Appendix F

Technical Report on Cost Estimation Methodology

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Technical Report on Cost Estimation Methodology

The total costs of the projects in the Non-motorized Transportation Plan include preliminary engineering (PE), right-of-way (ROW), utilities, and construction. The construction cost estimates are primarily based on weighted averages from GDOT's item mean summaries. For certain, unique project elements or types, CORE MPO staff adjusted estimates from other studies, from within the immediate region or the Southeast, if possible. Costs are in 2014 dollars. Any inflation adjustments used the GDOT annual factor of 1.025. Preliminary engineering phases, shown separately in the actual project lists, were assumed to be 15% of construction costs, due to the relatively low construction costs compared to roadway projects.

The right-of-way (ROW) and utilities cost estimates were developed using GDOT's Right-of-way and Utilities Cost Estimation (RUCEST) tool. The assumptions employed within the tool are explained in dedicated sections of this technical report.

If projects already had cost estimates from sources such as concept reports, state or local agencies' staffs, or Transportation Alternatives applications, then those estimates were used and inflated if necessary.

Construction Cost Estimates

Construction Costs Summary

For each type of facility, per-mile estimates were created. The consulting firm RS&H, who assisted MPO staff with the 2040 Total Mobility Plan, developed an initial version during their work on the statewide plan. The assumptions for facility dimensions were based on GDOT Design Policy. CORE MPO staff adapted some of the templates to create estimates for additional cross-sections (e.g. reduced width of shoulder clearing, grading, and paving for local, lower-speed roads) and also researched other sources for special project elements. The summary table below shows construction costs, including both sides for bike lanes, sidewalks, and shoulders. Preliminary engineering is not included in these constructions costs.

Summary of Per Mile Estimates (developed from Weighted Averages from GDOT Item Mean Summaries, unless noted)	
Both Directions (if for bike lanes, sidewalks, or shoulders) -- Construction phase (PE shown separately in project list)	
Project Elements	**Cost per Mile (2014)**
6.5' Rural Bikeable Shoulder	$583,899.78
4' Urban Bike Lane w/ 5' Sidewalk	$725,616.08
8' Urban Buffered Bike Lane w/ 5' Sidewalk	$1,311,003.08
4' Urban Bike Lane no Sidewalk	$544,125.12
8' Urban Bike Buffered Bike Lane no Sidewalk	$1,118,517.48
Urban 5' Sidewalk	$237,319.46
Multiuse Path (one side only)	$360,000.00
6.5' Rural Bike Lane (Striped version created by adjusting RS&H sheet.)	$594,834.30
4' Bike Lane Shoulder (Smaller project [for lower-speed local roads], created by adjustment)	$328,367.80
Granite Fines Trail (from Tybee Marsh Hen Trail, Phase 2 TAP application, 2014)	$300,000.00
Boardwalk (From UNC HSRC report[1] [incl. inflation].)	$2,056,115.00
Low Boardwalk, no railings (From Tybee's Marsh Hen Trail, Phase 2 TAP application, 2014)	$ 686,400.00
2-way Cycle Track with hatching, tubular markers (Cost/mi based on Atlanta 10th St. project [incl. infl].)	$405,900.00
Cantilevered bike/ped bridge (Cost/mi based on 2007 Ashley River Bridge Retrofit Feasibility Study[2] [incl. inflation and 20% contingency].)	$9,428,513.00
(Ea.) Pre-fab steel bridge (From UNC HSRC report [incl. inflation])	(Ea.) $201,090.00
(Ea.) Bike Share Station w 8 bikes (from CAT)	(Ea.) $43,762.00

[1] Bushell, M. A., Poole, B. W., Zegeer, C. V., & Rodriguez, D. A., (2013, October). *Costs for pedestrian and bicyclist infrastructure improvements: A resource for researchers, engineers, planners, and the general public.* Chapel Hill, N.C, UNC Highway Safety Research Center.

[2] Atlantic South Consulting Services and Dennis Corporation, (2007, December 7). Ashley River Bridge Pedestrian/Bicycle Retrofit – Feasibility Study. Retrieved from: http://www.ccroadwise.org/projects/ashley_river_bridge/index.php

Detailed Construction Cost Assumptions

The following tables show assumptions for items, quantities, and costs included in each type of facility. Even in the case of bike lanes, sidewalk, and shoulder (which are usually present on both sides of a road) these costs are per/mile for one side of a roadway only. For the double-sided types of facilities, these costs were then doubled to produce the two-sided cost in the summary table above.

