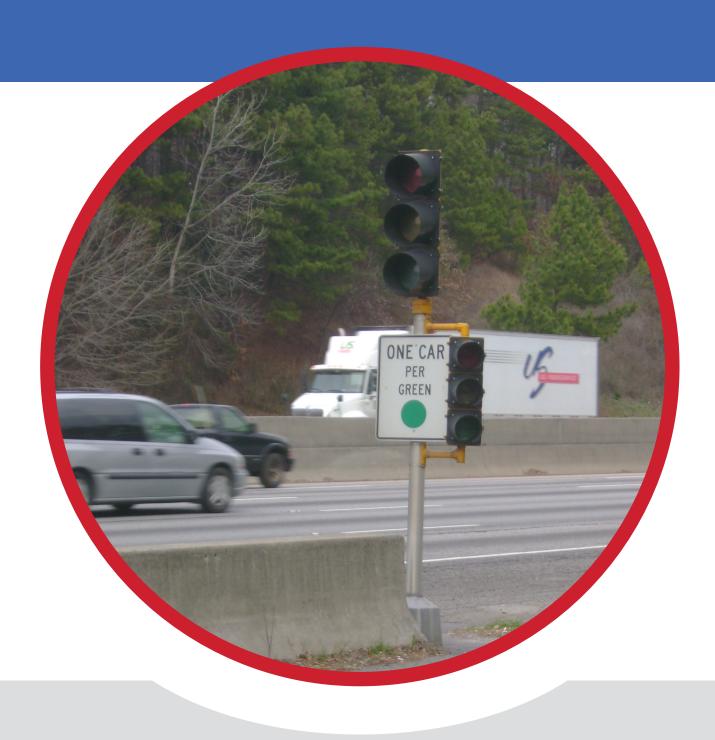
Implementation Plan



M-0468 Ramp Metering Feasibility Study for Cabarrus, Gaston, Iredell and Mecklenburg Counties

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1. Introduction

This report details the work involved in formulating options for the implementation of Ramp Metering within the study area.

The principles used in formulating the options rely on a combination of calculating Benefit to Cost Ratios (BCRs), a First-Year Rate of Return for each site and subsequently determining those sites that are viable based on these BCRs. These viable sites will be compared to a list of currently planned State Transportation Implementation Plan (STIP) and Mobility Fund projects, to ensure that a conflict does not limit the ability of a particular site to deliver a benefit.

The information used for the potential costs of each site originates from Task 8, *Typical Cost Estimates Report* of this project. That task identified typical ramp metering cost estimates for various layouts, alternative and optional features and documented the assumptions and unit costs used. The typical costs were then used to produce a cost estimate for each site. The program costs including procurement and integration of the control software and the controller firmware were also estimated.

The information used for the potential benefits of each site originates from Task 9, *Performance Measures Report* of this project. That task established the expected benefits for each of the 38 sites identified as either 'feasible for the introduction of ramp metering' or 'to be reviewed in future' as shown in Table 1 below. The potential benefits are quantified as a value of time saved, through the reduction of Vehicle Hours Delay (VHD) annually at each location because of the introduction of ramp metering.

This report contains the following sections:

- Costs:
- Benefits:
- Cost Benefit Analysis for Individual Sites;
- STIP Projects and Freeway-to-Freeway Sites;
- Options for Implementation;
- Summary;
- Recommendations

Table 1. Sites Suitable for Ramp Metering

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Ramp Type	Recommendation
32	S Main St	I-85	NB	22	Gaston	Direct	Feasible
34	McAdenville Rd	I-85	NB	23	Gaston	Direct	Feasible
35	Belmont-Mt. Holly Rd	I-85	SB	26	Gaston	Direct	Feasible
93	Westinghouse Blvd	I-77	SB	1A	Mecklenburg	Direct	Feasible
101	Arrowood Rd	I-77	NB	3	Mecklenburg	Direct	Feasible
102	Nations Ford Rd	I-77	SB	4	Mecklenburg	Direct	Feasible
103	Nations Ford Rd	I-77	NB	4	Mecklenburg	Direct	Feasible
105	Tyvola Rd	I-77	NB	5	Mecklenburg	Direct	Feasible
111	Remount Rd	I-77	SB	8	Mecklenburg	Direct	Feasible
129*	I-85 SB	I-77	NB	13	Mecklenburg	F2F	Feasible
140	Gilead Rd	I-77	NB	23	Mecklenburg	Direct	Feasible
143	NC 73 (Sam Furr Rd)	I-77	NB	25	Mecklenburg	Direct	Feasible
145	US 21 (Catawba Ave)	I-77	NB	28	Mecklenburg	Direct	Feasible
146	Goodrum Rd / Griffith St	I-77	SB	30	Mecklenburg	Direct	Feasible
147	Goodrum Rd / Griffith St	I-77	NB	30	Mecklenburg	Direct	Feasible
64	Graham St	I-85	SB	40	Mecklenburg	Loop	Feasible
67	Sugar Creek Rd	I-85	NB	41	Mecklenburg	Direct	Feasible
72	Harris Blvd	I-85	SB	45	Mecklenburg	Direct	Feasible
75	Mallard Creek Rd	I-85	NB	46	Mecklenburg	Direct	Feasible

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Ramp Type	Recommendation
177	Steele Creek Rd	I-485	Inner	4	Mecklenburg	Loop	Feasible
179	Steele Creek Rd	I-485	Inner	4	Mecklenburg	Direct	Feasible
181	West Blvd	I-485	Inner	6	Mecklenburg	Direct	Feasible
230	NC 16 (Providence Rd)	I-485	Outer	57	Mecklenburg	Direct	Feasible
231	NC 16 (Providence Rd)	I-485	Inner	57	Mecklenburg	Loop	Feasible
232	NC 16 (Providence Rd)	I-485	Outer	57	Mecklenburg	Loop	Feasible
233	NC 16 (Providence Rd)	I-485	Inner	57	Mecklenburg	Direct	Feasible
234	Rea Rd	I-485	Outer	59	Mecklenburg	Direct	Feasible
236	Rea Rd	I-485	Inner	59	Mecklenburg	Loop	Feasible
237	Rea Rd	I-485	Inner	59	Mecklenburg	Direct	Feasible
239	US 521 (Johnston Rd)	I-485	Outer	61	Mecklenburg	Loop	Feasible
Reviev	v in Future						
30	Cox Rd	I-85	NB	21	Gaston	Direct	Review in Future
37	Beatty Dr / Park St	I-85	SB	27	Gaston	Direct	Review in Future
104	Tyvola Rd	I-77	SB	5	Mecklenburg	Direct	Review in Future
175	Arrowood Rd	I-485	Inner	3	Mecklenburg	Direct	Review in Future
182	US 74 / US 29 (Wilkinson Blvd)	I-485	Outer	9	Mecklenburg		Review in Future
229	E John St	I-485	Inner	52	Mecklenburg	Direct	Review in Future
Not Fe	asible						
97*	I-485	I-77	SB	1B	Mecklenburg	F2F	Not Feasible
250	Briar Creek Rd	US 74	WB	244	Mecklenburg	Direct	Not Feasible

^{*} Freeway-to-Freeway site

2. Costs

There are four types of costs associated with the implementation and operation of a ramp metering site:

- Implementation or construction costs;
- Annual maintenance and operation costs;
- Equipment replacement costs; and
- Program costs.

More information on how the costs were derived can be found in Task 8, *Typical Cost Estimates Report* of this project, Task 8 breaks down each cost into its component parts and describes how they were calculated.

2.1. Implementation Cost

The implementation cost varies depending on the site requirements. The implementation cost includes the cost of design and construction cost. The construction costs would include ramp meter equipment, signing, pavement markings, temporary traffic control, drainage improvements, guardrail, roadway resurfacing or widening, and related earthwork. The prorated cost of the controller firmware is also included in the site-specific costs. The implementation cost for each site is shown in Table 2 below. Details for each site can be found in Appendix A.

Table 2 Implementation Costs for Each Site

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Implementation Costs	Recommendation
32	S Main St	I-85	NB	22	Gaston	\$139,099	Feasible
34	McAdenville Rd	I-85	NB	23	Gaston	\$162,687	Feasible
35	Belmont-Mt. Holly Rd	I-85	SB	26	Gaston	\$179,458	Feasible
93	Westinghouse Blvd	I-77	SB	1A	Mecklenburg	\$580,195	Feasible
101	Arrowood Rd	I-77	NB	3	Mecklenburg	\$211,827	Feasible
102	Nations Ford Rd	I-77	SB	4	Mecklenburg	\$154,201	Feasible
103	Nations Ford Rd	I-77	NB	4	Mecklenburg	\$185,012	Feasible

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Implementation Costs	Recommendation
105	Tyvola Rd	1-77	NB	5	Mecklenburg	\$177,930	Feasible
111	Remount Rd	I-77	SB	8	Mecklenburg	\$158,370	Feasible
129*	I-85 SB	I-77	NB	13	Mecklenburg	\$384,856	Feasible
140	Gilead Rd	I-77	NB	23	Mecklenburg	\$227,022	Feasible
143	NC 73 (Sam Furr Rd)	I-77	NB	25	Mecklenburg	\$208,050	Feasible
145	US 21 (Catawba Ave)	I-77	NB	28	Mecklenburg	\$170,218	Feasible
146	Goodrum Rd / Griffith St	I-77	SB	30	Mecklenburg	\$185,759	Feasible
147	Goodrum Rd / Griffith St	I-77	NB	30	Mecklenburg	\$209,913	Feasible
64	Graham St	I-85	SB	40	Mecklenburg	\$197,895	Feasible
67	Sugar Creek Rd	I-85	NB	41	Mecklenburg	\$195,775	Feasible
72	Harris Blvd	I-85	SB	45	Mecklenburg	\$190,057	Feasible
75	Mallard Creek Rd	I-85	NB	46	Mecklenburg	\$222,762	Feasible
177	Steele Creek Rd	I-485	Inner	4	Mecklenburg	\$232,328	Feasible
179	Steele Creek Rd	I-485	Inner	4	Mecklenburg	\$211,368	Feasible
181	West Blvd	I-485	Inner	6	Mecklenburg	\$210,146	Feasible
230	NC 16 (Providence Rd)	I-485	Outer	57	Mecklenburg	\$266,183	Feasible
231	NC 16 (Providence Rd)	I-485	Inner	57	Mecklenburg	\$226,669	Feasible
232	NC 16 (Providence Rd)	I-485	Outer	57	Mecklenburg	\$161,539	Feasible
233	NC 16 (Providence Rd)	I-485	Inner	57	Mecklenburg	\$239,220	Feasible

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Implementation Costs	Recommendation
234	Rea Rd	I-485	Outer	59	Mecklenburg	\$197,314	Feasible
236	Rea Rd	I-485	Inner	59	Mecklenburg	\$198,998	Feasible
237	Rea Rd	I-485	Inner	59	Mecklenburg	\$197,779	Feasible
239	US 521 (Johnston Rd)	I-485	Outer	61	Mecklenburg	\$196,970	Feasible
Review	v in Future						
30	Cox Rd	I-85	NB	21	Gaston	\$193,847	Review in Future
37	Beatty Dr / Park St	I-85	SB	27	Gaston	\$208,700	Review in Future
104	Tyvola Rd	I-77	SB	5	Mecklenburg	\$259,180	Review in Future
175	Arrowood Rd	I-485	Inner	3	Mecklenburg	\$602,263	Review in Future
182	US 74 / US 29 (Wilkinson Blvd)	I-485	Outer	9	Mecklenburg	\$269,255	Review in Future
229	E John St	I-485	Inner	52	Mecklenburg	\$203,919	Review in Future
Not Fe	easible						
97*	I-485	I-77	SB	1B	Mecklenburg	\$493,144	Not Feasible
250	Briar Creek Rd	US 74	WB	244	Mecklenburg	\$193,344	Not Feasible

^{*} Freeway-to-Freeway site

2.2. Annual Cost

The annual cost for each site includes maintenance, operations, and annual software support and has been calculated as \$8,300 per site.

2.3. Equipment Replacement Cost

Typically, certain equipment would be replaced when its useful life has been reached. This equipment would include controllers, servers, communications hardware, system software/firmware, and LED signal heads. Since the replacement period is typically ten years then replacement costs do not need to be considered in this analysis since the analysis covers a ten-year period.

2.4. Program Cost

The program cost is a fixed cost. It includes the procurement and integration of the central control software, software drivers, training, servers, and miscellaneous central communications hardware. This cost is a one-time cost when implementing ramp metering in a metropolitan area for the first time. The cost remains the same and is not related to the number of sites that are implemented. The program cost has been calculated at \$622,720. This cost will be prorated to the total site costs for each group of sites considered in the Options for Implementation section.

2.5. Basis of Costs

During this task, costs were updated based on updated bid costs from the *Triangle Ramp Metering Study* however, most costs have been expressed in 2012 prices. Following discussion with the Steering Committee, costs have not been discounted to a base year, or adjusted in anticipation of inflation. The committee wanted to have a baseline costs that is consistent amongst all ramp metering projects statewide for a viable comparison.

3. Benefits

The benefits used in this study are based on the value of time potentially saved through the introduction of a ramp metering site. The benefits have been quantified in financial terms based on a 20% saving in delay time. The expected annual benefit for each site can be seen in Table 3 below.

More information on how the benefits have been derived can be found in Task 9, *Performance Measures Report* of this project. This report describes the process of how benefits were calculated for each site.

Although the benefit analysis uses only travel time benefits, other benefits will accrue, including crash, emissions and reliability benefits. These are not quantified due to the disproportionately large effort it would take, especially in light of their relatively small benefits within the scale of the project.

Table 3 Annual Financial Benefit for Ramp Metering for Each Site

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Annual Financial Benefit	Recommendation
32	S Main St	I-85	NB	22	Gaston	\$166,653	Feasible
34	McAdenville Rd	I-85	NB	23	Gaston	\$249,539	Feasible
35	Belmont-Mt. Holly Rd	I-85	SB	26	Gaston	\$736,886	Feasible
93	Westinghouse Blvd	I-77	SB	1A	Mecklenburg	\$4,240,251	Feasible
101	Arrowood Rd	I-77	NB	3	Mecklenburg	\$302,400	Feasible
102	Nations Ford Rd	I-77	SB	4	Mecklenburg	\$2,626,166	Feasible
103	Nations Ford Rd	I-77	NB	4	Mecklenburg	\$524,893	Feasible
105	Tyvola Rd	I-77	NB	5	Mecklenburg	\$2,364,260	Feasible
111	Remount Rd	I-77	SB	8	Mecklenburg	\$1,850,566	Feasible
129*	I-85 SB	I-77	NB	13	Mecklenburg	\$4,750,671	Feasible

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Annual Financial Benefit	Recommendation
140	Gilead Rd	I-77	NB	23	Mecklenburg	\$243,918	Feasible
143	NC 73 (Sam Furr Rd)	I-77	NB	25	Mecklenburg	\$1,038,634	Feasible
145	US 21 (Catawba Ave)	I-77	NB	28	Mecklenburg	\$1,736,528	Feasible
146	Goodrum Rd / Griffith St	I-77	SB	30	Mecklenburg	\$161,841	Feasible
147	Goodrum Rd / Griffith St	I-77	NB	30	Mecklenburg	\$1,402,977	Feasible
64	Graham St	I-85	SB	40	Mecklenburg	\$197,895	Feasible
67	Sugar Creek Rd	I-85	NB	41	Mecklenburg	\$971,676	Feasible
72	Harris Blvd	I-85	SB	45	Mecklenburg	\$16,792	Feasible
75	Mallard Creek Rd	I-85	NB	46	Mecklenburg	\$57,005	Feasible
177	Steele Creek Rd	I-485	Inner	4	Mecklenburg	\$238,572	Feasible
179	Steele Creek Rd	I-485	Inner	4	Mecklenburg	\$446,865	Feasible
181	West Blvd	I-485	Inner	6	Mecklenburg	\$65,612	Feasible
230	NC 16 (Providence Rd)	I-485	Outer	57	Mecklenburg	\$866,973	Feasible
231	NC 16 (Providence Rd)	I-485	Inner	57	Mecklenburg	\$644,724	Feasible
232	NC 16 (Providence Rd)	I-485	Outer	57	Mecklenburg	\$545,454	Feasible
233	NC 16 (Providence Rd)	I-485	Inner	57	Mecklenburg	\$931,982	Feasible
234	Rea Rd	I-485	Outer	59	Mecklenburg	\$833,950	Feasible
236	Rea Rd	I-485	Inner	59	Mecklenburg	\$332,898	Feasible
237	Rea Rd	I-485	Inner	59	Mecklenburg	\$380,174	Feasible

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County	Annual Financial Benefit	Recommendation
239	US 521 (Johnston Rd)	I-485	Outer	61	Mecklenburg	\$123,408	Feasible
Revie	w in Future						
30	Cox Rd	I-85	NB	21	Gaston	\$9,429	Review in Future
37	Beatty Dr / Park St	I-85	SB	27	Gaston	\$283,050	Review in Future
104	Tyvola Rd	I-77	SB	5	Mecklenburg	\$1,256,127	Review in Future
175	Arrowood Rd	I-485	Inner	3	Mecklenburg	\$67,348	Review in Future
182	US 74 / US 29 (Wilkinson Blvd)	I-485	Outer	9	Mecklenburg	\$89,555	Review in Future
229	E John St	I-485	Inner	52	Mecklenburg	\$43,715	Review in Future
Not F	easible						
97*	I-485	I-77	SB	1B	Mecklenburg	\$553,771	Not Feasible
250	Briar Creek Rd	US 74	WB	244	Mecklenburg	\$0	Not Feasible

^{*} Freeway-to-Freeway site

During this task, benefits have been expressed in 2012 prices. Following discussion with the Steering Committee, benefits have not been discounted to a base year or adjusted in anticipation of inflation. The committee wanted to have a baseline benefits that is consistent amongst all ramp metering projects state wide for a viable comparison.

4. Cost Benefit Analysis for Individual Sites

Using the costs and benefits outlined in the previous sections, cost benefit ratios have been calculated for each of the potential ramp metering sites annually for periods of five and ten years.

The purpose is to allow comparison of the relative economic analysis of each site. Therefore, only the costs directly associated with the implementation of each individual site have been included. The program cost is a fixed one-time cost for the first implementation in each area so it will be added to the total costs for each scenario in the options section. Note that costs included below in Tables 4-1 and 4-2 only includes implementation costs. It does not include any of the central costs.

4.1. Five and Ten Year Benefit to Cost Ratios

The period of time used for economic analysis should normally be the period of the useful lifetime of the assets included for the options under consideration. Therefore, the recommended period for the main cost benefit analysis is ten years. This is due to the need to replace and/or upgrade the technology equipment after this period. This gives the opportunity to review the site after ten years and decide if it is worthwhile making the investment to continue.

A second analysis period of five years has been used. This is because there was consensus within the Steering Committee that a site which 'pays back' within five years would also be economically suitable for implementation. The five-year payback period analysis helps to distinguish the higher benefits suggesting a higher priority of implementation. The Benefit/Cost Ratio (BCR) is calculated by dividing the Five Year Total Benefits by the Five Year Total Costs.

Benefit/Cost Ratio = 5 Year Total Benefits / 5 Year Total Costs

Benefits are also determined by calculating the First Year Rate of Return (FYRR). The FFYR is a measure to determine which sites can pay off the implementation and first year operating costs with their expected benefits in the first year. A positive number indicates a financially strong candidate site. The FFYR is calculated by:

First Year Rate of Return = (Annual Benefits – (Implementation Costs +Annual Costs))
(Implementation Costs +Annual Costs)

4.1.1. Five-Year Results

Table 4-1 shows the expected cost and benefit of each site for five years, the benefit to cost ratio (BCR) and the First Year Rate of Return (FYRR). These are listed in descending order of BCR.

The five-year BCRs of the 38 sites considered feasible for ramp metering range from 67.10 to 0.00. The total five-year BCR of all 38 sites is 14.96.

26 sites have a positive FYRR, i.e. they pay for themselves within the first year of operation. 33 of the sites have a five-year BCR of greater than 1. (i.e. offering payback within the first five years of implementation)

4.1.2. Ten-Year Results

Table 4-2 shows the expected cost and benefit of each site for ten years, the benefit to cost ratio (BCR) and the First Year Rate of Return (FYRR).

The ten-year BCRs of the 38 sites considered feasible for ramp metering range from 110.72 to 0.00. The total ten-year BCR of all 38 sites is 26.00.

34 sites have a ten-year BCR of greater than 1. (i.e. offering payback within the first ten years of implementation)

4.1.3. First Year Rate of Return

26 sites have a FFYR greater than zero indicating a strong expected performance. The highest score is 1516%.

4.1.4. Summary

These overall positive results give confidence that the installation of ramp metering at the 38 sites could provide benefits; however, selecting a suitable subset of the sites would increase the overall benefit.

4.2. Sensitivity Testing

Some basic sensitivity analysis has been performed to test the impact of any over optimism in the benefits calculations. This analysis assumes that the delays are reduced by only 10% instead of 20%.

The site-by-site results of the sensitivity testing are shown in Appendix B.

4.2.1. Five-Year Results

In this scenario, 18 of the sites have a FYRR of greater than 1, but 30 of the sites have a five-year BCR of greater than 1.0. The total five-year BCR of all 38 sites is reduced from 14.96 to 7.48 of the remaining twelve sites, seven sites have a benefit cost ratio greater than 1 for the five-year period and eight sites have a benefit cost ratio greater than one for the ten-year period.

4.2.2. Ten-Year Results

For the ten-year scenario, 18 of the sites have a FYRR of greater than one, but 32 of the sites have a ten-year BCR of greater than 1.0. The total ten-year BCR of all 38 sites is reduced from 26.00 to 13.00.

Table 4-1 Benefit Cost Analysis over Five-Year Period for Each Site

Log	Freeway	Cross Street	Exit	Direction	County	Five Year Total Cost	Five Year Total Benefit	BCR in Period	FYRR
102	I-77	Nations Ford Rd	4	SB	Mecklenburg	\$195,701	\$13,130,831	67.1	1516%
129*	I-77	I-85 SB	13	NB	Mecklenburg	\$426,356	\$23,753,353	55.71	1108%
105	I-77	Tyvola Rd	5	NB	Mecklenburg	\$219,430	\$11,821,301	53.87	1170%
111	I-77	Remount Rd	8	SB	Mecklenburg	\$199,870	\$9,252,828	46.29	1010%
145	I-77	US 21 (Catawba Ave)	28	NB	Mecklenburg	\$211,718	\$8,682,642	41.01	873%
93	I-77	Westinghouse Blvd	1A	SB	Mecklenburg	\$621,695	\$21,201,256	34.1	621%
147	I-77	Goodrum Rd / Griffith St	30	NB	Mecklenburg	\$251,413	\$7,014,884	27.9	543%
143	I-77	NC 73 (Sam Furr Rd)	25	NB	Mecklenburg	\$249,550	\$5,193,170	20.81	380%
67	I-85	Sugar Creek Rd	41	NB	Mecklenburg	\$237,275	\$4,858,378	20.48	376%
104	I-77	Tyvola Rd	5	SB	Mecklenburg	\$300,680	\$6,280,635	20.89	370%
234	I-485	Rea Rd	59	Outer	Mecklenburg	\$238,814	\$4,169,750	17.46	306%
233	I-485	NC 16 (Providence Rd)	57	Inner	Mecklenburg	\$280,720	\$4,659,912	16.6	277%
35	I-85	Belmont-Mt. Holly Rd	26	SB	Gaston	\$220,958	\$3,684,428	16.67	292%
230	I-485	NC 16 (Providence Rd)	57	Outer	Mecklenburg	\$307,683	\$4,334,864	14.09	216%
232	I-485	NC 16 (Providence Rd)	57	Outer	Mecklenburg	\$203,039	\$2,727,270	13.43	221%
231	I-485	NC 16 (Providence Rd)	57	Inner	Mecklenburg	\$268,169	\$3,223,619	12.02	174%
103	I-77	Nations Ford Rd	4	NB	Mecklenburg	\$226,512	\$2,624,466	11.59	172%
179	I-485	Steele Creek Rd	4	Inner	Mecklenburg	\$252,868	\$2,234,327	8.84	103%
237	I-485	Rea Rd	59	Inner	Mecklenburg	\$239,279	\$1,900,870	7.94	84%
236	I-485	Rea Rd	59	Inner	Mecklenburg	\$240,498	\$1,664,490	6.92	61%
101	I-77	Arrowood Rd	3	NB	Mecklenburg	\$253,327	\$1,511,998	5.97	37%

Log	Freeway	Cross Street	Exit	Direction	County	Five Year Total Cost	Five Year Total Benefit	BCR in Period	FYRR
34	I-85	McAdenville Rd	23	NB	Gaston	\$204,187	\$1,247,694	6.11	46%
37	I-85	Beatty Dr / Park St	27	SB	Gaston	\$250,200	\$1,415,252	5.66	30%
097*	I-77	I-485	1B	SB	Mecklenburg	\$534,644	\$2,768,855	5.18	10%
140	I-77	Gilead Rd	23	NB	Mecklenburg	\$268,522	\$1,219,590	4.54	4%
32	I-85	S Main St	22	NB	Gaston	\$180,599	\$833,267	4.61	13%
177	I-485	Steele Creek Rd	4	Inner	Mecklenburg	\$273,828	\$1,192,859	4.36	-1%
64	I-85	Graham St	40	SB	Mecklenburg	\$239,395	\$993,608	4.15	-4%
146	I-77	Goodrum Rd / Griffith St	30	SB	Mecklenburg	\$227,259	\$809,207	3.56	-17%
239	I-485	US 521 (Johnston Rd)	61	Outer	Mecklenburg	\$238,470	\$617,042	2.59	-40%
182	I-485	US 74 / US 29 (Wilkinson Blvd)	9	Outer	Mecklenburg	\$310,755	\$447,774	1.44	-68%
181	I-485	West Blvd	6	Inner	Mecklenburg	\$251,646	\$328,058	1.3	-70%
75	I-85	Mallard Creek Rd	46	NB	Mecklenburg	\$264,262	\$285,024	1.08	-75%
229	I-485	E John St	52	Inner	Mecklenburg	\$245,419	\$218,577	0.89	-79%
175	I-485	Arrowood Rd	3	Inner	Mecklenburg	\$643,763	\$336,742	0.52	-89%
72	I-85	Harris Blvd	45	SB	Mecklenburg	\$231,555	\$83,960	0.36	-92%
30	I-85	Cox Rd	21	NB	Gaston	\$235,347	\$47,147	0.2	-95%
250	US-74	Briar Creek Road/Television Lane	244	WB	Mecklenburg	\$234,844	\$0	0	-100%

