CITY OF Midland

APPENDIX F

DESIGN CRITERIA

EASTMAN AVE CORRIDOR STUDY
Design Criteria

Designed By: SPR Date: 11-8-05
Checked by: AJI Date: 11-8-05

Item	Criteria	Reference
General - MDOT Standard Roadway Criteria		
3R/4R	4R	RDM 3.08.01B
NHS	No	www.mdot.state.mi.us/maps/nfc/nhsstate.cfm
Design Units	English	Scope Verification
Roadway Classification	Urban Principal/Minor Arterial	NFC map - NFC04_Midland.pdf
Design Speed	50 MPH	Posted + 5 MPH
Existing Posted Speed	45 MPH	Observed
Design Vehicle	WB-62	City of Midland
Total ADT	38,177	City of Midland
Directional ADT	20,625 NB/17,552 SB	City of Midland
Roundabout Design	Various	FHWA/Ourston
Mainline Typical Sections		
Existing Crown Location	Center of Roadway	
Pavement Crosslope	1.5-2%	AASHTO pg. 450
Lane Width (ft) - Roadway	12'	AASHTO pg. 452
Lane Width (ft) - Ramp	16'	RDM 3.07.02E
Maximum Shoulder Rollover	6% DES, 8% max/6% DES, 7% max	RDM 3.11.03E/AASHTO p311 & p320
Shoulder Width - Roadway	Width of Usable Shoulder - 8'	AASHTO pg. 452
Shoulder Slope	4%	AASHTO p.320, Standard Plans R-107E
Superelevation	7% Max	RDM 3.04, Standard Plans R-107E
Foreslope	1:4 or Flatter	RDM 3.11.03I
Backslope	1:4 or Flatter	RDM 2.03.01
Clear Zone Distance	Varies for Fill/Cut, Foreslope, ADT	RDM 7.01.11
Curb and Gutter	Barrier Curb allowed for Speed Limit 45 MPH or less	RDM 6.06.06
Vertical Alignment		
Minimum Grade (Curbed)	0.25% min (0.4% Des)	RDM 2.02.01
Maximum Grade	3%	RDM 2.02.01
Stopping Sight Distance - 50 mph	SSD = 425', K = 84 Crest, 96 Sag	AASHTO pg. 274, 280
Bridge Under Clearance	14'-6" Min	BDM 7.01.08, RDM 3.11.03J
Horizontal Alignment		
Lane Shift - Speed 45 MPH or Over	Speed x Width / 2	MDOT MOT Typicals - M1e
Lane Shift - Speed Under 45 MPH	Width x Speed^2 / 120	MDOT MOT Typicals - M1e
Median Width	See Attached	MDOT GDG VII-670C
Cover for Storm Sewer	3' min	RDM 4.02.08, Stand Specs 402.01
Cover for Culverts	2' min	General Practice
Cover for Watermain	5' min	General Practice
Ramp By-Pass		
Taper Rate		
Ramp Entrance	1:30	GDG VII=101D, Below 50 MPH
Ramp Exit	1:20	GDG VII=110D, Below 50 MPH
Compound Curves (in same direction)	Radii Ratio 2:1	RDM 3.0301 C

AASHTO: A Policy on Geometric Design of Highways and Streets, 2004
RDM: MDOT Road Design Manual
BDG: MDOT Bridge Design Guide
Stand Specs: MDOT 2003 Standard Specifications for Construction
GDG: MDOT Geometric Design Guide
FHWA/Ourston - FHWA - Roundabouts: An Informational Guide - FHWA-RD-00-067, 2000/Ourston - Roundabout Design Guidelines

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EASTMAN AVE CORRIDOR STUDY
Design Criteria