Rural Bikeable Shoulder (no markings)								
		Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
	6.5' Paved Shoulder						**$ 197,229.96**	
	1.5" 12.5mm Superpave	402-3130	TN	72.65	0.06	4.32	$ 22,785.36	(0.72SY/LF)*(165LB/SY)*(1TN/2000LB)=0.0594TN/LF=313.632TN/MI
	2" 19mm Superpave	402-3190	TN	67.49	0.08	5.35	$ 28,222.70	(0.72SY/LF)*(220LB/SY)*(1TN/2000LB)=0.0792TN/LF=418.176TN/MI
	4" 25mm Superpave	402-3121	TN	65.04	0.16	10.30	$ 54,396.33	(0.72SY/LF)*(440LB/SY)*(1TN/2000LB)=0.1584TN/LF=836.352TN/MI
	12" GAB	310-5120	SY	18.39	0.72	13.24	$ 69,911.42	(0.72SY/LF)*(5280LF/MI)=3801.6SY/MI
	Pavement reinforcing Fabric Strips, 18in Wide	446-1100	LF	3.32	1.00	3.32	$ 17,529.60	
	Bitum Tack Coat	413-1000	GL	0.73	0.72	0.72	$ 3,801.60	(2 Layers of Bit Tack)*(0.5GAL/SY)*(0.72SY/LF)=0.72GAL/LF=3801GAL/MI
	16" Rumble Strip at 12' Gap	456-2015	GLM	582.94			$ 582.94	
No	Guardrail						$ -	
	Erosion Control						**$ 58,179.03**	
	Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
	Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
	Temp Grassing	163-0232	AC	269.53	0.00	0.54	$ 2,846.24	1/2 Permanent Grassing
	Permanent Grassing	700-6910	AC	869.63	0.00	3.48	$ 18,366.59	3.5' Unpaved Shulder+20' of Side Slope for 30' of Clear Zone = 0.004AC/LF
	Mulch	163-0240	TN	178.76	0.01	2.15	$ 11,326.23	3TN/AC
	Agr. Lime	700-7000	TN	64.65	0.01	0.78	$ 4,096.22	3TN/AC
	Fertilizer - Mixed Grade	700-8000	TN	364.69	0.00	0.88	$ 4,621.35	0.6TN/AC
	Fertilizer Nitrogen Content	700-8100	LB	1.90	0.20	0.38	$ 2,006.40	50LB/AC
No	**Pavement Markings**							
							$ -	
	Earthwork Costs							
	Grading Per Mile	210-0200	LM	10000.00			**$ 10,000.00**	
No	**Drainage Costs**						$ -	
	Construction Cost						**$ 265,408.99**	
	E&C (10%)						**$ 26,540.90**	
	Total Const. Cost						**$ 291,949.89**	

Urban Section - Remove and Replace Existing Curb and Gutter and add 4' Bike Lane - Add 5' Sidewalk							
	Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
4' Paved Bike Lane						**$ 242,257.96**	
1.5" 12.5mm Superpave	402-3130	TN	72.65	0.06	4.32	$ 22,785.36	(0.44SY/LF)*(165LB/SY)*(1TN/2000LB)=0.0363TN/LF=191.66TN/MI
"Class B" Concrete Widening	500-9999	CY	131.07	0.07	9.70	$ 51,211.67	0.5FT Depthx1LF*4FT Width/27cf/CY=0.074CY/LF
Conc Curb and Gutter 6 IN x 30 IN, Type 2	441-6022	LF	13.65	1.00	13.65	$ 72,072.00	
6" GAB Under C&G and Concrete Widening	310-5060	SY	9.56	0.72	6.88	$ 36,343.30	(0.72SY/LF)*(5280LF/MI)=3801.6SY/MI
Sidewalk, 4 in Thick	441-0104	SY	20.24	0.56	11.33	**$ 59,845.63**	1Ft*5FT/9SF/SY=0.56SY/LF
Erosion Control						**$ 41,141.21**	
Inlet Sediment Trap	163-0550	EA	128.79			$ 2,318.22	Assume a catchbasin every 300 feet = 18/mile
Maintain Inlet Sediment Trap	165-0105	EA	44.23			$ 796.14	Assume a catchbasin every 300 feet = 18/mile
Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
Temp Grassing	163-0232	AC	269.53	0.00	0.03	$ 142.31	1/2 Permanent Grassing
Permanent Grassing	700-6910	AC	869.63	0.00	0.17	$ 918.33	6' grass buffer and 2.5' grass strip behind sidewalk = 8.5'*1/43560 = 0.0002AC/LF
Mulch	163-0240	TN	178.76	0.01	2.15	$ 11,326.23	3TN/AC
Agr. Lime	700-7000	TN	64.65	0.01	0.78	$ 4,096.22	3TN/AC
Fertilizer - Mixed Grade	700-8000	TN	364.69	0.00	0.88	$ 4,621.35	0.6TN/AC
Fertilizer Nitrogen Content	700-8100	LB	1.90	0.20	0.38	$ 2,006.40	50LB/AC
Pavement Markings & Signing						**$ 4,970.28**	
Remove Existing Traff. Markings	656-4001	SY	2.50	0.06	0.15	$ 792.00	0.5ftX1Ft/9sf/SY = 0.056SY/LF
Pavement Marking Symbol, TP4	652-0094	EA	45.96			$ 2,435.88	1per 100' = 53/mile
Solid Traffic Stripe, 5in White	652-5451	LF	0.14	1.00	0.14	$ 739.20	
Solid traffic Stripe 6in, White	652-5301	LF	0.19	1.00	0.19	$ 1,003.20	
Earthwork Costs							
Grading Per Mile (Incl. Removal of Exist C&G)	210-0200	LM	5002.44			**$ 5,002.44**	
Drainage Costs			0.00			**$ 36,453.60**	
Catch Basin, GP 1	668-1100	EA	1875.00			$ 33,750.00	Assume a catchbasin every 300 feet = 18/mile
18" Storm Drain Pipe	550-1180	LF	30.04			$ 2,703.60	Assume 5LF / Catch Basin *18 Catchbasin/mile
Construction Cost						**$ 329,825.49**	
E&C (10%)						**$ 32,982.55**	
Total Const. Cost						**$ 362,808.04**	