^{*} Freeway-to-Freeway site

Table 4-2 Benefit Cost Analysis over Ten-Year Period for Each Site

Log	Freeway	Cross Street	Exit	Direction	County	Ten Year Total Costs	Ten Year Total Benefits	Ten Year BCR	FYRR
102	I-77	Nations Ford Rd	4	SB	Mecklenburg	\$237,201	\$26,261,662	110.72	1516%
129*	I-77	I-85 SB	13	NB	Mecklenburg	\$467,856	\$47,506,707	101.54	1108%
105	I-77	Tyvola Rd	5	NB	Mecklenburg	\$260,930	\$23,642,601	90.61	1170%
111	I-77	Remount Rd	8	SB	Mecklenburg	\$241,370	\$18,505,656	76.67	1010%
145	I-77	US 21 (Catawba Ave)	28	NB	Mecklenburg	\$253,218	\$17,365,283	68.58	873%
93	I-77	Westinghouse Blvd	1A	SB	Mecklenburg	\$663,195	\$42,402,512	63.94	621%
147	I-77	Goodrum Rd / Griffith St	30	NB	Mecklenburg	\$292,913	\$14,029,769	47.9	543%
143	I-77	NC 73 (Sam Furr Rd)	25	NB	Mecklenburg	\$291,050	\$10,386,340	35.69	380%
67	I-85	Sugar Creek Rd	41	NB	Mecklenburg	\$278,775	\$9,716,756	34.86	376%
104	I-77	Tyvola Rd	5	SB	Mecklenburg	\$342,180	\$12,561,271	36.71	370%
234	I-485	Rea Rd	59	Outer	Mecklenburg	\$280,314	\$8,339,499	29.75	306%
233	I-485	NC 16 (Providence Rd)	57	Inner	Mecklenburg	\$322,220	\$9,319,823	28.92	277%
35	I-85	Belmont-Mt. Holly Rd	26	SB	Gaston	\$262,458	\$7,368,856	28.08	292%
230	I-485	NC 16 (Providence Rd)	57	Outer	Mecklenburg	\$349,183	\$8,669,728	24.83	216%
232	I-485	NC 16 (Providence Rd)	57	Outer	Mecklenburg	\$244,539	\$5,454,540	22.31	221%
231	I-485	NC 16 (Providence Rd)	57	Inner	Mecklenburg	\$309,669	\$6,447,238	20.82	174%
103	I-77	Nations Ford Rd	4	NB	Mecklenburg	\$268,012	\$5,248,933	19.58	172%
179	I-485	Steele Creek Rd	4	Inner	Mecklenburg	\$294,368	\$4,468,653	15.18	103%
237	I-485	Rea Rd	59	Inner	Mecklenburg	\$280,779	\$3,801,741	13.54	84%
236	I-485	Rea Rd	59	Inner	Mecklenburg	\$281,998	\$3,328,980	11.8	61%
101	I-77	Arrowood Rd	3	NB	Mecklenburg	\$294,827	\$3,023,996	10.26	37%
34	I-85	McAdenville Rd	23	NB	Gaston	\$245,687	\$2,495,389	10.16	46%

Log	Freeway	Cross Street	Exit	Direction	County	Ten Year Total Costs	Ten Year Total Benefits	Ten Year BCR	FYRR
37	I-85	Beatty Dr / Park St	27	SB	Gaston	\$291,700	\$2,830,504	9.7	30%
097*	I-77	I-485	1B	SB	Mecklenburg	\$576,144	\$5,537,711	9.61	10%
140	I-77	Gilead Rd	23	NB	Mecklenburg	\$310,022	\$2,439,181	7.87	4%
32	I-85	S Main St	22	NB	Gaston	\$222,099	\$1,666,535	7.5	13%
177	I-485	Steele Creek Rd	4	Inner	Mecklenburg	\$315,328	\$2,385,718	7.57	-1%
64	I-85	Graham St	40	SB	Mecklenburg	\$280,895	\$1,987,216	7.07	-4%
146	I-77	Goodrum Rd / Griffith St	30	SB	Mecklenburg	\$268,759	\$1,618,415	6.02	-17%
239	I-485	US 521 (Johnston Rd)	61	Outer	Mecklenburg	\$279,970	\$1,234,084	4.41	-40%
182	I-485	US 74 / US 29 (Wilkinson Blvd)	9	Outer	Mecklenburg	\$352,255	\$895,548	2.54	-68%
181	I-485	West Blvd	6	Inner	Mecklenburg	\$293,146	\$656,116	2.24	-70%
75	I-85	Mallard Creek Rd	46	NB	Mecklenburg	\$305,762	\$570,048	1.86	-75%
229	I-485	E John St	52	Inner	Mecklenburg	\$286,919	\$437,154	1.52	-79%
175	I-485	Arrowood Rd	3	Inner	Mecklenburg	\$685,263	\$673,485	0.98	-89%
72	I-85	Harris Blvd	45	SB	Mecklenburg	\$273,055	\$167,920	0.61	-92%
30	I-85	Cox Rd	21	NB	Gaston	\$276,847	\$94,294	0.34	-95%
250	US-74	Briar Creek Road/Television Lane	244	WB	Mecklenburg	\$276,344	\$0	0	-100%

^{*} Freeway-to-Freeway site

5. STIP Projects and Freeway-to-Freeway Sites

5.1. STIP Projects

The 2016-2025 State Transportation Implementation Plan (STIP) can be found in the following location: https://connect.ncdot.gov/projects/planning/STIPDocuments1/LIVE STIP.pdf.

The STIP has been reviewed to identify any planned projects in the vicinity of a potential ramp metering site. The scope of the work, schedule and the funding of each STIP project were used to determine if there is a potential conflict with a ramp metering deployment. The list in Table 5-1 has been compiled, with a comment on whether that project is likely to affect the potential benefits from a ramp metering installation in that location.

Table 5-1 List of STIP Projects

Sites Affected (Log)	STIP Project Number	Description	Anticipated Construction	Short Term Impact on Ramp Metering	County	Agency
029, 030	I-5713	I-85 Cox Road interchange improvements (Exit 21)	2020	No	Gaston	Div. 12
030, 032, 033, 034, 035, 037	I-5719	I-85 widening to 8 lanes between US 321 (Exit 17) and NC 273 (Exit 27)	2024 onwards	No	Gaston	Div. 12
032, 033, 034, 035, 037	I-5869	I-85 ITS improvements between Main Street in Lowell (Exit 22) and Sam Wilson Road (Exit 29)	2024	No	Gaston / Mecklenburg	Div. 10, 12
145, 146, 147	I-4750AA	I-77 construct HOT lanes between West Catawba Ave (Exit 28) and NC 150 (Exit 36)	Current	No	Iredell / Mecklenburg	Div. 10, 12
145, 146, 147	I-4750AB	I-77 construct one additional lane in each direction between West Catawba Ave (Exit 28) and NC 150 (Exit 36)	Post 2025	No	Iredell / Mecklenburg	Div. 10, 12
129*, 140, 143, 145	I-5405	I-77 construct HOT lanes and convert HOV lanes to HOT lanes between I-277 (Exit 11) and West Catawba Ave (Exit 28)	Current	No	Mecklenburg	Div. 10
140, 143, 145	I-3311B	I-77 construct additional lanes between I-485 (Exit 19) and West Catawba Ave (Exit 28)	Post 2025	No	Mecklenburg	Div. 10

Sites Affected (Log)	STIP Project Number	Description	Anticipated Construction	Short Term Impact on Ramp Metering	County	Agency
129*	I-3311C	I-77 construct HOT lanes and convert HOV lanes to HOT lanes between I-277 (Exit 11) and I-85 (Exit 13)	Current	No	Mecklenburg	Div. 10
146, 147	I-4750AC	I-77/Exit 30 (Griffith St) Interchange; construct roundabouts at northbound and southbound ramp termini.	Current	No	Mecklenburg	Div. 10
140	I-5714	I-77 upgrade Gilead Road interchange (Exit 23)	2019	Yes	Mecklenburg	Div. 10
143	I-5715	I-77 upgrade NC 73 interchange (Exit 25)	2021	Yes	Mecklenburg	Div. 10
093, 097*, 099, 101, 102, 103, 104, 105	I-5718A	I-77 widens to 10 lanes between I-485 (Exit 1) to Woodlawn Road (Exit 6)	Post 2025	No	Mecklenburg	Div. 10
109, 111	I-5718B	I-77 widens to 10 lanes between Woodlawn Road (Exit 6) and I-277/US 74 (Exit 9)	Post 2025	No	Mecklenburg	Div. 10
None	I-5718C	I-77 widens to 10 lanes between I-277/US 74 (Exit 9) and I-277/NC 16 (Exit 11)	Post 2025	No	Mecklenburg	Div. 10
None	I-5718D	I-77 I-277/US 74/NC 27 interchange improvements (Exit 9)	Post 2025	No	Mecklenburg	Div. 10
None	I-5718E	I-77 I-277/NC 16/US 21 interchange improvements (Exit 11)	Post 2025	No	Mecklenburg	Div. 10
229, 230, 231, 232, 233, 234, 236, 237, 239	I-5507	I-485 construct one express lane in each direction between I-77 (Exit 51) and US 74 (Exit 67)	2016-2019	No	Mecklenburg	Div. 10
229	R-0211EC	I-485 construct Weddington Road interchange	2019-2022	No	Mecklenburg	Div. 10
229	R-2123CG	I-485 from US 74 (Independence Boulevard) to I-85 North; ITS Device installation	Current	No	Mecklenburg	Div. 10
N/A	R-2248EA	I-485 from East of NC 115 (Old Statesville Rd) to I-85 North; ITS Device installation	Current	No	Mecklenburg	Div. 10

Sites Affected (Log)	STIP Project Number	Description	Anticipated Construction	Short Term Impact on Ramp Metering	County	Agency
None	R-2248G	I-485 construct interchange with Oakdale Road	Current	No	Mecklenburg	Div. 10
230, 231, 232, 233	I-5507/ U-4714AB	I-485 from I-77 to US 74: Construct Hot Lanes; I-485 – Interchange at John St. (NC 16); construct two loops just south of Johns St/Providence Rd.	2017	Yes	Mecklenburg	Div. 10

^{*} Freeway-to-Freeway site

It can be seen that six of the 38 potential ramp metering installations, 140, 143, 230, 231, 232, and 233 along I-485 could be affected by STIP projects.

These six sites will be removed from further analysis of the implementation options because their benefits cannot be assured.

Also, site 75, I-85 Northbound at Mallard Creek Church Road, could be impacted as well due to a NCDOT Congestion Management study that is currently being performed at this location. Recommendations from the study could impact site 75 from being proposed as a viable site for ramp metering implementation. That study has determined that implementation of ramp metering alone would not address the capacity problems being studied by the Congestion Management project. At this time, the committee will move forward with this site excluded.

5.2. Freeway-to-Freeway Sites

In the early stages of the NCDOT Ramp Metering Feasibility Study, the Steering Committee requested that a number of Freeway-to-Freeway (F2F) sites be considered. This was to satisfy a desire to know how feasible F2F sites would be and the issues in implementing ramp metering at such sites, but there was no intention to install ramp metering at an F2F intersection in the first round of implementation.

Of the two F2F sites included at the Detailed Analysis stage, one (site 129, I-85 SBD ramp to I-77 NBD) was found to be potentially feasible for ramp metering based on the analysis of congestion, traffic and geometric characteristics. The second (site 097, I-485 ramp to I-77 SBD) was found to be not feasible, but it was retained for further analysis at the request of the Steering Committee. Because there is no intention to install them at this stage, from this point forward these F2F sites will be removed from the analysis.

Table 5-2 shows the two F2F sites and their relative five year BCRs. It can be seen that both of the sites have a BCR greater than one, i.e. a payback time of less than five years. In fact, site 129 has the second highest five-year BCR of all 38 sites, demonstrating the value of providing F2F metering, if a suitable system could be developed to operate in this scenario.

Table 5-2 Freeway-to-Freeway Sites Applicable to the Suitable Locations

Log	Freeway	Cross Street	Exit	Direction	County	5 Year BCR
097	I-77	I-485	1B	SB	Mecklenburg	5.18
129	I-77	I-85 SB	13	NB	Mecklenburg	55.71

6. Options for Implementation

6.1. Proposed Approach

This section presents the options for possible stages of implementation. The options have been developed by logically grouping the sites by location. This has the benefit of addressing congestion problems on a corridor by corridor basis, ensuring all sites associated with each congestion problem are implemented together to maximize the effectiveness and realized benefits. This grouping would potentially mitigate any route diversion impacts by drivers attempting to avoid a ramp meter. This corridor-based approach will also provide construction works efficiencies.

This approach differs from that adopted on the previous project in Raleigh where two options for implementation were proposed. In that study, the first option included all sites with a five-year BCR greater than 1. The second option was a subset of the first, removing sites with an effectiveness factor of less than 1 and thus only retaining sites where the expected benefits were more assured, offering a 'reduced risk' approach.

This approach is not deemed appropriate for the Charlotte ramp metering sites for the following key reasons:

- 1. A much greater proportion of the sites in this project have an effectiveness factor less than 1 due to the more complex nature of the sites and the congestion problems;
- 2. The significantly higher traffic volumes experienced at the sites in Charlotte increase the potential benefits that can be realized through the implementation of ramp metering, so despite lower effectiveness factors, the BCRs are higher relative to those calculated for the Raleigh sites.

The 38 potential ramp metering sites are located on three main highways: I-85, I-77 and I-485. For each highway, the sites are grouped into two distinct locations. This provides six groups as follows:

- 1. I-85 South (Gaston County)
- 2. I-85 North (Mecklenburg County)
- 3. I-77 South
- 4. I-77 North
- 5. I-485 Southwest
- 6. I-485 Southeast

6.2. Sites Removed from Further Analysis

As explained in Section 5, the following sites will not be included in the analysis but will be displayed in the tables:

- Sites affected by STIP projects (as described in Section 5.1): 140, 143, 230, 231, 232, and 233
- F2F sites (as described in Section 5.2): Sites 097 and 129
- Site 75, due to the current Congestion Management study

In addition, sites categorized as 'Review in Future' during the Detailed Analysis stage will be removed from further analysis. The effectiveness of these sites is less certain and will need to be reassessed following the implementation of other ramp metering sites within the same corridors. Sites which are not expected to pay for themselves within five years of construction (i.e. sites with a five-year BCR of less than 1) have also been removed from further analysis since they are not deemed economically suitable for implementation. These sites are as follows:

- 'Review in future' sites: Sites 030, 037, 104, 175, 182, 229 and 250; and
- Sites with a five-year BCR of less than 1: Sites 229, 175, 072, 030 and 250.

Note that some of these sites fall into both categories.

Therefore, moving forward, there are 21 potential ramp metering sites that are being recommended for implementation. They are as follows:

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County
32	S Main St	I-85	NB	22	Gaston
34	McAdenville Rd	I-85	NB	23	Gaston
35	Belmont-Mt. Holly Rd	I-85	SB	26	Gaston
93	Westinghouse Blvd	I-77	SB	1A	Mecklenburg
101	Arrowood Rd	I-77	NB	3	Mecklenburg
102	Nations Ford Rd	I-77	SB	4	Mecklenburg
103	Nations Ford Rd	I-77	NB	4	Mecklenburg
105	Tyvola Rd	I-77	NB	5	Mecklenburg
111	Remount Rd	I-77	SB	8	Mecklenburg
145	US 21 (Catawba Ave)	I-77	NB	28	Mecklenburg
146	Goodrum Rd / Griffith St	I-77	SB	30	Mecklenburg
147	Goodrum Rd / Griffith St	I-77	NB	30	Mecklenburg
64	Graham St	I-85	SB	40	Mecklenburg

Log	FROM Cross Street	TO Freeway	Freeway Direction	Exit	County
67	Sugar Creek Rd	I-85	NB	41	Mecklenburg
177	Steele Creek Rd	I-485	Inner	4	Mecklenburg
179	Steele Creek Rd	I-485	Inner	4	Mecklenburg
181	West Blvd	I-485	Inner	6	Mecklenburg
234	Rea Rd	I-485	Outer	59	Mecklenburg
236	Rea Rd	I-485	Inner	59	Mecklenburg
237	Rea Rd	I-485	Inner	59	Mecklenburg
239	US 521 (Johnston Rd)	I-485	Outer	61	Mecklenburg

6.3. Implementation Options

The following sections define each of the options for implementing ramp metering sites, grouped by location. The tables outlining the costs, benefits, and BCRs provide subtotals for the sites on each roadway, a total cost for both roadways not including the central cost, and a total cost including the central cost.

Note that costs included above in Tables 4-1 and 4-2 do not include the central costs. For each grouping below, the total costs for the central costs was included in each of the estimates. If NCDOT makes the decision to move forward with only one grouping, then this grouping will need to absorb the entire central costs. If more than one grouping is chosen to be implemented, NCDOT can either have one group absorb the entire central costs or the central costs can be distributed evenly amongst the number of groupings chosen for implementation.

Table 6-1 Group 1 - I-85 South (Gaston County)

Log	Freeway	Cross Street	Exit	Direction	Include in Group?	Ten Year Total Cost	Ten Year Total Benefits	Ten Year BCR
030	I-85	Cox Rd	21	NB	No - review in future			
032	I-85	S Main St	22	NB	Yes	\$222,099	\$1,666,535	7.50
034	I-85	McAdenville Rd	23	NB	Yes	\$245,687	\$2,495,389	10.16
		Subtota	l (Norti	nbound)		\$467,786	\$4,161,923	8.90
033	I-85	McAdenville Rd	23	SB	No - ramp flows too low			
035	I-85	Belmont-Mt. Holly Rd	26	SB	Yes	\$262,458	\$7,368,856	28.08
037	I-85	Beatty Dr / Park St	27	SB	No - review in future			
		Subtota	l (Sout	hbound)		\$262,458	\$7,368,856	28.08
Total w	rithout Centra	Il Cost (I-85 South – Gastor	n Count	y)		\$730,245	\$11,530,779	15.79
Centra	Cost					\$622,720		
Total i	ncluding Ce	ntral Cost (I-85 South – G	aston (County)		\$1,352,965	\$11,530,779	8.52

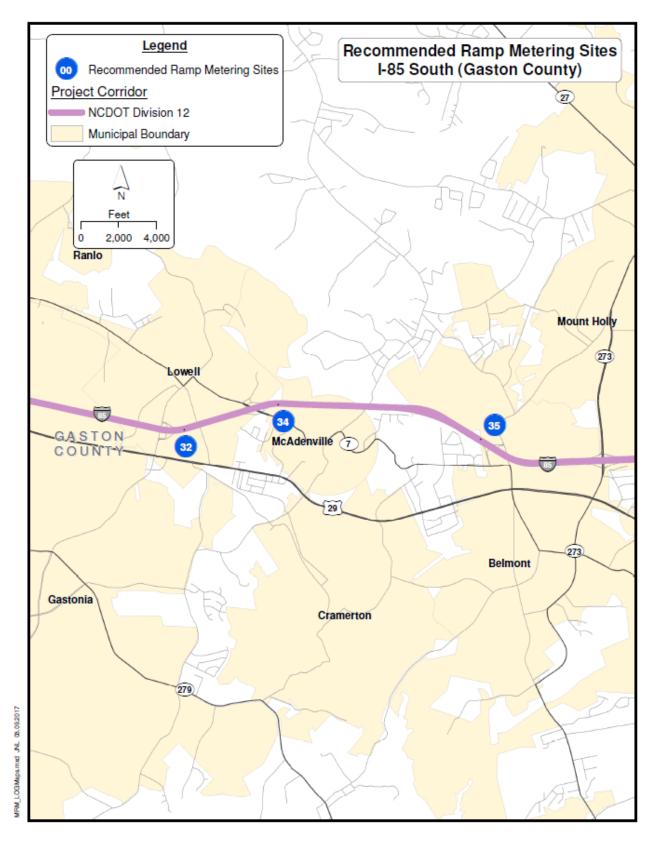


Figure 1. Group 1 – I-85 South (Gaston County) Map

Table 6-2 Group 2 - I-85 North (Mecklenburg County)

Log	Freeway	Cross Street	Exit	Direction	Status	Ten Year Total Cost	Ten Year Total Benefits	Ten Year BCR
129	I-77	I-85 SB	13	NB	No - F2F site			
062	I-85	I-77 NB	38	NB	No - cannot extend acceleration lane			
063	I-85	Statesville Ave	39	NB	No - cannot extend acceleration lane			
065	I-85	Graham St	40	NB	No - cannot extend acceleration lane			
067	I-85	Sugar Creek Rd	41	NB	Yes	\$278,775	\$9,716,756	34.86
075	I-85	Mallard Creek Rd	46	NB	No			
		Subtot	al (North	nbound)		\$278,775	\$9,716,756	34.86
061	I-85	Statesville Ave	39	SB	No - cannot extend acceleration lane			
064	I-85	Graham St	40	SB	Yes	\$280,895	\$1,987,216	7.07
066	I-85	Sugar Creek Rd	40	SB	No - cannot extend acceleration lane			
068	I-85	US 29 Connector (US 29/49)	42	SB	No - cannot extend acceleration lane			
069	I-85	University City Blvd	43	SB	No - ramp flows too low			
070	I-85	University City Blvd	43	SB	No - cannot extend acceleration lane			
072	I-85	Harris Blvd	45	SB	No - low BCR			
		Subtot	al (Soutl	hbound)		\$280,895	\$1,987,216	7.07
Total w	rithout Central	Cost (I-85 North – Meckle	enburg C	county)		\$559,670	\$11,703,971	20.91
Central	Cost					\$622,720		
Total in	ncluding Cen	itral Cost (I-85 North – M	ecklenb	urg County)		\$1,182,390	\$11,703,971	9.90

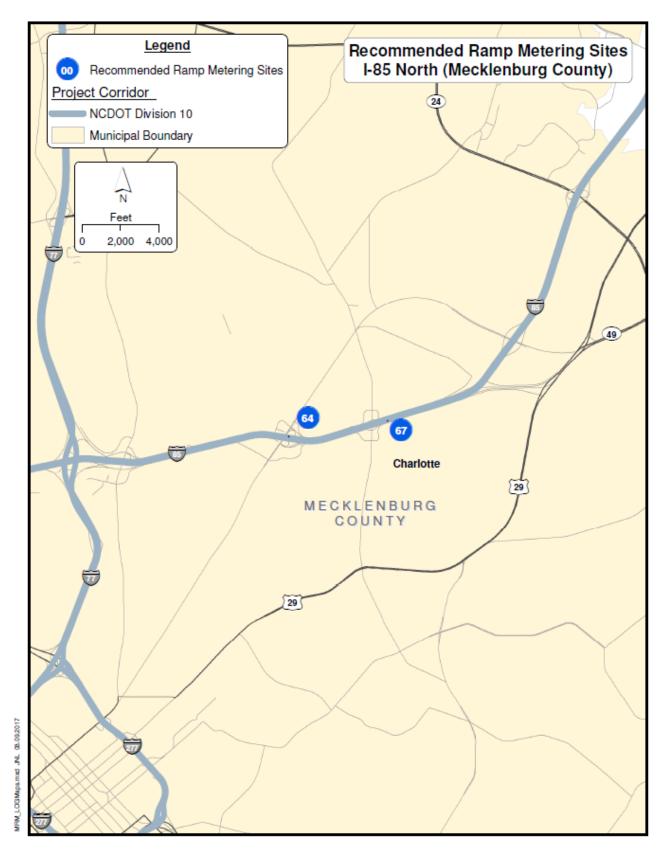


Figure 2. Group 2 – I-85 North (Mecklenburg County) Map

Table 6-3 Group 3 - I-77 South

Log	Freeway	Cross Street	Exit	Direction	Status	Ten Year Total Cost	Ten Year Total Benefits	Ten Year BCR
100	I-77	I-485	1B	NB	No - F2F site			
101	I-77	Arrowood Rd	3	NB	Yes	\$294,827	\$3,023,996	10.26
103	I-77	Nations Ford Rd	4	NB	Yes	\$268,012	\$5,248,933	19.58
105	I-77	Tyvola Rd	5	NB	Yes	\$260,930	\$23,642,601	90.61
107	I-77	S Tryon St	6B	NB	No - primary site is F2F site			
110	1-77	Clanton Rd	7	NB	No - primary site is F2F site			
113	1-77	West Blvd	9A	NB	No - primary site is F2F site			
Subtotal (Northbound)							\$31,915,530	38.74
093	I-77	Westinghouse Blvd	1A	SB	Yes	\$663,195	\$42,402,512	63.94
097	I-77	I-485	1B	SB	No - F2F site			
099	I-77	Arrowood Rd	3	SB	No - ramp flow too high, complex CDR			
102	I-77	Nations Ford Rd	4	SB	Yes	\$237,201	\$26,261,662	110.72
104	I-77	Tyvola Rd	5	SB	No - review in future			
106	I-77	Woodlawn Rd	6A	SB	No - cannot extend acceleration lane			
108	I-77	S Tryon St	6B	SB	No - cannot extend acceleration lane			
109	I-77	Clanton Rd	7	SB	No - low ramp flow, little congestion			
111	I-77	Remount Rd	8	SB	Yes	\$241,370	\$18,505,656	76.67
112	I-77	I-77 CD (US 74 (Wilkinson Blvd)/ Freedom Dr / I-277 (John Belk Frwy)	9	SB	No - F2F site			
Subtotal (Southbound)						\$1,141,765	\$87,169,830	76.35
Total without Central Cost (I-77 South)						\$1,965,534	\$119,085,360	60.59
Central Cost						\$622,720		
Total including Central Cost (I-77 South)						\$2,588,254	\$119,085,360	46.01

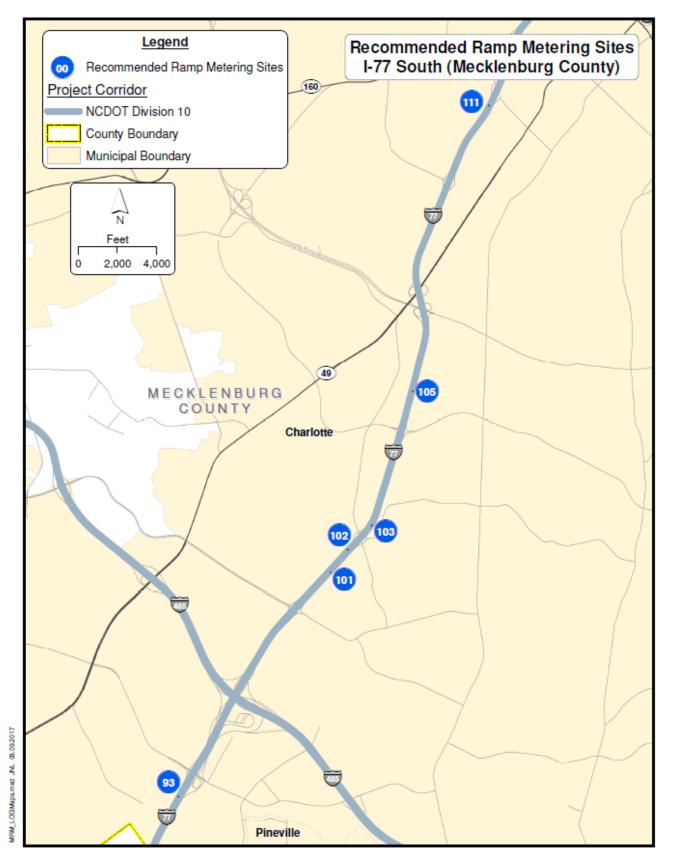


Figure 3. Group 3 – I-77 South Map

Table 6-4 Group 4 - I-77 North

Log	Freeway	Cross Street	Exit	Direction	Status	Ten Year Total Cost	Ten Year Total Benefits	Ten Year BCR
140	1-77	Gilead Rd	23	NB	No			
143	1-77	NC 73 (Sam Furr Rd)	25	NB	No			
145	I-77	US 21 (Catawba Ave)	28	NB	Yes	\$253,218	\$17,365,283	68.58
147	I-77	Goodrum Rd / Griffith St	30	NB	Yes	\$292,913	\$14,029,769	47.90
Subtotal (Northbound)						\$546,131	\$31,395,052	57.49
146	I-77	Goodrum Rd / Griffith St	30	SB	Yes	\$268,759	\$1,618,415	6.02
Subtotal (Southbound)							\$1,618,415	6.02
Total without Central Cost (I-77 North)						\$814,890	\$33,013,467	40.51
Central Cost						\$622,720		
Total including Central Cost (I-77 North)						\$1,437,610	\$33,013,467	22.96

