - Turning movement counts and clearance intervals
- Some roadway projects will be bid with signal work included. Full Signal Plans must be complete and included with these plan sets and bid documents.
 - Be sure to reference latest CDOT Special Provisions where applicable

► Signal Utility Plan vs. Signal Plan



Design- CDOT

► Preapproved Structure Types

- Initial cost is typically the main consideration for bridge/culvert structure type selection for both City Capital Projects and or developers. Another major consideration that considered is the lifecycle cost of maintaining these structures. Below is a list of preapproved structure types requiring low life cycle maintenance/replacement cost.

► Bridges - Superstructures

- 18-inch Cored Slab
 - 21-inch Cored Slab
 - 24-inch Cored Slab
 - Box Beam
 - Pre-Stressed Girders
- Bridge concepts 25 feet or less in length along the centerline of the structure will require discussion/preapproval to explore the viability of utilizing a reinforced concrete box or 3-side culvert. All remaining hydraulic structures (culverts equal to or less than 20ft and pipes) are maintained by City Stormwater.

Design- CDOT

► Preapproved Structure Types (continued)

► Bridges - Substructures

- Substructures that contain timber elements will not be taken over and maintained by the City.
- Mechanically Stabilized Earth (MSE) walls as part of a structure crossing a water body: Structures crossing a creek or any body of water that contain MSE walls will not be taken over and maintained by the City.

► Large Culverts - *greater than 20ft opening measured along the centerline of the roadway*

- Cast-in-place or precast reinforced concrete culverts are preapproved. Bottomless concrete culverts and concrete Con/Span type structures are preapproved when the foundation is on rock. Corrugated metal pipes will not be approved.

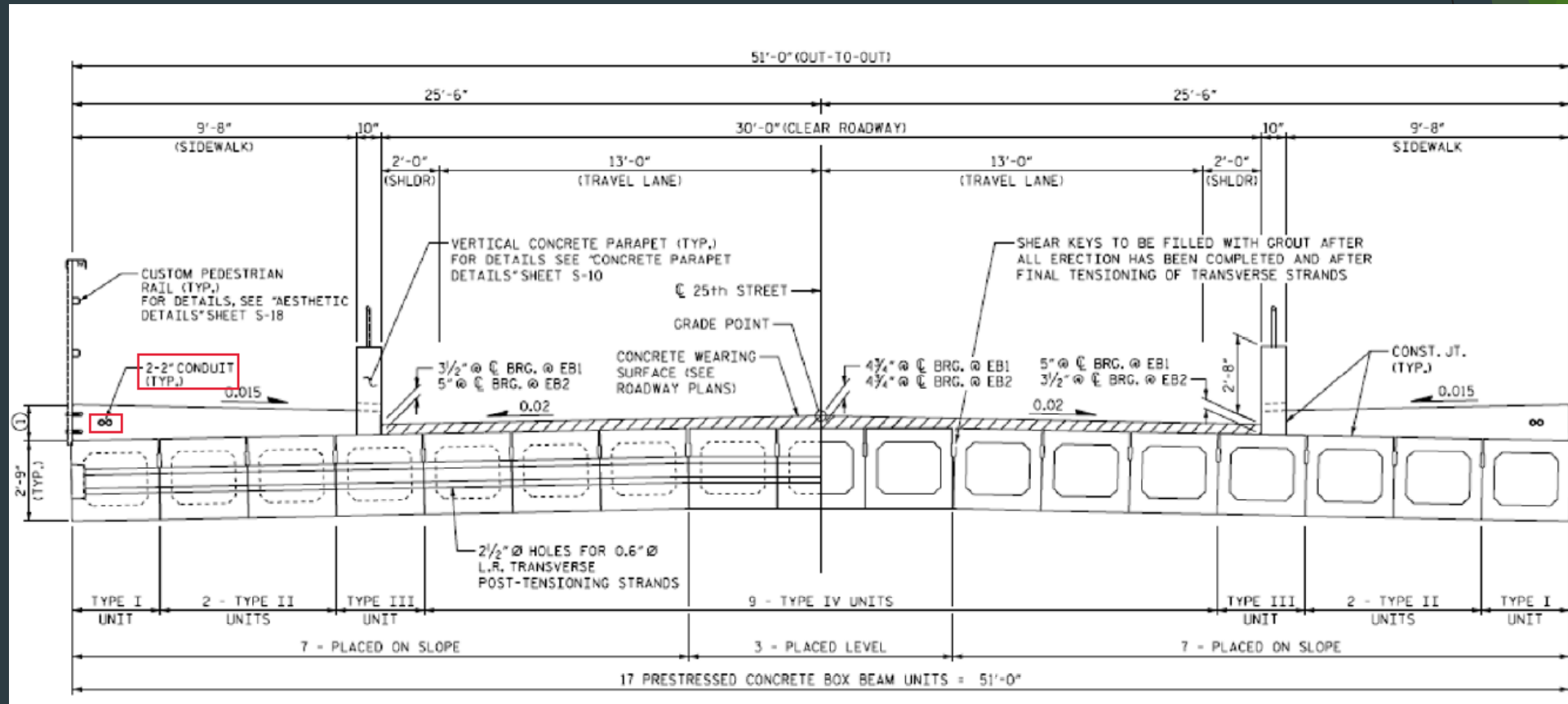
► Small Culverts - *equal to or less than 20ft opening measured along the centerline of the roadway*

- Concrete pipe, aluminized corrugated metal pipe or pipe arch, and reinforced concrete boxes are preapproved. Bottomless concrete culverts and concrete Con/Span type structures are preapproved when the foundation is on rock.

Design- CDOT

► Utilities on bridges

- When a new bridge is proposed on City streets, the only utilities allowed on the bridge are two 2-inch conduits under the sidewalk for CDOT Fiber and (if applicable) conduits for Duke to install lighting on the bridge.



Protected Intersection Best Practices and Resources

Will Washam, Erin Pratt, Matt Magnasco, Paul Benton, and Keith Bryant

[Presentations\Protected Intersections.pptx](#)

Agenda

- Protected Intersection Overview (Will)
- Key Design Elements (Keith)
- Precedent Charlotte and National Intersections (Paul)
- Pavement Markings (Matt)
- Design Resources (Erin)
 - Forthcoming CLDS Details
 - Protected Intersection References

Making a Case for Protected Intersections

- ❑ Accommodates ALL modes of transportation at intersections (everyone has a place)
- ❑ Islands create shorter crossing distances for more vulnerable roadway users
- ❑ Compact / urban design to slow auto turning speeds
- ❑ Vast majority of users prefer 8-80 / AAA Bike Facilities ('design vehicle')