Urban Section - Remove and Replace Existing Curb and Gutter and add 8' Bike Lane - Add 5' Sidewalk							
	Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
8' Paved Bike Lane						**$ 383,711.40**	
1.5" 12.5mm Superpave	402-3130	TN	72.65	0.07	5.33	$ 28,155.65	(0.89SY/LF)*(165LB/SY)*(1TN/2000LB)=0.0734TN/LF
2" 19mm Superpave	402-3190	TN	67.49	0.10	6.61	$ 34,886.39	(0.89SY/LF)*(220LB/SY)*(1TN/2000LB)=0.0979TN/LF
4" 25mm Superpave	402-3121	TN	65.04	0.20	12.73	$ 67,239.91	(0.89SY/LF)*(440LB/SY)*(1TN/2000LB)=0.1958TN/LF
12" GAB	310-5120	SY	18.39	0.89	16.37	$ 86,418.29	(0.89SY/LF)*(5280LF/MI)=4699.2SY/MI
Bitum Tack Coat	413-1000	GL	0.73	0.89	0.65	$ 3,430.42	(2 Layers of Bit Tack)*(0.5GAL/SY)*(0.89SY/LF)=0.89GAL/LF
Pavement reinforcing Fabric Strips, 18in Wide	446-1100	LF	3.32	1.00	3.32	$ 17,529.60	
Conc Curb and Gutter 6 IN x 30 IN, Type 2	441-6022	LF	13.65	1.00	13.65	$ 72,072.00	
6" GAB Under C&G	310-5060	SY	9.56	0.28	2.68	$ 14,133.50	2.5FT*1Ft = 2.5SF/9SF/YD=0.28SY/LF
Sidewalk, 4 in Thick	441-0104	SY	20.24	0.56	11.33	**$ 59,845.63**	1Ft*5FT/9SF/SY=0.56SY/LF
Erosion Control						**$ 41,141.21**	
Inlet Sediment Trap	163-0550	EA	128.79			$ 2,318.22	Assume a catchbasin every 300 feet = 18/mile
Maintain Inlet Sediment Trap	165-0105	EA	44.23			$ 796.14	Assume a catchbasin every 300 feet = 18/mile
Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
Temp Grassing	163-0232	AC	269.53	0.00	0.03	$ 142.31	1/2 Permanent Grassing
Permanent Grassing	700-6910	AC	869.63	0.00	0.17	$ 918.33	6' grass buffer and 2.5' grass strip behind sidewalk = 8.5'*1/43560 = 0.0002AC/LF
Mulch	163-0240	TN	178.76	0.01	2.15	$ 11,326.23	3TN/AC
Agr. Lime	700-7000	TN	64.65	0.01	0.78	$ 4,096.22	3TN/AC
Fertilizer - Mixed Grade	700-8000	TN	364.69	0.00	0.88	$ 4,621.35	0.6TN/AC
Fertilizer Nitrogen Content	700-8100	LB	1.90	0.20	0.38	$ 2,006.40	50LB/AC
Pavement Markings						**$ 8,349.48**	
Remove Existing Traff. Markings	656-4001	SY	2.50	0.06	0.15	$ 792.00	0.5ftX1Ft/9sf/SY = 0.056SY/LF
Straffic Strip, White (For Buffer)	652-9001	SY	1.46	0.44	0.64	$ 3,379.20	4ft Buffer *1 Foot/ 9SF/SY = 0.44SY/LF
Pavement Marking Symbol, TP4	652-0094	EA	45.96			$ 2,435.88	1 per 100' = 53/mile
Solid Traffic Stripe, 5in White	652-5451	LF	0.14	1.00	0.14	$ 739.20	
Solid traffic Stripe 6in, White	652-5301	LF	0.19	1.00	0.19	$ 1,003.20	
Earthwork Costs							
Grading Per Mile (Incl. Removal of Exist C&G	210-0200	LM	10000.00			**$ 10,000.00**	
Drainage Costs			0.00			**$ 152,708.40**	
Catch Basin, GP 1	668-1100	EA	1875.00			$ 33,750.00	Assume a catchbasin every 300 feet = 18/mile
18" Storm Drain Pipe	550-1180	LF	30.04	0.75	22.53	$ 118,958.40	Assumes the need to replace existing longitudal pipes at total LF of Pipe=75% Total Length
Construction Cost						**$ 595,910.49**	
E&C (10%)						**$ 59,591.05**	
Total Const. Cost						**$ 655,501.54**	

