### TRAIL FORUM 2019

Advancing the Carolina Thread Trail



# 2020: A New Frontier for Greenway Costs

Gabe Dobbs, PE, Senior Active Transportation Planner, LandDesign

Brian Bennett, PLA, ASLA, Project Manager, Mecklenburg County Asset & Facility Management

Katie Lloyd, PLA, ASLA, Planner, Mecklenburg County Park and Recreation Department

Curtis Bridges, AICP, Principal Planner, Charlotte Regional Transportation Planning Organization



#### // WHO WE ARE



#### **CURTIS BRIDGES**

**Principal Planner** 

American Institute of Certified Planners (162666)

#### **GABE DOBBS**



**Senior Active Transportation Designer + Planner** 

Professional Engineer in NC (039877)



### KATIE LLOYD

Landscape Architect / Senior Planner

Professional Landscape Architect, State of North Carolina #2039



### **BRIAN BENNETT**

Landscape Architect / **Project Manager** 

Professional Landscape Architect, State of North Carolina #1605





### // DISCLAIMER: WE ARE HUMAN

Cost estimation is tricky.

Let's have a discussion about the various ways the public and private sector estimates costs... and the impacts of those processes.

#### // OUTLINE

#### WHAT WE WILL COVER TODAY

- THINKING BIG PICTURE: PLANNING
- DIVING DEEPER: ANALYZING RECENT BIDS
- USING THE TOOLS: EXPLORING RESOURCES
- WRAP UP / Q&A

## THINKING BIG PICTURE: PLANNING

### // GREENWAYS TYPICAL GREENWAYS



**Sub-urban Trail Torrence Creek Greenway** 

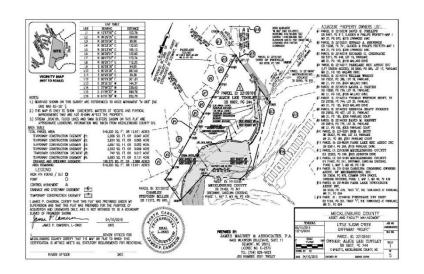
- Predominately asphalt, and often follow riparian corridors with sewer lines
- · 10' min. width, 12' preferred
- Mowed grass shoulders



### Urban Trail Little Sugar Creek Greenway

- Combination of asphalt and concrete.
- Width varies, preferred 14' min.
- Often includes more park-like amenities

### // GREENWAYS SPECIAL CONSTRAINTS



# Individual Floodplain Development Permit MECRLENBURG COUNTY PROJECT NAME Campbell Creek Greenway JRIBDOTCHOK (Check One) MCORLENBURG COUNTY MECRLENBURG COUNTY MATTHEWS PROJECT ADDRESS 327 Bluff Wood Cove Charlotte, NC 28212 TAX PARCEL DENTIFICATION NUMBER(S) 18512301, 16521402, 16521403, 16521404, 18508198, 16508108, 18508124, 16508101, 16505112 18505111, 16522199 STREAN NAME(S) Campbell Creek FEMA COMMUNITY AND PANEL NUMBER(S) 370169 / 467200K & 468200K OWNERS AGENT: SHELLYNN, Mecklenburg County Assest & Facility Management COMPANY COMPANY COMPANY Kenny Draffen The following Terms & Conditions apply to this Floodplain Development Permit (FDP): 1) This FDP goes and change the FIRM floodplain and/or Foodway Lines. 3) Permice mud obtain at other permits required the construction (Sed & EC, 4014404 Water Quality etc.) 4) The FDP goes not change the FIRM floodplain and/or Foodway Lines. 3) Permice mud obtain at other permits required the construction (Sed & EC, 4014404 Water Quality etc.) 4) The FDP goes not change the FIRM floodplain and/or Foodway Lines. 3) Permice mud obtain at other permits required the construction (Sed & EC, 4014404 Water Quality etc.) 4) The FDP goes not change the FIRM floodplain and/or Foodway Lines. 3) Permice mud obtain at other permits required the construction (Sed & EC, 4014404 Water Quality etc.) 4) The FDP goes not change the FIRM floodplain and/or Foodway Lines.