Four Key Design Elements

□ Protective islands

- Refuge, slows turning speeds, visibility

□ Forward stop bar

- Clear sight lines for turning vehicles

□ Set-back crossings

- Vehicles must cross paths perpendicular \pm to peds / bikes

□ Signal phasing

- Depending on context, can go more-or-less-aggressive phasing

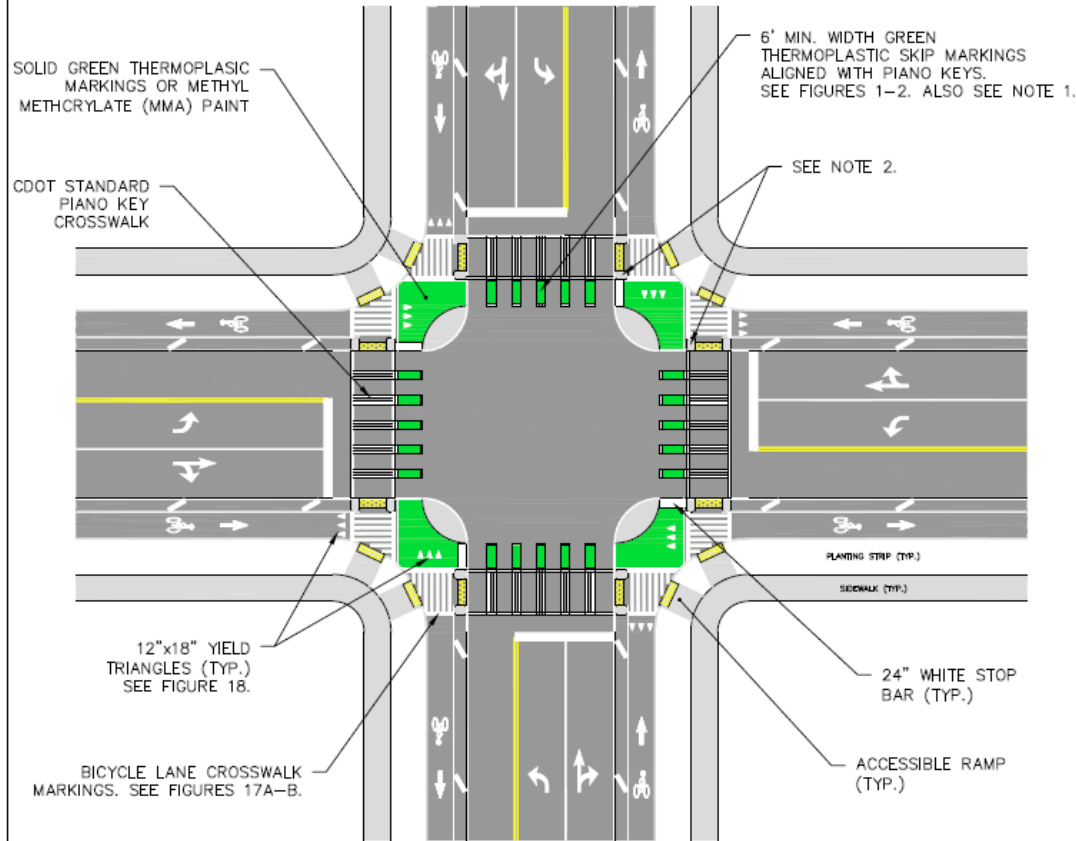
EXHIBIT 4N: ELEMENTS

| Phasing Scheme | Description | Pros | Cons |
|--|---|--|---|
| Concurrent Bike Phase with Concurrent Permissive Vehicle Turns (see EXHIBIT 6H) | Provides a bicycle phase that runs concurrently with the parallel vehicle phase. | <ul style="list-style-type: none"> Increased compliance when compared to following vehicle signals. | <ul style="list-style-type: none"> Not appropriate in locations with high vehicle turning volumes. Requires vehicles to yield when turning. |
| Concurrent Bike Phase with Leading Interval (see EXHIBIT 6I) | Provides an advanced green indication for the bike signal. Lead interval may provide 3 to 7 seconds of green time for bicycles prior to the green phase for the concurrent vehicle traffic. Lead bike intervals may typically be provided concurrently with lead pedestrian intervals. | <ul style="list-style-type: none"> Allows bicyclists to enter the intersection prior to vehicles. Improved visibility for turning vehicles. | <ul style="list-style-type: none"> Small increase to delay and queueing for vehicles. Concurrent turns may not be appropriate with higher vehicle or bike volumes. |
| Concurrent Protected Bike Phase (see EXHIBIT 6J and EXHIBIT 6K) | Provides a bicycle phase that runs concurrently with the parallel through vehicle phase. Right and left vehicle turns across the bicycle facility operate under protected phases before or after the through phase. | <ul style="list-style-type: none"> Provides full separation between turning vehicles and bicyclists. Motorists are not required to yield when turning. | <ul style="list-style-type: none"> Additional signal phase may increase delay, require longer cycle length. Protected right turns require the provision of a right-turn lane. |
| Protected Bike Phase (see EXHIBIT 6L) | Provides a protected bike phase where all motor vehicle traffic is stopped. This may run concurrently with a parallel pedestrian phase. May be appropriate at locations with complex signal phasing for vehicles and/or unusual geometry for a bicycle facility may result in unexpected conflicts between users. | <ul style="list-style-type: none"> Provides maximum separation between vehicles and bicyclists. | <ul style="list-style-type: none"> Increases delay for motor vehicles. Increases delay for bicyclists. |

Less Aggressive

More Aggressive

Figure 9. Protected Intersection Pavement Marking Concept



NOTES:

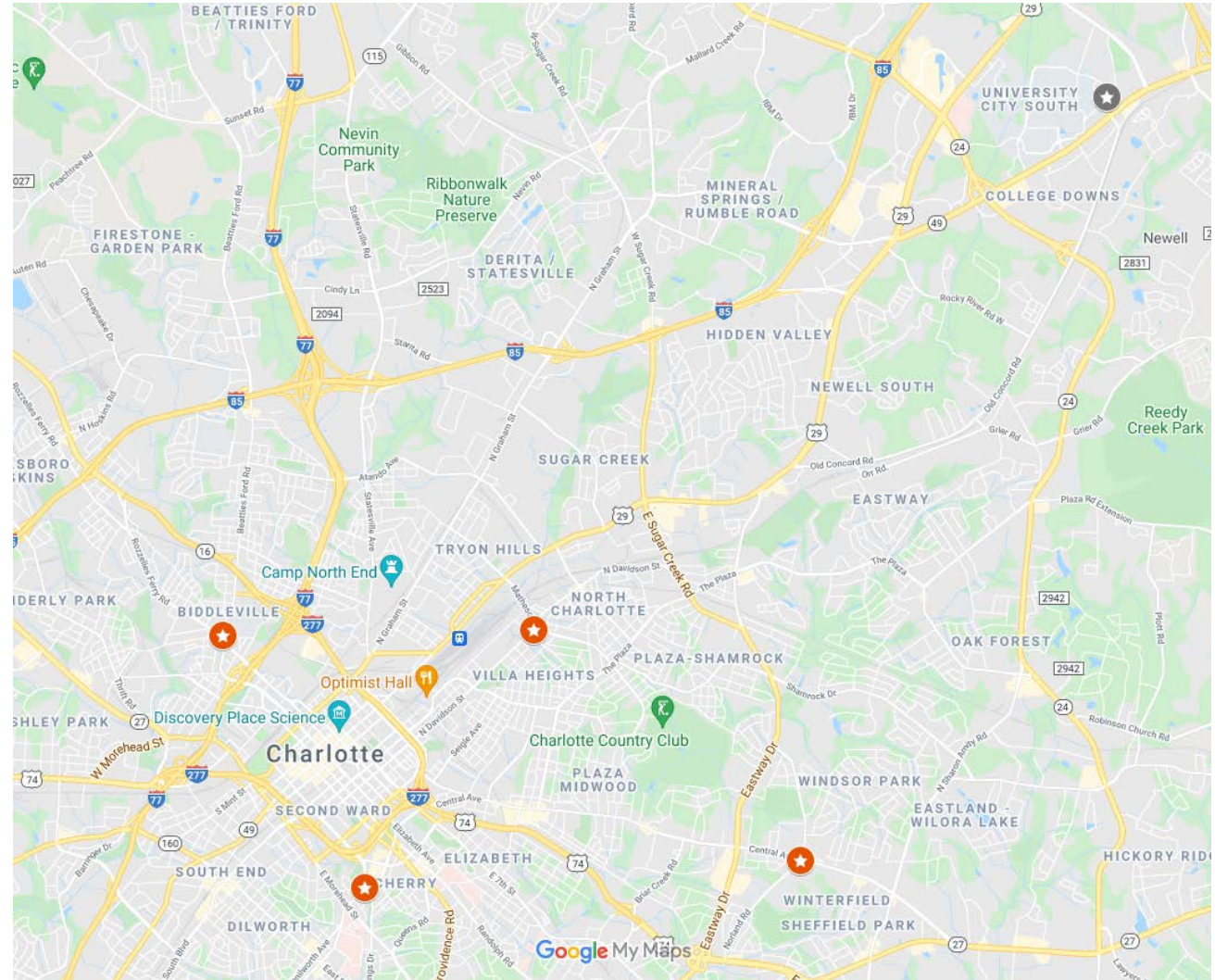
1. USE CROSSBIKE DETAIL FOR TWO-WAY CYCLE TRACK. SEE FIGURE 3.
2. VERTICAL CURB AND/OR TACTILE GUIDE STRIP SHALL SEPARATE ACCESSIBLE RAMP FROM BICYCLE PATH WITHIN INTERSECTION AREA.
3. THIS DETAIL IS SCHEMATIC IN NATURE AND INTENDED TO SHOW BICYCLE/GREEN PAVEMENT MARKINGS ONLY. REFERENCE APPROPRIATE DESIGN GUIDANCE FOR PROTECTED INTERSECTION GEOMETRIC LAYOUT CONSIDERATIONS AND ALL OTHER PAVEMENT MARKINGS.

