

**APPENDIX C**  
**EVALUATION OF GEOMETRIC DESIGN ISSUES**

.

**RED FLAG SUMMARY REPORT**

**HAM-32F-0.00**  
**PID 86461**

**RELOCATED SR-32 SEGMENT 1**

**RED BANK CORRIDOR IMPROVEMENTS**

**EASTERN CORRIDOR MULTIMODAL PROJECTS**

**HAMILTON COUNTY, OHIO**



URS Corporation  
564 White Pond Dr.  
Akron, OH 44320

DESIGN CRITERIA

RED BANK EXPRESSWAY (CR 67) (Future SR 32)

Current (CR 67) Urban Principal Arterial

(NOT Expressway: Some segments divided & some not, only one grade separation)

Design speed= \_\_\_mph, Posted speed= 35mph (southern) 45mph (northern).

Future (SR 32) Urban Principal Arterial

(MAY or MAY NOT be "Expressway": anticipated divided, but percent of grade separations unknown, See ORC 4511.01(ZZ) )

Design speed= 45mph, Legal & Posted speed= 45mph.

ADT=\_\_\_; DHV=\_\_\_; T24(%) =200±.

KEY HIGHWAY DESIGN FEATURES NORMAL DESIGN CRITERIA See L&D Fig. 105-1, & Section 900	SPECIFIC DETAILS	NORMAL DESIGN CRITERIA	EXISTING DATA	STATUS
<b>Lane Width</b> Sect.301.1.2, 303.1; Fig. 301-2, 301-4, 303-1	Lane Width	Preferred: all 12' Expressway: 12' Min. Arterial: 11' Min w/ one 12' each direction	12', 11' Lt (R3 Northward) 11', 11' Lt. (N of Erie Ave.) 10' (under Erie Ave.) 12', 12' Aux. (S of Erie Ave.)	NO
<b>Graded/Curbed Shoulder Width</b> Sect.301.2.3, 303.1; Fig. 301-3, 301-4, 303-1	Divided, Paved & Curbed	Right side: 10' Median: 2 Thru Lanes each dir.: 4' 3 Thru Lanes each dir.: 10' Arterial, 45mph: 1'-2'	0' E/P - F/C (N of Hetzel) 1' E/P - F/C (N of Erie) 0' E/P - F/C (under Erie) 2' E/P - F/C (S of Erie) (Ex. GR is NOT at F/C)	NO
<b>Bridge Width</b> Sect. 302.1; Fig. 302-1, -2, -3	Lateral Clearance	NA	NA	OK
<b>Structural Capacity</b> Sect. 302.1; See Bridge Design Manual	Min. Design Loading	NA	NA	OK
<b>Horizontal Alignment</b> see below	---	---	---	NO
<b>Excessive Deflections</b> Sect. 202.2; Fig. 202-1	Max. Deflection	1d 45'	Unknown	OK
<b>Degree of Curve or Radius</b> Sect. 202.3; Fig. 202-2	Max. Dc or Min. Radius	$Dc \leq 8d \ 00'$ , $R \geq 716'$	R1 1910' (near I-71) R2 1800' (near Duck Cr.) R3 1500' (S of Madison) R4 1200' (at Hetzel St.) R5 900' (at Brotherton Ct.) <b>R6 500' (S of Erie Ave.)</b> R7 859' (at Regency Dr.) R8 1100' (at Shannon Way) R9 1100' (at Fair Ln.)	NO
<b>Lack of Spirals</b> Sect. 202.5, Fig. 202-11	v = 45mph	None Required	None	OK
<b>Transition (Taper) Rates</b> Sect. 301.1.4	Shifting / Narrowing Rate	45 :1	21 :1 (NB S of Erie Ave.)	NO
<b>Intersection Angles</b> Sect. 401.3; Fig. 401-1	Unsignalized Angle Signalized Angle	70d, or 60d RF 60d Min.	Unsignalized $\geq 70d$ Signalized $\geq 60d$	OK
<b>Vertical Alignment</b> Sect. 203; see below	Sag A=4.53%(N/ DuckCr.) Sag A=2.38%(N/ Brother.) Crest A=7.18%(Brother.) Crest A=4.00%(Regency) SagA=2.62%(N/Shannon)	Sag K=79, L=358' Min Sag K=79, L=135' Min* Crest K=61, L=438' Min Crest K=61, L=181' Min Sag K=79, L=135' Min* *based on 3 x Vmph	<b>Sag K=44, L=200'</b> <b>Sag K=42, L=100'</b> <b>Crest K=42, L=300'</b> <b>Crest K=37, L=150'</b> Sag K=57, L=150'	NO NO
<b>Grade Breaks</b> Sect. 203.3.2; Fig. 203-2	Max. Grade Break	0.55%	$\leq 1.1\%$ (Madison - Brother.)	NO
<b>Grades</b> Sect. 203.2; Fig. 203-1	Level, Rolling, Hilly	Expressway: 4% Max. Arterial: 6% Max.	$\leq 4\%$	OK