#### **Land Acquisition**

- Can be very time consuming
- · Easement vs. Fee Simple
- Potential Impact: Project delays, disconnections in the system

#### **Permitting**

- USACE, SWIM buffer, FEMA Floodplain Development permits
- Potential Impact: Delays and added expense

#### **Budget Constraints**

- Hard to estimate projects
- Limited number of qualified contractors
- Volatile bidding atmosphere
- Potential Impact: Delays and added cost

### // GREENWAYS SPECIAL CONSTRAINTS



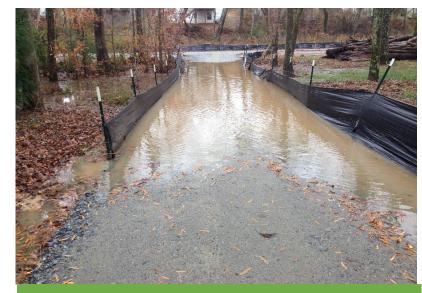
**Construction Access** 

- Narrow site corridors with limited road frontage
- Streams, wetland, poor soils
- Limited points of entry



**Utilities** 

- Water Mains, Sewer Lines and Structures
- PNG Gas lines
- Duke Transmission



**Weather Impacts** 

- Low lying, Poorly drained sites
- Seasonal constraints (asphalt and concrete install)

### // GREENWAYS SPECIAL CONSTRAINTS



Historic Features Cemetery at Clark's Creek Greenway

- Cemeteries
- Historic Structures
- Potential Impact: re-design, rerouting of trail, added expense



**Wetlands**4 Mile Creek Greenway

- Added design, permitting, and construction costs.
- Potential Impact: Permitting delays, added project expense



Species Mecklenburg County – Probable/Potential

- Mandated protection of threatened species (Northern long-eared bat).
- <u>Potential Impact</u>: Schedule impacts due to clearing restrictions.

### // GREENWAYS CREEK CROSSINGS



Fiberglass Bike/Ped Bridge Reedy Creek Greenway

 6-8' wide, light weight, modular, site assembled, typically 100 psf ped loading



Prefabricated Steel Bike/Ped Bridge Clarks Creek Greenway

 Cor-ten steel, fully assembled off site, low maintenance, 5-20 ton loading



 Steel/concrete construction, Site built, great for long spans

### // GREENWAYS LOW WATER CROSSINGS



Wooden Swale
Bridge
Irwin Creek Greenway

 Used for short spans over shallow swales.
 Built on site. Light duty.



Wooden Ped Bridge with Rails Reedy Creek Greenway

 Used for deeper channels. Built on site. Ped rated only.



Concrete Low Water/Swale Bridge Irwin Creek Greenway

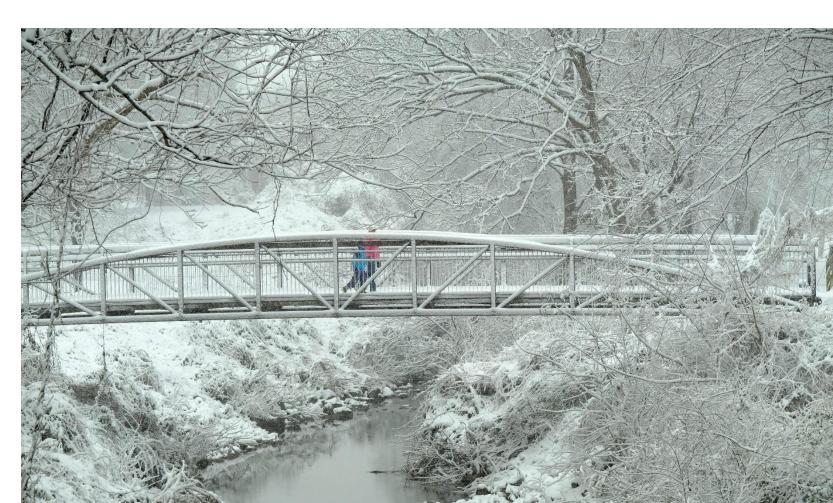
 Typically 10' wide, 10' long. Poured in place. 5 ton loading.

## // HIGH LEVEL - COUNTY ESTIMATE.... WHERE DO I BEGIN?

USING COST (\$) PER MILE + MANY UNIQUE FACTORS + SOFT COSTS...