Other Considerations

- Design vehicle vs "check" vehicle turning radii
 - Corner Design for All Users
- Ped waiting area / push button location
- Robust concrete islands
- Marking standardization

Upcoming Charlotte Protected Intersections

- ❑ NECI: Jordan PI / N Davidson St Intersection
- ❑ Kenilworth Ave / Pearl Park Way Intersection
- ❑ Central/Norland/Kilborne Intersection
- ❑ 5 Points Intersection
- ❑ 5th / 6th St Cycle Track (Multiple)



Upcoming Charlotte Protected Intersections

□ NECI: Jordan PI / N Davidson St Intersection

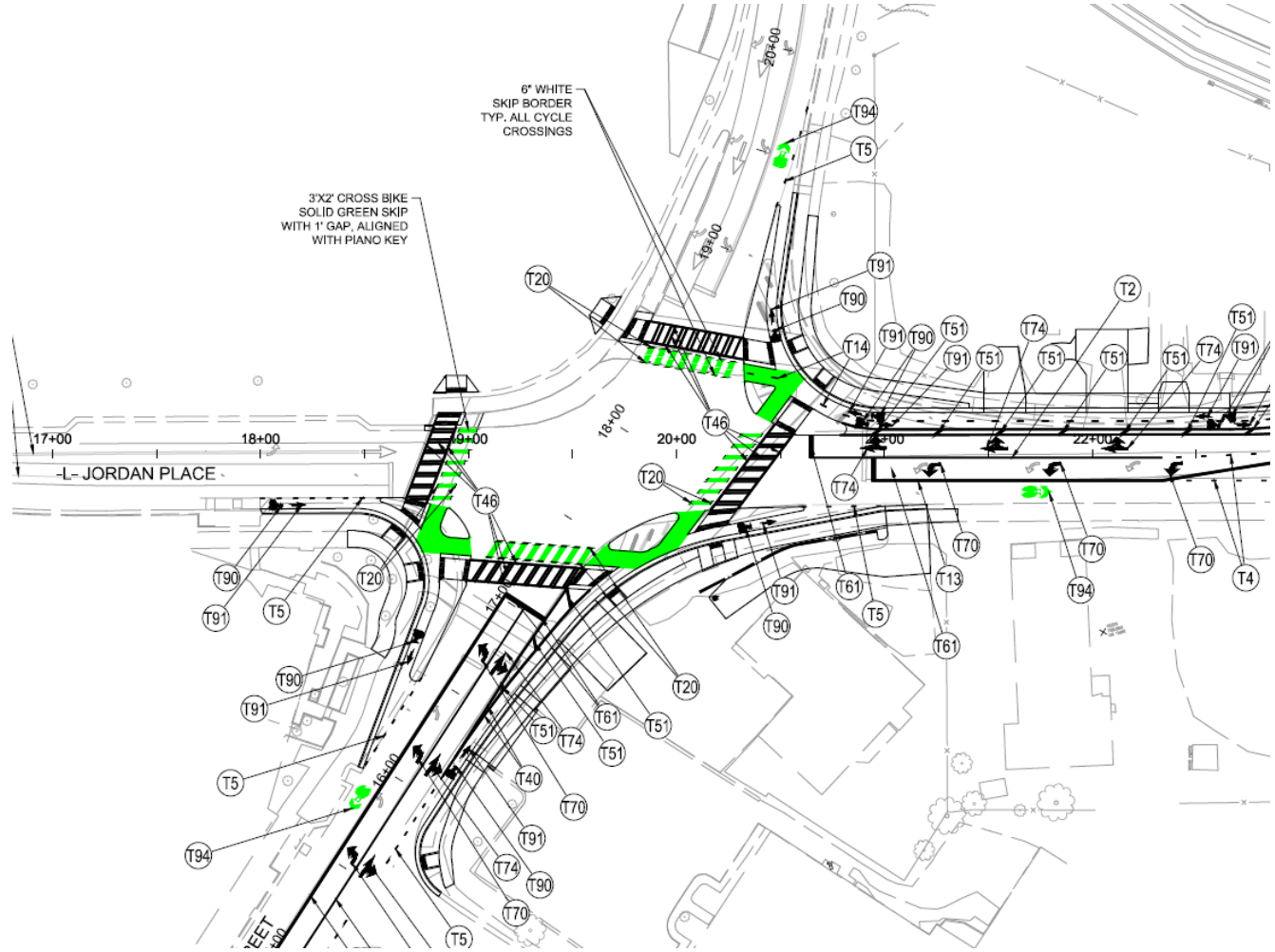
- Interim
*Paint and Post
On the ground now*
- Permanent
*NECI Capital Project
Connects XCLT, Matheson Ave
Streetscape, partnership with
development*



Upcoming Charlotte Protected Intersections

NECI: Jordan Pl / N Davidson St Intersection

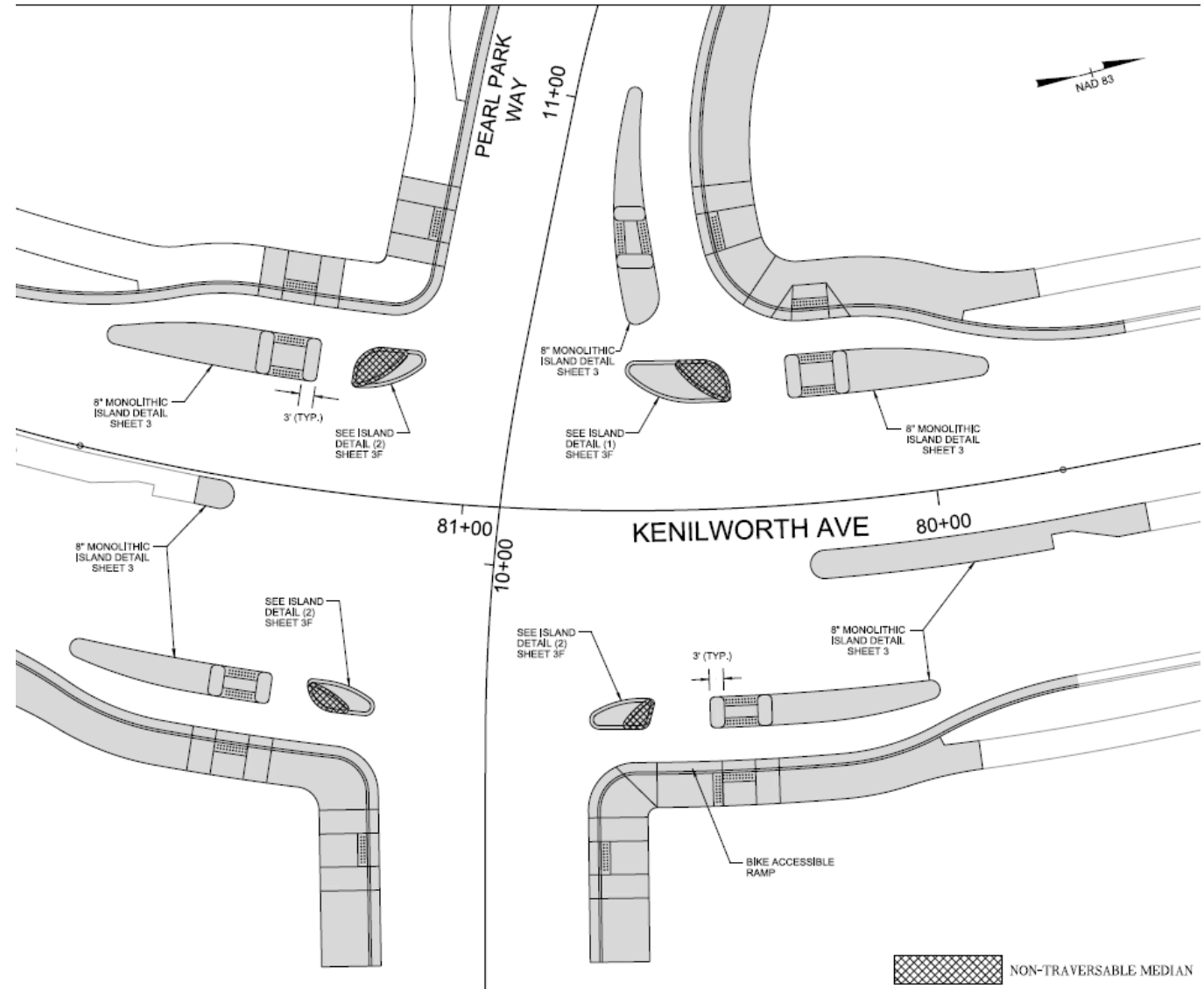
- Interim
Paint and Post
On the ground now
- Permanent
NECI Capital Project
Connects XCLT, Matheson Ave
Streetscape, partnership with
development