**HAM-32F-0.00**

**DESIGN CRITERIA**

URS # 15017500/15017511

**RED BANK EXPRESSWAY (CR 67) (Future SR 32)**

**Current (CR 67) Urban Principal Arterial**

(NOT Expressway: Some segments divided & some not, only one grade separation)

Design speed= \_\_\_mph, Posted speed= 35mph (southern) 45mph (northern).

**Future (SR 32) Urban Principal Arterial**

(MAY or MAY NOT be "Expressway": anticipated divided, but percent of grade separations unknown, See ORC 4511.01(ZZ) )

Design speed= 45mph, Legal & Posted speed= 45mph.

ADT=\_\_\_; DHV=\_\_\_; T24(%) =200±.

KEY HIGHWAY DESIGN FEATURES NORMAL DESIGN CRITERIA See L&D Fig. 105-1, & Section 900	SPECIFIC DETAILS	NORMAL DESIGN CRITERIA	EXISTING DATA	STATUS
<b>Stopping Sight Distance</b> Sect. 201.2; Fig. 201-1, 203-3, -4, -6, -7	Minimum	360'	Horiz: R1 600' (near I-71) R2 380' (near Duck Cr.) R3 360' (S of Madison) R4 400' (at Hetzel St.) <b>R5 300' (at Brotherton)</b> <b>R6 240' (S of Erie Ave.)</b> R7 600' (at Regency Dr.) R8 600' (at Shannon Way) R9 450' (at Fair Ln.) <b>Vert.= 235' (N/ DuckCr.)</b> Vert.= 506' (N/ Brotherton) <b>Vert.&lt; 300' (Brotherton)</b> <b>Vert.= 345' (Regency)</b> Vert.= 456' (N/ Shannon)	<b>NO</b>
<b>Pavement Cross Slopes</b> Sect. 301.1.5; Fig. 301-6	Normal Cross Slope	0.016	<b>Parabolic± (N of Erie)</b> 0.016 (S of Erie)	<b>NO</b>
<b>Superelevation</b> Sect. 202.4; see below	---	---	---	<b>NO</b>
<b>Maximum Rate</b> Sect.202.4.1 & 4.3; Fig. 202-3, -7 thru -10	Superelevation	R1 NC (near I-71) R2 NC (near Duck Cr.) R3 NC (S of Madison) R4 NC (at Hetzel St.) R5 RC (at Brotherton Ct.) R6 0.040 (S of Erie Ave.) R7 RC (at Regency Dr.) R8 NC (at Shannon Way) R9 NC (at Fair Ln.)	R1 Unknown (near I-71) R2 NC (near Duck Cr.) R3 NC (S of Madison) R4 NC (at Hetzel St.) R5 0.035 (at Brotherton Ct.) <b>R6 NC (S of Erie Ave.)</b> <b>R7 NC (at Regency Dr.)</b> R8 NC (at Shannon Way) R9 NC (at Fair Ln.)	<b>NO</b>
<b>Transition</b> Sect. 202.4.5; Fig. 202-4, -5, -6	$(w \times n_1)(e_a)(G)(b_w)$	G = 185	Unknown	<b>NO</b>
<b>Position</b> Sect. 202.4.6; Fig. 202-5	Percent on Tangent	50% - 70% or on spiral	Unknown	<b>NO</b>
<b>Horizontal Clearance (under bridge)</b> Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	Rt. 10' + Barrier Clearance (possible 2' + Barrier Cl.)	11'± (NB under RR) <b>5'± (under Erie Ave.)</b>	<b>NO</b>
<b>Vertical Clearance</b> Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	Preferred: all 17.0' New/reconstr: 16.5' Min. To Remain: 14.0' Min.	20'± (under RR) <b>Unknown (under Erie)</b>	<b>NO</b>