MECK COUNTY
ESTIMATES DO NOT
INCLUDE:

REAL ESTATE



## // HIGH LEVEL - COUNTY ESTIMATE... THE TOOL

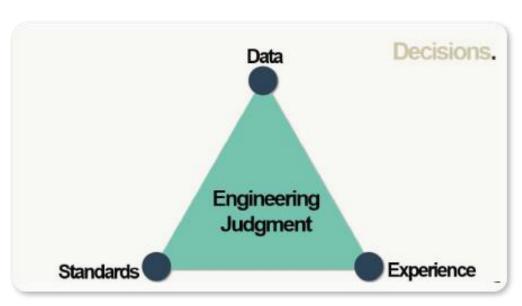
### General Estimated Cost Base 2.0 Million Per Mile (For Construction – no unique features or soft costs)

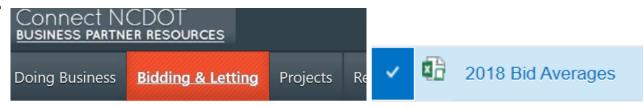
Greenway	Main Greenwa y Miles	Base Cost (1 mile trail, 1 swale bridge, 2 nbhd entr, permitting) \$2 M	(\$30,000 per mile; \$7,500 ea. Add'l	200'; \$300K	Parking Lot (50 cars) (\$ 200K)	Restr'm (\$350K)	Under- pass (\$300 K- \$500K)	Mitigatio n (\$50K min.)	\$300/If(\$700/I	Railroad (1) Trestle \$500K (2)Tunnel \$5K/ft (3)At- grade impr. \$1M	Crossin g	(\$100K)	Add'I N'Hood Entrances 500' length (\$50K each)	Other Cost	Const. Cost	Contingenc y (10% of Const. cost)	Cost for Federal (30% const cost)	Design (16% of const. cost)	Total Project Cost
ВС	1.42	\$2,840,000	\$30,000	\$1,050,000	\$200,000	\$0	\$0	\$0	\$250,000	\$0	\$0	\$0	\$5,600	\$0	\$4,375,600	\$437,560	\$0	\$700,096	\$5,513,256
cs	0.83	\$1,660,000	\$30,000	\$600,000	<b>\$0</b>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$322,400	\$0	\$2,612,400	\$261,240	\$0	\$417,984	\$3,291,624
LC	3.85	\$7,700,000	\$52,500	\$2,100,000	\$400,000	\$350,000	\$900,000	\$0	\$500,000	\$0	\$0	\$0	\$428,000	\$0	\$12,430,500	\$1,243,050	\$0	\$1,988,880	\$15,662,430
RC	2.3	\$4,600,000	\$37,500	\$1,080,000	\$200,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$428,000	\$0	\$6,345,500	\$634,550	\$0	\$1,015,280	\$7,995,330
WB	1.46	\$2,920,000	\$35,000	\$345,000	\$200,000	\$0	\$0	\$0	\$150,000	\$0	\$0	\$0	\$58,400	\$0	\$3,708,400	\$370,840	\$0	\$593,344	\$4,672,584
PC	1.5	\$3,000,000	\$35,000	\$1,050,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$40,000	\$0	\$4,125,000	\$412,500	\$0	\$660,000	\$5,197,500

## // HIGH LEVEL - DESIGNER ESTIMATE.... WHERE DO I BEGIN?

USING COST (\$) PER MILE + UNIQUE FACTORS...

SO I HAVE THIS AVAILABLE TO ME:





#### Bidding & Letting Let-Central

oject Name:		Little Sugar Creek	Greenway - 485 to Polk His	storic Site			
Prepared By:		LandDesign, Inc					
Date:		6/7/2017 REV 12/7/1	7 REV 4/16/18 REV 8/5/18 REV 1	/13/19 REV 2/13	3/19 REV 3/1/19 REV 3/1	2/2019 REV 4/2/2019	)
		100% Cost Estima	te				
Filter Wo	rkbook	Un-Filter					
						Mair	Trail
						Total:	\$4,445,042.40
Line #	Section #	Iten	n Description	Unit	Project Quantit =	Unit Price	Sub-Total
						MOBILIZATION	
1	800	Cont	ract Mobilization	LS	1	\$300,000.00	\$300,000.00
2	801	Con	struction Survey	LS	1	\$115,000.00	\$115,000.00
						MATERIALS	
3	226	Bor	rrow Excavation	CY	10000	\$25.00	\$250,000.00
4	226	Und	ercut Excavation	CY	653	\$25.00	\$16,325.00
5	876	Plain	Rip Rap (Class B)	TN	350	\$75.00	\$26,250.00
6	876	Plain	Rip Rap (Class 1)	TN	40	\$75.00	\$3,000.00
						PIPE	
7	SP	24" R.C. P	ipe Culverts (Class III)	LF	72	\$120.00	\$8,640.00
8	SP	30" R.C. P	ipe Culverts (Class III)	LF	54	\$140.00	\$7,560.00
9	SP	36" R.C. P	ipe Culverts (Class III)	LF	46	\$160.00	\$7,360.00