Urban Section - Remove and Replace Existing Curb and Gutter and add 4' Bike Lane -No Sidewalk							
	Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
4' Paved Bike Lane						**$ 182,412.33**	
1.5" 12.5mm Superpave	402-3130	TN	72.65	0.06	4.32	$ 22,785.36	(0.44SY/LF)*(165LB/SY)*(1TN /2000LB)=0.0363TN/LF=191. 66TN/MI
"Class B" Concrete Widening	500-9999	CY	131.07	0.07	9.70	$ 51,211.67	0.5FT Depthx1LF*4FT Width/27cf/CY=0.074CY/LF
Conc Curb and Gutter 6 IN x 30 IN, Type 2	441-6022	LF	13.65	1.00	13.65	$ 72,072.00	
6" GAB Under C&G and Concrete Widening	310-5060	SY	9.56	0.72	6.88	$ 36,343.30	(0.72SY/LF)*(5280LF/MI)=380 1.6SY/MI
Erosion Control						**$ 18,490.95**	
Inlet Sediment Trap	163-0550	EA	128.79			$ 2,318.22	Assume a catchbasin every 300 feet = 18/mile
Maintain Inlet Sediment Trap	165-0105	EA	44.23			$ 796.14	Assume a catchbasin every 300 feet = 18/mile
Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
Temp Grassing	163-0232	AC	269.53			$ 32.34	1/2 Permanent Grassing
Permanent Grassing	700-6910	AC	869.63			$ 208.71	2' grass buffer=2'*(1/43560)*5280 = 0.24AC/MI
Mulch	163-0240	TN	178.76			$ 128.71	3TN/AC
Agr. Lime	700-7000	TN	64.65			$ 15.52	3TN/AC
Fertilizer - Mixed Grade	700-8000	TN	364.69			$ 52.51	0.6TN/AC
Fertilizer Nitrogen Content	700-8100	LB	1.90			$ 22.80	50LB/AC
Pavement Markings & Signing						**$ 4,970.28**	
Remove Existing Traff. Markings	656-4001	SY	2.50	0.06	0.15	$ 792.00	0.5ftX1Ft/9sf/SY = 0.056SY/LF
Pavement Marking Symbol, TP4	652-0094	EA	45.96			$ 2,435.88	1per 100' = 53/mile
Solid Traffic Stripe, 5in White	652-5451	LF	0.14	1.00	0.14	$ 739.20	
Solid traffic Stripe 6in, White	652-5301	LF	0.19	1.00	0.19	$ 1,003.20	
Earthwork Costs							
Grading Per Mile (Incl. Removal of Exist C&G)	210-0200	LM	5002.44			**$ 5,002.44**	
Drainage Costs			0.00			**$ 36,453.60**	
Catch Basin, GP 1	668-1100	EA	1875.00			$ 33,750.00	Assume a catchbasin every 300 feet = 18/mile
18" Storm Drain Pipe	550-1180	LF	30.04			$ 2,703.60	Assume 5LF / Catch Basin *18 Catchbasin/mile
Construction Cost						**$ 247,329.60**	
E&C (10%)						**$ 24,732.96**	
Total Const. Cost						**$ 272,062.56**	