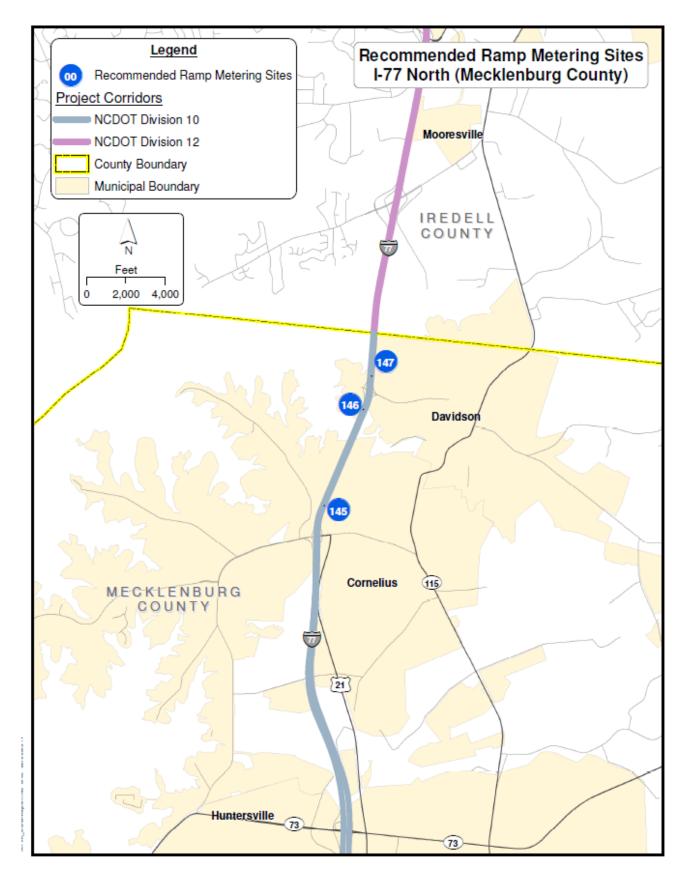


Figure 4. Group 4 – I-77 North Map

Table 6-5 Group 5 - I-485 Southwest

Log	Freeway	Cross Street	Exit	Direction	Status	Ten Year Total Cost	Ten Year Total Benefits	Ten Year BCR
175	I-485	Arrowood Rd	3	Inner	No - review in future			
177	I-485	Steele Creek Rd	4	Inner	Yes	\$315,328	\$2,385,718	7.57
179	I-485	Steele Creek Rd	4	Inner	Yes	\$294,368	\$4,468,653	15.18
181	I-485	West Blvd	6	Inner	Yes	\$293,146	\$656,116	2.24
		Sub		\$902,843	\$7,510,487	8.32		
182	l-485	US 74 / US 29 (Wilkinson Blvd)	9		No - review in future			
180	I-485	West Blvd	6		No - Ramp flows too low			
		Sub	\$0	\$0	N/A			
Total without Central Cost (I-485 Southwest)						\$902,843	\$7,510,487	8.32
Central Cost						\$622,720		
Total in	Total including Central Cost (I-485 Southwest)						\$7,510,487	4.92

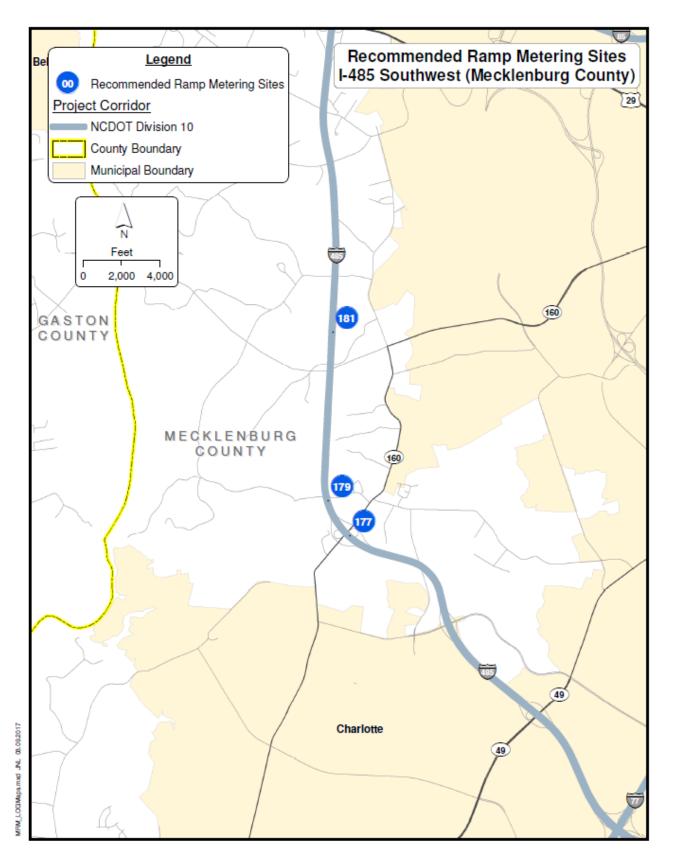


Figure 5. Group 5 – I-485 Southwest Map

Table 6-6 Group 6 - I-485 Southeast

Log	Freeway	Cross Street	Exit	Direction	Status	Ten Year Total Cost	Ten Year Total Benefits	Ten Year BCR
229	I-485	E John St	52	Inner	No - review in future			
231	I-485	NC 16 (Providence Rd)	57	Inner	No			
233	I-485	NC 16 (Providence Rd)	57	Inner	no			
236	I-485	Rea Rd	59	Inner	Yes	\$281,998	\$3,328,980	11.80
237	I-485	Rea Rd	59	Inner	Yes	\$280,779	\$3,801,741	13.54
Subto	tal (Inner)					\$562,777	\$7,130,721	12.67
230	I-485	NC 16 (Providence Rd)	57	Outer	No			
232	I-485	NC 16 (Providence Rd)	57	Outer	No			
234	I-485	Rea Rd	59	Outer	Yes	\$280,314	\$8,339,499	29.75
235	I-485	Rea Rd	59	Outer	No - ramp flow low, poor visibility			
238	I-485	US 521 (Johnston Rd)	61	Outer	No - ramp flow too low			
239	I-485	US 521 (Johnston Rd)	61	Outer	Yes	\$279,970	\$1,234,084	4.41
Subto	tal (Outer)	•		•		\$560,283	\$9,573,583	17.09
Total	Total without Central Cost (I-485 Southeast)						\$16,704,304	14.87
Centra	Central Cost							
Total	including Ce	ntral Cost (I-485 Southeas	it)			\$1,745,780	\$16,704,304	9.57

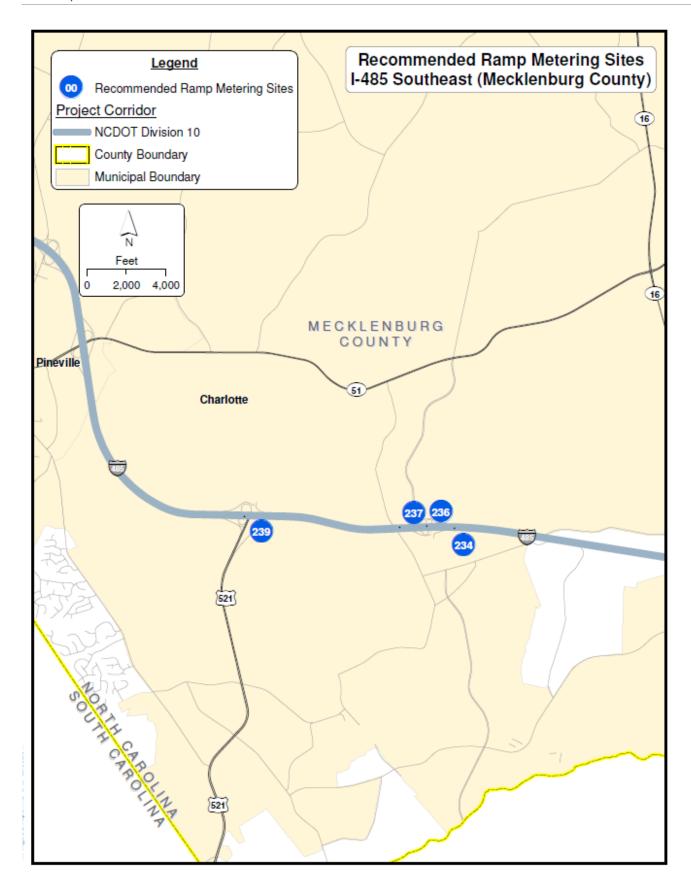


Figure 6. Group 6 – I-485 Southeast Map

7. Summary

Using the calculated costs and benefits of the ramp metering sites taken from the list of the 38 sites, a benefit cost analysis has been performed. This analysis takes into account implementation costs, maintenance costs, and program costs. The financial benefits are only for the reduction in travel time expected from the implementation of a ramp metering system.

As we move forward with the implementation of ramp metering sites in the Metrolina area, a site will be considered suitable for implementation when that ramp metering site will provide the "pay back" of the construction and operations costs within five years, (i.e. have a five-year benefit to cost ratio greater than 1.0). If the site does provide a "pay back" within the next five years, it must not have a conflicting current STIP project scheduled to be advertised in the next five years. If there is a STIP project that is planned to be advertised in the next five years, the proposed ramp meter site has been removed and will not be considered a viable site for ramp metering at this time. Lastly, freeway-to-freeway sites will not be considered for implementation of ramp metering at this time.

Table 7-1 Cumulative Site Implementation Costs and Benefits

Number of Sites	Ten Year Total	Ten Year Total	Ten Year
	Cost	Benefit	BCR
21	\$6,718,962	\$199,548,370	29.70

After the criteria above was applied to each site, the final number of sites being recommended for implementation are 21. These 21 ramp meter sites were then placed into groups. These groups will be the format for funding/projects as NCDOT moves forward.

It is important to consider the following as decisions are made about implementation:

- The analysis is based on travel time benefits only, whereas actually other benefits will accrue including safety, emissions and reliability improvements.
- Some of the sites screened out during the previous phase of analysis might well
 provide benefits in the future. Following an initial installation of ramp metering in the
 Metrolina area, it might be useful to review the effectiveness of some of those
 implemented ramp metering sites to determine whether to install at some of the sites
 screened out previously.

8. Recommendations

As mentioned previously, the sites for ramp metering were selected based on the criteria listed below.

- Does ramp metering site provide the "pay back" of the system costs within five years? (i.e. have a five-year benefit to cost ratio greater than 1.0)
- Is there a STIP project in the next five years that could impact ramp meter implementation?
- Is the site a freeway-to-freeway site?

Once the sites were filtered using the above criteria and grouped, ranking for implementation was then analyzed based on the best 'bang for the buck'. The analysis looked at how many sites were going to be implemented within each group, the sites individual rankings within the group, and what the total and average costs per site/group were. An analysis was also performed to determine how sites should be implemented based on a location as well as the direction. Table 8-1 below shows the priority for implementation based on group implementation while Table 8-2 shows the priority for implementation based on their site location and for a particular direction.

For implementation based on an entire group as shown in Table 8-1, Group 3 is recommended to be the first ramp meter implementation in the Metrolina area. While this group has the highest costs for implementation, it also includes the most sites with the highest site rankings, and has the lowest average costs/site for each of the groups.

After implementing Group 3, the recommended order for implementation would be Group 4, Group 6, Group 1, Group 5, and Group 2, refer to Table 8-1. Note that although Group 2 has a higher BCR than Groups 6, 1, and 5, the average cost/site for implementation is \$100,000 to \$150,000 higher.

If the Department decides to implement ramp meters based on location and direction as shown in Table 8-2, then the recommendation for implementation would be:

- 1. Southbound direction of I-77
- 2. Northbound direction of I-77 North
- 3. South Northbound direction of I-77 South
- 4. Both directions of I-85 North in Mecklenburg County
- 5. Southbound direction of I-85 South in Gaston County
- 6. Outer Loop of I-485 Southeast
- 7. Inner Loop of I-485 Southeast
- 8. Inner Loop of I-485 Southwest
- 9. Northbound direction of I-85 South in Gaston County
- 10. Southbound direction of I-77 North

As stated previously in Section 6.3, central costs have been included in each groups total 10 year costs. Therefore, if only one group is chosen for implementation, it would incur all of the central costs and the other groups 10 year total costs would each be reduced by \$622,720.

Table 8-1 Recommended Order for Ramp Meter Implementation – Per Group

Priority	Group	Direction	Sites	Site Rankings	Ten Year Individual Costs	Ten Year Total Costs	Ten Year Individual Benefits	Ten Year Total Benefits	Average Costs/Site for Group	Ten Year BCR	Combined BCR
	0	NB NB NB	101 103 105	21 17 3	\$294,827 \$268,012 \$260,930		\$3,023,996 \$5,248,933 \$23,642,601			10.26 19.58 90.61	
1	3 (I-77 South)	SB SB SB	93 102 111 Central	6 1 4	\$663,195 \$237,201 \$241,370 \$622,720	\$2,588,254	\$42,402,512 \$26,261,662 \$18,505,656	\$119,085,360	\$431,376	63.94 110.72 76.67	46.01
2	4 (I-77 North)	NB NB SB	145 147 146 Central	5 7 29	\$253,218 \$292,913 \$268,759 \$622,720	\$1,438.610	\$17,365,283 \$14,029,769 \$1,618,415	\$33,013,467	\$479,537	68.58 47.9 6.02	22.96
3	6 (I-485 Southeast)	Inner Inner Outer Outer	236 237 234 239	20 19 11 30	\$281,998 \$280,779 \$280,314 \$279,970	\$1,745,780	\$3,323,980 \$3,801,741 \$8,339,499 \$1,234,084	\$16,704,304	\$436,445	11.80 13.54 29.75 4.41	9.57
	1 (I-85 South	- NB NB	Central 32 34	26 22	\$622,720 \$222,099 \$245,687		\$1,666,535 \$2.495.389			7.50 10.16	
4	Gaston County)	SB -	35 Central	13	\$262,458 \$622,720	\$1,352,955	\$7,368,856 -	\$11,530,779	\$450,985	28.08	8.52
5	5 (I-485 Southwest)	Inner Inner Inner -	177 179 181 Central	27 18 32 -	\$315,328 \$294,368 \$293,146 \$622,720	\$1,525,563	\$2.385,718 \$4,468,653 \$656,116	\$7,510,487	\$508,521	7.57 15.18 2.24	4.92
6	2 (I-85 North Mecklenburg County)	NB SB -	67 64 Central	9 28 -	\$278,775 \$280,895 \$622,720	\$1,182,390	\$9,716,756 \$1,987,216 -	\$11,703,971	\$591,195	34.86 7.07 -	9.90

Table 8-2 Recommended Order for Ramp Meter Implementation – Location / Direction

Group	Direction	Sites	Site Rankings	Ten Year Individual Costs	Ten Year Total Costs	Ten Year Individual Benefits	Ten Year Total Benefits	Average Costs/Site for Group	Ten Year BCR	Combined BCR	Priority
3	NB NB NB	101 103 105 Central	21 17 3 -	\$294,827 \$268,012 \$260,930 \$622,720	\$1,446,489	\$3,023,996 \$5,248,933 \$23,642,601 -	\$ 31,915,530	\$482,163	10.26 19.58 90.61	22.06	3
(I-77 South)	SB SB SB	93 102 111 Central	6 1 4	\$663,195 \$237,201 \$241,370 \$622,720	\$1,764,486	\$42,402,512 \$26,261,662 \$18,505,656 -	\$87,169,830	\$588,162	63.94 110.71 76.67	49.40	1
4 (I-77 North)	NB NB -	145 147 Central	5 7	\$253,218 \$292,913 \$622,720	\$1,168,851	\$17,365,283 \$14,029,769 -	\$31,395,052	\$584,426	68.58 47.90 -	26.86	2
(I-77 NOTH)	SB -	146 Central	29	\$268,759 \$622,720	\$891,479	\$1,618,415 -	\$1,618,415	\$891,479	6.02	1.82	10
6	Inner Inner -	236 237 Central	20 19 -	\$281,998 \$280,779 \$622,720	\$1,185,497	\$3,323,980 \$3,801,741 -	\$7,125,721	\$592,749	11.79 13.54	6.01	7
(I-485 Southeast)	Outer Outer	234 239 Central	11 30 -	\$280,314 \$279,970 \$622,720	\$1,183,004	\$8,339,499 \$1,234,084	\$9,573,583	\$591,502	29.75 4.41 -	8.09	6
1 (I-85 South Gaston	NB NB -	32 34 Central	26 22 -	\$222,099 \$245,687 \$622,720	\$1,090,506	\$1,666,535 \$2,495,389 -	\$4,161,924	\$545,253	7.50 10.16	3.82	9
County)	SB -	35 Central	13 -	\$262,458 \$622,720	\$885,178	\$7,368,856 -	\$7,368,856	\$885,178	28.08	8.32	5
5 (I-485 Southwest)	Inner Inner Inner	177 179 181 Central	27 18 32 -	\$315,328 \$294,368 \$293,146 \$622,720	\$1,525,562	\$2,385,718 \$4,468,653 \$656,116	\$7,510,487	\$508,521	7.57 15.18 2.24	4.92	8
2 (I-85 North Mecklenburg County)	NB SB	67 64 Central	9 28 -	\$278,775 \$280,895 \$622,720	\$1,182,390	\$9,716,756 \$1,987,216 -	\$11,703,972	\$591,195	7.07	9.90	4

Appendix A. Detailed Implementation Site Costs

A.1. Site Cost Estimates

Each of the sites were evaluated and cost estimates were prepared looking at the following categories. As stated previously, site costs are impacted by the type of ramp, the mainline geometric conditions, and the existing ITS infrastructure, as well as the availability of power at each of the site locations.

Categories
Earthwork and Structure
Guardrail
Paving
Drainage
Signalization
Communications
Pavement Marking
Signing
SUBTOTAL CONSTRUCTION
Traffic Control
Contingencies
TOTAL CONSTRUCTION
Design
Construction Administration
TOTAL DESIGN AND CONSTRUCTION

A.1.1. Proposed One Lane Ramp Locations

A.1.1.1. Gaston County



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

030

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 30 **Ramp**: Cox Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2027	\$2.88	\$5,837.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUI	STOTA	۱L		\$5,837.76	
		Ι			
Guardrail	. –		Φ00.00	# 0.00	
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUI	ЗТОТА	\L		\$0.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUI	ЗТОТА	\L		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance

Log No.: 30 Ramp: Cox Rd

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	2950	\$6.90	\$20,355.00	All purposes
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	ЗТОТА	L		\$103,431.80	
	ı				T
Communications			* 4 * 2 * 2 *	***	111111111111111111111111111111111111111
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	

Log No.: 30 **Ramp**: Cox Rd

Cotomorios					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE					
Pavement Marking					
- Pavement Marking Removal	LF	600	\$0.71	\$427.80	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	ЗТОТА	L		\$1,212.10	
	1	1		, ,	
Signing					_
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE					
				\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$131,421.66	
Traffic Control	15%			\$19,713.25	-
Contingencies	10%			\$13,142.17	1

Log No.: 30 Ramp: Cox Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
TOTAL CONSTRUCTION				\$164,277.08	
Design	8%			\$13,142.17	
Construction Administration	10%			\$16,427.71	
TOTAL DESIGI					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

032

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 032 **Ramp**: S Main St. (Gaston Co.)

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions	Oilit	Quantity	Offic Cost	Total Cost	Assumptions
Earthwork and Structure				T	1
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1210	\$2.88	\$3,484.80	Seeding around trench, conduit runs, pull box, and foundation areas.
SUE	BTOTA	L		\$3,484.80	
	T	T		T	1
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUE	STOTA	L		\$0.00	
	T	T		T	1
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	STOTA	L		\$0.00	
	1	T		Т	1
Signalization				A	<u> </u>
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	1725	\$6.90	\$11,902.50	All purposes
- Conduit (Directional Drilled)	LF	340	\$16.10	\$5,474.00	Five ramp crossings,

Log No.: 032 **Ramp**: S Main St. (Gaston Co.)

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions					-
					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1000	\$5.75	\$5,750.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
 Pedestal Pole (Type III with Foundation) 	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
SUE	TOTA	L		\$70,607.93	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUF	TOTA	L		\$15,535.00	

Log No.: 032 **Ramp**: S Main St. (Gaston Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Marking					
- Pavement Marking Removal	LF	640	\$0.71	\$456.32	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	320	\$1.09	\$349.60	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	320	\$1.09	\$349.60	110' transitions, 100' narrowed lane
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTA	L		\$1,284.32	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTA	L		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$94,304.55	
Traffic Control	15%			\$14,145.68	-
Contingencies	10%			\$9,430.45	1
TOTAL CONSTRUCTION		\$117,880.68			
Design	8%			\$9,430.45	-
Construction Administration	10%			\$11,788.07]
TOTAL DESIGN AND CONS					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

033

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 033 **Ramp**: McAdenville Rd

Categories	I Imit	Oughtitus	Unit Coot	Total Coot	Accumutions
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1694	\$2.88	\$4,878.72	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SU	ВТОТА	L		\$4,878.72	
Guardrail	1				
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SU	ВТОТА	L		\$7,725.00	
Drainage					
	LF	0	\$60.00	\$0.00	Extend existing
- Pipe	U LF BTOTA		φου.υυ	\$0.00 \$0.00	Extend existing
30	БІОТА	L		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	2450	\$6.90	\$16,905.00	All purposes

Log No.: 033 **Ramp**: McAdenville Rd

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions					-
- Conduit (Directional Drilled)	LF	1120	\$16.10	\$18,032.00	Five ramp crossings,
Drilled)					multiple
					conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1000	\$5.75	\$5,750.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	TOTA	L		\$89,056.80	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction
, , ,					Drill on
					Mainline/Splice
Interconnect Conter	Ε.Δ	0	¢4 705 00	\$0.00	Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller
Stratius)					cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet	LS	1	\$1,080.00	\$1,080.00	
Service					
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	

Log No.: 033 **Ramp**: McAdenville Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
SUE	\$17,547.50	-			
301					
Pavement Marking					
- Pavement Marking Removal	LF	500	\$0.71	\$356.50	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
	TOTA	L		\$1,031.55	
	1			• •	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	ТОТА	L		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$123,632.07	
				,	-
Traffic Control	15%			\$18,544.81	1
Contingencies	10%			\$12,363.21	7
TOTAL CONSTRUCTION	\$154,540.09	╡			
	1				
Design	8%			\$12,363.21	1
Construction Administration	10%			\$15,454.01	
	_				
TOTAL DESIGN AND CONS					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

034

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 034 **Ramp**: McAdenville Rd

Location:	1-03 11	orthbound			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1294	\$2.88	\$3,726.72	Seeding
					around trench,
					conduit runs,
					pull box, and
					foundation
					areas.
SU	BTOTA	L		\$3,726.72	
Guardrail					
- Guardrail Rail	LF	500	\$20.00	\$10,000.00	
- Guardrail Approach End	EA	2	\$1,725.00	\$3,450.00	
Treatment					
SU	BTOTA	L		\$13,450.00	
	1	,		T	1
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend
				4	existing
SU	BTOTA	L		\$0.00	
Signalization					
Signalization	F ^		Ф4 Г О СО	ФО 700 OF	Mainline
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two
					loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	
- 6x6 100ps - Ramp	LA	5	Ф403.00	φ2,200.30	One queue, three passage
					and one
					clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed
Detector Lead-III Cable		030	ψ1.73	ψ1,+00.23	setback
					distance 350'
Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	distance 550
- Conduit (Trenched)	LF	1850	\$6.90	\$12,765.00	All purposes
- Conduit (Directional	LF	340	\$16.10	\$5,474.00	Five ramp
Drilled)	LF	340	φιυ.ιυ	φ5,474.00	crossings,
Dillieu)	Ì				Grossings,

Log No.: 034 **Ramp**: McAdenville Rd

Location:	N CO-I	ortnbound			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1250	\$5.75	\$7,187.50	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
SUE	ЗТОТА	L		\$72,907.93	
	T	<u> </u>			
Communications				_	
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE	ЗТОТА	L		\$15,535.00	
	T				
Pavement Marking					

Log No.: 034 **Ramp**: McAdenville Rd

Location.					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Pavement Marking	LF	640	\$0.71	\$456.32	40 MPH
Removal					design speed.
					110'
					transitions,
					100' narrowed
			A- 10		lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	4.4.01
- White Edge Line	LF	320	\$1.09	\$349.60	110'
					transitions,
					100' narrowed
- Yellow Edge Line	LF	320	\$1.09	\$349.60	lane 110'
- Yellow Edge Line	LF	320	φ1.09	\$3 4 9.60	transitions,
					100' narrowed
					lane
- 24" Stop Bar	LF	16	\$8.05	\$128.80	Idilo
	BTOTA	_	ψο.σσ	\$1,284.32	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post
, . ,			*	, , , , , , , , , , , , , , , , , , , ,	only
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post
When Flashing					only
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal
Here on Red					mounted
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal
Green					mounted
SUI	ЗТОТА	<u>L</u>		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$110,296.47	
Traffic Control	15%			\$16,544.47	-
Contingencies	10%			\$10,544.47	1
TOTAL CONSTRUCTION	\$137,870.58	1			
TOTAL CONCINCOTION	ψ101,010.30	1			
Design	8%			\$11,029.65	1
Construction Administration	10%			\$13,787.06	
TOTAL DESIGN AND CONS	-				
13 IAL DEGIGITATIO GOITO					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

035

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 035 **Ramp**: Belmont-Mt. Holly Rd (Gaston Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	1	\$300.00	\$ 300.00	
- Seeding	SY	6294	\$2.88	\$18,126.72	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUI	ЗТОТА	Ĺ		\$18,426.72	
				· · · ·	·
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUI	ЗТОТА	L		\$0.00	
					.
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUI	BTOTA	L		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
					l .

Log No.: 035 **Ramp**: Belmont-Mt. Holly Rd (Gaston Co.)