## // HIGH LEVEL - DESIGNER ESTIMATE.... WHICH CONTROL OF THE CONTROL

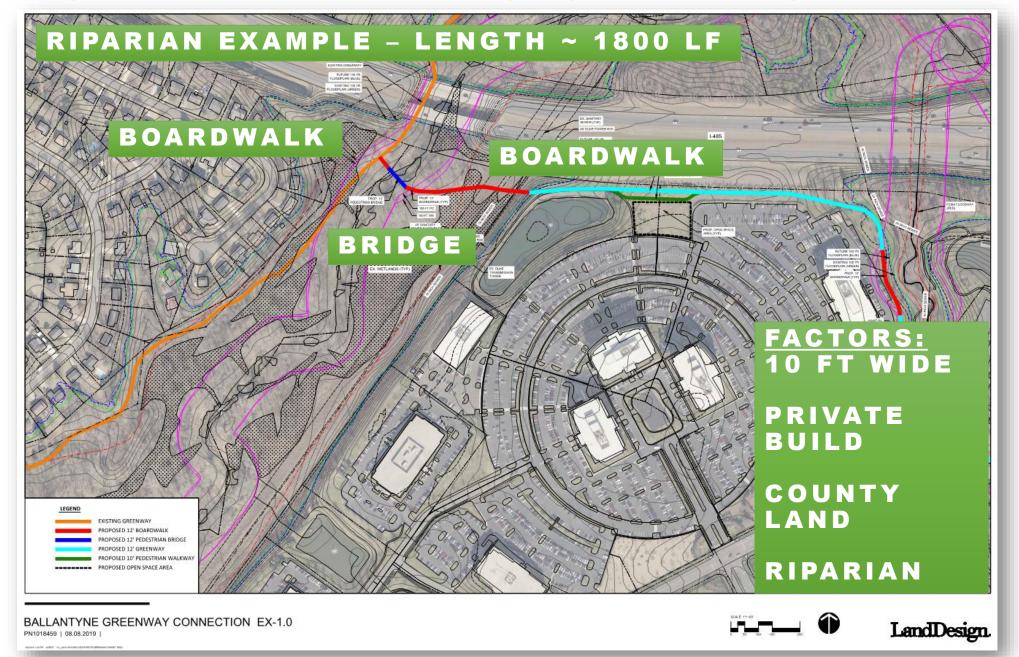
USING COST (\$) PER MILE + UNIQUE FACTORS...

#### THE **BIG IDEA** IS THIS:

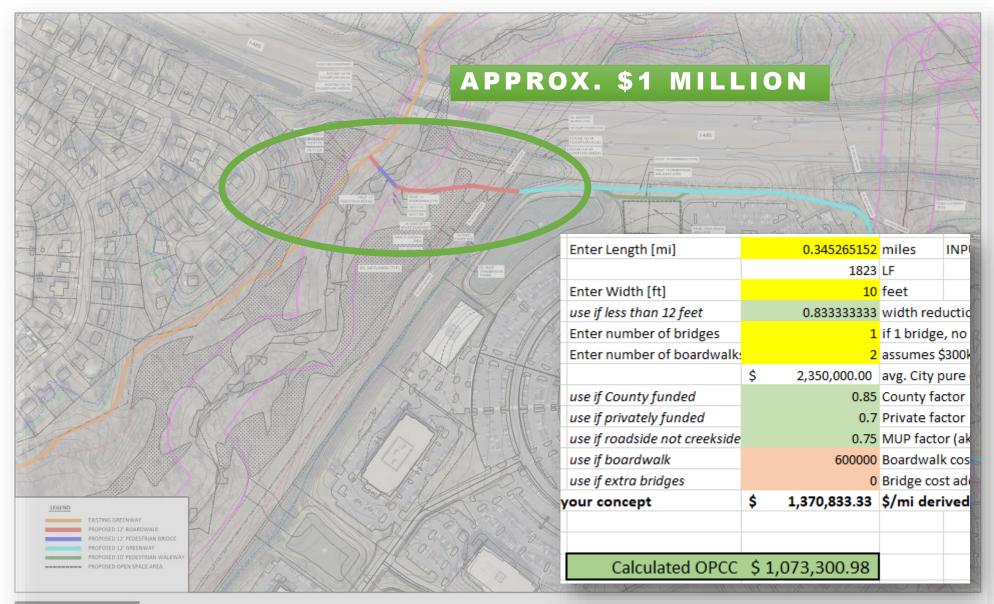
- WIDTH?
- RIPARIAN,
   TRANSITIONAL, OR
   ROADSIDE?
- PUBLIC OR PRIVATE?
- OTHER FACTORS...