## DESIGN CRITERIA

### MADISON ROAD (CR 612)

Urban Arterial, Design speed=35mph, Legal & Posted speed=35mph.

ADT=\_\_\_; DHV=\_\_\_; T24(%)=\_\_\_.

KEY HIGHWAY DESIGN FEATURES NORMAL DESIGN CRITERIA See L&D Fig. 105-1, & Section 900	SPECIFIC DETAILS	NORMAL DESIGN CRITERIA	EXISTING DATA	STATUS
<b>Lane Width</b> Sect.301.1.2, 303.1; Fig. 301-2, 301-4, 303-1	Lane Width (Less than 50mph)	Min. One 12' Each Way, otherwise 11' Min.	12' Thru, 11' Turn	OK
<b>Graded Shoulder Width</b> Sect.301.2.3, 303.1; Fig. 301-3, 301-4, 303-1	No curb w/slope > 6:1 Urban, Curbed	1' - 2' paved to F/C	0' to F/C	NO
<b>Bridge Width</b> Sect. 302.1; Fig. 302-1, -2, -3	Lateral Clearance	NA	NA	OK
<b>Structural Capacity</b> Sect. 302.1; See Bridge Design Manual	Min. Design Loading	NA	NA	OK
<b>Horizontal Alignment</b> see below	---	---	---	OK
<b>Excessive Deflections</b> Sect. 202.2; Fig. 202-1	Max. Deflection	2d 45m	Unknown	OK
<b>Degree of Curve or Radius</b> Sect. 202.3; Fig. 202-2	Max. Dc or Min. Radius	Dc= 15d 30m, R=370'	None	OK
<b>Lack of Spirals</b> Sect. 202.5, Fig. 202-11	Spiral ( Y / N )	v < 50mph None Required	NA	OK
<b>Transition (Taper) Rates</b> Sect. 301.1.4	Shifting / Narrowing Rate	S <sup>2</sup> /60= 20.5 :1	30:1	OK
<b>Intersection Angles</b> Sect. 401.3; Fig. 401-1	Unsignalized Angle Signalized Angle	70d, or 60d RF 60d Min.	Unsignalized ≥ 70d Signalized ≥ 60d	OK
<b>Vertical Alignment</b> Sect. 203; see below	Crest A = NA Sag A = Unknown	Crest K= NA, L= NA Sag K= Unk., L= 105'Min.	Crest L None Sag K=Unk., L=Unk.	OK
<b>Grade Breaks</b> Sect. 203.3.2; Fig. 203-2	Max. Grade Break	0.95%	Unknown	OK
<b>Grades</b> Sect. 203.2; Fig. 203-1	Level, Rolling, Hilly	8% Max.	≤ 5% ±	OK
<b>Stopping Sight Distance</b> Sect. 201.2; Fig. 201-1, 203-3, -4, -6, -7	Minimum	250'	Horiz: ≥ 250' Vert: ≥ 250'	OK
<b>Pavement Cross Slopes</b> Sect. 301.1.5; Fig. 301-6	Normal Cross Slope	0.016	Parabolic & Varies	NO
<b>Superelevation</b> Sect. 202.4; see below	---	---	---	OK
<b>Maximum Rate</b> Sect. 202.4.1 & .4.3; Fig. 202-3, -7 thru -10	Superelevation	NA	NA	OK
<b>Transition</b> Sect. 202.4.5; Fig. 202-4, -5, -6	(w x n <sub>1</sub> )(e <sub>d</sub> )(G)(b <sub>w</sub> )	G = 161	NA	OK
<b>Position</b> Sect. 202.4.6; Fig. 202-5	Percent on Tangent	50% - 70% or on spiral	NA	OK
<b>Horizontal Clearance</b> (under bridge) Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	NA	NA	OK
<b>Vertical Clearance</b> Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	16.5' Min, 17.0' Pref.	Unknown (to Utilities)	OK

## DESIGN CRITERIA

### DUCK CREEK ROAD (CR 331)

Urban Collector, Design speed=35mph, Legal & Posted speed=35mph.