Catagorico					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Trenched)	LF	2090	\$6.90	\$14,421.00	All purposes
- Conduit (Directional Drilled)	LF	730	\$16.10	\$11,753.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1630	\$5.75	\$9,372.50	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
SUE	TOTA	Ĺ		\$83,027.93	
			1		1
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splic e Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height

Log No.: 035 **Ramp**: Belmont-Mt. Holly Rd (Gaston Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- CCTV Cabinet (Pole	EA	1	\$3,300.00	\$3,300.00	
Mount, Type 336)			ψο,οσο.σσ	ψο,οσο.σσ	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
	TOTA		ψ 1,000100	\$15,535.00	
	- L				
Pavement Marking					
- Pavement Marking	LF	640	\$0.71	\$456.32	40 MPH
Removal					design speed.
					110'
					transitions,
					100' narrowed
					lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	320	\$1.09	\$349.60	110'
					transitions,
					100' narrowed
					lane
- Yellow Edge Line	LF	320	\$1.09	\$349.60	110'
					transitions,
					100' narrowed
					lane
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
	BTOTA	L	-	\$1,284.32	
Signing					
- W3-7, Ramp Meter Ahead	EΑ	2	\$747.50	\$1,495.00	Sign and post
•				·	only
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post
When Flashing					only
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal
Here on Red					mounted
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal
Green				\$3,392.50	mounted
SUE					
OUDTOTAL CONSTRUCTO					
SUBTOTAL CONSTRUCTION	-				
Troffic Control	450/			#40.040.07	-
Traffic Control	15% 10%			\$18,249.97 \$12,166.65	-
Contingencies	-				
TOTAL CONSTRUCTION				\$152,083.08	-

Log No.: 035 **Ramp**: Belmont-Mt. Holly Rd (Gaston Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Design	8%			\$12,166.65	
Construction Administration	10%			\$15,208.31	
TOTAL DESIGN AND CONS	\$179,458.04				



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

037

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 37 **Ramp**: Beatty Dr / Park St

Descriptions	Categories	1124	0	Half Oak	Tatal Oast	A
Retaining Wall		Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Excavation CY 0 \$25.00 \$0.00 - Fill CY 0 \$22.00 \$0.00 - Suppl. Clearing and Grub AC 0 \$300.00 \$0.00 - Seeding SY 2402 \$2.88 \$6,917.76 Seeding around trench conduit runs, pull box, clear/grub area, and foundation areas. SUBTOTAL \$6,917.76 Guardrail Rail LF 0 \$20.00 \$0.00 - Guardrail Approach End Treatment EA 0 \$1,725.00 \$0.00 Drainage - Pipe LF 0 \$60.00 \$0.00 Extend existing SUBTOTAL Signalization - 6x6' loops - Mainline EA 8 \$453.68 \$3,629.40 Mainline detection two loops per lane - 6x6' loops - Ramp EA 5 \$453.68 \$2,268.38 One queue, three passage and one	Earthwork and Structure					·
- Fill CY 0 \$22.00 \$0.00 - Suppl. Clearing and Grub AC 0 \$300.00 \$0.00 - Seeding SY 2402 \$2.88 \$6,917.76 Seeding around trench conduit runs, pull box, clear/grub area, and foundation areas. SUBTOTAL \$6,917.76 Guardrail LF 0 \$20.00 \$0.00 - Guardrail Approach End Treatment EA 0 \$1,725.00 \$0.00 Drainage	- Retaining Wall	SF	0	\$85.00	\$0.00	
- Suppl. Clearing and Grub	- Excavation	CY	0	\$25.00	\$0.00	
- Seeding SY 2402 \$2.88 \$6,917.76 Seeding around trench conduit runs, pull box, clear/grub area, and foundation areas. SUBTOTAL \$6,917.76 Guardrail - Guardrail Rail			0	\$22.00	\$0.00	
A	- Suppl. Clearing and Grub		0	\$300.00	\$ 0.00	
Guardrail	- Seeding	SY	2402	\$2.88	\$6,917.76	around trench, conduit runs, pull box, clear/grub area, and foundation
Guardrail	SU	втота	L		\$6.917.76	
- Guardrail Rail					¥ 0,0 11 11 0	
Guardrail Approach End Treatment	Guardrail					
SUBTOTAL \$0.00	- Guardrail Rail	LF	0	\$20.00	\$0.00	
Drainage LF 0 \$60.00 \$0.00 Extend existing SUBTOTAL \$0.00 Signalization - 6x6' loops - Mainline EA 8 \$453.68 \$3,629.40 Mainline detection two loops per lane - 6x6' loops - Ramp EA 5 \$453.68 \$2,268.38 One queue, three passage and one		EA	0	\$1,725.00	\$0.00	
- Pipe LF 0 \$60.00 \$0.00 Extend existing SUBTOTAL \$0.00 Signalization - 6x6' loops - Mainline EA 8 \$453.68 \$3,629.40 Mainline detection two loops per lane - 6x6' loops - Ramp EA 5 \$453.68 \$2,268.38 One queue, three passage and one	SUI	BTOTA	L		\$0.00	
- Pipe LF 0 \$60.00 \$0.00 Extend existing SUBTOTAL \$0.00 Signalization - 6x6' loops - Mainline EA 8 \$453.68 \$3,629.40 Mainline detection two loops per lane - 6x6' loops - Ramp EA 5 \$453.68 \$2,268.38 One queue, three passage and one		•				
SUBTOTAL \$0.00 Signalization - 6x6' loops - Mainline - 6x6' loops - Ramp EA 5 \$453.68 \$2,268.38 One queue, three passage and one	<u> </u>					
Signalization - 6x6' loops - Mainline	- Pipe	LF	0	\$60.00	\$0.00	
- 6x6' loops - Mainline - 6x6' loops - Mainline - 6x6' loops - Ramp EA 8 \$453.68 \$3,629.40 Mainline detection two loops per lane Considerable of the passage and one Substituting the passage and one	SUI	BTOTA	L		\$0.00	
- 6x6' loops - Mainline - 6x6' loops - Mainline - 6x6' loops - Ramp EA 8 \$453.68 \$3,629.40 Mainline detection two loops per lane Considerable of the passage and one Substituting the passage and one						
detection two loops per lane - 6x6' loops - Ramp EA 5 \$453.68 \$2,268.38 One queue, three passage and one						
three passage and one	- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	
	. ,					One queue, three passage
- Detector Lead-in Cable EA 1200 \$1.73 \$2,070.00 Assumed setback distance 350'	- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	setback
- Pullbox (Std.) EA 14 \$345.00 \$4,830.00	- Pullbox (Std.)	EA	14	\$345.00	\$4,830.00	

Log No.: 37 **Ramp**: Beatty Dr / Park St

0-1					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Trenched)	LF	3500	\$6.90	\$24,150.00	All purposes
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	2000	\$5.75	\$11,500.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	TOTA	Ĺ		\$111,699.15	
					_
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splic e Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height

Log No.: 37 **Ramp**: Beatty Dr / Park St

Cotomorios							
Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
- CCTV Cabinet (Pole	EA	1	\$3,300.00	\$3,300.00			
Mount, Type 336)	LA	'	φ3,300.00	φ3,300.00			
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00			
	BTOTA		\$4,000.00	\$17,547.50			
305	\$17,347.30						
Pavement Marking							
- Pavement Marking	LF	1000	\$0.71	\$713.00	40 MPH		
Removal			*	*	design speed.		
					110'		
					transitions,		
					100' narrowed		
					lane		
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	2		
- White Edge Line	LF	500	\$1.09	\$546.25	110'		
					transitions,		
					100' narrowed		
					lane		
- Yellow Edge Line	LF	500	\$1.09	\$546.25	110'		
					transitions,		
					100' narrowed		
					lane		
- White Skip Line	LF	0	\$0.28	\$0.00			
- 24" Stop Bar	LF	16	\$8.05	\$128.80			
SUE	\$1,934.30						
Signing							
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post		
					only		
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post		
When Flashing					only		
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal		
Here on Red					mounted		
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal		
Green					mounted		
SUE	SUBTOTAL \$3,392.50						
OUDTOTAL CONCERNIC	1						
SUBTOTAL CONSTRUCTIO	N			\$141,491.21	4		
Traffic Control	15%			\$21,223.68	-		
Contingencies	10%			\$14,149.12	-		
TOTAL CONSTRUCTION	-						
TOTAL CONSTRUCTION				\$176,864.01	-		

Log No.: 37 **Ramp**: Beatty Dr / Park St

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
Design	8%			\$14,149.12		
Construction Administration	10%			\$17,686.40		
TOTAL DESIGN AND CONS	\$208,699.53					

A.1.1.2. Iredell County



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

148

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 148 Ramp: Langtree Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2019	\$2.88	\$5,814.72	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	BTOTAL	•		\$5,814.72	
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End	EA	0	\$1,725.00	\$0.00	
Treatment					
SUE	BTOTAL	•		\$0.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	BTOTAL			\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	2950	\$6.90	\$20,355.00	All purposes

Log No.: 148 Ramp: Langtree Rd

Categories						
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
- Conduit (Directional	LF	1620	\$16.10	\$26,082.00	Five ramp	
Drilled)					crossings,	
					multiple conduits	
- Electrical Service	EA	1	\$1,500.00	\$1,500.00		
- Electrical Conductors	LF	2000	\$5.75	\$11,500.00		
- Ground Rods	EA	6	\$82.00	\$492.00		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00		
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00		
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00		
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00		
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole	
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole	
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal	
- Signal Cable	LF	630	\$3.16	\$1,992.38		
SUB	TOTAL			\$104,709.45		
Communications						
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO	
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures	
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet	
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet	
- Tracer Wire	LF	0	\$14.00	\$0.00		
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00		
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00		
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height	
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00		
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00		
SUB	TOTAL			\$17,547.50		

Log No.: 148 Ramp: Langtree Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Marking					
- Pavement Marking Removal	LF	1000	\$0.71	\$713.00	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL	ı		\$1,934.30	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUBTOTAL				\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$133,398.47	
Traffic Control	15%			\$20,009.77	
Contingencies	10%			\$13,339.85	7
TOTAL CONSTRUCTION	\$166,748.09				
Design	8%			\$13,339.85	
Construction Administration	10%			\$16,674.81	
			1		
TOTAL DESIGN AND CONS	TRUCT	ION		\$196,762.74	



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

149

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 149 **Ramp:** Langtree Rd

Location:	I-77 Northbound						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
Earthwork and Structure							
- Retaining Wall	SF	0	\$85.00	\$0.00			
- Excavation	CY	0	\$25.00	\$0.00			
- Fill	CY	0	\$22.00	\$0.00			
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00			
- Seeding	SY	2952	\$2.88	\$8,501.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.		
SUB	TOTAL			\$8,501.76			
Guardrail							
- Guardrail Rail	LF	0	\$20.00	\$0.00			
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00			
SUB	TOTAL			\$0.00			
Drainage							
- Pipe	LF	0	\$60.00	\$0.00	Extend existing		
SUB	TOTAL			\$0.00	_		
Signalization							
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane		
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance		
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'		
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00			
- Conduit (Trenched)	LF	4350	\$6.90	\$30,015.00	All purposes		
- Conduit (Directional Drilled)	LF	1120	\$16.10	\$18,032.00	Five ramp crossings, multiple conduits		
- Electrical Service	EA	1	\$1,500.00	\$1,500.00			

Log No.: 149 Ramp: Langtree Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	4800	\$5.75	\$27,600.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and	EA	1	\$16,100.00	\$16,100.00	
Cabinet					
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL			\$122,419.45	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL	_		\$17,547.50	
	T	T	 		
Pavement Marking		0000	00.74	M4.400.00	40 MPH 1
- Pavement Marking Removal	LF	2000	\$0.71	\$1,426.00	40 MPH design speed. 110' transitions, 100' narrowed lane

Log No.: 149 Ramp: Langtree Rd

		ortribourid			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	1000	\$1.09	\$1,092.50	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	1000	\$1.09	\$1,092.50	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL			\$3,739.80	
Ci ami in an	ı	1			1
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUB	TOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTIO	N			\$155,601.01	
				+ 100,001101	7
Traffic Control	15%			\$23,340.15	
Contingencies	10%			\$15,560.10	7
TOTAL CONSTRUCTION		\$194,501.26			
Docian	8%			\$15,560.10	4
Design Construction Administration	10%			\$19,450.13	-
Construction Administration	10%			φ19, 4 50.13	-
TOTAL DESIGN AND CONS	\$229,511.49				



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

150

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 150 **Ramp:** Williamson Rd / US 21 / Charlotte

Hwy

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions	Offic	Quantity	Offic Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1860	\$2.88	\$5,356.80	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	BTOTAL	i		\$5,356.80	
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUE	BTOTAL	ı		\$0.00	
		T	<u> </u>		
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	BTOTAL	ı		\$0.00	
	•				
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	2700	\$6.90	\$18,630.00	All purposes
- Conduit (Directional Drilled)	LF	1370	\$16.10	\$22,057.00	Five ramp crossings, multiple conduits

Log No.: 150 **Ramp:** Williamson Rd / US 21 / Charlotte

Hwy

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL			\$97,681.80	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL			\$17,547.50	
	T	Γ	,		
Pavement Marking					

Log No.: 150 **Ramp:** Williamson Rd / US 21 / Charlotte

Hwy

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Pavement Marking	LF	750	\$0.71	\$534.75	40 MPH design
Removal					speed. 110'
					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
			4		lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
100			*		lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL	•		\$1,482.93	
0:	1	I		T T	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post
When Flashing					only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUB	TOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$125,461.53	
Traffic Control	15%			\$18,819.23	
Contingencies	10%			\$12,546.15	
TOTAL CONSTRUCTION				\$156,826.91	
Design	8%			\$12,546.15	-
Construction Administration	10%			\$15,682.69	
TOTAL DESIGN AND CONS	TRUCT	TON		\$185,055.75	\dashv



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

153

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 153 **Ramp:** SR 1100 - Brawley School Road

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1886	\$2.88	\$5,431.68	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUB	TOTAL	ı		\$5,431.68	
					<u> </u>
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUB	TOTAL	ı		\$0.00	
	T	1			
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUB	TOTAL	1		\$0.00	
6: 1: 4:		T			T
Signalization		_	* 4 = 0 00		
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	2750	\$6.90	\$18,975.00	All purposes
- Conduit (Directional Drilled)	LF	1420	\$16.10	\$22,862.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 153 **Ramp:** SR 1100 - Brawley School Road

Cotomorios					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	1600	\$5.75	\$9,200.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and	EA	1	\$16,100.00	\$16,100.00	
Cabinet					
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
 45' Mast Arm Poles and Foundation 	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL			\$97,809.45	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL			\$17,547.50	
	1	T			
Pavement Marking	_				
- Pavement Marking Removal	LF	800	\$0.71	\$570.40	40 MPH design speed. 110'

Log No.: 153 **Ramp:** SR 1100 - Brawley School Road

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	400	\$1.09	\$437.00	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	400	\$1.09	\$437.00	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL			\$1,573.20	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUB	TOTAL	•		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$125,754.33	
Traffic Control	15%			\$18,863.15	
Contingencies	10%			\$12,575.43	
TOTAL CONSTRUCTION		\$157,192.91			
Design	8%			\$12,575.43	-
Construction Administration	10%			\$15,719.29	
TOTAL DESIGN AND CONS	-				

A.1.1.3. Mecklenburg County



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

075

Typical Design and Construction Costs Single Lane Ramp Meter

Mallard Creek Church Rd

Log No.: 075 **Ramp:** (Mecklenburg Co.)

Location: I-85 Northbound

Location:	1-85 NORINDOUNG						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
Earthwork and Struct	ure						
- Retaining Wall	SF	0	\$85.00	\$0.00			
- Excavation	CY	0	\$25.00	\$0.00			
- Fill	CY	0	\$22.00	\$0.00			
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00			
- Seeding	SY	1750	\$2.88	\$5,040.00	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.		
S	UBTOT	AL		\$5,040.00			
Guardrail							
- Guardrail Rail	LF	350	\$20.00	\$7,000.00			
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00			
S	UBTOT	AL		\$8,725.00			
Drainage							
- Pipe	LF	0	\$60.00	\$0.00	Extend existing		
S	UBTOT	AL		\$0.00			
Signalization							
- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	Mainline detection two loops per lane		
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance		
- Detector Lead-in Cable	EA	900	\$1.73	\$1,552.50	Assumed setback distance 350'		
- Pullbox (Std.)	EA	14	\$345.00	\$4,830.00			
- Conduit (Trenched)	LF	2850	\$6.90	\$19,665.00	All purposes		

Mallard Creek Church Rd

Log No.: 075 **Ramp:** (Mecklenburg Co.)

Location: I-85 Northbound

Location.	1-00 Northbourid						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
- Conduit (Directional Drilled)	LF	1810	\$16.10	\$29,141.00	Five ramp crossings, multiple conduits		
- Electrical Service	EA	1	\$1,500.00	\$1,500.00			
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00			
- Ground Rods	EA	8	\$82.00	\$656.00			
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00			
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00			
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00			
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00			
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole		
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole		
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal		
- Signal Cable	LF	590	\$3.16	\$1,865.88			
S	UBTOT	AL		\$106,918.15			
Communications							
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO		
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures		
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet		
- Fiber-optic Drop Cable (six strands)	LF	500	\$1.73	\$862.50	Drop cable to controller cabinet		
- Tracer Wire	LF	500	\$14.00	\$7,000.00			
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00			
- Ethernet Switch	EA	0	\$1,955.00	\$0.00			
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height		
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00			

Mallard Creek Church Rd

Log No.: Location: Ramp: (Mecklenburg Co.) 075

I-85 Northbound

Location:	1-05 14	ortribouria			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SI	UBTOT	AL		\$25,250.00	
Pavement Marking					
- Pavement Marking Removal	LF	900	\$0.71	\$641.70	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	425	\$1.09	\$464.31	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	425	\$1.09	\$464.31	110' transitions, 100' narrowed lane
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
	UBTOT	AL		\$1,699.13	
				•	•
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SI	UBTOT	AL		\$3,392.50	
SUBTOTAL CONSTRU	<u> </u>			\$151,024.78	
			T		_
Traffic Control			15%	\$22,653.72	_
Contingencies			10%	\$15,102.48	_
TOTAL CONSTRUCTION	ON			\$188,780.97	_
			T	A 1 B 1 C 2 C 2	_
Design			8%	\$15,102.48	_
Construction Administration			10%	\$18,878.10	

Mallard Creek Church Rd

Log No.: 075 **Ramp:** (Mecklenburg Co.)

Location: I-85 Northbound

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
TOTAL DESIGN AND	CONST	RUCTION		\$222,761.54	



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

099

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 99 **Ramp**: Arrowood Rd

Location.	ation. 1-77 Southbound					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
Earthwork and Structure						
- Retaining Wall	SF	0	\$85.00	\$0.00		
- Excavation	CY	0	\$25.00	\$0.00		
- Fill	CY	0	\$22.00	\$0.00		
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00		
- Seeding	SY	2019	\$2.88	\$5,814.72	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.	
SU	BTOTAL	_		\$5,814.72		
Guardrail						
- Guardrail Rail	LF	300	\$20.00	\$6,000.00		
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00		
SU	BTOTAL	-		\$7,725.00		
Drainage						
- Pipe	LF	0	\$60.00	\$0.00	Extend existing	
SU	BTOTAL	-		\$0.00		
		1			1	
Signalization						
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane	
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance	
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'	
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00		
- Conduit (Trenched)	LF	2950	\$6.90	\$20,355.00	All purposes	

Log No.: 99 **Ramp**: Arrowood Rd

Location: 1-77 Southbound						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
- Conduit (Directional Drilled)	LF	2120	\$16.10	\$34,132.00	Five ramp crossings, multiple conduits	
- Electrical Service	EA	1	\$1,500.00	\$1,500.00		
- Electrical Conductors	LF	2000	\$5.75	\$11,500.00		
- Ground Rods	EA	6	\$82.00	\$492.00		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00		
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00		
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00		
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00		
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole	
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole	
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal	
- Signal Cable	LF	630	\$3.16	\$1,992.38		
SUE	TOTAL	•		\$112,759.45		
Communications						
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO	
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures	
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet	
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet	
- Tracer Wire	LF	0	\$14.00	\$0.00		
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00		
- Ethernet Switch	EA	0	\$1,955.00	\$0.00		
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height	
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00		
- CCTV Assembly	EA	0	\$4,600.00	\$0.00		

Log No.: 99 **Ramp**: Arrowood Rd

Location: I-77 Southbound

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions			
SUB	\$0.00							
Pavement Marking								
- Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110' transitions, 100' narrowed lane			
- Raised Pavement Markers	EA	0	\$5.18	\$0.00				
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane			
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane			
- White Skip Line	LF	0	\$0.28	\$0.00				
- 24" Stop Bar	LF	16	\$8.05	\$128.80				
SUE	TOTAL	•		\$1,482.93				
Signing								
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only			
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only			
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted			
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted			
SUE	TOTAL	•		\$3,392.50				
SUBTOTAL CONSTRUCTIO	N			\$131,174.60				
Traffic Control	15%			\$19,676.19				
Contingencies	10%			\$13,117.46				
TOTAL CONSTRUCTION				\$163,968.24				
D	00/			040.447.40	_			
Design	8%			\$13,117.46	_			
Construction Administration	10%			\$16,396.82	_			
TOTAL DESIGN AND CONS	TOTAL DESIGN AND CONSTRUCTION \$193,482.53							



NCDOT Ramp Metering Feasibility Study

Individual Site Cost Estimate

101

Log No.: 101 **Ramp**: Arrowood Rd (Mecklenburg Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2077	\$2.88	\$5,981.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	BTOTAL	-		\$5,981.76	
Guardrail					
- Guardrail Rail	LF	350	\$20.00	\$7,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SUE	TOTAL	-		\$8,725.00	
					,
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	TOTAL	-		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	3025	\$6.90	\$20,872.50	All purposes
- Conduit (Directional Drilled)	LF	1320	\$16.10	\$21,252.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	3000	\$5.75	\$17,250.00	
- Ground Rods	EA	6	\$82.00	\$492.00	

Log No.: 101 **Ramp**: Arrowood Rd (Mecklenburg Co.)

Catamaniaa					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	Ŀ	630	\$3.16	\$1,992.38	
SUE	TOTAL	•		\$107,140.55	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE	TOTAL	•		\$15,535.00	
			Ţ Ţ		1
Pavement Marking		4=	40 = :		40.14517
- Pavement Marking Removal	LF	1500	\$0.71	\$1,069.50	40 MPH design speed. 110' transitions, 100' narrowed lane

Log No.: 101 **Ramp**: Arrowood Rd (Mecklenburg Co.)

Location: I-77 Northbound

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	750	\$1.09	\$819.38	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	750	\$1.09	\$819.38	110' transitions, 100' narrowed lane
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	TOTAL	_		\$2,837.05	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	TOTAL	-		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$143,611.86	
Traffic Control	15%			\$21,541.78	
Contingencies	10%			\$14,361.19	
TOTAL CONSTRUCTION		\$179,514.83			
	1				
Design	8%			\$14,361.19	
Construction Administration	10%			\$17,951.48	_
TOTAL DESIGN AND CONS	TRUCT	ION		\$211,827.49	



NCDOT Ramp Metering Feasibility Study
Individual Site Cost Estimate

102

Log No.: 102 **Ramp**: Nations Ford Rd (Mecklenburg Co.)

Cotogorios					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2077	\$2.88	\$5,981.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SU	BTOTAL	•		\$5,981.76	
	1	T			
Guardrail	 		***		
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SU	BTOTAL	-		\$0.00	
	1	T			
Drainage	 				<u> </u>
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL	-		\$0.00	
O' and a line of a se	1	1			
Signalization			#450.00	ФО 700 OF	NA - i - li
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	3025	\$6.90	\$20,872.50	All purposes
- Conduit (Directional Drilled)	LF	1020	\$16.10	\$16,422.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	

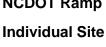
Log No.: 102 **Ramp**: Nations Ford Rd (Mecklenburg Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL	-		\$93,685.55	
			·		•
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00	
- CCTV Assembly	EA	0	\$4,600.00	\$0.00	
SUB	TOTAL	-		\$0.00	
Devement Meulding			<u> </u>		
Pavement Marking Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110'

Nations Ford Rd (Mecklenburg Co.) Log No.: 102 Ramp:

Location: I-77 Southbound

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
					transitions, 100'
D: 15 (M)	- A		Φ5.40	# 0.00	narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	4.4.01.4
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
Valle Edward		075	# 4.00	# 400.00	lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
- 24" Stop Bar	LF	16	\$8.05	\$128.80	lane
•	TOTAL		φο.υο	\$1,482.93	
306	IOIAL	•		Φ1,402.93	
Cianina					
Signing	- •		A7.17.5 0	04.405.00	0
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	only Sign and post
When Flashing	LA	2	\$747.50	\$1,495.00	only
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal
Here on Red		-	4 _00	* ====================================	mounted
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal
Green			,	* -	mounted
SUB	TOTAL			\$3,392.50	
					T
SUBTOTAL CONSTRUCTIO	N			\$104,542.74	_
Traffic Control	15%			\$15,681.41	-
Contingencies	10%			\$10,454.27	1
TOTAL CONSTRUCTION		\$130,678.42			
Danima	00/			¢40.454.07	
Design	8%			\$10,454.27	-
Construction Administration	10%			\$13,067.84	_
TOTAL DESIGN AND CONS	-				



NCDOT Ramp Metering Feasibility Study

Individual Site Cost Estimate

Nations Ford Rd (Mecklenburg

Log No.: 103 **Ramp:** Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structu	ıre				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1250	\$2.88	\$3,600.00	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
S	UBTOT	「AL		\$3,600.00	
	T	T		I	1
Guardrail	. –	500	#00.00	# 40,000,00	
- Guardrail Rail	LF	500	\$20.00	\$10,000.00	
- Guardrail Approach End Treatment	EA	2	\$1,725.00	\$3,450.00	
S	UBTOT	TAL		\$13,450.00	
	T				T
Drainage			400.00	*	
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
5	UBTOT	AL		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	2225	\$6.90	\$15,352.50	All purposes
- Conduit (Directional Drilled)	LF	1020	\$16.10	\$16,422.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Nations Ford Rd (Mecklenburg

Log No.: 103 **Ramp:** Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical		4000	ΦE 7E	#C 000 00	
Conductors	LF	1200	\$5.75	\$6,900.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E					
Controller and	EA	1	\$16,100.00	\$16,100.00	
Cabinet	- A	4	#0.005.00	#0.005.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$517.50	\$517.50	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$1,400.00	\$2,800.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
	UBTOT	AL		\$80,918.05	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	350	\$1.73	\$603.75	Drop cable to controller cabinet
- Tracer Wire	LF	350	\$14.00	\$4,900.00	
- Broadband Internet	LS	0	\$1,080.00	\$0.00	
Service					
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	AEL NA C
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
S	UBTOT	AL		\$22,891.25	
Pavement Marking					

Nations Ford Rd (Mecklenburg

Log No.: 103 **Ramp:** Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
- Pavement Marking Removal	LF	600	\$0.71	\$427.80	40 MPH design speed. 110' transitions, 100' narrowed lane	
- Raised Pavement Markers	EA	0	\$5.18	\$0.00		
- White Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane	
- Yellow Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane	
- 24" Stop Bar	LF	12	\$8.05	\$96.60		
S	UBTOT	AL		\$1,179.90		
Signing						
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only	
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only	
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted	
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted	
S	UBTOT	AL		\$3,392.50		
SUBTOTAL CONSTRU	ICTION			\$125,431.70	1	
SOBIOTAL CONSTRU	, C 11014			ψ123, 4 31.70	-	
Traffic Control			15%	\$18,814.76	1	
Contingencies			10%	\$12,543.17	1	
TOTAL CONSTRUCTION	OTAL CONSTRUCTION \$1					
	T					
Design			8%	\$12,543.17	-	
Construction			400/	015 670 00		
Administration			10%	\$15,678.96	-	
TOTAL DESIGN AND	CONST	RUCTION		\$185,011.76		



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

104

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 104 **Ramp:** Tyvola Road

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Struct	ure				•
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2510	\$2.88	\$7,228.80	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
S	UBTO	ΓAL		\$7,228.80	
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
	UBTO	ΓAL		\$0.00	
				-	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
S	UBTO	ΓAL		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	3675	\$6.90	\$25,357.50	All purposes

Log No.: 104 **Ramp:** Tyvola Road

Categories	Unit	Quantity	Unit Cost	Total Cost	Accumptions
Descriptions	Onit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Directional Drilled)	LF	2670	\$16.10	\$42,987.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	3000	\$5.75	\$17,250.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
S	UBTO1	ΓAL		\$133,075.93	
	ı	T			T
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	750	\$1.73	\$1,293.75	Drop cable to controller cabinet
- Tracer Wire	LF	750	\$14.00	\$10,500.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	

Log No.: 104 **Ramp:** Tyvola Road

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
S	UBTO	ΓAL		\$29,181.25	
		,			1
Pavement Marking					40 MDH da sisus
- Pavement Marking Removal	LF	1500	\$0.71	\$1,069.50	40 MPH design speed. 110' transitions, 100' narrowed lane
 Raised Pavement Markers 	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	750	\$1.09	\$819.38	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	750	\$1.09	\$819.38	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
S	UBTO1	ΓAL		\$2,837.05	
		T			1
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
S	UBTO1	ΓAL		\$3,392.50	
SUBTOTA	L CON	STRUCTIO	N	\$175,715.53	_
T. (". O)			450/	# 00.057.00	_
Traffic Control			15%	\$26,357.33	4
Contingencies			10%	\$17,571.55	-
TOTAL CONSTRUCTION	ON	\$219,644.41	_		
Design			-		
Construction				\$17,571.55	
Administration			10%	\$21,964.44	

Log No.: 104 **Ramp:** Tyvola Road

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
TOTAL DESIGN AND	CONST	RUCTION		\$259,180.40	



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

105

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 105 **Ramp**: Tyvola Rd (Mecklenburg Co.)