Designed By: SPR Date: 11-8-05
Checked by: AJI Date: 11-8-05

Item	Criteria	Reference
General		
3R/4R	4R	RDM 3.08.01B
NHS	No	www.mdot.state.mi.us/maps/nfc/nhsstate.cfm
Design Units	English	Scope Verification
Roadway Classification	Local Road	NFC map - NFC04_Midland.pdf
Design Speed	30 MPH	Posted + 5 MPH
Existing Posted Speed	25 MPH	Observed
Design Vehicle	WB-62	City of Midland
Total ADT (2003)	Assume > 2000	
Directional ADT	Assume > 2000	
Roundabout Design	Various	FHWA/Ourston
Mainline Typical Sections		
Existing Crown Location	Center of Roadway	
Pavement Crosslope	1.5-2%	AASHTO pg. 450
Lane Width (ft) - Roadway	12'	AASHTO pg. 452
Lane Width (ft) - Ramp	16'	RDM 3.07.02E
Maximum Shoulder Rollover	6% DES, 8% max/6% DES, 7% max	RDM 3.11.03E/AASHTO p311 & p320
Shoulder Width - Roadway	Width of Usable Shoulder - 8'	AASHTO pg. 452
Shoulder Slope	4%	AASHTO p.320, Standard Plans R-107E
Superelevation	7% Max	RDM 3.04, Standard Plans R-107E
Foreslope	1:4 or Flatter	RDM 3.11.03I
Backslope	1:4 or Flatter	RDM 2.03.01
Clear Zone Distance	Varies for Fill/Cut, Foreslope, ADT	RDM 7.01.11
Curb and Gutter	Barrier Curb allowed for Speed Limit 45 MPH or less	RDM 6.06.06
Vertical Alignment		
Minimum Grade (Curbed)	0.25% min (0.4% Des)	RDM 2.02.01
Maximum Grade	3%	RDM 2.02.01
Stopping Sight Distance - 30 mph	SSD = 200', K = 19 Crest, 37 Sag	AASHTO pg. 274, 280
Horizontal Alignment		
Lane Shift - Speed 45 MPH or Over	Speed x Width / 2	MDOT MOT Typicals - M1e
Lane Shift - Speed Under 45 MPH	Width x Speed^2 / 120	MDOT MOT Typicals - M1e
Median Width	See Attached	MDOT GDG VII-670C
Cover for Storm Sewer	3' min	RDM 4.02.08, Stand Specs 402.01
Cover for Culverts	2' min	General Practice
Cover for Watermain	5' min	General Practice
Ramp By-Pass		
Taper Rate		
Ramp Entrance	1:30	GDG VII=101D, Below 50 MPH
Ramp Exit	1:20	GDG VII=110D, Below 50 MPH
Compound Curves (in same direction)	Radii Ratio 2:1	RDM 3.0301 C

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Item	Criteria	Reference
General		
3R/4R	4R	RDM 3.08.01B
NHS	No	www.mdot.state.mi.us/maps/nfc/nhsstate.cfm
Design Units	English	Scope Verification
Roadway Classification	Local Road	NFC map - NFC04_Midland.pdf
Design Speed	35 MPH	Posted + 5 MPH
Existing Posted Speed	30 MPH	Observed
Design Vehicle	WB-62	City of Midland
Total ADT	10,522	City of Midland
Directional ADT	5,261 EB/WB	City of Midland
Roundabout Design	Various	FHWA/Ourston
Mainline Typical Sections		
Existing Crown Location	Center of Roadway	
Pavement Crosslope	1.5-2%	AASHTO pg. 450
Lane Width (ft) - Roadway	12'	AASHTO pg. 452
Maximum Shoulder Rollover	6% DES, 8% max/6% DES, 7% max	RDM 3.11.03E/AASHTO p311 & p320
Shoulder Width - Roadway	Width of Usable Shoulder - 8'	AASHTO pg. 452
Shoulder Slope	4%	AASHTO p.320, Standard Plans R-107E
Superelevation	7% Max	RDM 3.04, Standard Plans R-107E
Foreslope	1:4 or Flatter	RDM 3.11.03I
Backslope	1:4 or Flatter	RDM 2.03.01
Clear Zone Distance	Varies for Fill/Cut, Foreslope, ADT	RDM 7.01.11
Curb and Gutter	Barrier Curb allowed for Speed Limit 45 MPH or less	RDM 6.06.06
Vertical Alignment		
Minimum Grade (Curbed)	0.25% min (0.4% Des)	RDM 2.02.01
Maximum Grade	3%	RDM 2.02.01
Stopping Sight Distance - 35 mph	SSD = 250', K = 29 Crest, 49 Sag	AASHTO pg. 274, 280
Horizontal Alignment		
Lane Shift - Speed 45 MPH or Over	Speed x Width / 2	MDOT MOT Typicals - M1e
Lane Shift - Speed Under 45 MPH	Width x Speed^2 / 120	MDOT MOT Typicals - M1e
Median Width	See Attached	MDOT GDG VII-670C
Cover for Storm Sewer	3' min	RDM 4.02.08, Stand Specs 402.01
Cover for Culverts	2' min	General Practice
Cover for Watermain	5' min	General Practice
Design for Low-Speed Urban Streets*		
Min Radius Normal Crown - 35 mph	510'	AASHTO pg. 151

* UTILIZED WHERE STANDARD MDOT ROADWAY DESIGN CRITERIA IS NOT PRACTICAL

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Lane Width (ft) - Roadway	12'	AASHTO pg. 452
Maximum Shoulder Rollover	6% DES, 8% max/6% DES, 7% max	RDM 3.11.03E/AASHTO p311 & p320
Shoulder Width - Roadway	Width of Usable Shoulder - 8'	AASHTO pg. 452
Shoulder Width - Ramp Outside	8' (7' paved)	A
Shoulder Width - Ramp Inside	6' (4' paved)	MDOT Standard Plans R-110
Shoulder Slope	4%	AASHTO p.320, Standard Plans R-107E
Superelevation	7% Max	RDM 3.04, Standard Plans R-107E
Foreslope	1:4 or Flatter	RDM 3.11.03I
Backslope	1:4 or Flatter	RDM 2.03.01
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