Upcoming Charlotte Protected Intersections

□ Kenilworth Ave / Pearl Park Way Intersection

- *Development Partnership Under construction now*

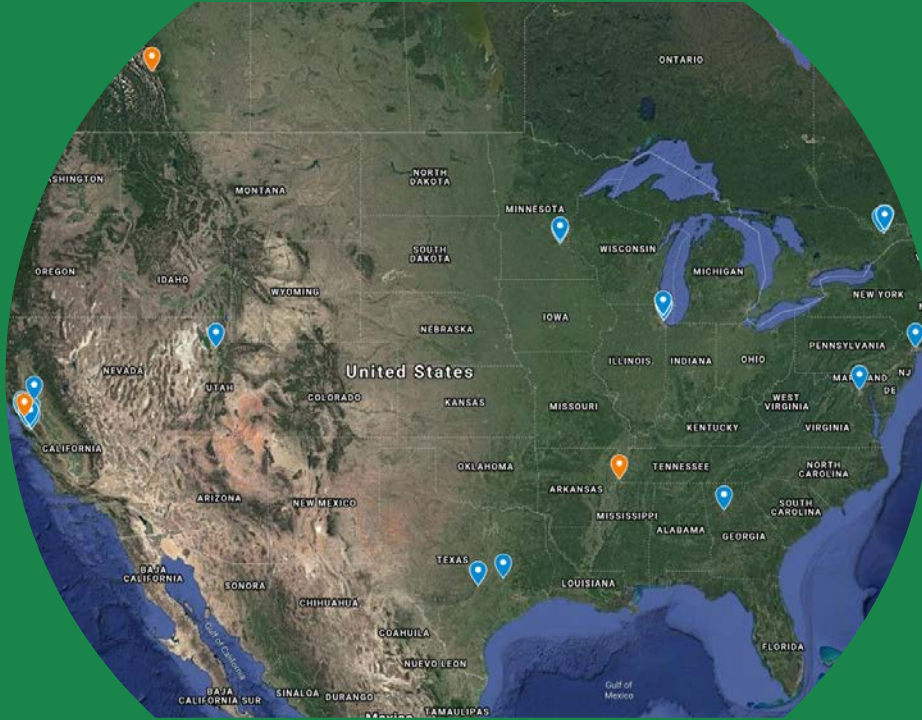


Central/Norland/Kilborne Intersection

-

Precedent National Examples

Map of North American Protected Intersections

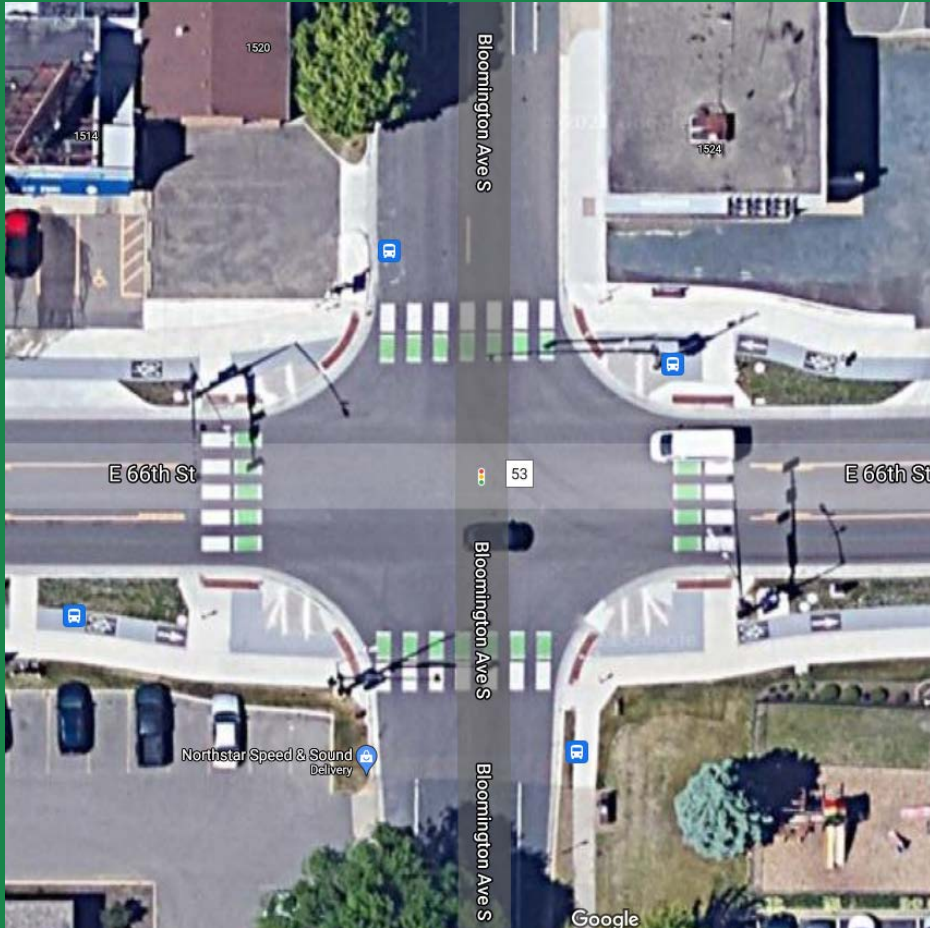


https://www.google.com/maps/d/u/0/viewer?mid=1c-Vg3Yy-_kjCImH0S9BXJwJG5K4wSTFb&ll=40.44926838759357%2C-97.12954845000002&z=5

- Ritchfield, MN
- Evanston, IL
- Fremont, CA
- Vancouver, BC

Precedent National Examples

□Ritchfield, MN



Google Maps URL:

<https://www.google.com/maps/@44.8835215,-93.25329,3a,90y,93h,91.99t/data=!3m6!1e1!3m4!1sreezxlKyYybE0j0lfxITAw!2e0!7i16384!8i8192>

Precedent National Examples

□ Evanston, IL



Google Maps URL:

<https://www.google.com/maps/@42.0493781,-87.6778972,3a,90y,298.68h,89.04t/data=!3m6!1e1!3m4!1sUC2MehF6vKMiV71weUFuzw!2e0!7i16384!8i8192>