Location:	1-77110	rthbound			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1877	\$2.88	\$5,405.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SU	BTOTAL	_		\$5,405.76	
			T		1
Guardrail					
- Guardrail Rail	LF	350	\$20.00	\$7,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SU	BTOTAL	-		\$8,725.00	
			T		1
Drainage		_			<u> </u>
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL	_		\$0.00	
O'con a l'anation			T	T	1
Signalization	-		\$450.00	* 0.700.05	NA similing
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	2725	\$6.90	\$18,802.50	All purposes
- Conduit (Directional Drilled)	LF	1020	\$16.10	\$16,422.00	Five ramp crossings,

Log No.: 105 **Ramp**: Tyvola Rd (Mecklenburg Co.)

Location:	1-77 INC	ortnbound			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
·					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	2400	\$5.75	\$13,800.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTAL	-		\$96,790.55	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00	
- CCTV Assembly	EA	0	\$4,600.00	\$0.00	
SUE	BTOTAL	<u>-</u>		\$0.00	<u> </u>
Pavement Marking					

Log No.: 105 **Ramp**: Tyvola Rd (Mecklenburg Co.)

Location.	1 7 7 1 40	ntiibouria			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	15	\$5.18	\$77.63	
- White Edge Line	LF	2400	\$1.09	\$2,622.00	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	2400	\$1.09	\$2,622.00	110' transitions, 100' narrowed lane
- White Skip Line	LF	1200	\$0.28	\$331.20	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	TOTAL	_		\$6,316.38	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	STOTAL	-		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$120,630.19	
Traffic Control	15%			\$18,094.53	_
Contingencies	10%			\$12,063.02	+
TOTAL CONSTRUCTION	\$150,787.73	1			
Design	8%			\$12,063.02	
Construction Administration	10%			\$15,078.77	
TOTAL DESIGN AND CONS	-				



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

109

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 109 **Ramp**: Clanton Rd

Location:	1-77 3	buthbound			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2027	\$2.88	\$5,837.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SU	BTOTAL	-		\$5,837.76	
	T	1			
Guardrail					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SU	BTOTAL	-		\$7,725.00	
		T			
Drainage	-		400.00		<u> </u>
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL	-		\$0.00	
O'con a l'acation	1	T			1
Signalization			# 450.00	#0.700.05	N.4 - 1 - 12
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	2950	\$6.90	\$20,355.00	All purposes
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings,

Log No.: 109 **Ramp**: Clanton Rd

Location:	Location: I-77 Southbound						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
					multiple conduits		
- Electrical Service	EA	1	\$1,500.00	\$1,500.00			
- Electrical Conductors	LF	1200	\$5.75	\$6,900.00			
- Ground Rods	EA	6	\$82.00	\$492.00			
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00			
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00			
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00			
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00			
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole		
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole		
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal		
- Signal Cable	LF	630	\$3.16	\$1,992.38			
SUE	TOTAL	-		\$101,706.80			
		T			_		
Communications							
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO		
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures		
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet		
- Fiber-optic Drop Cable (six strands)	LF	250	\$1.73	\$431.25	Drop cable to controller cabinet		
- Tracer Wire	LF	250	\$14.00	\$3,500.00			
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00			
- Ethernet Switch	EA	0	\$1,955.00	\$0.00			
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height		
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00			
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00			
SUE	TOTAL	-		\$21,318.75			

Log No.: 109 **Ramp**: Clanton Rd

Ostomonica					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Marking					
- Pavement Marking Removal	LF	600	\$0.71	\$427.80	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	TOTAL	-		\$1,212.10	
				<u> </u>	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	TOTAL	-		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$141,192.91	
Traffic Control	15%			\$21,178.94	
Contingencies	10%			\$14,119.29	
TOTAL CONSTRUCTION	\$176,491.14				
Design	8%			\$14,119.29	-
Construction Administration	10%			\$17,649.11	-
Construction Auministration	10/0			ψ11,049.11	-
TOTAL DESIGN AND CONS					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

111

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 111 **Ramp**: Remount Rd (Mecklenburg Co.)

Location:	1-77 50	outhbound			_
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure		l			
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2177	\$2.88	\$6,269.76	Seeding around trench, conduit runs, pull box,
					clear/grub area, and foundation areas.
SU	BTOTAL	-		\$6,269.76	
		T	<u> </u>		T
Guardrail	 		**		
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SU	BTOTAL	-		\$0.00	
	Т	T	ı		T
Drainage			*		
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL	•		\$0.00	
0: 1: 4:	T	T	Г		T
Signalization	- A		# 450.00	#0.700.05	NA - ' - I'
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	3175	\$6.90	\$21,907.50	All purposes
- Conduit (Directional Drilled)	LF	820	\$16.10	\$13,202.00	Five ramp crossings,

Log No.: 111 Ramp: Remount Rd (Mecklenburg Co.)

Location: I-77 Southbound							
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
					multiple conduits		
- Electrical Service	EA	1	\$1,500.00	\$1,500.00			
- Electrical Conductors	LF	2400	\$5.75	\$13,800.00			
- Ground Rods	EA	6	\$82.00	\$492.00			
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00			
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00			
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00			
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00			
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole		
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole		
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal		
- Signal Cable	LF	630	\$3.16	\$1,992.38			
SUB	TOTAL	-		\$96,675.55			
Communications							
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO		
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures		
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet		
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet		
- Tracer Wire	LF	0	\$14.00	\$0.00			
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00			
- Ethernet Switch	EA	0	\$1,955.00	\$0.00			
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height		
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00			
- CCTV Assembly	EA	0	\$4,600.00	\$0.00			
SUE	TOTAL	-		\$0.00			
			, ,		1		
Pavement Marking							

Log No.:111Ramp:Remount Rd (Mecklenburg Co.)Location:I-77 Southbound

	Location: 1-77 Southbound						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
- Pavement Marking	LF	500	\$0.71	\$356.50	40 MPH design		
Removal					speed. 110'		
					transitions, 100'		
					narrowed lane		
- Raised Pavement Markers	EA	0	\$5.18	\$0.00			
- White Edge Line	LF	250	\$1.09	\$273.13	110' transitions,		
					100' narrowed		
					lane		
- Yellow Edge Line	LF	250	\$1.09	\$273.13	110' transitions,		
					100' narrowed		
					lane		
- White Skip Line	LF	0	\$0.28	\$0.00			
- 24" Stop Bar	LF	16	\$8.05	\$128.80			
SUE	BTOTAL	-		\$1,031.55			
	ı	1	1	T	1		
Signing							
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post		
					only		
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post		
When Flashing					only		
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal		
Here on Red					mounted		
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal		
Green					mounted		
SUE	BTOTAL	•		\$3,392.50			
SUBTOTAL CONSTRUCTION	NI.			\$107,369.36			
GODIOTAL CONSTRUCTIO	· 1 ¶			φ107,303.30	-		
Traffic Control	15%			\$16,105.40			
Contingencies	10%			\$10,736.94]		
TOTAL CONSTRUCTION				\$134,211.70			
Design	00/			#40 700 04	4		
Design Construction Administration	8%			\$10,736.94	-		
Construction Administration	10%			\$13,421.17	-		
TOTAL DESIGN AND CONS	-						



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

117

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 117 Ramp: West Trade St (Loop)

177 Galilla Galilla						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
Earthwork and Structure	•					
- Retaining Wall	SF	0	\$85.00	\$0.00		
- Excavation	CY	0	\$25.00	\$0.00		
- Fill	CY	0	\$22.00	\$0.00		
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00		
- Seeding	SY	2502	\$2.88	\$7,205.76	Seeding around	
					trench, conduit	
					runs, pull box, clear/grub area,	
					and foundation	
					areas.	
SUI	BTOTAL			\$7,205.76	arcas.	
	3101AL	-		ψ1,200.10		
Guardrail						
- Guardrail Rail	LF	0	\$20.00	\$0.00		
- Guardrail Approach End	EA	0	\$1,725.00	\$0.00		
Treatment						
SUI	STOTAL	-		\$0.00		
Drainage						
- Pipe	LF	0	\$60.00	\$0.00	Extend existing	
SUI	BTOTAL	-		\$0.00		
	1	ı				
Signalization			* 150 00	<u> </u>		
- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	Mainline	
					detection two	
0.011		_	# 450.00	#0.000.00	loops per lane	
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue,	
					three passage	
					and one	
Detector Load in Cable	F.	4000	64.70	#0.070.00	clearance	
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback	
- Pullbox (Std.)	EA	14	\$345.00	\$4,830.00	distance 350'	
- Conduit (Trenched)	LF		*	\$25,185.00	All purposes	
		3650	\$6.90 \$16.10		All purposes	
- Conduit (Directional Drilled)	LF	2320	\$16.10	\$37,352.00	Five ramp crossings,	
Dillieu)	<u> </u>				crossings,	

Log No.: 117 **Ramp**: West Trade St (Loop)

Location: 1-77 Southbound						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
					multiple conduits	
- Electrical Service	EA	1	\$1,500.00	\$1,500.00		
- Electrical Conductors	LF	2400	\$5.75	\$13,800.00		
- Ground Rods	EA	6	\$82.00	\$492.00		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00		
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00		
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00		
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00		
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole	
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole	
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal	
- Signal Cable	LF	630	\$3.16	\$1,992.38		
SUE	TOTAL	-		\$126,304.15		
		T	,			
Communications						
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO	
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures	
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet	
- Fiber-optic Drop Cable (six strands)	LF	500	\$1.73	\$862.50	Drop cable to controller cabinet	
- Tracer Wire	LF	500	\$14.00	\$7,000.00		
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00		
- Ethernet Switch	EA	0	\$1,955.00	\$0.00		
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height	
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00		
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00		
SUE	TOTAL	•		\$25,250.00		

Log No.: 117 **Ramp**: West Trade St (Loop)

Location: 1-77 Southbound						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
Pavement Marking						
- Pavement Marking Removal	LF	600	\$0.71	\$427.80	40 MPH design speed. 110' transitions, 100' narrowed lane	
- Raised Pavement Markers	EA	0	\$5.18	\$0.00		
- White Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane	
- Yellow Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane	
- White Skip Line	LF	0	\$0.28	\$0.00		
- 24" Stop Bar	LF	16	\$8.05	\$128.80		
SUE	BTOTAL	-		\$1,212.10		
Signing						
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only	
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only	
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted	
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted	
SUE	TOTAL	-		\$3,392.50		
SUBTOTAL CONSTRUCTION	N			\$163,364.51		
Traffic Control	15%			\$24,504.68	-	
Contingencies	10%			\$16,336.45	7	
TOTAL CONSTRUCTION		\$204,205.64	7			
Design	8%			\$16,336.45		
Construction Administration	10%			\$20,420.56	4	
TOTAL DESIGN AND CONS	TRUCT	ION		\$240,962.65		



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

140

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 140 **Ramp**: Gilead Street

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions	Offic	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2769	\$2.88	\$7,974.72	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUBTOTAL				\$7,974.72	
Guardrail					
- Guardrail Rail	LF	250	\$20.00	\$5,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SUBTOTAL	•		•	\$6,725.00	
				•	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUBTOTAL	•			\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	4075	\$6.90	\$28,117.50	All purposes
- Conduit (Directional Drilled)	LF	1420	\$16.10	\$22,862.00	Five ramp crossings, multiple conduits

Log No.: 140 **Ramp**: Gilead Street

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	2400	\$5.75	\$13,800.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and	EA	1	\$16,100.00	\$16,100.00	
Cabinet					
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each
					pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter
					advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUBTOTAL				\$111,551.95	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill
					on
					Mainline/Splice
					Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six	LF	500	\$1.73	\$862.50	Drop cable to
strands)			*	AT 000 00	controller cabinet
- Tracer Wire	LF	500	\$14.00	\$7,000.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole	EA	1	\$3,300.00	\$3,300.00	
Mount, Type 336)				<u> </u>	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUBTOTAL				\$23,237.50	
Pavement Marking	1		T		
- Pavement Marking	LF	500	\$0.71	\$356.50	40 MPH design
Removal	-	300	ΨΟ.7 Ι	ψοσο.σο	speed. 110'
Romovai	L	L	<u> </u>	1	Speca. 110

Log No.: 140 **Ramp**: Gilead Street

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
					transitions, 100' narrowed lane	
- Raised Pavement Markers	EA	0	\$5.18	\$0.00		
- White Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane	
- Yellow Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane	
- White Skip Line	LF	0	\$0.28	\$0.00		
- 24" Stop Bar	LF	16	\$8.05	\$128.80		
SUBTOTAL		•		\$1,031.55		
Signing						
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only	
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only	
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted	
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted	
SUBTOTAL			•	\$3,392.50		
OUDTOTAL CONSTRUCTION				A450.040.00		
SUBTOTAL CONSTRUCTION	N			\$153,913.22		
Traffic Control	15%			\$23,086.98	-	
Contingencies	10%			\$15,391.32		
TOTAL CONSTRUCTION	•			\$192,391.53		
Design	8%			\$15,391.32		
Construction Administration	10%			\$19,239.15		
TOTAL DESIGN AND CONS	TOTAL DESIGN AND CONSTRUCTION \$227,022.00					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

143

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 143 **Ramp:** NC 73 (Sam Furr Road)

Location.	. , , , , ,	ortinbourid			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					<u>.</u>
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2236	\$2.88	\$6,439.68	Seeding around
					trench, conduit
					runs, pull box,
					clear/grub area,
					and foundation
	TOTAL			* 0.400.00	areas.
SUL	BTOTAL	_		\$6,439.68	
0		1	1		
Guardrail		500	# 00.00	#40.000.00	
- Guardrail Rail	LF	500	\$20.00	\$10,000.00	
- Guardrail Approach End	EA	1	\$1,725.00	\$1,725.00	
Treatment	 BTOTAL			644 705 00	
501	SIUIAL	-		\$11,725.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
	BTOTAL		4 0 0 1 0 0	\$0.00	
				·	
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline
•				. ,	detection two
					loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue,
					three passage
					and one
					clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed
					setback distance
					350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	3275	\$6.90	\$22,597.50	All purposes
- Conduit (Directional	LF	1370	\$16.10	\$22,057.00	Five ramp
Drilled)					crossings,
					multiple conduits

Log No.: 143 **Ramp:** NC 73 (Sam Furr Road)

Location: 177 Nottribound						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
- Electrical Service	EA	1	\$1,500.00	\$1,500.00		
- Electrical Conductors	LF	2000	\$5.75	\$11,500.00		
- Ground Rods	EA	6	\$82.00	\$492.00		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00		
- Firmware/Calibration	EΑ	1	\$6,095.00	\$6,095.00		
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00		
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00		
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole	
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole	
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal	
- Signal Cable	LF	630	\$3.16	\$1,992.38		
SUB	TOTAL	-		\$102,926.95		
Communications						
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO	
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures	
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet	
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet	
- Tracer Wire	LF	0	\$14.00	\$0.00		
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00		
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00		
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height	
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00		
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00		
SUB	TOTAL	-		\$15,535.00		
Pavement Marking						
- Pavement Marking Removal	LF	500	\$0.71	\$356.50	40 MPH design speed. 110'	

Log No.: 143 **Ramp:** NC 73 (Sam Furr Road)

Location.		- IIIDOUIIU			1
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
-					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	STOTAL	-	·	\$1,031.55	
				. ,	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL	-		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$141,050.68	
				Ψ111,000100	
Traffic Control	15%			\$21,157.60	
Contingencies	10%			\$14,105.07	†
TOTAL CONSTRUCTION		\$176,313.35			
Design	8%			\$14,105.07	_
Construction Administration	10%			\$17,631.34	
	, -			, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1
TOTAL DESIGN AND CONS	TRUCT	TON		\$208,049.75	



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

145

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 145 Ramp: US 21 (Catawba Avenue)

Cotogorias					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structi	IΓΩ				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and	_				
Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1500	\$2.88	\$4,320.00	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
S	UBTOT	AL		\$4,320.00	
Guardrail					
- Guardrail Rail	LF	500	\$20.00	\$10,000.00	
- Guardrail Approach End Treatment	EA	2	\$1,725.00	\$3,450.00	
S	UBTOT	AL		\$13,450.00	
Drainage					
- Pipe	LF	50	\$60.00	\$3,000.00	Extend existing
S	UBTOT	AL		\$3,000.00	
	ı	1			
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	3900	\$6.90	\$26,910.00	All purposes

Log No.: 145 **Ramp:** US 21 (Catawba Avenue)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Directional Drilled)	LF	340	\$16.10	\$5,474.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	Triditiple coridates
- Electrical Conductors	LF	2000	\$5.75	\$11,500.00	
- Ground Rods	EA	4	\$82.00	\$328.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
S	UBTOT	AL		\$90,207.83	
		1			1
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00	

Log No.: 145 **Ramp:** US 21 (Catawba Avenue)

					1
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- CCTV Assembly	EA	0	\$4,600.00	\$0.00	
S	UBTOT	AL		\$0.00	
			T.		
Pavement Marking					
- Pavement Marking Removal	LF	500	\$0.71	\$356.50	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
S	UBTOT	AL		\$1,031.55	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
S	UBTOT	AL		\$3,392.50	
SUBTOTAL CONSTRU	ICTION			\$115,401.88	
Traffic Control			15%	\$17,310.28	_
Contingencies			10%	\$11,540.19	
TOTAL CONSTRUCTION				\$144,252.34	
Design			8%	\$11,540.19	
Construction					
Administration			10%	\$14,425.23	

Log No.: 145 **Ramp:** US 21 (Catawba Avenue)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
TOTAL DESIGN AND					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

146

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 146 **Ramp:** Goodrum Rd / Griffith St

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structu	ure				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2586	\$2.88	\$7,447.68	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
S	UBTOT	AL		\$7,447.68	
	T				
Guardrail					
- Guardrail Rail	LF	500	\$20.00	\$10,000.00	
- Guardrail Approach End Treatment	EA	2	\$1,725.00	\$3,450.00	
S	UBTOT	ÀL.		\$13,450.00	
	T	1			
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
S	UBTOT/	AL .		\$0.00	
	T	1			
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	3800	\$6.90	\$26,220.00	All purposes

Log No.: 146 Ramp: Goodrum Rd / Griffith St

Catagorias					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Directional Drilled)	LF	340	\$16.10	\$5,474.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1200	\$5.75	\$6,900.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
S	UBTOTA	AL		\$85,081.83	
	T	1			
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	

Log No.: 146 Ramp: Goodrum Rd / Griffith St

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
	UBTOTA	ÀL.		\$15,535.00	
Pavement Marking					
- Pavement Marking Removal	LF	500	\$0.71	\$356.50	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
S	UBTOT	AL		\$1,031.55	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
S	UBTOT	AL		\$3,392.50	
SUBTOTAL CONSTRU	ICTION			\$125,938.56	
T (1) 0			T	* * * * * * * * * * * * * * * * * * *	_
Traffic Control			15%	\$18,890.78	4
Contingencies			10%	\$12,593.86	-
TOTAL CONSTRUCTION	אכ			\$157,423.19	-
Design			8%	\$12,593.86	-
Construction			0 /0	Ψ12,000.00	-
Administration			10%	\$15,742.32	
TOTAL DESIGN AND	CONSTR	\$185,759.37	_		
. S . AL DEGIGIT AND					

168 Ramp Metering Feas I Implementation Plan			



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

147

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 147 **Ramp:** Goodrum Rd/Griffith St

Categories	11	0	Unit 0 and	T-1-1 01	A
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	1	\$300.00	\$ 300.00	
- Seeding	SY	6942	\$2.88	\$19,992.96	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	BTOTAL	-		\$20,292.96	
	1	1			1
Guardrail	<u> </u>		* • • • •	A - - · · · · ·	
- Guardrail Rail	LF	250	\$20.00	\$5,000.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUE	BTOTAL			\$5,000.00	
	,				
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	BTOTAL	-		\$0.00	
	1	1			
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	3075	\$6.90	\$21,217.50	All purposes

Log No.: 147 **Ramp:** Goodrum Rd/Griffith St

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Directional	LF	1270	\$16.10	\$20,447.00	Five ramp
Drilled)					crossings,
					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
 Pedestal Pole (Type III with Foundation) 	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL			\$97,061.95	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL	-		\$15,535.00	

Log No.: 147 **Ramp:** Goodrum Rd/Griffith St

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Marking					
- Pavement Marking Removal	LF	500	\$0.71	\$356.50	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	250	\$1.09	\$273.13	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	-		\$1,031.55	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL	-		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$142,313.96	
	1			<u> </u>	
Traffic Control	15%			\$21,347.09	
Contingencies	10%			\$14,231.40	
TOTAL CONSTRUCTION				\$177,892.45	-
Design	8%			\$14,231.40	
Construction Administration	10%			\$17,789.25	
TOTAL DESIGN AND CONS	TRUCT	TON		\$209,913.09	-



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

045

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 45 **Ramp**: Little Rock Rd (Mecklenburg Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1868	\$2.88	\$5,379.84	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	ЗТОТА	L		\$5,379.84	
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUE	STOTA	L		\$0.00	
			T		T
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	BTOTA	L		\$0.00	
			,		
Signalization					
- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	14	\$345.00	\$4,830.00	
					i

Log No.: 45 **Ramp**: Little Rock Rd (Mecklenburg Co.)

0-1					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Trenched)	LF	2700	\$6.90	\$18,630.00	All purposes
- Conduit (Directional Drilled)	LF	1370	\$16.10	\$22,057.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTA	L		\$99,279.15	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	500	\$1.73	\$862.50	Drop cable to controller cabinet
- Tracer Wire	LF	500	\$14.00	\$7,000.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	

Log No.: 45 **Ramp**: Little Rock Rd (Mecklenburg Co.)