nstructions					
Step 1 - Enter inputs in yellow cells.	Enter Length [mi]		0.345265152	miles	INPUT
			1823	LF	
Step 1 - Enter inputs in yellow cells.	Enter Width [ft]		10	feet	
	use if less than 12 feet		0.833333333	width red	duction
Step 1 - Enter inputs in yellow cells.	Enter number of bridges		1	if 1 bridg	e, no ca
Step 1 - Enter inputs in yellow cells.	Enter number of boardwalks		2	assumes	\$300k p
		\$	2,350,000.00	avg. City	pure co
	use if County funded		0.85	County fa	actor
	use if privately funded		0.7	Private fa	actor
	use if roadside not creekside		0.75	MUP fact	or (aka
	use if boardwalk		600000	Boardwa	lk cost
	use if extra bridges		0	Bridge co	st addi
Step 2 - Edit \$/mi derived formula, highlighting the green cells that apply	to your concept	\$	1,370,833.33	\$/mi de	rived
	Calculated OPCC	#	##########		

#### // HIGH LEVEL - DESIGNER ESTIMATE...



### // HIGH LEVEL - DESIGNER ESTIMATE...







## E-DIVING DEEPER: ANALYZING BIDS

## // ANALYZING BIDS THE HYPOTHESIS

We created a tool to analyze a specific bid to see where unit prices vary between both contractors and our (planned + consultant) estimates.

#### WE WANTED TO SEE IF....

- our plans and specs are clear to contractors
- there are advantages/disadvantages of lump sum items

#### WE THOUGHT THERE WOULD BE CLEAR TAKEAWAYS.

 we want to use this information to compare across multiple projects to look for trends.

### // PROJECTS ANALYZE BIDS

Briar Creek-	LOO HED 4		1.00.407.4	-	
Randolph	LSC HFP to 485	Barton Creek	LSC 485 to Polk	Plum Creek	McDowell Creek Phase 1A
1.0	2.3	0.7	1.8	0.7	0.4
N	N	Y	N	N	N
2017	2017	2017	2019	2019	2019
Y	Y	N	Y	N	N
10	12	10	12	10	12
	1.0 N 2017 Y	1.0 2.3 N N 2017 2017 Y Y	1.0 2.3 0.7 N N Y  2017 2017 2017 Y N	1.0 2.3 0.7 1.8 N N Y N  2017 2017 2019  Y Y N Y	1.0 2.3 0.7 1.8 0.7 N N N N N N N N N N N N N N N N N N N

### // PROJECTS ANALYSIS TOOLS

#### **Excel Calculators....**

- bid tab analysis
- cost by discipline comparison
- unit cost comparison
- average total vs low bid + engineers estimate vs low bid comparison

#### **Acknowledged Limitations...**

- project scope
- funding sources
- limited data points (for now)
- variability bid climate, consultant, CD/project manual preference(s)