Precedent National Examples

□ Fremont, CA

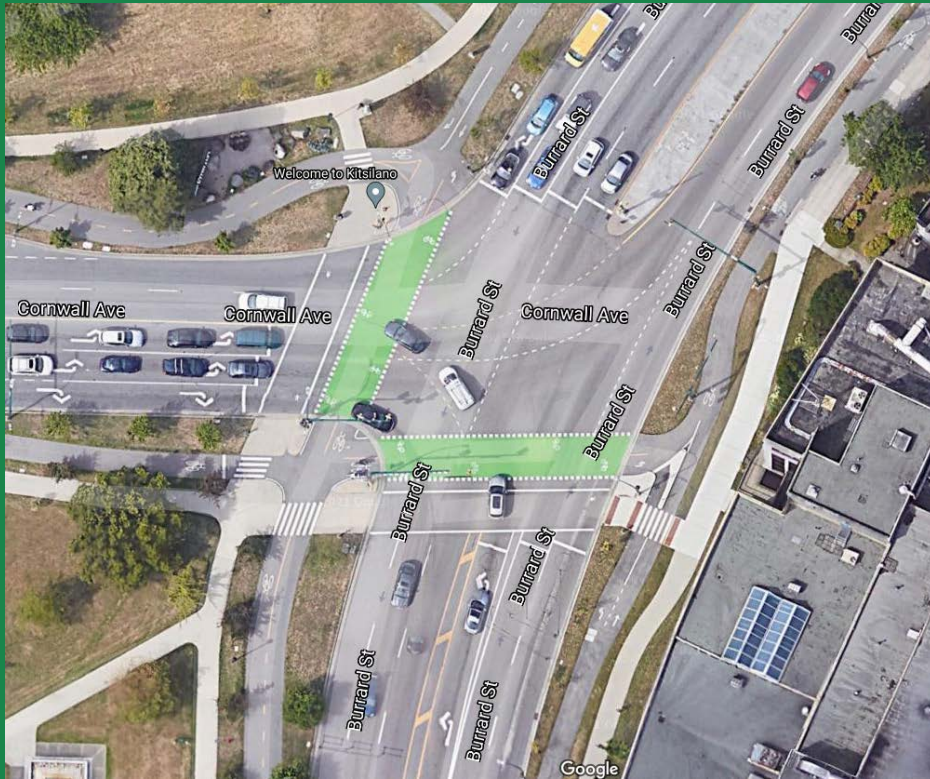


Google Maps URL:

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Precedent National Examples

□ Vancouver, BC



Google Maps URL:

https://www.google.com/maps/@49.2726972,-123.1451565,3a,51.8y,219.17h,86.89t/data=!3m6!1e1!3m4!1srW_EkKXlRUvXS0iWNwglQ!2e0!7i13312!8i6656

Green Pavement Marking Tech Memo

- Update to existing 2017 CDOT Green Pavement Markings memo
- New details include
 - Protected intersections
 - Green skips
 - Green crossbikes
- Memo work suspended pending adoption of 2020 draft MUTCD

DRAFT

Charlotte Department of Transportation
Engineering and Operations Division
Technical Memorandum No. 17-01
June 26, 2017
Revised November 2020

NOTE:
NOT RECONCILED with
2020 Draft MUTCD,
released for comments
by FHWA in mid-
December.

To: All CDOT Divisions

From: Debbie Smith, PE
Deputy Director

Subject: Green Pavement Markings for Bicycle Facilities, 2020 Revisions

Expiration

This Technical Memorandum expires December 31, 2025, unless superseded or extended prior to that date.

Purpose

The purpose of the Technical Memorandum is to establish consistent use of green pavement markings for bicycle facilities throughout the City of Charlotte. This technical memorandum covers only the design and layout of green markings when they are used. It is not intended to provide guidance, information about appropriateness, or notes on usage. For these and related items, please see separate guidance from the CDOT Bicycle Program and appropriate national guidance such as NACTO *Urban Bikeway Design Guideline*, FHWA *Separated Bike Lane Planning and Design Guide*, etc. Example layouts are provided.

This Technical Memorandum does not apply to high-profile multi-use trails such as the Cross-Charlotte Trail, Little Sugar Creek Greenway, and the Rail Trail. These trails have their own design guidance for street crossings. Refer to Technical Memorandum No. 17-02, *Urban Trails Crosswalk Marking Standard*, for the use of green pavement markings where these trails cross streets.

Authority/Administration

The Engineering & Operations Division (E&O) shall be responsible for administering this memorandum. E&O shall consult with the Design Section on any necessary changes or interpretations.

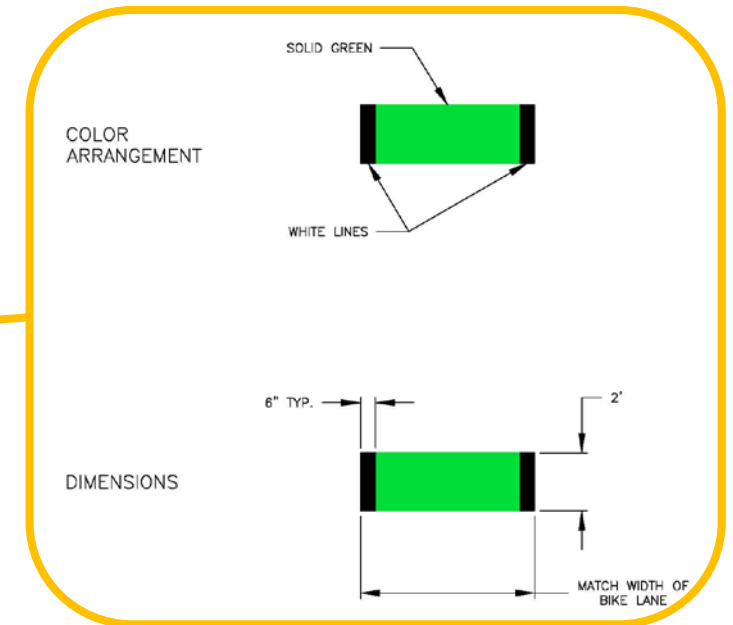
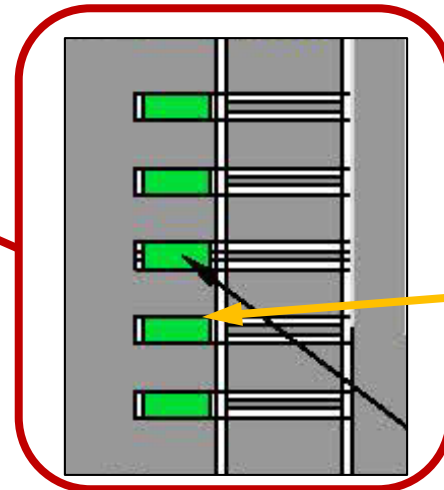
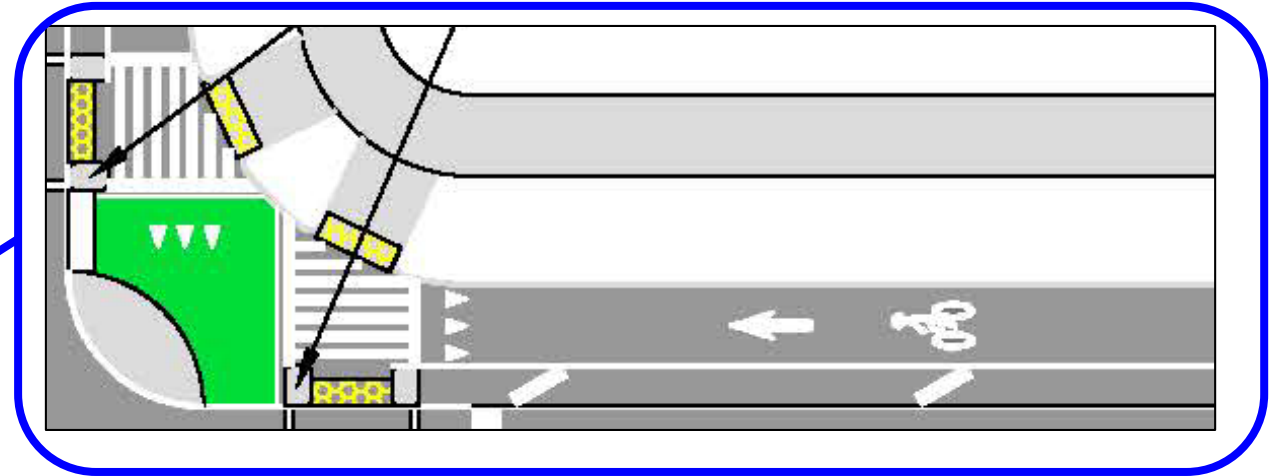
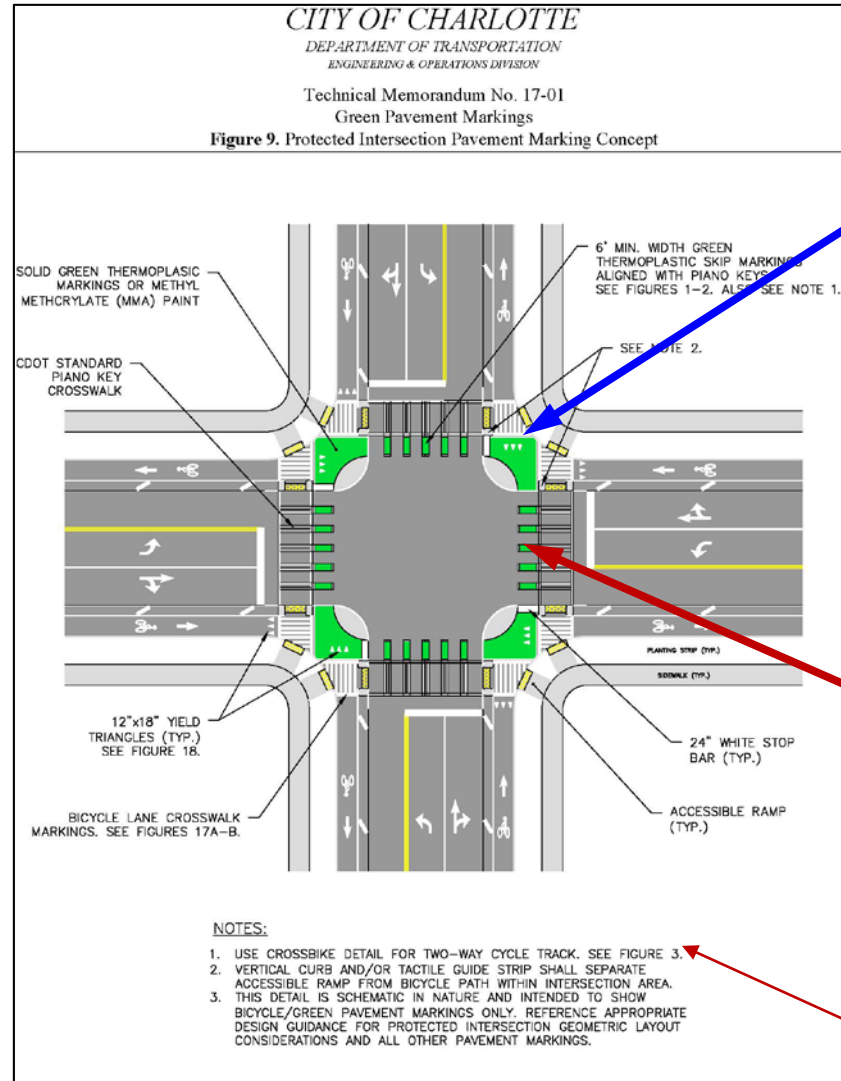
Background