Urban Section - Remove and Replace Existing Curb and Gutter and add 8' Bike Lane - No Sidewalk							
	Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
8' Paved Bike Lane						**$ 323,865.76**	
1.5" 12.5mm Superpave	402-3130	TN	72.65	0.07	5.33	$ 28,155.65	(0.89SY/LF)*(165LB/SY)*(1TN/2000LB)=0.0734TN/LF
2" 19mm Superpave	402-3190	TN	67.49	0.10	6.61	$ 34,886.39	(0.89SY/LF)*(220LB/SY)*(1TN/2000LB)=0.0979TN/LF
4" 25mm Superpave	402-3121	TN	65.04	0.20	12.73	$ 67,239.91	(0.89SY/LF)*(440LB/SY)*(1TN/2000LB)=0.1958TN/LF
12" GAB	310-5120	SY	18.39	0.89	16.37	$ 86,418.29	(0.89SY/LF)*(5280LF/MI)=4699.2SY/MI
Bitum Tack Coat	413-1000	GL	0.73	0.89	0.65	$ 3,430.42	(2 Layers of Bit Tack)*(0.5GAL/SY)*(0.89SY/LF)=0.89GAL/LF
Pavement reinforcing Fabric Strips, 18in Wide	446-1100	LF	3.32	1.00	3.32	$ 17,529.60	
Conc Curb and Gutter 6 IN x 30 IN, Type 2	441-6022	LF	13.65	1.00	13.65	$ 72,072.00	
6" GAB Under C&G	310-5060	SY	9.56	0.28	2.68	$ 14,133.50	2.5FT*1Ft = 2.5SF/9SF/YD=0.28SY/LF
Erosion Control						**$ 18,490.95**	
Inlet Sediment Trap	163-0550	EA	128.79			$ 2,318.22	Assume a catchbasin every 300 feet = 18/mile
Maintain Inlet Sediment Trap	165-0105	EA	44.23			$ 796.14	Assume a catchbasin every 300 feet = 18/mile
Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
Temp Grassing	163-0232	AC	269.53			$ 32.34	1/2 Permanent Grassing
Permanent Grassing	700-6910	AC	869.63			$ 208.71	2' grass buffer=2'*(1/43560)*5280 = 0.24AC/MI
Mulch	163-0240	TN	178.76			$ 128.71	3TN/AC
Agr. Lime	700-7000	TN	64.65			$ 15.52	3TN/AC
Fertilizer - Mixed Grade	700-8000	TN	364.69			$ 52.51	0.6TN/AC
Fertilizer Nitrogen Content	700-8100	LB	1.90			$ 22.80	50LB/AC
Pavement Markings						**$ 8,349.48**	
Remove Existing Traff. Markings	656-4001	SY	2.50	0.06	0.15	$ 792.00	0.5ftX1Ft/9sf/SY = 0.056SY/LF
Straffic Strip, White (For Buffer)	652-9001	SY	1.46	0.44	0.64	$ 3,379.20	4ft Buffer *1 Foot/ 9SF/SY = 0.44SY/LF
Pavement Marking Symbol, TP4	652-0094	EA	45.96			$ 2,435.88	1 per 100' = 53/mile
Solid Traffic Stripe, 5in White	652-5451	LF	0.14	1.00	0.14	$ 739.20	
Solid traffic Stripe 6in, White	652-5301	LF	0.19	1.00	0.19	$ 1,003.20	
Earthwork Costs							
Grading Per Mile (Incl. Removal of Exist C&G	210-0200	LM	5002.44			**$ 5,002.44**	
Drainage Costs			0.00			**$ 152,708.40**	
Catch Basin, GP 1	668-1100	EA	1875.00			$ 33,750.00	Assume a catchbasin every 300 feet = 18/mile
18" Storm Drain Pipe	550-1180	LF	30.04	0.75	22.53	$ 118,958.40	Assumes the need to replace existing longitudal pipes at total LF of Pipe=75% Total Length
Construction Cost						**$ 508,417.03**	
E&C (10%)						**$ 50,841.70**	
Total Const. Cost						**$ 559,258.74**	

