

APPENDIX B
DESIGN CRITERIA FOR THE FUNCTIONAL
ENGINEERING DESIGNS

PROPOSED DESIGN CRITERIA

STATE PROJECT:
F. A. PROJECT:
COUNTY: Mecklenburg/Union **DIVISION:** 10
PROJECT DESCRIPTION: Monroe Connector/Bypass between I-485 west of Charlotte in Mecklenburg County to US 74 near Marshville in Union County
(Traffic Alternative 1A)
PREPARED BY: PBS&J

TIP: R-3329 / R-2559
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DATE: March 17, 2008

ROUTE LINE	Monroe Conn/Bypass -L-	I-485	US 74 (West End)	US 74 (East End)	Union West
TRAFFIC DATA					Seg. 2
ADT LET YR = 2013					
ADT DESIGN YR = 2035	51,500	115,900	79,600	37,100	1,000
TTST	5%	5%	5%	5%	1%
DUALS	8%	10%	8%	8%	3%
DHV	10%	8%	8%	8%	9%
DIR	60%	55%	55%	55%	55%
CLASSIFICATION	Freeway	Interstate	Rural Arterial	Rural Arterial	Rural Local
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling
DESIGN SPEED km/hr or mph	70 mph	70 mph	60 mph	60 mph	50 mph
POSTED SPEED km/hr or mph	65 mph	65 mph	55 mph	55 mph	45 mph
PROP. R/W WIDTH m or ft	300 ft	300 ft	150 ft	150 ft	80 ft
CONTROL OF ACCESS	Full	Full	Partial	Partial	N
RUMBLE STRIPS (Y/N)	Y	Y	N	N	N
TYPICAL SECTION TYPE	4-lane divided	4-lane divided	4-lane divided	4-lane divided	2-lane shld
LANE WIDTH m or ft	12 ft	12 ft	12 ft	12 ft	12 ft
SIDEWALKS (Y/N)	N	N	N	N	N
BICYCLE LANES (Y/N)	N	N	N	N	N
MEDIAN WIDTH m or ft	70 ft	70 ft	30 ft	46 ft	N/A
MED. PROTECT. (GR/BARRIER)	Guiderail	Guiderail	N/A	N/A	N/A
SHOULDER WIDTH (total)					
MEDIAN m or ft	12 ft	12 ft	6 ft	6 ft	N/A
OUTSIDE w/o GR m or ft	14 ft	14 ft	12 ft	10 ft	6 ft
OUTSIDE w/ GR m or ft	17 ft	17 ft	15 ft	13 ft	9 ft
PAVED SHOULDER					
OUTSIDE TOTAL/FDPS m or ft	12 ft/ 12 ft	12 ft/ 12 ft	10 ft / 4 ft	10 ft / 4 ft	TURF
MEDIAN TOTAL/FDPS m or ft	4 ft/ 4 ft	4 ft/ 4 ft	4 ft/ 4 ft	4 ft/ 4 ft	N/A
GRADE					
MAX.	4%	4%	4%	4%	8%
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%
K VALUE					
SAG	181	181	136	136	96
CREST	247	247	151	151	84
HORIZ. ALIGN.					
MAX. SUPER.	8%	10%	8%	8%	6%
MIN. RADIUS m or ft	1,810	1,630	1,200	1,200	833
SPIRAL (Y/N)	Y	Y	Y	Y	N
CROSS SLOPES					
PAVEMENT	2%	2%	2%	2%	2%
PAVED SHOULDER	2%Median/4%Outside	2%Median/4%Outside	2% / 4%	2% / 4%	N/A
TURF SHOULDER	8%Median/4%Outside	8%Median/4%Outside	8%Median/4%Outside	8%Median/4%Outside	8%
MEDIAN DITCH	8:1	8:1	5:1	6:1	N/A
DITCH TYPICAL (A,B,C)	A	A	A	A	C
CLEAR ZONE m or ft					
TYPICAL SECTION NO.					

General Note: Accommodate for future loops at all diamond interchanges

Note 3: The median outside the ramp terminals will transition out in the future to the desirable 23' raised median