ADT=\_\_\_; DHV=\_\_\_; T24(%)=\_\_\_.

KEY HIGHWAY DESIGN FEATURES NORMAL DESIGN CRITERIA See L&D Fig. 105-1, & Section 900	SPECIFIC DETAILS	NORMAL DESIGN CRITERIA	EXISTING DATA	STATUS
<b>Lane Width</b> Sect.301.1.2, 303.1; Fig. 301-2, 301-4, 303-1	Lane Width (Commercial)	11' Min., 12' Pref.	10' Min, 12' Max.	<b>NO</b>
<b>Graded Shoulder Width</b> Sect.301.2.3, 303.1; Fig. 301-3, 301-4, 303-1	No curb w/slope > 6:1 Urban, Curbed	1' - 2' paved to F/C	0' to F/C	<b>NO</b>
<b>Bridge Width</b> Sect. 302.1; Fig. 302-1, -2, -3	Lateral Clearance	NA	NA	OK
<b>Structural Capacity</b> Sect. 302.1; See Bridge Design Manual	Min. Design Loading	NA	NA	OK
<b>Horizontal Alignment</b> see below	---	---	---	OK
<b>Excessive Deflections</b> Sect. 202.2; Fig. 202-1	Max. Deflection	2d 45m	Unknown	OK
<b>Degree of Curve or Radius</b> Sect. 202.3; Fig. 202-2	Max. Dc or Min. Radius	Dc= 15d 30m, R=370'	R= 580'±	OK
<b>Lack of Spirals</b> Sect. 202.5, Fig. 202-11	Spiral ( Y / N )	v < 50mph None Required	None	OK
<b>Transition (Taper) Rates</b> Sect. 301.1.4	Shifting / Narrowing Rate	S <sup>2</sup> /60= 20.5 :1	Unknown	OK
<b>Intersection Angles</b> Sect. 401.3; Fig. 401-1	Unsignalized Angle Signalized Angle	70d, or 60d RF 60d Min.	Unsignalized ≥ 70d Signalized ≥ 60d	OK
<b>Vertical Alignment</b> Sect. 203; see below	Crest A = 10.70% Sag A = 8.0%±	Crest K= 29, L= 310'Min Sag K= 49, L= 392'Min	Crest K=23, L=250' Sag L K=19±, L=155'±	<b>NO NO</b>
<b>Grade Breaks</b> Sect. 203.3.2; Fig. 203-2	Max. Grade Break	0.95%	Unknown	OK
<b>Grades</b> Sect. 203.2; Fig. 203-1	Level, Rolling, Hilly	10% Max.	≤ 8%	OK
<b>Stopping Sight Distance</b> Sect. 201.2; Fig. 201-1, 203-3, -4, -6, -7	Minimum	250'	Horiz: ≥ 250' Vert: ≤ 225'	<b>NO</b>
<b>Pavement Cross Slopes</b> Sect. 301.1.5; Fig. 301-6	Normal Cross Slope	0.016	Parabolic ±	<b>NO</b>
<b>Superelevation</b> Sect. 202.4; see below	---	---	---	OK
<b>Maximum Rate</b> Sect. 202.4.1 & .4.3; Fig. 202-3, -7 thru -10	Superelevation	R=580', NC	NC	OK
<b>Transition</b> Sect. 202.4.5; Fig. 202-4, -5, -6	(w x n <sub>1</sub> )(e <sub>d</sub> )(G)(b <sub>w</sub> )	G = 161	NA	OK
<b>Position</b> Sect. 202.4.6; Fig. 202-5	Percent on Tangent	50% - 70% or on spiral	NA	OK
<b>Horizontal Clearance (under bridge)</b> Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	NA	NA	OK
<b>Vertical Clearance</b> Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	14.5' Min, 15.0' Pref.	Unknown (to Utilities)	OK

## DESIGN CRITERIA

### ERIE AVENUE (CR 608)

Urban Collector, Design speed=35mph, Legal & Posted speed=35mph.