The Federal Highway Administration (FHWA) has authorized the use of green pavement markings in three interim approvals to the Manual on Uniform Traffic Control Devices (MUTCD), designated as IA-14, IA-18, and IA-20. Interim approval allows use of these traffic control devices, pending official rulemaking for inclusion in the MUTCD.

- IA-14: Use of green markings
- IA-18: Use of bike boxes
- IA-20: Use of 2-stage left-turn boxes

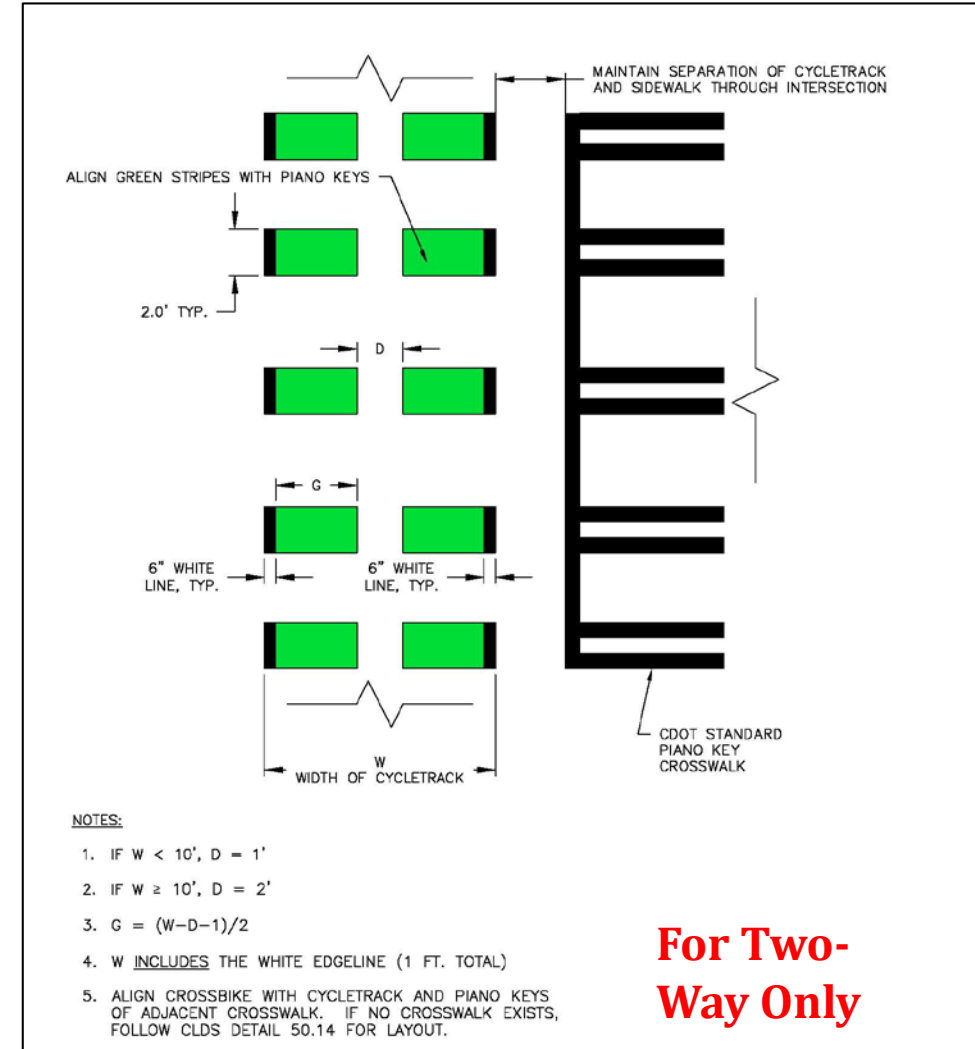
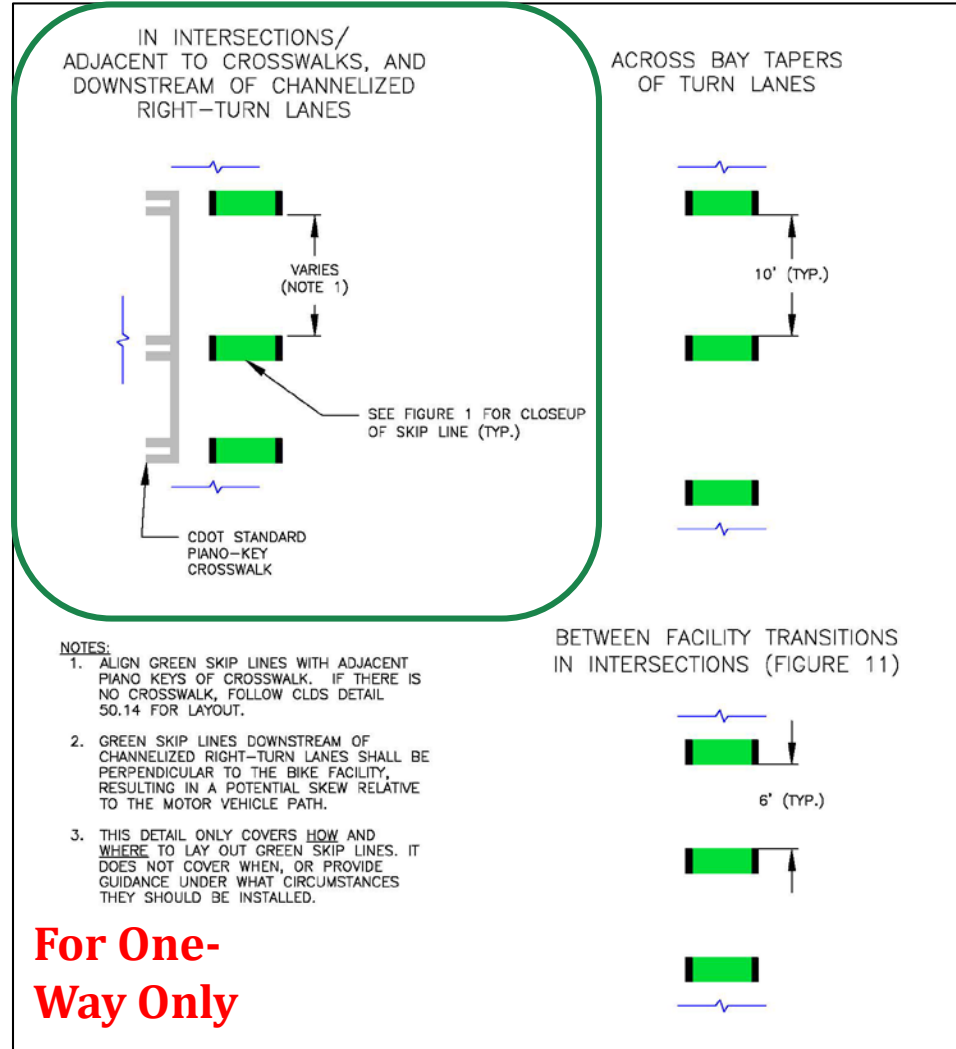
A number of experiments were conducted in the US and other countries to determine the value of designating a specific color to indicate a portion of the roadway reserved for use by bicyclists. Based on those studies, green was selected as the preferred color.