PROPOSED DESIGN CRITERIA

TIP: R-3329 / R-2559

ROUTE LINE	SR 1365 Stallings Road	SR 1520 Indian Trail Fairview	SR 1367 Unionville-Indian Trail	SR 1514 Rocky River Road	US 601 Concord Highway
TRAFFIC DATA	Seg. 1, 18A	Seg. 2, 18A	Seg. 22A, 30	Seg. 22A, 30	Seg. 31
ADT LET YR = 2013					
ADT DESIGN YR = 2035	11,500	22,700	20,200	17,000	53,900
TTST	1%	1%	1%	1%	7%
DUALS	3%	8%	3%	3%	8%
DHV	11%	9%	9%	9%	8%
DIR	60%	65%	60%	60%	55%
CLASSIFICATION	Rural Collector	Rural Collector	Rural Collector	Rural Collector	Rural Arterial
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling
DESIGN SPEED km/hr or mph	50 mph	50 mph	50 mph	50 mph	50 mph
POSTED SPEED km/hr or mph	45 mph	45 mph	45 mph	45 mph	45 mph
PROP. R/W WIDTH m or ft	80 ft	110 ft	110 ft	110 ft	120 ft
CONTROL OF ACCESS	N	N	N	N	Partial
RUMBLE STRIPS (Y/N)	N	N	N	N	N
TYPICAL SECTION TYPE	2-lane shld	4-lane divided	4-lane divided	4-lane divided	4-lane divided
LANE WIDTH m or ft	12 ft	12 ft	12 ft	12 ft	12 ft
SIDEWALKS (Y/N)	N	N	N	N	N
BICYCLE LANES (Y/N)	N	N	N	N	N
MEDIAN WIDTH m or ft	N/A	23 ft	23 ft	23 ft	17.5 ft
MED. PROTECT. (GR/BARRIER)	N/A	N/A	N/A	N/A	N/A
SHOULDER WIDTH (total)					
MEDIAN m or ft	N/A	1'-6" C&G	1'-6" C & G	1'-6" C & G	1'-6" C & G
OUTSIDE w/o GR m or ft	8 ft	8 ft	8 ft	8 ft	10 ft
OUTSIDE w/ GR m or ft	11 ft	11 ft	11 ft	11 ft	13 ft
PAVED SHOULDER					
OUTSIDE TOTAL/FDPS m or ft	4 ft/ 4 ft	4 ft/ 4 ft	4 ft/ 4 ft	4 ft/ 4 ft	10 ft / 4 ft
MEDIAN TOTAL/FDPS m or ft	N/A	1'-6" C&G	1'-6" C & G	1'-6" C & G	1'-6" C & G
GRADE					
MAX.	7%	7%	7%	7%	4%
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%
K VALUE					
SAG	96	96	96	96	136
CREST	84	84	84	84	151
HORIZ. ALIGN.					
MAX. SUPER.	8%	8%	8%	8%	8%
MIN. RADIUS m or ft	758	758	758	758	1,200
SPIRAL (Y/N)	N	N	N	N	Y
CROSS SLOPES					
PAVEMENT	2%	2%	2%	2%	2%
PAVED SHOULDER	2%	2%	2%	2%	2% / 4%
TURF SHOULDER	8%	8%	8%	8%	4%
MEDIAN DITCH	N/A	N/A	N/A	N/A	N/A
DITCH TYPICAL (A,B,C)	B	B	B	B	A
CLEAR ZONE m or ft					
TYPICAL SECTION NO.					

General Note: Accommodate for future loops at all diamond interchanges

Note 1: 2004 AASHTO page 220 exhibit 3-51 case II vehicle A; 26 ft for two-lane loops (13 ft lanes)

Note 2: R = 230 ft per NCDOT Roadway Design Manual. R = 213 ft per 2004 Green Book

Note 3: The median outside the ramp terminals will transition out in the future to the desirable 23' raised median