### // PROJECTS ANALYSIS TOOLS

#### average total vs low bid + engineers estimate vs low bid comparison:

				Average Tot	al vs. Low Bid			Engineers Estimate	vs. Low Bid	
Bid Date	Length(mi.)		Avg. Total <sup>1</sup>	Low Bid <sup>1</sup>	Delta	% over low bid	Eng. Estimate <sup>2</sup>	Low Bid <sup>2</sup>	Delta	%
		2017 Projects								
2/16/2017	1.00	Briar Creek Greenway	\$ 1,360,564.52	\$ 1,261,273.85	\$ 99,290.67	7 7.87%	\$ 1,384,726.50	\$ 1,361,273.85	\$ 23,452.65	1.72%
3/28/2017	2.30	Little Sugar Creek Greenway HFP to 485	\$ 5,300,386.72	\$ 4,833,791.67	\$ 466,595.0	9.65%	\$ 4,469,748.48	\$ 5,220,495.00	\$ (750,746.52)	-14.38%
10/12/2017	0.70	Barton Creek Greenway	\$ 3,076,418.55	\$ 2,129,804.65	\$ 946,613.90	44.45%	\$ 2,832,406.00	\$ 2,379,804.65	\$ 452,601.35	19.02%
	T	2019 Projects								
5/10/2019	1.8	Little Sugar Creek Greenway 485 to Polk	\$ 5,260,212.45	\$ 4,480,665.80	\$ 779,546.6	5 17.40%	\$ 5,304,235.32	\$ 6,203,163.59	\$ (898,928.27)	-14.49%
7/18/2019	0.7	Plum Creek Greenway	\$ 1,378,398.20	\$ 930,916.16	\$ 447,482.03	3 48.07%	\$ 1,125,933.00	\$ 1,045,580.56	\$ 80,352.44	7.68%
11/12/2019	0.4	McDowell Creek Greenway Phase 1A	\$ 1,715,422.39	\$ 1,574,874.16	\$ 140,548.2	8.92%	\$ \$ 1,663,000.00	\$ 1,741,174.16	\$ (78,174.16)	-4.49%

<sup>&</sup>lt;sup>1</sup> Not including contingency

<sup>&</sup>lt;sup>2</sup> Including contingency

### // PROJECTS WHAT ARE BIDS SAYING?

**ARE THERE TRENDS?** 

#### WHAT WE FOUND INTERESTING....

- EARTHWORK TO CLASSIFY OR NOT TO CLASSIFY?
- STRUCTURES TO ITEMIZE OR NOT TO ITEMIZE?
- CONSTRUCTION STAKING INCLUDE OR INCIDENTAL?
- HOW ARE DESIGNERS ACCOUNTING FOR UTILITIES, AMENITIES, and OTHER DISCIPLINES?
- ARE ALL THE SP'S CLEAR?
  - DO THEY CORRESPOND TO DRAWINGS and ACCURATELY CAPTURE FULL SCOPE & PAYMENT?

## // PROJECTS WHAT ARE BIDS SAYING?

ARE THERE ANY TAKEAWAYS...NOT DRAWING CONCLUSIONS...

#### WHAT WE FOUND INTERESTING....

- EARTHWORK TO CLASSIFY OR NOT TO CLASSIFY?
  - A CLEAR LS SPEC GOES A LONG WAY
  - IF CLASSIFYING...BE CLEAR + CONSIDER UNIT COST ADD/DEDUCT
- STRUCTURES TO ITEMIZE OR NOT TO ITEMIZE?
  - PERHAPS A STANDARD APPROACH TO BRIDGES (SWALE, ETC.) REIGNS IN COSTS?
- CONSTRUCTION STAKING INCLUDE OR INCIDENTAL?
  - "2.5% ISN'T THAT MUCH" SAYS DESIGNER A, B, C....
  - 2.5% OF \$5,000,000 = **\$125,000**; THE CONTRACTOR WILL FIND A WAY



# EUSING THE TOOLS: EXPLORING RESOURCES

## // COST ESTIMATES WHY IT'S IMPORTANT TO GET ESTIMATES RIGHT

### **NCDOT** Strategic Transportation Investments (STI)

- 2013 State legislation which makes project funding/prioritization very objective
- "Cost to NCDOT" is a factor in scoring
- A more expensive project will score *lower* (all other criteria being equal)

В	icycle & Pedestrian Scoring	
Criteria	Measure	Division Needs (50%)
Safety	(Number of crashes x 40%) + (Crash severity x 20%) + (Safety risk x 20%) + (Safety benefit x 20%)	20%
Accessibility/ Connectivity	Points of Interest pts + Connections pts + Route pts	15%
Demand/ Density	# of households and employees per square mile near project	10%
Cost Effectiveness	(Safety + Accessibility/Connectivity + Demand/Density) / Cost to NCDOT	5%