ADT=\_\_\_; DHV=\_\_\_; T24(%)=\_\_\_.

KEY HIGHWAY DESIGN FEATURES NORMAL DESIGN CRITERIA See L&D Fig. 105-1, & Section 900	SPECIFIC DETAILS	NORMAL DESIGN CRITERIA	EXISTING DATA	STATUS
<b>Lane Width</b> Sect.301.1.2, 303.1; Fig. 301-2, 301-4, 303-1	Lane Width (Commercial & Residential)	11' Min., 12' Pref.	Unknown	NO
<b>Graded Shoulder Width</b> Sect.301.2.3, 303.1; Fig. 301-3, 301-4, 303-1	No curb w/slope > 6:1 Urban, Curbed	1' - 2' paved to F/C	Unknown	NO
<b>Bridge Width</b> Sect. 302.1; Fig. 302-1, -2, -3	Lateral Clearance	2' to F/ High Curb or Behind Barrier	Unknown	NO
<b>Structural Capacity</b> Sect. 302.1; See Bridge Design Manual	Min. Design Loading	Bridge Loading	Unknown	OK
<b>Horizontal Alignment</b> see below	---	---	---	OK
<b>Excessive Deflections</b> Sect. 202.2; Fig. 202-1	Max. Deflection	2d 45m	Unknown	OK
<b>Degree of Curve or Radius</b> Sect. 202.3; Fig. 202-2	Max. Dc or Min. Radius	Dc= 15d 30m, R=370'	Unknown	OK
<b>Lack of Spirals</b> Sect. 202.5, Fig. 202-11	Spiral ( Y / N )	v < 50mph None Required	Unknown	OK
<b>Transition (Taper) Rates</b> Sect. 301.1.4	Shifting / Narrowing Rate	S <sup>2</sup> /60= 20.5 :1	Unknown	OK
<b>Intersection Angles</b> Sect. 401.3; Fig. 401-1	Unsignalized Angle Signalized Angle	70d, or 60d RF 60d Min.	Unknown	OK
<b>Vertical Alignment</b> Sect. 203; see below	Crest A = 0% Sag A = 0%+	Crest K= 29, L= 105'Min Sag K= 49, L= 105'Min	Unknown	OK OK
<b>Grade Breaks</b> Sect. 203.3.2; Fig. 203-2	Max. Grade Break	0.95%	Unknown	OK
<b>Grades</b> Sect. 203.2; Fig. 203-1	Level, Rolling, Hilly	10% Max.	Unknown	OK
<b>Stopping Sight Distance</b> Sect. 201.2; Fig. 201-1, 203-3, -4, -6, -7	Minimum	250'	Unknown	OK
<b>Pavement Cross Slopes</b> Sect. 301.1.5; Fig. 301-6	Normal Cross Slope	0.016	Unknown	NO
<b>Superelevation</b> Sect. 202.4; see below	---	---	---	NO
<b>Maximum Rate</b> Sect. 202.4.1 & .4.3; Fig. 202-3, -7 thru -10	Superelevation	R=___', __	Unknown	NO
<b>Transition</b> Sect. 202.4.5; Fig. 202-4, -5, -6	(w x n <sub>1</sub> )(e <sub>d</sub> )(G)(b <sub>w</sub> )	G = 161	Unknown	OK
<b>Position</b> Sect. 202.4.6; Fig. 202-5	Percent on Tangent	50% - 70% or on spiral	Unknown	OK
<b>Horizontal Clearance</b> (under bridge) Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	NA	NA	OK
<b>Vertical Clearance</b> Sect. 302.1; Fig. 302-1, -2, -3, 905-2	Highway Clearance	14.5' Min, 15.0' Pref.	Unknown (to Utilities)	OK