Urban Section - Add 5' Sidewalk							
	Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
Sidewalk, 4 in Thick	441-0104	SY	20.24	0.56	11.33	**$ 59,845.63**	1Ft*5FT/9SF/SY=0.56SY/LF
Erosion Control						**$ 38,026.85**	
Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
Temp Grassing	163-0232	AC	269.53	0.00	0.03	$ 142.31	1/2 Permanent Grassing
Permanent Grassing	700-6910	AC	869.63	0.00	0.17	$ 918.33	6' grass buffer and 2.5' grass strip behind sidewalk = 8.5'*1/43560 = 0.0002AC/LF
Mulch	163-0240	TN	178.76	0.01	2.15	$ 11,326.23	3TN/AC
Agr. Lime	700-7000	TN	64.65	0.01	0.78	$ 4,096.22	3TN/AC
Fertilizer - Mixed Grade	700-8000	TN	364.69	0.00	0.88	$ 4,621.35	0.6TN/AC
Fertilizer Nitrogen Content	700-8100	LB	1.90	0.20	0.38	$ 2,006.40	50LB/AC
Pavement Markings						**$ -**	
Earthwork Costs							
Grading Per Mile (Incl. Removal of Exist C&G	210-0200	LM	10000.00			**$ 10,000.00**	
Drainage Costs			0.00			**$ -**	
Construction Cost						**$ 107,872.48**	
E&C (10%)						**$ 10,787.25**	
Total Const. Cost						**$ 118,659.73**	

6.5' Rural Bike Lanes (has markings but no curb & gutter)								
		Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
	6.5' Paved Shoulder						**$ 197,229.96**	
	1.5" 12.5mm Superpave	402-3130	TN	72.65	0.06	4.32	$ 22,785.36	(0.72SY/LF)*(165LB/SY)*(1TN/2000LB)=0.0594TN/LF=313.632TN/MI
	2" 19mm Superpave	402-3190	TN	67.49	0.08	5.35	$ 28,222.70	(0.72SY/LF)*(220LB/SY)*(1TN/2000LB)=0.0792TN/LF=418.176TN/MI
	4" 25mm Superpave	402-3121	TN	65.04	0.16	10.30	$ 54,396.33	(0.72SY/LF)*(440LB/SY)*(1TN/2000LB)=0.1584TN/LF=836.352TN/MI
	12" GAB	310-5120	SY	18.39	0.72	13.24	$ 69,911.42	(0.72SY/LF)*(5280LF/MI)=3801.6SY/MI
	Pavement reinforcing Fabric Strips, 18in Wide	446-1100	LF	3.32	1.00	3.32	$ 17,529.60	
	Bitum Tack Coat	413-1000	GL	0.73	0.72	0.72	$ 3,801.60	(2 Layers of Bit Tack)*(0.5GAL/SY)*(0.72SY/LF)=0.72GAL/LF=3801GAL/MI
	16" Rumble Strip at 12' Gap	456-2015	GLM	582.94			$ 582.94	
No	Guardrail						$ -	
	Erosion Control						**$ 58,179.03**	
	Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
	Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
	Temp Grassing	163-0232	AC	269.53	0.00	0.54	$ 2,846.24	1/2 Permanent Grassing
	Permanent Grassing	700-6910	AC	869.63	0.00	3.48	$ 18,366.59	3.5' Unpaved Shulder+20' of Side Slope for 30' of Clear Zone = 0.004AC/LF
	Mulch	163-0240	TN	178.76	0.01	2.15	$ 11,326.23	3TN/AC
	Agr. Lime	700-7000	TN	64.65	0.01	0.78	$ 4,096.22	3TN/AC
	Fertilizer - Mixed Grade	700-8000	TN	364.69	0.00	0.88	$ 4,621.35	0.6TN/AC
	Fertilizer Nitrogen Content	700-8100	LB	1.90	0.20	0.38	$ 2,006.40	50LB/AC
	Pavement Markings						**$ 4,970.28**	
	Remove Existing Traff. Markings	656-4001	SY	2.50	0.06	0.15	$ 792.00	0.5ftX1Ft/9sf/SY = 0.056SY/LF
	Pavement Marking Symbol, TP4	652-0094	EA	45.96			$ 2,435.88	1per 100' = 53/mile
	Solid Traffic Stripe, 5in White	652-5451	LF	0.14	1.00	0.14	$ 739.20	
	Solid traffic Stripe 6in, White	652-5301	LF	0.19	1.00	0.19	$ 1,003.20	
	Earthwork Costs							
	Grading Per Mile	210-0200	LM	10000.00			**$ 10,000.00**	
No	**Drainage Costs**						$ -	
	Construction Cost						**$ 270,379.27**	
	E&C (10%)						**$ 27,037.93**	
	Total Const. Cost						**$ 297,417.20**	