Categories Unit Quantity Unit Cost Total Cost Assumptions	Cotogorico							
Pavement Marking	Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
Pavement Marking			<u> </u>	\$4,600.00				
Pavement Marking Removal Remov	SUE	\$25,250.00						
Pavement Marking Removal Remov		_						
Removal								
Raised Pavement Markers EA 0 \$5.18 \$0.00 \$1.09 \$409.69 \$110' transitions, 100' narrowed lane Yellow Edge Line LF 375 \$1.09 \$409.69 \$110' transitions, 100' narrowed lane Yellow Edge Line LF 375 \$1.09 \$409.69 \$110' transitions, 100' narrowed lane Yellow Edge Line LF 0 \$0.28 \$0.00 \$10' transitions, 100' narrowed lane Yellow Edge Line LF 16 \$8.05 \$128.80 \$138.478.44 \$138.		LF	750	\$0.71	\$534.75	_		
Raised Pavement Markers EA 0 \$5.18 \$0.00 - White Edge Line LF 375 \$1.09 \$409.69 110' transitions, 100' narrowed lane - Yellow Edge Line LF 375 \$1.09 \$409.69 110' transitions, 100' narrowed lane - Yellow Edge Line LF 0 \$0.28 \$0.00 - White Skip Line LF 0 \$8.05 \$128.80 - White Skip Line LF 16 \$8.05 \$128.80 - 24" Stop Bar LF 16 \$8.05 \$128.80 - W3-7, Ramp Meter Ahead EA 2 \$747.50 \$1,495.00 Sign and post only - W3-8, Ramp Metered EA 2 \$747.50 \$1,495.00 Sign and post only - W3-8, Ramp Metered EA 2 \$747.50 \$1,495.00 Sign and post only - R10-6R and R10-6L, Stop EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10	Removal							
Raised Pavement Markers EA 0 \$5.18 \$0.00 \$110' transitions, 100' narrowed lane								
- Raised Pavement Markers								
- Raised Pavement Markers								
- White Edge Line	Paisad Payament Markers	ΕΛ	0	¢5 10	\$0.00	larie		
transitions, 100' narrowed lane - Yellow Edge Line LF 375 \$1.09 \$409.69 110' transitions, 100' narrowed lane - White Skip Line LF 0 \$0.28 \$0.00 - 24" Stop Bar LF 16 \$8.05 \$128.80 SUBTOTAL Signing - W3-7, Ramp Meter Ahead EA 2 \$747.50 \$1,495.00 Sign and post only - W3-8, Ramp Metered EA 2 \$747.50 \$1,495.00 Sign and post only - R10-6R and R10-6L, Stop EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - SUBTOTAL S1.09 \$409.69 110' transitions, 100' narrowed lane \$1,495.00 Sign and post only Pedestal mounted Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per EA 1 \$201.25 \$201.25 Pedestal mounted						110'		
100' narrowed lane	- Write Luge Line	LI	373	ψ1.09	ψ409.09			
Signing								
- Yellow Edge Line								
transitions, 100' narrowed lane - White Skip Line	- Yellow Edge Line	LF	375	\$1.09	\$409.69			
100' narrowed lane				* 1.22	¥ 100100			
- White Skip Line						-		
- 24" Stop Bar LF 16 \$8.05 \$128.80 SUBTOTAL Signing - W3-7, Ramp Meter Ahead EA 2 \$747.50 \$1,495.00 Sign and post only - W3-8, Ramp Metered When Flashing EA 2 \$747.50 \$1,495.00 Sign and post only - R10-6R and R10-6L, Stop Here on Red EA 1 \$201.25 Pedestal mounted - R10-28, One Vehicle Per Green EA 1 \$201.25 Pedestal mounted SUBTOTAL \$3,392.50 SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44						lane		
SUBTOTAL \$1,482.93 Signing - W3-7, Ramp Meter Ahead EA 2 \$747.50 \$1,495.00 Sign and post only - W3-8, Ramp Metered When Flashing EA 2 \$747.50 \$1,495.00 Sign and post only - R10-6R and R10-6L, Stop Here on Red EA 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per Green EA 1 \$201.25 \$201.25 Pedestal mounted SUBTOTAL \$3,392.50 SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	- White Skip Line	LF	0	\$0.28	\$0.00			
Signing EA 2 \$747.50 \$1,495.00 Sign and post only - W3-7, Ramp Meter Ahead EA 2 \$747.50 \$1,495.00 Sign and post only - W3-8, Ramp Metered When Flashing EA 2 \$747.50 \$1,495.00 Sign and post only - R10-6R and R10-6L, Stop Here on Red 1 \$201.25 \$201.25 Pedestal mounted - R10-28, One Vehicle Per Green EA 1 \$201.25 \$201.25 Pedestal mounted SUBTOTAL \$3,392.50 SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	- 24" Stop Bar	LF	16	\$8.05	\$128.80			
- W3-7, Ramp Meter Ahead	SUE	BTOTA	L		\$1,482.93			
- W3-7, Ramp Meter Ahead						_		
- W3-8, Ramp Metered								
When Flashing only - R10-6R and R10-6L, Stop Here on Red EA 1 \$201.25 \$201.25 Pedestal mounted mounted - R10-28, One Vehicle Per Green EA 1 \$201.25 \$201.25 Pedestal mounted SUBTOTAL \$3,392.50 SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00			
- R10-6R and R10-6L, Stop Here on Red Here on Red 1 \$201.25 \$201.25 Pedestal mounted mounted - R10-28, One Vehicle Per Green EA 1 \$201.25 \$201.25 Pedestal mounted SUBTOTAL SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION Design 8% \$13,478.44	- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post		
Here on Red						,		
- R10-28, One Vehicle Per Green EA 1 \$201.25 \$201.25 Pedestal mounted SUBTOTAL \$3,392.50 SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	•	EA	1	\$201.25	\$201.25	Pedestal		
Green mounted SUBTOTAL \$3,392.50 SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44								
SUBTOTAL \$3,392.50 SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44		EA	1	\$201.25	\$201.25			
SUBTOTAL CONSTRUCTION \$134,784.42 Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44					4	mounted		
Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	SUE	BTOTA	L		\$3,392.50			
Traffic Control 15% \$20,217.66 Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	CURTOTAL CONCERNATION							
Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	SUBTUTAL CONSTRUCTIO	N			\$134,784.42	-		
Contingencies 10% \$13,478.44 TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44	Traffic Control	15%			\$20.217.66	-		
TOTAL CONSTRUCTION \$168,480.52 Design 8% \$13,478.44						1		
Design 8% \$13,478.44		, .				╡		
· , ,					¥ ,	1		
· , ,	Design	8%			\$13,478.44	╡		
		1			•	1		

Log No.: 45 **Ramp**: Little Rock Rd (Mecklenburg Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
TOTAL DESIGN AND CONS					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

064

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 064 **Ramp**: Graham St (Mecklenburg Co.)

Location.		outribouriu			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0.5	\$300.00	\$ 150.00	
- Seeding	SY	3838	\$2.88	\$11,053.44	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUI	BTOTA	Ĺ		\$11,203.44	
				· · ·	1
Guardrail					
- Guardrail Rail	LF	350	\$20.00	\$7,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SUI	BTOTA	L		\$8,725.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUI	BTOTA	L		\$0.00	
	1	, ,		1	
Signalization		_			
- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	14	\$345.00	\$4,830.00	
- Conduit (Trenched)	LF	2025	\$6.90	\$13,972.50	All purposes

Log No.: 064 **Ramp**: Graham St (Mecklenburg Co.)

Location:	1-00 0	outnbound			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Directional Drilled)	LF	1070	\$16.10	\$17,227.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1630	\$5.75	\$9,372.50	
- Ground Rods	EA	8	\$82.00	\$656.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
 Pedestal Pole (Type III with Foundation) 	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
SUI	ЗТОТА	L		\$89,814.78	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	150	\$1.73	\$258.75	Drop cable to controller cabinet
- Tracer Wire	LF	150	\$14.00	\$2,100.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUI	BTOTA	L		\$19,746.25	

Log No.: 064 **Ramp**: Graham St (Mecklenburg Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
200					
Pavement Marking					
- Pavement Marking Removal	LF	640	\$0.71	\$456.32	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	320	\$1.09	\$349.60	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	320	\$1.09	\$349.60	110' transitions, 100' narrowed lane
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	ЗТОТА	L		\$1,284.32	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	ЗТОТА	Ĺ		\$3,392.50	
					_
SUBTOTAL CONSTRUCTION	N			\$134,166.29	
	T . =			T	
Traffic Control	15%			\$20,124.94	_
Contingencies	10%			\$13,416.63	_
TOTAL CONSTRUCTION				\$167,707.86	_
Design	8%			\$13,416.63	-
Construction Administration	10%			\$16,770.79	
TOTAL DESIGN AND CONS	\$197,895.27				



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

067

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 067 **Ramp**: Sugarcreek Rd (Mecklenburg Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1585	\$2.88	\$4,564.80	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	ЗТОТА	L		\$4,564.80	
Guardrail					
- Guardrail Rail	LF	350	\$20.00	\$7,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SUE	STOTA	L		\$8,725.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	ЗТОТА	L		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	900	\$1.73	\$1,552.50	Assumed setback distance 350'
- Pullbox (Std.)	EA	14	\$345.00	\$4,830.00	
- Conduit (Trenched)	LF	2275	\$6.90	\$15,697.50	All purposes
- Conduit (Directional Drilled)	LF	1460	\$16.10	\$23,506.00	Five ramp crossings,

Log No.: 067 **Ramp**: Sugarcreek Rd (Mecklenburg Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
•					multiple
El (; lo ;		4	04 5 00 00	** ** ** ** ** ** ** **	conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1100	\$5.75	\$6,325.00	
- Ground Rods	EA	8	\$82.00	\$656.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III	EA	2	\$3,650.00	\$7,300.00	Breakaway
with Foundation)					pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	590	\$3.16	\$1,865.88	
SUE	ВТОТА	L		\$95,015.65	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	150	\$1.73	\$258.75	Drop cable to controller cabinet
- Tracer Wire	LF	150	\$14.00	\$2,100.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	_
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE	BTOTA	L		\$19,746.25	
Pavement Marking					

Log No.: 067 **Ramp**: Sugarcreek Rd (Mecklenburg Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
- Pavement Marking Removal	LF	640	\$0.71	\$456.32	40 MPH design speed. 110'	
					transitions, 100' narrowed lane	
- Raised Pavement Markers	EA	0	\$5.18	\$0.00		
- White Edge Line	LF	320	\$1.09	\$349.60	110' transitions, 100' narrowed lane	
- Yellow Edge Line	LF	320	\$1.09	\$349.60	110' transitions, 100' narrowed lane	
- 24" Stop Bar	LF	16	\$8.05	\$128.80		
SUE	BTOTA	Ĺ		\$1,284.32		
Signing						
Signing Note: About	^	0	Φ 7.47. ΓΩ	Ф4. 40E 00	O'ana anada aa	
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only	
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only	
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted	
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted	
<u></u>	ВТОТА	L		\$3,392.50	mounted	
SUBTOTAL CONSTRUCTION	N			\$132,728.52		
Traffic Control	15%			\$19,909.28		
Contingencies	10%			\$13,272.85		
TOTAL CONSTRUCTION	\$165,910.65					
Design	8%			\$13,272.85	1	
Construction Administration	10%			\$16,591.07		
	-				1	
TOTAL DESIGN AND CONS	TOTAL DESIGN AND CONSTRUCTION \$195,774.57					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

069

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 69 **Ramp**: University City Blvd

Categories		0 (1)		T (C)	
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					•
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2710	\$2.88	\$7,804.80	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUI	BTOTAL	_		\$7,804.80	
				4 - 1 0 0 0 0 0	
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUI	BTOTAL	_		\$0.00	
	_				
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUI	BTOTAL	-		\$0.00	
	T	1			
Signalization			* 4=0.00	* 4 * 5 0 0 * *	
- 6x6' loops - Mainline	EA	10	\$453.68	\$4,536.75	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	16	\$345.00	\$5,520.00	
- Conduit (Trenched)	LF	3950	\$6.90	\$27,255.00	All purposes

Log No.: 69 **Ramp**: University City Blvd

Ontonomina					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Conduit (Directional Drilled)	LF	2620	\$16.10	\$42,182.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	3000	\$5.75	\$17,250.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTAL	-		\$138,251.50	
					_
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	500	\$1.73	\$862.50	Drop cable to controller cabinet
- Tracer Wire	LF	500	\$14.00	\$7,000.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole	EA	1	\$3,300.00	\$3,300.00	
Mount, Type 336)					

Log No.: 69 **Ramp**: University City Blvd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
	I BTOTAL			\$25,250.00	-
301	JIOIAL	<u>-</u>		Ψ23,230.00	
Pavement Marking					
- Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	=		\$1,482.93	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL	<u>. </u>		\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$176,181.73	
	ı				
Traffic Control	15%			\$26,427.26	
Contingencies	10%			\$17,618.17	
TOTAL CONSTRUCTION				\$220,227.16	_
Dooign	00/			¢17 c10 17	-
Design Construction Administration	8%			\$17,618.17	-
Construction Administration	10%			\$22,022.72	-
TOTAL DESIGN AND CONS	TRUC1	TION		\$259,868.04	-



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

072

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 072 **Ramp:** Harris Blvd (Mecklenburg Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure)				•
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1450	\$2.88	\$4,176.00	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUBTOTAL			-	\$4,176.00	
Guardrail					
- Guardrail Rail	LF	350	\$20.00	\$7,000.00	
- Guardrail Approach					
End Treatment	EA	1	\$1,725.00	\$1,725.00	
SUBTOTAL				\$8,725.00	
D .				1	
Drainage		0	# 00.00	#0.00	Forten de autotione
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUBTOTAL				\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	900	\$1.73	\$1,552.50	Assumed setback distance 350'
- Pullbox (Std.)	EA	14	\$345.00	\$4,830.00	
- Conduit (Trenched)	LF	2550	\$6.90	\$17,595.00	All purposes
- Conduit (Directional Drilled)	LF	1560	\$16.10	\$25,116.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 072 **Ramp:** Harris Blvd (Mecklenburg Co.)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	1100	\$5.75	\$6,325.00	
- Ground Rods	EA	8	\$82.00	\$656.00	
- ATC/2070E Controller			-	-	
and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$517.50	\$517.50	
- 45' Mast Arm Poles					
and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III	ΕΛ	2	¢1 400 00	¢2 900 00	Progleguese polo
with Foundation) - Two Section Signal	EA	2	\$1,400.00	\$2,800.00	Breakaway pole Two each
Head	EA	4	\$500.00	\$2,000.00	pedestal pole
- One Section Signal		-	ψοσοίου	Ψ=,000.00	Ramp meter
Head	EA	2	\$575.00	\$1,150.00	advance signal
- Signal Cable	LF	540	\$3.16	\$1,707.75	
SUBTOTAL				\$93,842.53	
					•
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable	EA	0	\$1,725.00	φυ.υυ	Drop cable to
(six strands)	LF	0	\$1.73	\$0.00	controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet		-	*	.	
Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole	_ ^		# 0.000.00	# 0.000.00	
Mount, Type 336)	EA EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly SUBTOTAL	EA	1	\$4,600.00	\$4,600.00 \$47,547,50	
SUBTUTAL				\$17,547.50	
Pavement Marking					
- Pavement Marking Removal	LF	600	\$0.71	\$427.80	40 MPH design speed. 110' transitions, 100' narrowed lane

Log No.: 072 **Ramp:** Harris Blvd (Mecklenburg Co.)

Categories Descriptions	Unit	Quantity	Unit Coot	Total Coat	Accumptions
- Raised Pavement	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Markers	EA	4	\$5.18	\$20.70	
Markers	LA	7	ψ5.10	Ψ20.70	110' transitions,
					100' narrowed
- White Edge Line	LF	300	\$1.09	\$327.75	lane
vviite Eage Eine	<u> </u>	000	ψ1.00	ψ027.70	110' transitions,
					100' narrowed
- Yellow Edge Line	LF	300	\$1.09	\$327.75	lane
- 24" Stop Bar	LF	8	\$8.05	\$64.40	19.110
SUBTOTAL			ψ3.00	\$1,168.40	
OODIOTAL				ψ1,100.40	
Signing					
- W3-7, Ramp Meter					Sign and post
Ahead	EA	2	\$747.50	\$1,495.00	only
- W3-8, Ramp Metered			·	,	Sign and post
When Flashing	EA	2	\$747.50	\$1,495.00	only
- R10-6R and R10-6L,					Pedestal
Stop Here on Red	EA	1	\$201.25	\$201.25	mounted
- R10-28, One Vehicle					Pedestal
Per Green	EA	1	\$201.25	\$201.25	mounted
SUBTOTAL				\$3,392.50	
				****	T
SUBTOTAL CONSTRUC	TION			\$128,851.93	_
Traffic Control			15%	\$19,327.79	
Contingencies			10%	\$12,885.19	
TOTAL CONSTRUCTION	N		.070	\$161,064.91	
	-			ψ.σ.,σσ.πσ.	7
Design			8%	\$12,885.19	
Construction					
Administration			10%	\$16,106.49	
TOTAL DECICAL AND CO	ONCTOU	CTION		\$400.0E6.E0	4
TOTAL DESIGN AND CONSTRUCTION				\$190,056.59	



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

177

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 177 Ramp: Steele Creek Rd (LOOP)

Location: I-485 Inner

Categories				T (10)	
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	100	\$25.00	\$2,500.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	1	\$300.00	\$ 300.00	
- Seeding	SY	7034	\$2.88	\$20,257.92	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUB	TOTAL			\$23,057.92	
Guardrail					
- Guardrail Rail	LF	350	\$20.00	\$7,000.00	
- Guardrail Approach End	EA	1	\$1,725.00	\$1,725.00	
Treatment					
SUB	TOTAL			\$8,725.00	
Drainage	1	T			
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
	TOTAL	0	φου.υυ	\$0.00 \$0.00	Exterio existing
002	IOIAL			ψ0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1450	\$1.73	\$2,501.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	3200	\$6.90	\$22,080.00	All purposes
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings, multiple conduits

Log No.: 177 Ramp: Steele Creek Rd (LOOP)

Location: I-485 Inner

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and	EA	1	\$16,100.00	\$16,100.00	
Cabinet					
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL			\$105,588.05	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL			\$15,535.00	
Pavement Marking					

Log No.: 177 Ramp: Steele Creek Rd (LOOP)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Pavement Marking	LF	600	\$0.71	\$427.80	40 MPH design
Removal			ψο.,, ι	Ψ127.00	speed. 110'
					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	300	\$1.09	\$327.75	110' transitions,
					100' narrowed
					lane
- Yellow Edge Line	LF	300	\$1.09	\$327.75	110' transitions,
					100' narrowed
- White Skip Line	LF	0	\$0.28	\$0.00	lane
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
	TOTAL	_	φο.υσ	\$1,212.10	
000	IOIAL			Ψ1,212.10	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post
		_	V	4 1,100100	only
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post
When Flashing					only
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal mounted
Here on Red					
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal mounted
Green				40.000.00	
SUB	TOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$157,510.57	
GODIOTAL GONOTROGILO	<u> </u>			Ψ101,010.01	
Traffic Control	15%			\$23,626.59	1
Contingencies	10%			\$15,751.06	1
TOTAL CONSTRUCTION	•			\$196,888.21	
Design	8%			\$15,751.06	
Construction Administration	10%			\$19,688.82	
TOTAL DESIGN AND CONSTRUCTION \$23					_



179

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 179 **Ramp**: Steele Creek Rd (RAMP)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
Earthwork and Structure					·	
- Retaining Wall	SF	0	\$85.00	\$0.00		
- Excavation	CY	0	\$25.00	\$0.00		
- Fill	CY	0	\$22.00	\$0.00		
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00		
- Seeding	SY	2327	\$2.88	\$6,701.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.	
SUB	TOTAL			\$6,701.76		
	1	T				
Guardrail						
- Guardrail Rail	LF	0	\$20.00	\$0.00		
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00		
SUB	TOTAL			\$0.00		
Drainage						
- Pipe	LF	0	\$60.00	\$0.00	Extend existing	
SUB	TOTAL			\$0.00		
Signalization						
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane	
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance	
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'	
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00		
- Conduit (Trenched)	LF	3400	\$6.90	\$23,460.00	All purposes	
- Conduit (Directional Drilled)	LF	1870	\$16.10	\$30,107.00	Five ramp crossings, multiple conduits	
- Electrical Service	EA	1	\$1,500.00	\$1,500.00		

Log No.: 179 **Ramp**: Steele Creek Rd (RAMP)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	2400	\$5.75	\$13,800.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.0 0	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.0 0	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB [*]	TOTAL			\$115,736.80	
	ı	I	Г		
Communications			•	<u> </u>	
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL			\$15,535.00	
Pavement Marking					
- Pavement Marking Removal	LF	1000	\$0.71	\$713.00	40 MPH design speed. 110'

Log No.: 179 **Ramp**: Steele Creek Rd (RAMP)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
•					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL			\$1,934.30	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUB	TOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$143,300.36	
Traffic Control	15%			\$21,495.05	-
Contingencies	10%			\$14,330.04	
TOTAL CONSTRUCTION		\$179,125.45	_		
Design	8%			\$14,330.04	-
Construction Administration	10%			\$17,912.55]
TOTAL DESIGN AND CONS	TRUCT	TON		\$211,368.03	_



180

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 180 **Ramp:** West Blvd.

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions	Oilit	Quantity	Onit Cost	Total Cost	Assumptions
Earthwork and Structure	1	T	T		
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2194	\$2.88	\$6,318.72	Seeding around
					trench, conduit
					runs, pull box,
					clear/grub area,
					and foundation
CUE	 BTOTAL			¢c 240 72	areas.
305	OIOIAL	<u>.</u>		\$6,318.72	
Guardrail					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End	EA	1	\$1,725.00	\$1,725.00	
Treatment			4 1,1 2 3 1 3 2	ψ·,· =σ·σσ	
	TOTAL			\$7,725.00	
					_
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	BTOTAL	•		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline
- 0x0 100ps - Mairillie		0	ψ433.00	ΨΖ,1 ΖΖ.03	detection two
					loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three
oxo loops Ramp			Ψ-00.00	Ψ2,200.00	passage and one
					clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback
			V S	ψ=,σ:σ:σ	distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	3200	\$6.90	\$22,080.00	All purposes
- Conduit (Directional	LF	1870	\$16.10	\$30,107.00	Five ramp
Drilled)					crossings,
					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 180 **Ramp:** West Blvd.

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	2500	\$5.75	\$14,375.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and	EA	1	\$16,100.00	\$16,100.00	
Cabinet					
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL			\$114,931.80	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill
Tambox (openial olizo)		J	φ2,012.00	ψο.σσ	on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00	
- CCTV Assembly	EA	0	\$4,600.00	\$0.00	
SUB	TOTAL	i		\$0.00	
	1	I	, ,		
Pavement Marking					

Log No.: 180 **Ramp:** West Blvd.

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Pavement Marking Removal	LF	1000	\$0.71	\$713.00	40 MPH design speed. 110'
					transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL			\$1,934.30	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
 W3-8, Ramp Metered When Flashing 	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	TOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$134,302.32	
Traffic Control	450/			# 00 445 05	
Traffic Control	15%			\$20,145.35	_
Contingencies TOTAL CONSTRUCTION	10%			\$13,430.23	
TOTAL CONSTRUCTION				\$167,877.90	-
Design	8%			\$13,430.23	\dashv
Construction Administration	10%			\$16,787.79	
Construction / terminotration	1 10 /0			ψ10,101.10	_
TOTAL DESIGN AND CONS	TRUCT	ION		\$198,095.92	



181

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 181 Ramp: West Blvd

	1				
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•	•			
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0.25	\$300.00	\$ 75.00	
- Seeding	SY	3404	\$2.88	\$9,803.52	Seeding around trench, conduit runs, pull box, clear/grub area,
					and foundation areas.
SU	BTOTAL			\$9,878.52	
			L	+-,-· -	
Guardrail					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End	EA	1	\$1,725.00	\$1,725.00	
Treatment					
SU	BTOTAL			\$7,725.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL	•		\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	3200	\$6.90	\$22,080.00	All purposes
- Conduit (Directional Drilled)	LF	1370	\$16.10	\$22,057.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 181 Ramp: West Blvd

1 100 miles						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
- Electrical Conductors	LF	2000	\$5.75	\$11,500.00		
- Ground Rods	EA	6	\$82.00	\$492.00		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00		
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00		
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00		
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00		
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole	
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole	
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal	
- Signal Cable	LF	630	\$3.16	\$1,992.38		
SUE	BTOTAL		,	\$104,006.80		
			<u>.</u>		<u> </u>	
Communications						
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO	
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures	
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet	
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet	
- Tracer Wire	LF	0	\$14.00	\$0.00		
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00		
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00		
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height	
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00		
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00		
SUE	BTOTAL	1		\$15,535.00		
		<u> </u>	Г		<u></u>	
Pavement Marking						

Log No.: 181 Ramp: West Blvd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Pavement Marking	LF	1000	\$0.71	\$713.00	40 MPH design
Removal					speed. 110'
					transitions, 100'
					narrowed lane
- Raised Pavement	EA	0	\$5.18	\$0.00	
Markers					
- White Edge Line	LF	500	\$1.09	\$546.25	110' transitions,
					100' narrowed
					lane
- Yellow Edge Line	LF	500	\$1.09	\$546.25	110' transitions,
					100' narrowed
140			# 0.00		lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	•		\$1,934.30	
	T	1	T		
Signing					
- W3-7, Ramp Meter	EA	2	\$747.50	\$1,495.00	Sign and post
Ahead					only
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post
When Flashing					only
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal mounted
Here on Red				<u> </u>	
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal mounted
Green					
SUE	BTOTAL	•		\$3,392.50	
CURTOTAL CONCERNATION	- NI			£4.40.470.40	
SUBTOTAL CONSTRUCTION	JN			\$142,472.12	4
Traffic Control	15%			\$21,370.82	-
Contingencies	10%			\$14,247.21	-
TOTAL CONSTRUCTION	1070			\$178,090.15	=
101AL CONSTRUCTION				ψ110,030.13	-
Design	8%			\$14,247.21	1
Construction	10%			\$17,809.02	-
Administration	, .			+ · · ,300.0 -	
TOTAL DEGICAL AND COM	TD::07	101		\$210,146.38	_
TOTAL DESIGN AND CONS					



182

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 182 Ramp: US 74/&S 29/Wilkinson Blvd

		•			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	3394	\$2.88	\$9,774.72	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUI	BTOTAL			\$9,774.72	
	_	T	,		
Guardrail		_			
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUI	BTOTAL			\$0.00	
		1	 		1
Drainage	. –		# 00.00	Φο οο	F
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
Sui	BTOTAL			\$0.00	
Cianalization	1	1	<u> </u>		
Signalization - 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection
- oxo loops - Mairille	LA	0	φ433.00	φ2,722.03	two loops per
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	5000	\$6.90	\$34,500.00	All purposes
- Conduit (Directional	LF	3120	\$16.10	\$50,232.00	Five ramp
Drilled)					crossings,
					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 182 Ramp: US 74/&S 29/Wilkinson Blvd

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	3500	\$5.75	\$20,125.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUI	BTOTAL	•		\$153,226.80	
	ı	T			T
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	750	\$1.73	\$1,293.75	Drop cable to controller cabinet
- Tracer Wire	LF	750	\$14.00	\$10,500.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00	
- CCTV Assembly	EA	0	\$4,600.00	\$0.00	
SUI	BTOTAL			\$14,668.75	
Pavement Marking					

Log No.: 182 Ramp: US 74/&S 29/Wilkinson Blvd

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions - Pavement Marking	LF	750	\$0.71	\$534.75	40 MPH design
Removal	L	750	φυ.7 ι	φυυ4.75	speed. 110'
Removal					transitions, 100'
					narrowed lane
- Raised Pavement	EA	0	\$5.18	\$0.00	
Markers		075	# 4.00	# 400.00	44014
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed
					lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		0	Φο οο	# 0.00	lane
- White Skip Line	LF LF	0 16	\$0.28	\$0.00	
- 24" Stop Bar	TOTAL		\$8.05	\$128.80	
306	DIOTAL	•		\$1,482.93	
Signing					
- W3-7, Ramp Meter	EA	2	\$747.50	\$1,495.00	Sign and post
Ahead		2	ψ141.30	ψ1,495.00	only
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post
When Flashing					only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal mounted
Green					
SUE	BTOTAL	•		\$3,392.50	
SUBTOTAL CONSTRUCTION	ON			\$182,545.70	
Traffic Control	15%			\$27,381.85	-
Contingencies	10%			\$18,254.57	_
TOTAL CONSTRUCTION	\$228,182.12				
Design	8%			\$18,254.57	
Construction	10%			\$22,818.21	
Administration					_
TOTAL PEOLES AND COM				4000 07 1 00	_
TOTAL DESIGN AND CONS	STRUCT	ION		\$269,254.90	



229

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 229 **Ramp:** E John St

Location:	1-485 Ir	nner			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure		•			
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2386	\$2.88	\$6,871.68	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SU	BTOTAL	•		\$6,871.68	
Cuardrail					
Guardrail - Guardrail Rail	LF	0	¢20.00	<u> </u>	
		0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SU	BTOTAL	•		\$0.00	
Dueinene	<u> </u>		Γ		
Drainage			# 00.00	Φο οο	F (I ! ! !
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL	-		\$0.00	
Signalization			Γ		T
Signalization - 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection
- oxo loops - Mairille	EA	4	φ 4 55.06	\$1,014.70	two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	3500	\$6.90	\$24,150.00	All purposes
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings,
Dilliou)					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 229 **Ramp:** E John St