PROPOSED DESIGN CRITERIA

TIP: R-3329 / R-2559

ROUTE LINE	NC 200 Morgan Mill Road	SR 1758 Austin Chaney Road	SR 1754 Forest Hills School	Loops	Ramps
TRAFFIC DATA	Seg. 34, 36	Seg. 34, 36	Seg. 40, 41		
ADT LET YR = 2013					
ADT DESIGN YR = 2035	20,700	17,400	1,700		
TTST	3%	1%	1%		
DUALS	10%	3%	3%		
DHV	8%	9%	9%	10%	10%
DIR	60%	55%	55%	60%	60%
CLASSIFICATION	Rural Arterial	Rural Collector	Rural Local		
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling
DESIGN SPEED km/hr or mph	60 mph	50 mph	50 mph	30 mph	60 mph
POSTED SPEED km/hr or mph	55 mph	45 mph	45 mph	N/A	N/A
PROP. R/W WIDTH m or ft	150 ft	150 ft	80 ft	100 ft	100 ft
CONTROL OF ACCESS	Partial	N	N	Full	Full
RUMBLE STRIPS (Y/N)	N	N	N	N	N
TYPICAL SECTION TYPE	4-lane divided	4-lane divide	2-lane shld	1-lane	1-lane shld
LANE WIDTH m or ft	12 ft	12 ft	12 ft	18 ft (note 1)	16 ft
SIDEWALKS (Y/N)	N	N	N	N	N
BICYCLE LANES (Y/N)	N	N	N	N	N
MEDIAN WIDTH m or ft	23 ft	23 ft	N/A	N/A	N/A
MED. PROTECT. (GR/BARRIER)	N/A	N/A	N/A	N/A	N/A
SHOULDER WIDTH (total)					
MEDIAN m or ft	1'-6" C & G	1'-6" C & G	N/A	14 ft BERM	12 ft
OUTSIDE w/o GR m or ft	8 ft	8 ft	6 ft	12 ft	14 ft
OUTSIDE w/ GR m or ft	11 ft	11 ft	9 ft	N/A	17 ft
PAVED SHOULDER					
OUTSIDE TOTAL/FDPS m or ft	4 ft/ 4 ft	4 ft/ 4 ft	TURF	4 ft/ 4 ft	4 ft/ 4 ft
MEDIAN TOTAL/FDPS m or ft	1'-6" C & G	1'-6" C & G	N/A	2'-6" C & G	4 ft/ 4 ft
GRADE					
MAX.	4%	7%	8%	10%	4%
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%
K VALUE					
SAG	136	96	96	37	136
CREST	151	84	84	19	151
HORIZ. ALIGN.					
MAX. SUPER.	8%	8%	6%	8%	8%
MIN. RADIUS m or ft	1,200	758	833	230 ft (note 2)	1,200 ft
SPIRAL (Y/N)	Y	N	N	Y	Y
CROSS SLOPES					
PAVEMENT	2%	2%	2%	2%	2%
PAVED SHOULDER	2%	2%	N/A	2%	2%
TURF SHOULDER	8%	8%	8%	8%	8%
MEDIAN DITCH	N/A	N/A	N/A	N/A	N/A
DITCH TYPICAL (A,B,C)	B	B	C	A	A
CLEAR ZONE m or ft					
TYPICAL SECTION NO.					

General Note: Accommodate for future loops at all diamond interchanges

Note 1: 2004 AASHTO page 220 exhibit 3-51 case II vehicle C; 22 ft for one-lane loop minus paved shoulder (18 ft lane)

Note 2: R = 230 ft per NCDOT Roadway Design Manual. R = 213 ft per 2004 Green Book

Note 3: The median outside the ramp terminals will transition out in the future to the desirable 23' raised median

PROPOSED DESIGN CRITERIA

TIP: R-3329 / R-2559

ROUTE LINE	Misc. Collector Rds	Misc. Local Rds
TRAFFIC DATA		
ADT LET YR = 2013		
ADT DESIGN YR = 2035		
TTST		
DUALS		
DHV		
DIR		
CLASSIFICATION		
	Collector	Local
TERRAIN TYPE		
	Rolling	Rolling
DESIGN SPEED km/hr or mph	50 to 60 mph	30 to 60 mph
POSTED SPEED km/hr or mph	45 to 55 mph	25 to 55 mph
PROP. R/W WIDTH m or ft		
CONTROL OF ACCESS		
	N	N
RUMBLE STRIPS (Y/N)		
	N	N
TYPICAL SECTION TYPE		
	2-lane shld	2-lane shld
LANE WIDTH m or ft		
	9-12 ft	9-12 ft
SIDEWALKS (Y/N)		
	N	N
BICYCLE LANES (Y/N)		
	N	N
MEDIAN WIDTH m or ft		
	N/A	N/A
MED. PROTECT. (GR/BARRIER)		
	N/A	N/A
SHOULDER WIDTH (total)		
MEDIAN m or ft		
	N/A	N/A
OUTSIDE w/o GR m or ft		
	2-8 ft	2-8 ft
OUTSIDE w/ GR m or ft		
	7-11 ft	7-11 ft
PAVED SHOULDER		
OUTSIDE TOTAL/FDPS m or ft		
	0' - 4 ft/ 4 ft	0' - 4 ft/ 4 ft
MEDIAN TOTAL/FDPS m or ft		
	N/A	N/A
GRADE		
MAX.		
	6-10%	6-10%
MIN.		
	0.3%	0.3%
K VALUE		
SAG		
	96 to 136	37 to 136
CREST		
	84 to 151	19 to 151
HORIZ. ALIGN.		
MAX. SUPER.		
	8%	6%
MIN. RADIUS m or ft		
	758 to 1,200	231 to 1,330
SPIRAL (Y/N)		
	N	N
CROSS SLOPES		
PAVEMENT		
	2%	2%
PAVED SHOULDER		
	2%	2%
TURF SHOULDER		
	8%	8%
MEDIAN DITCH		
	N/A	N/A
DITCH TYPICAL (A,B,C)		
	B	C
CLEAR ZONE m or ft		
TYPICAL SECTION NO.		

General Note: Dimensions will vary on miscellaneous Collector and Local routes depending on design year ADT.