4' BL Shoulder (reduced shoulder and clear zone for lower-speed, non-state road) (bike symbol, no curb & gutter) (created by adjusting quantities from RS&H 6.5' paved shoulder assumptions)								
		Pay Item #	Unit	Cost/Unit	Unit/LF	Cost/Foot	Cost/Mile	Notes
	4' Paved Shoulder						**$ 126,362.98**	
	1.5" 12.5mm Superpave	402-3130	TN	72.65	0.04	2.64	$ 13,924.39	(0.44SY/LF)*(165LB/SY)*(1TN/2000LB)=0.0363TN/LF=191.664TN/MI
	2" 19mm Superpave	402-3190	TN	67.49	0.05	3.27	$ 17,247.20	(0.44SY/LF)*(220LB/SY)*(1TN/2000LB)=0.0484TN/LF=255.552TN/MI
	4" 25mm Superpave	402-3121	TN	65.04	0.10	6.30	$ 33,242.20	(0.44SY/LF)*(440LB/SY)*(1TN/2000LB)=0.0968TN/LF=511.104TN/MI
	12" GAB	310-5120	SY	18.39	0.44	8.09	$ 42,723.65	(0.44SY/LF)*(5280LF/MI)=3801.6SY/MI
	Pavement reinforcing Fabric Strips, 18in Wide	446-1100	LF	3.32	1.00	3.32	$ 17,529.60	
	Bitum Tack Coat	413-1000	GL	0.73	0.44	0.32	$ 1,695.94	(2 Layers of Bit Tack)*(0.5GAL/SY)*(0.44SY/LF)=0.44GAL/LF=2323GAL/MI
No	16" Rumble Strip at 12' Gap	456-2015	GLM	582.94			$ -	
No	Guardrail						$ -	
	Erosion Control						**$ 15,456.79**	
	Type C Silt fence	171-0030	LF	2.53	1.00	2.53	$ 13,358.40	
	Maint. Of Type C Silt Fence	165-0030	LF	0.59	0.50	0.59	$ 1,557.60	1/2 of Type C Silt Fence
	Temp Grassing	163-0232	AC	269.53	0.00	0.01	$ 35.58	1/2 Permanent Grassing
	Permanent Grassing	700-6910	AC	869.63	0.00	0.04	$ 229.58	2' Unpaved Shoulder = 0.00005AC/LF
	Mulch	163-0240	TN	178.76	0.00	0.03	$ 141.58	3TN/AC
	Agr. Lime	700-7000	TN	64.65	0.00	0.01	$ 51.20	3TN/AC
	Fertilizer - Mixed Grade	700-8000	TN	364.69	0.00	0.01	$ 57.77	0.6TN/AC
	Fertilizer Nitrogen Content	700-8100	LB	1.90	0.00	0.05	$ 25.08	50LB/AC
	Pavement Markings							
	Pavement Marking Symbol, TP4	652-0094	EA	45.96			**$ 2,435.88**	1per 100' = 53/mile
	Earthwork Costs							
	Grading Per Mile	210-0200	LM	5002.44			**$ 5,002.44**	
No	**Drainage Costs**						$ -	
	Construction Cost						**$ 149,258.09**	
	E&C (10%)						**$ 14,925.81**	
	Total Const. Cost						**$ 164,183.90**	

2-way Cycle Track Retrofit, with Buffer of Cross-hatching and Tubular Markers (no widening) (based on City of Atlanta, 10th St. 2-way Cycle Track, 2013						
	Length (LF)	Length (MI)	Cost/LF	Cost/MI	With 1.025 Annual Inflation Factor	Notes
2-way Cycle Track Retrofit	1200	.23	$ 75.00	$ 396,000	**$ 405,900**	

Bridge Replacements – Two 24-foot lanes, 8-foot shoulders (adjusted from Bull River Bridge Replacement [Option N cross-section] in the CORE MPO US 80 Bridges Study)								
	Bridge Length (LF)	Bridge Width (LF)	Cost/ SF	Contgcy. Factor	Demolition Cost	Const. & Demo. Total	With 1.025 Annual Inflation Factor	Notes
Diamond Causeway @ Moon River (Bikeway #21)	1313	43	110	1.25	$ 630,240	$ 8,393,353	**$ 9,038,723**	Demol. = length *width*$15/SF
SR 25 @ Middle River (Bikeway #22)	1819	43	110	1.25	$ 873,120	$ 11,627,958	**$ 12,522,039**	Demol. = length *width*$15/SF

Preliminary Engineering Cost Estimates

As mentioned initially, the preliminary engineering cost was generally assumed to be 15% of construction costs. The assumption is higher than the typical 8.5% - 10% often assumed in typical roadway projects because these pedestrian and bicycle projects have lower construction costs, which could put PE estimates below a reasonable threshold if applying the typical roadway project assumption.