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	2000	\$5.75	\$11,500.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUI	BTOTAL	1		\$108,504.45	
	1	T	Г		T
Communications			* 4 * 5 • 6 • 6		111111111111111111111111111111111111111
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUI	BTOTAL			\$17,547.50	
	1	T	<u>, </u>		T
Pavement Marking	1-	1000	ФО 7 4	Ф740 OO	40 MDI I da ai aia
- Pavement Marking Removal	LF	1000	\$0.71	\$713.00	40 MPH design speed. 110'

Log No.: 229 **Ramp:** E John St

Location.	1-400 11	11101			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
•					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	STOTAL			\$1,934.30	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	ON			\$138,250.43	
Traffic Control	15%			\$20,737.56	_
Contingencies	10%			\$13,825.04	-
TOTAL CONSTRUCTION	1070			\$172,813.04	
Design	8%			\$13,825.04	
Construction Administration	10%			\$17,281.30	
TOTAL DESIGN AND CON	STRIICT	TON		\$203,919.38	
TOTAL DESIGN AND CON-					



230

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 230 **Ramp:** NC 16 (Providence Rd)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	3686	\$2.88	\$10,615.68	Seeding around
					trench, conduit
					runs, pull box,
					clear/grub area,
					and foundation
					areas.
SUE	BTOTAL	1		\$10,615.68	
	1	1	<u> </u>		
Guardrail		222	*		
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End	EA	1	\$1,725.00	\$1,725.00	
Treatment	TOTAL			A7 705 00	
SUE	BTOTAL	1		\$7,725.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	BTOTAL			\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection
					two loops per
					lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three
					passage and one
					clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback
					distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	5450	\$6.90	\$37,605.00	All purposes
- Conduit (Directional	LF	1370	\$16.10	\$22,057.00	Five ramp
Drilled)					crossings,
					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
	<u> </u>	L			

Log No.: 230 **Ramp:** NC 16 (Providence Rd)

			T T			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00		
- Ground Rods	EA	6	\$82.00	\$492.00		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00		
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00		
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00		
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00		
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole	
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole	
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal	
- Signal Cable	LF	630	\$3.16	\$1,992.38		
SUE	BTOTAL			\$115,059.45		
Communications						
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO	
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill	
					on	
					Mainline/Splice	
Interconnect Conter	Ε.Δ	4	¢4.705.00	¢4 705 00	Enclosures	
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet	
 Fiber-optic Drop Cable (six strands) 	LF	2500	\$1.73	\$4,312.50	Drop cable to controller cabinet	
- Tracer Wire	LF	2500	\$14.00	\$35,000.00		
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00		
- Ethernet Switch	EA	0	\$1,955.00	\$0.00		
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height	
- CCTV Cabinet (Pole	EA	0	\$3,300.00	\$0.00		
Mount, Type 336)	EA	0	\$4,600,00	\$0.00		
- CCTV Assembly		0	\$4,600.00	\$0.00 \$42,187.50		
SUBTOTAL \$42,187.50						
Pavement Marking						
- Pavement Marking	LF	750	\$0.71	\$534.75	40 MPH design	
Removal					speed. 110'	

Log No.: 230 **Ramp:** NC 16 (Providence Rd)

Location.	1-403 C	outoi			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
•					transitions, 100'
					narrowed lane
- Raised Pavement	EA	0	\$5.18	\$0.00	
Markers					
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
					lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
					lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	•		\$1,482.93	
	1	T	Ī		1
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered	EA	2	\$747.50	\$1,495.00	Sign and post
When Flashing					only
- R10-6R and R10-6L, Stop	EA	1	\$201.25	\$201.25	Pedestal mounted
Here on Red					
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal mounted
Green					
SUE	BTOTAL	•		\$3,392.50	
SUBTOTAL CONSTRUCTION	ON			\$180,463.06	
Traffic Control	15%			\$27,069.46	
Contingencies	10%			\$18,046.31	_
TOTAL CONSTRUCTION				\$225,578.82	
Design	8%			\$18,046.31	
Construction Administration	10%			\$22,557.88	
TOTAL DESIGN AND CON	CTDUCT	TION		\$266 192 04	
I TOTAL DESIGN AND CON	\$266,183.01				



23′

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 231 Ramp: NC 16 (Providence Rd) (LOOP)

	1				
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2786	\$2.88	\$8,023.68	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUI	BTOTAL			\$8,023.68	
	1	1	T		1
Guardrail					
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUI	BTOTAL			\$0.00	
	1	1	Г		
Drainage					<u> </u>
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUI	BTOTAL			\$0.00	
		T	Г		
Signalization	E 4		# 450.00		NA ' P L C
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	4100	\$6.90	\$28,290.00	All purposes
- Conduit (Directional Drilled)	LF	2120	\$16.10	\$34,132.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 231 Ramp: NC 16 (Providence Rd) (LOOP)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	1000	\$5.75	\$5,750.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller	EA	1	\$16,100.00	\$16,100.00	
and Cabinet					
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTAL			\$114,944.45	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	1500	\$1.73	\$2,587.50	Drop cable to controller cabinet
- Tracer Wire	LF	1500	\$14.00	\$21,000.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00	
- CCTV Assembly	EA	0	\$4,600.00	\$0.00	
SUE	BTOTAL	1		\$26,462.50	
Pavement Marking			<u> </u>		
- Pavement Marking Removal	LF	400	\$0.71	\$285.20	40 MPH design speed. 110'

Log No.: 231 Ramp: NC 16 (Providence Rd) (LOOP)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
2000 paono					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	200	\$1.09	\$218.50	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	200	\$1.09	\$218.50	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	•		\$851.00	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	STOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	ON			\$153,674.13	
T (" 0	4=0/			***	
Traffic Control	15%			\$23,051.12	_
Contingencies	10%			\$15,367.41	_
TOTAL CONSTRUCTION				\$192,092.66	_
Design	8%			\$15,367.41	
Construction Administration	10%			\$19,209.27	
TOTAL DESIGN AND CON	STDIICT	ION		\$226,669.34	
TOTAL DESIGN AND CON	φ ∠∠ 0,009.34				



232

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 232 Ramp: NC 16 (Providence Rd) (LOOP)

Location:	1-485 C	Julei			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1786	\$2.88	\$5,143.68	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SU	BTOTAL	-		\$5,143.68	
0 1 1	1		T	1	
Guardrail			# 00.00	Φο οο	
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SU	BTOTAL	-		\$0.00	
Day's and			T	I	
Drainage			# 00.00	Ф0.00	
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL	-		\$0.00	
Signalization					
Signalization - 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection
- oxo loops - Mairille	EA	4	φ433.00	\$1,614.70	two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	2600	\$6.90	\$17,940.00	All purposes
- Conduit (Directional Drilled)	LF	1420	\$16.10	\$22,862.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 232 **Ramp:** NC 16 (Providence Rd) (LOOP)

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions					Assumptions
- Electrical Conductors	LF	1000	\$5.75	\$5,750.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUI	BTOTAL	ı		\$93,324.45	
	T	1	T	T	
Communications				*	
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	250	\$1.73	\$431.25	Drop cable to controller cabinet
- Tracer Wire	LF	250	\$14.00	\$3,500.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	0	\$4,600.00	\$0.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	0	\$3,300.00	\$0.00	
- CCTV Assembly	EA	0	\$4,600.00	\$0.00	
SUI	BTOTAL			\$6,806.25	
Payamont Marking			T	T	
- Pavement Marking Removal	LF	400	\$0.71	\$285.20	40 MPH design speed. 110'

Log No.: 232 Ramp: NC 16 (Providence Rd) (LOOP)

Location.	1-405 (Julion			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
·					transitions, 100'
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	200	\$1.09	\$218.50	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	200	\$1.09	\$218.50	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUI	STOTAL	•	•	\$851.00	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUI	BTOTAL	•		\$3,392.50	
					1
SUBTOTAL CONSTRUCTION	ON			\$109,517.88	
Tag#ia Operatural	450/			M40 407 00	4
Traffic Control	15%			\$16,427.68	4
Contingencies	10%			\$10,951.79	_
TOTAL CONSTRUCTION				\$136,897.35	-
Dosign	8%			\$10,951.79	-
Design Construction	10%			\$13,689.74	-
Administration	10 /0			ψ13,009.74	
TOTAL DESIGN AND CON	STRUC	ΓΙΟΝ		\$161,538.87	
	•			Ţ . J . , J J J	



233

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 233 **Ramp:** NC 16 (Providence Rd)

					1
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure	•				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2686	\$2.88	\$7,735.68	Seeding around
					trench, conduit
					runs, pull box,
					clear/grub area,
					and foundation
					areas.
SUE	BTOTAL			\$7,735.68	
	1	1	Г		
Guardrail					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End	EA	1	\$1,725.00	\$1,725.00	
Treatment				AT TOE 00	
SUL	BTOTAL	•		\$7,725.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	STOTAL			\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection
					two loops per
					lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three
					passage and one
					clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback
					distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	3950	\$6.90	\$27,255.00	All purposes
- Conduit (Directional	LF	1620	\$16.10	\$26,082.00	Five ramp
Drilled)					crossings,
					multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
	L	L	1		

Log No.: 233 **Ramp:** NC 16 (Providence Rd)

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions - Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
			·	•	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTAL			\$108,734.45	
	T		T. T.		1
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	1000	\$1.73	\$1,725.00	Drop cable to controller cabinet
- Tracer Wire	LF	1000	\$14.00	\$14,000.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE	BTOTAL	ı		\$33,112.50	
Payament Marking			<u> </u>		
- Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110'

Log No.: 233 **Ramp:** NC 16 (Providence Rd)

Location.					
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
·					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	STOTAL			\$1,482.93	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	ON			\$162,183.06	
				***	_
Traffic Control	15%			\$24,327.46	_
Contingencies	10%			\$16,218.31	_
TOTAL CONSTRUCTION				\$202,728.82	4
D	00/		Ī	# 40.040.04	4
Design	8%			\$16,218.31	-
Construction Administration	10%			\$20,272.88	
TOTAL DESIGN AND CON	STRUCT	TON		\$239,220.01	
	- -			,,	



234

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 234 **Ramp:** Rea Rd

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2019	\$2.88	\$5,814.72	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SU	BTOTAL			\$5,814.72	
				<u> </u>	
Guardrail					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End	EA	1	\$1,725.00	\$1,725.00	
Treatment	 BTOTAL			\$7,725.00	
30	BIUIAL	1		\$1,125.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL		-	\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	2950	\$6.90	\$20,355.00	All purposes
- Conduit (Directional Drilled)	LF	1370	\$16.10	\$22,057.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	

Log No.: 234 Ramp: Rea Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTAL	ı		\$97,809.45	
	T	T	T		
Communications			1		
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE	BTOTAL			\$17,547.50	
Pavement Marking					
- Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110'

Log No.: 234 Ramp: Rea Rd

Categories Descriptions	Unit	Quantity	Unit Cos	t Total Cost	Assumptions
•					transitions, 100'
					narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
Willio Eago Ellio		0,0	Ψ1.00	Ψ100.00	100' narrowed
					lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions,
					100' narrowed
					lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	-		\$1,482.93	
	Т	1	T	T	T
Signing					
- W3-7, Ramp Meter	EA	2	\$747.50	\$1,495.00	Sign and post
Ahead					only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per	EA	1	\$201.25	\$201.25	Pedestal mounted
Green					
SUE	BTOTAL	•		\$3,392.50	
SUBTOTAL CONSTRUCTION)N		\$1	33,772.10	
COBTOTAL CONCINCOTA	711		Ψ'	00,772.70	
Traffic Control	15%		\$2	20,065.81	
Contingencies	10%			3,377.21	
TOTAL CONSTRUCTION			\$1	67,215.12	
Decima	00/		Φ.4	0.077.04	
Design Construction	8% 10%			3,377.21	_
Administration	10%		\$1	6,721.51	
	1		1		
TOTAL DESIGN AND CONS	STRUCT	ION	\$1	97,313.84	



235

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 235 **Ramp:** Rea Rd. (Loop)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions				
Earthwork and Structure									
- Retaining Wall	SF	0	\$85.00	\$0.00					
- Excavation	CY	0	\$25.00	\$0.00					
- Fill	CY	0	\$22.00	\$0.00					
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00					
- Seeding	SY	1852	\$2.88	\$5,333.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.				
SUE	BTOTAL			\$5,333.76					
	Т	T		Γ	T				
Guardrail		255	405.55	00.000.00					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00					
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00					
SUE	BTOTAL			\$7,725.00					
	T	T		T	T				
Drainage									
- Pipe	LF	0	\$60.00	\$0.00	Extend existing				
SUE	BTOTAL			\$0.00					
	T	Т	Г	Т	T				
Signalization									
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane				
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance				
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'				
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00					
- Conduit (Trenched)	LF	2700	\$6.90	\$18,630.00	All purposes				
- Conduit (Directional Drilled)	LF	1370	\$16.10	\$22,057.00	Five ramp crossings, multiple conduits				
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	•				
	· ·								
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00					

Log No.: 235 **Ramp:** Rea Rd. (Loop)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00			
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00			
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00			
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00			
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole		
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole		
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal		
- Signal Cable	LF	630	\$3.16	\$1,992.38			
SUE	BTOTAL			\$96,084.45			
Communications							
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO		
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures		
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet		
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet		
- Tracer Wire	LF	0	\$14.00	\$0.00			
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00			
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00			
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height		
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00			
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00			
SUE	BTOTAL			\$17,547.50			
Pavement Marking							
- Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110' transitions, 100' narrowed lane		
- Raised Pavement Markers	EA	0	\$5.18	\$0.00			

Log No.: 235 **Ramp:** Rea Rd. (Loop)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL			\$1,482.93	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL		•	\$3,392.50	
SUBTOTAL CONSTRUCTION)NI			\$131,566.14	
SOBIOTAL CONSTRUCTION	JIN .			\$131,300.14	
Traffic Control	15%			\$19,734.92	
Contingencies	10%			\$13,156.61	
TOTAL CONSTRUCTION	\$164,457.67				
Design	8%		\$13,156.61		
Construction Administration	10%			\$16,445.77	
Concade a care in the care in	1070			ψ10,440.77	
TOTAL DESIGN AND CONSTRUCTION \$194,060.					



236

Typical Design and Construction Costs Single Lane Ramp Meter

Rea Rd

Log No.: 236 Ramp: (LOOP)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structur	e				
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
 Suppl. Clearing and Grub 	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1500	\$2.88	\$4,320.00	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
	UBTOTA	L		\$4,320.00	
Guardrail					
- Guardrail Rail	LF	250	\$20.00	\$5,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
	UBTOTA	L		\$6,725.00	
Drainage					
- Pipe	LF	50	\$60.00	\$3,000.00	Extend existing
	UBTOTA	L		\$3,000.00	, and the second
		I	1		
Signalization					Mainline data dia atau
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	2950	\$6.90	\$20,355.00	All purposes
- Conduit (Directional Drilled)	LF	1370	\$16.10	\$22,057.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	

Rea Rd

Log No.: 236 **Ramp:** (LOOP)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
S	UBTOTA	L		\$98,716.80	
		1	 		
Communications	F ^		#4 450.00	#0.00	
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO For Direction Drill on
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
S	UBTOTA	L		\$17,547.50	
Pavement Marking					
- Pavement Marking Removal	LF	600	\$0.71	\$427.80	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane

Rea Rd

Log No.: 236 **Ramp:** (LOOP)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
5	SUBTOTA	L		\$1,212.10	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
5	SUBTOTA	L		\$3,392.50	
SUBTOTAL CONSTRUC	CTION			\$134,913.90	
Traffic Control			15%	\$20,237.09	-
Contingencies			10%	\$13,491.39	
TOTAL CONSTRUCTIO	N			\$168,642.38	
Design			8%	\$13,491.39	
Construction Administration			10%	\$16,864.24	
TOTAL DESIGN AND C					



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

237

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 237 **Ramp:** Rea Rd

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2052	\$2.88	\$5,909.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	TOTAL			\$5,909.76	
Output line it	ı	1	<u> </u>		1
Guardrail Dail	1.5	450	#20.00	ФО 000 00	
- Guardrail Approach End	LF	150	\$20.00	\$3,000.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
SUB	TOTAL			\$3,000.00	
Drainage					
Drainage - Pipe	LF	0	\$60.00	ድ ስ ስስ	Extend existing
	TOTAL	0	\$60.00	\$0.00 \$0.00	Extend existing
305	HOTAL			φυ.υυ	
Signalization					
- 6x6' loops - Mainline	EA	4	\$453.68	\$1,814.70	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three
oxo loopo mamp			Ψ100.00	Ψ2,200.00	passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	10	\$345.00	\$3,450.00	
- Conduit (Trenched)	LF	3000	\$6.90	\$20,700.00	All purposes
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	'
- Electrical Conductors	LF	1600	\$5.75	\$9,200.00	
- Ground Rods	EA	6	\$82.00	\$492.00	

Log No.: 237 **Ramp:** Rea Rd

		ı			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUB	TOTAL			\$102,754.45	
	1	1	ı		
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL			\$17,547.50	
Pavement Marking					
- Pavement Marking Removal	LF	750	\$0.71	\$534.75	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	

Log No.: 237 **Ramp:** Rea Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- White Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	375	\$1.09	\$409.69	110' transitions, 100' narrowed lane
- White Skip Line	Ŀ	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL			\$1,482.93	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUB	TOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	N			\$134,087.14	
Traffic Control	15%			\$20,113.07	
Contingencies	10%			\$13,408.71	
TOTAL CONSTRUCTION			\$167,608.92		
Design	8%			\$13,408.71	_
Construction Administration	10%			\$16,760.89	
TOTAL DESIGN AND CONS	STRUC	ΓΙΟΝ		\$197,778.52	_



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

238

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 238 Ramp: US 521 (Johnston Rd)

Location:	1-485 C	outer			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	3027	\$2.88	\$8,717.76	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUI	BTOTAL	1		\$8,717.76	
Guardrail					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
	BTOTAL		I.	\$7,725.00	
Business			Ι		
Drainage	. –		#00.00	Ф0.00	E Contractor
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUI	BTOTAL	•		\$0.00	
O' was all as the se		Т	Τ		
Signalization	Ε.Δ		0450.00	ФО 7 00 ОБ	Mainline detection
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	4450	\$6.90	\$30,705.00	All purposes
- Conduit (Directional Drilled)	LF	3120	\$16.10	\$50,232.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	,
- Electrical Conductors	LF	5000	\$5.75	\$28,750.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
L	ı	1	·	·	I .

Log No.: 238 **Ramp:** US 521 (Johnston Rd)

	1 700 0	1			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTAL			\$158,056.80	
Communications					
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE	BTOTAL	ı		\$17,547.50	
Pavement Marking					
- Pavement Marking Removal	LF	1000	\$0.71	\$713.00	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane

Log No.: 238 Ramp: US 521 (Johnston Rd)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Yellow Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUB	TOTAL			\$1,934.30	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUB	TOTAL			\$3,392.50	
SUBTOTAL CONSTRUCTION	ON			\$197,373.86	
T (" 0 1 1	450/			Фоо ооо оо]
Traffic Control	15%			\$29,606.08	<u> </u>
Contingencies	10%			\$19,737.39	<u> </u>
TOTAL CONSTRUCTION	\$246,717.33				
Design	8%			\$19,737.39	1
Construction Administration	10%			\$24,671.73	
TOTAL DESIGN AND CON	\$291,126.44				



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

239

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 239 **Ramp:** US 521/Johnston Rd.

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	1960	\$2.88	\$5,644.80	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.
SUE	BTOTAL	•		\$5,644.80	
O			_		
Guardrail	LF	150	¢20.00	#2 000 00	
- Guardrail Approach End	EA	150 0	\$20.00	\$3,000.00	
- Guardrail Approach End Treatment			\$1,725.00	\$0.00	
SUE	BTOTAL	•		\$3,000.00	
Drainaga					
Drainage - Pipe	LF	0	\$60.00	\$0.00	Extend existing
	BTOTAL	_	φου.σο	\$0.00 \$0.00	Lateria existing
301	JIOIAL			Ψ0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	
- Conduit (Trenched)	LF	2850	\$6.90	\$19,665.00	All purposes
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	,
Florida do Latro	LF	1500	\$5.75	\$8,625.00	
- Electrical Conductors	ᆫ	1500	φυ. <i>1</i> υ	ჶი,ნ∠ე.00	

Log No.: 239 **Ramp:** US 521/Johnston Rd.

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Descriptions					71000
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00	
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	630	\$3.16	\$1,992.38	
SUE	BTOTAL	ı		\$102,741.80	
Communications			<u> </u>		<u> </u>
Communications		0	Φ4.450.00	Ф0.00	Links OMEO
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet
- Tracer Wire	LF	0	\$14.00	\$0.00	
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00	
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUE	BTOTAL			\$17,547.50	
Pavement Marking					
- Pavement Marking Removal	LF	600	\$0.71	\$427.80	40 MPH design speed. 110' transitions, 100' narrowed lane
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	
- White Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane

Log No.: 239 **Ramp:** US 521/Johnston Rd.

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Yellow Edge Line	LF	300	\$1.09	\$327.75	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	•		\$1,212.10	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL	•		\$3,392.50	
SUBTOTAL CONSTRUCTI	ON			\$133,538.70	
Traffic Control	15%			\$20,030.81	-
Contingencies	10%			\$13,353.87	<u></u>
TOTAL CONSTRUCTION		\$166,923.38			
Design	8%			\$13,353.87	-
Construction Administration				\$16,692.34	
TOTAL DESIGN AND CONSTRUCTION \$196,96					-



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

250

Typical Design and Construction Costs Single Lane Ramp Meter

Log No.: 250 **Ramp:** Briar Creek Rd

Location: US 74 - Independence Blvd WB

Leoditori: Co / i independence biva vib							
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
Earthwork and Structure							
- Retaining Wall	SF	0	\$85.00	\$0.00			
- Excavation	CY	0	\$25.00	\$0.00			
- Fill	CY	0	\$22.00	\$0.00			
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00			
- Seeding	SY	1960	\$2.88	\$5,644.80	Seeding around trench, conduit runs, pull box, clear/grub area, and foundation areas.		
SU	BTOTAL	i		\$5,644.80			
		1	<u> </u>				
Guardrail		_	*	• • • • • • • • • • • • • • • • • • • •			
- Guardrail Rail	LF	0	\$20.00	\$0.00			
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00			
SU	BTOTAL	i		\$0.00			
	T	1	1				
Drainage							
- Pipe	LF	0	\$60.00	\$0.00	Extend existing		
SU	BTOTAL			\$0.00			
	1	1	Г				
Signalization		_	*	*			
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane		
- 6x6' loops - Ramp	EA	5	\$453.68	\$2,268.38	One queue, three passage and one clearance		
- Detector Lead-in Cable	EA	1200	\$1.73	\$2,070.00	Assumed setback distance 350'		
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00			
- Conduit (Trenched)	LF	2850	\$6.90	\$19,665.00	All purposes		
- Conduit (Directional Drilled)	LF	1620	\$16.10	\$26,082.00	Five ramp crossings, multiple conduits		
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	'		
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00			
			·				
- Ground Rods	EA	6	\$82.00	\$492.00			

Log No.: 250 **Ramp:** Briar Creek Rd

Location: US 74 - Independence Blvd WB

Eocation: 00 74 independence biva vvb							
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00			
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00			
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00			
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00			
- Pedestal Pole (Type III with Foundation)	EA	2	\$3,650.00	\$7,300.00	Breakaway pole		
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	Two each pedestal pole		
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal		
- Signal Cable	LF	630	\$3.16	\$1,992.38			
SUE	BTOTAL			\$102,741.80			
Communications							
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO		
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For Direction Drill on Mainline/Splice Enclosures		
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet		
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet		
- Tracer Wire	LF	0	\$14.00	\$0.00			
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00			
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00			
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	45' Mounting height		
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00			
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00			
SUE	BTOTAL			\$17,547.50			
Davis and Maril Inc.	ı	1	 		1		
Pavement Marking		000	#0.74	# 044.70	40 MDLL desire		
- Pavement Marking Removal	LF	900	\$0.71	\$641.70	40 MPH design speed. 110' transitions, 100' narrowed lane		
- Raised Pavement Markers	EA	0	\$5.18	\$0.00			
- White Edge Line	LF	450	\$1.09	\$491.63	110' transitions, 100' narrowed lane		

Log No.: 250 **Ramp:** Briar Creek Rd

Location: US 74 - Independence Blvd WB

		•			
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Yellow Edge Line	LF	450	\$1.09	\$491.63	110' transitions, 100' narrowed lane
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	16	\$8.05	\$128.80	
SUE	BTOTAL	ı		\$1,753.75	
Signing					
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	1	\$201.25	\$201.25	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	1	\$201.25	\$201.25	Pedestal mounted
SUE	BTOTAL			\$3,392.50	
OURTOTAL CONCERNATION	ON .			*404.000.05	<u> </u>
SUBTOTAL CONSTRUCTI	ON			\$131,080.35	_
Traffic Control	15%			\$19,662.05	
Contingencies	10%			\$13,108.04	
TOTAL CONSTRUCTION			\$163,850.44		
Design	8%			\$13,108.04	
Construction Administration				\$16,385.04	
TOTAL DESIGN AND CONSTRUCTION				\$193,343.52	_

A.1.2. Proposed Two Lane Ramp Locations

A.1.2.1. Mecklenburg County



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

093

Typical Design and Construction Costs Two Lane Ramp Meter

Log No.: 093 **Ramp:** Westinghouse Blvd (Mecklenburg Co.)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	Assumed 6'x1300
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	Assumed 12'x1000'x6'
 Suppl. Clearing and Grub 	AC	0	\$300.00	\$ 0.00	Assumed 25'x1000'
- Seeding	SY	1755	\$2.88	\$5,054.40	Seeding around trench, conduit runs, pull box, and foundation areas.
SU	BTOTAL	_		\$5,054.40	
Guardrail					
- Guardrail Rail	LF	350	\$20.00	\$7,000.00	
- Guardrail Approach End Treatment	EA	1	\$1,725.00	\$1,725.00	
SU	BTOTAL	•		\$8,725.00	
Paving					
- Ramp Widening	SY	3140	\$62.50	\$196,250.00	includes both asphalt and binder
- Pavement Resurfacing	SY	4225	\$13.50	\$57,037.50	
SU	BTOTAL	_		\$253,287.50	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
•	BTOTAL	-	•	\$0.00	J
					l
Signalization					
- 6x6' loops - Mainline	EA	8	\$453.68	\$3,629.40	Mainline detection two loops per lane

Log No.: 093 **Ramp:** Westinghouse Blvd (Mecklenburg Co.)