## // COST ESTIMATES WHY IT'S IMPORTANT TO GET ESTIMATES RIGHT

#### **Discretionary Funding (MPO, Local, Private)**

- Cost is often a limiting factor, regardless of the source
- MPO discretionary funds are limited (TAP, CMAQ, STBG-DA)
- Low cost/High impact projects are rewarded
- 20% local matches can make or break most local budgets



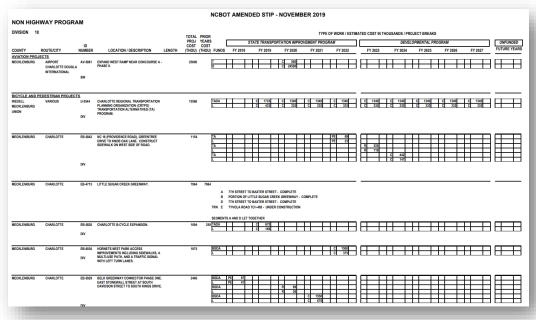
### Discretionary Funds Policy Guide

Adopted by CRTPO Board February 13, 2019

## // COST ESTIMATES WHY IT'S IMPORTANT TO GET ESTIMATES RIGHT

#### **Logistics of Funding**

- Incorrect estimates can impact when your project is
  - funded in the STIP
- An under-estimate means having to ask for more money later (not promised)
- Local agency may not have funds for increased match
- Federal funds are reimbursed vs funded up front



#### **THOUGHTS**

#### **Estimate is Too High...**

- ☐ Project will **score lower** in competitive ranking and prioritization
- □ 20% required local match will be higher than necessary



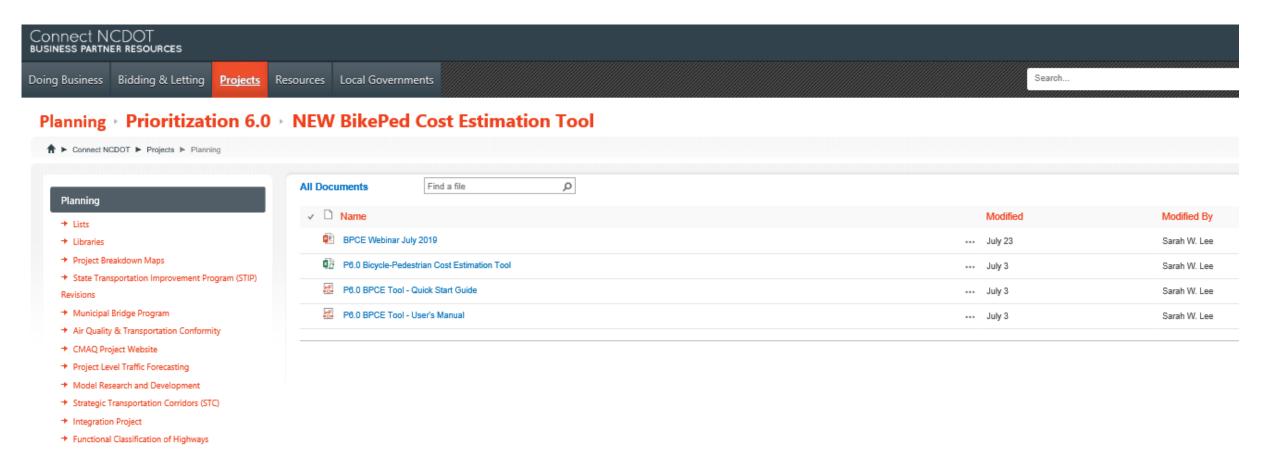
#### **Estimate is Too Low...**

- ☐ Project will have to go "back to the well" to ask for additional funding often **not** guaranteed
  - ☐ Local sponsor may not be able to fund increased match commitment

#### **Estimate is Juuuuuuust Riiiight...**

- ☐ Project is funded in STIP
- NCDOT is happy
- ☐ Local sponsor gets a completed project **on budget & on-time!**

## // CONTENT SLIDE NCDOT TOOLS



**COST ESTIMATION TOOL** 

# EWRAP UP / Q & A

### THANK YOU!

### ...QUESTIONS??



2020: A NEW FRONTIER FOR GREENWAY COSTS