There are some exceptions to the 15% assumption for PE, namely in projects involving high cost elements, such as bridge replacements or bridge widening. In those cases, the PE was assumed to be 8.5%.

Right-of-Way Cost Estimates

The GDOT Right-of-Way and Utilities Cost Estimation (RUCEST) tool allows users to enter the length and width of the different types of land needed, in order to calculate acres of each land use. For a given county, the tool then applies certain assumed values for each land use involved in the project. The system also employs factors for various non-land costs. Relocation costs were not involved in ROW estimates for the Non-motorized Transportation Plan, given the relatively low impacts of pedestrian and bicycle improvements, and thus are omitted from the tables below.

These tables show the RUCEST assumptions for three different counties in the CORE MPO planning area, using acreage values of "1" as an example. (Because the calculation has an exponential characteristic, the resulting total for one acre should ***not*** be use as a "per/acre" shortcut; the acreage must be entered at the beginning of the calculation.)

Chatham County, Example Calculation						
Terrain = Flat						
Land Use Type	No. of Acres	Cost/Acre	Damage Cost Factor (default)*	Scheduling Contgcy. Factor (default)*	Admin. & Court Cost Factor (default)*	Total Cost for 1 Acre**
Commercial	1	$ 1,000,000	1.50	1.60	1.60	**$ 3,840,000**
Residential	1	$ 100,000	1.50	1.60	1.60	**$ 384,000**
Agricultural	1	$ 25,000	1.50	1.60	1.60	**$ 96,000**
Industrial	1	$ 50,000	1.50	1.60	1.60	**$ 192,000**

* These factors are applied in left-to-right order, in a cumulative fashion, to the previous sub-total.
** Acreage of 1 used for example. However, the resulting total must ***not*** be used as a per/acre value, due to exponential functions.

Bryan County, Example Calculation						
Terrain = Flat						
Land Use Type	No. of Acres	Cost/Acre	Damage Cost Factor (default)*	Scheduling Contgcy. Factor (default)*	Admin. & Court Cost Factor (default)*	Total Cost for 1 Acre**
Commercial	1	$ 100,000	1.50	1.60	1.60	**$ 384,000**
Residential	1	$ 20,000	1.50	1.60	1.60	**$ 76,800**
Agricultural	1	$ 10,000	1.50	1.60	1.60	**$ 38,400**
Industrial	1	$ 15,000	1.50	1.60	1.60	**$ 57,600**

* These factors are applied in left-to-right order, in a cumulative fashion, to the previous sub-total.
** Acreage of 1 used for example. However, the resulting total must ***not*** be used as a per/acre value, due to exponential functions.

Effingham County, Example Calculation						
Terrain = Flat						
Land Use Type	No. of Acres	Cost/Acre	Damage Cost Factor (default)*	Scheduling Contgcy. Factor (default)*	Admin. & Court Cost Factor (default)*	Total Cost for 1 Acre**
Commercial	1	$ 150,000	1.50	1.60	1.60	**$ 576,000**
Residential	1	$ 30,000	1.50	1.60	1.60	**$ 115,200**
Agricultural	1	$ 10,000	1.50	1.60	1.60	**$ 38,400**
Industrial	1	$ 25,000	1.50	1.60	1.60	**$96,000**

* These factors are applied in left-to-right order, in a cumulative fashion, to the previous sub-total.
** Acreage of 1 used for example. However, the resulting total must ***not*** be used as a per/acre value, due to exponential functions.

Utilities Cost Estimates

The GDOT Right-of-Way and Utilities Cost Estimation (RUCEST) tool uses the following assumptions, for District 5, for types of utilities that were thought to be involved in various projects in the Non-motorized Transportation Plan. CORE MPO staff used aerial imagery and Pictometry through Savannah Area GIS (SAGIS), as well as Google "street view," to decide which utilities were impacted by each project.

District = 5	
Contingency Factor = 1.50	
Water	
8" ductile iron water line	$ 80 / LF
Relocation of fire hydrants	$ 2,000 Each
Electricity	
Power poles	$ 4,400 Each
Telephone	
Aerial or buried telephone fiber optic	$ 4 / LF
Gas	
8" steel gas main (AGL)	$ 95 / LF
Traffic	
Traffic control	$ 1,500 Each