	Location: 177 Coutinocutio						
Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions		
- 6x6' loops - Ramp	EA	10	\$453.68	\$4,536.75	Two queue, six passage and two clearance		
- Detector Lead-in Cable	EA	900	\$1.73	\$1,552.50	Assumed setback distance 350'		
- Pullbox (Std.)	EA	19	\$345.00	\$6,555.00			
- Conduit (Trenched)	LF	2500	\$6.90	\$17,250.00	All purposes		
- Conduit (Directional Drilled)	LF	1360	\$16.10	\$21,896.00	Five ramp crossings, multiple conduits		
- Electrical Service	EA	1	\$1,500.00	\$1,500.00			
- Electrical Conductors	LF	1500	\$5.75	\$8,625.00			
- Ground Rods	EA	8	\$82.00	\$656.00			
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00			
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00			
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00			
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00			
 Pedestal Pole (Type III with Foundation) 	EA	2	\$3,650.00	\$7,300.00	Breakaway pole		
- Two Section Signal Head	EA	4	\$500.00	\$2,000.00	Two each pedestal pole		
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal		
- Signal Cable	LF	540	\$3.16	\$1,707.75			
SUE	STOTAL	-		\$102,093.40			
Communications							
- Splice Enclosure	EA	0	\$1,150.00	\$0.00	Link to SMFO		
- Pullbox (Special Size)	EA	0	\$2,012.50	\$0.00	For splice enclosure		
- Interconnect Center	EA	0	\$1,725.00	\$0.00	In cabinet		
- Fiber-optic Drop Cable (six strands)	LF	0	\$1.73	\$0.00	Drop cable to controller cabinet		
- Tracer Wire	LF	0	\$14.00	\$0.00			
- Broadband Internet Service	LS	1	\$1,080.00	\$1,080.00			
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00	45' Mounting height		
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00			
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00			

Log No.: 093 **Ramp:** Westinghouse Blvd (Mecklenburg Co.)

Location: I-77 Southbound

Categories	Unit	Quantity	Unit Cost	Total Cost	Assumptions			
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	•			
	BTOTAL	-	φ4,600.00	\$15,535.00				
301	Ψ10,000.00							
Pavement Marking					40 MPH design speed. 110' transitions, 100' narrowed lane			
 Pavement Marking Removal 	LF	2000	\$0.71	\$1,426.00	Along skip line only			
 Raised Pavement Markers 	EA	12	\$5.18	\$62.10	110' transitions, 100' narrowed lane			
- White Edge Line	LF	1000	\$1.09	\$1,092.50	110' transitions, 100' narrowed lane			
- Yellow Edge Line	LF	1000	\$1.09	\$1,092.50				
- White Skip Line	Ŀ	900	\$0.28	\$248.40				
- 24" Stop Bar	LF	24	\$8.05	\$193.20				
SUI	BTOTAL			\$4,114.70				
Signing					Sign and post only			
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only			
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Pedestal mounted			
- R10-6R and R10-6L, Stop Here on Red	EA	2	\$201.25	\$402.50	Pedestal mounted			
- R10-28, One Vehicle Per Green	EA	2	\$201.25	\$402.50				
- W4-1L, Merge Left	EA	1	\$747.50	\$747.50				
SUI	BTOTAL	-		\$4,542.50				
SUBTOTAL CONSTRUCTI	ON			\$393,352.50				
Traffic Control	15%			\$59,002.88				
Contingencies	10%			\$39,335.25	1			
TOTAL CONSTRUCTION	1 . 5 70	\$491,690.63	1					
Design	8%			\$39,335.25				
Construction Administration	10%			\$49,169.06				
TOTAL DESIGN AND CON								



NCDOT Ramp Metering Feasibility Study

Individual Site Cost Estimate

175

Log No.: 175 **Ramp**: Arrowood Rd

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2314	\$2.88	\$6,664.32	Seeding around trench, conduit runs, pull box, and foundation areas.
SUE	BTOTAL			\$6,664.32	
Guardrail			1		
- Guardrail Rail	LF	0	\$20.00	\$0.00	
- Guardrail Approach End Treatment	EA	0	\$1,725.00	\$0.00	
	BTOTAL			\$0.00	
				Ψ0100	
Paving					
- Ramp Widening	SY	3140	\$62.50	\$196,250.00	includes both asphalt and binder
- Pavement Resurfacing	SY	4225	\$13.50	\$57,037.50	
SUE	BTOTAL			\$253,287.50	
	,				
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SUE	BTOTAL			\$0.00	
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection two loops per lane
- 6x6' loops - Ramp	EA	10	\$453.68	\$4,536.75	Two queue, six passage and two clearance
- Detector Lead-in Cable	EA	850	\$1.73	\$1,466.25	Assumed setback distance 350'
- Pullbox (Std.)	EA	17	\$345.00	\$5,865.00	
- Conduit (Trenched)	LF	3350	\$6.90	\$23,115.00	All purposes
- Conduit (Directional Drilled)	LF	2370	\$16.10	\$38,157.00	Five ramp crossings, multiple conduits

Log No.: 175 **Ramp:** Arrowood Rd

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	0	\$5.75	\$0.00	
- Ground Rods	EA	6	\$82.00	\$492.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.0 0	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.0 0	\$0.00	
 Pedestal Pole (Type III with Foundation) 	EA	2	\$3,650.00	\$7,300.00	Breakaway pole
- Two Section Signal Head	EA	4	\$500.00	\$2,000.00	Two each pedestal pole
- One Section Signal Head	EA	2	\$575.00	\$1,150.00	Ramp meter advance signal
- Signal Cable	LF	190	\$3.16	\$600.88	
SUB	TOTAL			\$112,639.93	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For splice enclosure
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	750	\$1.73	\$1,293.75	Drop cable to controller cabinet
- Tracer Wire	LF	750	\$14.00	\$10,500.00	
- Broadband Internet Service	LS	0	\$1,080.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	45' Mounting height
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUB	TOTAL			\$29,181.25	
		, , , , , , , , , , , , , , , , , , , 			
Pavement Marking					40 MPH design speed. 110' transitions, 100' narrowed lane
- Pavement Marking Removal	LF	1000	\$0.71	\$713.00	Along skip line only

Log No.: 175 **Ramp**: Arrowood Rd

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- Raised Pavement Markers	EA	0	\$5.18	\$0.00	110' transitions, 100' narrowed lane
- White Edge Line	LF	500	\$1.09	\$546.25	110' transitions, 100' narrowed lane
- Yellow Edge Line	LF	500	\$1.09	\$546.25	
- White Skip Line	LF	0	\$0.28	\$0.00	
- 24" Stop Bar	LF	24	\$8.05	\$193.20	
SUB	TOTAL			\$1,998.70	
Signing					Sign and post only
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Pedestal mounted
- R10-6R and R10-6L, Stop Here on Red	EA	2	\$201.25	\$402.50	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	2	\$201.25	\$402.50	
- W4-1L, Merge Left	EA	1	\$747.50	\$747.50	
SUB	TOTAL	•	-	\$4,542.50	
				-	
SUBTOTAL C	ONSTR	UCTION		\$408,314.20	
Troffic Control	450/		1	ФС4 04 7 40	
Traffic Control	15%			\$61,247.13	
Contingencies	10%			\$40,831.42	
TOTAL CONSTRUCTION				\$510,392.74	
Dosign	8%				
Design Construction Administration	10%			\$40,831.42 \$51,039.27	
Construction Administration	10%			φ31,039.27	
TOTAL DESIGN AND CON					

A.1.3. Proposed Two Lane Freeway to Freeway Ramp Locations

A.1.3.1. Mecklenburg County



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

097

Typical Design and Construction Costs Two Lane Freeway to Freeway Ramp Meter

Log No.: 97 **Ramp**: I-485 (F2F)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure					
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	3160	\$2.88	\$9,100.80	Seeding around trench, conduit runs, pull box, and foundation areas.
SU	BTOTAL			\$9,100.80	
Guardrail					
- Guardrail Rail	LF	300	\$20.00	\$6,000.00	
 Guardrail Approach End Treatment 	EA	1	\$1,725.00	\$1,725.00	
SU	BTOTAL			\$7,725.00	
Paving					
- Ramp Widening	SY	0	\$62.50	\$0.00	includes both asphalt and binder
- Pavement Resurfacing	SY	0	\$13.50	\$0.00	
SUBTOTAL				\$0.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	\$0.00				
Signalization					
- 6x6' loops - Mainline	EA	6	\$453.68	\$2,722.05	Mainline detection

Log No.: 97 **Ramp**: I-485 (F2F)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- 6x6' loops - Ramp	EA	10	\$453.68	\$4,536.75	two queue, six passage and two clearance
- Detector Lead-in Cable	EA	390	\$1.73	\$672.75	Assumed setback distance 350'
- Pullbox (Std.)	EA	17	\$345.00	\$5,865.00	
- Conduit (Trenched)	LF	4625	\$6.90	\$31,912.50	All purposes
- Conduit (Directional Drilled)	LF	3620	\$16.10	\$58,282.00	Five ramp crossings, multiple conduits
- Electrical Service	EA	1	\$1,500.00	\$1,500.00	
- Electrical Conductors	LF	1000	\$5.75	\$5,750.00	
- Ground Rods	EA	5	\$82.00	\$410.00	
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.0 0	\$16,100.00	
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00	
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00	
- 45' Mast Arm Poles and Foundation	EA	1	\$17,250.0 0	\$17,250.00	
- Pedestal Pole (Type III with Foundation)	EA	0	\$3,650.00	\$0.00	
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00	
- One Section Signal Head	EA	6	\$575.00	\$3,450.00	Ramp meter advance signal
- Signal Cable	LF	190	\$3.16	\$600.88	
SU	BTOTAL			\$157,686.93	
Communications					
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For splice enclosure
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet
- Fiber-optic Drop Cable (six strands)	LF	500	\$1.73	\$862.50	Drop cable to controller cabinet
- Tracer Wire	LF	500	\$14.00	\$7,000.00	
- Broadband Internet Service	LS	0	\$500.00	\$0.00	
- Ethernet Switch	EA	0	\$1,955.00	\$0.00	
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00	
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00	

Log No.: 97 **Ramp**: I-485 (F2F)

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00	
SUI	BTOTAL			\$25,250.00	
		T T		1	1
Pavement Marking					
- Pavement Marking Removal	LF	2000	\$0.71	\$1,426.00	To narrow lanes, 50 PMH design speed, maintain one edgeline, pave over other edgeline
- Raised Pavement Markers	EA	3	\$5.18	\$15.53	Along skip line only
- White Edge Line	LF	400	\$1.09	\$437.00	200' transitions, 100' narrowed lane, 50 MPH
- Yellow Edge Line	LF	600	\$1.09	\$655.50	200' transitions, 100' narrowed lane, 50 MPH
- White Skip Line	LF	200	\$0.28	\$55.20	
- 24" Stop Bar	LF	24	\$8.05	\$193.20	
SUI	BTOTAL			\$2,782.43	
		T T		1	T
Signing		_			
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only
- R10-6R and R10-6L, Stop Here on Red	EA	2	\$201.25	\$402.50	Pedestal mounted
- R10-28, One Vehicle Per Green	EA	2	\$201.25	\$402.50	Pedestal mounted
- W4-1L, Merge Left	EA	2	\$747.50	\$1,495.00	
- Sign Structure (Cantilever)	EA	2	\$57,500.00	\$115,000.00	
- Ramp Meter On Sign (Message A)	EA	1	\$5,750.00	\$5,750.00	
- Ramp Meter On Sign (Message B)	EA	1	\$5,750.00	\$5,750.00	
SUI	BTOTAL			\$131,790.00	
				T * * * * * * * * * * * * * * * * * * *	T
SUBTOTAL CONSTRUCTI	ON	<u> </u>		\$334,335.15	-
Traffic Control	15%			\$50,150.27	

Log No.: 97 **Ramp**: I-485 (F2F)

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Contingencies	10%			\$33,433.52	
TOTAL CONSTRUCTION				\$417,918.94	
Design	8%			\$33,433.52	
Construction Administration	10%			\$41,791.89	
	•			•	
TOTAL DESIGN AND CONSTRUCTION				\$493,144.35	



NCDOT Ramp Metering Feasibility Study Individual Site Cost Estimate

129

Typical Design and Construction Costs Two Lane Freeway to Freeway Ramp Meter

Log No.: 129 Ramp: I-85 Southbound

Categories					
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Earthwork and Structure		•			
- Retaining Wall	SF	0	\$85.00	\$0.00	
- Excavation	CY	0	\$25.00	\$0.00	
- Fill	CY	0	\$22.00	\$0.00	
- Suppl. Clearing and Grub	AC	0	\$300.00	\$ 0.00	
- Seeding	SY	2409	\$2.88	\$6,937.92	Seeding around trench, conduit runs, pull box, and foundation areas.
SU	BTOTAL			\$6,937.92	
	1	<u>, </u>			
Guardrail					
- Guardrail Rail	LF	500	\$20.00	\$10,000.00	
- Guardrail Approach End Treatment	EA	2	\$1,725.00	\$3,450.00	
SU	BTOTAL			\$13,450.00	
Paving					
- Ramp Widening	SY	0	\$62.50	\$0.00	includes both asphalt and binder
- Pavement Resurfacing	SY	0	\$13.50	\$0.00	
SUBTOTAL				\$0.00	
Drainage					
- Pipe	LF	0	\$60.00	\$0.00	Extend existing
SU	BTOTAL			\$0.00	
	T	T	1		1
Signalization		4.5	* 4 * 5 5 5	**	
- 6x6' loops - Mainline	EA	10	\$453.68	\$4,536.75	Mainline detection
- 6x6' loops - Ramp	EA	10	\$453.68	\$4,536.75	two queue, six passage and two clearance
- Detector Lead-in Cable	EA	390	\$1.73	\$672.75	Assumed setback distance 350'
- Pullbox (Std.)	EA	12	\$345.00	\$4,140.00	

Log No.: 129 Ramp: I-85 Southbound

Categories	Categories										
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions						
- Conduit (Trenched)	LF	3535	\$6.90	\$24,391.50	All purposes						
- Conduit (Directional	LF	340	\$16.10	\$5,474.00	Five ramp crossings,						
Drilled)					multiple conduits						
- Electrical Service	EA	1	\$1,500.00	\$1,500.00							
- Electrical Conductors	LF	1000	\$5.75	\$5,750.00							
- Ground Rods	EA	4	\$82.00	\$328.00							
- ATC/2070E Controller and Cabinet	EA	1	\$16,100.00	\$16,100.00							
- Firmware/Calibration	EA	1	\$6,095.00	\$6,095.00							
- Cabinet Foundation	EA	1	\$1,540.00	\$1,540.00							
- 45' Mast Arm Poles and Foundation	EA	0	\$17,250.00	\$0.00							
- Pedestal Pole (Type III with Foundation)	EA	0	\$3,650.00	\$0.00							
- Two Section Signal Head	EA	2	\$500.00	\$1,000.00							
- One Section Signal Head	EA	6	\$575.00	\$3,450.00	Ramp meter advance signal						
- Signal Cable	LF	190	\$3.16	\$600.88							
SU	BTOTAL			\$80,115.63							
Communications											
- Splice Enclosure	EA	1	\$1,150.00	\$1,150.00	Link to SMFO						
- Pullbox (Special Size)	EA	1	\$2,012.50	\$2,012.50	For splice enclosure						
- Interconnect Center	EA	1	\$1,725.00	\$1,725.00	In cabinet						
- Fiber-optic Drop Cable (six strands)	LF	500	\$1.73	\$862.50	Drop cable to controller cabinet						
- Tracer Wire	LF	500	\$14.00	\$7,000.00							
- Broadband Internet Service	LS	0	\$500.00	\$0.00							
- Ethernet Switch	EA	1	\$1,955.00	\$1,955.00							
- CCTV Pole (55' Wood)	EA	1	\$4,600.00	\$4,600.00							
- CCTV Cabinet (Pole Mount, Type 336)	EA	1	\$3,300.00	\$3,300.00							
- CCTV Assembly	EA	1	\$4,600.00	\$4,600.00							
SU	BTOTAL			\$27,205.00							
Pavement Marking											
i aveilletti markitig		L									

Log No.: 129 Ramp: I-85 Southbound

		Categories Unit Quantity Unit Cost Total Cost Accumutions									
Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions						
- Pavement Marking Removal	LF	0	\$0.71	\$0.00	To narrow lanes, 50 PMH design speed, maintain one edgeline, pave over other edgeline						
- Raised Pavement Markers	EA	3	\$5.18	\$15.53	Along skip line only						
- White Edge Line	LF	400	\$1.09	\$437.00	200' transitions, 100' narrowed lane, 50 MPH						
- Yellow Edge Line	LF	600	\$1.09	\$655.50	200' transitions, 100' narrowed lane, 50 MPH						
- White Skip Line	LF	200	\$0.28	\$55.20							
- 24" Stop Bar	LF	32	\$8.05	\$257.60							
SU	BTOTAL	•		\$1,420.83							
Signing											
- W3-7, Ramp Meter Ahead	EA	2	\$747.50	\$1,495.00	Sign and post only						
- W3-8, Ramp Metered When Flashing	EA	2	\$747.50	\$1,495.00	Sign and post only						
- R10-6R and R10-6L, Stop Here on Red	EA	2	\$201.25	\$402.50	Pedestal mounted						
- R10-28, One Vehicle Per Green	EA	2	\$201.25	\$402.50	Pedestal mounted						
- W4-1L, Merge Left	EA	2	\$747.50	\$1,495.00							
- Sign Structure (Cantilever)	EA	2	\$57,500.00	\$115,000.00							
- Ramp Meter On Sign (Message A)	EA	1	\$5,750.00	\$5,750.00							
- Ramp Meter On Sign (Message B)	EA	1	\$5,750.00	\$5,750.00							
SU	BTOTAL			\$131,790.00							
SUBTOTAL CONSTRUCTI	ON			\$260,919.37							
Traffic Control	15%			\$39,137.91	-						
Contingencies	10%			\$26,091.94							
TOTAL CONSTRUCTION	1 3,72	I	<u>I</u>	\$326,149.21	-						
				<u>, , </u>	-						

Log No.: 129 Ramp: I-85 Southbound

Categories Descriptions	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Design	8%			\$26,091.94	
Construction Administration	10%			\$32,614.92	
TOTAL DESIGN AND CON					

Appendix B. Sensitivity Calculations

B.1. Benefit Cost Appraisal over 5-Year Period for Each Site – 10% Delay Reduction

		1070 Delay							
Log	Freeway	Cross Street	Exit	Direction	County	Cumulative Cost in Period	Cumulative Benefit in Period	BCR in Period	FYRR
102	I-77	Nations Ford Rd	4	SB	Mecklenburg	\$195,701	\$6,565,415	33.55	708%
129	I-77	I-85 SB	13	NB	Mecklenburg	\$426,356	\$11,876,677	27.86	504%
105	I-77	Tyvola Rd	5	NB	Mecklenburg	\$219,430	\$5,910,650	26.94	535%
111	I-77	Remount Rd	8	SB	Mecklenburg	\$199,870	\$4,626,414	23.15	455%
145	I-77	US 21 (Catawba Ave)	28	NB		\$211,718	\$4,341,321	20.51	386%
093	I-77	Westinghouse Blvd	1A	SB	Mecklenburg	\$621,695	\$10,600,628	17.05	260%
147	I-77	Goodrum Rd / Griffith St	30	NB		\$251,413	\$3,507,442	13.95	221%
143	I-77	NC 73 (Sam Furr Rd)	25	NB		\$249,550	\$2,596,585	10.41	140%
067	I-85	Sugar Creek Rd	41	NB		\$237,275	\$2,429,189	10.24	138%
104	I-77	Tyvola Rd	5	SB		\$300,680	\$3,140,318	10.44	135%
234	I-485	Rea Rd	59	Outer		\$238,814	\$2,084,875	8.73	103%
233	I-485	NC 16 (Providence Rd)	57	Inner		\$280,720	\$2,329,956	8.30	88%
035	I-85	Belmont- Mt. Holly Rd	26	SB		\$220,958	\$1,842,214	8.34	96%
230	I-485	NC 16 (Providence Rd)	57	Outer		\$307,683	\$2,167,432	7.04	58%
232	I-485	NC 16 (Providence Rd)	57	Outer		\$203,039	\$1,363,635	6.72	61%
231	I-485	NC 16 (Providence Rd)	57	Inner		\$268,169	\$1,611,809	6.01	37%
103	I-77	Nations Ford Rd	4	NB		\$226,512	\$1,312,233	5.79	36%
179	I-485	Steele Creek Rd	4	Inner		\$252,868	\$1,117,163	4.42	2%
237	I-485	Rea Rd	59	Inner		\$239,279	\$950,435	3.97	-8%
236	I-485	Rea Rd	59	Inner		\$240,498	\$832,245	3.46	-20%
101	I-77	Arrowood Rd	3	NB		\$253,327	\$755,999	2.98	-31%
034	I-85	McAdenville Rd	23	NB		\$204,187	\$623,847	3.06	-27%
037	I-85	Beatty Dr / Park St	27	SB		\$250,200	\$707,626	2.83	-35%
097	I-77	I-485	1B	SB		\$534,644	\$1,384,428	2.59	-45%
140	I-77	Gilead Rd	23	NB		\$268,522	\$609,795	2.27	-48%
032	I-85	S Main St	22	NB		\$180,599	\$416,634	2.31	-43%
177	I-485	Steele Creek Rd	4	Inner		\$273,828	\$596,430	2.18	-50%
064	I-85	Graham St	40	SB		\$239,395	\$496,804	2.08	-52%
146	I-77	Goodrum Rd / Griffith St	30	SB		\$227,259	\$404,604	1.78	-58%
239	I-485	US 521 (Johnston Rd)	61	Outer		\$238,470	\$308,521	1.29	-70%
182	I-485	US 74 / US 29 (Wilkinson Blvd)	9	Outer		\$310,755	\$223,887	0.72	-84%
181	I-485	West Blvd	6	Inner		\$251,646	\$164,029	0.65	-85%

Log	Freeway	Cross Street	Exit	Direction	County	Cumulative Cost in Period	Cumulative Benefit in Period	BCR in Period	FYRR
075	I-85	Mallard Creek Rd	46	NB		\$264,262	\$142,512	0.54	-88%
229	I-485	E John St	52	Inner		\$245,419	\$109,289	0.45	-90%
175	I-485	Arrowood Rd	3	Inner		\$643,763	\$168,371	0.26	-94%
072	I-85	Harris Blvd	45	SB		\$231,555	\$41,980	0.18	-96%
030	I-85	Cox Rd	21	NB		\$235,347	\$23,574	0.10	-98%
250	US-74	Briar Creek Road/Television Lane	244	WB		\$234,844	\$0	0.00	-100%

B.2. Benefit Cost Appraisal over 10-Year Period for Each Site – 10% Delay Reduction

Log	Freeway	Cross Street	Exit	Direction	Cumulative Cost in Period	County	Cumulative Benefit in Period	BCR in Period	FYRR
102	I-77	Nations Ford Rd	4	SB	\$237,201	Mecklenburg	\$13,130,831	55.36	708%
129	I-77	I-85 SB	13	NB	\$467,856		\$23,753,353	50.77	504%
105	I-77	Tyvola Rd	5	NB	\$260,930		\$11,821,301	45.30	535%
111	I-77	Remount Rd	8	SB	\$241,370		\$9,252,828	38.33	455%
145	I-77	US 21 (Catawba Ave)	28	NB	\$253,218		\$8,682,642	34.29	386%
093	I-77	Westinghouse Blvd	1A	SB	\$663,195		\$21,201,256	31.97	260%
147	I-77	Goodrum Rd / Griffith St	30	NB	\$292,913		\$7,014,884	23.95	221%
143	I-77	NC 73 (Sam Furr Rd)	25	NB	\$291,050		\$5,193,170	17.84	140%
067	I-85	Sugar Creek Rd	41	NB	\$278,775		\$4,858,378	17.43	138%
104	I-77	Tyvola Rd	5	SB	\$342,180		\$6,280,635	18.35	135%
234	I-485	Rea Rd	59	Outer	\$280,314		\$4,169,750	14.88	103%
233	I-485	NC 16 (Providence Rd)	57	Inner	\$322,220		\$4,659,912	14.46	88%
035	I-85	Belmont-Mt. Holly Rd	26	SB	\$262,458		\$3,684,428	14.04	96%
230	I-485	NC 16 (Providence Rd)	57	Outer	\$349,183		\$4,334,864	12.41	58%
232	I-485	NC 16 (Providence Rd)	57	Outer	\$244,539		\$2,727,270	11.15	61%
231	I-485	NC 16 (Providence Rd)	57	Inner	\$309,669		\$3,223,619	10.41	37%
103	I-77	Nations Ford Rd	4	NB	\$268,012		\$2,624,466	9.79	36%
179	I-485	Steele Creek Rd	4	Inner	\$294,368		\$2,234,327	7.59	2%
237	I-485	Rea Rd	59	Inner	\$280,779		\$1,900,870	6.77	-8%
236	I-485	Rea Rd	59	Inner	\$281,998		\$1,664,490	5.90	-20%
101	I-77	Arrowood Rd	3	NB	\$294,827		\$1,511,998	5.13	-31%
034	I-85	McAdenville Rd	23	NB	\$245,687		\$1,247,694	5.08	-27%
037	I-85	Beatty Dr / Park St	27	SB	\$291,700		\$1,415,252	4.85	-35%
097	I-77	I-485	1B	SB	\$576,144		\$2,768,855	4.81	-45%
140	I-77	Gilead Rd	23	NB	\$310,022		\$1,219,590	3.93	-48%
032	I-85	S Main St	22	NB	\$222,099		\$833,267	3.75	-43%
177	I-485	Steele Creek Rd	4	Inner	\$315,328		\$1,192,859	3.78	-50%
064	I-85	Graham St	40	SB	\$280,895		\$993,608	3.54	-52%
146	I-77	Goodrum Rd / Griffith St	30	SB	\$268,759		\$809,207	3.01	-58%
239	I-485	US 521 (Johnston Rd)	61	Outer	\$279,970		\$617,042	2.20	-70%
182	I-485	US 74 / US 29 (Wilkinson Blvd)	9	Outer	\$352,255		\$447,774	1.27	-84%
181	I-485	West Blvd	6	Inner	\$293,146		\$328,058	1.12	-85%
075	I-85	Mallard Creek Rd	46	NB	\$305,762		\$285,024	0.93	-88%
229	I-485	E John St	52	Inner	\$286,919		\$218,577	0.76	-90%

Log	Freeway	Cross Street	Exit	Direction	Cumulative Cost in Period	County	Cumulative Benefit in Period	BCR in Period	FYRR
175	I-485	Arrowood Rd	3	Inner	\$685,263		\$336,742	0.49	-94%
072	I-85	Harris Blvd	45	SB	\$273,055		\$83,960	0.31	-96%
030	I-85	Cox Rd	21	NB	\$276,847		\$47,147	0.17	-98%
250	US-74	Briar Creek Road/Television Lane	244	WB	\$276,344		\$0	0.00	-100%

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