Protected Intersection Marking Detail



Note: for a 2-way facility,
use crossbike marking

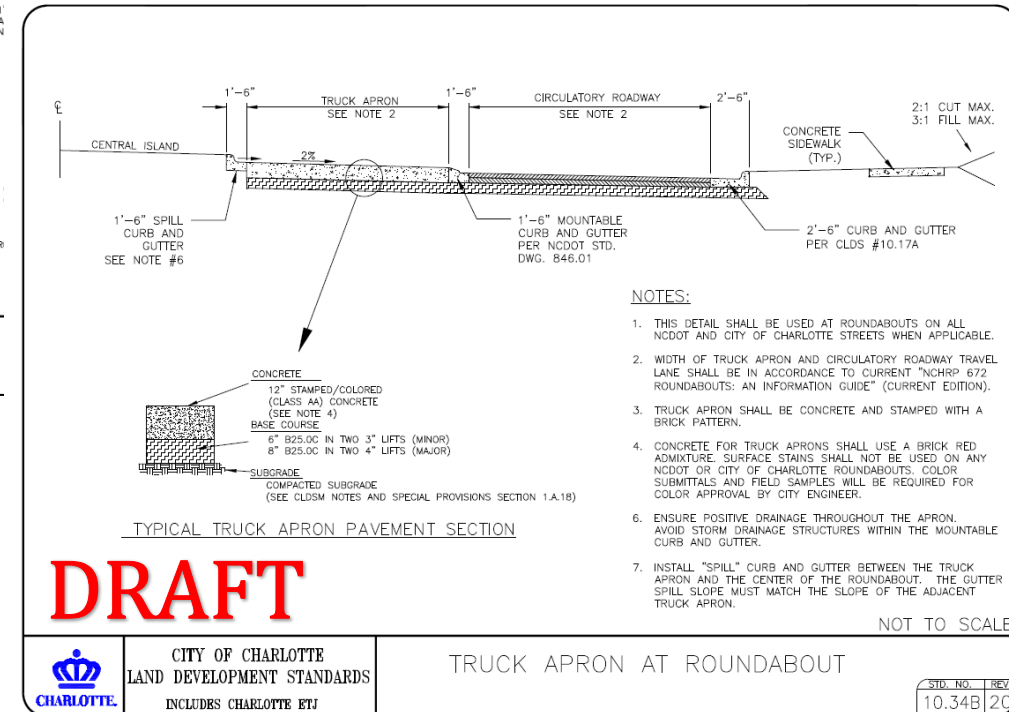
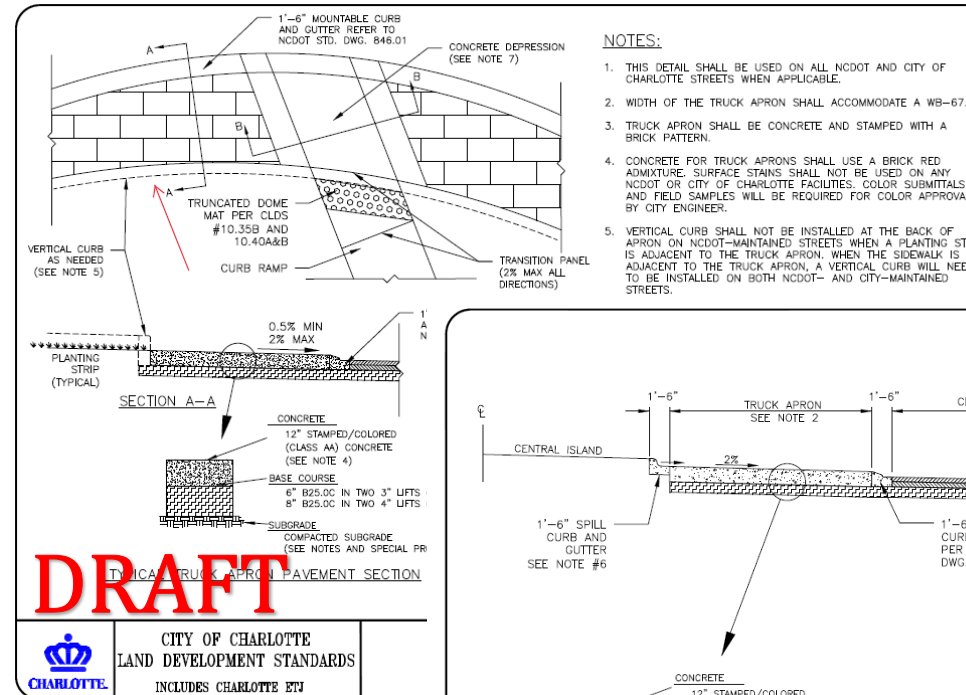
Green Skip & Crossbike Details



CLDS Updates and Protected Intersection Design Resources

Truck Apron Details

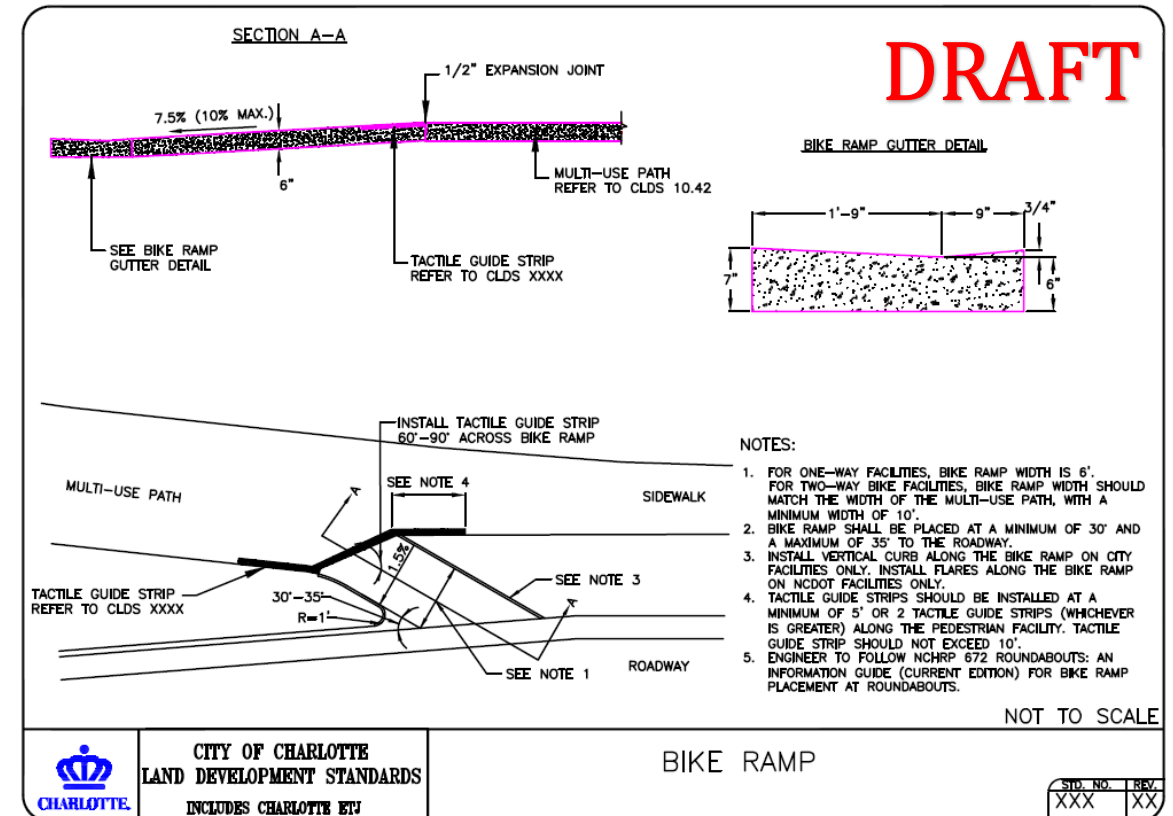
- Traditional Intersection
- Roundabout
- Availability
 - Tentatively Summer 2021*



CLDS Updates and Protected Intersection Design Resources

□ Bike Ramp & Tactile Guide Strip Detail

- Bike Ramp
- Tactile Guide Strip
- Availability
 - *Tentatively Summer 2021*



Thank You!

□ References

- Protected Intersection Primer Video [Link](#)
- MassDOT Separated Bike Lane Guide (Ch 4) [Link](#)
- FHWA Separated Bike Lane Planning and Design Guide [Link](#)
- NACTO Don't Give Up at the Intersection [Link](#)
- The Case for Protected Intersections [Link](#)

Design- CDOT

▶ Intelligent Transportation Systems

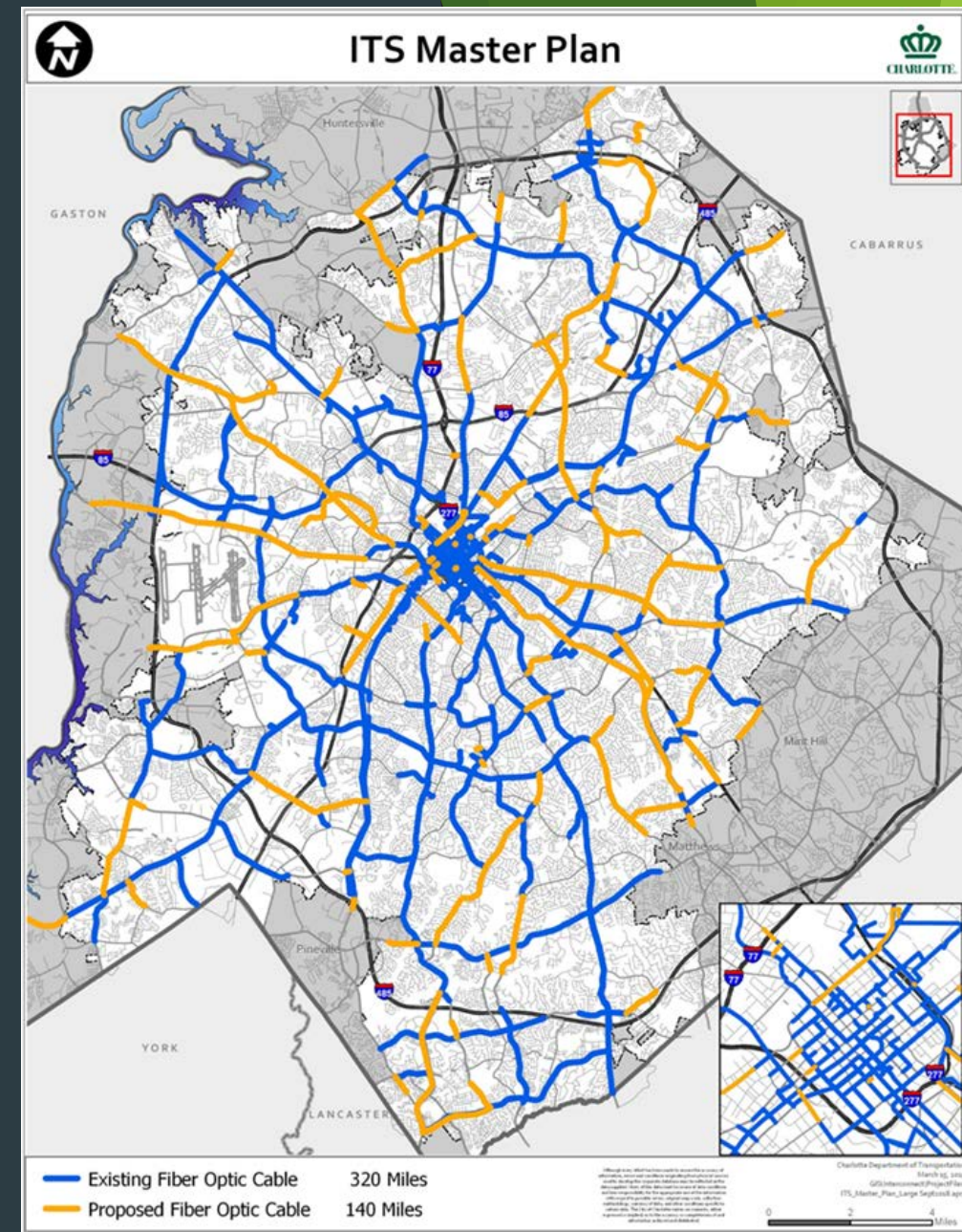
- ▶ Program provides the infrastructure for remote communications with traffic signals, installation of traffic management cameras, and other technologies to improve traffic conditions.

- ▶ Conduit
- ▶ Fiber optic cable
- ▶ Traffic management cameras
- ▶ Ethernet Switches

- ▶ CDOT standard that all new traffic signals be on a coordinated system

Design- CDOT

- ▶ ITS Master Plan
 - ▶ Developed in 2004 and updated in 2008
 - ▶ Outlines need for ITS facilities
- ▶ 70% of fiber infrastructure built out
 - ▶ 340 miles of existing fiber
 - ▶ 140 miles of proposed fiber
 - ▶ 75+ signal comm groups
- ▶ 470+ Traffic Cameras
- ▶ Emergency Vehicle Preemption
- ▶ Bus Priority Preemption



Design- CDOT

- ▶ ITS Design Considerations
 - ▶ CDOT ITS Special Provisions & ITS Standard Details
 - ▶ Consultant Deliverables
 - ▶ Cable Routing Design Plans
 - ▶ Fiber Splice Details
 - ▶ Standard Details
 - ▶ Specifications
 - ▶ Preliminary Cost Estimates
 - ▶ Utility Make-Ready Plans
- ▶ Beneficial to install conduit with sidewalk, roadway, and other projects.
- ▶ Install cameras with all new signals
- ▶ CDOT to review and approve materials used
- ▶ Utility Coordination- CDOT typically oversees ITS
- ▶ Record Plans

BREAK

QUESTIONS?/DISCUSSION

ADJOURN